UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

October 10, 2019

Martin Suuberg, Commissioner
Department of Environmental Protection
One Winter Street
Boston, MA 02108

Re: Approval of the Slocums and Little Rivers Embayment System TMDL for Total Nitrogen

Dear Commissioner Suuberg:

Thank you for your Department's submittal of the TMDL analysis for Slocums and Little Rivers Embayment System on September 10, 2019. We appreciate your efforts and involvement with our office to finalize this TMDL. The U.S. Environmental Protection Agency (EPA) has reviewed the document entitled "Final Slocums and Little Rivers Embayment System Total Maximum Daily Loads for Total Nitrogen", Control #315.1, September 2019 and it is my pleasure to approve the Total Nitrogen TMDLs for Slocums and Little Rivers and accompanying four protection plan TMDLs for hydrologically linked waterbodies. EPA has determined, as set forth in the enclosed review document, that this TMDL meets the requirements of Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 Code of Federal Regulations (CFR) Part 130.

MassDEP's efforts will help restore water quality and prevent further degradation of this, and adjacent, waterbody segments. My staff and I look forward to continued cooperation with the Massachusetts DEP in exercising our shared responsibility of implementing the requirements under Section 303(d) of the CWA. If you have any questions regarding this approval, please contact Ralph Abele at (617) 918-1629 or have your staff contact Ivy Mlsna of my staff at (617) 918-1311.

Sincerely,

/s/

Kenneth Moraff, Director
Water Division

Enclosure

cc:
Laura Blake, MassDEP
Barbara Kickham, MassDEP
Ralph Abele, EPA
Ivy Mlsna, EPA

EPA NEW ENGLAND'S TMDL REVIEW

DATE: October 10th, 2019

TMDL: Slocums and Little Rivers Embayment System TMDL for Total Nitrogen

STATUS: Final

IMPAIRMENT/POLLUTANT: 2 Total Nitrogen TMDLs, 4 Pollution Prevention TMDLs (See Attachment 1)

BACKGROUND: EPA Region 1 received the *Slocums and Little Rivers Embayment System Total Maximum Daily Loads for Total Nitrogen* (Control Number: CN 315.1) from the Massachusetts Department of Environmental Protection (MassDEP) with a transmittal letter dated September 10, 2019. In addition to the Final Nitrogen TMDL itself, the submittal included, either directly or in reference, the following documents:

- Public Meeting Information and Response to Comments, page 38 and Appendix E
- Applicable Massachusetts Surface Water Quality Standards (WQS), Appendix A
- Massachusetts Estuaries Project, Linked Watershed-Embayment Approach to Determine Critical Nitrogen Loading Threshold for the Slocum's and Little River Estuaries, Dartmouth, Massachusetts, October 2012. **https://www.mass.gov/files/documents/2016/08/ue/mep-slocums-bb.pdf**
- Massachusetts Year 2014 Integrated List of Waters: Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act (CN 450.1), December 2015. **http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf**
- Massachusetts Estuaries Project Embayment Restoration and Guidance for Implementation Strategies, MassDEP 2003. **http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/mepmain.pdf**

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: Ivy Mlsna (617-918-1311) e-mail: mlsna.ivy@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 Slocums and Little Rivers Embayment System is located on the western shore of Buzzards Bay. About 74.6% of the watershed of the Slocums River, including the estuary portion, is located within the Town of Dartmouth. The remaining approximately 25% of the northern portion of the watershed lies in the City of New Bedford. A very small percentage (<0.5%) lies also in the Towns of Westport and Freetown. The Slocums River is a tidal embayment with a number of streams, which flow into it. The principal stream is the Paskamansett River (also spelled Paskamanset), which discharges into the northern headwaters and accounts for >80% of the surface water inflows. Other streams that discharge to the embayment include, in order of diminishing freshwater contribution: Destruction Brook; Barney's Joy River North and Barney's Joy River South/Giles Creek entering the estuary on the southwestern shore; and several relatively small, seasonal streams along both shores of the embayment. Slocums River Estuary is supporting significantly impaired eelgrass habitat within its lower basin and significantly impaired infaunal habitat within its broad middle basin (MEP report, Executive Summary page 6).

