

Municipal Separate Storm Sewer System (MS4) Program

***E. coli* Total Maximum Daily Loads for MS4s in Impaired Watersheds**

Introduction

Total Maximum Daily Loads (TMDLs) are required under Section 303(d) of the federal Clean Water Act when waterbodies are identified as impaired due to not meeting one or more designated uses established in Michigan's Water Quality Standards (WQS). A TMDL is developed by determining the maximum daily load of a pollutant that a water body can assimilate and still meet WQS. Generally, TMDL development begins by collecting and analyzing water quality data to determine the extent of the issue. EGLE then identifies and determines the pollutant load from all point sources (discharges to surface waters that hold a National Pollutant Discharge Elimination System (NPDES) permit), and nonpoint sources (diffuse sources, such as land-applied manure from a small farm). To account for any uncertainty, a margin of safety is developed, and seasonal differences are also considered.

TMDLs provide a basis for determining the pollutant reductions necessary from both point and nonpoint sources to ensure waterbodies meet WQS and the designated uses.

E. Coli

E. coli bacteria are a group of fecal coliform bacteria found in the lower intestine of warm-blooded organisms such as humans, livestock, wildlife, including mammals and birds, and domesticated animals. The presence of these bacteria in a river or stream indicates the water has been contaminated with the fecal material of humans or animals.

Additional information on *E. coli* in surface waters can be found at Michigan.gov/EGLEecoli.

Assessment of Rivers and Streams for *E. coli*

Rule 62 of the WQS limits the concentration of *E. coli* in surface waters of the state and surface water discharges. The limits are based on two designated uses for waters of the state, Total Body Contact Recreation and Partial Body Contact Recreation. All surface waters of the state are protected for total body contact from May 1 to October 31, and partial body contact the remainder of the calendar year. These standards are identified in the following table.

E. coli Water Quality Standards

Designated Use	Water Quality Standard
Total Body Contact Recreation	130 <i>E. coli</i> /100 ml as a 30-day geometric mean 300 <i>E. coli</i> /100 ml as a daily geometric mean
Partial Body Contact Recreation	1,000 <i>E. coli</i> /100 ml as a daily geometric mean

Addressing *E. coli* Impairments

Routine testing has shown *E. coli* levels in many waterbodies are above WQS. These levels increase the risk of illness upon contact or incidental ingestion of the water. Given the extent of this problem, and the multitude of potential sources, a statewide approach is being taken to address this issue.

Long term solutions to bacterial problems can only be accomplished through a collaborative approach. In addition to its work on effective NPDES permit requirements and corrective actions on illegal sources, EGLE is looking for assistance from landowners, local health departments, conservation districts, other state and local agencies, and environmental groups to focus voluntary improvements in areas where nonpoint sources are a problem.

E. coli Impairments in an MS4 Regulated Area

Michigan has a statewide, interactive mapping tool available to assist in identifying impacted areas as well as provide resources for getting involved in efforts to reduce *E. coli* levels. The purpose is to encourage and empower local communities to protect our waters.

Information about Michigan’s statewide *E. coli* TMDL, and a link to the interactive mapping tool, are available at Michigan.gov/EcoliTMDL.

Using this tool, MS4 communities and the public can identify if an MS4 discharges to an *E. coli* TMDL watershed. MS4 permittees and stakeholders can review *E. coli* data for local lakes and rivers and find information on potential *E. coli* point sources (i.e., NPDES-permitted discharges).

Responsibilities of MS4 Permittees in *E. coli* Impaired Watersheds

MS4 permittees that discharge to a watershed with an approved TMDL for *E. coli* are required to develop a TMDL Implementation Plan to reduce the discharge of *E. coli* from the permittee’s MS4 to make progress in meeting the *E. coli* WQS. The TMDL Implementation Plan identifies prioritized Best Management Practices (BMP). The permittee is required to implement this plan during the permit term to make progress in achieving the pollutant load reduction requirement in the TMDL.

