December 29, 2005

Ms. Yvonne Bolton, Chief
Bureau of Water Management
Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 06106

Dear Ms. Bolton:

The final **Total Maximum Daily Load Analysis for Cedar Pond in North Branford, Connecticut** for total phosphorus was submitted for EPA review and approval by Kelly Streich of your staff. This waterbody was included on Connecticut's 2004 303(d) list and targeted for TMDL development within two years. The TMDL addresses the impairment of aquatic life support and primary recreation in Cedar Pond. Organic enrichment/low dissolved oxygen and turbidity are identified as the causes of aquatic life impairment. Impairment of primary recreation is attributed to the presence of algal growth/chlorophyll *a* and nutrients. CTDEP has found that phosphorus is the pollutant of concern contributing to the impairments. This TMDL furthers the efforts to address excessive anthropogenic phosphorus loading to Cedar Pond.

The U.S. Environmental Protection Agency (EPA) hereby approves Connecticut's TMDL dated November 28, 2005 and received by EPA staff on December 12, 2005. EPA has determined that this TMDL meets the requirements of Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations (40 CFR Part 130). Attached is a copy of our approval documentation.

EPA supports the State's efforts to remedy impairment of Connecticut's lakes and ponds through submission and implementation of nutrient TMDLs. My staff and I are pleased to work with your Agency in this program. We look forward to our collective progress in implementing the requirements of Section 303(d) of the CWA.

If you have any questions regarding this approval, please contact Steve Silva at (617) 918-1561 or have your staff contact Mary Garren at (617) 918-1322. Thank you very much.

Sincerely,

Linda M. Murphy, Director
Office of Ecosystem Protection

attachment

cc with attachment:
Lee Dunbar, CT DEP
Kelly Streich, CT DEP
Steve Silva, EPA
Lynne Hamjian, EPA
Mary Garren, EPA

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: A Total Maximum Daily Load Analysis for **Cedar Pond** in North Branford, Connecticut

CT Waterbody Segments on the State of Connecticut 2004 List of Connecticut Water Bodies Not Meeting Water Quality Standards (Section 303(d) of the Federal Clean Water Act):

Cedar Pond ID # CT5111-09-1-L1_01

STATUS: Final

IMPAIRMENT/POLLUTANT: Impairment of aquatic life support due to organic enrichment/low DO and turbidity. Primary recreation is impaired due to algal growth/Chlorophyll *a* and nutrients. The Total Daily Maximum Load (TMDL) is proposed for total phosphorus (49 kg/yr).

BACKGROUND:
The Connecticut Department of Environmental Protection (CTDEP) submitted to EPA New England the final Cedar Pond TMDL Analysis for total phosphorus with a transmittal letter dated December 5, 2005 and received by EPA on December 12, 2005. This TMDL was prepared using the same export coefficient model as other CT lake TMDLs approved by EPA New England in 2004. EPA New England finds that the Cedar Pond TMDL analysis contains all the necessary components to warrant EPA approval.

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 40 CFR Part 130.

REVIEWER: Mary Garren (617-918-1322) garren.mary@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 that 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.

Cedar Pond is a fresh water pond (page 2 of the TMDL document) in North Branford, Connecticut (New Haven County). The 22-acre pond and its 593-acre watershed are located in the Branford River basin. Four sub-basins make up the larger watershed. Cedar Pond and its watershed form the headwaters of Pisgah Brook. Cedar Pond is upstream of Linsley Pond. Linsley Pond is the subject of a TMDL for total phosphorus that is being approved at the same time as this TMDL for Cedar Pond. Maximum and mean water depths of the pond are 17.1 and 10.8 feet, respectively. Cedar pond has a retention time of approximately 58 days and flushes its 10.1 million cubic feet of water roughly six times annually. The retention time can vary significantly due to high stormwater inputs. Base flow and groundwater flow into Cedar Pond account for 12% of the total inflow. Inflow to the pond is strongly dominated by stormwater. The majority of the total inflow is made up of 82% stormwater. The watershed is dominated by 58% industrial land, due to the presence of the Tilcon Connecticut's North Branford Quarry, and 21% residential property.

