

**Total Maximum Daily Loads and National Pollutant
Discharge Elimination System Stormwater Permits for
Impaired Waterbodies:**

A Summary of State Practices

September 15, 2007

(updated from March 9, 2007 version)

USEPA Region 5

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EXECUTIVE SUMMARY

Effectively addressing water quality issues in waterbodies impaired due to stormwater sources requires improved tools and approaches that will strengthen connections between two key federal programs under the Clean Water Act (CWA) – the National Pollutant Discharge Elimination System (NPDES) stormwater permitting program and the Total Maximum Daily Load (TMDL) program. There are challenges associated with bridging the programs for both regulatory agency staff, as well as stormwater permittees.

The purpose of this report is to compile and summarize states' current practices for developing TMDLs and for implementing TMDLs through stormwater permitting. Initiated by the U.S. Environmental Protection Agency Region 5 (USEPA), at the suggestion of state TMDL managers and staff, this project set out to document how several states are currently addressing technical and programmatic TMDL and stormwater permitting issues. USEPA Region 5 received input on technical and programmatic issues from several states; this report presents information from the following: California, Georgia, Maine, New Mexico, Oregon, Pennsylvania, Tennessee, Vermont, Virginia, and Washington. Information presented in this report is intended to provide examples of current technical approaches, TMDL and permit language, as well as suggestions to overcome challenges associated with bridging the programs.

The process of compiling and summarizing states' current practices highlighted several key issues that need to be addressed in TMDLs and/or NPDES permits for these two regulatory program components to be "in sync" and to ensure it is clear what needs to be done by who to restore uses. There are complications that can arise related to:

- ↪ Time
- ↪ Geography
- ↪ How Requirements are Expressed

With regard to timing, in different areas a 303(d) listing may occur before, during, or after the term of the NPDES permit. Also the TMDL may be completed and approved before, during, or after the term of the permit. NPDES permit language may need to consider these possibilities.

With regard to geography, the scope or scale of relevant regulatory components may not be the same. The TMDL will cover a waterbody or stream segment and its drainage area. NPDES stormwater general permits often apply State-wide. Regulated entities have boundaries which may not coincide with TMDL boundaries, for example, some parts of an MS4 area may drain to an impaired water, others may not. The TMDL and permit language need to consider these various situations.

Regarding how requirements are expressed, EPA guidance requires that TMDLs define load wasteload allocations for permitted entities in quantitative terms. Stormwater permits typically define stormwater controls in terms of BMPs that need to be implemented. Permittees reading TMDLs and seeing assigned quantitative wasteload allocations may not always be clear on what BMPs need to be implemented to meet the WLA, so it will often be helpful if the WLA and/or the TMDL implementation plan provide information on what stormwater management measures should be implemented to achieve the target pollutant loading reductions.

Information gathered from State practitioners revealed a number of programmatic challenges that are likely to be encountered in developing TMDLs and permits for waterbodies impaired due to stormwater sources. Key challenges and associated recommendations for developing effective TMDLs and permits are described in Section Three of this Report, including:

- Overcoming challenges related to agency organizational structures and internal processes
- Developing equitable and consistent wasteload allocations for permitted stormwater sources
- Developing TMDL implementation plans and creating strong, effective bridges to stormwater permits
- Reconciling spatial boundaries of impaired waterbodies with boundaries of permitted stormwater sources
- Incorporating monitoring, tracking, and adaptive management requirements in WLAs and stormwater permits

As highlighted by the states included in this Summary Report, efforts are underway to bridge the TMDL and stormwater programs to address waterbodies impaired by stormwater runoff. However, examples of TMDLs and stormwater permits with strong connections exist mostly on a case-by-case basis. Discussions with state TMDL and stormwater program staff consistently included an acknowledgment of the need to improve current technical and programmatic practices. In addition, states cited the need for additional guidance and an interest in examples of effective approaches. The findings from this report are a pre-cursor to a Handbook for developing and implementing TMDLs for waterbodies impaired due to stormwater sources. Work will begin on this handbook in Spring 2007. This Handbook will specifically address the development of effective TMDLs and stormwater permits to ensure consistency and successful implementation, and will identify alternative approaches and provide example language for federal and state staff working on TMDLs and stormwater permits.

INTRODUCTION

Stormwater runoff is a significant contributor to water quality impairments across the country, particularly runoff from developing and urbanized areas. For example, stormwater runoff from urban and suburban development is the largest contributor to water quality impairments in New England (ENSR 2006). To effectively address stormwater-related water quality impairments, the USEPA and its state partners need to continue to develop tools and approaches for, and strengthen connections between, two key federal programs under the CWA – the NPDES stormwater permitting program and the TMDL program. There are a variety of technical and programmatic challenges that regulatory agencies need to address to ensure water bodies impaired due to stormwater sources are restored. These challenges include developing WLAs for permitted stormwater sources that reflect current best management practice implementation and crafting stormwater permit requirements that will ensure the pollutant load reductions necessary to achieve associated WLAs. To successfully address these challenges, states and other key stakeholders (e.g., operators of permitted municipal separate storm sewer systems) have requested additional guidance and tools that will facilitate a bridge between the programs and ensure effective TMDL implementation, stormwater permit compliance, and attainment of water quality standards.

During the 2005 USEPA Region 5 TMDL Practitioners' Workshop, state TMDL managers and staff (representing Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) identified issues related to the development and implementation of TMDLs for water bodies impaired due to stormwater discharges as priority topics for investigation and future training. Approaches for developing TMDLs and bridges between TMDLs and NPDES stormwater permits were of particular interest. In response to this expressed interest, USEPA Region 5 planned and hosted a TMDL and stormwater permitting problem-solving and training workshop during October 2006.

To inform discussions during the 2006 workshop and to provide a reference for USEPA and state staff, USEPA Region 5 initiated a project to compile and summarize states' current practices for developing TMDLs and for implementing TMDLs through stormwater permitting. The project involved obtaining information from several states and presenting comprehensive information from ten states: California, Georgia, Maine, New Mexico, Oregon, Pennsylvania, Tennessee, Vermont, Virginia, and Washington. The process sought to identify examples in every USEPA region and capture a variety of practices from across the country. In addition, USEPA reviewed two federal general permits– the Construction General Permit and the proposed Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activities.

The goal of this summary of state practices report is to provide information, ideas, and example language to USEPA and states as TMDL and permitting work continues on waterbodies impaired due to stormwater sources. The primary audience for the report is federal and state TMDL and stormwater permitting staff. Ultimately, USEPA Region 5 would like the target audience to use the report as a resource and reference guide to help craft TMDLs, TMDL implementation plans, and stormwater permits that are harmonized and which effectively address water quality impairments. The report is not intended to critique or evaluate the efforts of states, but rather to compile information on current practices and example TMDL and permit language.

This report contains findings of states' current efforts to bridge TMDL and stormwater permitting. It summarizes programmatic concepts and processes that affect the connections

between the TMDL and stormwater programs, and presents sample TMDL and permit language for waterbodies impaired due to stormwater sources. In addition, this report presents an analysis of challenges and preliminary recommendations to promote a connection between these two programs. This document will continue to evolve to reflect updated information from the states selected to participate in the project, as well as the ideas and discussion generated by the Region 5 states during the 2006 workshop.

Remaining sections of this document are organized as follows:

Section One: Overview of the TMDL and NPDES Stormwater Programs. This section provides a brief overview of the TMDL program and the NPDES stormwater program to help readers familiarize with the policies and processes related to each program. An understanding of how each program works is key to understanding issues related to bridging TMDLs and stormwater permits. This section also explores recent state, regional, and national efforts to successfully bridge TMDLs and stormwater permits.

Section Two: Approach and Findings. This section provides a detailed analysis of the current efforts by ten states to bridge TMDLs and NPDES stormwater permitting. Findings include a brief overview of each state's TMDL and NPDES stormwater permitting program, any relevant state policies or approaches for bridging TMDLs and NPDES stormwater permits, and a detailed analysis of TMDLs that address permitted stormwater sources and how the TMDL is translated into the applicable NPDES stormwater permit.

Section Three: Challenges and Recommendations. Based on the conclusions from the summary of state practices, as well as the input provided by the Region 5 states during the 2006 workshop, this section summarizes the overall challenges and suggests potential recommendations for overcoming these challenges.

Section Four: Conclusions and Next Steps. This section details the action items identified by the Region 5 states for crafting and implementing approaches for bridging TMDL and NPDES stormwater permitting over the short, medium, and long-term.

SECTION ONE: OVERVIEW OF TMDL AND NPDES STORMWATER PROGRAMS

Developing effective strategies to bridge TMDL and stormwater permitting requires an understanding of the relevant regulatory requirements, goals, and processes. This section provides a brief overview of the TMDL and NPDES Stormwater programs and provides resources for additional detailed information on each program.

The TMDL Program

The TMDL program, authorized under Section 303(d) of the CWA, is intended to set quantifiable goals for achieving water quality standards in impaired waterbodies. States or authorized tribes (collectively referred to as “states”) administer the TMDL Program, which includes developing a list of impaired waterbodies, developing TMDLs and, in some cases, associated implementation plans, and submitting final TMDLs to USEPA for review and approval. The schedule for developing TMDLs varies, with some state TMDL Programs governed by federal court ordered consent decrees. A summary of requirements and processes related to Section 303(d) listing, TMDL development, and TMDL review and approval is provided below.

Requirements for Section 303(d) Lists of Impaired Waterbodies

USEPA’s Water Quality Planning and Management Regulation (40 CFR § 130) specifies several requirements for state Section 303(d) lists of impaired waterbodies. Each state is required to identify “water quality limited segments” for which federal technology-based controls, state, tribal, or local effluent limitations or other pollution control requirements (e.g., best management practices) required by local, state, tribal, or federal authority are not stringent enough to achieve water quality standards, including waters not meeting standards due to thermal discharges (40 CFR § 130.7 (b)). The list that identifies these water quality limited segments that require the development of a TMDL is known as the Section 303(d) list. States are required to submit Section 303(d) list updates every two years.

Each state must consider all existing and readily available data in assembling the Section 303(d) list (40 CFR § 130.7), including:

- Waters identified as impaired, threatened, or not meeting designated uses by other lists required by the CWA, such as the Section 305(b) report, and nonpoint source assessments, submitted to USEPA under Section 319;
- Waters for which technical analyses (such as predictive modeling) show violation of a water quality standard;
- Waters identified by other information sources, such as academic institutions or members of the public, as not meeting water quality standards (the state is directed to actively solicit entities for such information); and
- Threatened waters (waters that currently meet water quality standards, but that are not expected to in the near future).

USEPA issued guidance in 2001 recommending that states, territories, and authorized tribes to submit integrated reports that will satisfy CWA requirements for both Section 305(b) water quality reports and Section 303(d) lists.

Information that the Section 303(d) list must contain (40 CFR § 130.7) is as follows:

- A priority ranking of all listed waters and waters targeted for TMDL development within the next listing cycle (which are not necessarily “high priority” waters);
- The pollutant(s) causing (or expected to cause) the violation of water quality standards for each listed water; and
- Documentation to support listing decisions, including a description of the methodology used, data evaluated, rationale for not using any readily available data, and any other reasonable information requested by USEPA to evaluate the listing decisions.

After receiving a final Section 303(d) list, USEPA has 30 days to approve or disapprove the list. USEPA considers a number of factors in this decision, such as whether the list includes the required components, the basis of listing decisions, and the process used to develop the list.

Requirements for TMDL Development

A TMDL reflects the total pollutant loading a waterbody can receive and still meet water quality standards. By statute (Section 303(d)(1)(C)) and regulation (40 CFR § 130.7(c)(1)), TMDLs are to be developed for all waters placed on the Section 303(d) list, taking into account seasonal variations and a margin of safety (MOS) to allow for uncertainty.

USEPA’s regulations at 40 CFR § 130.2(i) define a TMDL as the sum of WLAs plus load allocations (LA) plus a margin of safety (MOS) to account for uncertainty. Mathematically, this is:

$$\text{TMDL} = \sum(\text{WLA}) + \sum(\text{LA}) + \text{MOS}$$

Allocations vary based on the type of pollutant sources – WLAs are loads allotted to existing and future point sources and LAs are loads allotted to existing and future nonpoint sources, plus loads from natural background. Only WLAs are implemented through NPDES permits. TMDLs might also include a reserve for future growth, which can be a separate element in the mathematical expression above, or included in WLAs or LAs.

Characteristics of TMDLs, such as the expression of quantitative measures and the geographic basis, can vary. USEPA has issued various guidance documents that clarify acceptable characteristics of TMDLs. Key TMDL characteristics include:

- Expression related to standard. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure that relates to a State/Tribe’s water quality standard.
- Geographic focus. USEPA’s 1991 guidance recommends that States/Tribes develop TMDLs on a geographic basis (e.g., by watershed). TMDLs may help drive State, Tribal, or local watershed plans.
- Comprehensive source assessment. TMDLs consider all significant sources of the stressor of concern and identify the recommended approaches or controls for each source.

- Load reductions for selected sources. While TMDLs include load allocations, they need not assign load allocations or load reductions to all known sources.
- Quantified target dependent on stressor. TMDLs contain a quantified target or endpoint. However, there is flexibility in expressing quantitative measures (i.e., mass per unit of time, energy, toxicity) depending upon the nature of the stressor.
- Appropriate for a variety of stressors. TMDLs can be developed to address any kind of stressor (e.g., sediment deposition, nutrient loading). Because a TMDL generally addresses a single stressor, several TMDLs are sometimes necessary to fully address a waterbody's problems.
- Based on sound data. TMDLs should be supported by the best available scientific information.

USEPA released guidance in August 2006 to clarify the definition of phased TMDLs, adaptive implementation, and staged implementation. A brief overview of this guidance is provided below.

- **Phased TMDLs.** USEPA recommends the use of the term “phased TMDLs” be limited to TMDLs that, for scheduling reasons, need to be established despite significant data uncertainty and where the State expects that the loading capacity and allocation scheme will be revised in the near future as additional information is collected. All phased TMDLs must include all elements of a regular TMDL, including LAs, WLAs and a MOS. As with any TMDL, each phase must be established to attain and maintain the applicable water quality standard. In addition, USEPA recommends that a phased TMDL document a monitoring plan and scheduled timeframe for revision of the TMDL; the implementation plan can contain this information.
- **TMDLs with Adaptive Implementation and Trading Provisions.** USEPA believes that in appropriate cases it should be feasible for States to develop TMDLs that facilitate implementation of practicable controls while additional data collection and analysis are conducted to guide implementation actions. Follow-up monitoring is integral to the adaptive implementation approach.
- **TMDL with Staged Implementation.** The third type of TMDL is different from the two preceding types. While not a “phased TMDL,” it is a TMDL that anticipates implementation in several distinct stages. It is also different from the adaptive implementation scenario because it is anticipated that the load and wasteload allocations will not require any significant adjustments. Instead, implementation actions will be staged over a period of time. For example, USEPA has approved mercury TMDLs where the WLA to point sources (which would be implemented within five years through the NPDES process) was predicated on long-term reductions in atmospheric mercury deposition. USEPA believes that the appropriate terminology for such a TMDL, if a label needs to be applied, would be “staged implementation.”

The CWA requires states to submit TMDLs to USEPA for approval (Section 303(d)(1)(C)). In its review, USEPA determines whether the state's TMDLs are sufficient to achieve the applicable water quality standards given seasonal variations and a margin of safety. USEPA's 1991 guidance suggests that USEPA may tailor its review of state-submitted TMDLs to what is

reasonable and appropriate, and that states should include in their TMDL submissions the proposed allocations and necessary supporting information.

USEPA expects states to involve the public in establishing TMDLs. At a minimum, TMDLs are to be made available for public comment. USEPA regulations (40 CFR §130) state that the TMDL development process should be described in the state's continuing planning process (CPP) under Section 303(e) of the CWA. In addition, the regulations require USEPA-approved TMDLs to be incorporated into a state's Water Quality Management Plan (WQMP). Thus, TMDLs should be integrated with other state water quality management activities.

The NPDES Stormwater Program

In 1987 Congress amended the CWA to require the implementation of a national program for controlling stormwater discharges in two phases. The NPDES program, administered by USEPA, currently covers three types of stormwater discharges:

- discharges from medium and large MS4s and small MS4s located in "urbanized areas" as delineated by the Bureau of the Census,
- discharge from industrial facilities in 11 categories that discharge to an MS4 or to waters of the United States (construction activity is one of these 11 categories, but because of the nature of its operations, it is addressed separately from the other 10 categories.); all categories of industrial activity (except construction) may certify to a condition of "no exposure" if their industrial materials and operations are not exposed to stormwater, thus eliminating the need to obtain stormwater permit coverage,
- discharges from construction activity that disturbs 1 or more acre of land; construction sites less than 1 acre are covered if part of a larger plan of development (USEPA 2004).

Phase I of the NPDES program regulated stormwater discharges from medium and large MS4s, construction activities of 5 acres or larger (or less than 5 acres if part of a common plan of development or sale), and industrial activities.

Phase II extended the regulations to stormwater discharges from small MS4s, and construction activities that disturb equal to or greater than 1 acre of land (or less than 1 acre if part of a common plan of development of sale).

The sections below provide a summary of how USEPA and State NPDES permitting authorities administer the NPDES stormwater program to regulate stormwater discharges from MS4s, industrial facilities, and construction activities. Much of the discussion presented below is taken from USEPA's 2004 document entitled, "National Pollutant Discharge Elimination System (NPDES) Stormwater Program Questions and Answers."

Overall NPDES Stormwater Program Administration and Approaches

Federal stormwater regulations establish minimum requirements nationwide. The NPDES program is administered by USEPA in States without approved programs. Most States and the Virgin Islands administer the program throughout most of their jurisdictions and have the authority to impose more stringent permit requirements than those set forth in federal regulations. The stormwater program is administered through USEPA regional offices for the

five non-delegated States (Alaska, Idaho, Massachusetts, New Hampshire, New Mexico), the District of Columbia, and all Territories except the Virgin Islands.

The NPDES stormwater program uses both individual and general permits to regulate stormwater discharges. Individual permits, required for Phase I MS4s, require the submission of a comprehensive permit application that contains detailed information (e.g., stormwater discharge characterization monitoring). NPDES permitting authorities use the detailed permit application information to develop the facility-specific requirements of an individual permit. General permits, unlike individual permits, contain one set of requirements for a certain type of stormwater discharger. Stormwater dischargers apply for coverage under general permits issued by the NPDES permitting authority using a Notice of Intent (NOI). The information necessary to complete an NOI for coverage under a general permit is less burdensome than the information required to obtain individual permit coverage. Coverage under a general permit is relatively automatic, whereas the individual permitting process requires a longer waiting period due to the time necessary to review the permit application, craft appropriate permit requirements, and allow for appropriate public involvement.

NPDES stormwater permits use a variety of approaches to ensure that water quality standards are achieved, including: 1) setting technology-based standards; 2) defining maximum extent practicable (MEP) abatement and technology standards; 3) establishing required performance standards the discharger must meet to address problem parameters; and in some cases, 4) establishing numeric effluent limits. Primarily, the stormwater program utilizes a framework which is a combination of approaches 1, 2 and 3, with permit provisions focused on the application of source control and pollution prevention BMPs.

Overview of Permit Requirements

The primary requirement of an NPDES stormwater permit is the development and implementation of a stormwater management program (SWMP) or a stormwater pollution prevention plan (SWPPP). Regulated MS4s develop and implement SWMPs with cover a variety of activities discharging to the MS4, while industrial facilities and construction activities must develop and implement facility-specific SWPPPs. The goal for SWMPs and SWPPPs is to reduce stormwater pollutants to the MEP and/or to meet the requirements of the associated permit. A brief overview of the type of activities required in MS4 SWMPs and industrial and construction SWPPPs is provided below.

Phase I MS4 SWMPs. As part of the application for an individual permit, Phase I MS4s were required to develop and submit a proposed SWMP that addressed programmatic, structural and source control measures to control stormwater pollutants from commercial and residential areas; a program to detect and remove illicit discharges; a program to monitor and control stormwater pollutants from priority industrial facilities; and a program to control stormwater runoff from construction sites (USEPA 1996). Individual permits issued to Phase I MS4s specified the required SWMP activities and included other provisions to ensure effective implementation, such as monitoring and annual reporting.

Phase II MS4 SWMPs. Under the Phase II Final Rule, regulated small MS4s are required to obtain individual or general permit coverage (depending upon what the permitting authority requires) and implement a SWMP that addresses six minimum control measures: 1) public education and outreach; 2) public participation and involvement; 3) illicit discharge detection

and elimination; 4) construction site stormwater runoff control; 5) post-construction stormwater management in new and redevelopment; 6) pollution prevention/good housekeeping for municipal operations. In addition, Phase II MS4s must also develop and specify measurable goals for each of the six minimum control measures in the SWMP. The Phase II Final Rule does not require monitoring, although NPDES permitting authorities may choose to incorporate this type of requirement. Annual reports are required and serve as one tool for tracking permit compliance.

Construction SWPPPs. General permits for construction require SWPPPs that describe in detail all pollution control measures (i.e., BMPs) to control pollutants in stormwater discharges. These measures include erosion and sediment control BMPs to prevent the discharge of sediment, measures to prevent the discharge of non-sediment materials (e.g. vehicle fluids, trash), and post-construction stormwater management measures to minimize pollutant discharge after construction is complete. The SWPPP must also include a description of construction and waste materials expected to be stored on-site and a description of controls to minimize exposure of the materials to stormwater, and spill prevention and response practices. In addition, the SWPPP must include a description of pollutant sources from areas other than construction. The SWPPP should include a description of interim and permanent stabilization practices for the site, including a schedule of when the practices will be implemented. The SWPPP should also maintain records of important dates, such as when major grading activities occur.

Industrial SWPPPs. The contents for industrial facility SWPPPs also focus on the implementation of BMPs to reduce stormwater pollutants. NPDES stormwater permits for industrial facilities typically require SWPPPs to document the facility's pollution prevention team, describe the site, and identify the receiving waters. A SWPPP should also contain a summary of potential pollutant sources, including spills and leaks, and a summary of existing stormwater discharge sampling data. The focus of the SWPPP is the description of the existing and planned structural and non-structural BMPs to reduce stormwater pollutants. Non-structural BMPs include good housekeeping activities, spill prevention and response, preventative maintenance, routine facility inspections, and employee training. Structural BMPs include sediment and erosion control techniques and facilities and equipment used to divert or promote infiltration of stormwater.

SWMPs and SWPPPs are the primary mechanism for reducing pollutants found in stormwater discharges. As a result, they are the primary mechanism for implementing TMDL requirements to achieve the necessary pollutant load reductions to attain water quality standards. Issues related to implementing TMDLs through SWMP and SWPPP implementation are discussed in the next section.

Issues and Efforts Related to Bridging TMDL and NPDES Stormwater Permitting

The regulatory requirements and technical approaches that characterize the TMDL and NPDES stormwater programs have the potential to generate a variety of challenges. There are, for example, technical and programmatic challenges associated with how to:

- Develop and assign WLAs for permitted stormwater sources (not just aggregated allocations) given limited data on pollutant contributions from these sources;

- Define the geographic scope of where stormwater control requirements apply, given that the boundaries of regulated entities (particularly MS4s) may not correspond to the drainage areas of impaired water bodies
- Translate numeric WLAs from a TMDL into appropriate BMPs (given stormwater permits do not contain numeric effluent limits and focus on BMP implementation);
- Incorporate specific permit requirements for impaired waters into general permits;
- Develop TMDLs and stormwater permit requirements that provide adequate guidance and technical assistance without diminishing existing flexibility in stormwater management requirements.

There are challenges associated with bridging the TMDL and stormwater permit programs for both regulatory agency staff and for stormwater permittees. Among the challenges for regulatory agency staff are conflicting program priorities, ambitious (and unsynchronized) schedules, lack of sufficient data, inadequate cross-program communication, and lack of adequate staff. From the perspective of a permittee, there may be uncertainty about how to translate requirements specified in a TMDL into a SWPPP or SWMP and whether implementation of planned BMPs will adequately address in-stream impairments. Some of this uncertainty may arise because the permit refers to (and requires compliance with) approved TMDLs, but neither the permit nor the TMDL clearly specify what level of BMP implementation is required to restore and protect in-stream water quality.

The challenge of effectively bridging TMDLs and stormwater permits is gaining increased attention at the federal and state levels, evidenced through recent efforts to provide guidance and develop examples of how to successfully bridge the two programs. A few of the most relevant and recent efforts are discussed below.

- **USEPA Memorandum “Establishing TMDL WLAs for Stormwater Sources and NPDES Requirements Based on Those WLAs.”** This memorandum, dated November 22, 2002, clarifies existing USEPA regulatory requirements for establishing WLAs for stormwater discharges. It states that NPDES-regulated stormwater discharges must receive a WLA and that WLA can be expressed as a single categorical WLA from multiple point sources when data are insufficient to assign each source a separate WLA. In addition, this memorandum states that the WLA is to be expressed in numeric form, but that associated permit limits for permitted stormwater sources may be expressed in the form of BMPs. This memorandum states that the stormwater permit must specify the monitoring necessary to determine compliance with effluent limitation and BMP effectiveness, and provide a mechanism for improving implementation through adaptive management.
- **USEPA’s Proposed Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP).** USEPA has proposed an updated MSGP to provide coverage to stormwater discharges from eligible industrial categories of activity. The proposed MSGP addresses stormwater discharges to impaired waterbodies with and without an approved TMDL. The requirements pertinent to discharges to impaired waterbodies span requirements related to eligibility; stormwater pollution prevention plans; and monitoring, reporting, and correction actions. It represents one of the first stormwater permits issued by USEPA to contain comprehensive requirements

that will address water quality impairments required through the TMDL program. Further information about the proposed MSGP is provided within the body of this report.

- **USEPA Region 1 Stormwater TMDL Implementation Support Manual.** USEPA Region 1 led the development of a guide for stakeholders responsible for implementing TMDLs developed using the impervious cover method (ICM). Impervious cover serves as a surrogate measure of impairment due to habitat disturbance, pollutant loading, biological diversity, and stream health. Using the ICM, TMDLs provide an estimate of existing impervious cover and identify target percentages of impervious cover to improve water quality conditions and attain water quality standards. This document is intended to help stakeholders select appropriate BMPs to achieve the target percent impervious cover.
- **USEPA Handbook for Developing and Implementing TMDLs for Waterbodies Impaired due to Stormwater Sources.** USEPA will develop a Handbook for developing and implementing TMDLs for water bodies impaired due to stormwater sources beginning in fall 2007. This Handbook will specifically address development of effective TMDLs, and ensuring permits are consistent with and implement TMDLs. The Handbook will identify alternative approaches and provide example language for Federal and State staff working on TMDLs and stormwater permits.

SECTION TWO: APPROACH AND FINDINGS

This section provides an overview of the approach used to compile and summarize states' current practices. Information on issues and practices was collected from a sample of states. The manner in which a permit authority addresses the issue of bridging TMDL and stormwater permitting is largely determined by state-specific factors, such as existing regulations; programmatic priorities and processes; agency organizational structure and staffing; available resources; and time constraints. Thus, this report does not present a comprehensive picture of all practices in all states. This report is, however, intended to capture and share information on new and/or well-regarded practices, with the goal that the report might present ideas or alternatives of interest to other states.

The initial primary audience for this report is USEPA Region 5 and the states located within this region. As a result, none of the Region 5 states were officially included in the analysis for this project. However, several of the Region 5 states are addressing the connection between TMDLs and stormwater permits.