MS4 permittees are also responsible for implementing a TMDL Monitoring Plan for assessing the effectiveness of the prioritized BMPs implemented to make progress toward achieving the TMDL pollutant load reduction requirement. A minimum approach to monitoring includes conducting *E. coli* monitoring of the MS4 during wet weather at the beginning of the permit term, generally in

Year 1, to establish baseline *E. coli* levels and potentially identify sources through microbial source tracking. Based on the *E. coli* levels and potential sources, the MS4 permittee can perform a desktop analysis or televise the MS4 to align the potential *E. coli* sources with land use activities and implement the prioritized BMPs to target the source. The monitoring is repeated in Year 4 of the permit cycle to determine if the implemented BMPs were effective at reducing *E. coli* concentrations. Additional interim monitoring may be helpful to ensure progress is on track.

Common Sources of *E. coli* from MS4s

Contamination of storm water runoff in urbanized areas can be from pets, feral animals, nuisance wildlife (especially those that are attracted to human habitation, such as raccoons), improper garbage disposal (such as diapers or cat litter) and failing septic systems (such as failures that result in seepage to the storm sewer). Sometimes sewage from homes and businesses can come in contact with storm water because the plumbing is improperly connected to the storm sewer, rather than entering the sanitary sewer. This situation is known as an illicit connection and would need to be corrected immediately. Illicit discharges may also occur by “dumping” into a storm sewer system. For example, recreational vehicle waste tanks have illegally discharged into MS4 catch basins, and wastewater from failing septic tanks has been directed to MS4 catch basins or directly to surface waters through “cheater pipes.”

Best Management Practices for the Reduction of *E. coli*

If an MS4 permittee is subject to an *E. coli* TMDL, BMPs to achieve pollutant load reductions of *E. coli* are required to be referenced in the TMDL Implementation Plan and integrated into the Storm Water Management Program (SWMP). These BMPs may overlap with BMPs associated with several of the minimum measures required by the MS4 permit. Some examples are below:

Public Participation/Involvement Program (PPP)

A city’s municipal website explains particular water quality issues that have been identified in the area. For example, a local creek is impaired for *E. coli*, with pet waste identified as one of the potential contributing factors. The city specifically requests input from the public on ways to encourage proper disposal of pet waste. For example, are residents aware of high traffic locations where signage about proper pet waste disposal, baggies, and public waste receptacles could be placed? Public input obtained through a webpage form and through comments at public meetings is then integrated into an action plan in the SWMP.

The city also decides to hold a public education poster design contest. Children are given the opportunity to create posters with graphics and text explaining the need for residents to pick up and properly dispose of pet waste. The designs from the winning posters are then placed on signage in public spaces throughout the MS4 area. This delivery mechanism fits under both the public participation/involvement program and the public education program.

Public Education Program (PEP)

A group of MS4 communities has partnered in implementing a multi-media campaign using social media, radio ads, and static displays. Each public education topic required by the MS4 permit is covered for a month, and then another topic is brought into the rotation. Several topics relate to reducing the inputs of *E. coli* and pathogens into local waterbodies, including:

- Promoting public responsibility and stewardship in the permittee’s watershed.
- Informing and educating the public about the connection of the MS4 to area waterbodies and the potential impacts discharges can have on surface waters of the state.
- Educating the public on illicit discharges and promoting public reporting on illicit discharges and improper disposal of materials into the MS4
- Promoting proper disposal practices for animal wastes that may enter into the MS4.
- Informing and educating the public on proper septic care and maintenance, and how to recognize system failure.

Illicit Discharge Elimination Program (IDEP)

A city implements and enforces the IDEP to detect and eliminate illicit discharges and connections to the permittee’s MS4. This includes conducting field observations, field screening, source investigation, responding to illicit discharges, and pursuing enforcement action, as outlined in the SWMP.

Pollution Prevention and Good Housekeeping Activities for Municipal Operations (P2/GH)

A county park has a lake that attracts large numbers of waterfowl, especially Canada Geese. The county has implemented a “no mow zone” around the lake, except for the swimming area, which has a sandy beach. The vegetation is allowed to grow tall. As a result, the Canada Geese feel less comfortable in this area, as a predator may be hiding behind the tall grass. The number of geese diminishes over time, and the *E. coli* levels also drop to acceptable levels.

