



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
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BOSTON, MA 02114-2023

January 4, 2007

Betsey Wingfield, Chief
Bureau of Water Protection and Land Reuse
Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

Dear Ms. Wingfield:

Thank you for the final submission of **A Total Maximum Daily Load Analysis for Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond** for indicator bacteria (*Escherichia coli*). Allen Brook Pond and Allen Brook-02 were included on Connecticut's 2004 303(d) List as priority waters for TMDL development. Allen Brook-01, Gay City Pond and Schreeder Pond were not included on the 2004 303(d) List. Testing of Allen Brook-01 identified levels of *E. coli* above Water Quality Criteria. Elevated levels of bacteria also led to beach closures at Gay City and Schreeder ponds subsequent to submission of the 2004 303(d) List. TMDLs were calculated for Allen Brook-01, Gay City Pond and Schreeder Pond based on these new data. TMDL analyses for the five waterbody segments have been submitted to EPA for approval.

The U.S. Environmental Protection Agency (EPA) hereby approves Connecticut's TMDL dated November 29, 2006. 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.

This TMDL analysis is based upon Connecticut's methodology entitled, *Development of Total Daily Maximum Loads (TMDLs) for Indicator Bacteria in Contact Recreation Areas Using the Cumulative Frequency Distribution Function Method (November 8, 2005)*. The technical support document for this method is detailed in Appendix B of the TMDL analysis. This is the first application of this modified method to designated swimming areas in the State. This approach to calculating the TMDL does not alter CT's standing policy of assessing use support in accordance with *Connecticut Consolidated Assessment and Listing Methodology (CT-CALM)*.

Connecticut continues to make progress in addressing the State's water quality impairments through adoption of this new approach for TMDLs in small watersheds impaired by stormwater and nonpoint source pollution. My staff and I look forward to continued cooperation with the CT 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 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:
Betsey Wingfield, CT DEP
Lee Dunbar, CT DEP
Mary Kozlak, CT DEP
Steve Silva, EPA
Mary Garren, EPA

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: A Total Maximum Daily Load Analysis for Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond

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

Waterbody Name	(Segment ID)
Allen Brook Pond	(CT5207-02-1-L1_01)
Allen Brook	(CT5207-02_02)

CT Waterbody Segments not listed on the 2004 303(d) List but with subsequent water quality data indicating impairment:

Waterbody Name	(Segment ID)
Allen Brook	(CT5207-02_01)
Gay City Pond	(CT4707-00-2-L2_01)
Schreeder Pond	(CT5105-00-2-L1_01)

STATUS: Final

IMPAIRMENT/POLLUTANT: Impairment of primary contact recreation due to indicator bacteria. The Total Daily Maximum Loads (TMDL) are proposed for indicator bacteria - *Escherichia coli*.

BACKGROUND:

The Connecticut Department of Environmental Protection (CTDEP) submitted to EPA New England the final TMDL Analysis for Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond with a transmittal letter dated November 29, 2006. The TMDL Analysis was received by EPA on December 5th. EPA New England concurs with the content of TMDL analysis.

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.

Assessment:

This TMDL analysis has been prepared for Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond (page 1, main document). Allen Brook Pond, Gay City Pond, and Schreeder Pond are waters designated by the State of Connecticut as swimming areas. The Ponds are located in Wharton Brook State Park, Gay City State Park, and Chatfield Hollow State Park, respectively. The upstream segment of Allen Brook (CT 5207-02_02) and Allen Brook Pond were found to be impaired for contact recreational use due to the presence of elevated levels of indicator bacteria (*E. coli*). Beach closures at Allen Brook Pond have been declared as a result of elevated bacteria levels. The upstream segment of Allen Brook and Allen Brook Pond were identified as impaired on the State of Connecticut 2004 List of Connecticut Water Bodies Not Meeting Water Quality Standards (2004 303(d) List). The small downstream segment of Allen Brook (CT5207-02_01), Gay City Pond and Schreeder Pond were not listed on the 2004 303(d) List. Beach closures subsequent to submission of the 2004 303(d) List indicated that the indicator bacteria criteria were exceeded in Gay City and Schreeder Ponds, therefore TMDLs have been developed for the two ponds. Recent data from Allen Brook (CT5207-02_01) shows indicator bacteria criteria have been exceeded. This segment will be included on the 2006 303(d) list. The State elected to prepare a TMDL for this downstream segment concurrent with the TMDL for the upstream segment. Designated swimming areas impaired by bacteria are categorized by CTDEP as high priority for TMDL development (page 2, main document). TMDLs for the three ponds were high priority. Allen Brook, a tributary to Allen Brook Pond, was identified as priority “T” meaning it was targeted for TMDL development within two years if warranted (page 2, main document). There are no individually-permitted point source discharges into any of these surface waters (Table 2, main document). Allen Brook Pond and Allen Brook are located in MS4 urban communities subject to the Phase II Stormwater General Permit (page 1, main document). Gay City Pond is located in an MS4 community however,