Overview of the Approach to Compile and Summarize States' Practices

USEPA Region 5 planned this project in conjunction with the 2006 Region 5 TMDL Practitioners' Workshop. The states covered in this report have initiated efforts to improve the bridge between TMDLs and stormwater permitting. States were identified for inclusion in this report based on information presented in a report prepared for the Minnesota Pollution Control Agency entitled, "Benchmarking Report: Site-Specific Approaches for Lake Nutrient TMDLs." In addition, USEPA reviewed draft case study information on the relevant topics, developed in support of an USEPA general permits workgroup, to select states to participate in this project. Table 1 provides an overview of the basic information about the permits and TMDLs compiled, analyzed, and summarized for this project by state.

Table 1 – TMDLs and Permits Reviewed At a Glance

State & Waterbody	TMDL Pollutant(s)	Permit(s) Reviewed	Noteworthy Details
California			
Santa Monica Beaches	Bacteria (dry weather)	Los Angeles MS4 permit	<ul style="list-style-type: none"> TMDL: Establishes WLAs expressed as the number of sample days at a shoreline monitoring site that may exceed the single sample targets. MS4 permit: Includes the bacteria WLA as a summer dry weather prohibition for the MS4 with the compliance points established in the receiving waters at the ‘wave wash,’ not end-of-pipe.
Georgia			
Flint River Basin	Copper	Phase II MS4 General Permit; Industrial Stormwater General Permit; & Construction General Permit	<ul style="list-style-type: none"> Industrial general permit: Contains specific requirements for permittees that discharge into, or within one linear mile upstream of and within the same watershed as, any portion of an impaired stream segment to develop, implement, and maintain stormwater pollution prevention plans (SWP3s) that are consistent with a TMDL.
Coosa River Basin	Fecal coliform		
Maine			
Barberry Creek	Impervious cover as surrogate for stormwater pollutants	Phase II MS4 General Permit; Construction General Permit (current & draft)	<ul style="list-style-type: none"> TMDL: Establishes a WLA of 12 percent imperviousness cover; requires use of adaptive management; includes description of BMP options. Construction General Permit: Requires discharge to be consistent with any applicable TMDL. MS4 Permit: Does not authorize a direct discharge that is inconsistent with any USEPA approved TMDL waste load allocation and any implementation plan for the waterbody to which the direct discharge drains.
New Mexico			
Middle Rio Grande	Fecal coliform	Phase I MS4 permit for Albuquerque & co-permittees	<ul style="list-style-type: none"> TMDL: Establishes numeric targets for stormwater conveyances; encourages structural BMPs expected to reduce fecal coliform loading. MS4 permit: Includes a specific list of program requirements, including monitoring, to address the TMDL.

Table 1 – TMDLs and Permits Reviewed At a Glance

State & Waterbody	TMDL Pollutant(s)	Permit(s) Reviewed	Noteworthy Details
Oregon			
Columbia Slough	Dissolved oxygen (with biochemical oxygen demand (BOD) as a surrogate), pH, phosphorus, bacteria, lead, dioxin, DDE/DDT, polychlorinated biphenyls (PCBs), dieldrin. <i>BOD was analyzed for this review.</i>	Phase I MS4; Construction General Permit; & Draft MS4 Phase II General Permit	<ul style="list-style-type: none"> • TMDL: Contains WLA for stormwater source types (e.g. urban and industrial), but not specific permittees; requires monitoring and BMP implementation to meet WLA; includes implementation strategy that recommends the development of an industrial general permit for the watershed to control pollutants from industrial sources. • Phase I MS4 permit: Requires the development of performance measures and benchmarks, as well as monitoring to assess progress towards meeting performance measures and benchmarks; requires each permittee to submit an Interim Evaluation Report (due May 1, 2006) and a MEP determination for stormwater pollutant reduction efforts by each co-permittee. • Industrial General Permit: Includes industrial WLAs converted to effluent concentrations and provided as benchmarks that trigger need for an individual permit. • Draft MS4 Phase II permit: Includes requirements to develop benchmarks the first permit term and implementing these benchmarks during the second permit term. • Construction General Permit: Includes specific BMPs for projects which discharge to streams that are impaired by sedimentation or turbidity or additional monitoring to prove no impacts.
Pennsylvania			
Wissahickon Creek	Sediment	Phase II MS4 General Permit	<ul style="list-style-type: none"> • TMDL: WLAs were determined for MS4 permittees using land-use-specific, unit-area loads determined in modeling analysis for specific regions of the Wissahickon Creek basin; no allocation given to construction project discharges.

Table 1 – TMDLs and Permits Reviewed At a Glance

State & Waterbody	TMDL Pollutant(s)	Permit(s) Reviewed	Noteworthy Details
Tennessee			
Harpeth River	Siltation, habitat alteration	Phase II MS4 General Permit & Construction General Permit	<ul style="list-style-type: none"> • TMDL: Establishes a WLA for MS4 and construction stormwater discharges, combined. Does not establish WLAs for individual permitted stormwater dischargers. WLAs are established per sub-watershed. • TMDL Implementation Plan: Requires additional BMPs on construction projects; does not require additional MS4 BMPs beyond existing permit. • Construction General Permit: BMPs referenced in any TMDL, state-wide, are required. • Phase II MS4 General Permit: does not cover any facility that has been assigned a TMDL WLA and the TMDL recommends individual permit coverage.
Harpeth River	E. coli		<ul style="list-style-type: none"> • Phase II MS4 General Permit: does not cover any facility that has been assigned a TMDL WLA and the TMDL recommends individual permit coverage.
Vermont			
Potash Brook	Stormwater flow	Phase II MS4 General Permit; Multi-Sector General Permit for Industrial Stormwater; Construction General Permit	<ul style="list-style-type: none"> • TMDL: uses the land use-based allocation approach to distribute the overall percent targets for the watershed among three broad categories that results in an aggregate WLA for both permitted and nonpoint source urban stormwater discharges; no specific BMPs or monitoring requirements • TMDL Implementation Plan: describes a two-prong approach for meeting the WLA assigned to the Urban/Developed category – the issuance of a watershed-wide general permit under Vermont’s state stormwater law, and potentially requiring additional BMPs and monitoring under NPDES MS4, construction, and industrial stormwater permits. • Phase II MS4 General Permit: contains specific requirements for MS4s that discharge 1) to an impaired waterbody with an approved TMDL and 2) to an impaired waterbody without an approved TMDL. • Construction General Permit: addresses stormwater discharges to impaired waterbodies with and without approved TMDLs with varying requirements for moderate and low risk construction activities and whether the TMDL contains a specific WLA.

Table 1 – TMDLs and Permits Reviewed At a Glance			
State & Waterbody	TMDL Pollutant(s)	Permit(s) Reviewed	Noteworthy Details
Lake Champlain	Phosphorus	Phase II MS4 General Permit; Multi-Sector General Permit for Industrial Stormwater; Construction General Permit	<ul style="list-style-type: none"> TMDL: the developed land WLA category includes all stormwater discharges requiring NPDES permits, other state-permitted stormwater discharges, and nonpoint source loads from residential and other developed areas, backroads, small construction sites, and erosion of stream banks and stream channels caused directly or indirectly by land development in the watershed. Phase II MS4 General Permit: has specific requirements for MS4s that discharge 1) to an impaired waterbody with an approved TMDL and 2) to an impaired waterbody without an approved TMDL. Construction General Permit: addresses stormwater discharges to impaired waterbodies with and without approved TMDLs with varying requirements for moderate and low risk construction activities and whether the TMDL contains a specific WLA.
Virginia			
No TMDLs reviewed		Draft Phase I MS4 Individual Permits and Phase II MS4 General Permit	<ul style="list-style-type: none"> Phase I MS4 Individual Permit: proposes requirement to develop an implementation control plan and benchmarking goals to assess progress towards achieving WLA and water quality standards Phase II MS4 General Permit: anticipated that draft permit will also include implementation control plan and associated monitoring requirements Permitting authority promoting idea that MS4s should collect information on existing stormwater BMPs to inform TMDL development process
Washington			
Swamp Creek	Fecal coliform	Draft Phase II MS4; Construction General Permit; & Industrial General Permit	<ul style="list-style-type: none"> TMDL: WLAs developed for permitted stormwater sources; each permittee assigned a percent reduction of fecal coliform. TMDL: contains specific recommendations for MS4 BMPs; requires TMDL Effectiveness Monitoring, Source Detection Monitoring, and some Special Purpose Studies. Phase II MS4 General Permit: contains the list of all TMDLs in Western Washington that include more specific requirements than those found in either the Phase I or Phase II permits.

Multiple techniques were used to compile information on each state. First, representatives from the state's TMDL program and the NPDES stormwater permitting program were contacted to obtain initial information on existing activities. As part of the discussion, examples of existing TMDLs and stormwater permits that demonstrate some degree of connection were requested. TMDLs and stormwater permits recommended by state contacts were collected and reviewed. If the state contact was unable to provide specific information, TMDLs and stormwater permits available through the Internet were researched to determine if they had allocations to permitted stormwater sources. Information gleaned from the discussions with state contacts and the review of TMDLs and associated stormwater permits provide the basis of the state-specific findings, presented in this document in a summary matrix and in a narrative format.

The information obtained for each state varies and continues to evolve.

State TMDL and Permit Findings

This section presents a summary of the analysis for each state, based on the review and analysis of TMDLs and stormwater permits, as well as personal communication with TMDL and stormwater program staff. Findings are presented by state, organized alphabetically. The findings are organized using the following categories:

- TMDL Program Overview
- NPDES Stormwater Program Overview
- TMDL(s) Reviewed (year approved)
- TMDL Pollutant(s) Addressed
- Permitted Stormwater Source(s) Identified by TMDL
- Permit(s) Reviewed
- TMDL Findings
- NPDES Permit Findings
- Conclusions

To date, this draft of the document presents findings for California, Georgia, Maine, New Mexico, Oregon, Pennsylvania, Tennessee, Vermont, Virginia, and Washington. The level of detail in each state discussion varies to a degree based on availability of information, type of findings from the review process, and time constraints affecting one-on-one communications or document review. All states participating in the process will have the opportunity to review and comment on the information presented for their respective state.

California

TMDL Program Overview: TMDLs in California are developed either by Regional Water Quality Control Boards (Regional Water Boards) or by USEPA. TMDLs developed by Regional Water Boards are incorporated as Basin Plan amendments and include implementation provisions. TMDLs developed by USEPA typically contain the total load and load allocations required by Section 303(d), but do not contain comprehensive implementation provisions. The Porter-Cologne Act requires each Regional Water Board to formulate and adopt water quality control plans for all areas within its region. It also requires that a program of implementation be

developed that describes how water quality standards will be attained. TMDLs can be developed as a component of the program of implementation, thus triggering the need to describe the implementation features, or alternatively as a Water Quality Standard. When the TMDL is established as a standard, the program of implementation must be designed to implement the TMDL. Typically a revision to the program of implementation is needed whenever a new standard is adopted. Based on the current 303(d) list (over 1,883 water body/pollutant combinations), the State Water Resources Control Board (State Water Board) estimates that the total number of TMDLs needed is more than 400 projects. The Regional Water Boards are currently engaged in developing over 120 TMDLs, many addressing multiple pollutants. Schedules have been developed for establishing all required TMDLs over a 13-year period.

NPDES Stormwater Program Overview: The State Water Board establishes policies and regulations that help protect and restore the water quality in California. The State Water Board also coordinates with and supports Regional Water Board efforts, and reviews Regional Water Board actions. The Regional Water Boards monitor and enforce State and federal plans, policies, and regulations. While the State Water Board has issued a few NPDES permits, the vast majority of NPDES permits are issued by the Regional Water Boards.

The Stormwater Program in the Los Angeles Regional Water Board uses an integrated approach to regulate stormwater discharges from industrial facilities, construction sites, and municipal systems. The Surface Water Division presently includes two units to issue and enforce Stormwater NPDES permits. The Permitting Unit develops Region specific MS4 permits and the Enforcement Unit conducts inspections and enforces statewide construction and industrial general stormwater permits in the Region.

TMDL reviewed (year approved): The Santa Monica Bay Beaches Bacteria (SMB Beaches Bacteria) TMDL; the Los Angeles Regional Water Board adopted the SMB Beaches Bacteria TMDL in 2002. This TMDL was subsequently approved by the State Water Board and the USEPA and became effective on July 15, 2003. This TMDL required compliance with the Summer Dry Weather WLAs by July 15, 2006.

TMDL Pollutants Addressed: Bacteria (Dry Weather)

Permitted Stormwater Source(s) Identified by TMDL: With the exception of isolated sewage spills, dry weather urban runoff conveyed by storm drains and creeks is the primary source of elevated bacterial indicator densities to SMB beaches during dry weather. Limited natural runoff and groundwater may also potentially contribute to elevated bacterial indicator densities during winter dry weather. This is supported by the finding that historical monitoring data from the reference beach indicate no exceedances of the single sample targets during summer dry weather and on average only three percent exceedance during winter dry weather.

Permit(s) Reviewed: Los Angeles County MS4 Permit No. CAS004001 (01-182); amended on September 14, 2006 by Order R4-2006-0074) to incorporate the Santa Monica Bay Beaches Bacteria (SMB Beaches Bacteria) TMDL WLAs for summer dry weather discharges from MS4 outfalls to Santa Monica Bay beaches.

TMDL Findings: The following findings were noted about the TMDL reviewed and used to ascertain the level of connection between the TMDL and permit:

- The TMDL has a multi-part numeric target based on the bacteriological water quality objectives for marine water to protect the water contact recreation use. These targets are the most appropriate indicators of public health risk in recreational waters. These bacteriological objectives are set forth in Chapter 3 of the Basin Plan, as amended by the Regional Board on October 25, 2001. The objectives are based on four bacterial indicators and include both geometric mean limits and single sample limits. The Basin Plan objectives are as follows:

1. Rolling 30-day Geometric Mean Limits

- a. Total coliform density shall not exceed 1,000/100 ml
- b. Fecal coliform density shall not exceed 200/100 ml
- c. Enterococcus density shall not exceed 35/100 ml

2. Single Sample Limits

- a. Total coliform density shall not exceed 10,000/100 ml
- b. Fecal coliform density shall not exceed 400/100 ml
- c. Enterococcus density shall not exceed 104/100 ml
- d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

The targets apply throughout the year. The compliance point for the targets is the wave wash, where there is a freshwater outlet (i.e., storm drain or creek) to the beach, or at ankle depth at beaches without a freshwater outlet. The wave wash is defined as the point at which the storm drain or creek empties and the effluent from the storm drain initially mixes with the receiving ocean water. The geometric mean targets may not be exceeded at any time. For the single sample targets, each existing shoreline monitoring site is assigned an allowable number of exceedance days for two time periods (summer dry weather and winter dry weather). The allowable number of exceedance days is set such that (1) bacteriological water quality at any site is at least as good as at a designated reference site within the watershed and (2) there is no degradation of existing shoreline bacteriological water quality.

- Wasteload allocations are expressed as the number of sample days at a shoreline monitoring site that may exceed the single sample targets identified under “Numeric Target.” Wasteload allocations are expressed as allowable exceedance days because the bacterial density and frequency of single sample exceedances are the most relevant to public health protection. For each shoreline monitoring site and corresponding subwatershed, the allowable number of exceedance days is set for two time periods. These two periods are: 1. summer dry weather (April 1 to October 31), and 2. winter dry weather (November 1 to March 31). The allowable number of exceedance days for a shoreline monitoring site for each time period is based on the lesser of two criteria (1) exceedance days in the designated reference system and (2) exceedance days based on historical bacteriological data at the monitoring site. This ensures that shoreline bacteriological water quality is at least as good as that of a largely undeveloped system and that there is no degradation of existing shoreline bacteriological water quality. All responsible jurisdictions and responsible agencies within a subwatershed are jointly responsible for complying with the allowable number of exceedance days for each associated shoreline monitoring site identified in the TMDL. Each MS4 discharging into

Santa Monica Bay (i.e. LA City, LA County) has multiple monitoring sites identified in the TMDL.

NPDES Permit Findings: The following findings were noted about the permit reviewed and used to ascertain the level of connection between the permit and the TMDL:

- The original permit was issued prior to the approval of the SMB Beaches Bacteria TMDL, therefore it was reopened and amended.
- The amended permit includes the bacteria WLA as a summer dry weather prohibition for the MS4 with the compliance points established in the receiving waters at the ‘wave wash’ not end-of-pipe. The amended language incorporating the TMDL is included in the permit on p.13 – 15. [\[Link to permit language\]](#)

Conclusions: Review of the TMDL and the Phase I MS4 permit reveals the Lost Angeles Regional Water Board has bridged the requirements. The TMDL reviewed considered existing stormwater sources and established a WLA for the two MS4s. In addition, the TMDL identifies multiple monitoring sites where MS4s should conduct monitoring to assess compliance with the WLA. Upon approval of the TMDL, the Phase I MS4 permit was reopened to incorporate the WLA and the monitoring locations.

Georgia

TMDL Program Overview: The Environmental Protection Division (EPD) in the Georgia Department of Natural Resources (GA DNR) is responsible for developing all Georgia TMDLs. To date, EPD has developed nearly 1,200 TMDLs in approximately 14 river basins (Elizabeth Booth, personal communication, December 15, 2006). Without reviewing each TMDL, it is difficult to determine the number of TMDLs that address permitted stormwater sources. It is important to note that one group within EPD develops the TMDLs and another group works with local stakeholders to develop the associated implementation plan after the TMDL is complete.

NPDES Stormwater Program Overview: Georgia has approximately 58 Phase I MS4s permitted under individual permits. The Phase II MS4 general permit became effective on December 8, 2002 and will expire on December 8, 2007. Approximately 55 cities and 29 counties have coverage under the Phase II MS4 general permit. The industrial general permit became effective on August 1, 2006 and expires on August 1, 2011. In 2003, EPD issued three types of construction general permits for three types of construction activities.

TMDL reviewed (year approved): TMDL Evaluation for Copper in the Flint River Basin (January 2003) and TMDL Evaluation for Fecal Coliform in the Coosa River Basin (January 2004)

TMDL Pollutants Addressed: Copper and fecal coliform

Permitted Stormwater Source(s) Identified by TMDL: The TMDL Evaluation for Copper in the Flint River Basin identifies both stormwater discharges associated with industrial activities and MS4s in the source assessment. The TMDL document states that it is unknown at this time (January 2003) if industrial facilities and MS4s are contributing copper to the watershed. Table 3 of the TMDL lists industrial facilities and MS4s with a stormwater general permit. Tables 7-9 of the TMDL summarize the copper TMDL; the tables state that WLAs for MS4s and stormwater sources are not necessary if the critical period is a low flow event, per a draft

interoffice memorandum on “Estimating Water Quality Loadings from MS4 Areas” dated December 19, 2002. As a result, the TMDL does not establish WLAs for permitted stormwater sources.

The TMDL Evaluation for Fecal Coliform in the Coosa River Basin also identifies stormwater discharges associated with industrial activities and MS4s in the source assessment. The TMDL provides an overview of the process used to estimate WLAs for MS4s. The process involves determining the percentage of urban area in the watershed covered under the MS4 permit; the TMDL does not specify if this means the actual amount of urban area within the MS4 boundary or if this means the percentage of urban area within the jurisdictional boundary of an entity required to obtain coverage under an MS4 permit. The TMDL states that the portion of runoff from the watershed that goes to the permitted storm sewer system versus what is nonpoint source runoff has not been clearly defined. It is assumed that approximately 70 percent of the stormwater runoff from the urban area is actually collected and conveyed by the MS4. According to the TMDL, an iterative approach to developing the TMDL is necessary to further define sources of pollutants and the portion that enters the regulated MS4. The iterative approach will allow for the collection of additional information and aid in selecting BMPs to achieve the WLA and associated water quality standards.

Permit(s) Reviewed: Phase II MS4 General Permit (General NPDES Stormwater Permit No. GAG610000); General Permit for Stormwater Discharges Associated with Industrial Activity (General Permit No. GAR000000); General Permit for Construction Stormwater Discharges (3 types)

TMDL Findings: The following findings were noted about the TMDLs reviewed and used to ascertain the level of connection between them and the permits:

- Each TMDL lists stormwater discharges associated with industrial activities and MS4s in the source assessments, but do not assign specific WLAs to these sources.
- In the case of the TMDL for copper in the Flint River Basin, WLAs are not assigned to permitted stormwater sources because the critical period is a low flow event. WLAs in this situation are not necessary per the draft interoffice memorandum dated December 19, 2002.
- The TMDL for fecal coliform in the Coosa River Basin provides WLAs for stormwater for each stream segment based on estimates of stormwater runoff from the urban area in the watershed. Specific WLAs for the five Phase I MS4s and fifteen Phase II MS4s are not specified in the TMDL.
- Each TMDL contains an initial TMDL implementation plan that includes several elements, including a general management measure selector table to identify management strategies by source category and pollutant; requirements to select and implement best management practice demonstration projects; and a deadline for developing a revised TMDL implementation plan. The initial implementation plan does not specify BMP requirements for permitted stormwater sources. Once the TMDL is approved, EPD’s implementation planning staff have 18 months to develop a revised implementation plan. The revised implementation plans contain “boiler plate” language about MS4 permit requirements.

NPDES Permit Findings: The following findings were noted about the permits reviewed and used to ascertain the level of connection between the permits and the TMDLs:

- The existing Phase II MS4 general permit does not specifically mention impaired waterbodies or waterbodies with approved TMDLs; therefore, the permit does not contain any specific references or requirements that would instruct MS4 permittees to research and understand implications of listed waters or WLAs on their stormwater management program. The permit does contain language that would allow Georgia EPD to require MS4 permittees to modify their existing stormwater management programs to address more stringent requirements to comply with the goals of the CWA. The permit language that could serve as a mechanism for requiring modifications based on a TMDL analysis is found on pp. 13-14: [\[Link to permit language\]](#)
- The recently issued industrial general permit contains specific requirements for permittees that discharge into, or within one linear mile upstream of and within the same watershed as, any portion of an impaired stream segment to develop, implement, and maintain SWPPPs (referred to in GA as SWP3s) that are consistent with a TMDL. In addition, the industrial general permit further categorizes requirements by specifying requirements for all impairments other than fecal coliform (e.g., dissolved oxygen and non-pollutant specific criteria) and impairments due to fecal coliform. The permit requires permittees with discharges to impaired stream segments, or within the one linear mile upstream or same watershed, to conduct stormwater discharge sampling for the pollutant of concern and meet applicable benchmark values that serve as guideline concentrations – not numeric effluent limitations or permit conditions. The permit requires permittees that fail to meet the benchmark sampling evaluation criteria to select and implement supplemental BMPs within a year. The permit uses total suspended solids (TSS) as a surrogate for evaluating fecal coliform levels. The permit also provides a list of supplemental BMPs to address fecal coliform in Appendix C. The permit language that addresses requirements for stormwater discharges to an impaired waterbody, found on pp. 12-19 of the permit: [\[Link to permit language\]](#)
- The three types of construction general permits issued in 2003 do not specifically mention requirements for discharges to impaired waterbodies or waterbodies with approved TMDLs. The Notice of Intent requirements for these construction general permits also do not require the applicant to determine if the receiving waterbody is impaired or has an approved TMDL.

Conclusions: Review of the selected TMDLs and stormwater general permits indicate that Georgia is making progress toward developing and implementing mechanisms to better connect TMDL and stormwater permitting, particularly with respect to industrial stormwater permitting. Although neither TMDL reviewed contains a specific WLA for the pollutant of concern, each TMDL does acknowledge the potential contributions from industrial and MS4 permitted stormwater sources and addresses these sources in the WLA section. The TMDL for fecal coliform in the Coosa River Basin states that the TMDL will take an iterative approach in future phases of TMDL development to further define sources of pollutants and contributions from the MS4. This TMDL also articulates the approach for developing an MS4 WLA that focuses on determining the percentage of urban area in the watershed and determining the pollutant load from that urban area. The unique aspect of this particular approach is the assumption that 70 percent of the stormwater runoff in the urban area is conveyed by the MS4, as opposed to leaving

the watershed as urban nonpoint source runoff. Based on conversations with EPD implementation planning staff, it appears as if the revised implementation plans for these TMDLs will not contain additional requirements for industrial and MS4 stormwater discharges that go beyond existing stormwater permit requirements.

Of the three types of stormwater general permits reviewed, only Georgia's industrial stormwater general permit contains very detailed requirements for discharges to impaired waterbodies. Not only does it contain sampling and benchmarking requirements that will allow the permittee to better understand its pollutant contributions, and potentially aid in future TMDL development activities, but also contains supplemental BMP requirements to control fecal coliform. Future MS4 general permits will include requirements for the MS4 to take steps to reduce pollutants causing stream impairments to the maximum extent practicable. This will be accomplished by including and implementing BMPs, or by participating in an approved TMDL implementation plan. Future construction general permits will include language addressing requirements for permittees that discharge to a stream segment impaired due to sediment.

It is recommended that agencies give careful consideration to whether WLAs should address stormwater sources – and the approach for doing so – where the critical period is a low flow event. Factors to consider include 1) whether pollutants are discharged during wet weather events and are settling out in certain portions of the receiving water; and 2) if MS4s might have dry weather discharges containing these pollutants as a result of illicit connections.

Maine

TMDL Program Overview: The Maine Department of Environmental Protection (MEDEP) has submitted and had approved approximately 31 TMDLs to date and eight are in draft form out for public comment.

NPDES Stormwater Program Overview: In 2003, Maine issued a Phase II MS4 General permit and is in the process of issuing a revised Construction General Permit.

TMDL reviewed (year approved): Barberry Creek TMDL (currently out for public comment)

TMDL Pollutants Addressed: Impervious cover as a surrogate for stormwater pollutants which cause an impairment of Class C uses. The State of Maine considers Class C waters shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under (Maine Legislature) Title 12, section 403; and navigation; and as habitat for fish and other aquatic life.

Permitted Stormwater Source(s) Identified by TMDL: The TMDL establishes a WLA for point sources in general and an LA for nonpoint sources of stormwater runoff.

Permit(s) Reviewed: Phase II MS4 General Permit; and Construction General Permit (current and draft).

TMDL Findings: The following findings were noted about the TMDL and used to ascertain the level of connection between the TMDL and the permits reviewed:

- The TMDL established a WLA of 12 percent due to the fact that Maine's IC Policy states that 12 percent IC target values represent the level of impervious cover that generally

coexists with a biological community that meets aquatic life criteria as defined by Statutory Class.

- The TMDL requires that implementation of remedial measures will occur under an adaptive management approach in which certain measures are implemented, their outcome evaluated, and future measures selected so as to achieve maximum benefit based on new insights gained. The order in which measures are implemented should be determined with input from all concerned parties (e.g., city, businesses, industry, residents, regulatory agencies, watershed protection groups). It is suggested in the TMDL that the City of South Portland (Phase II MS4) develop implementation recommendations by the end of 2006 and present them to the watershed stakeholders, the Cumberland County Soil and Water Conservation District, and the MDEP. The TMDL also recommends that the annual report required each year by the MEPDES stormwater general permit (MS4), include a description of efforts to meet the wasteload allocation of this TMDL.
- The TMDL includes a description of BMP options in the following three categories: stream restoration techniques, and disconnection and conversion of impervious surfaces. No specific recommendations or requirements were made for MS4s or construction/development projects.
- The reference to construction/development BMPs is as follows: As far as possible, construction or building projects should, however, consider [conversion of impervious surface BMPs] and other possibilities for reducing new impervious cover during the planning stages.”