The Little River watershed and estuary is contained entirely within the Town of Dartmouth. The Little River embayment has a small watershed relative to its size, with 16.5 acres of land for each acre of estuary. Surface water inflow to the estuary is from two short intermittent streams that drain the low uplands to the northwest, while groundwater discharge is primarily to the extensive northern and eastern saltmarsh areas. The mouth of Little River is defined and controlled on the west by the bedrock outcrop of Potomska Point and on the east by both buried and partially exposed bedrock. There is a small amount of freshwater inflow, due to the small watershed relative to the surface area of estuary, and the relative "open" tidal exchange. The Little River shows little dilution of the salinity from the incoming Buzzards Bay waters and lower nutrient levels compared to the adjacent Slocums River waters.

Currently, tidal exchange (and thus water quality) of the Little River Estuary is linked in part to that of the Slocums River. The Little River Estuary functions primarily as a salt marsh basin and therefore does not represent potential eelgrass habitat, and is presently supporting high quality infaunal habitat (MEP report, Executive Summary page 6)

The TMDL document presents a sound overview of the estuary system and the companion Massachusetts Estuaries Project final report (October 2012) presents a thorough description of the Slocums and Little Rivers embayment system. These systems are at risk of eutrophication from enhanced nitrogen loads entering through groundwater and surface waters discharging from the increasingly developed watershed. The TMDL was calculated by projecting reductions in locally controllable on-site subsurface wastewater disposal systems. The nitrogen septic load reductions within the Slocums River Estuary West and East sub-watersheds were reduced by 76% along with an approximate 80% reduction in nitrogen septic load for Paskamansett River and Destruction Brook. However, septic nitrogen loading represents only a moderate portion of the total watershed N load.

The Massachusetts Estuary Project (MEP) divided the embayment system into 4 distinct areas for analysis: Slocums River, Little River, Paskamansett River and Destruction Book, and the North and South Barney's Joy River. Just the Slocums River was found to be impaired for nitrogen over the course of the MEP study. The other studied segments were not found to be impaired for nitrogen but require a TMDL since all of these segments are hydraulically linked.

MassDEP has determined that all nutrient impaired segments in the Commonwealth are a high priority. See the Massachusetts 2014 Integrated List of Waters at:
http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf

B. Pollutant of Concern

In the Slocums and Little Rivers Embayment System, the pollutant of concern is the nutrient nitrogen. Additional listed impairments include fecal coliform and estuarine bioassessments. Additional SMAST-determined impaired parameters include dissolved oxygen level, chlorophyll *a,* benthic fauna, and eelgrass loss.

C. Pollutant Sources

The TMDL document identifies that the predominate sources of controllable nitrogen affecting this system originate from septic systems and impervious surface runoff. Additional controllable sources include fertilizers, agricultural activities, and landfills. Other sources, not locally controllable, include atmospheric nitrogen deposition to the estuary and natural surfaces (pages 11-12 of the TMDL document).

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.

The Slocums and Little Rivers, as well as Giles Creek, water quality classification is SA (surface waters subject to the rise and fall of the tide). The four freshwater waterbodies subject to pollution prevention TMDL thresholds are considered Class B. The water quality problems affecting nutrient-enriched embayments generally include period decreases of dissolved oxygen, loss of eelgrass habitat, decreased diversity and quantity of benthic animals, and periodic algae blooms (page 7 of the TMDL document). The Massachusetts water quality standards (314 CMR 4.00) contain numeric criteria for dissolved oxygen but have only narrative standards that relate to the other variables. The narrative standards for nutrients (nitrogen and phosphorus) for waters of the Commonwealth are such that "all surface waters shall be free of nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed site specific criteria developed in a TMDL or otherwise, established by the department". As stated on page 13 of the TMDL document and in EPA guidance, individual estuarine and coastal marine waters tend to have unique characteristics and therefore, site-specific analyses of the individual water body are typically required. For example, the loading of nitrogen that a specific water body can handle without becoming impaired varies. Factors that influence the effect of nitrogen include: flow velocity, tidal hydraulics, dissolved oxygen, and sediment adsorption and desorption of nitrogen.

