November 25, 2009

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 the Pequabuck River Sub-Regional Basin** for indicator bacteria (*Escherichia coli*). The Pequabuck River, Coppermine Brook, and Poland River were included on Connecticut's 2008 303(d) List as priority waters for TMDL development. TMDL analyses for the nine waterbody segments, comprising the river and brooks in the regional basin, have been submitted to EPA for approval.

The U.S. Environmental Protection Agency (EPA) hereby approves Connecticut's TMDL submission dated October 15, 2009 and received by EPA on October 27, 2009. 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 C of the TMDL analysis. This approach for TMDL development does not alter CT's standing policy of assessing use support in accordance with *Connecticut Consolidated Assessment and Listing Methodology (CT-CALM).*

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,

/s/

Lynne Hamjian, Acting Director
Office of Ecosystem Protection

attachment

cc with attachment:
Paul Stacey, CT DEP
Traci Iott, CTDEP
Chris Sullivan, CT DEP
Steve Silva, EPA
Mary Garren, EPA

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: A Total Maximum Daily Load Analysis for the Pequabuck River Sub-Regional Basin

CT Waterbody Segments on the State of Connecticut 2008 List of Connecticut Water Bodies Not Meeting Water Quality Standards (Section 303(d) of the Federal Clean Water Act):

Waterbody Name	**(Waterbody Segment ID number)**
Pequabuck River:	CT4315-00_01, CT4315-00_02, CT4315-00_03, CT4315-00_04, CT4315-00_05, CT 4315-00_06
Poland River:	CT4313-00_01, CT4313-00_02
Coppermine Brook:	CT4314-00_01

STATUS: Final

IMPAIRMENT/POLLUTANT: Impairment of recreational uses due to indicator bacteria. The Total Daily Maximum Loads (TMDLs) are proposed for indicator bacteria - *Escherichia coli*.

BACKGROUND:
The Connecticut Department of Environmental Protection (CTDEP) submitted the final TMDL Analysis for the Pequabuck River Sub-Regional Basin to EPA New England for approval. The TMDL, dated October 15, 2009, was received by EPA on October 27, 2009. 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 Section 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.

This TMDL analysis has been prepared for the Pequabuck River Sub-Regional Basin (page 1, main document). The Pequabuck River Sub-Regional Basin includes the eight municipalities of Harwinton, Burlington, Plymouth, Farmington, Bristol, New Britain, Plainville and Wolcott. The Pequabuck River, Poland River and Coppermine Brook are waters within the basin that are protected for recreational uses such as kayaking, wading, water skiing, fishing, boating, aesthetic enjoyment and others. Nine waterbody segments, included within these three waterbodies, were identified as impaired for their recreational uses due to the presence of *E. coli*. Eight of nine segments were listed on the State of Connecticut 2008 List of Connecticut Water Bodies Not Meeting Water Quality Standards (2008 List). Segment CT4313-00_01 of the Poland River was not included on the 2008 List, but rather identified as impaired during the TMDL analysis.

The Pequabuck River, Poland River and Coppermine Brook were categorized by CTDEP as high priority for TMDL development. They were identified as priority "H" meaning they were targeted for TMDL development within 3 years if warranted (page 3, main document). There are three individually-permitted municipal point source discharges into the Pequabuck River (page 4, main document). These municipal wastewater treatment plants are the Bristol Water Reclamation Facility, and the Plymouth and Plainville Water Pollution Control Facilities. Portions of the 8 municipalities are Municipal Separate Storm Sewer System (MS4) urban communities subject to the NPDES Phase II Stormwater General Permit (Figure 2, main document). Industrial and commercial stormwater dischargers are covered under the MS4 permit. Potential sources of bacteria are identified for each waterbody (Table 2, main document). Point and nonpoint sources (NPS) are contributing to the impairment of the rivers and brook. Nonpoint sources include unspecified urban stormwater and unknown sources. Point sources include regulated stormwater runoff and illicit connections/hook-ups to storm sewers. The individually-permitted municipal point source discharges are not significant contributors of *E. coli* to the Pequabuck River (page 7, main document). This is due to the fact that the

individually-permitted municipal discharges must be disinfected during the summer season prior to release from the facilities. Industrial and commercial stormwater discharges that operate under a general permit are generally more significant sources of bacteria.

The first page in Appendices A-1 through A-3 of the TMDL document provides detailed identifying information on each sub-regional basin and waterbody segment. The designated use that is being impaired is identified as recreation in all these waters. No designated swimming or non-designated swimming areas are located in any of these waters. The waterbodies must meet the standard for recreational use that does not include full body contact with the water, e.g. boating, fishing, etc. Surface water classifications for the Poland River and Coppermine Brook are Class A while the classifications for the Pequabuck River segments range from Class A, Class B to Class B/C (Table 3, main document). The goal for the Class B/C waters is Class B (CTDEP Water Quality Standards (WQS), effective December 17, 2002).

