REGION 1
BOSTON, MA 02109

February 28, 2024

Brian Kavanah, Director
Bureau of Water Quality
Maine Department of Environmental Protection #17
State House Station
Augusta, Maine 04333-0017

Dear Mr. Kavanah:

Thank you for the Maine Department of Environmental Protection's (ME DEP) submittal of the final *Maine Impervious Cover TMDL (Total Maximum Daily Load) Addendum.* This Addendum contains the relevant information to add Penjajawoc Stream and Meadow Brook to the existing Statewide Impervious Cover (IC) TMDL which was previously approved in 2012. The purpose of these TMDLs is to address the impaired Aquatic Life Use in several small streams in Maine receiving a mix of regulated and unregulated urban stormwater and using percent impervious cover (% IC) as a surrogate for the mix of pollutants in stormwater.

The U.S. Environmental Protection Agency (EPA) hereby approves ME DEP's January 31, 2024, IC TMDL Addendum. EPA has determined that the TMDLs included in this report meet the requirements of Section 303(d) of the Clean Water Act (CWA) and of EPA's implementing regulations (40 CFR Part 130). Attached is a copy of our approval documentation.

My staff and I look forward to continued cooperation with the ME DEP in exercising our shared responsibility of implementing the requirements under Section 303(d) of the CWA.

Sincerely,

/s/

Ken Moraff, Director
Water Division

cc: Wendy Garland, ME DEP

Susanne Meidel, ME DEP
Tracy Krueger, ME DEP
Mel Cote, US EPA Region 1
Ivy Mlsna, US EPA Region 1

EPA Region 1
TOTAL MAXIMUM DAILY LOAD (TMDL) REVIEW

DATE: February 28, 2024

TMDL: **Maine Impervious Cover TMDL Addendum**

Penjajawoc Stream and Meadow Brook in Bangor (Segment ID: ME0102000513_226R03); 2018/2020/2022 303(d) list: Benthic Macroinvertebrates Bioassessments, Habitat Assessment (streams), Dissolved Oxygen, Periphyton Indicator Bioassessments

STATUS: Final

IMPAIRMENT/POLLUTANT: Aquatic life use impairment measured by Class B aquatic life criteria (benthic macroinvertebrate bioassessments, dissolved oxygen, habitat assessment, periphyton indicator bioassessments); primary sources are a mix of regulated and unregulated urban stormwater. TMDLs are established in terms of percent impervious cover (% IC, serving as a surrogate for the mix of pollutants in stormwater).

BACKGROUND: The Maine Department of Environmental Protection (ME DEP) submitted a Statewide Impervious Cover (IC) TMDL that was approved by EPA in 2012. This Addendum is to develop TMDLs for one additional impaired waterbody segment which includes Penjajawoc Stream and it's tributary, Meadow Brook, to add to the existing 2012 IC TMDL. A thirty-day public comment period was made available beginning on October 23, 2023, and a virtual informational meeting was held on November 8, 2023. ME DEP submitted to EPA Region 1 the final *Maine Impervious Cover TMDL Addendum* with a transmittal letter dated January 31, 2024. In addition to the TMDL itself, the submittal included, either directly or by reference, the following documents:

- *Public Comments and Responses,* Appendix A, TMDL report.
- *Stream Summaries,* Appendix B, TMDL report.
- *Maine 2012 Statewide IC TMDL*
  https://www.maine.gov/dep/water/monitoring/tmdl/tmdl2.html
- *Maine Stormwater Best Practices Manual*.
  http://www.maine.gov/dep/land/stormwater/stormwaterbmps/index.html
- *Maine 2018/2020/2022 Integrated Water Quality Monitoring and Assessment Report*
  https://www.maine.gov/dep/water/monitoring/305b/

The following review explains how the TMDL submission meets the statutory and regulatory requirements of TMDLs in accordance with § 303(d) of the Clean Water Act and EPA's implementing regulations in 40 CFR Part 130.

REVIEWERS: Bonnie Blalock (617-918-1253), e-mail: blalock.bonnie@epa.gov

REVIEW ELEMENTS OF TMDLs

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. § 130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

1. Description of Waterbody, Pollutant of Concern, Pollutant Sources and Priority Ranking

The TMDL analytical document must identify the waterbody as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments, or chlorophyll a and phosphorus loadings for excess algae.