The Massachusetts Estuaries Project analytical method is the Linked Watershed-Embayment Management Model (Linked Model), discussed on pages 14-21 of the TMDL document. It links watershed inputs with embayment circulation and nitrogen characteristics, and:

- requires site-specific measurements within each watershed and embayment;
- uses realistic "best-estimates" of nitrogen loads from each specific type of land-use;
- spatially distributes the watershed nitrogen loading to the embayment;
- accounts for nitrogen attenuation during transport to the embayment;
- includes a 2D or 3D embayment circulation model depending on embayment structure;
- accounts for basin structure, tidal variations, and dispersion within the embayment;
- includes nitrogen regenerated within the embayment;
- is validated by both independent hydrodynamic, nitrogen concentration, and ecological data; and
- is calibrated and validated with field data prior to generation of "what if" scenarios.

Two sentinel stations were identified in the embayment system at locations at which restoration will necessarily result in high quality habitat throughout the system and attainment of water quality standards (page 17 of the TMDL document). In these embayments, high habitat quality was defined as healthy eelgrass beds (in the Slocums River only), diverse benthic animal communities, and dissolved oxygen levels that would support Class SA waters. The sentinel stations SRT-12 and SRT-15 sites were selected such that the restoration of it would necessarily bring the entire system to acceptable habitat quality levels.

Since there is no eelgrass within this estuary, the target threshold nitrogen concentration was determined upon comparison to other local embayments of similar depths and structure. A well-studied eelgrass bed within the lower Oyster River in Chatham has been stable at a tidally averaged water column level of 0.37 mg/L N, while eelgrass was lost within the Lower Centerville River at a tidally

averaged leverl of 0.395 mg/L N and also within Waquoit Bay at 0.39 mg/L N. Although the nitrogen management target is restoration of eelgrass habitat, benthic infaunal habitat quality must also be supported as a secondary condition. Therefore, in addition to the primary target nitrogen threshold at the sentinel station, secondary criteria for infaunal habitat restoration was established to ensure that all impaired regions are restored if the threshold at the sentinel station is achieved.

Should the target concentration be met at the sentinel stations without eelgrass habitat restoration in Slocums River, other management activities would have to be identified and considered to reach to goals outlined in this TMDL (page 36 of the TMDL document). MassDEP's commitment to monitor the receiving water response is, in EPA's view, a reasonable measure designed to manage the inherent uncertainty around selecting an instream target against a backdrop of considerable scientific and technical uncertainty. While there is sufficient basis in the administrative record at the time of approval to conclude that the selected target will be protective, EPA will coordinate with the MassDEP to review any additional monitoring data or other information that may become available concerning eelgrass populations in the receiving waters, consistent with MassDEP's commitment to evaluate the adequacy of the target. EPA may determine at some point in the future whether a revision of this TMDL may be necessary in order to achieve water quality that fully supports the aquatic life designated use. These revisions may require additional monitoring, modeling and revised nitrogen targets at the sentinel stations.

Assessment: The use of the Linked Model, the description of the process in the TMDL document, and the companion Technical Report to this TMDL document adequately demonstrate the basis for deriving the target nitrogen loads and demonstrating that the targets will achieve water quality standards. EPA Region 1 concludes that MassDEP has properly presented its numeric water quality targets and has made a reasonable and appropriate interpretation of its narrative water quality criteria for the designated uses of the Slocums and Little Rivers Embayment System. In addition, MassDEP's adaptive management approach to the TMDL allows for revision if the target concentration is reached but habitat indicators are not met.