because the pond does not receive stormwater discharges, the MS4 permit is not applicable to the pond. The more rural community surrounding Schreeder Pond is not subject to the Phase II permit (page 2, main document). Potential sources of bacteria are identified for each waterbody (Table 2, main document). Nonpoint sources (NPS) are contributing to the impairment of all five water body segments. Potential point sources of *E.coli* are identified for Allen Brook and Allen Brook Pond.

The first page in Appendices A-1 through A-3 of the TMDL document provides detailed identifying information on each subregional basin and waterbody segment. The designated use that is being impaired is identified as contact recreation in all these Class A waters. Allen Brook Pond, Gay City Pond and Schreeder Pond are all designated swimming areas. There are, however, no designated swimming or non-designated swimming areas in Allen Brook. Allen Brook is in the “all other recreational use” category, meaning that its uses do not require full body contact with the water, e.g. boating, fishing, etc. The assessment methodology for primary and secondary contact recreation are presented on pages 13 to 15 of CTDEP’s 2004 guidance document, Connecticut Consolidated Assessment and Listing Methodology (CALM). Applicable indicator bacteria criteria for each of the waterbody segments are presented in Table 3 of the TMDL Analysis. A more detailed explanation of the relevant water quality criteria can be found in Appendix B (pages 2 and 3). The critical season for the TMDL is the recreational season, May 1st to September 30th. These waterbodies are not impaired during the cold months when enteric bacteria die off due to the lower temperatures and potential human exposure is greatly reduced (page 3, Appendix B). Surface water classifications for each of impacted waters are listed as they were defined by the CTDEP Water Quality Standards (WQS), effective December 17, 2002. Connecticut’s WQS contain an anti-degradation policy (Appendix E of the WQS). Present and future growth in these watersheds is therefore required to comply with all applicable WQS including this policy (page 11, main document).

Specific information relevant to each waterbody is provided within the TMDL analysis. Allen Brook Pond and Allen Brook are located in the Wharton Brook subregional basin. The towns of Wallingford and North Haven are within the watershed (Appendix A-1). Gay City Pond is within the Blackledge River subregional basin. Bolton and Hebron are the towns in the watershed (Appendix A-2). Schreeder Pond is within the Chatfield Hollow Brook subregional basin. The town of Killingworth is located within the watershed (Appendix A-3). The appendices list additional information on each waterbody, including the linear mileage of each waterbody and the square mileage of the individual sub-drainage basin. Land use categories are presented for each watershed. The watersheds are broken down into appropriate land use categories, e.g. forested, urban/developed, open space, water/wetland and agriculture.

EPA concludes that the TMDL report sufficiently describes the pollutants of concern, pollutant sources, priority rankings, and identifying information for the waters of the Mattabesset River Subregional Basin.

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.

Assessment:

Appendix B of the TMDL is entitled "Development of TMDLs for Indicator Bacteria in Contact Recreational Areas using the Cumulative Distribution Function Method." This Appendix details the entire methodology for this TMDL analysis. Water Quality Criteria supporting "designated swimming" are applicable to the three ponds. The geometric mean density of indicator bacteria must be less than 126 colonies/100 ml and the single sample maximum is limited to 256 colonies/100 ml to comply with CT's bacteria criteria (pages 2 and 3, Appendix B). The indicator bacteria criteria for Allen Brook are those for "all other recreational uses." The geometric mean density of indicator bacteria must be less than 126 colonies/100 ml and the single sample maximum is limited to 576 colonies/100 ml.