The assessment methodology for recreation is presented on pages 20 and 21 of the 2008 State of Connecticut Integrated Water Quality Report (Integrated Report), August 2008. Chapter one of the Integrated Report explains Connecticut's Consolidated Assessment and Listing Methodology (CALM). Applicable indicator bacteria criteria for each of the waterbody segments are presented in Table 4 of the TMDL Analysis. A more detailed explanation of the relevant water quality criteria can be found in CTDEP's document entitled, Development of Total Maximum Daily Loads (TMDLs) for Indicator Bacteria in Contact Recreation Areas using the Cumulative Function Distribution Method, November 8, 2005. This method is attached as Appendix C of the main document. 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 63, Appendix C). Surface water classifications for each of impacted waters are listed as they were defined by WQS. 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 12, main document).

Appendices A-1 through A-3 also 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, water/wetland, and agriculture.

Assessment:

EPA New England concludes that the TMDL document meets the requirements for describing water body segments, pollutants of concern, identifying and characterizing sources of impairment, and priority rankings.

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.

Appendix C 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 "all recreational uses" are applicable to these three waterbodies. There are no designated or non-designated swimming areas in the segments. 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 to comply with CT's indicator bacteria criteria.

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. 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 most currently approved CALM (page 61, Appendix C). Connecticut's anti-degradation policy (Appendix E of the State's 2002 WQS) is referenced (page 12, 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 WQS require levels of *E. coli* to be less than a geometric mean of 126 col/100 ml and single sample maximum that varies depending on the designated use of the waterbody. The Pequabuck River, Poland River and Coppermine Brook must comply with a single sample maximum of 576 colonies/100 ml which is protective of its designation as a waterbody appropriate for recreational use that does not include swimming (pages 4-5 and Table 3, main document). The single sample maximum of 576 col/100 ml represents the 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 C (pages 62-65) 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 Figures 1a - 1c (Appendix C). Analytical data from these waterbodies are then plotted on the same graph (Figures 2a – 2c, Appendix C) 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 (Figure 2c, Appendix C). The TMDL is then the arithmetic average of the percent reduction needed for each sampling data point to meet water quality criteria.

Assessment:

The use of the cumulative distribution function method, the description of the process in the TMDL document, and the companion method document to this TMDL document adequately demonstrate the basis for deriving the target indicator bacteria loads and demonstrating that the targets will achieve Water Quality Standards (WQS). EPA concludes that Connecticut has properly presented its numeric Water Quality Standards and has made a reasonable and appropriate interpretation of its narrative water quality criteria for the designated uses of the Pequabuck River Sub-Regional Basin.

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 result in attaining and maintaining the water quality criterion and have 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 loading capacities for each waterbody, or TMDLs, are calculated using the cumulative frequency distribution function method detailed in Appendix C 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. A TMDL is the sum of the Waste Load Allocation (WLA), Load Allocation (LA) plus a Margin of Safety (MOS) for a particular waterbody segment. The indicator bacteria used in freshwater is *E. coli*. The numeric water quality targets are therefore the average percent reductions needed in *E. coli* to meet Water Quality Standards. The TMDLs, calculated in Appendices A-1 through A-3 and presented in Table 5 of the main document, are:

TMDL - Average percent reduction in *E. coli* needed at each specified monitoring site

Waterbody	Segment ID Number	TMDL - Avg. % Reduction needed in indicator bacteria	Monitoring Site Number
Pequabuck River_01	CT4315-00_01	79%	1974
		79%	1095
Pequabuck River_02	CT4315-00_02	83%	258
		79%	267
Pequabuck River_03	CT4315-00_03	36%	399
		76%	781
		63%	712
Pequabuck River_04	CT4315-00_04*	63%	712
Pequabuck River_05	CT4315-00_05	55%	711
		17%	265
Pequabuck River_06	CT4315-00_06	62%	264
		61%	263
Poland River_01	CT4313-00_01*	14%	277
Poland River_02	CT4313-00_02	14%	277
Coppermine Brook_01	CT4314-00_01	88%	33

*data used was from adjacent segment – see explanation below

Appendices A-1 through A-3 (main document) provide detailed information on each of the waterbodies. Waterbody specific information, sampling data, calculations of the TMDL, cumulative distribution frequency curves, and summaries of the TMDLs are included in each of these appendices. The municipalities in the Pequabuck River sub-regional watershed contain designated urbanized areas where Connecticut's Phase II stormwater general permit (MS4 permit) is applicable (page 1, main document). The Pequabuck River sub-watershed is largely comprised of urban communities that are covered by the MS4 permit (Figure 2, main document).