A. Description of Waterbody, Priority Ranking, and Background Information

The IC TMDL Addendum applies to a single assessment unit representing a 5.2- mile section of Penjajawoc Stream, and a 1.5-mile section of Meadow Brook located in the city of Bangor, Maine (as from the 2024 Addendum on page 9, Appendix B). Penjajawoc Stream and Meadow Brook are part of the Penjajawoc Stream Watershed which is made up of four subwatersheds including the Upper Subwatershed, Middle Subwatershed, Meadow Brook Subwatershed, and Mt. Hope Subwatershed (Figure 1, Appendix B of the 2024 Addendum). The impaired sections of Penjajawoc Stream and Meadow Brook were listed in Maine's approved 2018/2020/2022 303(d) list as high priorities for TMDL development.

B. Pollutant of Concern

ME DEP's earlier stressor identification studies of several small urban streams have provided extensive documentation of the "urban stream syndrome" in Maine, where biological impairments are due primarily to a combination of pollutant (temperature, low dissolved oxygen, heavy metals) and non-pollutant aquatic life stressors (such as impaired stream habitat and altered hydrology) related to stormwater runoff from developed areas. Data developed by ME DEP in its 1998-2002 urban stream study of Long Creek and Red Brook in southern Maine resulted in a wealth of data on dissolved oxygen, altered flow regime, decreased woody debris, increased water temperatures, and increased toxicity (heavy metals), all analyzed by EPA ORD in the "EPA Stressor Report." The report identifies each probable cause/stressor, the anthropogenic activities related to that stressor, and the specific steps, or causal pathways between the source and the biological response. Impervious surfaces and the stormwater it generates are identified as an anthropogenic source that contributes to each of the probable causes of the biological impairments in Long Creek. ORD particularly notes the complex interactions of dissolved oxygen, altered flow regime and temperature, and that each of the individual proximate stressors may

also be acting jointly to cause biological impairments. ORD's report concludes that multiple probable causes or environmental stressors are responsible for the biological impairment of Long Creek. These earlier studies detailing multiple stream impacts of excessive stormwater runoff provided extensive documentation and analyses to inform later assessments of similar small urban streams in Maine.

Given the importance of stormwater runoff and multiple stressors in the development of small urban stream TMDLs, ME DEP has used the total **extent of impervious cover (% IC)** in the watershed as a **surrogate** for the complex mixture of pollutant and non-pollutant aquatic life stressors which are attributable to stormwater runoff from developed areas. A number of urban stressors (e.g., impaired stream habitat, increased temperature, toxic contaminants, and low base-flow) and their sources can be addressed simultaneously by reducing % IC or its effects, and ME DEP refers to a list of recommended future actions in Appendix B of the Addendum.

C. Pollutant Sources

The Addendum for the Penjajawoc Stream Watershed describes the % IC in each subwatershed which is a surrogate/source for the mix of pollutants in stormwater. The Upper Subwatershed of Penjajawoc Stream is comprised largely of wetlands and other undeveloped land (estimated % IC of 3%) and drains a large 300-acre emergent freshwater marsh known as Penjajawoc Marsh. The Mt. Hope subwatershed is largely rural and is comprised of older, low-density residential development and a cemetery (% IC of 8%). The Mt. Hope subwatershed drains the eastern portion of the watershed and joins Penjajawoc Stream a small distance before it flows into the Penobscot River. Higher IC areas include the Middle (% IC of 45%) and Meadow Brook (% IC of 25%) subwatersheds which contain the Bangor Mall and other intensely developed commercial areas. Meadow Brook flows into Penjajawoc Stream and then Penjajawoc Stream flows southeasterly into the Penobscot River (Figure 1, 2024 Addendum).

Assessment: EPA Region 1 concludes that the TMDL document meets the requirements for describing the TMDL waterbody segments, pollutants of concern, identifying and characterizing sources of impairment, and priority ranking.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribe water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

Penjajawoc Stream and Meadow Brook have been assessed by ME DEP as not meeting water

quality standards (WQS) for aquatic life use for Class B freshwater streams 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. Water quality classification and WQS of all surface waters of the State of Maine have been established by the Maine Legislature at Title 38 MRSA 464-468. In order for a waterbody to attain its classification, all applicable surface WQS must be met. Each classification of freshwater rivers and streams includes designated uses, narrative and/or numeric water quality criteria for dissolved oxygen, habitat, and aquatic life (all applicable to the IC TMDLs), and antidegradation provisions (designed to protect and maintain all water uses and water quality).