The cumulative distribution function method is an accepted method used by CTDEP to develop TMDLs for indicator bacteria. CTDEP worked with EPA during the development of this method. The method was also peer reviewed by many colleagues outside CTDEP. The methodology has been applied to many waterbody segments and TMDL analyses in CT. The first TMDL analysis using this method was approved by EPA in May 2005. This TMDL Analysis is the first application of the modified cumulative distribution function method to water segments with a recreational use category of designated swimming. Representative ambient water quality monitoring data taken on a minimum of 21 sampling dates between May 1st and September 31st is a requirement for use of this method. Representative sampling of indicator bacteria density and precipitation are required. Decisions regarding listing or delisting of a waterbody pursuant to Section 303(d) of the Clean Water Act will not be made based on this methodology. CTDEP will continue to make an assessment as to whether a waterbody is supporting its designated use according to its 2004, or subsequent 2006, CALM (page 1, Appendix B). Connecticut's anti-degradation policy (Appendix E of the State's 2002 WQS) is referenced (page 11, main document) in the context that this and any future modification of the TMDL must be consistent with that policy.

This TMDL analysis uses a cumulative distribution function method to determine the reduction in the density of bacteria needed to allow the waterbody to meet its water quality criteria. Connecticut's Water Quality Criteria for Bacterial Indicators (CTDEP Water Quality Standards (WQS), effective December 17, 2002) require a geometric mean of 126 col/100 ml and single sample maximum that varies depending on the designated use of the waterbody. Allen Brook Pond, Gay City Pond and Schreeder Pond have a

single sample maximum of 235 colonies/100 ml of *E. coli* due to the fact that they all are designated swimming areas. Allen Brook has a single sample maximum of 576 colonies/100 ml which is protective of its designation as a waterbody appropriate for “all other recreational uses” (Table 3, main document). The single sample maximums of 235 col/100 ml and 576 col/100 ml represent the 75th and 95th percentile upper confidence limit for statistical distribution of *E. coli* data with a geometric mean of 126 colonies/100 ml and a log standard deviation of 0.4. Appendix B (page 2-3) contains a detailed explanation of these water quality criteria and the cumulative frequency distribution curve. The cumulative frequency distribution curves that express the applicable water quality criteria are shown graphically in Figure 1 (Appendix B). Analytical data from these waterbodies are then plotted on the same graph (Figure 2, Appendix B) to form a second cumulative relative frequency curve. The graph shows the percent reduction in *E. coli* needed to move each data point from the sample data curve to the criteria curve. The cumulative frequency distribution curves show the estimated percent reduction needed for any given concentration of *E.coli* on any given day (page 7, Appendix B). The TMDL is then the arithmetic average of the percent reduction needed for each sampling data point to meet water quality criteria.

EPA concludes that the TMDL report sufficiently describes the applicable water quality standards and numeric water quality targets.

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.

Assessment:

The TMDLs are calculated using the cumulative frequency distribution function method detailed in Appendix B of the document. The TMDL for each waterbody segment is the average percent reduction of indicator bacteria needed to meet the applicable Water Quality Criteria. The indicator bacteria used in freshwater is *E. coli*. The numeric water

quality targets are therefore the average percent reductions in *E. coli*. The TMDLs (Table 4, main document) are:

<u>Waterbody</u>	<u>Segment ID Number</u>	<u>TMDL - Avg. % Reduction needed in indicator bacteria</u>
Allen Brook Pond	CT5207-02-1-L1_01	23 % at site WBK-1
Allen Brook Pond	CT5207-02-1-L1_01	22 % at site WBK-2
Allen Brook	CT5207-02_01	22% at site WBKOUT
Allen Brook	CT5207-02_02	68% at site AB-1
Gay City Pond	CT4707-00-2-L2_01	18% at site GYC-1
Gay City Pond	CT4707-00-2-L2_01	13% at site GYC-2
Schreeder Pond	CT5105-00-2-L1_01	5% at site CHH-1
Schreeder Pond	CT5105-00-2-L1_01	5% at site CHH-2