Cedar Pond is listed on the State of Connecticut 2004 List of Connecticut Water Bodies Not Meeting Water Quality Standards (303(d) List). The list is a requirement of Section 303(d) of the Federal Clean Water Act. Aquatic life support in Cedar Pond is identified as impaired due to organic enrichment/low dissolved oxygen (DO) and turbidity. Primary recreation is impaired due to algal growth/Chlorophyll *a* and nutrients. The 2004 list ranked Cedar Pond as a Tier 2 Waterbody (page 1) and a priority "T" (page 4). These waters are under study that may lead to TMDL development if appropriate, as is the case with Cedar Pond. Potential sources of the impairments identified for Cedar Pond in the 303(d) List are resource extraction and urban runoff/storm sewers.

Eutrophic conditions in Cedar Pond arise from non-algal turbidity, caused by stormwater runoff during inclement weather, and algal blooms, when low-flow conditions lead to higher nutrient levels and fertility in the pond (page 2). The goal of this TMDL is to reduce anthropogenic phosphorus loading to Cedar Pond through additional stormwater controls. Phosphorus is the primary nutrient of concern. Implementation of this phosphorus TMDL is expected to restore the designated uses of Cedar Pond. Implementation of this TMDL using Best Management Practices (BMPs), however, will also aid in controlling the input of other nutrients, e.g. nitrogen (page 4).

Specific information on pollutant sources and pollution control strategies are detailed in two reports (page 2) entitled, *An Evaluation of Potential Stormwater Runoff Impacts to Cedar and Linsley Ponds* (EPSRI, 1996) and a *Characterization and Management of Stormwater in Tilcon Connecticut's North Branford Quarry* (CMSW, 2001). Sources of phosphorus to Cedar Pond (page 4) are stormwater runoff, activities associated with construction and operation of the quarry, fertilizers, poorly functioning septic systems, and waterfowl. Phosphorus enters the

water column via surface water base flow, stormwater flow, atmospheric deposition, waterfowl and internal recycling within the pond.

One NPDES Phase I-regulated stormwater discharge within this watershed is individually permitted by CTDEP. This permit is issued for stormwater from the quarry owned by Tilcon Connecticut, Inc. There are no permitted point source discharges, except for stormwater, within the Cedar Pond watershed. All additional stormwater loading from the watershed is conservatively viewed as being covered by the Phase II General Permit for MS4 urban communities. The Phase I and Phase II stormwater discharges comprise the TMDL's waste load allocation (pages 13 and 14). CTDEP notes that all future potential increases in loading will be addressed through future stringent requirements. Any land use change must incorporate BMPs such that no net increase in loading will occur (page 16).

Assessment: EPA New England concludes that the CTDEP has done a sufficiently detailed characterization of the sources of impairment.

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 anti-degradation policy. Such information is necessary for EPA's review of the load and wasteload allocations that 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 State of Connecticut Water Quality Standards applicable to Cedar Pond have two components (page 9). Surface Water Standards and Lake Trophic Categories are both applicable components of CT's Water Quality Standards for Cedar Pond. Class A Water Quality Standards apply to Cedar Pond to preserve its use for habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture. The surface water criteria for phosphorus used in this nutrient TMDL document are narrative criteria. Specific CTDEP standards are referenced in the TMDL document (page 9). The natural trophic state of Cedar Pond, in the absence of human-derived inputs, would be mesotrophic to late mesotrophic (pages 10). Lake trophic categories are defined in CT's Water Quality Standards. Cedar Pond, in its present highly eutrophic state, fails to meet both portions of the applicable Water Quality Standards (page 10). The TMDL document is clear that no additional wasteload allocations will be permitted in the future (page 15) which will serve to ensure adherence to the anti-degradation policy.

CTDEP provides numerous points to justify that a Total Maximum Annual Load is a better expression for the nutrient loading capacity of a lake or pond than a TMDL (pages 1 and 2). The nonpoint sources that contribute nutrients to Cedar Pond are highly variable and seasonally dependent. Uncertainty in nutrient loads is high. The Total Maximum Annual Load is a more realistic number and goal to assess compliance with Water Quality Standards. The

Total Maximum Annual Load will still be referred to as a "TMDL" in this approval documentation to avoid confusion. The TMDL is, however, is expressed in kilograms per year and not as a numeric daily load.

