

Maine Impervious Cover TMDL for Impaired Streams Addendum

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INTRODUCTION

This is an addendum to the *Maine Statewide Impervious Cover Total Maximum Daily Load (IC TMDL)*, which was prepared by the Maine Department of Environmental Protection (MDEP) and approved by the U.S. Environmental Protection Agency (USEPA) in 2012. The IC TMDL and all appendices are available on the MDEP webpage (<https://www.maine.gov/dep/water/monitoring/tmdl/tmdl2.html>). As stated in Section 2.4 Future TMDL Applicability of the 2012 TMDL, DEP may submit additional TMDLs to EPA for specific waterbodies to be added for IC TMDL coverage without resubmitting the approved core document. This addendum contains the information to develop TMDLs for one additional impaired stream (Table 1).

This report:

- Contains the watershed-specific information necessary to add this IC TMDL to the existing 2012 TMDL Report.
- References the basic background information and required TMDL elements from the 2012 TMDL Report.

Table 1. Summary information for impaired streams included in this addendum (from Maine DEP 2018/2020/2022 Integrated Water Quality Monitoring and Assessment Report Appendices).

Streams	Town	Segment ID	Class	Listing Causes
Penjawoc Stream and Meadow Brook	Bangor	ME0102000513_226R03	B	Benthic Macroinvertebrate Bioassessments, Dissolved Oxygen, Habitat Assessment, Periphyton (Aufwuchs) Indicator Bioassessments

This stream is listed on Maine’s 303(d) list of impaired waters in Maine DEP’s *2018/2020/2022 Integrated Water Quality Monitoring and Assessment Report* (MDEP, 2022). It has been assessed by DEP as not meeting Maine’s water quality standards for aquatic life use based on the results of various assessment criteria for aquatic life use in freshwater streams, including dissolved oxygen, benthic-macroinvertebrate bioassessment, periphyton indicator bioassessment, and habitat assessment. TMDLs are required under the U.S. Clean Water Act for all impaired waters on the 303(d) list, and this TMDL will be added to the existing 2012 IC TMDL.

The IC TMDL provides a framework for addressing aquatic life and habitat impairments in streams. Developed areas and associated impervious cover result in increased stormwater volume and pollutant loads to receiving waterbodies. A combination of pollutants found in stormwater, including sediment and nutrients, contribute to aquatic life impairments in streams, along with habitat loss and unstable stream banks caused by excessive amounts of runoff. Increasing the percentage of total impervious cover (% IC) in a watershed is linked to decreasing stream health (CWP, 2003). Because aquatic life impairment associated with stormwater is not always caused by a single pollutant, % IC has been selected and applied as a representative measure of the mix of pollutants and other impacts associated with excessive stormwater runoff and urban development. The IC TMDL estimates the effective % IC target for the watershed of each impaired surface water addressed by the TMDL. The ultimate achievement of the TMDL will be assessed by the waterbody meeting water quality standards. The Load Allocation & Waste Load Allocation (WLA & LA) target is intended to guide the development of a Watershed-Based

Management Plan (WBP) that will apply appropriate Best Management Practices (BMPs) and Low Impact Development (LID) techniques to achieve water quality standards.

Table 2. Elements of a TMDL

TMDL Element	Definitions	Stream Goals
Goal (End Point)	Achieve water quality consistent with Maine’s Class A, B or C standards	A biological community consistent with Maine’s Class A, B or C standards
TMDL Target (Loading Capacity)	Maximum loading of pollutants that attains the goal	Analysis of Maine’s biomonitoring data indicate that a watershed with characteristics of X% IC would achieve the goal
Margin of Safety (MOS)	The MOS accounts for uncertainty in target-setting and adds a safety factor to increase the likelihood of attainment	A 1% or 2% IC reduction is reserved from the target as a MOS
Load Allocation (LA) & Waste Load Allocation (WLA) Target	Maximum allowable pollutant load that can be allocated to various watershed sources and still achieve the water quality target and goal	X% IC Target - MOS, which represents an approximate % reduction in stormwater runoff volume and associated pollutants when compared to existing pollutant loads
Future Actions or Watershed Management Plan	Actions or engineered BMPs that are designed to achieve water quality standards	A Watershed-Based Management Plan and/or BMP implementation plan may be developed to determine the relative contributions and the best approach to solutions

Under Maine’s Water Classification Program, the State of Maine has four tiers of water quality classifications for freshwater rivers and streams (AA, A, B, C), each with varying designated uses and water quality criteria providing different levels of protection. A guidance document developed by MDEP in 2011 outlines the methods used to determine the % IC values adequate to support aquatic life use in Maine’s waterbodies. The % IC guidelines are based on analyses of data collected in Maine streams at 148 sample locations across the state, representing the full range of impervious cover expected in Maine. Based on the combined information obtained in the study, the % IC guideline ranges specified in Table 3 represent the % IC values found sufficient to support water quality classes in Maine (MDEP, 2011).