NPDES Permit Findings: The following findings were noted about the permits reviewed and used to ascertain the level of connection between the TMDL and the permits:

- The only reference to TMDLs included in the current or draft versions of the Construction General Permit is as follows: “If the waterbody to which a direct discharge drains is impaired and has an USEPA approved TMDL, then the discharge must be consistent with any waste load allocation (WLA) contained in the TMDL and any implementation plan.” According to the Maine DEP webpage, Appendix D to this permit includes a list of impaired streams for reference, but the appendix could not be located on the website. Maps of impaired watersheds are specified on a separate webpage, however, to assist in the determination of whether a development will be in an impaired watershed <http://www.maine.gov/dep/blwq/docstand/stormwater/stream_map_1.htm>.
- The Phase II MS4 General Permit does not authorize a direct discharge that is inconsistent with any USEPA approved TMDL waste load allocation and any implementation plan for the waterbody to which the direct discharge drains. This general permit does not authorize a discharge to an impaired waterbody for which the Department has issued a watershed-specific general permit.
- The Phase II MS4 General Permit states that the discharge must be consistent with the wasteload allocation and implementation plan if it drains to an impaired waterbody with an approved TMDL. It also states three potential requirements that the MDEP might take if a TMDL is approved or modified subsequent to the effective date of the general permit.
- Appendix B is a list of all impaired waters.

Conclusions: Review of the selected TMDL and permits indicates that a good foundation exists to bridge requirements between TMDLs and permits. A great deal of information about BMPs to reduce imperviousness is included in the implementation plan of the TMDL. However, definitive guidance is not provided to specific Phase II MS4s regarding how to proceed and comply with the TMDL WLA to ensure that the discharge is consistent with the WLA and implementation plan, as required under the Phase II MS4 general permit.

New Mexico

TMDL Program Overview: The New Mexico Environment Department Surface Water Quality Bureau has submitted and had approved approximately 79 TMDLs to date and one is pending USEPA approval.

NPDES Stormwater Program Overview: New Mexico issued a Phase II MS4 General permit and is in the process of issuing a revised Construction General Permit.

TMDL reviewed (year approved): Middle Rio Grande TMDL for Fecal Coliform (2002)

TMDL Pollutant Addressed: Fecal coliform

Permitted Stormwater Source(s) Identified by TMDL: The TMDL establishes WLAs for four major stormwater conveyances (from Albuquerque and surrounding areas) and LAs for nine arroyos and ditches to account for nonpoint sources of stormwater runoff.

Permit(s) Reviewed: Phase I MS4 Permit for the City of Albuquerque – Co-permittees include City of Albuquerque, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), New Mexico State Highway and Transportation Department, and the University of New Mexico.

TMDL Findings: The following findings were noted about the TMDL and used to ascertain the level of connection between the TMDL and the permit:

- The TMDL document states that while numeric targets for stormwater conveyances are established in the TMDL, USEPA has stated that establishing numeric limits for stormwater permits is problematic and that USEPA requires that conditions be included in permits to ensure that water quality standards are met, the permitting authority has flexibility when deciding whether to apply numeric limits to stormwater dischargers.
- The TMDL first established the river loading capacity for each river segment addressed in the TMDL by converting the associated standard (either the geometric mean of 1000 colonies per unit volume (cfu)/100 mL or 100 cfu/100 mL depending upon the standard that applies) to cfu per day allowed at the 4Q3 flow level. For example, the river loading capacity for fecal coliform for segment 20.6.4.105 is 9.205×10^{12} cfu/day.
- The WLAs for the point source discharges (WWTPs and stormwater conveyance channels) within that segment are then determined using the appropriate standard and the same conversion. For example, the WLA for the North Diversion Channel is determined using the ambient criteria of 100 cfu/100 mL as a 30-day geometric mean and the maximum annual flow value. This calculation yields a WLA of 6.438×10^{11} cfu/day as a 30-day geometric mean. This value is then subtracted from the overall loading capacity of that segment to determine the “remaining river loading capacity”.

- The North Diversion Channel LA is developed by calculating the loading for each contributing arroyo or ditch and subtracting that loading from the overall loading allowed (WLA). The remaining loading is assumed to be from nonpoint sources.
- The TMDL encouraged structural BMPs expected to reduce fecal coliform loading.
- The TMDL specifically lists a number of management measures that “may be included in a stormwater management program” as follows:
 1. Characterize sources of fecal coliform
 2. Develop and implement a dry weather inspection program to locate source of fecal coliform loading.
 3. Develop and implement a wet weather sampling program to locate sources of fecal coliform loading.
 4. Develop and implement a program to eliminating or treating existing sources of fecal coliform loading.
 5. Develop and implement a program for preventing new source of fecal coliform loading in the future.
 6. Develop and implement a monitoring program to assess BMP effectiveness and to compare loadings to the targets.
 7. Develop and implement a monitoring program to track trends in fecal coliform discharges over time.

NPDES Permit Findings: The following findings were noted about the permit reviewed and used to ascertain the level of connection between the TMDL and the permit:

- The permit includes a specific list of requirements to address the Middle Rio Grande Fecal Coliform TMDL. The requirements are outlined in a table found on pp. 20 – 24 of the permit: [\[Link to permit language\]](#)
- The specific requirements are based on the seven recommendations included in the TMDL.
- The requirement to develop a monitoring program to track trends in fecal coliform and BMP effectiveness is intended to track compliance with the TMDL WLA. The table containing the specific requirements includes the applicable target values and equation for comparison of loadings.
- The permit requires Albuquerque to use an adaptive management approach by implementing revisions to the required programs if deemed necessary based on monitoring data.
- The permit requires Albuquerque to develop and submit BMP evaluations and assessments, as well as an Annual TMDL Progress Report that summarizes monitoring results and includes computations of annual percent reduction achieved from the baseline loads and comparisons with the target loads.

Conclusions: Review of the selected TMDL and Phase I MS4 permit reveals that a bridge exists between the recommendations made in the TMDL and permit requirements. The TMDL recommends specific types of management measures that should be included in stormwater

management programs. The Phase I MS4 individual permit for Albuquerque draws upon these recommendations and incorporates them as permit requirements. Although the permit does not use the specific terms “adaptive management” or “benchmarking,” the permit promotes these approaches through the following requirements: 1) stormwater discharges and BMP effectiveness monitoring; 2) comparing annual percent reductions from baseline loads and comparison with target loads; and 3) adjusting the programs based on monitoring data. It is interesting to note that the TMDL did not require these activities, but the permit translated them into specific permit requirements to ensure compliance with the TMDL.

Oregon

TMDL Program Overview: The Oregon Department of Environmental Quality’s (ORDEQ) Water Quality Division, Watershed Management Section develops TMDLs for the state. ORDEQ has committed to having federally approved TMDLs on all waterbodies listed on the 1998 303(d) list completed by the end of the year 2007. ORDEQ has completed TMDLs for 449 stream segments.

NPDES Stormwater Program Overview: ORDEQ’s Water Quality Division also implements all NPDES stormwater permits. General permits have been issued for quarrying and mining (1200-A), private construction activities one acre or greater (1200-C), public construction projects which disturb one acre or greater (1200-CA), industrial facilities state-wide (1200-Z), and industrial facilities within the Columbia Slough watershed (1200-COLS). A draft Phase II MS4 permit has been developed as well.

TMDL reviewed (year approved): Columbia Slough (1998)

Pollutants Addressed by the TMDL: Dissolved Oxygen (biochemical oxygen demand (BOD) is used as a surrogate), pH, phosphorus, bacteria, lead, dioxin, DDE/DDT, polychlorinated biphenyls (PCBs), dieldrin, and chlorophyll a. For purposes of this report, BOD was analyzed.

Permitted Stormwater Source(s) of Pollutants Addressed Identified by TMDL: urban stormwater; including MS4s (characterized as designated management agencies or DMAs) and airports, and industrial stormwater were identified as sources of BOD in the Columbia Slough TMDL and in the implementation strategy.

Permit(s) Reviewed: Phase I MS4 Permit No. 101315 City of Gresham, City of Fairview, and Multnomah County; Industrial General Permit (1200-COLS); Construction General Permit (1200-C); and draft language for the MS4 Phase II General Permit.

TMDL Findings: The following findings were noted about the TMDL reviewed and used to ascertain the level of connection between the TMDL and the permits:

- WLAs were developed for stormwater source types (e.g. urban and industrial), but not specific permittees. The ambient dissolved oxygen criteria concentration is used to determine the loading capacity of the Slough for BOD materials. The loading capacity is expressed as an ultimate biochemical oxygen demand. The BOD loading capacity is dependent on the deoxygenation and aeration rate. The TMDL is a matrix of flows and associated average, daily average maximum and hourly maximum BOD.
- An adaptation of the Simple Method was used to develop WLAs [Area x Annual Rainfall x Runoff Coefficient x Pollutant Concentration = Annual Pollutant Load]

- A water quality model has been used to estimate the effects of winter weather and wet weather loads, particularly from Combined Sewer Overflows (CSOs) and stormwater. The CSOs were given zero load with the exception of a 5-year winter and a 10-year summer storm event. The water quality and hydrodynamics model is an adaptation of the Corps of Engineers' model CE-QUAL-W2. Event-based pollutant loads from stormwater were estimated, including de-icing loads from Portland International Airport.
- The TMDL states that the “controls are to be implemented via Memorandums Of Agreement (MOAs) with the designated management agencies (DMAs). For most of the MS4 permit holders the permit incorporates the agreements in the MOAs as a permit condition. The TMDL states that the requirements for urban stormwater control for Multnomah County, however, are to be implemented via revisions to their MS4 permits since their permit does not incorporate the TMDL requirements of the MOA.” (Note: While the TMDL does make these statements, DEQ revised course and in 2004 started incorporating the WLAs into the MS4 permits without creating a separate MOA.)
- The Columbia Slough TMDL implementation strategy recommends the development of an industrial general permit for the watershed to control pollutants from industrial sources: *DEQ anticipates implementing stormwater permits through application of BMPs. When stormwater permits are renewed, a basin-specific general stormwater permit will be developed by DEQ to address BOD₅ loads as well as other 303(d) parameters. The permit will include monitoring and BMP requirements to reduce the BOD₅ load to the Slough. The WLA for industrial stormwater will not be incorporated into NPDES industrial stormwater permits as individual effluent limits.* In 1999, ORDEQ created the Columbia Slough Industrial General Permit (1200-COLS). WLAs were translated to effluent concentrations and expressed as a benchmark in the 1200-COLS permit
- The TMDL states that monitoring and implementation of BMPs shall be done by MS4s in order to comply with the BOD WLA. [\[Link to permit language\]](#)

NPDES Permit Findings: The following findings were noted about the permits reviewed and used to ascertain the level of connection between the TMDL and the permits:

- The MS4 Phase I permit reviewed specifies BMP requirements to meet the WLA to the MEP. Instead of the prescriptive BMPs listed in the TMDL, the ORDEQ created the MS4 permit benchmarking approach that applies to all TMDL parameters for which stormwater WLAs were established. Benchmarks are estimates of future pollutant load reductions.
- The permit requires the development of benchmarks to demonstrate this compliance and specifically requires monitoring to assess progress towards meeting those benchmarks. If the benchmarks are not achieved, the permit requires an adaptive management approach that will allow the permittees to propose and implement changes to their program in a continual effort towards meeting the benchmarks. The permit defines a “benchmark” as follows:
A benchmark is a total pollutant load reduction estimate for each parameter or surrogate, where applicable, for which a [Waste Load Allocation] WLA is established at the time of permit issuance. A benchmark is used to measure the overall effectiveness of

the stormwater management plan in making progress toward the wasteload allocation (this estimate will be related to the statistical variability of the underlying data and may be stated as a range), and is intended to be a tool for guiding adaptive management activities. A benchmark is not a numeric effluent limit; rather it is a goal that is subject to the maximum extent practicable standard. The co-permittee must provide the rationale for the proposed benchmark, which includes an explanation of the relationship between the benchmarks and the TMDL wasteload allocations. Any limiting factors related to the development of a benchmark, such as data availability and data quality, must also be included in this rationale.

- The permit requires [p. 17] that the benchmarks and necessary BMPs be included in the MS4 SMWP. [\[Link to permit language\]](#)
- In addition, the Phase I permit requires that the MS4s consider and assess impact on streams listed on the 303(d) list which have not had TMDLs assigned [p. 19]. [\[Link to permit language\]](#)
- The Phase I permit requires that a monitoring plan be designed to track the long-term progress of the SWMP towards achieving improvements in receiving water quality, including progress towards meeting pollutant load reduction benchmarks associated with TMDL constituents. This requirement is addressed with the ambient and outfall monitoring that is conducted, and assessed as part of the data evaluation and reporting components of the program that occur during each permit renewal application. The permit also requires that results of the monitoring be used to support the adaptive management process and lead to refinements of the SWMP.
- The Phase I permit requires that each permittee submit an Interim Evaluation Report (due May 1, 2006) and a MEP determination for stormwater pollutant reduction efforts by each co-permittee to assess progress. [\[Link to permit language\]](#)
- The Industrial General Permit for the Columbia Slough watershed was effective September 1, 2006 and requires coverage for typical industrial facilities as well as “additional” facilities (i.e. where significant materials are exposed to stormwater) in order to better regulate industrial wastewater in the watershed. These facilities include: vehicle, machinery, equipment, and trailer maintenance including repairs, servicing, washing, and painting; vehicle, machinery, equipment, and trailer storage including rental, sales, wrecked vehicles, fleet, and general storage; materials storage including raw materials; bulk fuels, chemicals, detergents, and plastic pellets; finished materials; lumber and food products; wholesale gravel, sand, and soil stockpiles; and bulk liquids other than water; waste handling, including recycled product storage, composting, tires, and bulk hazardous waste; commercial animal operations such as kennels, race tracks, veterinarians not covered under a Confined Animal Feeding Operation (CAFO) permit; fuel distribution and sales including bulk stations, fuel oil dealers, retail stations (manned and unmanned), fleet fueling, mobile fueling, and truck stops.
- The Industrial General Permit for the Columbia Slough included authorization for the state to require an “action plan” of additional BMPs, additional monitoring, or cessation of discharge if it is determined that the facility’s discharge is violating water quality standards, but does not include a specific reference to meeting TMDL WLA or LAs. Industrial WLAs were converted to effluent concentrations and are included in the permit

as benchmarks. If benchmarks are exceeded, the permittee must apply for an individual permit. Additional pollutants of concern (e.g. Cu, Zn) for which no TMDL was established and which are not 303(d) listed were included as benchmarks as well.

- The draft MS4 Phase II permit includes requirements for Phase II MS4s to develop benchmarks the first permit term and implementing these benchmarks during the second permit term. The permit has not been issued to date. [\[Link to permit language\]](#)
- The Construction General Permit includes specific BMPs for projects which discharge to streams that are impaired by sedimentation or turbidity or additional monitoring to prove no impacts.

Conclusions: Review of the selected TMDL and stormwater permits reveals that TMDL WLA and permit requirements are bridged. The permits have incorporated the WLA and implementation plan included in the Columbia Slough TMDL and the TMDL recommends the utilization of several NPDES permitting strategies to attain the stormwater WLAs. The Columbia Slough TMDL includes WLAs for multiple stormwater sources and makes specific recommendations for the utilization of NPDES permits to meet the WLA. The Phase I MS4 permit includes specific requirements for meeting the WLAs to the MEP and specifically require the development of benchmarks to implement the necessary BMPs, as well as monitoring and reporting requirements to document progress. In addition, the permit includes an adaptive management requirement so that permittees will have to regularly assess how well the existing SWMP (and benchmarks) are achieving the WLA to the MEP.

Pennsylvania

TMDL Program Overview: On an April 7, 1997 the Pennsylvania Department of Environmental Protection (PA DEP) agreed to a Memorandum of Understanding with USEPA, which outlined a 12-year schedule to develop TMDLs for impaired streams listed on the 1996 CWA Section 303(d) list. This schedule included: assessing all unassessed streams within 10 years, assessing 100 significant lakes within 10 years; establishing TMDLs for all 1996 303(d) listed waters (575 segments) – within 12 years and, prepare TMDLs for newly listed waters (403 in 1998). Over the years the Department has met those TMDL goals.

NPDES Stormwater Program Overview: The Pennsylvania DEP has developed two construction stormwater general permits – construction general permit (PAG-2), construction activities at oil and gas sites (5500-PM-0G003) – and an industrial stormwater general permit (PAG-3). The Pennsylvania DEP is in the process of developing a new Phase II MS4 general permit to replace the current Phase II MS4 general permit when it expires.

TMDL reviewed (year approved): Wissahickon Creek (2003)

TMDL Pollutants Addressed: Sediment (nutrients were included in this TMDL as well, but this TMDL was not reviewed as WLAs were not assigned to stormwater sources).

Permitted Stormwater Source(s) Identified by TMDL: Phase I and Phase II MS4s

Permit(s) Reviewed: PAG-13 General Permit for Discharges of Stormwater from Small MS4s

TMDL Findings: The following findings were noted about the TMDL and used to ascertain the level of connection between the TMDL and permit:

- The TMDL used a reference watershed as the endpoint for the TMDL. [\[Link to TMDL language\]](#)
- Once the impaired and reference watersheds were matched, a watershed model was used to simulate the sediment loads from different sources. The modeling framework used in this study consisted of a modified application of the Generalized Watershed Loading Function (GWLF) watershed model, including a special module for simulation of streambank erosion. Using hydrology input parameters established by the GWLF model, BasinSim was used to run GWLF with model output specially formatted for a separate Streambank Erosion Simulation Module. Loadings from streambank erosion were estimated with this separate module using daily flows predicted by GWLF, site-specific information, and process-based algorithms.
- WLAs were determined for MS4 permittees using land-use-specific, unit-area loads determined in modeling analysis for specific regions of the Wissahickon Creek basin, as well as the streambank erosion within each municipality. The Wissahickon Creek watershed was divided into five main subwatersheds in order to match the impaired watershed with the smaller reference watershed. Sediment loads were estimated for each of the five subwatersheds and then distributed among municipalities as MS4 stormwater WLAs for each individual 303(d)-listed watershed. The distribution of the unit-area loading (lbs/acre/year) for overland runoff and streambank erosion was determined through modeling analysis.
- Overland flow and streambank erosion was accounted for in the MS4 WLA.
- No WLA or LA was given to construction project discharges.
- The “Reasonable Assurance and Implementation” section of the TMDL stated that the “goals of this TMDL can be met with proper watershed planning, aggressive implementation of stormwater flow and pollutant reduction best management practices (BMPs), and strong political and financial mechanisms”; however, no specific recommendations regarding BMPs are provided. The TMDL describes existing local, state, and federal stormwater and watershed planning policies as well as Phase I and Phase II MS4 and construction project discharge requirements, but does not make any recommendations or requirements for BMP implementation to meet the TMDL WLAs.

NPDES Permit Findings: The following findings were noted about the TMDL and permits reviewed and used to ascertain the level of connection between the two:

- The existing Phase II MS4 General Permit does not include provisions for discharges to impaired waterbodies.
- The draft Phase II MS4 General Permit includes provisions covering an MS4 discharging to an impaired waterbody with an approved TMDL where the stormwater discharge contains the pollutant causing the impairment. The permittee may choose one of two options: 1) direct implementation; or 2) update (or develop) and implement an Act 167 plan within 2 years, and start implementing 6 months after receiving PA DEP approval.

Conclusions: The method used in the TMDL to calculate WLAs is noteworthy because it accounted for overland flow and streambank erosion. In addition, the method calculated a land-use-specific, unit-area load on a subwatershed basis and then distributed those loads among

MS4s. The TMDL reviewed referenced existing NPDES stormwater permits, but did not specify BMPs or other additional requirements (e.g., monitoring) to meet the WLA or track progress toward meeting the WLA. Although the TMDL references existing NPDES stormwater permits, the existing Phase II MS4 General Permit does not complete the bridge by including provisions for discharges to impaired waterbodies.

Tennessee

TMDL Program Overview: The Tennessee Department of Environmental & Conservation, Division of Water Pollution Control has structured monitoring and permitting activities on a rotating watershed basis. In keeping with this approach, Tennessee is developing TMDLs on a watershed basis, with each watershed examined at the appropriate time in the five-year watershed cycle. Further, the watersheds in Tennessee have been divided into five groups based on the year of implementation in a five-year cycle. Approximately, 67 TMDLs have been submitted to and approved by USEPA.

NPDES Stormwater Program Overview: Four cities are permitted as Phase I MS4s. The Phase II program will affect about 85 cities and counties by requiring them to obtain coverage under a stormwater discharge permit and to implement a set of programs to manage the quality of stormwater runoff from the storm sewer systems.

Tennessee issued a small MS4 general permit on February 27, 2003. Along with the permit is a notice of intent (NOI) that cities and counties should use to apply for coverage under the permit. On June 16, 2005 Tennessee issued a Construction General Permit (TNR10000) as well.

TMDLs reviewed (year approved): Harpeth River Siltation and Habitat Alteration TMDL (2002); Harpeth River E. coli TMDL (2006)

TMDL Pollutants Addressed: Siltation and habitat alteration; E. coli

Permitted Stormwater Source(s) Identified by TMDL: Construction projects and MS4s

Permit(s) Reviewed: Construction General Permit, Phase II MS4 General Permit

TMDL Findings: The following findings were noted about the Harpeth River Siltation and Habitation Alternation TMDL which was used to ascertain the level of connection between the two:

- In the Harpeth River Siltation and Habitat Alteration TMDL (Siltation TMDL), the determination of target average annual sediment loading values for reference watersheds and the sediment loading analysis of 303(d) listed waterbodies was accomplished utilizing the Watershed Characterization System (WCS) Sediment Tool (v.2.1). WCS is an Arcview GIS-based program developed by USEPA Region IV to facilitate watershed characterization and TMDL development. The Sediment Tool is an extension of WCS that utilizes available GIS coverages (land use, soils, elevations, roads, etc), the Universal Soil Loss Equation (USLE) to calculate potential erosion, and sediment delivery equations to calculate sediment delivery to the stream network. Sediment analyses can be performed for single or multiple watersheds.

- The Siltation TMDL establishes a WLA for MS4 and construction stormwater discharges, combined. It does not establish WLAs for individual permitted stormwater dischargers. WLAs are established per sub-watershed.
- The Siltation TMDL Implementation Plan requires additional BMPs on construction projects: More frequent (weekly) inspections of erosion and sediment controls; Inspections and the condition of erosion and sediment controls must be reported to the Division of Water Pollution Control; the SWPPP must be submitted to the DWPC prior to disturbing soil at the construction site.
- The Siltation TMDL Implementation Plan does not require MS4 BMPs, but requires development of a SWMP with BMPs that the permittee thinks are appropriate to reduce pollutants to the MEP. Indicates that “as the science and available data for wet weather discharges of sediment continues to grow, more advanced approaches to sediment TMDLs are expected to be developed. These new approaches will be applied, as appropriate, through the adaptive management process to enhance the effectiveness of TMDLs and to provide a sound basis for water quality management decisions.
- The Harpeth River E. coli TMDL used a load duration curve approach to develop WLAs for MS4s. The WLAs for MS4s are aggregated on a sub-watershed basis; specific WLAs are not assigned to specific MS4s.
- The Harpeth River E. coli TMDL describes and reiterates the Phase II MS4 General Permit requirements. [\[Link to permit language\]](#)

NPDES Permit Findings: The following findings were noted about the permits reviewed and used to ascertain the level of connection between the TMDLs and the permits:

- Additional BMPs referenced in the TMDL are required in the Construction General Permit and apply state-wide (i.e., not just for the Harpeth River watershed).
- The Phase II MS4 General Permit states that it does not cover any MS4 where a TMDL includes a WLA for the MS4 and recommends coverage under an individual permit.
- The Phase II MS4 General Permit requires all facilities to comply with various TMDL-related special conditions. [\[Link to permit language\]](#)

Conclusions: Review of the selected TMDLs and stormwater general permits indicate that a basic bridge exists between TMDLs and permit requirements. Although the TMDLs do not have specific WLAs assigned to specific regulated permittees, the TMDLs do contain specific requirements for construction BMPs or MS4 SWMP planning to meet the WLA. The construction and MS4 general permits reviewed support those requirements by referencing the need to comply with the requirements contained in the TMDL. In this case, the TMDL provides the description of the requirements and it is therefore incumbent upon the language in the TMDL to provide clear guidance on how to implement additional requirements to ensure progress toward achieving the applicable WLAs.

Vermont

TMDL Program Overview: The Vermont Department of Environmental Conservation (VTDEC) has approximately 155 impairment entries listed in Part A – Impaired Surface Waters in Need of TMDLs – on its 2004 303(d) list of waters. There are 17 stormwater-impaired watersheds on the

list. Under new state legislation, VTDEC is required to develop TMDLs, or Water Quality Remediation Plans, for these impaired watersheds by October 2007. Management of stormwater volume, rather than a pollutant-specific load reduction, is the focus of these TMDLs to provide channel protection, water quality treatment, groundwater recharge, and flood control.

To date, VTDEC has developed only one draft TMDL for the Potash Brook stormwater-impaired watershed. USEPA Region 1 recently approved this TMDL.

NPDES Stormwater Program Overview: VTDEC's stormwater program addresses stormwater runoff from impervious surfaces (NPDES MS4 permit and State Stormwater Discharge Program), construction, and industrial facilities. The NPDES Phase II MS4 General Permit (3-9014), adopted on March 19, 2003 with an expiration date of March 2008, covers eight municipalities in Vermont. A new Construction General Permit (3-9020) for projects disturbing one acre or more of land became effective on September 13, 2006. The Construction General Permit covers low and moderate risk projects; high risk projects require coverage under an individual permit. The Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (3-9003) became effective on August 18, 2006. It is important to note that Vermont also has state-specific permitting requirements for stormwater-impaired watersheds and stormwater discharges from new development and redevelopment based on the total amount of imperviousness.

TMDLs reviewed (year approved): Stormwater TMDL for Restoration of Biological Impairment in Potash Brook (draft 2005; not yet approved); Lake Champlain Phosphorus TMDL (2002)

TMDL Pollutants Addressed: Stormwater flow volume; total phosphorus

Permitted Stormwater Source(s) Identified by TMDL: The TMDL establishes a WLA for point sources in general and an LA for nonpoint sources of stormwater runoff.

Permit(s) Reviewed: Phase II MS4 General Permit (3-9014); Multi-Sector General Permit for Industrial Stormwater Discharges (3-9003); and Construction General Permit (3-9020).

TMDL Findings: The following findings were noted about the TMDL reviewed and used to ascertain the level of connection between the TMDL and the permits:

- The Stormwater TMDL for Restoration of Biological Impairment in Potash Brook (Potash Brook TMDL) development process followed the steps described in the document entitled "A Scientifically Based Assessment and Adaptive Management Approach to Stormwater Management (Stormwater Cleanup Plan Framework)" that focuses on TMDL development for stormwater-impaired waterbodies.
- In the Potash Brook TMDL, the hydrologic targets are expressed as percentage reductions or increases relative to the attainment (i.e., reference) watersheds' flow duration curves (FDCs) at the representative high and low flow values; this is consistent with the approach outlined in the Stormwater Cleanup Plan Framework document. A technical analysis is provided which links the FDCs to pollutant loadings and impairments.
- The Potash Brook TMDL uses the land use based allocation approach to distribute the overall percent targets for the watershed among three broad categories: Urban/Developed, Agriculture/Open, and Forest/Wetland. To determine allocations, the

TMDL assumed that flows from Forest/Wetland would not change over time and this category received a zero allocation. The remaining categories, Urban/Developed and Agriculture/Open, received the remaining allocation based on the relative amount of influence each category had on runoff characteristics, and thus the FDC, using a runoff coefficient (R_v) influenced by the degree of watershed imperviousness. By calculating the R_v for each land use group and then weighting that coefficient's influence on runoff based on the amount of land area within each group, the relative influence of each group on runoff (and conversely groundwater recharge) can be used to allocate the watershed targets across the entire watershed.