A. Water Quality Target - Aquatic Life Criteria

The impact of excessive pollutant-laden stormwater runoff into the small urban streams has resulted in a violation of the ME WQS, specifically the designated use as habitat for fish and other aquatic life [MRSA Title 38 §465]. These narrative criteria have provided the regulatory basis for Maine's numeric tiered aquatic life criteria since 1992. Numeric biocriteria designed to protect aquatic life use were adopted by Maine in 2004 [DEP Rule, Chapter 579], submitted to EPA as a water quality standard revision, and approved by EPA on January 25, 2005 (as required by §303(c) of the Clean Water Act, 33 U.S.C. §1313(c)). The narrative and numeric biocriteria for waters in Maine's WQS were used as the TMDL end point, goal, and ultimate numeric water quality compliance measure for the impaired portions of the streams to address non-attainment of aquatic life uses.

Maine's freshwater biocriteria were initially developed through the use of macroinvertebrate sampling and associated community structure modeling. The biocriteria provide a quantitative methodology for interpreting Maine's narrative biological criteria and aquatic life uses for rivers and streams, and for making decisions about classification attainment. A waterbody is determined to be in attainment in accordance with Chapter 579.4. Maine's biocriteria are based on 20 years of data from (currently) 768 river and stream and 126 wetland sampling locations, and over 1300 individual sampling events. Required sampling methods are referenced in Chapter 579.2 and included in the document entitled, *Methods for Biological Sampling and Analysis of Maine's Rivers and Streams* (DEP LW0387-B2002).

Assessment: EPA Region 1 concludes that ME DEP has properly presented its WQS and has made a reasonable and appropriate application of its WQS to protect the designated uses of these streams. This conclusion is based on the following factors.

Penjajawoc Stream and Meadow Brook are impaired for aquatic life use designation. ME DEP's determinations of impairment were based on habitat assessments and/or instream biological data collected according to required quality assurance protocols, and the modeling and assessment protocols for the implementation of Maine's WQS for assessment of aquatic life use. Both benthic

macroinvertebrate and algae biomonitoring assessments were conducted at various sampling stations since 1997, with the most recent assessments in 2016. Data indicated that the watershed did not attain its statutory Class B classification at any of the eight sampling locations tested.

The approved biocriteria are the end point or goal for the TMDL, creating a direct connection between Maine's WQS and the TMDL targets. The approved biocriteria are based on a long-term, extensive database and a peer reviewed model, used and interpreted by highly qualified and experienced staff biologists.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards (40 C.F.R. § 130.2(f)). The loadings are required to be expressed as either mass- per-time, toxicity or other appropriate measure (40 C.F.R. § 130.2(i)). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results from water quality modeling, etc. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation.

In many circumstances, a critical condition must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

Establishment of TMDL Percent Impervious Cover (%IC) Target

In a pollutant-specific TMDL, a stream's loading capacity is the greatest amount of pollutant loading the water can receive without violating WQS. In these TMDLs, the "pollutant of concern" is a complex mixture of pollutant and non-pollutant aquatic life stressors, and is represented by the surrogate measure of IC. The loading capacity for these TMDLs, therefore, is the greatest amount of IC each watershed can support without violating each stream segment's assigned aquatic life criteria.

In the 2012 Statewide IC TMDL, ME DEP explains the IC TMDL method used to establish the link between water quality (attainment of aquatic life and other criteria) and the mix of pollutants in stormwater runoff. The benefit of using this method is that a number of urban stressors and their sources can be addressed simultaneously (e.g., toxic load from runoff and road deicers; habitat destruction due to storm flows including erosion and wash-out of aquatic life, and sedimentation

problems from road sand and exposed soil; low base flows related to high imperviousness).

ME DEP developed a technical support document for using this IC TMDL method in 2005, and subsequently updated the document in 2011 using more rigorous analysis and multiple lines of evidence to support TMDL target-setting in Maine. For Class B freshwater streams, such as the Penjajawoc Stream and Meadow Brook, Maine recommends a level of total watershed IC not to exceed 9%. The Penjajawoc Stream Watershed overall has an estimated % IC of 11% (see Appendix B of the 2024 Addendum).