Appendices A-1, A-2 and A-3 provide detailed information for each of the waterbodies. Waterbody specific information, sampling data, calculations of the TMDL, cumulative distribution frequency curves and a summary of the TMDL are included in each of the appendices. The TMDL is the sum of the Waste Load Allocation (WLA), Load Allocation (LA) plus a Margin of Safety (MOS) for a particular waterbody segment. Allen Brook and Allen Brook Pond are located in an urbanized area where Connecticut's stormwater general permit (MS4 permit) is applicable (page 1, main document). In an urban area, the reduction of *E. coli* needed under wet weather conditions is allocated to the WLA and the dry weather reductions are assigned to the LA (page 8, Appendix B). A wet weather LA is estimated for Allen Brook Pond and the downstream segment of Allen Brook (CT5207-02_01) despite their more urbanized watershed in order to better distinguish between point-source regulated stormwater (WLA) and non-point source stormwater (wet LA). The wet weather LA equals zero for Allen Brook (CT5207-02_02 at site AB-1) because the indicator bacteria delivered to the brook during wet weather is assigned to the WLA (page 6, main document). Gay City Pond is also located in a designated MS4 community, however the MS4 permit does not apply to the pond because it does not received stormwater discharges (page 2, main document). Schreeder Pond is located in a more rural community where the MS4 permit does not apply. Gay City and Schreeder ponds do not receive regulated stormwater discharges. In these ponds, the wet and dry weather reductions are separated into two different reduction goals that make up the LA (page 8, Appendix B). The WLA equals zero because there are no regulated stormwater or point source discharges to the two ponds (page 5, main document).

CTDEP's cumulative distribution function method for TMDL development calls for certain minimum data requirements (pages 9 and 10, Appendix B). All the TMDLs are based upon ambient water quality monitoring data obtained on at least 21 sampling dates within the last five recreational seasons (tabular data tables in Appendices A-1 through A-3). The TMDLs for Allen Brook Pond and the downstream segment of Allen Brook (CT5207-02_01) are based upon 106 sampling dates with samples taken from the pond. The TMDL for the upstream segment of Allen Brook (CT5207-02_02) is based upon 21

sampling dates. Gay City Pond is based upon 83 sampling dates. Schreeder Pond was sampled on 71 sampling dates.

The TMDL for a small 0.5 linear mile segment of Allen Brook (CT5207-02_01 at site WBKOUT) is not based upon current data obtained directly from the segment as are the other TMDLs. This is a deviation from CTDEP's method requirement (see Appendix B). The TMDLs for Allen Brook Pond CT5207-02-1-L1_01 and Allen Brook segment CT5207-02_01 are set at 22% reductions in indicator bacteria. CTDEP set the TMDL for the downstream segment of Allen Brook equal to the Allen Brook Pond TMDL (at sampling location WBK-2) because segment CT5207-02_01 is immediately downstream of the sampling location in the pond. Water Quality Criteria in the pond is more stringent than in the downstream brook due to the presence of a designated swimming beach. Setting the TMDL for Allen Brook segment CT5207-02_01 equal to the TMDL just above the segment is a conservative choice for this very short brook segment.

Potential sources of indicator bacteria are identified for each waterbody segment (Table 2, main document). Wildlife contribute to nonpoint source loads in each of the waters. A sustainable natural habitat for wildlife is the State's management goal. Other than controlling "nuisance" populations of wildlife, e.g. Canada geese clusters, no reduction would be expected for wildlife contributions to *E. coli* loads (page 8, Appendix B). The goal for sources such as pet waste, non-discharging toilets, unknown sources and illicit discharges is their elimination. No individually-permitted point source discharges contribute to any of these waterbodies. There are no regulated stormwater discharges to Gay City Pond and Schreeder Pond. Regulated stormwater discharges to Allen Brook and Allen Brook Pond are subject to the Phase II Stormwater General Permit. Surface water from the upstream segment of Allen Brook (CT5207-02_02) is currently a nonpoint source to Allen Brook Pond. The bacterial load from the brook is targeted for a 68% reduction in *E. coli* by the TMDL which will consequently improve water quality in the downstream pond.

Critical conditions for these watersheds are identified in the seasonal analysis section of the TMDL (page 6, main document and Table 2, Appendix B). Summer is the critical season for increased bacterial densities in waterbodies. Warm weather conditions in water and sediment improve the survival of bacteria. Resident and migratory wildlife are more prevalent and active during the summer increasing the bacterial load. The summer season is when the designated recreational uses of waters are most critical. For waters impaired by bacteria, if the TMDL and designated uses can be achieved during the worst-case summer season, then the designated uses of the water will be met during the remainder of the year.

EPA concludes that the TMDL report sufficiently determines the loading capacity and links water quality and pollutant sources

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.