- The category of Urban/Developed aggregates both NPDES-permitted stormwater discharges and non NPDES-permitted stormwater discharges; the entire category received a WLA that constitutes a 91 percent weighted influence on stormwater runoff.
- Future growth allocations account for new developments that are 1) subject to Vermont's state permit program for impervious surfaces and 2) not subject to impervious surface permit requirements.
- The overall Potash Brook TMDL watershed allocations as a percentage change from current conditions are expressed as shown in the tables taken from the TMDL presented below:

Table 7. Potash Brook TMDL high flow allocation at Q0.3%.

Wasteload Allocation	Stormwater reduction from current Urban/Developed areas	-14.6 %	-16.5 %
	Additional stormwater flow reduction from Urban/Developed areas to account for future growth	-1.9 %	
Load Allocation	Stormwater reduction from Agriculture/Open areas		-1.4 %
Total Potash Brook watershed stormwater flow reduction allocation at Q0.3%			-17.9 %

Table 8. Potash Brook TMDL low flow allocation at Q95%.

Wasteload Allocation	Base flow increase from current Urban/Developed areas	10.5 %	11.2 %
	Additional base flow increase from Urban/Developed areas to account for future growth	0.7 %	
Load Allocation	Base flow increase from Agriculture/Open areas		1.0 %
Total Potash Brook watershed base flow increase allocation at Q95%			12.2 %

- The Potash Brook Implementation Plan describes a two-prong approach for meeting the WLA assigned to the Urban/Developed category. The first prong focuses on the issuance of a watershed-wide general permit under Vermont's state stormwater law. The second prong focuses on potentially requiring additional BMPs and monitoring under NPDES MS4, construction, and industrial stormwater permits. No specific BMPs or monitoring requirements are mentioned for inclusion in these NPDES stormwater permits.
- The Lake Champlain Phosphorus TMDL (Lake Champlain TMDL) recognizes NPDES permitted stormwater sources as requiring a WLA as regulated point sources. However,

the TMDL acknowledges that monitoring difficulties and the geographic scale made it technically infeasible to separate the allocations for phosphorus sources requiring NPDES permits from more general nonpoint source load allocation categories based on land use.

- The Lake Champlain TMDL states that phosphorus loading from developed land can be estimated using land use and phosphorus export modeling methods. The base year phosphorus loading to Lake Champlain from developed land sources was estimated using these modeling methods, and allocations for developed land, agricultural land, and forest land sources were derived for each lake segment watershed as described in the Vermont Load Allocation section of the TMDL. The wasteload allocation portion of the TMDL includes a category for developed land sources, while recognizing that this category incorporates both point sources that require NPDES permits, and nonpoint sources that do not require such permits.
- The developed land wasteload allocation category for the Lake Champlain TMDL includes all stormwater discharges requiring NPDES permits, other state-permitted stormwater discharges, and nonpoint source loads from residential and other developed areas, backroads, small construction sites, and erosion of stream banks and stream channels caused directly or indirectly by land development in the watershed.
- The Lake Champlain Implementation Plan addresses regulatory activities to address stormwater runoff from the developed land category. The focus is on Vermont's state stormwater management program, including the development and issuance of Watershed Improvement Permits (WIPs). The NPDES Phase II MS4 permit requirements are briefly mentioned in the Implementation Plan.

NPDES Permit Findings: The following findings were noted about the permits reviewed and used to ascertain the level of connection between the TMDL and the permits:

- The Phase II MS4 General Permit addresses stormwater discharges to impaired waterbodies under Special Conditions. There are specific requirements for MS4s that discharge 1) to an impaired waterbody with an approved TMDL and 2) to an impaired waterbody without an approved TMDL.
- Where an MS4 is discharging to an impaired waterbody with an approved TMDL, the permit states that the MS4 must have a SWMP that describes, to the MEP, how the pollutants will be controlled. [\[Link to permit language\]](#)
- The permit requires consistency with TMDL requirements. [\[Link to permit language\]](#)
- The permit requires permittees to develop and submit an annual report that gives assessment of BMPs, progress toward reducing pollutants to the MEP (including any monitoring data used to make this assessment), and any proposed changes to SWMP. The permit does not require any specific monitoring or reporting requirements to assess progress toward achieving a WLA.

Conclusions: The TMDLs and permits reviewed have a good foundation for bridging. The Lake Champlain Phosphorus TMDL and the Phase II MS4 General Permit are fully bridged, with the TMDL referencing the requirements of the Phase II MS4 General Permit, which identifies distinct requirements to address the WLA assigned to urban/developed areas representing both permitted MS4s and non NPDES permitted stormwater runoff. The one potential challenge exists with regard to the Lake Champlain Phosphorus TMDL and the new Construction General

Permit. Language in the Construction General Permit mentions stormwater discharges to impaired waterbodies listed for sediment or stormwater impairments, which might unintentionally overlook the Lake Champlain Phosphorus TMDL given the TMDL does not explicitly address an impairment due to sediment or stormwater. The Lake Champlain Phosphorus TMDL Implementation Plan identifies sediment and erosion control as important activities for achieving phosphorus load reductions. Therefore, it is important that the Construction General Permit addresses other types of pollutants related to construction stormwater runoff (e.g., phosphorus). Although the language in the TMDLs and the permits are bridged, true success in bridging NPDES stormwater permits and TMDLs depends on how well permittees are able to translate WLAs into BMPs in their SWMPs and SWPPPs. To date, there appears to be a lack of guidance for permittees on how to select and implement appropriate BMPs to achieve their respective WLAs.

Virginia

Virginia Department of Environmental Quality (VADEQ) and Virginia Department of Conservation and Recreation (VADCR) were contacted to participate in the development of this report. VA DEQ is responsible for the development of TMDLs and industrial stormwater permitting. VA DCR is responsible for construction and MS4 stormwater permitting. VA DCR provided information on the MS4 stormwater program in time for inclusion into this report. Although it is only a partial analysis and summary of current practices in Virginia, the information adds to the overall understanding of states' ideas for implementing TMDLs through stormwater permitting.

Permit(s) Reviewed: Discussions with VA DCR focused on six draft individual MS4 permits that contain new requirements to address stormwater discharges to impaired waterbodies. VA DCR and USEPA Region 3 are currently in the process of discussing the proposed requirements and finalizing the permit language.

NPDES Permit Findings: The draft MS4 individual permits contain requirements for the development of "impairment control plans" for one impaired waterbody or an entire watershed. Through the implementation control plans, permittees must address two impairments per year; permittees can develop a prioritization process and determine which impairments they will address first. The draft MS4 individual permits also contain requirements for developing benchmarking goals that track progress toward achieving water quality standards. The permit contains monitoring requirements, but does not require ambient water quality monitoring, and annual reporting requirements. Implementation control plans also contain an adaptive management component; permittees would be required to update these plans based on monitoring results. A unique goal of VA DCR is to have MS4s that discharge to impaired waterbodies collect information on existing stormwater BMPs, particularly where TMDLs have not yet been developed, to better inform the TMDL development process and ensure WLAs and associated implementation plans are as realistic as possible. VA DCR would like to incorporate same type of implementation control plan requirements into MS4 general permits. In developing proposed permit requirements to support TMDL implementation, VA DCR examined state regulations to identify any potential regulatory issues. For example, state regulations might require modification to authorize MS4 general permits to include monitoring requirements necessary for developing and updating implementation control plans.

Conclusions: An evaluation of the connections between TMDLs and stormwater permits in Virginia cannot be provided until USEPA Region 3 has approved draft MS4 permit language. However, the proposed requirements described by VA DCR have the potential to establish a stronger connection between the TMDL and stormwater programs.

Washington

TMDL Program Overview: The Washington Department of Ecology (Ecology) is working to develop Water Cleanup Plans (i.e. TMDLs) for 643 water segments by 2013. Ecology organizes water cleanup efforts through geographic areas called Water Quality Management Areas (WQMAs). Each WQMA is made up of one or more watersheds or Water Resource Inventory Areas (WRIAs). There are 62 WRIAs in Washington State. Each year, with the help of local communities, Ecology selects WRIAs or watersheds where TMDLs will be developed.

NPDES Stormwater Program Overview: Ecology issues general permits to cover all MS4 permittees – Phase I Eastern Washington, Phase II Eastern Washington, Phase I Western Washington, and Phase II Western Washington. All are currently being reissued. In addition, a general state-wide permit for Washington DOT (WADOT) is being developed. This general permit will cover stormwater runoff from state highways, rest areas, weigh stations, scenic view points, park and ride lots, ferry terminals, and maintenance facilities. Upon issuance, this permit will replace WSDOT’s existing coverage under the Phase I MS4 general permits.

TMDL reviewed (year approved): Swamp Creek TMDL (2006)

TMDL Pollutants Addressed: Fecal coliform

Permitted Stormwater Source(s) Identified by TMDL: MS4s (Phase I and II)

Permit(s) Reviewed: Draft Phase II MS4 General Permit (Western Washington); Construction General Permit (state-wide); and Industrial General Permit (state-wide)

TMDL Findings: The following findings were noted about the TMDL reviewed and used to ascertain the level of connection between the TMDL and permits:

- WLAs were developed for permitted stormwater sources; each permittee was assigned a percent reduction of fecal coliform.
- The Simple Method was used to develop WLAs.
- The TMDL includes specific BMP requirements to address Pollution Source Control Activities, Public Involvement, TMDL Activity Documentation & Tracking, Public Outreach & Education, Water Quality Monitoring, Coordination of SW Management Activities, and Illicit Discharge Detection and Elimination.
- The TMDL requires that TMDL Effectiveness Monitoring be done and recommends that Source Detection Monitoring and some Special Purpose Studies be conducted as well.
- The TMDL states that *“In order to gauge the progress of this TMDL, Ecology will convene a meeting of municipal stakeholders no less than annually to share information on the state of water quality in the watershed and status of implementation activities. Water quality data, trends (where applicable), regulatory changes, new and innovative concepts, and funding sources will be discussed to evaluate the overall status of the TMDL. Ecology will solicit input from the workgroup at this time to help direct the*

adaptive management of this TMDL. Ecology will track implementation no less than annually using the tracking table in Appendix E and through municipal stormwater permit program audits.”

NPDES Permit Findings: The following findings were noted about the permits reviewed and used to ascertain the level of connection between the TMDL and the permits:

- The draft Phase II MS4 General Permit for Western Washington (Appendix 2) contains the list of all TMDLs in Western Washington that include more specific requirements than those found in either the Phase I or Phase II permits. The potential permittees that these would apply to are listed with each TMDL in the appendix as well.

The Appendix is in draft form; it does not contain all TMDLs and does not contain the Swamp Creek TMDL, but once finalized will contain all TMDLs.

[\[Link to permit language\]](#)

- Phase II MS4 General Permit (Appendix 2) requires that SWMPs must specify the BMPs that will be used to meet the permit and TMDL requirements. The final permit will list all TMDLs and specific requirements from the implementation plans.
- Phase II MS4 General Permit (Appendix 2) describes specific monitoring requirements for permittees discharging into specific TMDL areas. Monitoring is required to characterize streams (determine high priority areas and locate sources) and to determine if the waterbody is meeting standards.
- The Construction General Permit (state-wide) states that where a TMDL specifically precludes or prohibits discharges from construction activity, the construction site operator is not eligible for coverage under the permit.
- The Construction General Permit requires compliance with TMDLs for turbidity, fine sediment, high pH, phosphorus, or other applicable parameters for covered construction projects.
- Construction projects discharging to these streams must verify, through sampling and analysis, that discharges are not causing or contributing to violations of water quality standards.
- The Construction General Permit requires additional monitoring for projects that discharge to waterbodies with TMDLs for turbidity, fine sediment, high pH, or phosphorus. [\[Link to permit language\]](#)
- The Industrial General Permit does not cover facilities discharge into a waterbody with a TMDL unless an adequate level of protection is provided to comply with the TMDL. [\[Link to permit language\]](#)
- The Industrial General Permit requires that dischargers comply with any applicable water-quality based requirements for TMDL streams – either loading or concentration based limits. Existing facilities that exceed the limits will be put under a compliance schedule to implement necessary BMPs to assure compliance; new facilities must meet the limits immediately.

[\[Link to permit language\]](#)

- The Industrial General Permit Requires that the SWPPP document steps to compliance for existing facilities and include the steps taken to gain compliance.
- The Industrial General Permit has specific monitoring requirements for facilities that discharge into 303(d) listed streams or those subject to a TMDL.

[\[Link to permit language\]](#)

Conclusions: Review of the selected TMDL and general permits reveal that a bridge exists between TMDL and permit requirements. The TMDL makes specific references to MS4 permit requirements (BMPs, monitoring, reporting) and the permit reciprocates by including these requirements and referencing specific TMDLs. A noteworthy feature of the Phase II MS4 general permit is the appendix that contains specific monitoring requirements for permittees that discharge to specific TMDL areas because Phase II MS4 permits typically do not contain monitoring requirements. In addition, both the construction and industrial general permits require compliance with TMDLs. The industrial general permit requires any permittees exceeding water quality-based requirements for impaired waters with approved TMDLs to implement BMPs to achieve compliance. Both the industrial and construction general permits require permittees to demonstrate compliance with TMDLs and water quality standards.

Federal General Permit Findings

Where a state is not authorized to administer the NPDES stormwater program, USEPA serves as the NPDES permitting authority and has the responsibility for developing and issuing stormwater permits. USEPA has developed and issued a construction general permit and has recently proposed a multi-sector general permit for stormwater discharges associated with industrial activities. These permits were reviewed for this report. Relevant findings are summarized below.

Construction General Permit

- Part 9 of the Construction General Permit addresses stormwater discharges to impaired waterbodies with and without approved TMDLs. Requirements vary for permittees depending on whether the construction activity is moderate or low risk and whether the TMDL contains a specific WLA. [\[Link to permit language\]](#)

Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity

- The proposed permit addresses requirements for stormwater discharges to impaired waterbodies with and without an approved TMDL. [\[Link to permit language\]](#)
- Monitoring requirements for permitted stormwater discharges to impaired waterbodies also vary based on whether the permittee is subject to a TMDL with a specific WLA. [\[Link to permit language\]](#)

SECTION THREE: CHALLENGES AND RECOMMENDATIONS

The previous section provides an analysis of current approaches to TMDL and stormwater permitting connection from a sample of states. The review of current state approaches, as well as discussions among Region 5 states at the 2006 workshop, highlighted existing challenges and

potential recommendations for addressing these challenges. As stated throughout this report, the challenges and recommendations identified in this section are likely to evolve over time as discussions and efforts continue in the near-term.

Challenge 1: Addressing Obstacles Related to Organizational Structure and Internal Processes

The process of bridging of TMDLs and stormwater permitting begins with communication and coordination among internal programmatic staff. Often this is challenging for agency staff for a variety of reasons. In most instances, TMDL and NPDES permitting staff function not only in different programs, but in different organizational groups. In some states, TMDL program staff reside within one state agency and stormwater permitting staff reside in a sister agency. Organizational structures can often create real and perceived obstacles for effective staff coordination. In addition to organizational issues, agency staff might face programmatic pressures (e.g., court ordered deadlines, permit reissuance schedules) that create hurdles for effective coordination. In addition, TMDL and permitting schedules might not be synchronized, e.g., a TMDL may be completed and approved early in the permit cycle for a stormwater permit(s).

During the 2006 workshop, Region 5 states and guest speakers representing Vermont, Washington, and the City of Portland, Oregon discussed challenges related to delineating responsibilities among programmatic staff. For example, review of SWMPs and SWPPPs is historically a stormwater permit staff responsibility. However, when these plans address an impaired waterbody, should TMDL staff become involved in the review and approval process? Additional questions regarding internal coordination and responsibilities raised by the group include the following:

- At what point should TMDL and stormwater staff initiate coordination?
- Who understands if "standard" SWMPs and SWPPPs will be sufficient for restoring uses, or if more rigorous control measures may be needed? Who can specifically define what additional control measures may be needed?
- Should stormwater TMDLs or implementation plans be "handed off" to stormwater permit staff for development and implementation?
- Should stormwater TMDLs start at the permit and work backwards?
- Should TMDL staff get involved in permitting activities (review of notices of intent forms, SWPPPs/SWMPs, annual reports)?

Recommendations for addressing this challenge were identified by the states participating in the summary process, as well as Region 5 states, through their current approaches to resolve internal organizational issues. For example, in the State of Vermont, TMDL staff hand off stormwater TMDL development and implementation to stormwater staff. Stakeholders participate in the development of implementation strategies in several states, including Minnesota and Virginia. In Minnesota and Tennessee, the state agencies have recently created new positions intended to promote successful stormwater management implementation and connection to the TMDL program, as well as other related requirements. Oregon assigns one person to coordinate TMDL development and permitting within one watershed, although that one person might not necessarily be responsible for actually developing the TMDLs or crafting permit language.

Different approaches will work best in different states, but it appears agencies may need to take specific steps to ensure effective coordination between TMDL and stormwater staff, which will then contribute to effective bridges between TMDLs and permits. The group participating in the 2006 workshop indicated that the idea of using a joint TMDL and stormwater permitting team approach, a concept currently under discussion in the State of Ohio, seemed to be potentially feasible.

Challenge 2: Developing Equitable and Consistent WLAs for Permitted Stormwater Sources

From a technical perspective, TMDL and stormwater permitting connection begins with the development of WLAs that are more suitable to translate into permits. The summary process revealed approaches for developing WLAs for stormwater sources are highly variable. Many states use a land-use based process for establishing WLAs for regulated MS4s. This type of approach often results in a rather generalized WLA that might not allow for separate and equitable allocations among multiple permitted MS4s in a watershed. Depending on the type of data available, this approach might also assign a WLA to an entire municipality, even though only a portion of the municipality is actually served by a regulated MS4. In addition, this approach does not take into consideration existing structural and non-structural BMPs that permittees might have in place to address the pollutant of concern at the time of TMDL development. A land-use based approach is often used due to a lack of adequate discharge monitoring data to quantify the pollutant load associated with a stormwater discharge. Better data would likely allow TMDL staff to generate more realistic and equitable WLAs for specific permitted stormwater sources.

In addition to separate and equitable allocations, permitted dischargers also have a need for consistency in the methodology and expression of WLAs. Some permitted dischargers, particularly MS4s, might be located in a watershed that is impaired by several parameters and has multiple TMDLs with varied WLAs endpoints (e.g., required loading reduction measured in percent overall or in actual pounds). This type of scenario creates challenges for permitted dischargers to develop and implement effective stormwater management programs and gauge their progress toward achieving WLAs.

It appears as if a majority of states are currently using land use estimates for urban/developed land to generate WLAs for MS4s. Some states go a step further and use land use coverages of MS4s to determine the proportion of the urban/developed area in a watershed that falls within the MS4 boundary. It is important to note that the MS4 boundary should be defined as the portion of a municipality that is served by a regulated municipal separate storm sewer system – not necessarily the entire area within the actual municipal boundary. This approach is dependent on the state or the local MS4s having this type of land use coverage of the MS4s.

In the State of Virginia, future MS4 permits are likely to contain requirements for discharges to impaired waterbodies – not just those with approved TMDLs. As a result, permitted dischargers might be required to conduct monitoring for the pollutant(s) of concern and compile data on existing structural and non-structural BMPs. This information will assist TMDL staff in developing WLAs that reflect current conditions within the MS4 boundary. This type of approach would be ideal in moving away from aggregate WLAs based on land use estimates to more refined WLAs. Where permittees cannot provide this level of data, TMDL staff could consider developing phased TMDLs that assign an initial WLA using the best available data and

set a schedule to develop revised TMDLs using additional data. The TMDL and associated stormwater permit(s) would then specify requirements for monitoring and other data collection activities (e.g., BMP identification and pollutant reduction estimates) to inform subsequent TMDL development activities.

Recommendations for improving WLA development include:

- Using data and information collected by permittees discharging to impaired waterbodies prior to TMDL development to assist with future TMDL development activities.
- Developing land-use based WLAs for TMDLs, and using subsequent monitoring data, generated in response to stormwater permit requirements, to demonstrate progress towards TMDL targets. If subsequent data demonstrate that the WLAs are not sufficient, revising the TMDL with allocations lowered to ensure attainment of targets will be necessary
- Refining aggregate WLAs based on land use estimates for urban/developed land using specific land use coverages to determine the percentage of land area within the regulated MS4 boundary.

Challenge 3: Developing TMDL Implementation Plans and Creating a Strong Bridge with Stormwater Permits

Once the WLA for a permitted stormwater source is developed, the next challenge is ensuring that the approved TMDL is “implementable.” Although there is no federal requirement for USEPA to review and approve an implementation plan with a TMDL, many states do conduct some form of implementation planning. For other states, implementation plans are not considered a programmatic priority. As a result, TMDL staff often do not have sufficient time or resources to develop strong implementation plans to assist in achieving the allocations identified in the TMDL.

Participants at the 2006 workshop raised several issues related to developing implementation plans and creating a strong bridge with stormwater permit requirements. Issues include whether to develop implementation plans during or after TMDL development; inclusion of BMP performance standards and goals in implementation plans versus a permit compliance presumptive approach; use of adaptive management to achieve WLAs through stormwater management implementation; and specification of monitoring and data needs in implementation plans. It is important to note that USEPA guidance per the 2002 TMDL WLA Memorandum states that NPDES permit conditions must be consistent with the assumptions and requirements of available WLAs; therefore, it is recommended that agencies consider including monitoring and data needs and BMPs needed to achieve need loading reductions as part of the WLA to give NPDES stormwater permit writers the mechanism and authority to include additional requirements.

Recommendations for bridging TMDLs with stormwater permits include specifying requirements for permittees in the WLA and providing supplemental guidance and resources for achieving the WLA requirements in implementation plans. Requirements addressed in WLAs and supported by implementation plans could include one or more of the following:

- Defining and requiring the implementation of additional BMPs (i.e., beyond the standard measures required of stormwater permittees) to address specific pollutants of concern;

- Conducting additional monitoring (e.g., stormwater discharge, BMP, ambient) and inspections;
- Reviewing and modifying the existing SWPPP or SWMP and provide documentation to demonstrate compliance with WLA;
- Meeting BMP performance standards to ensure presumptive approach based on permit compliance will result in achieving the WLA;
- Assessing progress toward qualitative benchmarks;
- Implementing specific requirements for discharges to unimpaired waters that cause or contribute to impairment (e.g., one linear mile upstream from impaired waterbody);
- Implementing tiered requirements for discharges to impaired waterbody with and without an approved TMDL, as well as an approved TMDL that contains a specific WLA; and
- Conducting frequent monitoring and reporting to support adaptive management during and beyond permit term to demonstrate BMP effectiveness and progress toward achieving the WLA.

Challenge 4: Reconciling Spatial Boundaries of Impaired Waterbodies with Boundaries of Permitted Stormwater Sources

Bridging the TMDL and NPDES stormwater programs involves overcoming spatial challenges faced by regulatory agencies and permittees. There are a variety of spatial boundaries to consider. The TMDL program often provides information on impaired waters by waterbody or watershed. The NPDES stormwater program focuses on site-specific activities (e.g., construction sites and industrial facilities) and large stormwater conveyances systems (e.g., MS4s). The different spatial-scales at which regulatory agencies provide information to, and require information from, permittees can create challenges as permittees attempt to identify applicable requirements and determine the appropriate locations to implement the requirements.

Permittees are likely to know the name of the receiving waterbody to which they discharge, but might find it difficult to take that information and determine if the waterbody is on the state's 303(d) list, the causes and sources of impairment, and the status of TMDL development. States have taken a variety of steps to assist permittees in making these determinations. For example, the State of Maine incorporated a list of waterbodies impaired by urban runoff in the MS4 general permit as an appendix. Among the information that the appendix provides is the impaired segment name and the name of the municipality in which the impaired segment is located. The State of Maine also provides permittees with a series of maps, listed by municipality, that delineate the approximate watershed boundaries of urban impaired streams. It is then up to permittees to use their knowledge of their regulated construction site, industrial facility, or MS4 to determine if stormwater discharges to the impaired stream watershed. Pennsylvania provides a web-based tools for searching lists of impaired waterbodies and associated TMDLs by county. Permittees can identify impaired waters in the appropriate watershed or county; however, the information is not provided by municipality to help permittees get a step closer to determining if their regulated stormwater runoff actually discharges to the impaired waterbody.

Stormwater permit applications, such as the one used for the MS4 general permit in Tennessee, often ask applicants to state whether their stormwater runoff discharges to a 303(d) listed waterbody and if the listed waterbody has an approved TMDL. Although the permit application might ask for this information, states don't always provide applicants with guidance on how to

obtain this information to complete the permit application. For example, Tennessee asks for this information but does not provide any instructions for completing the form. In Oregon, MS4 general permit applications ask permittees to provide the name of receiving waterbodies; draft Phase II MS4 general permits are then tailored to include the names of the applicable watersheds to which the MS4 discharges and general information on approved TMDLs with wasteload allocations that affect the MS4.

Once a permittee identifies the applicable impaired waterbodies affected by stormwater discharges, the challenge then becomes determining where to implement particular BMPs to address the impairment. This is particularly complex for an MS4 that has several impaired waterbodies or watersheds within the MS4 boundary and has more than one WLA for more than one pollutant. This type of situation requires the permittee to not only have information on BMP effectiveness, but also have tools to determine the most appropriate location for BMPs to achieve the various applicable WLAs. The State of Vermont has invested in the development of a BMP optimization tool that helps permittees determine where to place particular BMPs so as to minimize cost and maximize pollutant load reductions. Other states have similar tools under development.

Recommendations for addressing challenges related to spatial boundaries include:

- Developing general permit applications that provide permittees with detailed instructions on how to determine the name and location of receiving waterbodies, whether the waterbody is on the state's 303(d) list, and the TMDL development status.
- Providing lists of waterbodies impaired due to stormwater sources as attachments to stormwater permits that include information on affected counties and municipalities.
- Providing maps (or the necessary GIS data layers for permittees to create maps) that show the watershed boundaries of urban impaired streams and municipal jurisdictional boundaries. Permittees could use these maps, or GIS data layers, to overlay with the maps of their construction sites, industrial facilities, or MS4 boundaries. It would be important to include key information on such maps, including waterbody name.
- Requesting permittees to provide minimal information during the application process (e.g., name of receiving water; latitude and longitude of regulated activity, facility, or MS4) and providing permittees with the information they need to know about the impaired waterbodies to which they discharge.
- Developing computer tools to help permittees determine the most desirable location to install and implement BMPs within the boundary of a regulated construction site, industrial facility, or MS4 to make progress toward achieving applicable WLAs.