Critical Conditions

The % IC loading capacities for the streams are set to protect water quality for the full range of flows expected, and thus support uses during *critical conditions*. Since stormwater runoff events occur throughout the year, with different environmental effects, at both low and high flows, critical conditions for aquatic life protection are not limited to particular flow conditions or time of year. Benefits realized from IC reductions will occur in all seasons because stormwater controls to be implemented to meet the IC targets will reduce adverse impacts (pollutant loading and damaging flows) for the full spectrum of storms throughout the year. Please see EPA's assessment of **climate change** issues in the assessment section below.

Assessment: EPA Region 1 concludes that Maine selected reasonable surrogates for the complex mixture of pollutant and non-pollutant stressors causing water quality impairment, and that the target for % IC has been appropriately set at levels necessary to attain and maintain applicable WQS in Maine. The loading capacities are based on reasonable approaches for establishing the relationship between pollutant loading in stormwater runoff and water quality in stormwater-impaired streams. The % IC guidelines used to develop this TMDL were developed based on analyses of data collected in Maine streams at 148 sample locations across the state, representing the full range of IC expected in Maine. EPA also concludes that Maine adequately documented the assumptions and strengths and weaknesses in the analytical approaches used to support the establishment of the loading capacities for % IC, and properly accounted for critical conditions for all the TMDLs established. The bases for these conclusions are explained below.

Maine's Use of Surrogates is Reasonable and Appropriate

While TMDLs are intended to address impairments resulting from pollutants, EPA's regulations state that TMDLs can be expressed in several ways, including terms of toxicity, which is a characteristic of one or more pollutants, or by some "other appropriate measure" 40 CFR §130.2(i). EPA's regulations also state that TMDLs may be established using a biomonitoring approach as an alternative to the pollutant-by-pollutant approach 40 CFR §130.7(c)(1). The use of a surrogate IC target in place of a numeric pollutant target is appropriate in this case because the IC target serves as an indicator for conditions under which the water quality criteria for aquatic

life can be attained. The 2012 Statewide IC TMDL further summarizes the rationale for linking % IC to attainment of aquatic life criteria and uses.

TMDL for Percent Impervious Cover (% IC)

As summarized in EPA's 2012 Statewide IC TMDL review, EPA Region 1 concludes that the use of total IC as a surrogate for loading capacity is reasonable and appropriate and is supported by scientific literature that shows that aquatic insect, freshwater fish diversity, stream habitat declines as IC increases. The TMDL target set for this segment is further based on site-specific conditions and factors in the watershed which both lessen or increase the volume of stormwater runoff (i.e., local total percent imperviousness).

Critical Conditions

The critical conditions for these streams are associated with storm events from developed areas which, in addition to potential immediate damage to aquatic biota, produce cumulative impacts to the biota over time. These urban/suburban storm events dramatically change watershed hydrology by affecting the quantity and quality of runoff. Urban development results in increases in stormwater runoff peaks and volumes, and increased frequency of runoff from smaller storms. As the amount of IC in watersheds increases, greater quantities of stormwater flows destabilize, alter structure, and destroy and impair habitat for aquatic life, while increased runoff of pollutants creates water quality problems, and less base flow is available to aquatic life in streams during low flow periods.

These higher peak volumes scour macroinvertebrates along with other stream bed materials. Lower base flows reduce the amount and extent of wetted aquatic habitat and increase aquatic temperatures and stress on aquatic life. More frequent post-development runoff from smaller storms (that used to infiltrate or soak into pervious ground and surfaces) subject aquatic life to more frequent exposure to pollutants, and increased destabilization of stream morphology and aquatic habitat.

EPA concludes that critical conditions are adequately accounted for because the target for % IC directly addresses the effect of % IC on stormwater runoff in the watershed, and thus the range of the stormwater impacts under varying critical conditions at different flows.

Climate Change

Increasing atmospheric greenhouse gas concentrations are driving climate change resulting in deviations in atmospheric temperature and precipitation patterns from their historic norms in many areas (IPCC, 2022). These climate changes, in turn, affect key parameters influencing water quality such as flow and water temperature.

Over 41,000 TMDLs have been developed for the nation's waters to determine the maximum pollutant loads allowable that would still permit attainment of WQS. Until recently, all were based upon historical water data, without consideration of the plausible range of future flow and water temperature profiles in a climate-change altered world.