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.

As stated in the TMDL document, the Linked Model is a robust and fairly complicated model that determines an embayment's nitrogen sensitivity, nitrogen threshold watershed loading levels and response to changes in the loading rate. A key feature of the approach involves the selection of sentinel locations that have the poorest water quality in the embayment system. If these degraded areas come into compliance with the TMDL, other areas will also achieve water quality standards for nitrogen in the system. This approach captures the critical targets needed to address the impaired segments.

The percent reductions of existing nitrogen loads necessary to meet the target threshold watershed loads range from 0% to 23.8% with an overall required reduction of 10.7% for the Slocums and Little Rivers embayment system as a whole (Table 6 below, page 20 of the TMDL document). As described in the TMDL document, these loads represent one scenario using the Linked Model that could achieve the target threshold N concentration at the sentinel station. An alternative scenario to meet the target threshold N concentration can also be evaluated as part of the MEP process, at the town's request.

TABLE 6. Present Watershed Nitrogen Loading Rates, Calculated Loading Rates that are Necessary to Achieve Target Threshold Nitrogen Concentrations, and the Percent Reductions of the Existing Loads Necessary to Achieve the Target Threshold Loadings

Sub-embayment	**Present Total Watershed Load [1] (kg/day)**	**Target Threshold Watershed Load[2] (kg/day)**	**% Watershed Load Reductions Needed to Achieve Target**
Slocums River	7.56	5.76	-23.8%
Paskamansett River & Destruction Book	120.0	106.5	-11.3%
Barney's Joy River (North and South)	7.53	7.53	0%
Little River	8.14	8.14	0%
System Total	143.24	127.93	-10.7%

[1] Composed of fertilizer, runoff, landfill, farm animals, atmospheric deposition to lakes and natural surfaces, and septic system loadings.
[2]Target threshold watershed load is the N load from the watershed (including natural background) needed to meet the target threshold N concentrations identified in Table 4 on page 17 of the TMDL document.

The TMDL for each embayment considers all sources of N and is therefore the sum of the calculated target threshold watershed load, atmospheric deposition load, and benthic flux load from sediment sources (Table 9 below, page 29 of the TMDL document). The TMDLs for the Slocums and Little Rivers embayment system range from 7.54 kg N/day to 106.5 kg N/day. The TMDL for the system as a whole is 144.35 kg N/day.

Table 9: The Total Maximum Daily Loads (TMDL) for the Slocums and Little Rivers System

Sub-embayment	Target Threshold Watershed Load[1] (kg N/day)			Atmospheric Deposition (kg N/day)	Load from Sediments[5] (kg N/day)	TMDL[6] (kg N/day)
	Natural Background[2]	WLA[3]	LA[3]			
Slocums River	3.44	0.005	2.32	6.16	0	11.92
Paskamansett River & Destruction Brook	60.61	18.07	27.82	--	--	106.4
Barney's Joy River (North and South)[7]	4.95	0.003	2.59	--	--	7.54
Little River	5.63	0.002	2.51	1.36	8.90	18.4
System Total	74.63	18.08	35.24	7.52	8.9	144.35

[1] Target threshold watershed load is the load from the watershed needed to meet the embayment target threshold nitrogen concentration identified in Table 4 of the TMDL Document.
[2] Natural background N load from Table ES-1 of the MEP Technical Report
[3] WLA is the impervious surfaces runoff from directly connected impervious areas
[4] LA is the remaining Target Watershed Load
[5] Projected sediment N loadings obtained by reducing present loading rates proportional to proposed watershed load reductions and factoring in the existing and projected future concentrations of PON. Negative sediment loads were set to zero.
[6] Sum of target threshold watershed load, sediment load, and atmospheric deposition load
[7] The two freshwater streams enter the headwaters of Slocums River. Through nutrient load is combined here, separate TMDLs are assigned in Appendix D of the TMDL document.