Challenge 5: Incorporating Monitoring, Tracking, and Adaptive Management Requirements in WLAs and Stormwater Permits

Monitoring and evaluation are key components to determining if stormwater management efforts are producing the necessary pollutant load reductions as required in approved TMDLs and making progress toward attainment of water quality standards. Many of the TMDLs reviewed do not address the need for additional monitoring or, if the need is mentioned, the type and frequency of monitoring necessary to demonstrate progress are not specified or required. Not all stormwater permittees are required to conduct any type of monitoring or assess stormwater management efforts to quantify progress toward improving water quality. Regulatory agencies

must consider the type and frequency of monitoring that is necessary to assess pollutant load reductions (i.e., BMP performance monitoring and stormwater discharge monitoring) and improvements in water quality conditions (i.e., ambient water quality monitoring) as part of the TMDL development process. In addition, regulatory agencies should develop an adaptive management approach for permittees to improve SWMPs and SWPPPs based on monitoring data results. The adaptive management approach might include frequent monitoring and reporting during and beyond the five-year permit term to demonstrate BMP effectiveness and progress toward achieving the WLA.

In addition to determining the appropriate monitoring, tracking, and adaptive management requirements, regulatory agencies are faced with the challenge of how to ensure consistency between TMDLs and stormwater permits. To effectively bridge TMDLs and stormwater permits, the WLA for permitted stormwater sources should specify the necessary monitoring, tracking, and adaptive management requirements and the relevant stormwater permits should either reference the requirements listed under the WLA or explicitly state the same requirements in the appropriate portions of the stormwater permit. While federal regulations state that NPDES permits must contain requirements that are consistent with WLAs, some states fear that incorporating monitoring requirements into stormwater permits that do not currently require monitoring (e.g., Phase II MS4 general permits) will be challenging if not authorized by state regulations. States will likely have to discuss this type of issue with in-house legal counsel and determine if regulatory modifications to support monitoring requirements would be necessary.

The requirement for permittees to develop benchmarks, defined as estimates of future pollutant load reductions, is used in permits issued by Georgia and Oregon as tools for assessing progress and determining if adjustments to existing SWMPs and SWPPPs are necessary to further reduce pollutant loads. The Columbia Slough TMDL that affects the City of Portland (Oregon) requires implementation of BMPs (not specified) to achieve the WLAs and monitoring to demonstrate that the BMPs achieve the WLA. The most recent Phase I MS4 permit for the City of Portland requires the development and implementation of a monitoring program, benchmarks, BMP performance measures, as well as interim evaluation reporting and adaptive management activities. The monitoring program is intended to track the long-term progress of the SWMP towards achieving improvements in receiving water quality, including progress towards meeting benchmarks and performance measures associated with TMDL constituents. The City of Portland addresses this requirement through ambient, outfall discharge, and BMP performance monitoring. Information from these monitoring activities are part of frequent program evaluations. If the City of Portland does not achieve the benchmarks it has developed, the permit requires the permittee to use an adaptive management approach that includes proposing and implementing changes to their program based on monitoring data. Oregon DEQ is in the process of incorporating similar benchmarking requirements into Phase II MS4 general permits.

Recommendations for addressing these challenges include incorporating requirements into WLAs and stormwater permits that would facilitate monitoring, tracking and adaptive management such as:

- Monitoring BMP performance and developing BMP performance standards.
- Monitoring ambient water quality and stormwater discharges, developing pollutant load reduction benchmarks, and conducting interim evaluations using monitoring data.

- Allowing permittees to propose and implement adjustments to existing stormwater management efforts based on monitoring data.

A review of state regulations may be necessary to determine if modifications are required to support the inclusion of these types of monitoring requirements for permitted stormwater sources.

SECTION FOUR: CONCLUSIONS AND NEXT STEPS

This summary highlights efforts underway to bridge the TMDL and stormwater programs to address waterbodies impaired by stormwater runoff. However, examples of TMDLs and stormwater permits with strong connections exist mostly on a case-by-case basis and not due to overarching state policies or guidance on the nuances of developing a TMDL that is easy to understand and implement by permitted stormwater sources.

Discussions with state TMDL and stormwater permitting staff consistently included an acknowledgment of the need to improve current technical and programmatic practices. In addition, states cited the need for additional guidance and an interest in examples of effective approaches. The findings from this report is a pre-cursor to a handbook for developing and implementing TMDLs for water bodies impaired due to stormwater sources that USEPA plans to initiate in Spring 2007. This Handbook will specifically address the development of effective TMDLs and stormwater permits to ensure consistency and successful implementation. The Handbook will identify alternative approaches and provide example language for federal and state staff working on TMDLs and stormwater permits.

REFERENCES

- ENSR Corporation (ENSR). 2006. *Stormwater TMDL Implementation Support Manual*. Westford, Massachusetts.
- U. S. Environmental Protection Agency (USEPA). 1996. *Overview of the NPDES Stormwater Program*. U.S. Environmental Protection Agency, Washington D.C.
- U.S. Environmental Protection Agency (USEPA). 2004. *National Pollutant Discharge Elimination System (NPDES) Stormwater Program Questions and Answers*. January 21, 2004. (Revised December 17, 2004).

**APPENDIX A:
TMDL and NPDES Stormwater Permit Language Excerpts**

California

Los Angeles County MS4 NPDES Permit

28. *The Regional Board adopted the Santa Monica Bay Beaches Dry Weather TMDL for Bacteria (hereinafter “Dry Weather Bacteria TMDL”) on January 24, 2002. The TMDL was subsequently approved by the State Board, the Office of Administrative Law (OAL), and the USEPA and became effective on July 15, 2003.*

29. *The Waste Load Allocations (WLAs) in the Dry Weather Bacteria TMDL are expressed as the number of allowable days that the Santa Monica Bay beaches may exceed the Basin Plan water quality objectives for protection of Water Contact Recreation (REC-1) in marine waters, specifically the water quality objectives for bacteria. Appropriate modifications to this order are therefore included in Parts 1 (Discharge Prohibitions) and 2 (Receiving Water Limitations), pursuant to 40 CFR 122.41(f) and 122.62, and Part 6.I.1 of this Order. Additionally, 40 CFR 122.44(d)(1)(vii)(B) requires that NPDES permits be consistent with the assumptions and requirements of any available waste load allocation. Tables 7-4.1, 7-4.2a, and 7-4.3 of the Basin Plan set forth the pertinent provisions of the Dry Weather Bacteria TMDL. They require that during Summer Dry Weather there shall be no exceedances in the Wave Wash of the single sample or the geometric mean bacteria objectives set to protect the Water Contact Recreation (REC-1) beneficial use in marine waters. Accordingly, a prohibition is included in this Order barring discharges from a MS4 to Santa Monica Bay that result in exceedance of these objectives. Since the TMDL and the WLAs contained therein are expressed as receiving water conditions, Receiving Water Limitations have been included in this Order that are consistent with and implement the zero exceedance day WLAs.*

30. *Pursuant to federal regulations at 40 CFR 124.8, and 125.56, a Fact Sheet was prepared to provide the basis for incorporating the Dry Weather Bacteria TMDL into this Order. The Fact Sheet is hereby incorporated by reference into these findings.*

31. *The iterative approach to regulating municipal stormwater is not an appropriate means of implementing the Santa Monica Bay beaches Summer Dry Weather WLAs for any and all of the following reasons: (a) The WLAs do not regulate the discharge of stormwater; (b) The harm to the public from violating the WLAs is dramatic both in terms of health impacts to exposed beachgoers, and the economic cost to the region associated with related illnesses; (c) Despite the fact that more than a decade and a half has passed since MS4 permittees were required to eliminate illicit connections/discharges (IC/ID) into their MS4s, their programs have not eliminated standards violations at the beaches; and (d) Few permittees have ever documented revisions to their SQMP to address chronic exceedances of water quality standards.*

Georgia

Phase II MS4 General Permit

D. Stormwater Management Modifications

1. The SWMP may be modified by the permittee at any time. Written notification of substantial SWMP modifications must be submitted 30 days prior to implementation of the SWMP modification.

2. EPD may require the permittee to modify the SWMP as needed to:

a. Include more stringent requirements as necessary to comply with new State or Federal statutory or regulatory requirements;

b. Include other conditions deemed necessary by the Director to comply with the goals and requirements of the CWA and the State Act. The Director's request for modifications shall be made in writing and set forth a time schedule for the permittee to develop the modification(s), and offer the permittee the opportunity to propose alternative SWMP modifications to meet the objective of the requested modification.

General Permit for Stormwater Discharges Associated with Industrial Activity

C. Discharges Into, Or Within One Mile Upstream Of And Within The Same Watershed As, Any Portion Of An Impaired Stream Segment.

An operator is not eligible for coverage under this permit for discharges of stormwater associated with industrial activity to waters of the State for which a Total Maximum Daily Load (TMDL) is approved prior to or during the term of this permit, unless the facility develops, implements, and maintains a SWP3 that is consistent with the TMDL. The SWP3 must specifically address any conditions or requirements included in the TMDL that are applicable to the operator's discharge within the timeframe specified in the TMDL. If the TMDL establishes a specific numeric wasteload allocation that applies to an operator's discharge, or to stormwater discharges associated with industrial activity in general, then the operator must incorporate that allocation into the facility's SWP3 and implement all necessary measures to meet that allocation.

Any operator who intends to obtain coverage under this permit for stormwater discharges associated with industrial activity into an Impaired Stream Segment, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment, identified as "partially supporting" or "not supporting" designated uses on Georgia's most current 303(d) list, must satisfy the requirements of Part III.C of this permit if the pollutant(s) of concern for which the Impaired Stream Segment has been listed may be exposed to stormwater as a result of current or previous industrial activity at the facility. Those discharges that are within one (1) linear mile of an Impaired Stream Segment, but are not located within the watershed of any portion of that stream segment are excluded from this requirement. Georgia's 303(d) list can be viewed on EPD's website at www.gaepd.org.

1. Discharges into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment Impaired by substances other than fecal coliform.

a. Sampling schedule.

Regulated industrial facilities that are subject to the requirements in Part III.C.1. of this permit must conduct stormwater discharge sampling for the pollutant(s) of concern two times per quarter for a period of twelve (12) months. The pollutant(s) of concern for each impaired stream segment are identified on Georgia's 303(d) list. The sampling will only be required for those outfalls at the facility that have the potential to discharge the pollutant(s) of concern. The sampling must be conducted in accordance with Parts VI.A.3, 4, and 5 of this permit, except that composite samples may be collected in lieu of grab samples at the permittee's discretion. The Director may require composite or grab sampling where deemed appropriate in order to ensure that representative samples are collected.

Except as provided below, the sampling must begin no later than ninety (90) days after the later of the effective date of the permit or the date the facility becomes subject to the sampling requirements in Part III.C. However, if a facility with an existing stormwater discharge associated with industrial activity determines that additional time is needed to design and implement new or improved BMPs specifically for the pollutant(s) of concern, then that facility may delay commencement of the sampling program under this section of the permit for no more than twelve (12) months after the effective date of the permit in order to design and implement those BMPs. Facilities choosing this option must, no later than the date on which the Part III.C sampling would otherwise begin, provide a written notification, signed in accordance with Part VII.G of this permit, to EPD that they have elected to delay sampling and provide a schedule for BMP implementation. The Part III.C sampling program must begin immediately after the BMPs are required to have been implemented according to the schedule provided to EPD.

A summary of the sampling results must be submitted to EPD's Watershed Protection Branch with the Annual Report (see Appendix B of this permit). The report must also identify the applicable benchmark value(s) and state whether the facility has passed or failed the benchmark requirement for the twelve (12) month sampling period.

If a facility is unable to conduct one or both of the Part III.C sampling event(s) during a certain quarter due to adverse climatic conditions (i.e. no qualifying rainfall event occurs), then the facility shall include a written explanation for the absence of the sampling event in the next Annual Report submitted to EPD.

b. *Applicable Benchmark Values.*

The applicable benchmark values for discharges into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment shall be the same numeric value as the Instream Water Quality Criterion for the pollutant(s) of concern as specified in Georgia's Rules and Regulations for Water Quality Control (Georgia Rule 39136. 03) unless otherwise established in Part III.C of this permit. The benchmark values are designed to assist permittees in determining if the BMPs established in a facility's SWP3 are effective in minimizing the concentration of the pollutant(s) of concern in stormwater discharge(s) from their facility. These benchmark values are intended to be guideline concentrations rather than numeric effluent limitations or permit conditions. The exceedance of a benchmark value established in Part III.C of this permit is not a permit violation and does not of itself indicate a violation of instream water quality standards. However, an exceedance of a benchmark value may be used in conjunction with other information to demonstrate a violation of this permit or a violation of water quality standards.

(1). Specific requirements for discharges into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment impaired for DO (Dissolved Oxygen).

Facilities discharging into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment for which the listing criterion is identified as DO (Dissolved Oxygen) will only be required to conduct sampling under Part III.C if industrial materials that may contribute Five Day Carbonaceous Biochemical Oxygen Demand (CBOD5) or ammonia (NH3) may be exposed to stormwater as a result of current or previous industrial activity at the facility. These facilities must sample for Five Day Carbonaceous Biochemical Oxygen Demand (CBOD5) and NH3. The applicable benchmark value for these discharges shall be an Ultimate Oxygen Demand (UOD) of 125 mg/l. The UOD shall be calculated as $[(CBOD5 \times 1.5) + (NH3 \times 4.57)]$.

(2). Specific requirements for discharges into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment impaired by nonpollutant specific criteria.

(i). Facilities discharging into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment for which the listing criterion is identified as "Biota or Sediment" are required to conduct sampling for Total Suspended Solids (TSS) unless a TMDL has identified a different pollutant from nonpoint sources as causing the impairment, in which case sampling should be conducted for the pollutant(s) identified in the TMDL. The applicable TSS benchmark value for these discharges shall be 100 mg/l.

(ii). Facilities discharging into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment for which the listing criterion is toxicity, FCG (fish consumption guidelines), SB (shellfishing ban), CFB (commercial fishing ban) or TWR (trophic weighted residue value of mercury in fish tissue)" will only be

required to conduct sampling under Part III.C if a TMDL identifying a specific water quality parameter has been approved for the stream segment.

c. Evaluation of Part III.C sampling data

The Part III.C stormwater discharge sampling is intended to measure the effectiveness of the Best Management Practices (BMPs) implemented at those facilities. If benchmark values are exceeded using the pass/fail determination provided below, then improved or additional BMPs are required at the facility.

The sampling data for the twelve (12) month period must be evaluated using one of the following criteria. This shall constitute the pass/fail determination for evaluating BMP effectiveness:

(1). At least seventy-five (75) percent of the samples collected during the twelve (12) month period do not exceed the applicable benchmark value(s); or

(2). The average of the samples collected during the twelve (12) month period does not exceed the applicable benchmark value(s).

If a facility meets at least one of the above criteria then that facility has passed the benchmark requirement and may discontinue the Part III.C sampling but must thereafter properly maintain all of the BMPs that enabled the facility to meet the benchmark requirement.

If a facility does not meet at least one of the above criteria, then that facility has failed the benchmark requirement. Those facilities that do not pass the benchmark requirement for the first twelve (12) month sampling period may take up to one year to budget, select, design and construct/implement additional supplemental BMPs at the facility. Once the supplemental BMPs have been implemented, an additional twelve (12) month (two samples per quarter) period of sampling must be conducted as described in Part III.C.1.a above. Those facilities that pass the benchmark requirement, using the above pass/fail determination, after implementing supplemental BMPs may discontinue the Part III.C sampling but must thereafter properly maintain all of the BMPs that enabled the facility to meet the benchmark requirement.

Facilities that are not able to pass the benchmark requirement, using the above pass/fail determination, after implementing supplemental BMPs must continue the process of implementing additional supplemental BMPs at the facility and conducting a subsequent twelve month (two samples per quarter) period of sampling until the facility meets the benchmark requirement using the pass/fail determination provided above. If a facility is unable to pass the benchmark requirement after the twelve (12) month sampling period following a second round of implementing supplemental BMPs, then EPD will determine what further action is required, which may include, but is not limited to, applying for an individual NPDES permit.

d. *Written justification to cease Part III.C sampling.*

If a facility provides a written justification after the first twelve (12) month period of sampling (or after any subsequent twelve (12) month period of sampling) and EPD concurs that the facility's stormwater discharges associated with industrial activity do not have a reasonable potential to cause or contribute to a violation of an instream water quality standard, then EPD may conclude that additional sampling under Part III.C is not required. Facilities that have passed the benchmark requirement are not required to submit a written justification in order to cease Part III.C sampling.

2. *Discharges into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment impaired for fecal coliform.*

Facilities discharging into, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment for which the listing criterion is identified as fecal coliform must adhere to the following conditions if industrial materials or activities that are potential sources of fecal coliform (as defined in Part IV.D.9 of this permit) are, or may be, exposed to stormwater at the facility during the term of this permit.

a. *List of BMPs for animal processing plants that may be potential sources of fecal coliform.*

A list of BMPs designed to reduce fecal coliform levels in stormwater runoff has been developed for animal processing plants that may be potential sources of fecal coliform. Other facilities may find this list to be useful as well. The list is provided in Appendix C of this permit.

b. *Sampling schedule.*

Regulated industrial facilities that are subject to the requirements in Part III.C.2 of this permit must conduct stormwater discharge sampling for TSS two times per quarter for a period of twelve (12) months. Two of the sampling events must include simultaneous testing of TSS and fecal coliform. The sampling will only be required for those outfalls at the facility that have the potential to discharge stormwater associated with industrial activity where industrial materials or activities that are potential sources of fecal coliform (as defined in Part IV.D.9 of this permit) are, or may be, exposed to stormwater at the facility during the term of this permit. The sampling must be conducted in accordance with Parts VI.A.3, 4, and 5 of this permit.

Except as provided below, the sampling must begin no later than ninety (90) days after the later of the effective date of the permit or the date the facility becomes subject to the sampling requirements in Part III.C. However, if a facility with an existing stormwater discharge associated with industrial activity determines that additional time is needed to design and implement new or improved BMPs specifically for the pollutant(s) of concern, then that facility may delay commencement of the sampling program under this section of the permit for no more than twelve (12) months after the effective date of the permit in order to

design and implement those BMPs. Facilities choosing this option must, no later than the date on which the Part III.C sampling would otherwise begin, provide a written notification, signed in accordance with Part VII.G of this permit, to EPD that they have elected to delay sampling and provide a schedule for BMP implementation. The Part III.C sampling program must begin immediately after the BMPs are required to have been implemented according to the schedule provided to EPD.

A summary of the sampling results for TSS and fecal coliform must be submitted to EPD's Watershed Protection Branch with the Annual Report (see Appendix B of this permit). The report must also identify the applicable benchmark value(s) and state whether the facility has passed or failed the benchmark requirement for the twelve (12) month sampling period.

If a facility is unable to conduct one or both of the Part III.C sampling event(s) during a certain quarter due to adverse climatic conditions (i.e. no qualifying rainfall event occurs), then the facility shall include a written explanation for the absence of the sampling event in the next Annual Report submitted to EPD.

c. Applicable Benchmark Value

A Total Suspended Solids (TSS) benchmark value of 100 mg/l will be used as a surrogate for evaluating fecal coliform levels in stormwater discharges associated with industrial activity. Fecal coliform sampling data collected simultaneously with TSS sampling data (as required in Part III.C.2.b) is not subject to the pass/fail determination for benchmark sampling as established in Part III.C.2.d below.

The TSS benchmark value is designed to assist permittees in determining if the implementation of the BMPs (as established in a facility's SWP3) is minimizing the concentration of the pollutant(s) of concern in stormwater discharge(s) from their facility. These benchmark values are intended to be guideline concentrations rather than numeric effluent limitations or permit conditions. The exceedance of a benchmark value established in Part III.C of this permit is not a permit violation and does not of itself indicate a violation of instream water quality standards. However, an exceedance of a benchmark value may be used in conjunction with other information to demonstrate a violation of this permit or a violation of water quality standards.

d. Evaluation of Part III.C sampling data.

The Part III.C stormwater discharge sampling is intended to measure the effectiveness of the Best Management Practices (BMPs) implemented at those facilities. If benchmark values are exceeded using the pass/fail determination provided below, then improved or additional BMPs are required at the facility.

The TSS sampling data for the twelve (12) month period must be evaluated using one of the following criteria. This shall constitute the pass/fail determination for evaluating BMP effectiveness.

(1). At least seventy-five (75) percent of the samples collected during the twelve (12) month period do not exceed the TSS benchmark value; or

(2). The average of the samples collected during the twelve (12) month period does not exceed the TSS benchmark value.

If a facility meets at least one of the above criteria then that facility has passed the TSS benchmark requirement and may discontinue the Part III.C sampling but must thereafter properly maintain all of the BMPs that enabled the facility to pass the TSS benchmark requirement.

If a facility does not meet at least one of the above criteria, then that facility has failed the TSS benchmark requirement. If a facility does not pass the TSS benchmark requirement for the first twelve (12) month sampling period then the facility may take up to one year to budget, select, design and construct/implement additional supplemental BMPs from the list provided in Appendix C, or other appropriate BMPs. Once the supplemental BMPs have been implemented at the facility, an additional twelve (12) month (two samples per quarter) period of sampling must be conducted as described in Part III.C.2.b above. Those facilities that pass the benchmark requirement, using the above pass/fail determination, after implementing supplemental BMPs may discontinue the Part III.C sampling but must thereafter properly maintain all of the BMPs that enabled the facility to pass the TSS benchmark requirement.

Facilities that are not able to pass the TSS benchmark requirement after implementing supplemental BMPs must continue the process of implementing additional supplemental BMPs from the Appendix C list, or other appropriate BMPs, (within twelve (12) months after the end of the previous twelve (12) month sampling period) and conducting a subsequent twelve month (two samples per quarter) period of sampling until the facility passes the benchmark requirement using the pass/fail criteria provided above.

e. Written justification to cease Part III.C monitoring.

If a facility provides a written justification, after the first twelve (12) month period of sampling (or after any subsequent twelve (12) month period of sampling), and EPD concurs that the facility's stormwater discharges associated with industrial activity do not have a reasonable potential to cause or contribute to a violation of an instream water quality standard, then EPD may conclude that additional sampling under Part III.C is not required. Facilities that have passed the benchmark requirement are not required to submit a written justification in order to cease Part III.C sampling.

f. Demonstration of appropriate BMPs.

If a facility with a stormwater discharge associated with industrial activity that may be a potential source of fecal coliform has implemented all technologically and economically feasible BMPs in the Appendix C list (for animal processing facilities), or other appropriate

BMPs (for other facilities), and is still unable to pass the TSS benchmark requirement, the owner or operator of that facility may submit a demonstration to EPD that the facility has properly designed, installed and maintained all of the BMPs that are technologically and economically feasible for the facility and still cannot meet the benchmark. If, after reviewing the demonstration and conducting a site inspection, EPD concurs with the facility's determination, then the facility will not be required to implement additional supplemental BMPs in order to comply with the permit. However, if new BMPs become technologically and economically feasible for the facility at a later date, then EPD may require the implementation of such BMPs at that time. EPD may also require an individual NPDES permit for a facility if that facility does not properly design, install and maintain technologically and economically feasible BMPs in a timely manner.

New Mexico

Phase I MS4 Permit for the City of Albuquerque

B. Area-specific Stormwater Management Program Requirements. Permittees are required to develop and implement measures necessary to bring the discharge into compliance with the Middle Rio Grande Total Maximum Daily Load (TMDL) for Fecal Coliform. Specific permit requirements to implement the TMDL are included in Part III, Table III.B. [Note: Table III.B. includes the implementation activities required, the co-permittees responsible and the schedule of compliance. The implementation activities in the table have been incorporated as text as follows:]

1.0 Source Categories. Develop and submit a list of potential categories of fecal coliform sources by watershed and watershed density (undeveloped, low, moderate, high), covering the entire permit area.

1.1 Legal Authority Evaluate adequacy of existing legal authority to implement the conditions included in this T able. Where existing ordinances are lacking, provide a schedule for obtaining the necessary legal authority. Ordinances shall be in place prior to the implementation of the programs.

2.0 Dry Weather Investigation. Develop and submit a dry weather field investigation program, by watershed, to identify and isolate fecal coliform sources that occur during dry weather so that they can be reduced/eliminated. The program shall address the sources identified in item 1.0 above. The program shall address the suitability of each of the following measures and shall include detailed description of activities and frequencies.

2.1 Low Density Watersheds:

2.1.1 Conduct dry weather channel survey

2.1.2 Conduct survey of septic systems (e.g. aerial, ground, etc.)

2.1.3 Conduct visual or tracer tests on suspected failing systems

2.1.4 Investigate recreational and seasonal sewage dischargers

2.1.5 Conduct ARA and study to determine whether fecal coliforms are of human or nonhuman origin

2.1.6 Test ditch or channel sediments to see if they are a bacteria source or reservoir

2.2 Moderate/High Density Watersheds:

2.2.1 Conduct dry weather channel survey

2.2.2 Test for Illicit connections

2.2.3 Check integrity of major trunk lines for cracks and leaks

2.2.4 Check for historic and unconnected septic systems

2.2.5 Conduct ARA and study to determine whether fecal coliforms are of human or nonhuman origin

2.2.6 Check ponds, lakes and impoundments for waterfowl concentrations

3.0 Wet Weather Investigation Develop and submit a wet weather field investigation program, by watershed, to identify and isolate fecal coliform sources that occur during wet weather so that they can be reduced/eliminated. The program shall address the sources identified in item 1.0 above. The program shall address the suitability of each of the following measures and shall include detailed description of activities and frequencies.

3.1 Low Density Watersheds

3.1.1 Inspect septic systems for wet-weather failure

3.1.2 Conduct comprehensive wet weather monitoring to isolate subwatershed hot spots

3.1.3 Submit results of the Antibiotic Resistance Analysis and the study to determine whether fecal coliforms are of human or nonhuman origin

3.1.4 Sample runoff from suspected source areas (e.g. hobby farms and livestock areas)

3.1.5 Test storm drain or channel sediments to see if they are a bacteria sink or source

3.2 Moderate/High Density Watersheds:

3.2.1 Check for chronic sanitary sewer overflows at specific manholes and /or pumping stations

3.2.2 Submit results of the Antibiotic Resistance Analysis and the study to determine whether fecal coliforms are of human or nonhuman origin

3.2.3 Conduct comprehensive wet weather monitoring to identify key source areas or subwatersheds

4.0 Submit certification of the full implementation of the dry and wet weather field investigation programs.

5.0 Fecal Coliform Reduction and Treatment Develop and submit a program for reducing or treating existing fecal coliform sources, by watershed and watershed density. The program shall address the sources identified in items 3.0 and 4.0 above. The program shall address the suitability of each of the following measures and shall include detailed description of activities and frequencies. Where activities are to be performed by entities other than the permittee, describe enforcement mechanism to be used to ensure compliance.

5.1 Low Density Watersheds

- 5.1.2 Rehabilitate failing septic systems*
- 5.1.3 Connect failing septic systems to sewer*
- 5.1.4 Increase septic system clean outs*
- 5.1.5 Retrofit stormwater ponds*
- 5.1.6 Retrofit ditches as dry swales*
- 5.1.7 Waterfowl management*
- 5.1.8 Install recreational vehicle sewage pumpouts*
- 5.1.9 Implement conservation plans at hobby farms*

5.2 Moderate/High Density Watersheds:

- 5.2.2 Eliminate illicit connections to storm sewer*
- 5.2.2 Rehabilitate existing sewer system to eliminate sanitary sewer overflows*
- 5.2.3 Relocate storm outfalls*
- 5.2.4 Disinfect at the end of pipe*
- 5.2.5 Retrofit stormwater ponds*
- 5.2.6 Retrofit ditches as dry swales*
- 5.2.7 Waterfowl harassment*
- 5.2.8 Enforce pet waste disposal*
- 5.2.9 Implement conservation plans at hobby farms*

6.0 Submit certification of the full implementation of fecal coliform reduction and treatment program.

7.0. Prevention of Future Fecal Discharges Develop and submit a program for preventing future fecal coliform discharges, by watershed. The program shall address at a minimum, the measures included below, with detailed description of activities and frequencies. Where activities are to be performed by entities other than the permittee, describe enforcement mechanism to be used to ensure compliance.