National research at EPA and other parts of the federal government, states, etc., is currently developing tools and projections for assessing the impacts of climate change on future water quality and, by extension, TMDLs. Multi-decadal projections of possible future climate conditions at local to regional scales are variable depending on the choice of general circulation model and economic growth assumptions used to drive the levels of greenhouse gas emissions upon which the models rely. In most locations, models agree that temperature will go up, though they vary on how much. Projected precipitation changes vary significantly by region, and in many locations models disagree on the direction of changes, especially in the northeastern United States. Climate models currently have limited skill in accurately projecting local to regional scale changes in frequency, intensity, and duration of precipitation events, though current observations and theory suggest these factors will change.

The ultimate goal of these TMDLs is achieving water quality consistent with Maine's current WQS and criteria, in this case, aquatic life use measured by habitat assessments and/or ambient biomonitoring for benthic macroinvertebrates) [38 MRSA 38 §465]. Any substantial future increases in stormwater flow and associated pollutants due to climate change in New England may require additional implementation efforts to achieve the ultimate TMDL goal of achieving Maine's aquatic life criteria. Implementation plan recommendations may need to be re-evaluated periodically and revised to account for such changes in runoff and water quality if future water quality assessments continue to document non-attainment of WQS.

TMDL Time Increment

EPA's November 15, 2006, guidance entitled "Establishing TMDL 'Daily' Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No.05-5015, (April 25, 2006) and Implications for NPDES Permits," recommends that TMDL submittals express allocations in terms of daily time increments. In this case, the TMDL's % IC targets are not explicitly expressed in terms of a daily increment. However, they are, in effect, daily targets because they will achieve reductions in stormwater runoff volume in all storm events whenever they occur (e.g., on any given day) throughout the year.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 C.F.R. § 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. § 130.2(g)). Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable water quality standard, and all nonpoint and background sources will be removed.

ME DEP has found that in order to support Class B aquatic life use, the Penjajawoc Stream Watershed needs to have the characteristics of a watershed with 9% IC (ME DEP, 2012; ME DEP 2024). The 2012 Statewide IC TMDL has set an explicit Margin of Safety (MOS) for Class B waters at 1% IC, making 8% IC the combined Wasteload (WLA) and Load (LA) (TMDL report). The resulting % IC allocation applies to all stormwater drainage areas and affects all sources subject to load allocations (LA) and wasteload allocations (WLA) in the watershed (WLA=LA). The LA relates to existing and future nonpoint sources, natural background, and stormwater runoff not subject to NPDES permitting. (See WLA discussion below.)

Assessment: The IC wasteload and load allocations apply irrespective of the type of stormwater (nonpoint source or point source) that is generated from any given parcel of land. Since stormwater discharges are highly variable in frequency and duration, and because insufficient data are available for each parcel in the watershed, it is not feasible to establish specific % IC allocations for each area that generates stormwater, nor is it feasible to draw a clear distinction among stormwater from nonpoint sources, stormwater from non-NPDES- regulated point sources, and stormwater from NPDES-regulated point sources (which require a wasteload allocation – see next section). EPA agrees that it is reasonable to address the combined loading contributions for % IC into one allocation because separating the loading contributions is infeasible and because the control measures necessary to abate point and nonpoint sources of stormwater are the same. EPA Region 1 concludes that the load allocations for % IC are adequately specified in the TMDL at levels necessary to attain and maintain WQS.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 C.F.R. § 130.2(h)). If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to nonpoint sources and background will result in attainment of the applicable water quality standard, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. In such cases, the State/Tribe will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

As described in the 2012 Statewide IC TMDL report, the TMDL establishes the WLA at the same % IC that is established for the LA for each impaired stream segment, as a gross allotment or watershed allocation, because it was not possible to establish WLAs for individual parcels or stormwater sources. Stormwater runoff is addressed by MEPDES MS4 general permit for any stormwater runoff entering an MS4 collection system.

The necessary reduction in % IC discussed in the TMDL reflects reduction from current conditions. Future development activities have the potential to increase effective IC and resulting stormwater runoff and associated pollutants, and these future activities will need to be addressed in the watershed-based management plan (WBP) (prepared by watershed stakeholders with support from ME DEP). The city of Bangor completed a WBP for Penjajawoc Stream, approved by DEP in 2008 and is currently working on updating the WBP. To ensure that the WLA and LA targets are attained, future development either will need to be constructed and operated in such a way that there is no net increase in stormwater runoff, or additional reduction in IC will need to occur at existing sites that contribute stormwater runoff.