CTDEP's cumulative distribution function method for TMDL development calls for certain minimum data requirements (pages 69 and 70, Appendix C). All the TMDLs should be 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). Segment CT4315-00_04 of the Pequabuck River was not sampled. The Pequabuck River segment_04 is a 0.33 mile stretch of river that is located between two segments that require reductions. The TMDL for this segment is set equal to the 63% reduction in indicator bacteria required in the adjacent downstream segment. This is a reasonable assumption. The segment is very short and the TMDL is more stringent than those for upstream segments and equal to the next downstream segment. Segment CT4313-00_01 of the Poland River was not sampled either. The Poland River segment_01 is 0.42 miles long. The TMDL for segment_01 is set equal to segment_02 at a 14% reduction. The Poland River watershed is 75% forested. Land use for both segments is essentially the same. The TMDL for segment_01 is set equal to the TMDL for the upstream segment_02. Segment_01 flows directly into the Pequabuck River which has targets for percent reduction in indicator bacteria as well. These factors make setting the TMDL for the Poland River segment_01 equal to the upstream segment a reasonable decision.

Potential sources of indicator bacteria are identified for each waterbody segment (Table 2, main document). Unspecified urban stormwater runoff and unknown sources contribute to nonpoint source loads in each of the waters. Wildlife and domestic pet waste are contributors of bacteria to nonpoint source stormwater runoff. 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 68, Appendix C). Domestic pet waste management is an ongoing strategy in all communities. The goal for nonpoint sources such as pet waste and unknown sources is their elimination. Regulated baseflow from individually permitted wastewater treatment plants, regulated stormwater discharges subject to the Phase II Stormwater General Permit, sanitary/combined sewer overflows, illicit and unknown discharges are potential contributing point sources. Insufficiently treated wastewater from permitted treatment plants, illicit discharges, and sanitary/combined sewer overflows are allocated 100% reduction in indicator bacteria since the goal is their elimination. Reduction of *E. coli* discharged from regulated urban runoff/storm sewers is identified as a necessary step to reduce point source loading of *E. coli*.

Critical conditions for these watersheds are identified in the seasonal analysis section of the TMDL (pages 7-8, main document and page 68, Appendix C). 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. CTDEP clearly states that, "The percent reduction TMDLs for the Pequabuck River Sub-Regional Basin are applicable each and every day until recreational use goals are attained." (page 1, main document)

Assessment:

The TMDL document explains and EPA concurs with the approach for applying the cumulative distribution function method to specific surface water bodies for the purpose of developing target indicator bacteria loading rates and in identifying sources of needed *E. coli* load reduction. EPA believes that this approach is reasonable because the factors influencing and controlling indicator bacteria impairment were well justified.

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.

Load Allocations (LAs) for the nine segments that make up the Pequabuck River Sub-Regional Basin are summarized in Table 5 (main document) and calculated in Appendices A-1 through A-3. Using the cumulative distribution function method, the percent reduction needed to achieve indicator bacteria criteria from unregulated nonpoint source discharges is assigned to the LA (pages 67-68, Appendix C). CTDEP uses dry weather data to reflect these unregulated nonpoint source discharges. ”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 (page 72, Appendix C). The TMDL identifies unspecified urban stormwater and unknown sources as largely contributing to the LA for the Pequabuck River, Coppermine Brook and the Poland River (Table 2, main document). The LA is based on the average bacteria loading reduction needed in unregulated nonpoint sources to comply with the criteria. The Load Allocations (Table 5 and appendices A-1 through A-3, main document) are:

Waterbody	Segment ID Number	**Dry Weather** Load Allocation Avg. % Reduction	# of Dry Samples
Pequabuck River_01	CT4315-00_01	78% at site 1974	13
		78% at site 1095	13
Pequabuck River_02	CT4315-00_02	82% at site 258	13
		77% at site 267	13
Pequabuck River_03	CT4315-00_03	46% at site 399	13
		75% at site 781	13
		64% at site 712	13
Pequabuck River_04	CT4315-00_04*	64% at site 712	*
Pequabuck River_05	CT4315-00_05	54% at site 711	13
		4% at site 265	13
Pequabuck River_06	CT4315-00_06	56% at site 264	13
		57% at site 263	13
Poland River_01	CT4313-00_01*	12% at site 277	*
Poland River_02	CT4313-00_02	12% at site 277	14
Coppermine Brook_01	CT4314-00_01	87% at site 33	14

*data used was from adjacent segment – see explanation in Section 3 above.