Assessment:

Load Allocations (LAs) for the five water body segments are summarized in Table 4 (main document) and calculated in the appendices (A-1 through A-3). TMDLs are calculated as the sum of WLA for point sources, LA for nonpoint sources and a Margin of Safety. Using the cumulative distribution function method, the percent reduction in nonpoint source bacterial loads needed to achieve Water Quality Criteria during dry weather is assigned to the LA (page 8, Appendix B). “Dry” data is collected at any time when precipitation is less than 0.1” per 24 hours, 0.25” per 48 hours, or 2.0” per 96 hours (footnote in the tabular data tables in Appendices A-1 through A-3). The dry LAs account for nonpoint source baseflow loads during dry weather conditions. The wet LAs account for nonpoint source loads under wet conditions. “Wet” data is collected when precipitation is greater than 0.1” per 24 hours, 0.25” per 48 hours, or 2.0” per 96 hours. During wet weather, nonpoint source loads are dominated stormwater runoff.

The LAs for presented below are calculated based upon the data in Appendix A-1 through A-3. Three allocations in the tables below indicate no reduction needed for certain loads. There are two reasons for these 0% allocations. Schreeder Pond has two dry LAs equal to 0% based upon the actual dry weather data collected at the pond. No nonpoint source baseflow reduction is indicated based upon the data. All of Schreeder Pond’s LA is attributed to wet weather. Allen Brook segment CT5207-02_02 does not have a wet LA because all the wet weather data is accounted for in the WLA (page 6, main document). The wet weather bacterial load to this upstream portion of Allen Brook is from regulated stormwater discharges and is appropriately placed in the WLA.

The nonpoint source Load Allocations (Table 4, main document) for Allen Brook, Allen Brook Pond, Gay City Pond and Schreeder Pond are broken down into wet LAs and dry LAs below. The wet and dry LAs provide information to best tailor Best Management Practices (BMPs) for nonpoint sources under each condition (page 6, main document). The LA is based on the average bacteria loading reduction needed from nonpoint sources to comply with the Water Quality Criteria.

The dry weather LAs that capture the nonpoint source bacterial load during baseflow conditions are:

<u>Waterbody</u>	<u>Segment ID Number</u>	<u>Dry Weather</u>	
		<u>Load Allocation</u>	<u># of Dry Samples</u>
Allen Brook Pond	CT5207-02-1-L1_01	3 % at site WBK-1	56
Allen Brook Pond	CT5207-02-1-L1_01	3 % at site WBK-2	56
Allen Brook	CT5207-02_01	3 % at site WBKOUT	0 in the pond
Allen Brook	CT5207-02_02	64% at site AB-1	13
Gay City Pond	CT4707-00-2-L2_01	12% at site GYC-1	53
Gay City Pond	CT4707-00-2-L2_01	8% at site GYC-2	53
Schreeder Pond	CT5105-00-2-L1_01	0% at site CHH-1*	52
Schreeder Pond	CT5105-00-2-L1_01	0% at site CHH-2*	52

* Contributions of indicator bacteria during dry weather are negligible based upon sampling data.

The wet weather LAs that capture the nonpoint source bacterial load during wet stormwater-dominated conditions are:

<u>Waterbody</u>	<u>Segment ID Number</u>	<u>Wet Weather</u>	
		<u>Load Allocation</u>	<u># of Wet Samples</u>
Allen Brook Pond	CT5207-02-1-L1_01	21 % at site WBK-1	50
Allen Brook Pond	CT5207-02-1-L1_01	21 % at site WBK-2	50
Allen Brook	CT5207-02_01	21% at site WBKOUT	0 in the pond
Allen Brook	CT5207-02_02	0% at site AB-1*	8
Gay City Pond	CT4707-00-2-L2_01	28% at site GYC-1	30
Gay City Pond	CT4707-00-2-L2_01	21% at site GYC-2	30
Schreeder Pond	CT5105-00-2-L1_01	18% at site CHH-1	19
Schreeder Pond	CT5105-00-2-L1_01	18% at site CHH-2	19

The advantage of breaking the LAs into wet and dry nonpoint source loads is that managers have a better sense on whether to prioritize BMPs that address dry weather baseflow conditions or BMPs that are tailored to high stormwater runoff conditions found during wet weather.

EPA concludes that the TMDL report sufficiently addresses the calculation of a load allocation.

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.