Assessment: The TMDL document explains and EPA concurs with the approach for applying the Linked Model to specific embayments for the purpose of developing target nitrogen loading rates and in identifying sources of needed nitrogen load reduction. EPA believes that this approach is reasonable because the factors influencing and controlling nutrient impairment were well justified, as demonstrated by the foregoing and the TMDL's administrative record.

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.

Using the Linked Model, MassDEP has identified the portion of the loading capacity allocated to existing and future non-point sources necessary to meet water quality standards. In the case of the Slocums and Little Rivers embayment system the nonpoint source loadings are primarily from septic systems although nearly as much has been attributed to agricultural activities, fertilizers and stormwater runoff from impervious surfaces not previously accounted for as a point source coming from DCIA. Locally controllable sources of N within the watershed are categorized as on-site subsurface wastewater

disposal system wastes, runoff from impervious surface, fertilizers, agriculture, farm animals, and the landfill. Nitrogen from stormwater runoff attributed to impervious surfaces not directly connected to a waterbody was determined to be 9.9 kg/day for the entire watershed which, when compared to the total impervious surfaces N watershed load of 27.8, accounts for approximately 36% of the impervious surfaces N load for the entire watershed.

MassDEP describes the load allocations for natural background sources (see page 22 of the TMDL document).

Assessment: EPA concludes that the TMDL document sufficiently addresses the calculation of the load allocations, as demonstrated by the foregoing and by the TMDL's administrative record.

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.

The Commonwealth assigned to the WLA those point sources (1) that "discharge" pollutants to waters of the United States within the meaning of the Act and (2) that are subject to the NPDES permitting program (existing and future); it allocated sources that did not meet these two criteria to the LA. This approach is reasonable and is consistent with the Act and implementing regulations. EPA interprets 40 CFR § 130.2(h) to require that allocations for NPDES-regulated discharges of stormwater be included in the waste load component of the TMDL.

There are areas of the Slocums and Little Rivers watershed in New Bedford and Dartmouth (as well as a small area of Freetown) that contain EPA designated "urbanized areas" and as such are required to obtain coverage under the NPDES Phase II General Permit for stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4s). In addition, there are directly connected impervious areas (DCIAs) throughout the entire watershed as identified by the EPA in: https://www.epa.gov/npdes-permits/regulated-ms4-massachusetts-communities that discharge stormwater directly to waterbodies via a conveyance system such as a swale, pipe or ditch. This TMDL treats stormwater discharge from all DCIA (even those outside of regulated urbanized areas) as part of a waste load allocation. Since there are no other point sources of nitrogen in the Slocums and Little Rivers watershed the DCIA stormwater load contribution is considered the total waste load allocation for the TMDL.

Percentages of DCIA in the subwatersheds were determined from the town by impervious area statistics listed on the EPA NPDES Stormwater Regulated Communities website: https://www.epa.gov/npdes-permits/regulated-ms4-massachusetts-communities. The WLAs for stormwater nitrogen contribution (kg N/day) was determined using the DCIA for each subembayment divided by total impervious area in the subembayment, then multiplying the total impervious surfaces runoff N load for the subwatershed (from Table IV-6 in the MEP Technical Report) per EPA (EPA, 2010) Methodology. The remaining impervious surfaces loads were assigned as the LA.

In the absence of site-specific information on direct discharge sources, EPA believes the approach set out in the TMDL for the WLAs is reasonable. The specific WLAs are set forth in Appendix C and on pages 22-23 of the TMDL document.

Assessment: EPA concludes that the TMDL document sufficiently addresses the calculation of the waste load allocations, as demonstrated by the foregoing and by the TMDL's administrative record.[1]

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.