Assessment:

EPA concludes that the TMDL document sufficiently addresses the calculation of the load allocations.

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.

Waste Load Allocations (WLAs) for the water bodies are summarized in Table 5 (main document) and calculated in Appendices A-1 through A-3. Using the cumulative distribution function method, the percent reduction needed to achieve water quality criteria from regulated point source discharges is assigned to the WLA. CTDEP uses wet weather data to reflect these regulated point source discharges. "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 (page 72, Appendix C). The WLA is based on the average bacteria loading reduction needed in regulated point source loadings to comply with the criteria (pages 67 and 68, Appendix C). There are 3 individually permitted municipal point source discharges to the Pequabuck River (page 4, main document). The permits require disinfection during the summer season. These municipal waste water treatment plants are not considered to contribute a significant amount of indicator bacteria to the watershed. There are many MS4 industrial and commercial stormwater discharges in the Pequabuck River Sub-Regional Basin. These discharges are considered potential sources of indicator bacteria. Many of these MS4 discharges of stormwater are contributing factors in the WLA. The Waste Load Allocations (Table 4, main document) are:

Waterbody	Segment ID Number	**Wet Weather** Load Allocation Avg. % Reduction	# of Dry Samples
Pequabuck River_01	CT4315-00_01	81% at site 1974	8
		81% at site 1095	8
Pequabuck River_02	CT4315-00_02	85% at site 258	8
		83% at site 267	8
Pequabuck River_03	CT4315-00_03	19% at site 399	8
		78% at site 781	8
		61% at site 712	8
Pequabuck River_04	CT4315-00_04*	61% at site 712	*
Pequabuck River_05	CT4315-00_05	56% at site 711	8
		39% at site 265	8
Pequabuck River_06	CT4315-00_06	71% at site 264	8
		68% at site 263	8
Poland River_01	CT4313-00_01*	17% at site 277	*
Poland River_02	CT4313-00_02	17% at site 277	9
Coppermine Brook_01	CT4314-00_01	89% at site 33	9

*data used was from adjacent segment – see explanation in Section 3 above

Assessment:

EPA concludes that the TMDL document sufficiently addresses the calculation of the waste load allocations.

6. Margin of Safety (MOS)

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

An implicit Margin of Safety (MOS) is relied upon in the TMDL document (Table 4 and page 7, 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. The Pequabuck River, Poland River and Coppermine Brook do not include designated swimming areas, so swimming is not expected or encouraged by the State. The water quality criterion of a single sample maximum of 576 colonies/100 ml is only applicable to those waters without swimming beaches. Reliance upon data from EPA's targeted impaired swimming beaches to assess the data from these CT waters is a conservative comparison. Potential sources of contamination of these waters (pages 3 and 4, main document and TMDL summaries in Appendices A-1 through A-3) are primarily not from human fecal matter, but from stormwater runoff.

The analytical methodology (page 69, Appendix C) 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. 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 will most often contribute to load reductions during all conditions.

Assessment:

EPA concludes that the implicit margin of safety for the TMDL is acceptable.

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 TMDL relies upon samples obtained during the summer recreational season which runs from May 1 to September 30 (page 69, Appendix C). Bacteria densities are highest during warm months (pages 67-68, main document). Summer months with warm temperatures provide an optimal environment for survival of bacteria colonies. Resident and migratory wildlife are more abundant during the summer. 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.

Assessment:

Since the other seasons are less sensitive to loading of indicator bacteria, EPA concludes that the TMDL is protective of all seasons throughout the year.

8. Monitoring Plan for TMDLs Developed Under the Phased Approach

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

Because this TMDL is not a "phased" TMDL, a monitoring plan is not required in order to assure that data is available for updating the TMDL in the near future. Nevertheless, in order to assess the progress in obtaining the TMDLs' water quality goals, CTDEP has recommended that the municipalities establish a water quality monitoring program consistent with the Comprehensive Wastewater Management Planning process and implementation of the TMDL. The State outlines a comprehensive water quality monitoring program necessary to identify sources, track improvement and document attainment of water quality criteria (pages 10-11, main document).

The TMDL presents recommendations as to how these communities can implement successful water quality monitoring programs. Analytical parameters and methods required by the MS4 Permit are listed in the TMDL (page 11, main document). Stormwater monitoring has been a requirement for MS4 communities since 2004 (page 10, 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. CTDEP commits to investigating funding sources for local communities and to providing technical assistance (page 11, 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 61, Appendix C). Monitoring data, the CT CALM, and CT Water Quality Standards will guide the assessment of designated use attainment.