Assessment:

Waste Load Allocations (WLAs) for the water bodies are summarized in Table 4 (main document) and calculated in the appendices (A-1 through A-3). Using the cumulative distribution function method, the percent reduction needed to achieve Water Quality Criteria during wet weather from point source discharges is assigned to the WLA. “Wet” data is collected when precipitation is greater than 0.1” per 24 hours, 0.25” per 48 hours, or 2.0” per 96 hours (footnote in the tabular data tables in Appendices A-1 through A-3). The WLA is based on the average bacteria loading reduction needed in point source stormwater loadings to comply with the criteria (pages 7 and 8, Appendix B). There are no individually permitted point source discharges to any of these waters (Table 2, main document). Allen Brook segment CT5207-02_02 and Allen Brook Pond have regulated point source discharges from storm sewers/urban runoff. These discharges are regulated under Connecticut’s Phase II Stormwater General Permit (page 1, main document). The regulated stormwater Waste Load Allocations (Table 4, main document) are:

<u>Waterbody</u>	<u>Segment ID Number</u>	<u>Waste Load Allocation Avg. % Reduction</u>	<u>Total # of Samples</u>
Allen Brook Pond	CT5207-02-1-L1_01	25 % at site WBK-1	56
Allen Brook Pond	CT5207-02-1-L1_01	22 % at site WBK-2	56
Allen Brook	CT5207-02_01	22% at site WBKOUT	0 in the pond
Allen Brook	CT5207-02_02	73% at site AB-1	13
Gay City Pond	CT4707-00-2-L2_01	0% at site GYC-1*	53
Gay City Pond	CT4707-00-2-L2_01	0% at site GYC-2 *	53
Schreeder Pond	CT5105-00-2-L1_01	0% at site CHH-1*	52
Schreeder Pond	CT5105-00-2-L1_01	0% at site CHH-2*	52

* WLA is not appropriate as there are no regulated stormwater discharges or other point source discharges (page 5, main document).

EPA concludes that the TMDL report sufficiently addresses the calculation of a wasteload allocation.

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.

Assessment:

An implicit Margin of Safety (MOS) is relied upon in the TMDL report (Table 4 and page 6, main document). EPA's indicator bacteria criteria, adopted by CT and used in this TMDL analysis, were developed from data taken at high use bathing beaches with identified human fecal contamination. Allen Brook Pond, Gay City Pond and Schreeder Pond are swimming areas designated by the State for that purpose (page 4, main document). The designated use for Allen Brook is "all other recreational uses" so swimming is not expected or encouraged by the State. Reliance upon data from EPA's chosen impaired swimming beaches to assess the data from these CT waters is a conservative comparison. Potential sources of contamination of these waters (Table 2, main document and TMDL summaries in Appendices A-1 through A-3) are primarily not from human fecal matter.

The analytical methodology (page 9, appendix B and page 6, main document) offers additional factors contributing to a MOS that are inherent to the cumulative distribution function method. Sample results from waters with lower levels of bacteria as compared to the bacteria criteria are assigned a percent reduction equal to zero. A negative value would suggest that the water could assimilate additional bacteria and still meet the criteria. Assigning a zero percent reduction is more conservative. Another factor is that compliance with CT's MS4 Permit requires elimination of high loading sources (illegal connections, dry weather storm sewer overflows, etc). This permit, separate from the TMDL, will greatly reduce bacteria loading to these waters and contribute the MOS. Best Management Practices (BMPs), whether implemented for wet or dry weather sources, will also add to the MOS. BMPs designed to target a particular weather condition, most often contribute to load reductions during all conditions.

EPA concludes that the TMDL report sufficiently addresses the need for a Margin of Safety.

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)).

Assessment:

The TMDL relies upon samples obtained during the summer recreational season which runs from May 1 to September 30 (page 6, main document). Bacteria densities are highest during warm months in waters impacted only by nonpoint sources. Summer months with warm temperatures provide an optimal environment for survival of bacteria colonies. Data taken during the recreational season therefore represents "worst-case"

conditions. Restoring designated uses during the summer will ensure that uses are met for the remainder of the year.

Restricting data to samples taken during the warm months is therefore conservative and an acceptable approach to considering seasonal variation (page 6, main document).

EPA concludes that the TMDL report sufficiently considers season variation.

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.