This TMDL document estimates that compliance with Water Quality Standards and use attainment would be achievable with a TMDL for total phosphorus set at 49 kg/yr (pages 16-18, Table 6). Descriptive text and numeric calculation of the TMDL are presented on pages 10-18. The TMDL was determined based on a detailed current loading analysis and comparison with target levels based on various applicable criteria. Appendix A presents a modeling assessment of how the implementation of best management practices (BMPs) in the Cedar Pond watershed will improve the water quality of the pond. The TMDL is a target load based on best profession judgment and modeling that is expected to bring the pond back to its natural mesotrophic condition (page 17). The TMDL end point is the predicted in-pond phosphorus concentration of 23 µg/L. The predicted concentration is based the average of several empirical models using the loads derived from the export coefficient model (page 6). CTDEP explains that in a variable lake/pond system, the TMDL will not serve as an absolute endpoint if the water quality is not consistent with Connecticut Water Quality Standards and the pond does not fully support its designated recreational uses (page 10). Implementation, ongoing monitoring and reassessment are all components of the iterative TMDL implementation process and adaptive management of Cedar Pond (pages 16-17).

Assessment: EPA New England concludes that CTDEP has properly presented its water quality standards and has made a reasonable interpretation of the narrative water quality criteria in the standards when setting the 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 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 that 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.

The TMDL document presents a detailed current loading analysis (pages 4-9) based on three methods: use of actual and estimated data from the detailed reports referenced in Section 1 above (CMSW, 2001 and EPSRI, 1996), the average of seven empirical models, and a calibrated land use export coefficient model. The estimates made using the three methods are the bases for the TMDL. The strengths and weakness of these three methods are presented on pages 4 and 5. CTDEP's use of multiple methods to estimate current nutrient loading is conservative. The current mean annual phosphorus load entering Cedar Pond based upon the three methods is 92 kg/yr.

A site-specific modification of the land use export coefficient model was used to estimate pre-development background conditions in Cedar Pond (page 6). The model was calibrated based on assumptions that would reflect pre-development forested and wetland conditions surrounding the pond. Mining of the quarry has increased the size of the watershed over time. The drainage area of the sub-basin in which the quarry is located (sub-basin C-1 in Figure 1 of the TMDL document) was reduced by 75% to account for this growth. Internal phosphorus loading was reduced by 50% to reflect more natural levels. Background phosphorus loading to the pond was estimated to historically have been 32 kg/yr. The in-pond phosphorus concentration predicted from modeling of background conditions was estimated to have been 26 µg/L.

The TMDL for Cedar Pond is set at TP 49 kg/yr (pages 16-18, Table 6). This target is based on modeled background conditions and necessary load reductions as presented in the TMDL document (pages 10-17). The phosphorus reduction necessary is identified as a 60% reduction in TP from urban and industrial land uses and a 50% reduction in current internal loading (page 16). Post-TMDL implementation conditions in the pond are presented in Tables 2 and 7 and Appendix A. The predicted in-pond concentration of total phosphorus is estimated to be an average 23 µg/L once the TMDL is fully implemented. Average chlorophyll *a* and Secchi disk transparency are predicted to be 9 µg/L and 2.1 meters, respectively. These in-pond conditions are very close to pre-development background conditions and will place Cedar Pond well within its natural mesotrophic range.

The modeled background in-pond phosphorus concentration, 26 µg/L, is actually higher than the predicted post-BMP in-pond concentration, 23 µg/L. The background phosphorus load, 32 kg/yr, however was modeled to be less than the post-BMP load, 49 kg/yr. This is not intuitive at first glance for the in-pond concentration to have been higher at a time when the phosphorus load was less. CTDEP explains (pages 6-12) that the background conditions were modeled without the presence of the quarry, which dramatically reduced the drainage area to Cedar Pond. The smaller drainage area permitted less stormwater run-off to the pond. Less dilution of phosphorus loads led to higher background in-pond concentrations.

Cedar Pond would be expected to approach critical condition in the late spring or early summer. Increased precipitation, decreased flushing rates, and higher internal loading of phosphorus via sediment release are more likely to occur during this time of year. These conditions are identified as the primary contributing factors to increased nutrient loads in the watershed (page 18). Stratification and increased internal sediment loading become important factors during the summer months. The occurrence of these conditions in excess could pose a critical condition for the water quality of the pond. CTDEP estimates ideal loading conditions for the spring and

summer seasons (pages 19). Loading in excess of these estimates will serve as a potential indicator of critical conditions in the pond.