E. Coli Monitoring- Frequently Asked Questions

1. Which outfalls need to be sampled for *E. coli* during wet weather?

Sampling is required for MS4 permitted outfalls and points of discharge that discharge to a watershed with an approved *E. coli* TMDL. To be concise, this document will refer to outfalls and points of discharge together as “discharge points.” After the Year 1 monitoring results have been obtained, the MS4 permittee will need to follow up by investigating elevated *E. coli* levels in the sewershed. After this initial evaluation, the MS4 needs to implement the prioritized BMPs included in the TMDL Implementation Plan. The monitoring study is repeated at the end of the permit term (Year 4) to determine if the BMPs were effective and determine how to proceed during the next permit term.

2. If my community is an MS4 permittee conducting wet weather *E. coli* sampling of discharge points, do all discharge points in the TMDL area need to be sampled in one permit term?

All MS4 permitted discharge points with a discharge in the *E. coli* TMDL watershed need to be sampled eventually. If the permittee has many discharge points where it is not feasible to sample all of them during a permit cycle, then discharge points expected to have higher levels of *E. coli* should be prioritized for sampling first. The prioritization can be based on prior sampling results and/or land use. If there are a small number of discharge points it is expected that sampling would be completed for all in the first permit term. When developing the TMDL Monitoring Plan, the number of discharge points to sample in a permit cycle should be based in part on the size and complexity of the upstream sewersheds. The goal is to balance monitoring targeted discharge points with the ability to reduce *E. coli* in the contributing area to the discharge point during the permit term.

3. Can my community sample instream instead of at discharge points?

Instream sampling may be conducted in order to gather more information about the health of a waterbody and prioritize next steps. Instream sampling has been performed in numerous locations around the state and results in high-level information about *E. coli* levels which aggregates all potential sources of *E. coli*. The resulting data leaves MS4 permittees to make high-level assumptions when implementing permit requirements. This approach has the potential to lead to delays or accepting responsibility for *E. coli* sources outside of the MS4 regulated area (e.g., agricultural inputs), which may lead to noncompliance. Sampling at discharge points allows permittees to isolate contributions of *E. coli* from the regulated MS4 and focus the investigation on the contributing sewershed.

4. What is the method for sampling?

Wet weather sampling involves mobilizing at the beginning of a storm event, taking the samples quickly, within the first 30-60 minutes to capture the “first flush” or water quality volume, and getting the samples to the lab within the 6-hour hold time. Grab samples should be taken once a storm event begins and storm water starts discharging at discharge points. *E. coli* data is highly variable, which is why EGLE’s aquatic biologists take three samples at each location (right bank, center, left bank) when conducting instream sampling. This approach is not needed when sampling outfalls, because mixing occurs as the storm water travels down the pipe.

5. What if there is no local laboratory that offers 24 hour per day service?

Many wastewater treatment plants (WWTP) have labs that are open 24 hours per day, although the standard test method being run is fecal coliforms, and not *E. coli*. One option would be to purchase a Quanti-Tray System for *E. coli*, to be housed at the wastewater treatment plant. If the WWTP lab is staffed 24 hours a day, WWTP staff would be available to run samples within the 6-hour hold time.

6. We are using the Quanti-Tray system, which detects a maximum of 2,400 *E. coli*/100 ml. Do we need to perform dilutions in order to obtain the actual concentration?

No. EGLE's action level for follow-up investigation is 1,000 *E. coli*/100 ml for outfall monitoring.

7. What concentration of *E. coli* is considered to be acceptable?

The daily maximum for *E. coli* in Michigan's WQS is 300 *E. coli*/100 ml from May to October (Total Body Contact criteria). When conducting instream sampling, further investigation into sources is needed if the value is above 300 *E. coli*/100 ml. When conducting outfall sampling, most MS4 permittees use 1,000 *E. coli*/100 ml as the action level to determine if further investigation is needed in the current permit cycle.

8. What are the next steps if we find concentrations of *E. coli* elevated above the action level?

Focus on BMP implementation in the areas where *E. coli* levels are elevated. Then, conduct sampling again at the end of the permit term. If results from the second round of sampling do not identify a reduction and all appropriate BMPs have been implemented, EGLE staff will work with the MS4 permittee to identify next steps at the time of permit reissuance.

More Information

Additional information on *E. coli* in surface waters can be found at Michigan.gov/EGLEecoli.

Information about Michigan's statewide *E. coli* TMDL, and a link to the interactive mapping tool, are available at Michigan.gov/EcoliTMDL.

For questions regarding other aspects of the MS4 permit, please contact your [MS4 Compliance Staff Person](#).

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