7.1 Low Density Watersheds

- 7.1.1 Land use management*
- 7.1.2 Stringent septic system requirements:*
 - 7.1.2.1 Feasibility criteria*
 - 7.1.2.2 Setbacks*
 - 7.1.2.3 Reserve field requirements*
 - 7.1.2.4 Minimum lot size*
 - 7.1.2.5 Technology criteria*
 - 7.1.2.6 Inspections*
 - 7.1.2.7 Maintenance requirements*
- 7.1.3 Stream/ ditches buffers and access restrictions*
- 7.1.4 Livestock fencing*
- 7.1.5 Wildlife control*
- 7.1.6 Land application criteria for biosolids*
- 7.1.7 Stormwater treatment for new development*
- 7.1.8 Public education*
- 7.1.9 Recreational vehicle and park sewage pump-out facilities*

- 7.2 Moderate/High Density Watersheds:*
- 7.2.1 New Sewer Testing*
 - 7.2.2 Inspection of new sewer hookups*
 - 7.2.3 SSO monitoring and prevention*
 - 7.2.4 Stormwater treatment for new development*
 - 7.2.5 Optimal stormwater outfall location*
 - 7.2.6 Engineered stream buffers*
 - 7.2.7 Pet Exclusion*
 - 7.2.8 Waterfowl control /management*
 - 7.2.9 Public education on pet waste*
 - 7.2.10 Transient sewage disposal*
 - 7.2.11 Septic system rehabilitation*

8.0 Submit certification of the implementation of the program to prevent future fecal coliform sources.

9.0 Monitoring Program Develop a monitoring program, in consultation with the State of New Mexico, to assess BMP effectiveness and compliance with Fecal Coliform TMDL at North Diversion Floodway Channel, San Jose Drain, South Diversion Channel and Tijeras Arroyo. Target values and equation for comparison of loadings are included in Table III.B.2 below. While developing this monitoring program, the permittees should take into account the frequency of storm events, and the variation in Fecal Coliform levels, within individual storm event. Collection and analysis of samples shall be conducted in accordance with Part V requirements. Results shall be submitted in Discharge Monitoring Report (DMR) forms.

10.0 Submit certification of the full implementation of the monitoring program to assess BMP effectiveness.

11.0 BMP Assessment Submit BMP evaluations and assessment, and revisions to the programs above if deemed necessary, based on monitoring data obtained.

12. 0 Annual TMDL Progress Reports The permittees shall submit annual reports describing progress on the activities required in Table III.B. to comply with the Fecal Coliform TMDL. The reports shall follow the requirements included in Part V.C, items 1, 4, 6 and 7, but shall be submitted separately from the Annual Report covering all other items of the permit. Results of the monitoring program shall be summarized in the Annual TMDL Progress Report and shall include graphic representation of fecal coliform trends. The Annual TMDL Progress Report shall also include computations of annual percent reduction achieved from the baseline loads and comparisons with the target loads.

Oregon

Columbia Slough TMDL

The DMAs will conduct monitoring of stormwater BOD5 loads and the instream response to those loads. Previous monitoring under the MS4 permits has measured BOD5 levels from urban runoff that do not correlate with the few instream BOD5 samples taken during storm events. The discrepancy between loads and instream concentration is likely due to processes such as deposition and decay during the transport to the receiving water. The monitoring data will be used to calibrate a dynamic water quality model to simulate the Slough's response to stormwater and deicing fluid. The DMA WLA will not be included as an effluent limit. Achievement of the WLA will be through implementation of BMPs. Municipal discharges will be required to implement BMPs and demonstrate that the BMPs achieve the WLAs established. The DMAs will be required, through MOAs, to:

- 1. Provide DEQ with a description of the program designed to reduce BOD5 loads to the Slough.*
- 2. Implement a program of BMPs that will reduce overall BOD5 load to achieve the DMA WLAs.*
- 3. Implement coordinated monitoring to define stormwater loads to the Slough and the influence of stormwater BOD5 on receiving water quality.*
- 4. Implement monitoring to demonstrate compliance with BOD5 WLA targets. Instream monitoring will include grab samples of BOD5 and DO and continuous hydrolab monitoring.*
- 5. Implement water quality management plans as developed as part of the Lower Willamette Subbasin plan (projected completion spring 1999).*

Phase I MS4 Permit for City of Gresham, City of Fairview, and Multnomah County

The requirements of this section [p. 17] apply to co-permittee's MS4 discharges to receiving waters with established TMDLs and associated allocations as noted on page 1 of this permit. It is the intent of this section to ensure that pollutant discharges for those parameters listed in the TMDL are reduced to the maximum extent practicable. Adequate progress toward achieving assigned wasteload allocations (WLAs) will be demonstrated through the implementation of best management practices that are targeted at TMDL related pollutants.

- i) Progress towards reducing TMDL pollutant loads must be evaluated by the co-permittee through the use of performance measures and pollutant load reduction benchmarks developed and listed in the SWMP.*

(1) Performance measures are estimates of the effectiveness of various best management practices (BMPs) implemented by the co-permittees as per the SWMP; and they are not numeric effluent limits. Performance measures must, where appropriate, be pollutant reduction estimates. The performance measures for the BMPs addressing TMDL pollutants may be based on the same metrics developed in accordance with the program effectiveness monitoring requirements in Schedule B(1)(c)(i).

(2) A benchmark is a total pollutant load reduction estimate for each parameter or surrogate, where applicable, for which a WLA is established at the time of permit issuance. A benchmark is used to measure the overall effectiveness of the stormwater management plan in making progress toward the wasteload allocation (this estimate will be related to the statistical variability of the underlying data and may be stated as a range), and is intended to be a tool for guiding adaptive management activities. A benchmark is not a numeric effluent limit; rather it is a goal that is subject to the maximum extent practicable standard. The co-permittee must provide the rationale for the proposed benchmark, which includes an explanation of the relationship between the benchmarks and the TMDL wasteload allocations. Any limiting factors related to the development of a benchmark, such as data availability and data quality, must also be included in this rationale.

ii) The SWMP must describe a program that includes BMPs, monitoring triggers, narrative conditions, or other elements, designed to achieve reductions in the TMDL pollutants. The SWMP must include a specific strategy for implementing monitoring designed to enable the co-permittee to gauge the effectiveness of the SWMP in reducing TMDL pollutant loads to the maximum extent practicable.

iii) When the co-permittee applies for permit renewal, the co-permittee must include an evaluation of the effectiveness of the stormwater management plan with respect to all pollutant parameters addressed in an applicable TMDL. This evaluation must assess progress towards meeting the pollutant load reductions (benchmarks) using the reporting and monitoring programs and other methods described in Schedules B(1), B(2) and D(2)(d)(v) of this permit. If the co-permittee has failed to meet the estimated pollutant load reductions during the permit term, they must use the adaptive management process described in Schedule D(2)(a) of this permit to reassess the SWMP and determine what additional or alternative BMPs are practicable. The co-permittee must update the SWMP to include these BMPs. The co-permittee must submit the evaluation and any SWMP revisions to the Department as specified in Schedule D(2)(d)(v).

iv) If within three (3) years following permit issuance a TMDL is approved by the Environmental Protection Agency (EPA) and the TMDL has wasteload allocations assigned to stormwater within the geographic area covered by this permit, the co-permittee must, at the time of the next permit renewal application, complete a review and strategy development, and propose changes, if appropriate, to the SWMP to address the urban stormwater discharges.

v) If, at the time of permit issuance, TMDL wasteload allocations have been established for pollutant parameters associated with the MS4's discharges, each co-permittee must, as appropriate, review their SWMP to determine its adequacy in reducing TMDL pollutant discharges to the maximum extent practicable and develop pollutant load

reduction benchmark(s) and performance measures in the SWMP as defined in Schedule D(2)(d)(i)(1) and (2). As part of the SWMP review and benchmark and performance measure development process, the co-permittee must document, and subsequently report in accordance with Schedule B(2)(b), the following information:

(1) A description of the methodology and rationale used to develop and select pollutant reduction benchmarks and performance measures. The methodology must address current estimated discharge loadings and TMDL wasteload allocations.

(2) Any proposed modifications to the SWMP resulting from the adaptive management process [Schedule D(2)(a)] necessary to give reasonable assurance that the SWMP is designed to reduce TMDL pollutants to the maximum extent practicable. This must include selection of BMPs and any assumptions related to the proposed BMPs.

(3) Any proposed modifications to the monitoring component of the SWMP that are necessary to ensure adequate data and information are collected to assess SWMP implementation, BMP effectiveness, progress towards the pollutant load reduction (4) A description of the public participation process, including a summary of material public comments and the responses to those comments.

The requirements of this section apply to receiving waters without established TMDL wasteload allocations. The co-permittee must qualitatively review the pollutants that are on the 2002 303(d) list that are relevant to the co-permittee's MS4 discharges. This review and corresponding summary of proposed actions must be incorporated into the interim evaluation report. The review and summary must accomplish the following:

i) Determine whether there is a reasonable likelihood for stormwater from the MS4 to cause or contribute to water quality degradation of receiving waters through the discharge of pollutants on the 2002 303(d) list. Provide the rationale for the conclusion, including the results of an evaluation.

ii) If the discharges from the MS4 is a contributor to specific listed pollutants, determine and describe the relationship between the 303(d) listed pollutant and the MS4 discharges.

iii) Determine whether the BMPs in the existing SWMP are effective to address the 303(d) pollutants. If not, describe how the plan could be adapted to more appropriately address these pollutants. A summary of the rationale for this determination must also be included in the report. If sufficient information is not available to make the determinations required above, the co-permittee must compile pertinent information necessary to adequately complete these determinations.

The Interim Evaluation Report is to include: i) An evaluation of, and proposed revisions to, the SWMP that addresses the requirements of Schedules D(2)(b) and B(1)(b), including the rationale supporting the proposed revisions. ii) A description of the current source identification components of the SWMP and the rationale regarding the adequacy of these components. iii) For each of the listed non-stormwater discharges [Schedule A(3)] expected to occur in a copermitee's area, the co-permittee must identify the

appropriate control measures and the rationale for the selection of these BMPs (or the rationale for why BMPs are deemed not necessary). iv) The required information regarding TMDL pollutants as described in Schedule D(2)(d)(v) and the corresponding proposed revisions to the SWMP, and/or the required information regarding 303(d) listed pollutants as described in Schedule D(2)(e) and the corresponding proposed revisions to the SWMP. v) An executive summary of the SWMP, no more than 15 pages in length, that describes the main elements of the SWMP. vi) Maps providing updated information as described in 40 CFR §122.26(d)(1)(iii)(B), where applicable.

Draft Phase II MS4 Permit

The requirements of this section apply to MS4 discharges to receiving waters with established TMDLs and associated wasteload allocations as noted on page 1 of this permit or if the permittee becomes subject to an approved TMDL, and following notice of such by the Department. If the permittee reduces applicable pollutant discharges for the parameters listed in the TMDL to the maximum extent practicable, this reduction is deemed to be adequate progress toward achieving assigned TMDL wasteload allocations (WLAs).

a) Progress towards reducing TMDL pollutant loads will be evaluated, in subsequent permit terms, by the permittee through the use of performance measures and pollutant load reduction benchmarks developed and listed in the SWMP.

(1) Performance measures are estimates of the effectiveness of various best management practices (BMPs) implemented by the permittee as per the SWMP; and are not numeric effluent limits. Performance measures must, where appropriate, be pollutant reduction estimates. If appropriate, the performance measures for the BMPs addressing TMDL pollutants may be based on the same metrics developed to determine progress towards measurable goals, as described in the SWMP.

(2) A pollutant load reduction benchmark is an estimate for each parameter or surrogate, where applicable, for which a WLA is established. A benchmark is used to measure the overall effectiveness of the stormwater management program in making progress toward the WLA (this estimate will be related to the statistical variability of the underlying data and may be stated as a range), and is intended to be a tool for guiding adaptive management activities. A benchmark is not a numeric effluent limit; rather it is a goal. The permittee must provide the rationale for the proposed benchmark, which includes an explanation of the relationship between the benchmarks and the TMDL wasteload allocations. Any limiting factors related to the development of a benchmark, such as data availability and data quality, must also be included in this rationale.

b) The permittee must use adaptive management, as described in Schedule A(3), to focus and refine SWMP elements to address TMDL wasteload allocation(s) over the course of this permit cycle.

c) If, at the time of permit issuance or within three (3) years of permit issuance, a TMDL establishes municipal stormwater wasteload allocations for pollutant parameters associated with the MS4's discharges, the permittee must develop and propose to the Department specific performance measures and pollutant load reduction benchmarks, as

described in Schedule D(2)(a). Performance measures and pollutant load reduction benchmarks must be submitted to the Department as part of the permit renewal package described in Schedule B(3).

Pennsylvania

Wissahickon Creek TMDL

The reference watershed approach is based on determining the current loading rates for the pollutants of interest from a selected unimpaired watershed that has similar physical characteristics (i.e., landuse, soils, size, geology) to those of the impaired watershed. The objective of this process is to reduce the loading rate of sediment (or other pollutant) in the impaired stream segment to a level equivalent to or slightly lower than the loading rate in the unimpaired reference stream segment.

Tennessee

Harpeth River E. coli TMDL

SWMPs must include a section describing how discharges of pollutants of concern will be controlled to ensure that they do not cause or contribute to instream exceedances of water quality standards. Specific measures and BMPs to control pollutants of concern must also be identified. In addition, MS4s must implement the WLA provisions of an applicable TMDL and describe methods to evaluate whether stormwater controls are adequate to meet the WLA. In order to evaluate SWMP effectiveness and demonstrate compliance with specified WLAs, MS4s must develop and implement appropriate monitoring programs. Instream monitoring, at locations selected to best represent the effectiveness of BMPs, must include analytical monitoring of pollutants of concern. A detailed plan describing the monitoring program must be submitted to the Division of Water Pollution Control Nashville Field Office within 12 months of the approval date of this TMDL. Implementation of the monitoring program must commence within 6 months of plan approval by the Field Office. The monitoring program shall comply with the monitoring, recordkeeping, and reporting requirements of NPDES General Permit for Discharges from Small Municipal Separate Storm Sewer Systems.

Phase II MS4 General Permit

- 1. Determine whether stormwater discharge from any part of the MS4 significantly contributes directly or indirectly to a 303(d) listed (i.e., impaired) waterbody. Water quality impaired waters means any segment of surface waters that has been identified by the division as failing to support classified uses. If you have discharges meeting these criteria, you must comply with Part 3.1.1.2 and 3.1.2; if you do not, the remainder of this Part 3.1 does not apply to you.*

2. *If you have “303(d)” discharges described above, you must also determine whether a Total Maximum Daily Load (TMDL) has been developed by the division and approved by EPA for the listed waterbody. If there is a TMDL, you must comply with both Parts 3.1.2 and 3.1.3; if no TMDL has been approved, Part 3.1.3 does not apply until a TMDL has been approved.*
 3. *Water Quality Controls for Discharges to Impaired Waterbodies. The stormwater management program review submitted to the division must include a section describing how your program will control the discharge of the pollutants of concern. This section must identify the measures and BMPs that will collectively control the discharge of the pollutants of concern. The measures should be presented in order of priority with respect to controlling the pollutants of concern.*
 4. *Consistency with Total Maximum Daily Load (TMDL). If a TMDL has been approved for any waterbody into which you discharge, you must follow the procedure below and report on these activities in annual reports to the division:*
 5. *Determine whether the approved TMDL is for a pollutant likely to be found in stormwater discharges from your MS4.*
 6. *Determine whether the TMDL includes a pollutant wasteload allocation (WLA), implementation recommendations, or other performance requirements specifically for stormwater discharges from your MS4.*
 7. *Determine whether the TMDL addresses a flow regime likely to occur during periods of stormwater discharge.*
 8. *After the determinations above have been made and if it is found that your MS4 must implement specific provisions of the TMDL, evaluate whether the implementation of existing stormwater control measures is meeting the TMDL provisions, or if additional control measures are necessary.*
 9. *Document all control measures currently being implemented or planned to be implemented. Include a schedule of implementation for all planned controls. Provide your rationale (e.g., calculations, assessments, reports and/or other evidence) that shows that you will comply with the TMDL provisions. For control measures that are expected to be implemented and evaluated beyond the term of this permit, you should also include longer schedule of implementation as necessary to describe the control measure.*
 10. *Describe a method to evaluate whether the stormwater controls are adequate to meet the requirements of the TMDL.*
 11. *If the evaluation shows that additional or modified controls are necessary, describe the type and schedule for the control additions/revisions.*
-

Vermont

Phase II General MS4 Permit

Your SWMP, including your operation and maintenance program for preventing or reducing pollutant runoff from municipal operations prepared pursuant to section 4.2.6, must include a section describing how your program will control to the maximum extent practicable the discharge of the pollutants of concern. This discussion must specifically identify measures and BMPs that will collectively control the discharge of the pollutants of concern. Pollutant(s) of concern refer to the pollutant identified as causing the impairment.

As set forth in 1.3.7 in implementing the six minimum control measures set forth in 4.2 you must be consistent with recommendations applicable to your MS4 in the implementation section of the Lake Champlain TMDL and any future TMDLs for impaired waters affected by your MS4 established or approved by EPA pursuant to section 303(d) of the federal Clean Water Act. The Lake Champlain Phosphorus TMDL recommendations for municipalities include: adoption of erosion controls (page 65), improved construction and maintenance practices for gravel backroads (page 69), promotion of riparian buffers and setbacks (page 76) and impervious surface minimization (page 76). 3.1.4. Determination of Consistency. The assessment of whether your Stormwater Management Program is consistent with TMDL recommendations will be based on your implementation and maintenance of best management practices not on estimates or measurements of pollutant loading does not authorize a direct discharge that is inconsistent with any EPA approved TMDL waste load allocation and any implementation plan for the waterbody to which the direct discharge drains. This general permit does not authorize a discharge to an impaired waterbody for which the Department has issued a watershed-specific general permit.

Washington

Draft Phase II MS4 General Permit (Western Washington)

An example of TMDL specific requirements is as follows:

Name of TMDL: Snohomish River Tributaries

Location of Original 303 (d) Listings – WA-07-1012, WA-07-015, WA-07-1052, WA-07-1163 WA-07-1163, WA-07-1030 and WA-07-040

Area where TMDL Requirements Apply:

For each waterbody listed, TMDL coverage includes areas draining to the WASWIS segment number, and all the upstream tributaries contributing to it: Allen Creek,

YT94RF: Quilceda Creek, TH58TS: French Creek, XZ24XU: Woods Creek, FZ74HO: Pilchuck River, NF79WA: Marshland Watershed, XW79FQ

TMDL coverage includes the areas indicated in the Lower Snohomish River Tributaries

Fecal Coliform Bacteria TMDL Detailed Implementation Plan dated June 2003, Figure 3, page 7. This TMDL can be found at http://www.ecy.wa.gov/programs/wq/tmdl/watershed/tmdl_info-nwro.html

Parameter – Fecal Coliform

Approval Date – 9 – Aug. 2001

Potential MS4 Permittees – Phase I permit: Snohomish County

Phase II permit: Granite Falls, Lake Stevens, Monroe, Snohomish, Marysville, Arlington, Everett

WSDOT permit: WSDOT.

Action Required –

Baseline Requirements: *Within 12 months after the effective date of this permit, all municipal stormwater permittees must adopt and enforce an ordinance or ordinances requiring the application of source control BMPs for the following existing land uses if they occur within their jurisdiction: 1) commercial animal handling areas, and 2) commercial composting facilities.*

Where these activities are not occurring, no action is required. BMPs shall be equivalent to those found in Volume IV of the 2001 Ecology Stormwater Management Manual for Western Washington. Ordinances shall also address illicit connections to storm drains.

Where potential sources of bacterial pollution exist, operational source control BMPs shall be required for all pollutant generating sources. Only in those cases where a facility is demonstrated to be causing a violation of surface or ground water standards, or is discharging illegally, shall structural source control BMPs shall be required as related to this TMDL. The provision for structural source control BMPs is not intended to apply to individual municipal stormwater outfalls.

No later than 12 months after the effective date of this permit, affected municipal permittees shall compile a list of the existing composting and animal waste handling facilities. This list shall be updated no later than 180 days prior to the expiration of the permit and submitted with the permit renewal application. Starting no later than 24 months after the effective date of this permit, conduct an inspection program for all the listed sites, with adequate enforcement capability to ensure implementation of source control BMPs. All facilities must be inspected with 40 months of the effective date of this permit.

Monitoring and Implementation Requirements: *Permittees shall choose one or both of the following monitoring strategies. Strategy A is the default implementation strategy unless the permittee chooses to implement Strategy B in all or part of the area subject to the TMDL:*

Strategy A, Targeted Implementation Approach

- *Within 90 days of permit issuance, prepare and submit to Ecology for review, a Quality Assurance Project Plan (QAPP) for the sampling of streams and/or discharges from stormwater conveyances within the jurisdictions boundaries in order to determine areas with highest bacteria concentrations (high priority areas). Provisions for additional monitoring in high priority areas shall be included in order to locate pollution sources were they are not obvious.*

- *The QAPP shall be prepared following Ecology's "Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, Feb. 2001, Ecology Publication No. 01-03-003. Ecology will review and provide comments within 30 days the plan is received. The sampling plan shall include an adequate number of sampling points and adequate sampling frequency to reasonably characterize the receiving water or waste stream. Monitoring shall begin no later than 270 days after permit issuance.*
- *No later than 365 days prior to permit renewal application, a Bacterial Pollution Control Plan shall be developed. The Bacterial Pollution Control Plan shall, at a minimum, consider the use of the following approaches:*
 - 1) pet waste ordinance, 2) evaluation of water pollution control enforcement capabilities, 3) evaluation of CAO in relation to TMDL goals, 4) educational program directed at reducing bacterial pollution, 5) investigation and implementation of methods that prevent additional stormwater bacterial pollution through stormwater treatment, reducing stormwater volumes, and preventing additional sources of stormwater in association with new development, 6) implementation of activities in the Quilceda/Allen or French Creek Watershed Management Plans (as applicable), 7) ambient water quality and stormwater quality sampling to specifically identify bacterial pollution sources, and 8) livestock ordinance and compost ordinance (Phase I Permittees only.)*
- *No later than 270 days prior to permit renewal application, conduct public review of the Bacterial Pollution Control Plan.*
- *Submit the final Bacterial Pollution Control Plan to Ecology at the time of permit renewal application.*

Strategy B: Early Action Approach.

- *Prepare Early Action BMP plan within 180 days of permit effective date. The Early Action Plan shall contain those BMPs that the permittee believes will be effective in reducing bacteria levels within the MS4 (or otherwise in local waters). The Early Action Plan must include implementation of the required baseline requirement for all municipal stormwater permittees including adoption and enforcement of ordinance(s) requiring the application of source control BMPs related to bacterial pollutants (equivalent to Volume IV of the 2001 Ecology Stormwater Management Manual for Western Washington).*
- *The Early Action BMP Plan shall, at a minimum, consider the use of the following approaches: 1) pet waste ordinance, 2) evaluation of water pollution control enforcement capabilities, 3) evaluation of CAO in relation to TMDL goals, 4) educational program directed at reducing bacterial pollution, 5) investigation and implementation of methods that prevent additional stormwater bacterial pollution through stormwater treatment, reducing stormwater volumes, and preventing additional sources of stormwater in association with new development, 6) implementation of activities in Quilceda/Allen or French Creek Watershed Management Plans (as applicable) Watershed Management Plan, 7) ambient water quality and stormwater quality sampling to specifically identify bacterial pollution sources, and 8) livestock and compost ordinances (Phase I permittees only)*

- *Conduct and complete public review of the Early Action BMP plan within 270 days of permit effective date.*
- *Begin implementation of Early Action BMPs as specified in the plan within 360 days of permit issuance. BMPs shall be place within 36 months of permit issuance unless otherwise approved by Ecology.*
- *Within 30 months of permit issuance, prepare and submit to Ecology for review, a Quality Assurance Project Plan (QAPP) for the sampling of streams and/or discharges from stormwater conveyances within the jurisdictions boundaries in order to assess whether or not affected water bodies and/or stormwater discharges, are meeting state water quality standards.*
- *The QAPP shall be prepared following Ecology's "Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, Feb. 2001, Ecology Publication No. 01-03-003. Ecology will review and provide comments within 30 days the plan is received. The sampling plan shall include an adequate number of sampling points and adequate sampling frequency to reasonably characterize the receiving water or waste stream. Monitoring shall begin no later than 36 months after permit issuance.*
- *No later than 270 days prior to permit renewal, a Bacterial Pollution Control Plan shall be developed. The Plan shall consider all available monitoring data and the approaches noted for the Early Action BMP Plan above.*
- *No later than 270 days prior to permit renewal application, conduct public review of the Bacterial Pollution Control Plan.*
- *Submit the Bacterial Pollution Control Plan to Ecology at the time of permit renewal application for review.*

Construction General Permit (state-wide)

S8. DISCHARGES TO 303(D) OR TMDL WATERBODIES

A. Sampling and Numeric Effluent Limitations For Discharges to 303(d)-listed Waterbodies

1. Permittees that discharge to water bodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, high pH, or phosphorus, shall conduct water quality sampling according to the requirements of this section.

2. All references and requirements associated with Section 303(d) of the Clean Water Act mean the most current listing by Ecology of impaired waters that exists on November 16, 2005, or the date when the operator's complete permit application is received by Ecology, whichever is later.

B. Discharges to 303(d)-Listed Waterbodies (Turbidity, Fine Sediment, or Phosphorus)

1. Permittees which discharge to waterbodies on the 303(d) list for turbidity, fine sediment, or phosphorus shall conduct turbidity sampling at the following locations to evaluate compliance with the water quality standard for turbidity: a. Background turbidity shall be measured in the 303(d)-listed receiving water immediately upstream (upgradient) or outside the area of influence of the discharge; and b. Discharge turbidity shall be measured at the point of discharge into the 303(d) listed receiving waterbody, inside the area of influence of the discharge; or Alternatively, discharge turbidity may be measured at the point where the discharge leaves the construction site, rather than in the receiving waterbody.

2. Based on sampling, if the discharge turbidity exceeds the water quality standard for turbidity (more than 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or more than a 10% increase in turbidity when the background turbidity is more than 50 NTU), all future discharges shall comply with a numeric effluent limit which is equal to the water quality standard for turbidity.

3. If a future discharge exceeds the water quality standard for turbidity, the Permittee shall:

a. Review the SWPPP for compliance with Condition S9 and make appropriate revisions within 7 days of the discharge that exceeded the standard;

b. Fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, but within 10 days of the discharge that exceeded the standard;

c. Document BMP implementation and maintenance in the site log book; d. Notify the appropriate Ecology Regional Office by phone within 24 hours of analysis;

e. Continue to sample daily until discharge turbidity meets the water quality standard for turbidity.

C. Discharges to waterbodies on the 303(d) list for High pH

1. Permittees which discharge to waterbodies on the 303(d) list for high pH shall conduct sampling at one of the following locations to evaluate compliance with the water quality standard for pH (in the range of 6.5 – 8.5): a. pH shall be measured at the point of discharge into the 303(d) listed waterbody, inside the area of influence of the discharge; or b. Alternatively, pH may be measured at the point where the discharge leaves the construction site, rather than in the receiving water.