Assessment: EPA New England concludes that the loading capacity has been appropriately set at a level necessary to attain and maintain applicable water quality standards. The TDML is based on a reasonable and widely accepted approach for establishing the relationship between pollutant loading and water quality in lakes/ponds.

The degree of load reductions necessary to achieve the desired in-pond phosphorus level is based on the average of several empirical models using the loads derived from the export coefficient model. The models were calibrated using water quality data obtained from sampling Cedar Pond.

EPA New England also concurs with expressing the TMDL as an annual loading based on the reasons provided by CT DEP. Factors include the seasonal variability inherent to nutrient loading, the pond's moderate flushing rate, and the impact of spring/summer critical conditions.

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.

The Load Allocation to Cedar Pond includes surface water base flow (including groundwater infiltration), internal sediment loading, waterfowl input, and atmospheric deposition (pages 14-15). All storm water runoff is considered to be regulated and fully accounted for in the Wasteload Allocation (see Section 5 below). The composite Load Allocation for total phosphorus is 19 kg/yr (page 14). The individual allocations that combine to account for the total Load Allocation are listed in Table 4. The TMDL estimates a 50% reduction in the internal sediment loading of phosphorus through the inactivation of internal nutrient reserves (page 14). Surface water base load is a relatively minor load to Cedar Pond so no reductions are assumed (Table 6). No reductions are assumed for atmospheric deposition or waterfowl input either. Management of geese is acknowledged as a way to achieve some small decrease in loading (page 14).

Assessment: EPA New England concludes that the LA is specified in the TMDL at a level necessary to attain and maintain water quality standards. The LA used to calculate the TMDL assumes a 50% reduction in internal sediment loading. This assumption is consistent with implementation of nutrient inactivation BMPs in many lakes/ponds. CTDEP was conservative in

the TMDL by assuming no LA reductions to surface water base load, waterfowl and atmospheric inputs.

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.

Stormwater runoff that comes from urban areas and is discharged through a discrete outfall is regulated under the NPDES Phase II Stormwater General Permit (page 13). Municipal small separate storm sewers (MS4s) in these urban communities are regulated, while stormwater discharges in less populated areas are not subject to the "Phase II Rule". The watershed for Cedar Pond is located primarily, but not entirely, in an MS4 urban community. CTDEP makes the conservative assumption that all stormwater within the watershed is considered to be regulated for the purposes of this WLA.

Tilcon Connecticut's North Branford Quarry is the only individually-permitted source for industrial stormwater discharge in the watershed (page 15). Discharges of stormwater from industrial facilities and construction sites are regulated under the NPDES "Phase I Rule". No Publicly Owned Treatment Works (POTWs) or additional NPDES permitted dischargers are located in the Cedar Pond watershed.

The individual components of the Waste Load Allocation for Cedar Pond are presented in Table 5. The WLA is made up of total phosphorus allocations for the NPDES Phase I-regulated stormwater discharge from the Tilcon Quarry and for the Phase II MS4 stormwater discharges. CTDEP does not anticipate allowing future allocations for additional point sources or industrial growth. The State will require that future discharge permits incorporate BMPs to ensure that stormwater loads are consistent with the WLA. The WLA for total phosphorus in Cedar Pond is 30 kg/yr.

Assessment: EPA New England agrees that CTDEP has been conservative in considering all stormwater in the watershed to be regulated by NPDES. EPA concurs that the WLA component of the TMDL has been calculated based on the necessary reductions in phosphorus levels in all

stormwater discharges. The one individually-permitted stormwater discharge allocated to the WLA is for Tilcon quarry. The quarry's individual allocation was determined using the export coefficient model. An overall stormwater reduction of 60% is needed in the watershed to enable the pond to meet Water Quality Standards.

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.

CTDEP relies on an implicit margin of safety in the Cedar Pond TMDL document. Conservative assumptions are relied upon to support the implicit MOS. The assumptions regarding total phosphorus loading versus phosphorus availability suggest a Margin of Safety of 50% (pages 15-16). Uncertainty, influenced by the particulate composition of stormwater, would yield a MOS of at least 25% and possibly as high as 75%. Much of the particulate fraction of TP that becomes incorporated into the sediment, if later released, has already been accounted for as internal load.