MassDEP employs an implicit MOS in these TMDLs, described in the TMDL document on pages 25-28. There are several factors that contribute to the margin of safety inherent in the approach used to develop this TMDL including:

1) **Use of conservative data in the Linked Model as follows**:
    - Nitrogen concentrations in the watershed that were used in the model are conservative because the model assumes 100% of the groundwater discharge load enters the embayment, and stream flow entering the embayment was directly measured to determine attenuation;

[1] The categorization of the pollutant sources on Cape Cod (*i.e.*, whether a particular source, or category of sources, is required as a matter of law to be placed within the WLA or LA) has been the subject of recent litigation. On August 24, 2010, CLF filed a complaint in the United States District Court for the District of Massachusetts, captioned *Conservation Law Foundation et al. v. United States Environmental Protection Agency, et al*., Action No. 1:10-cv-11455, challenging EPA's approval of thirteen (13) Total Maximum Daily Load determinations submitted to EPA by the Commonwealth of Massachusetts under section 303(d), 33 U.S.C. § 1313(d), of the Clean Water Act, 33 U.S.C. §§ 1251-1387, as arbitrary and capricious, an abuse of discretion, and in violation of the Administrative Procedure Act, 5 U.S.C. § 706(2). EPA's positions on categorization, margin of safety, seasonal variation and other matters raised in the litigation, including climate change, have been described in the Agency's filings in that case; have been specifically considered and relied upon by EPA for the purpose of these TMDL approvals; and accordingly, have been incorporated into the TMDL's administrative record. Additionally, EPA has considered MassDEP's correspondence of April 3, 2015 regarding these issues, and EPA's analysis thereof has also been included in the administrative record.

- Agreement between the modeled and observed values has been approximately 95%;
- Water column nitrogen validation dataset is conservative. High or low measurements are marked as outliers;
- Reductions in benthic regeneration of nitrogen are most likely underestimates based on a reduced deposition of PON, due to lower primary production rates under the reduced N loading in these systems; and

2) **Conservative sentinel station/target threshold nitrogen concentrations.** The target nitrogen concentration was chosen based on sites that had stable eelgrass or benthic animal (infaunal) communities, and not those just starting to show impairment, which would have slightly higher N concentration. Meeting the target threshold N concentrations at the sentinel stations will result in reductions of N concentrations in the rest of the system; and

3) **Conservative approach.** The target loads were based on tidally averaged N concentrations on the outgoing tide, which is the worst case condition because that is when the N concentrations are the highest. The N concentrations will be lower on the flood tides and therefore this approach is conservative.

Assessment: EPA concludes that the approach used in developing the TMDL provides for an adequate implicit MOS, as demonstrated by the foregoing and by the TMDL's administrative record.

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).

The TMDLs for the water body segments identified in the document are based on achieving the nitrogen loads during the most critical time period, i.e., the summer growing season. Since the other seasons are less sensitive to nitrogen loading, the TMDLs are protective of all seasons throughout the year. Seasonal variation is addressed on page 28 of the TMDL document.

Assessment: Since the other seasons are less sensitive to nitrogen loading, EPA concludes that the TMDL is protective of all seasons 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 TMDL document presents two forms of monitoring that would be useful to determine progress towards achieving compliance with the TMDL (page 33 of the TMDL document). MassDEP's position is that TMDL implementation will be conducted through an iterative process where adjustments may be needed in the future. The two forms of monitoring include 1) tracking implementation progress as approved in the CWMP and 2) monitoring water quality and habitat conditions in the estuaries,

including but not limited to, the sentinel stations identified in the MEP Technical Report. Relative to water quality MassDEP believes that an ambient monitoring program much reduced from the data collection activities needed to properly assess conditions and to populate the model, will be important to determine actual compliance with water quality standards. Although more specific details need to be developed on a case-by-case basis, MassDEP believes that about half the current effort (using the same data collection procedures) would be sufficient to monitor compliance over time and to observe trends in water quality changes. In addition, the benthic habitat and infaunal communities would require periodic monitoring on a frequency of about every 3-5 years. Finally, in addition to the above, existing monitoring conducted by MassDEP for eelgrass should continue into the future to observe any changes that may occur to eelgrass populations as a result of restoration efforts.

