



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
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September 27, 2007

Alicia Good, Assistant Director of Water Resources
Rhode Island Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, RI 02908

SUBJECT: Approval of 9 Eutrophic Ponds and Mashapaug Pond TMDLs

Dear Ms. Good:

Thank you for your submission of Rhode Island's Total Maximum Daily Loads (TMDLs) for the 9 Eutrophic Ponds and Mashapaug Pond, for phosphorus. These water bodies are included on the State's 2006 303(d) list and were prioritized for TMDL development. The purpose of these ten TMDLs for Rhode Island waters are to address nutrient-related impairments of contact recreation and aquatic life use due to nutrients from point and nonpoint source pollution.

The U.S. Environmental Protection Agency (EPA) hereby approves Rhode Island's TMDLs for the 9 Eutrophic Ponds and Mashapaug Pond, received by EPA on September 20, 2007. EPA has determined that these TMDLs meet the requirements of §303(d) of the Clean Water Act (CWA), and of EPA's implementing regulations (40 CFR Part 130). Attached are copies of our approval documentation.

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

If you have any questions, please contact Stephen Silva (617-918-1561) or Steven Winnett (617-918-1687) of my staff.

Sincerely,

/s/

Stephen S. Perkins, Director
Office of Ecosystem Protection

cc Angelo Liberti, RI DEM
Elizabeth Scott, RI DEM

Cindy Hannaus, RI DEM
Scott Ribas, RI DEM
Stephen Silva, EPA
Steven Winnett, EPA

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: Mashapaug Pond, Rhode Island

Location: City of Providence, RI

STATUS: Final

IMPAIRMENT/POLLUTANT: Mashapaug Pond is impaired for phosphorus, excess algal growth/chlorophyll-a, and low dissolved oxygen. The pond is designated Class B, for contact recreation, and for fish and wildlife habitat. A TMDL submission is presented for total phosphorus. The State believes that limits on phosphorus will address the other, nutrient-related impairments.

BACKGROUND: The Rhode Island Department of Environmental Management (RI DEM) submitted to EPA New England the final Total Maximum Daily Load Analysis for Mashapaug Pond (the "TMDL," "submission," or "Report") with a transmittal letter dated September 20, 2007. EPA submitted comments to RI DEM on September 5, 2007 in response to the March 2007 draft TMDL report, and RI DEM addressed those comments in its final TMDL.

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: Steven Winnett (617-918-1687) E-mail: winnett.steven@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 Water Body, Pollutant of Concern, Pollutant Sources and Priority Ranking

The TMDL analytical document must identify the water body as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the water body. 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.

Mashapaug Pond is located in Providence, RI, bordering the Town of Cranston to the west. The Report describes the pollutant of concern, total phosphorus. The Report lists the water body as it appears on the State's 2006 303(d) list (TMDL pp.1-2), and explains that it is a high priority for TMDL development (TMDL p.4). The document also describes the TMDL study area and its land uses (TMDL pp. 6-11).

The submission includes a discussion of the nonpoint sources that contribute to the water quality impairments as well as a discussion of the water monitoring and data that indicate the condition of the water body (TMDL pp. 12-19). The major sources of pollution to the watershed include urban runoff from stormwater outfalls, overland flow, waterfowl and wildlife, wet and dry atmospheric deposition, and groundwater underflow.

Assessment: RI DEM has adequately identified the water body, the pollutant of concern, and the magnitude and location of the sources of pollution.

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 water body, 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.

Mashapaug Pond is impaired by phosphorus, low dissolved oxygen and excess algal growth/chlorophyll-a (TMDL, page vii). RI DEM's goals for the TMDL are to:

- Reduce total phosphorus levels to an average of 20 ug/l (0.02 mg/l);
- Reduce algal abundance to levels consistent with designated uses; and
- Eliminate hypoxia (defined as a DO concentration < 2 mg/l) in the hypolimnion (lower level) to support the propagation of fish and other animal life in the ponds.