ME DEP recommends that the % IC WLA and LA target be used to guide TMDL implementation because stormwater impacts can be reduced most effectively by reducing the volume of stormwater discharge and the effect of IC in the contributing watershed (as well as using stream restoration techniques). M E DEP also explains that ultimate compliance with the TMDL and all of Maine's WQS will be determined by habitat assessments and/or measuring instream water quality.

Assessment:

WLAs are required for NPDES-regulated point sources of pollutants. In this case, WLAs would be needed for areas from which there are NPDES (or, in Maine, MEPDES)-regulated stormwater discharges. EPA's TMDL guidance suggests that it is acceptable, in cases when data and information are unavailable, to allocate stormwater by gross allotments. See EPA's November 22, 2002, guidance entitled *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs)*. Given the data limitations mentioned above, it is acceptable to group all NPDES eligible stormwater discharges into a common wasteload allocation target for % IC. In addition, given the difficulty of separating out % IC associated with different stormwater sources (point and nonpoint, regulated and nonregulated), it is acceptable to include all sources in the one aggregate allocation (WLA and LA) for each waterbody. Future construction projects in the watershed may be subject to the Maine stormwater permitting program and will require control of stormwater on site or potential further IC reduction by existing sources, and Maine's ambient water quality criteria must be met. EPA Region 1 concurs that the WLA components of the TMDLs

are appropriately set to assure attainment of WQS.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)). EPA guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Penjajawoc Stream and Meadow Brook are Class B freshwater streams. The 2012 Statewide IC TMDL has set an explicit Margin of Safety (MOS) for Class B waters at 1% IC.

Assessment: EPA Region 1 has evaluated the margin of safety and believes it is adequate for the Penjajawoc Stream Watershed. Maine's % IC TMDL provides an explicit MOS in the contributing watersheds, which is reserved from the total loading capacity.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)).

ME DEP considered seasonal variations in conditions when developing the TMDL because stormwater volume and pollutant loads occur and vary throughout the year, and because impairment to aquatic life and habitat in stormwater-impaired streams occurs at both low and high flows, with different environmental impacts (page 19, 2012 TMDL report). The TMDL was established to protect during critical conditions throughout the year. The IC target will result in reductions in the effects of IC which will improve water quality for all flows and seasonal conditions. In addition, specific Best Management Practices (BMPs) implemented will be designed to address loadings during all seasons.

Assessment: EPA Region 1 concludes that seasonal variation has been adequately accounted for in the TMDL because the TMDL was developed to be protective year-round. Seasonal fluctuations in flow, and varying contributions of pollutants from snow and rainfall runoff are taken into account. There is no need to apply different targets on a seasonal basis because the stormwater controls to be implemented to meet the IC targets will reduce adverse impacts (pollutant loading damaging flows, and droughts) for the full spectrum of weather conditions throughout the year.

8. Monitoring Plan

EPA's 1991 document, Guidance for Water Quality-Based Decisions: The TMDL Process (EPA 440/4-91-001), and EPA's 2006 guidance, Clarification Regarding "Phased" Total Maximum Daily Loads, recommend a monitoring plan when a TMDL is developed using the phased approach. The guidance indicates that a State may use the phased approach for situations where TMDLs need to be developed despite significant data uncertainty and where the State expects that the loading capacity and allocation scheme will be revised in the near future. EPA's guidance provides that a TMDL

developed under the phased approach should include, in addition to the other TMDL elements, a monitoring plan that describes the additional data to be collected, and a scheduled timeframe for revision of the TMDL.

The IC TMDLs are not phased TMDLs, so a monitoring plan is not required, but the 2012 TMDL document includes a description of a monitoring plan designed to measure attainment of WQS. ME DEP explains that progress towards attainment of WQS will be evaluated by monitoring the macroinvertebrate community according to an existing rotating basin sampling schedule (page 24, Appendix 1, 2012 TMDL report).

Assessment: EPA Region 1 concludes that the anticipated monitoring by and in cooperation with ME DEP is sufficient to evaluate the adequacy of the TMDL and attainment of WQS.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that Regions assist States/Tribes in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by EPA, they help establish the basis for EPA's approval of TMDLs.

ME DEP provides general recommendations for future actions in the Addendum (page 6, Appendix B). Emphasis is placed on updating and implementing the WBP for Penjajawoc Stream as the primary strategy for implementing water quality improvements.