Table 3. Percent impervious cover (% IC) guidance for expected attainment of Maine’s designated aquatic life uses (DEP, 2011).

	Class AA/A	Class B	Class C
IC TMDL TARGETS*	≤5%	≤9%	≤16%

* A 1% Margin of Safety (MOS) is applied to Class AA, A, and B waters; a 2% MOS is applied to Class C waters. The MOS for Penjajawoc Stream and Meadow Brook is 1%.

Impervious Cover Used for this Addendum

The waterbody-specific % IC target for this TMDL was determined based on the Class B value provided in Table 3. To calculate the current Penjajawoc watershed % IC, Maine DEP staff used the City of Bangor's impervious cover layer. The City of Bangor created this detailed impervious surface GIS data layer from high resolution aerial photography (City of Bangor, 2014).¹ This layer was determined to be the best available impervious cover dataset for the portion of the watershed located within the City of Bangor, which is the majority of the watershed. The very small portion of the watershed in Orono was determined to have no impervious cover. For the portion of the watershed in Veazie, the impervious cover dataset created by the State of Maine and Sanborn (Sanborn and State of Maine, 2007) was used as a base product. This layer was created from 2007 data, and therefore did not contain any impervious additions between 2007 and present. Additional impervious area was added to the Veazie dataset by DEP staff, using 2021 NAIP (National Agriculture Imagery Program) imagery with 1 meter resolution.

PUBLIC PARTICIPATION

Maine DEP staff have been in communication with the City of Bangor during the development of this addendum and the development of the Penjajawoc Stream Watershed-Based Management Plan.

This draft introduction and stream summary appendix was made available for public review and comment for thirty days beginning on October 23, 2023, on MDEP's 'Opportunity for Comment' webpage, <https://www.maine.gov/dep/comment/index.html>. Email notification was sent to a list of compiled stakeholders, along with any others who expressed interest, as well as to digital subscribers of the comment webpage.

A virtual informational meeting on the addition of Penjajawoc Stream and Meadow Brook to the Statewide IC TMDL was held on November 8, 2023 at 2:00pm via Zoom. Notification of the meeting was included with notification of public review and comment of the TMDL addendum both on MDEP's website and via email.

All written public comments and responses are included in Appendix A and are part of the final TMDL submittal documents to the USEPA and will be posted on DEP's web page 'TMDL approved by EPA' at <http://www.maine.gov/dep/water/monitoring/tmdl/tmdl2.html>.

REFERENCES

City of Bangor, 2014. Impervious GIS layer. James Sewall Company 2009. Updated by KAPPA 2014.

Maine Department of Environmental Protection (MDEP), 2011. Impervious Cover Targets for Stream Restoration and Watershed Management. Thomas J. Danielson, Leonidas Tsomides, Doug Suitor.

¹ Bangor impervious data developed by James Sewall Company from ½ inch resolution aerial photography in November 2009. Data was updated in known changed areas in April 2014 by KAPPA mapping based on ¼ inch resolution photography provided by the Maine Geolibrary Board.

Maine Department of Environmental Protection (MDEP), 2012. Maine Impervious Cover Total Maximum Daily Load (TMDL) for Impaired Streams. DEPLW-1239.

https://www.maine.gov/dep/water/monitoring/tmdl/2012/IC%20TMDL_Sept_2012.pdf

Maine Department of Environmental Protection (MDEP), 2012. Maine Impervious Cover Total Maximum Daily Load (TMDL) for Impaired Streams. DEPLW-1239. Appendix 3: Public Comments, Frequently Asked Questions and DEP Responses to Public Comments.

https://www.maine.gov/dep/water/monitoring/tmdl/2012/ICPublicComments&FAQs_Appendix3.pdf

Maine Department of Environmental Protection (MDEP), 2022. 2018/2020/2022 Integrated Water Quality Monitoring and Assessment Report. Bureau Water Quality, Augusta, ME.

<https://www.maine.gov/dep/water/monitoring/305b/>

Sanborn and State of Maine. 2007. Imperviousness change 2003-2007. Raster digital data.