The numeric water quality target is set at the appropriate numeric water quality standard for phosphorus (TMDL p. 38). The pond is classified as Class B (TMDL, page 4). Rhode Island has both a numeric and narrative standard for phosphorus (RI Water Quality Regulations: Rule 8.D.(2)(10)(a) and (b), respectively), which includes that average total phosphorus shall not exceed 0.025 mg/l (25.0 ug/l), and allows for lower levels as determined by the Director of RI DEM as necessary to prevent cultural eutrophication (TMDL pp. 4-5). RI DEM included consideration of naturally occurring hypolimnetic low dissolved oxygen conditions in setting its TMDL target for the pond (TMDL pp. 13-15 and 38). Based on the stratification of the pond and its low dissolved oxygen, RI DEM established a target of 0.02 mg/l (20 ug/l) for Mashapaug Pond.

Assessment: EPA New England concludes that RI DEM has properly presented its water quality standard when setting a numeric water quality target.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in EPA guidance, a TMDL identifies the loading capacity of a water body 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 water body'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 water body 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 water body 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.

RI DEM set the numeric water quality target at the applicable water quality criteria as outlined in the TMDL report.

RI DEM describes the methods used to establish the cause-and-effect relationship between the numeric target (WQS) and the identified pollutant sources. Due to the size and complex stratification of Mashapaug Pond, RI DEM used a 3-dimensional, multiple grid-cell and multiple layer model (EFDC) to simulate current loads and load reductions (TMDL pp. 20-37). Inputs to the model were data on climate, surface and groundwater flow, water chemistry, atmospheric deposition, and bathymetry, and nutrient concentration values for each land use type derived from literature.

Modeling results indicated that a 65% reduction in annual loads from controllable sources (excluding out-of-state sources) would be necessary to meet the TMDL goals (including an explicit 5% margin of safety). RI DEM applied the load reductions to storm drains, overland flow, and base flow from Spectacle Pond, and applied no reductions to groundwater underflow or atmospheric deposition (wet or dry). They also applied no allocation for future growth as the study area is completely built out.

The daily load is the annual load divided by 365.

Assessment: EPA New England concludes that the loading capacities, having been calculated using a water quality model well-known to EPA, and using observed concentration data and water quality targets consistent with or more stringent than numeric water quality criteria, have been appropriately set at levels necessary to attain and maintain applicable water quality standards. The TMDL (107.7 kg/yr, or 0.295 kg/day) is based on a reasonable approach for establishing the relationship between pollutant loading and water quality.

4. Load Allocation (LA)

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.

The submission contains a load allocation (LA) that is expressed as a target load in kg/year. Because there is insufficient data to determine how much of the stormwater runoff is from regulated vs. unregulated sources, RI DEM has chosen to allocate all stormwater runoff to the wasteload allocation (WLA—see Section 5, below). The LA is the remaining load from groundwater underflow, and from wet and dry atmospheric deposition. As these sources are considered uncontrollable by the State, RI DEM has allocated no load reduction to the LA, and the LA (41.0 kg/yr, or 0.11 kg/day) is therefore equal to the current load from these sources.

Assessment: EPA New England concludes that load allocation is adequately specified in the TMDL.

5. Wasteload Allocation (WLA)

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 submission contains a waste load allocation (WLA) that is expressed as a target load and corresponding load reduction required to meet the applicable water quality criteria. There are no permitted, wastewater point sources in the TMDL study area. However, because the study area is in Phase 2 regulated MS4 communities, sources of stormwater from developed areas which contribute to runoff through identified culverts, pipes, or other conveyances are therefore NPDES-permitted point sources. Consequently, the submission contains a wasteload allocation (WLA) for the stormwater runoff from those permitted sources.

Because of the difficulties of determining the relative amount of regulated and unregulated stormwater runoff from developed areas, EPA has allowed states to put both into the wasteload allocation. Consequently, RI DEM has allocated all stormwater to the WLA, and has applied the load reductions for both types of sources to the WLA.

Assessment: In the absence of sufficient information to determine the relative contributions of regulated and unregulated sources of stormwater runoff to the water body, EPA has allowed states to include both sources in the WLA. RI DEM has used this approach and has allocated all load reductions to the WLA. EPA New England concludes that the WLA for this submission (72.4 kg/yr, or 0.2 kg/day) is acceptable and reasonable.

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.

An explicit MOS of 5% is included in the TMDL for phosphorus loads, and RI DEM has also set a water quality target for this water body 20% lower than required by the State's numeric water quality standard for phosphorus (TMDL p. 39).