2. Based on the sampling set forth above, if the pH exceeds the water quality standard for pH (in the range of 6.5 – 8.5), all future discharges shall comply with a numeric effluent limit which is equal to the water quality standard for pH.

3. If a future discharge exceeds the water quality standard for pH, the Permittee shall:

a. Review the SWPPP for compliance with Condition S9 and make appropriate revisions within 7 days of the discharge that exceeded the water quality standard;

b. Fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, but within 10 days of the discharge that exceeded the standards;

c. Document BMP implementation and maintenance in the site log book; d. Notify the appropriate Ecology Regional Office by phone within 24 hours of analysis; and

e. Continue to sample daily until discharge meets the water quality standard for pH (in the range of 6.5 – 8.5) or the discharge stops or is eliminated.

<i>Parameter identified in 303(d) listing</i>	<i>Parameter/Units</i>		<i>Analytical Method</i>	<i>Sampling Frequency</i>
<i>Turbidity Fine Sediment</i>	<i>Phosphorus</i>	<i>Turbidity/NTU</i>	<i>SM2130 or EPA180.1</i>	<i>Weekly, if discharging If background is 50 NTU or less: 5 NTU over background; or If background is more than 50 NTU: 10% over background</i>
<i>High pH</i>	<i>pH/Standard Units</i>		<i>pH meter</i>	<i>Weekly, if discharging</i>

D. Sampling and Limitations For Sites Discharging to Applicable TMDLs

1. Discharges to a waterbodies subject to an applicable Total Maximum Daily Load (TMDL) for turbidity, fine sediment, high pH, or phosphorus, shall be consistent with the assumptions and requirements of the TMDL.

a. Where an applicable TMDL sets specific waste load allocations or requirements for discharges covered by this permit, discharges shall be consistent with any specific waste load allocations or requirements established by the applicable TMDL. ii. The Permittee shall sample discharges weekly, or as otherwise specified by the TMDL, to evaluate compliance with the specific waste load allocations or requirements. iii. Analytical methods used to meet the monitoring requirements shall conform to the latest revision of the Guidelines Establishing Test Procedures for the Analysis of Pollutants contained in 40 CFR Part 136. Turbidity and pH methods need not be accredited or registered unless conducted at a laboratory which must otherwise be accredited or registered.

b. Where an applicable TMDL has established a general waste load allocation for construction stormwater discharges, but no specific requirements have been identified, compliance with Conditions S4 (Monitoring) and S9 (SWPPPs) will be assumed to be consistent with the approved TMDL.

c. Where an applicable TMDL has not specified a waste load allocation for construction stormwater discharges, but has not excluded these discharges, compliance with Conditions S4 (Monitoring) and S9 (SWPPPs) will be assumed to be consistent with the approved TMDL.

d. Where an applicable TMDL specifically precludes or prohibits discharges from construction activity, the operator is not eligible for coverage under this permit.

2. Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus, which has been completed and approved by EPA prior to November 16, 2005, or prior to the date the operator's complete permit application is received by Ecology, whichever is later. TMDLs completed after the operator's complete permit application is received by Ecology become applicable to the Permittee only if they are imposed through an administrative order by Ecology, or through a modification of permit coverage.

Industrial General Permit (state-wide)

Facilities that discharge to a waterbody with a control plan unless this general permit is adequate to provide the level of protection required by the control plan. Excluded facilities need to obtain coverage under another NPDES permit for stormwater discharges associated with industrial activity. Control plans may be total maximum daily load (TMDL) determinations, restrictions for the protection of endangered species, ground water management plans, or other limitations that regulate or set limits on discharges to a specific waterbody or groundwater recharge area.

E. Stormwater Discharges to Impaired Waterbodies Except 303(d) Listings for Sediment and Tissue

The Permittee's discharge must not cause or contribute to an excursion of the State's water quality standards, including the State's narrative criteria for water quality. For 303(d) listings based on numeric water quality criteria, Permittees must comply with the State's water quality standard for each pollutant named as a pollutant causing a violation of water quality standards at the location named on the State's 303(d) list except for temperature which is not required and fecal coliform which is only required if there is a potential source from the industrial activity. Ecology will not require monitoring for fecal coliform if the Permittee can document that there is no potential source of fecal coliform from any of their industrial activities. A permittee's requirements to comply with this condition will be listed on the cover sheet. Ecology will maintain an electronic list of permittees subject to this permit condition. This list, titled Appendix 4, is available on Ecology's web site.

For waterbody segments listed as impaired by the State under Section 303(d) of the Clean Water Act, the applicable 303(d) list is the list which is in effect August 21, 2002, or the 303(d) list which is in effect at the date the first application for coverage is received by Ecology, whichever is later.

Permittees must be in compliance with applicable Total Maximum Daily Load (TMDL) determinations. Applicable TMDLs or TMDL determinations are TMDLs which have been completed by the issuance date of this permit, or which have been completed prior to the date that the permittees application is received by Ecology, which ever is later. A permittee's requirements to comply with this condition will be listed on their cover sheet. Ecology will maintain an electronic list of permittees subject to this permit condition.

This list, titled Appendix 5, is available on Ecology's web site. Unless the first application for coverage is received after any updated 303(d) list is effective, changes associated with revised 303(d) lists completed after September 20, 2002 will only become effective if they are imposed through an administrative order issued by Ecology.

Unless the first application for coverage is received after the TMDL is completed TMDL requirements associated with TMDLs completed after the issuance date of this permit will only become effective if they are imposed through an administrative order issued by Ecology.

1. New Facilities and Significant Process Change New facilities that discharge either directly or indirectly via a stormwater conveyance system to waterbody segments listed as impaired by the State under Section 303(d) of the Clean Water Act must comply with the State's water quality standards for the named pollutant(s) at the point of discharge. Facilities with coverage under this permit, that implement a significant process change (see S1.D.1.) must either comply with the State's water quality standards for the named pollutant(s) at the point of discharge or demonstrate no increase in loading from the entire facility as a result of the process change. All new discharges including new discharges associated with significant process changes must be in compliance with any applicable TMDL determination.

PARAMETER	EFFLUENT LIMITATIONS: NEW FACILITIES TO IMPAIRED WATERS OR WATERS COVERED BY A TMDL
<i>Parameter(s) as identified for the 303(d) listed segment or if applicable, TMDL determination</i>	<i>As listed on the coversheet, based on Chapter 173-201A or as identified in the TMDL or listing documentation</i>

2. Existing Facilities discharging to water bodies for which an applicable TMDL has been completed:

PARAMETER	EFFLUENT LIMITATIONS: EXISTING FACILITIES TO WATERS COVERED BY A TMDL
<i>Parameter(s) as identified in the applicable TMDL</i>	<i>As listed on the cover sheet to comply with the applicable TMDL</i>

Note: A current listing of permittees subject to this permit condition and the specific effluent limitations and monitoring requirements, Appendix 5, is available on Ecology's web site.

3. Existing facilities which discharge either directly or indirectly via a stormwater conveyance system to waterbody segments listed as impaired by the State under Section 303(d) of the Clean Water Act are subject to the general compliance with standards provisions in S7. Additional monitoring and benchmarks apply as described in S.4.G Note: A current listing of permittees subject to this permit condition, and the associated benchmarks and monitoring requirements, Appendix 4, is available on Ecology's web site.

G. Monitoring Requirements for Facilities Discharging to 303(d) Listed Waters or Subject to TMDL Determination Except 303(d) Listings for Sediment and Tissue

In addition to the requirements in S4.C. above, beginning January, 2005, all facilities that discharge to waterbody segments listed as impaired by the State under Section 303(d) of the Clean Water Act must conduct quarterly monitoring of authorized discharges of stormwater to surface water. Samples must be analyzed for the parameters named on the 303(d) as causing impairment of the listed waters except for temperature which is not required and fecal coliform which is only required if there is a potential source from the industrial activity. Note: A current Appendix 4 with a list of permittees subject to the monitoring requirements of this condition is available on Ecology's web site.

Discharges to a waterbody for which a TMDL has been completed must be consistent with the TMDL determination. Where the TMDL determination sets load allocations for new discharges or limits pollutant concentrations in the discharge, the Permittee must conduct quarterly monitoring for the named pollutant(s) and the monitoring must be consistent with TMDL requirements, if any. Reporting as required by this permit begins with the first quarter of the year 2005. Note: A current Appendix 5 with a list of permittees subject to the monitoring requirements of this condition is available on Ecology's web site.

1. Permittees may suspend monitoring for a listed parameter if:

- a. Eight consecutive samples fail to detect the presence of the listed parameter. Fail to detect does not apply to pH. For pH it is eight consecutive samples where the values are not outside of the water quality-based range of 6.5 to 8.5 (freshwater) or 7.0 to 8.5 (marine).*
- b. The Permittee can demonstrate to Ecology's satisfaction after eight or more consecutive quarterly samples that there is no reasonable potential to violate water quality standards. For the purposes of suspending monitoring required under S4.G only, no reasonable potential to violate water quality is defined as a single sample exceeding eighty percent of the benchmark, and the average of the last eight consecutive quarterly samples is less than sixty percent of the benchmark.*

2. For existing permittees discharging to water bodies for which an applicable TMDL has been completed:

<i>Parameter</i>	<i>Units</i>	<i>Analytical Method</i>	<i>Minimum Sampling Frequency</i>
<i>Parameter(s) as identified in the applicable TMDL. (See cover sheet)</i>	<i>As Applicable (see cover sheet)</i>	<i>Appropriate EPA or Equivalent Method</i>	<i>Quarterly (See cover sheet for specifics)</i>

Note: A current Appendix 5 with a list of permittees subject to the monitoring requirements of this condition is available on Ecology's web site.

3. Existing permittees discharging to water bodies that discharge to waterbody segments listed as impaired by the State under Section 303(d) of the Clean Water Act:

<i>Parameter</i>	<i>Units</i>	<i>Analytical Method</i>	<i>303(d) Benchmark Value</i>	<i>Minimum Sampling Frequency</i>
<i>Parameter(s) as identified for the 303(d) listed segment (See cover sheet)</i>	<i>As Applicable (See cover sheet)</i>	<i>Appropriate EPA or Equivalent Method</i>	<i>Based on Chapter 173-201A (See cover sheet)</i>	<i>Quarterly (See cover sheet for specifics)</i>

Note: A current Appendix 4 with a list of permittees subject to the monitoring requirements of this condition is available on Ecology's web site.

H Monitoring Requirements for Facilities Discharging to 303(d) Waterbody segments listed for Sediment

All facilities that discharge to waterbody segments listed for sediment must notify Ecology of any sediment data they may have collected. Upon request from Ecology they will submit the data.

In addition to the requirements in S4.A. above, beginning with the first quarter of the year 2005, all facilities that discharge to waterbody segments listed by the State for violations of sediment standards under Section 303(d) of the Clean Water Act must conduct quarterly monitoring of authorized discharges of stormwater to surface water for total suspended solids (TSS). Discharges that demonstrate TSS levels consistent with secondary treatment standards (30 mg/L monthly average not to exceed 45 mg/L) are considered unlikely to violate sediment quality standards. Permittees that can demonstrate consistent attainment TSS levels of secondary treatment standards may suspend monitoring for the duration of the permit term. Consistent attainment is defined as 8 consecutive quarterly samples (omitting any quarter where there is no discharge) with an average TSS of 30 mg/L and no sample exceeding 45 mg/L.

Federal Construction General Permit

Part 1.3.C.: Eligibility, Limitations on Coverage

5. Discharging into Receiving Waters With an Approved Total Maximum Daily Load Analysis

a. You are not eligible for coverage under this permit for discharges of pollutants of concern to waters for which there is a total maximum daily load (TMDL) established or approved by EPA unless you incorporate into your SWPPP measures or controls that are consistent with the assumptions and requirements of such TMDL. To be eligible for coverage under this general permit, you must incorporate into your SWPPP any conditions applicable to your discharges necessary for consistency with the assumptions and requirements of such TMDL. If a specific wasteload allocation has been established that would apply to your discharge, you must incorporate that allocation into your SWPPP and implement necessary steps to meet that allocation.

b. In a situation where an EPA-approved or established TMDL has specified a general wasteload allocation applicable to construction storm water discharges, but no specific requirements for construction sites have been identified in the TMDL, you should consult with the State or Federal TMDL authority to confirm that adherence to a SWPPP that meets the requirements of the CGP will be consistent with the approved TMDL. Where an EPA-approved or established TMDL has not specified a wasteload allocation applicable to construction storm water discharges, but has not specifically excluded these discharges, adherence to a SWPPP that meets the requirements of the CGP will generally be assumed to be consistent with the approved TMDL. If the EPA-approved or established TMDL specifically precludes such discharges, the operator is not eligible for coverage under the CGP.

3.14 Documentation of Permit Eligibility Related to Total Maximum Daily Loads

The SWPPP must include documentation supporting a determination of permit eligibility with regard to waters that have an EPA-established or approved TMDL, including:

A. Identification of whether your discharge is identified, either specifically or generally, in an EPA-established or approved TMDL and any associated allocations, requirements, and assumptions identified for your discharge;

B. Summaries of consultation with State or Federal TMDL authorities on consistency of SWPPP conditions with the approved TMDL, and

C. Measures taken by you to ensure that your discharge of pollutants from the site is consistent with the assumptions and requirements of the EPA-established or approved TMDL, including any specific wasteload allocation that has been established that would apply to your discharge.

See section 1.3.C.5 for further information on determining permit eligibility related to TMDLs.

Federal Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity

Impaired waters include both those with established TMDLs, and those for which TMDL development has been identified as necessary, but for which one has not yet been established. For a more detailed definition see Appendix A.

1.4.4.1 Discharge to an Impaired Water with an Established TMDL. If a wasteload allocation (WLA) has been established that applies to your discharge, you must develop the SWPPP accordingly (Part 2.1.3.2), and implement all necessary controls to meet that allocation. You must verify that your discharge complies with the WLA through the appropriate discharge monitoring (Part 3.2.4.2). Failure to comply with a relevant WLA is a violation of this permit.

If you have properly complied with the requirements of Part 2.1.3.2 and find that the applicable TMDL does not specify a wasteload allocation or other requirements either individually or categorically for your discharge (including disallowing such discharge), compliance with this permit will be deemed adequate to meet the requirements of the TMDL.

1.4.4.2 Discharge to an Impaired Water without an Established TMDL. If a TMDL has not been established that applies to your discharge you must comply with the requirements of this permit and any additional conditions stipulated by the Secretary (Part 2.1.3.2). If you have properly complied with all such requirements then compliance with this permit will be deemed adequate to meet the requirements for discharging to an impaired water. You are also subject to the monitoring requirement of Part 3.2.4.1. Failure to comply with applicable conditions is a violation of this permit.

3.2.4.1 Discharges to impaired waters with no applicable wasteload allocation. For discharges that are conveyed directly or indirectly to impaired waters, monitoring for the pollutant of concern must be conducted at a minimum of once each permit year throughout the term of the permit unless this permit already assigns your discharge an effluent limitation or a benchmark for the pollutant of concern. Your monitoring year begins on the day that your discharge is authorized.

This monitoring requirement is waived after one year if the pollutant of concern is not detected in an amount expected to cause and contribute to a violation of Vermont Water Quality Standards in your stormwater discharge, and you document in your SWPPP that there is no exposure of the pollutant of concern to stormwater at your site.

3.2.4.2 Discharges to impaired waters with an applicable wasteload allocation. For discharges that are conveyed directly or indirectly to waters for which a TMDL has been established with a wasteload allocation applicable to your discharge (either specifically or categorically), monitoring for the wasteload allocation pollutant of concern must be conducted, consistent with any instructions in TMDL documentation. If the TMDL documentation does not specify specific monitoring requirements, monitoring for the pollutant of concern must be conducted at a minimum of once each permit year throughout the term of the permit, unless this permit already assigns your discharge an effluent limitation or a benchmark for the pollutant of concern, in which case you must

follow the effluent limitation or benchmark monitoring schedule. Your monitoring year begins on the day your discharge is authorized. This monitoring must be conducted in addition to all other monitoring requirements prescribed in this permit. Monitoring of a pollutant of concern for which your discharge has been assigned a wasteload allocation cannot be waived unless the WLA is specified only in terms of BMPs, in which case the monitoring requirement is waived after one year if the pollutant of concern is not detected in your stormwater discharge and you document in your SWPPP that you have adopted the required BMPs.

If at any time your monitoring data exceed a relevant waste load allocation you are subject to the Corrective Action requirements of Part 3.3 and the Follow-up Monitoring and Reporting requirements of Part 3.4.

APPENDIX B:
The Minnehaha Creek Watershed District (MN) Nine Lakes TMDL

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, Wassermann, and Virginia.

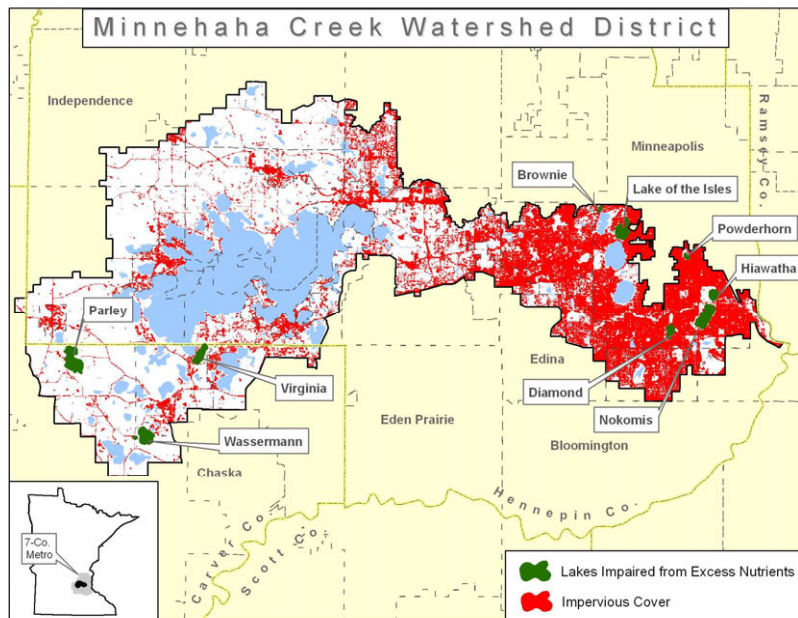


Figure 1. Minnehaha Creek Watershed District and the Nine Impaired Lakes

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

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.)

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, schedules, 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 stormwater 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.

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.

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 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.



References

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APPENDIX C:
The DuPage River and Salt Creek (IL) Case Study

Laying the Foundation for TMDL Implementation

The DuPage River and Salt Creek (Illinois) Case Study

Introduction and Purpose

The DuPage River and Salt Creek, significant tributaries of the Des Plaines River, flow through rapidly urbanizing watersheds in the Chicago metropolitan area. In this area a group of local watershed stakeholders are working together to respond to Total Maximum Daily Loads (TMDLs) that address impairments caused by a number of sources, including municipal separate storm sewer systems (MS4s) regulated under the Phase II MS4 Stormwater Program and publicly owned treatment works (POTWs), as well as severe habitat alterations. This stakeholder group—the DuPage River Salt Creek Workgroup—is taking a distinctive approach to address the findings of the TMDL reports developed to address identified impairments in the watersheds. DRSCW participants are committed to an approach for attaining water quality standards that focuses on stakeholder involvement, monitoring, and locally led decision-making based on sound science.

This case study provides information on the water quality-related challenges being addressed and the activities initiated by the DRSCW to better determine the stressors causing impairments in the watersheds, obtain stakeholder support, and plan and implement measures to improve water quality, with a particular emphasis on stormwater as one of the sources of the impairments. The case study is organized as follows:

- I. The DuPage River and Salt Creek Watersheds
- II. The DuPage River Salt Creek Workgroup
- III. Moving Toward Implementation of the TMDLs
—DRSDW Monitoring and Technical Activities
- IV. Lessons Learned from the DRSCW's Experiences to Date
- V. Recommendations for Addressing Stormwater Issues through TMDL Implementation in the DuPage River and Salt Creek Watersheds

I. The DuPage River and Salt Creek Watersheds

The DuPage River and Salt Creek watersheds, shown in Figure 1, are in northeastern Illinois, west of the city of Chicago. The two watersheds combined encompass an area of approximately 360 square miles. The watersheds lie in two counties, and they are home to 55 municipal entities. There are 25 POTWs in the watersheds, which collectively discharge approximately 156 million gallons per day (MGD) of wastewater.

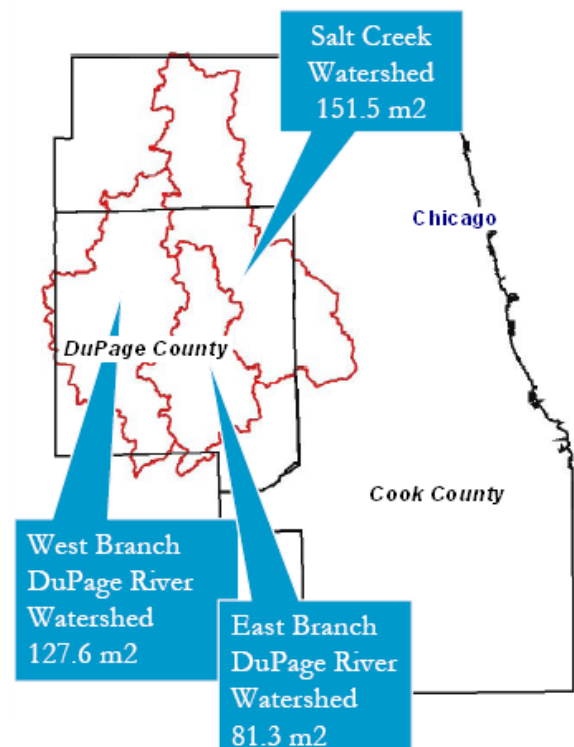


Figure 1. West and East Branches DuPage River and Salt Creek Watersheds

Land uses within the watersheds are predominantly urban, with significant portions of each watershed classified as residential land use. Impervious surfaces overlie much of the land. Table 1 provides additional detailed information on the watersheds.

Table 1. Summary of DuPage River and Salt Creek Watersheds Land Uses and Impervious Surfaces

Watershed	Land Use	Impervious Surfaces
Salt Creek	49% of the watershed classified as residential land use.	23% of the watershed covered by impervious surfaces (Illinois EPA 2004a).
East Branch DuPage River	40% residential land use.	16% of the watershed covered by impervious surfaces (Illinois EPA 2004b).
West Branch DuPage River	33% residential land use; 17% agricultural land use. It is expected that over time a greater percentage of the land will be converted to residential use.	14% of the watershed covered by impervious surfaces (Illinois EPA 2004c).

With increasing urbanization and population growth over time, the watersheds have experienced a variety of impacts from several stressors. Increased impervious surfaces have led to increases in stormwater runoff, causing flooding, combined sewer overflows, and increased stormwater discharges. At least 21 dams have been constructed in the watersheds to address issues such as flooding and recreational needs. Over time the dams have changed the natural hydrology of the DuPage River and Salt Creek and have affected native aquatic species and habitat. The watersheds contain 41 permitted MS4s. Stormwater discharges from the MS4s contribute pollutants like nutrients, metals, and bacteria to the watersheds (DuPage County SMD 2006; MBI 2006). Impacts from these stressors can affect public health and safety, recreational opportunities, economics, aesthetics, and ecological health.

Despite improvements in water quality attributable to point source discharge controls, data collected by the Illinois Environmental Protection Agency (Illinois EPA) indicated that several segments in the watersheds were not meeting water quality standards (see box at right; Illinois EPA 2004 a, 2004b, 2004c). Illinois EPA began work on TMDL reports to address impairments in the watersheds, and three reports were finalized in 2004. The reports presented the analyses and findings for meeting water quality standards for dissolved oxygen (DO) and chloride.

The DO problems in the watersheds have both wet weather and dry weather components. The

**Identified Impairments
(2000–2004)**

Salt Creek
Impairments: copper, conductivity, chloride, and dissolved oxygen

East Branch of the DuPage River
Impairments: conductivity, chloride, and dissolved oxygen

West Branch of the DuPage River
Impairments: chloride and copper

All streams classified as general use. TMDLs completed in 2004 for listed impairments, with the exception of copper.

dry weather components relate to biological oxygen demand (BOD), nutrient loadings into the watershed, and in-stream conditions. For example, there are identifiable DO sags near several of the dams in the watershed. The TMDL report presented two approaches that could be used to increase in-stream DO levels and meet water quality standards:

- ✓ Reduce effluent limits for POTW discharges to 8 mg/L BOD5 and 1 mg/L ammonia—permit limits that would require POTWs to make costly upgrades, estimated at between \$18 million and \$48 million for Salt Creek alone
- ✓ Alternative activities to improve DO levels, including the removal of a dam in Salt Creek and in-stream aeration (Illinois EPA 2004d).

The DRSCW's monitoring work has indicated there are also DO concerns related to wet weather flows. Further investigation is needed, but stormwater discharges appear to be contributing to reduced DO levels in some areas during and after storms.

The chloride impairments in the watershed are related to runoff, including discharges from MS4s. The primary source of chloride loadings appears to be runoff from paved surfaces after deicing with salts. The recommendations for action in the TMDL reports focus on reducing chloride in all three watersheds through more targeted road salt applications by municipalities. The reports cite the NPDES Phase II MS4 stormwater permit requirements as a mechanism for implementing the necessary deicing best management practices (BMPs).

II. The DuPage River Salt Creek Workgroup

Illinois EPA held public meetings during the development of the TMDL reports in January 2001 and September 2003; however, a strong watershed group did not exist in the area when the TMDL reports were written. With the completion of the TMDL reports, questions immediately arose: Who would do the further assessment and planning work needed to implement the TMDLs? Who would decide what approaches would be taken to restore uses? The DRSCW was formed to take on the important work to be done.

The DRSCW is a collaborative effort by sanitary districts, municipalities, counties, forest preserve districts, state and federal agencies, and private environmental organizations to address the water quality impairments identified in the TMDL reports. The goal of the group is to “achieve attainment of water quality standards and designated uses in these three streams in a rational and cost-efficient manner” (DRSCW 2006).

Among the factors motivating municipalities and POTWs to form and actively participate in the DRSCW were issues and concerns related to the analysis and allocation scenarios in the TMDL reports, including the estimated costs for wastewater treatment plant upgrades and the need for a better understanding of sources of the impairments. Stakeholders affected by the TMDL allocations wanted an opportunity to “substantiate” implementation strategies and determine whether there were other cost-effective options for achieving water quality standards (DRSCW 2004). Representatives from municipalities affected by the TMDL reports discussed forming the workgroup to collect data and carry out other technical activities to move forward with implementing the TMDLs. It was also envisioned that the DRSCW could help stakeholders establish a solid foundation for future TMDLs, contribute to the development of nutrient criteria, and address other water quality or regulatory issues in the watersheds. A core group of

municipalities generated support for the workgroup concept by emphasizing the importance of locally led decisions on where and how to spend local money to address water quality issues.

In addition to generating interest from and participation by local stakeholders, the core group of municipalities worked with Illinois EPA to identify a fair, open-minded, collaborative organization to facilitate the efforts of a workgroup. The Conservation Foundation, a nonprofit working in the DuPage River watershed for nearly 15 years, agreed to accept the role of collaborative group facilitator. In April 2004 the DRSCW met for the first time with participation and interest from 25 agencies and organizations in the watersheds. By fall 2006 the DRSCW had grown to 40 members, with an executive board of 7 and a staff of 1.