The TMDL document stresses the uncertainty inherent in systems dominated by storm water and the large temporal variability in loading in these systems (page 16). An explicit MOS would not be particularly meaningful given the uncertainties of the system and iterative nature of the stormwater–BMP implementation process. The implementation process would remain essentially the same even if an attempt was made to present an explicit MOS.

Assessment: EPA New England concludes that adequate MOS is provided for the following reasons: (1) EPA believes an adequate implicit MOS is provided in the selection of an in-pond TP concentration of 23 µg/L based on the export coefficient model, and (2) the adequacy of this MOS is supported by in-pond data and the TP range for mesotrophic lakes and ponds in the lake trophic categories found in the CT WQS.

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 Cedar Pond TMDL document addresses seasonal variation (page 18) in establishing the annual target load that would remain protective for all seasons. Cedar Pond is expected to flush six times a year, but that can vary with precipitation patterns. Critical conditions are most likely to occur in the late spring and early summer when loading can be greater and flushing rates lower. The pond will generally stratify in the summer accelerating the decomposition of the high spring phosphorus load and influencing greater sediment phosphorus release. CTDEP estimates

(page 19) that no more than 1/4 of the annual load should be attributed to each of the spring and summer seasons (TP ≤ 12 kg/season). No more than 1/3 of the seasonal load should be attributed to any one month during the spring and summer (TP ≤ 4 kg/month). Weekly or daily loading is not as meaningful in this system due to the residence time of water within the pond.

Assessment: EPA New England concludes that seasonal variation has been adequately accounted for in the TMDL because the TMDL was developed to be protective of the most environmentally sensitive period, the summer season. In addition, phosphorus controls are expected to be in place through the year so that these controls will reduce pollution whenever sources are active.

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) recommends a monitoring plan when a TMDL is developed under the phased approach. The guidance recommends that a TMDL developed under the phased approach also should provide assurances that nonpoint source controls will achieve expected load reductions. The phased approach is appropriate when a TMDL involves both point and nonpoint sources and the point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. EPA's guidance provides that a TMDL developed under the phased approach should include a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards.

The monitoring plan for Cedar Pond outlined in the TMDL document is intended to assess the effectiveness of BMPs and applicability of the TMDL allocations. CTDEP defines the TMDL for Cedar Pond to be effective at the entrance to the pond (page 16). Water sampling is consequently recommended at the three major inlets to the pond, at any stormwater discharge pipe directed into the pond, as well as at the top and bottom of the water column in the pond is recommended (page 19). Sampling of the terminal pool at the Tilcon quarry is recommended at least weekly. Tracking of the total discharge from the quarry is suggested on a daily to weekly basis (page 20). The frequency of sampling and the necessary analytical parameters are presented. Phytoplankton and zooplankton sampling in Cedar Pond is also recommended as a way to assess the changing nutrient ratios in the pond (page 20). Periodic mapping of the rooted plant assemblage in the pond is recommended to assess the impact of BMPs (page 20). CTDEP allows for flexibility in the monitoring program to best assess the effectiveness of BMPs and achievement of the TMDL.

Assessment: EPA New England concludes that the ongoing monitoring by CT DEP as part of its rotating basin program, and the required NPDES monitoring of the Tilcon stormwater discharge and MS4 discharges is sufficient to evaluate the adequacy of the TMDL. CT DEP commits to work with the Town of North Branford to implement BMPs and necessary monitoring.

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 (pages 20-21) notes that a feasibility assessment will be required and a Diagnostic/Feasibility report prepared for Cedar Pond. The Town of North Branford must then identify specific appropriate BMPs for Cedar Pond. A general list of possible management techniques is presented in Table 8. CTDEP will provide technical assistance to the towns during this assessment.

CTDEP highlights a few techniques to address the internal phosphorus loading as well as inputs from the Tilcon quarry (pages 20-21). Application of buffered aluminum or installation of a mixing or aeration system in the pond could reduce internal loading. Adjusting the pumping schedule at the quarry, use of aluminum compounds in the terminal pool, or vertical mixing of the pool may be options to address phosphorus input from the quarry. Physical/chemical treatment of the discharge from the terminal pool might be an option to keep loading from the pool to the pond consistent with the WLA.

Assessment: Addressed, though not required.

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."