Assessment: EPA concludes that the anticipated ambient water quality monitoring program approved in the CWMP by MassDEP is sufficient to evaluate the adequacy of the TMDL and attainment of water quality standards, although is not a required element of EPA's TMDL approval process.

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.

The implementation plan for the total nitrogen TMDL for the Slocums and Little Rivers embayment system is described on pages 30-33 of the TMDL document. MassDEP has provided the following implementation plan recommendations:

- **Stormwater runoff** contributes a large percentage of the N load to the Slocums River; MassDEP recommends that Dartmouth and New Bedford continue to work towards reducing stormwater runoff N loads to the Paskamansett and Destruction Brook subwatersheds through the implementation of their Stormwater Management Programs (SWMPs) under their NPDES Phase II Stormwater permits. Portions of the watershed in Dartmouth and New Bedford are not currently regulated under the Phase II program. It is recommended that these municipalities consider expanding some or all of the six minimum control measures and other BMPs throughout their jurisdiction in order to minimize storm water contamination.

- **Septic system** loads from private residences is a significant contributor to the controllable N load, therefore as part of the Comprehensive Water Resources Management Plan (CWRMP) the town should assess the most cost-effective options for achieving the target N watershed loads, including but not limited to, sewering and treatment for N control of sewage and septage at either centralized or de-centralized locations and denitrifying systems for all private residences.

EPA concludes that the approach taken by MassDEP is reasonable because of the resources available to the towns to address nitrogen such as the CWMP, additional Linked Model runs at nominal expense,

assessment of cost-effective options for reducing loadings from individual on-site subsurface wastewater disposal systems, as well as reductions in stormwater runoff and/or fertilizer use within the watershed through the establishment of local by-laws and/or the implementation of stormwater Best Management Practices.

Assessment: MassDEP has addressed the implementation plan. Although EPA is not approving the implementation plan, EPA has concluded that it outlines a reasonable approach to implementation, as demonstrated by the foregoing and by the TMDL's administrative record.

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 TMDL targets for point sources in this TMDL are not less stringent based on any assumed nonpoint source reductions, so documentation of reasonable assurance in the TMDL is not a requirement. However, MassDEP addresses the concept of reasonable assurance insofar as it relates to overall TMDL implementation on pages 37-38 of the TMDL document. The towns expect to use the information in this TMDL to generate support from their citizens to take the necessary steps to remedy existing problems related to nitrogen loading on-site subsurface wastewater disposal systems, stormwater runoff (including lawn fertilizers), and to prevent any future degradation of these valuable resources. Enforcement of local, state, and federal programs for pollution control contribute to the level of reasonable assurance. There are also financial incentives to encourage the town to follow through with its plans and prevent further degradation to water quality.

Assessment: Because MassDEP did not increase WLAs based on expected LA reductions, reasonable assurance is not required. However, EPA acknowledges MassDEP's reasonable assurance discussion for the record.

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 for the Slocums and Little Rivers Embayment System TMDL is described on page 39 of the TMDL document. MassDEP publicly announced the draft TMDL and copies were distributed to key stakeholders. A public meeting to present the results of and answer questions on this TMDL was held on September 20th, 2019 at the Dartmouth Town Hall for all interested parties. Comments received at the public meeting and received in writing within the 30-day comment period were considered by MassDEP. The attendance list, public comments from the meeting, written comments received by MassDEP, and the MassDEP responses are included in Appendix E of the TMDL document. MassDEP fully addressed all comments received in Appendix E of the TMDL document.