Assessment: EPA New England concurs that an adequate MOS is provided by the explicit 5% MOS for phosphorus.

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).

This TMDL addresses seasonal variation because the required reduction in phosphorus was calculated for the conditions during the critical season for algae growth, low dissolved oxygen, and contact use, summer. Therefore, the TMDL allocation protects designated uses during the entire year.

Assessment: EPA New England concludes that seasonal variations have been adequately accounted for as the TMDL was developed to be protective during the critical period for phosphorus, and will therefore be more than adequately protective during the other seasons.

8. Monitoring Plan for TMDLs Developed Under the Phased Approach

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.

This is not a phased TMDL but the document includes a description of a monitoring plan. The TMDL proposes continuing monitoring to ensure that water quality improvement activities are adjusted as monitoring indicates changes in the water quality of the pond. RI DEM briefly discusses their monitoring plans in the TMDL report (TMDL p. 64).

Assessment: Addressed, though not required.

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.

A detailed implementation plan is provided in the submission (TMDL pp. 46-60) which specifically addresses the major identified sources of pollution and gives specific recommendations for abating them, including for each identified storm drain and for Spectacle Pond, the largest single source of phosphorus loadings to Mashapaug Pond. The plan contains specific recommendations with regard to the six minimum measures that comprise the Stormwater Phase II permit program, and discusses several types of specific corrective actions, including measures to reduce stormwater runoff and control waterfowl.

Assessment: Addressed, though not required. EPA 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 body 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."

Reasonable assurance is not required because point sources are not given less stringent wasteload allocations based on the assumption of future nonpoint source load reductions.

Assessment: Although not required, reasonable assurance is addressed in the implementation plan. RI DEM's work with its watershed partners, backed up by its regulatory authority, provide reasonable assurance.

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.

RI DEM summarizes its public participation in the TMDL report (TMDL pp. 61-63). RI DEM presented the project to the public at an introductory meeting on June 5, 2001. Following monitoring and the analysis of the initial results, RI DEM held another public meeting on June 11, 2002 to present the findings of the study. Over the course of the ensuing five years, RI DEM worked with the public to educate them about the Pond and its limitations for use, being particularly concerned about unsafe contact with its waters.

RI DEM presented the draft TMDL to the public at a meeting on May 2, 2007. The meeting was well publicized in the press and letters were sent to key stakeholders well in advance. Copies of the TMDL were made available to the public two weeks before the meeting. Approximately 15 individuals attended the meeting. The meeting began the 30-day comment period, during which stakeholders provided written comments to the agency. The agency received several comment letters during the comment period, and addressed several verbal comments at the public meeting. The TMDL submission includes copies of all submitted comments and the Department's responses, along with meeting notes, as appendices to the final TMDL submission.

Assessment: EPA New England has reviewed all comments and the agencies' responses to comments. EPA concludes that RI DEM involved the public during the development of the *Mashapaug Pond TMDL*, has provided adequate opportunities for the public to comment on the TMDL, and has provided reasonable responses to the comments received.

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 water body, the pollutant(s) of concern, and the priority ranking of the water body.

Comment: RI DEM's letter of September 20, 2007 stated that the TMDL is being formally transmitted for EPA approval.

Data for entry in EPA's National TMDL Tracking System						
TMDL (Water body) Name *		Mashapaug Pond				
Number of TMDLs*		1				
Type of TMDLs (Pollutant)*		Nutrients				
Number of listed causes (from 303(d) list)		3				
Lead State		Rhode Island (RI)				
TMDL Status		Final				
Individual TMDLs listed below						
TMDL Segment name	TMDL Segment ID #	TMDL Pollutant ID# & name	TMDL Impairment Cause(s)	Pollutant endpoint	Unlisted?	RIPDES Point Source & ID#
Mashapaug Pond	RI0006017L-06	515 (Total Phosphorus)	Phosphorus (29), excess algal growth/chlorophyll-a (239), low dissolved oxygen (341)	20 ug/l phosphorus		RIPDES MS4 General Stormwater Permit
TMDL Type		Point & Nonpoint Source (Stormwater)				
Cycle (list date)		2006				
Establishment Date (approval)*		Sep 27, 2007				
EPA Developed		No				
Towns affected*		Cranston and Providence, RI				