One of the initial activities of the DRSCW focused on establishing a group structure, goals, and funding sources. The DRSCW Bylaws document the group's goals and objectives; describe its membership, officers, and committees; and establish requirements for membership dues. The DRSCW allows for three categories of membership, although members currently participate in only two of them:

- **Agency members** are public agencies that hold National Pollutant Discharge Elimination System (NPDES) permits for POTWs or public separate storm sewer systems that discharge to any of the three watersheds. Agency members have four votes and are the only category eligible to hold an elected office on the executive board.
- **Associate members** are agencies, organizations, and companies that are not eligible to participate as agency members. Participants in this category have two votes.

The DRSCW is incorporated as a not-for-profit organization. As of fall 2006, the DRSCW had 28 agency members and 12 associate members. Individuals are also eligible to participate and are entitled to one vote under the individual member category.

A mix of membership dues and grants funds the DRSCW's activities. Members pay annual dues calculated on the basis of their discharges to the watersheds: POTWs pay dues that are based on average design flow, and communities with stormwater discharges pay dues that are based on drainage area. As a result, POTWs represent two-thirds of the DRSCW's membership dues and communities with MS4s represent the other third. Membership dues have provided the necessary local match for section 319 grants from Illinois EPA. To date, the DRSCW has received approximately \$677,000 in section 319 grant funding to support technical activities, such as monitoring, and workgroup coordination (DRSCW 2006).

Mission:

To bring together a diverse coalition of stakeholders to work together to preserve and enhance water quality in the East Branch DuPage River, West Branch DuPage River, Salt Creek and their tributaries.

Objectives:

- Develop and implement a dynamic plan that will achieve attainment of water quality standards and designated uses for the East Branch DuPage River, West Branch DuPage River, Salt Creek and their tributaries.
- Develop and implement a comprehensive, long-term monitoring program that will include chemical, physical and biological components to accurately identify the quality of the river ecosystems as well as stressors associated with non-attainment of water quality standards and designated uses.
- Develop and implement long-term viable management strategies that accurately address water quality problems identified by the monitoring program.
- Identify point and nonpoint source pollution issues and develop and implement short-term and long-term strategies to address these issues.
- Develop and maintain appropriate computer models of the watersheds to assess attainment of these objectives.

During DRSCW meetings, members take on issues related to TMDL development and implementation, including water quality standards, NPDES permitting, water quality and watershed modeling, and monitoring. Members also participate in writing grants, reviewing reports and issue papers, administering contracts, and attending public meetings.

III. Moving Toward Implementation of the TMDLs—DRSCW Monitoring and Technical Activities

The development of the TMDLs and the need to plan appropriate implementation actions were the catalyst prompting DRSCW members to participate in an adaptive management approach to TMDL implementation. At the outset, DRSCW members acknowledged the need for better data to make informed decisions. As a result, establishing and implementing a monitoring program have been the DRSCW's highest priorities and have helped to unify the group. Better monitoring data will allow the DRSCW to understand the sources of impairment in the three watersheds, identify priority restoration activities and track implementation effectiveness, calibrate water quality and watershed models, determine progress toward achieving water quality standards, and assess the overall health of the watersheds. The DRSCW works cooperatively to make monitoring decisions, as well as to review and analyze monitoring data. Using this collaborative, science-based approach to decision-making helps to achieve buy-in from DRSCW members, ensuring credibility, trust, and transparency.

DRSCW Monitoring Activities

The objectives of water quality monitoring in the watersheds are multi-faceted and include the following:

- Characterize water quality conditions and trends throughout the watershed.
- Support the development of water quality standards and in-stream targets.
- Provide technical information to help guide implementation efforts.
- Document the effectiveness of water quality management strategies.



Routine fixed-station monitoring has been conducted in the watersheds by the Illinois EPA and the Metropolitan Water Reclamation District (MWRD) of Greater Chicago since the 1970s. Sampling usually occurs monthly for a suite of field and lab parameters. In addition, the U.S. Geological Survey (USGS) operates a network of stream gauges in the watershed and has also conducted some water quality sampling.

To augment routine fixed-station monitoring, the DRSCW established a network of continuous monitoring probes throughout the watersheds. To date, the

monitoring network includes ten submerged probes located throughout the watersheds. These probes measure DO and also collect hourly data on pH, conductivity, and temperature (DRSCW 2006). Agency members of the DRSCW also contribute data from their probes to supplement the data collected by the DRSCW probes. As a result, the DRSCW has data from a total of 15 probes.

The TMDL reports addressed the impact that sediment oxygen demand can have on low DO levels. The DRSCW conducted a one-time sediment oxygen demand study that involved monitoring at 16 sites throughout the watersheds. The data from this monitoring project will also feed into the updated water quality model and help the DRSCW to better understand the sources affecting DO levels. The DRSCW might conduct further sediment oxygen demand sampling on Salt Creek before coming to a conclusion regarding the DO situation on that stream.

The current DO data collection, data analysis, and modeling efforts focus primarily on dry weather conditions. Given that data have also revealed DO concerns in wet weather conditions, the DRSCW is considering organizing a new committee to focus on wet weather impacts and issues, and initiating work focused on the impacts of wet weather events on DO levels in the watersheds.

In 2006 the Workgroup also initiated an extensive bioassessment program across DuPage County. The DRSCW hired a consultant with expertise in bioassessment to develop and conduct bioassessment sampling in the watersheds. This component of the monitoring work will provide expanded information about water quality conditions across the watersheds from a spatial perspective. Through bioassessment sampling, the DRSCW will establish baseline information on fish, macroinvertebrates, and habitat, as well as water and sediment chemistry, at approximately 120 sampling sites throughout the watersheds (DRSCW 2006). Bioassessment sampling on the West Branch of the DuPage River took place at 41 sites during summer 2006. Sampling of Salt Creek and the East Branch of the DuPage River will take place during summer 2007. To track trends in each of the watersheds, subsequent sampling will be conducted in each watershed every three years on a rotating basis (DRSCW 2006).

A geometric site selection design that selects sites on the basis of a declining watershed area scale has been used. This method has been complemented with a targeted method, placing sites in and around natural and human features of interest (e.g., dams, outfalls, tributary mouths). Benefits of the approach include cost-effective sampling on a watershed scale, development of a stratified database, and an enhanced ability to capture previously unassessed streams. Figure 2 shows the location of monitoring sites throughout the watersheds.

Developing and implementing a monitoring program that produces credible data for decision-making purposes involved various activities. They included establishing and documenting quality assurance procedures; training or hiring certified staff; purchasing and maintaining sampling equipment; collecting and managing samples; conducting quality assurance/quality control; and managing, analyzing, and reporting data. To date the DRSCW has prepared and Illinois EPA has approved Quality Assurance Project Plans for the continuous DO monitoring program and the bioassessment sampling program.

The DRSCW relies on a spreadsheet for tracking monitoring data; however, the group intends to develop a more sophisticated database for managing and analyzing data in the near future. Illinois EPA receives a copy of the DRSCW's data each year. By 2009 the group would like to develop a publication that presents water quality data.

Addressing Chloride Impairments

The TMDL reports contain chloride allocations that directly affect the regulated MS4s in the watersheds. To address the chloride allocations, the DRSCW initiated a chloride education and usage study. The Chloride Usage Education and Reduction Program Study report was completed in August 2007. Through this study, the DRSCW hopes to catalyze changes in deicing practices, reducing salt applications while still protecting public safety.

To determine current road salting practices in the watersheds, a questionnaire was sent to approximately 80 public entities that conduct deicing operations. Responses were received from 39 public entities, which reported a total annual salt use of 126,000 tons. In addition, 8 of approximately 130 private snow removal companies in the watershed area were contacted.

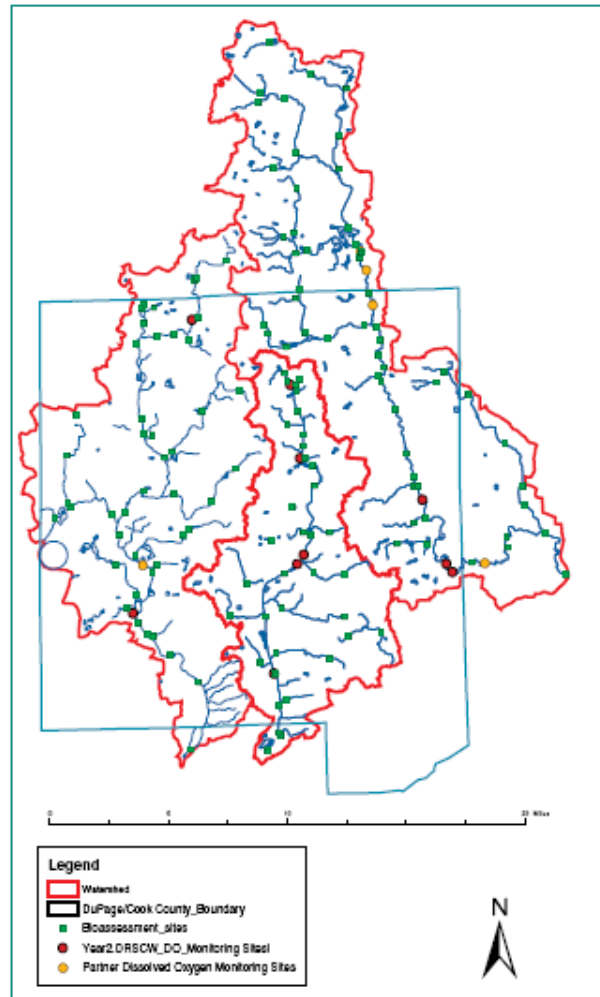


Figure 2. Monitoring Sites in the DuPage River and Salt Creek Watersheds

The total amount of chloride applied to the watersheds annually, in the form of road salt, was estimated from the questionnaire responses. The estimated load includes salt from municipalities, townships, the Illinois State Toll Highway Authority, and county transportation departments; private snow removal companies and the Illinois Department of Transportation are not accounted for. Table 2 provides the estimated chloride loads per watershed.

Table 2. Estimated Current Chloride Load Per Watershed

Watershed	Estimated Current Chloride Load (tons per year)
Salt Creek	32,600
East Branch	16,900
West Branch	21,200
Total	70,700

A literature search conducted for this study revealed a variety of potential measures that could reduce chloride loading to the watersheds. The measures were evaluated for feasibility and potential effectiveness in reducing chloride, and implementing them was discussed with local deicing program managers. As a result of this study, the following measures to reduce chloride loading from deicing practices are recommended:

- Public education, staff training, and improved salt storage and handling practices
- Watershed-wide implementation of pre-wetting and anti-icing programs
- Consideration of alternative non-chloride products, such as acetate deicers and beet and corn derivatives
- Chloride monitoring in streams to demonstrate program effectiveness

A noteworthy finding from the work done on chloride loadings is that private deicers (e.g., contractors that provide deicing services at hotels, schools, stores, and the like), a group initially assumed to have minimal impact, apply very significant amounts of salt and thereby are significantly contributing to chloride loadings. Addressing these activities will likely require different approaches and different implementation tools. For example, municipalities might adopt licensing programs or ordinances governing operations to induce private companies to implement the identified BMPs.

Monitoring and Assessment—Looking Forward

In October 2006 DuPage County and the DRSCW became aware of data assessment tools being used to connect stormwater management plans, developed and implemented pursuant to stormwater permits, with TMDLs intended to address water quality problems. Following some discussions with U.S. EPA and USGS, the DRSCW became interested in the use of basic hydrology in the form of duration curves as a way to expand its use of water quality monitoring data. The DRSCW subsequently hosted a workshop on the use of duration curves as a tool to characterize water quality concerns in terms of flow conditions, linking these concerns to key watershed processes, prioritizing source assessment efforts, and identifying potential solutions. Bruce Cleland from U.S. EPA, a national expert on using flow duration curves to analyze watersheds and plan restoration measures, was the workshop instructor.

The DRSCW recognizes that it is important for the public to understand the relationship between proposed actions and documented water quality concerns. The DRSCW is interested in pursuing use of the duration curve framework as a simple communication tool to help answer a broad range of basic questions. Benefits include not only TMDL development, but also water quality assessment efforts (enhanced description of concerns using available data) and implementation planning (focus on meaningful solutions through understanding key watershed processes that deliver pollutants).

One overall objective of the DRSCW is to add the dimension of connecting specific implementation activities— both TMDLs and stormwater management programs—to actual watershed data. This objective is illustrated using MWRD water quality monitoring data collected on Salt Creek at Wolf Road (see Figure 3).

Municipalities have been implementing combined sewer overflow controls, as well as illicit discharge detection and elimination programs, under their MS4 stormwater management programs. Based on ambient data, significant reductions in bacteria concentrations observed in Salt Creek have occurred over the past 15 years in response to these efforts. Water quality improvements are reflected using the duration curve framework, and they are noticeable across all flow conditions. This illustrates one way in which DRSCW stakeholders and the public can see a “return on their investment” in terms of documented program results based on monitoring information, a key part of the problem-solving framework.

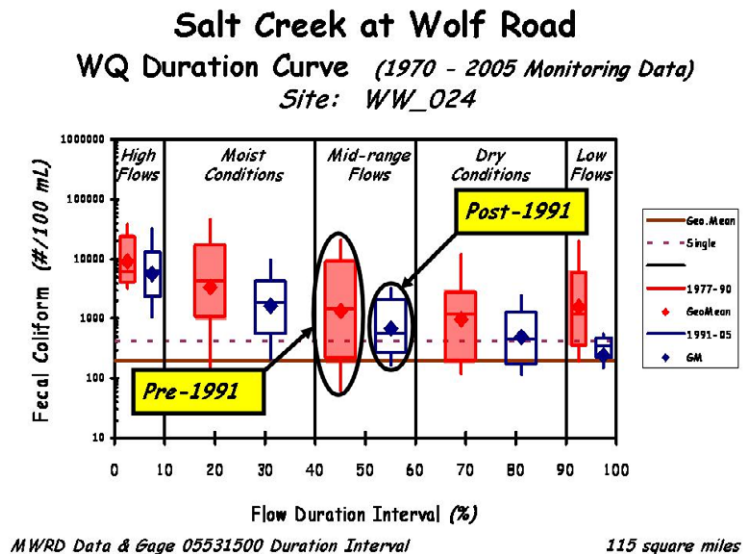


Figure 3. Flow Duration Curve Developed Using Salt Creek Watershed Monitoring Data

Other DRSCW Technical Activities

Although monitoring is the DRSCW’s highest priority, the group conducts several other activities that will assist with implementing TMDLs and attaining water quality standards. Geographic information system (GIS) capabilities are key to the technical projects that the DRSCW conducts. DRSCW members, including the Forest Preserve District of DuPage County and DuPage County, as well as the USGS, provide GIS data essential for understanding the location of key features, including dams, point source dischargers, and monitoring sites.

The DRSCW has initiated two projects focused on updating water quality and hydraulic modeling using data from the continuous DO monitoring network. The water quality model used during the TMDL development process (QUAL2K) will run updated allocation scenarios based on the more recent, more comprehensive data set. The TMDL reports with DO allocation scenarios identified alternative restoration activities to achieve the DO standard in the East Branch DuPage River and Salt Creek: (1) dam removal/modification and (2) in-stream aeration. To determine the feasibility of these alternative restoration strategies, the DRSCW initiated the Stream Dissolved Oxygen Improvement Feasibility Study. The study involves an updated hydraulic model that uses the most recent DO monitoring data, as well as POTW discharge data, to determine impacts from potential projects (DRSCW 2006). The findings of this study will allow the DRSCW to make recommendations on priority restoration strategies to achieve the DO standard based on modeled impacts, regulatory issues, project costs, and public input (DRSCW 2006).

IV. Lessons Learned from the DRSCW’s Experiences to Date

As more watersheds face water quality impairments that involve a mix of point and nonpoint sources, more watershed stakeholders will likely face complex—and potentially controversial and expensive—TMDLs similar to those developed for the DuPage River and Salt Creek

watersheds. The collaborative, locally led approach initiated by DRSCW members focuses on data collection to set priorities, make informed decisions, and evaluate the effects of selected restoration activities. This approach, while still in its beginning phases, has several early indicators of success, including support from state and federal regulatory agencies, financial support from all levels of watershed stakeholders, membership that continues to grow, and more watershed monitoring data to facilitate science-based collaborative decision-making. The formation of the DRSCW and the group's efforts provide several lessons learned that can assist stakeholders in other watersheds in TMDL implementation.

- ***Enhance credibility for the TMDL development process through meaningful stakeholder involvement.*** DRSCW members see great value in the work being done to plan for the implementation of the TMDL. Some of this work could have been done as part of the TMDL development process, which might have strengthened the technical components of the TMDLs and better facilitated TMDL implementation. Future TMDL development efforts in the watersheds will involve DRSCW members at the outset and will benefit from the group's recent data collection efforts. As a result, TMDL reports generated with DRSCW support will more closely reflect watershed conditions and have a greater potential for implementation success.
- ***TMDLs can be catalysts for action.*** The DRSCW came together to address impairments identified on the Illinois 303(d) list and addressed in a TMDL. The DRSCW members recognized they would be best served by working collaboratively, and by working actively to better understand and address the impairments. The TMDLs catalyzed action on the part of key stakeholders in the watershed.
- ***Identify champions to lead the effort.*** The DRSCW came to fruition largely as a result of representatives from a small number of agencies who championed the idea and advocated the value of this approach to other municipalities in the watersheds. The leadership of two municipalities helped to generate support and enthusiasm for the DRSCW, identifying and securing the elements necessary to set the group in motion—funding, coordination, and credibility.
- ***Capitalize on preexisting relationships.*** Although DRSCW members represent municipalities within common watershed boundaries, the shared boundaries did not automatically translate into the communities' working together to solve watershed problems. Fortunately, many of the municipalities within the watersheds already had relationships formed through participation in the Illinois Association of Wastewater Agencies, and they used this affiliation as a means for communicating about the DRSCW concept.
- ***Bring in a trusted facilitator to coordinate the group.*** Part of the original DRSCW concept was to have a fair, credible, and open-minded organization serve as the group facilitator and coordinator. Although DRSCW members give time and money to the group, it is essential to have an organization that is focused on the day-to-day coordination of the group's activities and keeps the technical and administrative responsibilities on track. The Conservation Foundation serves in this capacity for the DRSCW, and it has emerged as a trusted group facilitator, technical resource, and project coordinator.

- **Collect and analyze data to drive decisions.** DRSCW members state that they are “led by science.” The group minimizes conflict and controversy by allowing data to drive its priorities and decisions. For example, data have helped to put environmental groups and agencies on the same page. Allowing data to drive decisions is essential not only to collaborative decision-making but also to a successful adaptive management approach.
- **A technically sound, tailored dataset is valuable to better understand impairments and plan restoration measures.** Illinois EPA had sufficient data to list the waterbodies on the state section 303(d) list of impaired waters and to preliminarily identify the changes needed to restore uses. However, the DRSCW has conducted further monitoring to fully understand the impairments, including concerns related to wet weather and dry weather conditions; to better identify sources of loadings; and to plan actions to restore uses. Collecting and analyzing data on land uses, runoff characteristics, habitat, biota, and water chemistry will help the DRSCW to plan and implement cost-effective measures that will fully restore uses.
- **Evaluate and implement alternative restoration strategies through a phased, adaptive management approach.** The DRSCW is an important component in the overall phased, adaptive management approach for TMDL implementation, as described in Illinois EPA's technical paper on links between TMDLs and NPDES permitting (*The Link Between TMDLs and NPDES Permits for Salt Creek and the East Branch DuPage River: Practical Application of Adaptive Management and a Phased Approach for Meeting the Dissolved Oxygen Standard*, November 2004; see box on page 12). Through the monitoring activities of the DRSCW, watershed stakeholders have the opportunity to evaluate and implement alternative restoration strategies, such as dam modification and in-stream aeration, as means to achieving DO standards. Special conditions incorporated into NPDES permits for POTWs in the watersheds authorize this adaptive management approach, providing DRSCW members with sufficient time to implement and assess alternative strategies. If monitoring data indicate that alternative strategies are not adequate to achieve the DO standard, DRSCW members allow data to drive decisions and, therefore, undertake the necessary steps to comply with new effluent limitations deemed necessary to attain water quality standards. A well-planned monitoring program is a crucial component of implementing adaptive management approaches for water quality restoration.

V. Recommendations for Addressing Stormwater Issues through TMDL Implementation in the DuPage River and Salt Creek Watersheds

Since the group's inception, the DRSCW members have focused on addressing DO impairments through monitoring and modeling projects analyzing DO levels under dry weather conditions. The TMDL reports, as well as recent monitoring data, indicate that stormwater sources also affect DO levels in the watersheds. The DRSCW recognizes the need to better understand the impact of wet weather discharges on DO levels. As a DRSCW Agency Member, and the primary Phase II MS4 permittee in the watersheds, DuPage County has a vested interest in expanding the group's focus to include more analysis and discussion of stormwater impacts and NPDES permitting issues related to TMDL implementation. Recommendations for incorporating stormwater issues into the DRSCW's TMDL implementation activities are provided below.

- Develop a comprehensive water monitoring strategy.*** Develop a comprehensive, long-term watershed monitoring strategy that integrates surface water quality monitoring, stormwater monitoring, bioassessment sampling, and POTW discharge monitoring. The DRSCW has established an extensive monitoring network that includes sites for both continuous DO monitoring and bioassessment throughout the watersheds. With future TMDLs for fecal coliform bacteria and various metals on the horizon, as well as the development of nutrient criteria, it is likely that the DRSCW will continue to expand its monitoring activities over time. Other monitoring activities in the watersheds include POTW discharge monitoring and, in the near future, Phase II MS4 monitoring required by NPDES permits. To avoid duplication of effort and ensure efficiencies and strategic data collection to track a variety of watershed and water quality goals, the DRSCW should consider developing a comprehensive, long-term watershed monitoring strategy that integrates all ongoing and planned monitoring activities. This type of strategy would examine watershed-wide monitoring needs and develop a scientifically sound road map for addressing these needs effectively and efficiently. The timing for such a strategy is particularly appropriate as DuPage County and its Phase II MS4 co-permittees begin developing a stormwater monitoring program to comply with the Phase II MS4 general permit requirements. The DRSCW can assist DuPage County in developing an effective stormwater monitoring program that identifies strategically located monitoring sites and establishes appropriate procedures for not only tracking stormwater management program effectiveness but also determining the impacts of stormwater discharges on water quality conditions.
- Update stormwater management programs to address water quality impairments and TMDL allocations based on analysis of recent monitoring data and study results.*** The current Phase II MS4 general permit contains special conditions requiring the review and, if necessary, modification of stormwater management programs to meet TMDL allocations. Information

Using Adaptive Management to Implement TMDLs Through NPDES Permitting

The dissolved oxygen TMDLs for Salt Creek and East Branch DuPage River provide allocation scenarios that involve more stringent permit limits for POTWs or alternative approaches involving dam removal and in-stream aeration to achieve water quality standards. Each approach has the potential to improve water quality conditions, but with significantly different associated costs. Using an adaptive management process to implement the dissolved oxygen TMDLs would allow watershed stakeholders to collect more data on the sources of impairment in the watershed, implement less-costly restoration strategies, monitor results to determine progress toward meeting water quality standards, and adjusting restoration strategies based on monitoring data.

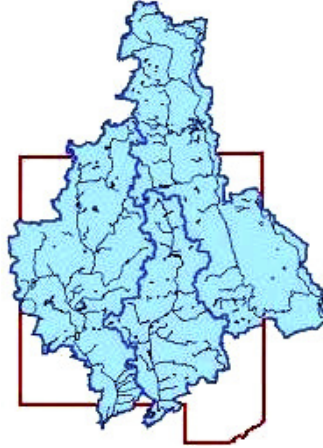
Upon completing the TMDL reports in October 2004, IEPA drafted a paper entitled, "The Link Between TMDLs and NPDES Permits for Salt Creek and the East Branch DuPage River: Practical Application of Adaptive Management and a Phased Approach for Meeting the Dissolved Oxygen Standard." This paper outlines the key steps for phasing-in TMDL implementation using an adaptive management approach that concurrently evaluates alternative restoration activities for achieving the dissolved oxygen standard. Forming the DRSCW is the first step of the phased-in approach identified by the IEPA. The second step focuses on investigating and implementing several alternative restoration approaches, as prioritized by the DRSCW, that might achieve dissolved oxygen standards more efficiently and cost-effectively. If alternative restoration activities implemented under the second step do not achieve dissolved oxygen standards, IEPA will work with the DRSCW to incorporate appropriate effluent limitations into NPDES permits by January 1, 2008.

In the interim, IEPA is deferring the imposition of more stringent permit limits to provide sufficient time for alternative restoration activities to improve dissolved oxygen levels. All existing NPDES permits in the three watersheds will contain a special provision that acknowledges potential changes to existing effluent limitations for CBOD5 and ammonia-N if necessary upon completion of an "alternate Salt Creek/EBDR Water Quality Study (IEPA 2004e)."

and data generated by the DRSCW will assist DuPage County and its Phase II MS4 co-permittees in conducting the review of each Phase II MS4 stormwater management program to determine whether activities currently meet TMDL allocations. For example, findings from the Chloride Education and Usage Study will help DuPage County and its Phase II MS4 co-permittees to determine whether current road salt storage and application practices meet the chloride allocations in the TMDL reports or whether specific deicing best management strategies are necessary to meet the chloride allocation in each watershed. Once the DRSCW convenes a wet weather committee to address wet weather impacts on DO levels, DuPage County and its Phase II MS4 co-permittees will also have the opportunity to integrate information and data generated by this committee into their stormwater management program. As these efforts get under way, DuPage County and its Phase II MS4 co-permittees should consider referencing the special conditions under Part III.C of the Phase II MS4 general permit and cite the related activities of the DRSCW to demonstrate compliance with these TMDL-related requirements.

- ***Evaluate watershed-based NPDES permitting options that integrate POTW and stormwater permitting requirements.*** DRSCW members are interested in analyzing potential watershed-based NPDES permitting options for point source discharges in the watersheds. A variety of options that could generate administrative efficiencies while producing environmental benefits are available for the DRSCW to consider. POTWs discharging to the watersheds share a common special condition in their respective NPDES permits that acknowledges ongoing watershed-based water quality studies that could affect future permit effluent limitations; this shared permit condition is an example of a watershed-based permit requirement. The Phase II MS4 general permit that covers the Phase II MS4s in the watersheds does not contain any specific watershed-based conditions because the provisions of the permit apply to Phase II MS4s throughout Illinois. The DRSCW can consider working with Illinois EPA to identify other watershed-based NPDES permitting opportunities that could more comprehensively integrate POTW NPDES permit requirements and possibly incorporate stormwater permit provisions tailored to the unique conditions of the watersheds.

One option for watershed-based NPDES permitting could involve a single, streamlined general permit that covers POTW discharges for parameters with wasteload allocations under approved TMDLs for the watersheds. This approach is similar to that taken by Connecticut Department of Environmental Protection for POTWs discharging to the Long Island Sound. A second option could involve a watershed general permit that covers a variety of point sources within a watershed boundary. Under this option, POTWs and Phase II MS4s within, for example, the East Branch DuPage River could obtain permit coverage under a watershed general permit that contains the effluent limitations (expressed numerically for POTWs and as BMPs for Phase II MS4s) necessary to achieve watershed-based TMDL allocations and other water quality standards. A third option might involve the DRSCW's working with Illinois EPA to develop and issue a watershed-based Phase II MS4 general permit for DuPage County and its Phase II MS4 co-permittees that contains watershed-specific language when the statewide Phase II MS4 general permit expires February 29, 2008.



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