Reasonable assurances are not required for the Cedar Pond TMDL document because no point sources are given a less stringent WLA based on an assumption that NPS load reductions will occur (page 15). However, there is reasonable assurance that reductions in regulated storm water will take place (page 23). The new phosphorus allocation for the Tilcon quarry stormwater discharge will be incorporated into the company's NPDES discharge permit during its next renewal. Tilcon has adjusted their operations several times in the past to comply with their NPDES permit. The Town of North Branford will continue to improve the water quality in stormwater discharges through the MS4 permit and implementation of BMPs.

A complicating factor impeding significant progress may be funding (page 23). State and Federal assistance may be necessary to assist with TMDL implementation. CTDEP's anticipates a ten-year phased implementation schedule if sufficient funding is available.

Assessment: Addressed, though not required.

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.

Copies of the public notice and mailing list were submitted along with the TMDL document. The TMDL analysis for Cedar Pond was noticed at the same time as the one for Linsley Pond. The two TMDL documents were submitted together for EPA approval. The Notice of Intent to adopt phosphorus TMDLs for Cedar and Linsley Ponds was published in the New Haven Register on March 1, 2005. A 30 day public comment was provided. Representatives of Tilcon Connecticut, Inc. submitted comments on the TMDL document to CTDEP. The comment period ended on March 31, 2005. CTDEP responded in writing to the public comments in a detailed Response to Comments document dated August 18, 2005. Text was added to the TMDL document in response to the comments received. CTDEP intends to hold open forums with the public during the implementation of the TDML. Provisions for Revising the TMDL are presented in the Cedar Pond TMDL on page 23 in the event that new information warrants revision of the TMDL. Full public process would be incorporated into any possible revision of the approved TMDL.

Assessment: EPA New England concludes that CT DEP has done a sufficient job of involving the public during the development of the TMDL, provided adequate opportunities for the public to comment on the TMDL, and 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.

The submittal letter accompanying the Cedar Pond TMDL document is dated December 5, 2005. The letter specifies that the Cedar Pond TMDL document was established as final on December 1, 2005. CTDEP clearly states that the Final TMDL document has been submitted to EPA for approval in accordance with Section 303(d) of the Clean Water Act. The submittal letter along with the attached public notice provide all the required identifying information for Cedar Pond.

Assessment: EPA concludes that the TMDL submittal letter and attached public notice provide all the necessary information.

13. **Other Comments:**

The TMDL Summary section of the document (page 16) characterizes the TMDL as a calculated target load identified to bring the waterbody into compliance with Water Quality Standards. The explanation of this target load is a good portrayal of the TMDL in a stormwater-dominated system. Implementation of the TMDL will reduce nutrient loading to the pond and thereby bring it back to its natural mesotrophic condition. The TMDL endpoint will result in Cedar Pond achieving Water Quality Standards and meeting its designated recreational uses. CTDEP characterizes the TMDL as a nutrient-loading target used to set the direction and magnitude of management activities (page 2).

DEP affirms their support for an adaptive management approach to TMDLs. BMP implementation followed by water quality monitoring will facilitate improved management techniques as implementation of the TMDL moves forward (page 20). The adaptive management approach is supported by EPA New England and is consistent with EPA guidance on successful implementation of stormwater TMDLs.

Data for entry in EPA's National TMDL Tracking System & Region 1 TMDL Webpage Version (6/27/05)

TMDL Name *	A Total Maximum Daily Load Analysis for Cedar Pond in North Branford, Connecticut
Water body segment names(s)	Cedar Pond
List ID (from system)	CT5111-09-1-L1_01
Number of TMDLs *	4
Lead State	Connecticut (CT)
TMDL Status	Final
Pollutant ID(s)	Organic enrichment/low dissolved oxygen (385) Turbidity (50) Algal growth/Chlorophyll *a* (48) Nutrients (28)
TMDL End Point	49 kg/yr Total Phosphorus
TMDL Type	Point and Nonpoint Source
Point source ID (permit) #	Tilcon Connecticut, Inc., North Branford - CT0000892
Impairment ID(s) (from system)	Aquatic Life Support Primary Contact Recreation
Cycle (list date)	2004
Establishment Date (approval) *	December 29, 2005
EPA Developed	No
Towns affected *	North Branford, CT

* = data needed for Region 1 "Approved TMDLs" web page