Assessment: EPA concludes that MassDEP has done a sufficient job of involving the public in the development of the TMDL, provided adequate opportunities for the public to comment and has addressed the comments received as set forth in the response to comment section of the TMDL document.

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 September 10, 2019, MassDEP submitted the Final Slocums and Little Rivers Embayment System TMDL For Total Nitrogen (Control #315.1) and associated documents for EPA approval. The documents contained all of the elements necessary to approve the TMDL

Attachment 1: **Slocums and Little Rivers Embayment System Total Nitrogen TMDLs** (Appendix D of TMDL document)

Sub-embayment	Waterbody Segment ID	Impairment	TMDL (kg N/day)
Slocums River	MA95-34	Estuarine Bioassessments, Nitrogen (Total), Fecal Coliform	**11.92**
Little River	MA95-66	Nitrogen (Total)	**18.4**
Paskamansett River	MA95-11**	Not impaired for Nitrogen (Total), but Pollution Prevention TMDL needed since embayments are linked.	91.59*
Destruction Brook	MA95-90_2018**		14.91*
Unnamed Tributary to Slocums River (aka Barneys Joy River North)	MA95-91_2018**	Not impaired for Nitrogen (Total), but Pollution Prevention TMDL needed since embayments are linked.	7.54*
Unnamed Tributary to Slocums River (aka Barneys Joy River South)	MA95-92_2018**		4.60*
System Total			144.35

*Pollution Prevention TMDLs (kg-N/day) for community planning and to prevent further downstream impairment.

** These freshwater segments were not assessed for Total Nitrogen. The TMDL was apportioned based on relative watershed size, however, SMAST was unable to clearly define the hydraulic boundary between the two stream segments. For purposes of nitrogen reduction strategies, communities may consider the combined TMDL for the Paskamansett River and Destruction Brook and Barneys Joy River North and South watersheds.

Data for entry in EPA's National TMDL Tracking System								
TMDL Name *			**Final Slocums and Little Rivers Embayment System Total Maximum Daily Loads for Total Nitrogen**					
Number of TMDLs*			2 restoration TMDLs, 4 protection TMDLs					
Type of TMDLs*			Nutrients (nitrogen)					
Number of listed causes/parameters (from 303(d) list)			3					
Lead State			Massachusetts (MA)					
TMDL Status			Final					
Individual TMDLs listed below								
TMDL ID#	TMDL Segment name	TMDL Segment ID #	TMDL Pollutant ID# & name	TMDL Impairment PARAMETERS/Cause(s), ID# and name	Pollutant endpoint	Unlisted ?	MA DEP Point Source & ID#	Listed for anything else?
R1_MA_2020_01	Slocums River	MA95-34	772 (Total Nitrogen)	772 (Total Nitrogen) 472 (Estuarine Bioassessments)	11.92 kg N/day	N		500 (Fecal Coliform)
R1_MA_2020_01	Little River	MA95-66	772 (Total Nitrogen)	772 (Total Nitrogen)	18.4 kg N/day	N		
R1_MA_2020_02	Paskamansett River	MA95-11	772 (Total Nitrogen)	None – protective TMDL	91.59 kg N/day	Y		
R1_MA_2020_02	Destruction Brook	MA95-90	772 (Total Nitrogen)	None – protective TMDL	14.91 kg N/day	Y		
R1_MA_2020_02	Barneys Joy River North	MA95-91	772 (Total Nitrogen)	None – protective TMDL	7.54 kg N/day	Y		
R1_MA_2020_02	Barneys Joy River South	MA95-92	772 (Total Nitrogen)	None – protective TMDL	4.60 kg N/day	Y		
TMDL Type			Nonpoint Sources					
Establishment Date (approval)*			October 10, 2019					
Completion (final submission) Date			September 10, 2019					
Public Notice Date			September 20, 2018					
EPA Developed			No					
Towns affected* (in alphabetical order)			Dartmouth, Freetown, New Bedford, Westport					