Assessment:

The TMDLs for Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond are not calculated such that WLAs are less stringent based upon the expectation that nonpoint source load reductions will be attained. Reductions in bacterial loads will be assessed using the State's existing Beach Monitoring Program and monitoring by local communities. The State outlines a comprehensive water quality monitoring program necessary to track improvement and document attainment of water quality criteria during the phased implementation BMPs designed to achieve the TMDLs (pages 9-10, main document).

The TMDL presents recommendations as to how this community can implement a successful water quality monitoring programs. Analytical parameters and methods required by the MS4 Permit are listed in the TMDL (page 10, main document). Stormwater monitoring has been a requirement for MS4 communities since 2004 (page 9, main document). The required monitoring is scheduled to take place during stormwater runoff events. Municipalities have the option, however, to request that CTDEP approve an alternate sampling plan of equivalent or greater scope. A fixed station ambient water quality monitoring program is recommended by CTDEP to most effectively assess BMP implementation (page 10, main document). CTDEP commits to investigating funding sources for local communities and to providing educational and technical assistance (page 10, main document).

The cumulative distribution function method is not a tool that will be used to assess use attainment status of the water as it relates to listing or delisting of a waterbody on the 303(d) List (page 1, Appendix B). Monitoring data and the CT CALM will guide the assessment of designated use attainment.

EPA concludes that the TMDL report provides sufficient detail in the monitoring plan.

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.

Assessment:

Each TMDL for Allen Brook, Allen Brook Pond, Gay City Pond and Schreeder Pond are broken down into WLA, dry LA and wet LA with an implicit Margin of Safety. Phased implementation of BMPs is better targeted through identifying the allocations for point sources, dry weather nonpoint sources and wet weather storm-water dominated nonpoint source runoff. CTDEP presents a plan for how these TMDLs will be effectively implemented (pages 7-9, main document). Effective nonpoint source watershed management and NPDES Stormwater Management Plans are highlighted as the primary mechanisms by which nonpoint and point sources of *E. coli* will be reduced. Stormwater Management Plans required by Connecticut's NPDES MS4 Permit will address minimum control measures and BMPs appropriate to regulated stormwater management. Municipalities are required by Section 6 (K) of the MS4 permit to amend their Stormwater Management Plans within four months to implement the TMDL (page 8, main document). References to specific EPA and CTDEP guidance documents on BMP implementation are offered to assist the municipalities.

A study of the water quality issues in Allen Brook Pond was funded by CTDEP and the CT Department of Public Works (page 7, main document). The recommendations and conclusions of the '*Wharton Brook State Park Water Quality Study Report*' are in Appendix C of the TMDL document. A suite of BMPs are explored for Allen Brook and Allen Brook Pond. The report concludes with specific recommendations for the State Park and the local municipalities to consider when designing BMPs to address stormwater and nonpoint source inputs of *E. coli*.

Nonpoint source loading from unregulated sources are partitioned into the LA for these TMDLs (page 8, Appendix B). CTDEP further separates the LA into dry LA and wet LA to distinguish the influence of baseflow from stormwater dominated periods (page 5, main document). This allows for more focused BMP planning. BMPs that address nonpoint sources are highlighted for consideration within local watershed management plans (page 8, main document). Suggested BMPs for Allen Brook Pond, Gay City Pond, and Schreeder Pond are riparian buffer zones, nuisance wildlife control plans, enforcement of pet waste ordinances, and maintenance or replacement of non-discharging toilets.

EPA acknowledges that the TMDL report includes an implementation plan. EPA does not approve this component of any TMDL submission.

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.”

Assessment:

The waters of the Allen Brook and Allen Brook Pond are impaired solely by stormwater discharges and nonpoint sources. Urban point sources of stormwater were not given a less stringent wasteload allocation (WLA) based on an assumption that nonpoint source load reductions (LA) would occur, so a reasonable assurance is presented but not required. Gay City Pond and Schreeder Pond do not have regulated stormwater discharges and are impaired solely by non point sources of *E.coli*. Reasonable assurance is not required in this situation either. CTDEP, however, addresses reasonable assurances that point and NPS reductions will occur by providing the following information (page 10, main document).

Allen Brook Pond, Gay City Pond, and Schreeder Pond are all designated swimming areas located with State parks. CTDEP’s Bureau of Outdoor Recreation operates the State parks in Connecticut. Both the Bureau of Water Protection and Land Reuse and the Bureau of Outdoor Recreation are committed to keeping designated swimming areas within State parks safe for swimming. Implementation of the TMDL will assist the Bureau of Outdoor Recreation in the prevention of beach closures. This offers reasonable assurance that the TMDL’s load reductions will guide the Bureau’s efforts.