The city of Bangor is subject to the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4s). The city anticipates revising and resubmitting the Penjajawoc Stream WBP as part of the 2022-2027 MS4 permit cycle. The MS4 General Permit contains specific requirements for Urban Impaired Streams, which includes the Penjajawoc Stream Watershed. The MS4 Stormwater Management Plan (SMP) identifies three BMPs that will be implemented to meet the Urban Impaired Stream requirement of the 2022 MS4 General Permit. These BMPs include: an education campaign to raise citizens' awareness of Urban Impaired Streams in Bangor, inspection of publicly owned ditches within the right-of-way in Urban Impaired Stream watersheds, and implementation of structural BMPs in Urban Impaired Stream watersheds (as from the TMDL Addendum on page 6, Appendix B)

Assessment: Addressed, though not required. EPA Region 1 is taking no action on the implementation plan.

10. Reasonable Assurances

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a water impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, States/Tribes are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in State/Tribe implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

The Penjajawoc Stream Watershed is located within designated urban MS4 areas. Most stormwater sources are regulated under the MEPDES Program. As described in Sections 4 and 5 above, single allocations of % IC (WLA and LA) are established for the Penjajawoc Stream Watershed. No point sources have been given less stringent limits assuming nonpoint source reductions. Meaningful actions and commitments that support achievement of needed reductions are described above, in the 2024 Addendum (page 6, Appendix B), and the 2012 TMDL report (page 20, Appendix 1).

Assessment: Reasonable assurance was addressed in the TMDL Addendum, the 2012 Statewide IC TMDL report, and in public comments and ME DEP's response to comments. Based on the commitment of the ME DEP and its watershed partners to work together to abate adverse stormwater impacts, backed up by ME DEP's regulatory authority, EPA concludes that adequate reasonable assurance has been provided.

11. Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each State/Tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. § 130.7(d)(2)).

Inadequate public participation could be a basis for disapproving a TMDL; however, where EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

The public participation process is described on page 5 of the Addendum. A draft of the Addendum was posted for a 30-day public review period on ME DEP's website on October 23, 2023, and notice was emailed to the ME DEP's public interest contact list. Eight comments were received from one commentor. ME DEP fully addressed comments received during public review

(see Appendix A of the Addendum). An informational public meeting was held via Zoom on November 8, 2023. Notification of the meeting was included with notification of public review and comment of the TMDL Addendum both on ME DEP's website and via email.

Assessment: EPA Region 1 concludes that ME DEP has done an adequate job of involving the public during the development of the TMDL, has provided sufficient opportunities for the public to comment on the TMDL, and has provided reasonable responses to the public comments.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, the pollutant(s) of concern, and the priority ranking of the waterbody.

Assessment: On January 31, 2024, ME DEP submitted the Maine IC TMDL for Impaired Streams Addendum and associated documents for EPA approval. These documents contained all of the elements necessary to approve the TMDL as demonstrated by the foregoing and the TMDL's administrative record.

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	Data for entry in EPA's National TMDL Tracking System								
TMDL Name									
Number of TMDLs, Protection Plans and/or Advance Restoration Plan*			1						
Type of TMDLs			Impervious Cover						
Number of listed causes/parameters (from 303(d) list)			4						
Lead State			Maine						
TMDL Status			Approved						
	Individual TMDLs listed below								
Action ID#	Segment name	Segment ID #	TMDL, Protection Plan, OR Alternative*	Pollutant name	Impairment PARAMETERS/Cause name	Pollutant endpoint	Unlisted?	MA DEP Point Source & ID#	Listed for anything else?
R1_ME_2024_01	Penjajawoc Stream (Bangor) Meadow Bk (Bangor)	ME0102000513_226R03	TMDL	Pollutants in Urban Stormwater	Benthic Macroinvertebrates Bioassessments; Habitat Assessment; Dissolved Oxygen; Periphyton (Aufwuchs) Indicator Bioassessments		Listed	N/A	N/A
Point and/or Nonpoint Sources?			NPS						
Establishment Date (approval)*			2/28/2024						
Completion (final submission) Date			1/31/24						
Public Notice Date			10/23/23						
EPA Developed?			No						
Towns affected* (in alphabetical order)			Bangor;						

*Abbreviations: TMDL = TMDL; Protection Plan = PP; Advance Restoration Approach = Adv

**Where XX = State abbreviation, yyyy = year of approval, xx = sequential per year (e.g., first TMDL submission is 01), z = p if protection plan, z = a if advanced restoration plan