Connecticut’s MS4 Permit provides assurance that reductions in *E. coli* loading will occur in urban point sources of stormwater through the implementation of the NPDES Program. These point sources are reflected in the TMDL analysis within the WLA. The MS4 permit requires that communities identify minimum control measures in a Stormwater Management Plan that is submitted to CTDEP. The control measures must include identification of appropriate BMPs and a schedule for implementation before January 8, 2009 (pages 7 and 8, main document). The MS4 permit is a legally enforceable mechanism by which CTDEP can mandate, if necessary, that communities reduce stormwater point sources (page 11, main document).

EPA concludes that the TMDL report offers reasonable assurances that the TMDLs will be implemented.

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.

Assessment:

Interested parties and communities were notified of the public comment period by a published *Notice of Intent to Adopt A Total Daily Maximum Load Analysis for Allen Brook Pond and Allen Brook in the County of New Haven, Gay City Pond in the County of Tolland, and Schreeder Pond in the County of Middlesex*. The notice was published in the Hartford Courant on September 1, 2006. The public notice was posted in the kiosks near the ponds at each of the three State parks. The notice was also mailed to interested parties on CTDEP's mailing list. No written comments were received prior to the end of the public comment period on October 6, 2006. Copies of the public notice and the mailing list were submitted to EPA along with the TMDL. EPA submitted comments to CTDEP on the draft document prior to public notice. EPA's comments were addressed prior to public notice of the final TMDL. CTDEP recognizes that participation by the public is a necessity when resolving water quality impairments in the State (page 2, main document).

EPA concludes that CTDEP involved the public during the development of the TMDL for Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond and has provided adequate opportunities for the public to comment on the TMDL. EPA concludes that the TMDL report documents a sufficient public participation process.

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:

The letter of submission accompanying the final TMDL for Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond is dated November 29, 2006. The letter

specifies that the TMDL report was established as final on the same day. CTDEP clearly states that the Final TMDL report 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 Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond.

EPA concludes that the TMDL submittal letter provides all the necessary information.

13. Other Comments:

Appendix A provides all the identifying information and data relied upon to develop the TMDL for each waterbody. The data tables and graphs depict how the cumulative distribution function method (Appendix B) was applied to the five waterbody segments that comprise Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond.

Data for entry in EPA's National TMDL Tracking System

TMDL Name*	A Total Maximum Daily Load Analysis for Allen Brook Pond, Allen Brook, Gay City Pond, and Schreeder Pond
2 water body segment names and list IDs	Allen Brook Pond CT5207-02-1-L1_01 Allen Brook-02 CT5207-02_02
3 water body segment names with TMDL completed, but not on 2004 list (use unlisted water and/or unlisted impairment code)	Allen Brook-01 CT5207-02_01 Gay City Pond CT4707-00-2-L2_01 Schreeder Pond CT5105-00-2-L1_01
Number of TMDLs*	5
Lead State	CT
Towns impacted*	Wallingford, North Haven, Bolton, Hebron, Killingworth
TMDL Status	Final
Pollutant ID	<i>E. coli</i> (227)
TMDL End Point	Waterbody – Segment ID number – Average percent reduction in <i>E.coli</i> at each specified monitoring site <u>Allen Brook Pond</u> CT5207-02-1-L1_01 (at location WBK-1) 23% CT5207-02-1-L1_01 (at location WBK-2) 22% <u>Allen Brook - 01</u> CT5207-02_01 (at location WBKOUT) 22% <u>Allen Brook - 02</u> CT5207-02_02 (at location AB-1) 68% <u>Gay City Pond</u> CT4707-00-2-L2_01 (at location GYC-1) 18% CT4707-00-2-L2_01 (at location GYC-2) 13% <u>Schreeder Pond</u> CT5105-00-2-L1_01 (at CHH-1) 5% CT5105-00-2-L1_01 (at CHH-2) 5%
TMDL Type	Nonpoint Source
Point Sources & Permit #	Stormwater only
List ID (from system)	
Impairment ID (from system)	Contact Recreation
Cycle (list date)	2004
Establishment Date (approval)*	January 4, 2007
EPA Developed	No

* Data also for EPA Region 1 TMDL web page.