Assessment:

EPA New England concludes that the anticipated monitoring by and in cooperation with CTDEP is sufficient to evaluate the adequacy of the TMDL and attainment of Water Quality Standards, although not a required element for TMDL approval.

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.

CTDEP presents a plan for how the TMDLs for the Pequabuck River, Poland River and Coppermine Brook will be effectively implemented (pages 8 and 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. CTDEP's watershed management program will provide technical and educational assistance for nonpoint source management, as well as help investigate funding sources for local communities. 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 of this EPA approval to implement the TMDL (page 9, main document). References to specific EPA and CTDEP guidance on BMP implementation are offered to assist the municipalities.

Assessment:

CT DEP has addressed the implementation plan, although it is not required. EPA is taking no action on the implementation plan.

10. **Reasonable Assurances**

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source

reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

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

The State of Connecticut has statutory and regulatory authority to require implementation of this TMDL. Three municipal wastewater treatment plants are located within the Pequabuck River Sub-Regional Basin. The municipal treatment plants point sources are currently regulated by NPDES permits that require disinfection of their effluent from May 1 to September 30 to reduce indicator bacteria below levels of concern (pages 4 and 7, main document). Municipal discharges of treated and disinfected wastewater are allocated no reduction in the Waste Load Allocation, as present NPDES regulations are in effect.

Connecticut's MS4 Permit provides assurance that reductions in *E. coli* loading will occur in urban point sources of stormwater through continued implementation of the NPDES Program (page 12, main document). These point sources are reflected in the TMDL analysis within the WLA. The MS4 permit for regulated stormwater discharges requires that communities identify minimum control measures in a Stormwater Management Plan that is submitted to CTDEP. Six minimum control measures that must be addressed by the community are listed (pages 8-9, main document). All minimum control measures were to be implemented by January 8, 2009. The MS4 permit is a legally enforceable mechanism by which CTDEP can mandate, if necessary, that communities reduce stormwater point source discharges of bacteria (page 12, main document). CTDEP also has the authority to designated municipal discharges outside the urbanized area as regulated by the MS4 permit.

Nonpoint source loading from unregulated sources are partitioned into the LA for these TMDLs (page 68, Appendix C). The TMDL document states that CTDEP's watershed coordinator will provide assistance to local municipalities and stakeholders as part of the CTDEP's nonpoint source program. BMPs that address nonpoint sources are highlighted for consideration within local watershed management plans (page 9, main document). Some suggested non-point source BMPs for the Pequabuck River Sub-Regional Basin include nuisance wildlife control plans, pet waste ordinances, and illicit discharge detection.

Assessment:

Reasonable assurance is not necessary for this TMDL to be approvable, since the point sources are not given less stringent wasteload allocations based on projected nonpoint source load reductions. CTDEP has provided reasonable assurance that Water Quality Standards will be met.

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.

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 the Pequabuck River Sub-Regional Basin*. The notice was published in the *Hartford Courant* and *Bristol Press* on July 30, 2009. The notice was also mailed to interested parties on CTDEP's mailing list. One written comment letter, a letter from EPA Region 1, was received prior to the end of the public comment period on September 10, 2009. EPA comments were addressed in the final document. Copies of the public notice, mailing list, and a fact sheet were submitted to EPA along with 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).

Assessment:

EPA concludes that CTDEP has involved the public during the development of the TMDL, has provided adequate opportunities for the public to comment on the TMDL, and has provided reasonable responses to the public comments.

12. **Submittal Letter**

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

The letter of submission accompanying the final TMDL for the Pequabuck River Sub-Regional Basin is dated September 29, 2009. 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 the Pequabuck River Sub-Regional Basin.

Assessment:

CTDEP's letter of September 29, 2009 states that the TMDL is being formally submitted for EPA review and approval.

Data for entry in EPA's National TMDL Tracking System	
TMDL Name *	**Pequabuck River Basin (9 segments)**
Number of TMDLs*	9
Type of TMDLs*	Bacteria
Number of listed causes (from 303(d) list)	8
Information/prevention TMDLs, Y/N? (#)	N
Lead State	CT
TMDL Status	Final
Individual TMDLs listed below	

TMDL sub-embayments systems and segment names	***TMDL Segment ID #***	***TMDL Pollutant ID# & name***	***TMDL Impairment Cause(s)***	***Pollutant endpoint (sampling location number) % reduction needed in E. coli***	***Unlisted?***	***NPDES Point Source & ID#***	***Listed for something else?***
Poland River, segment 01	CT4313-00_01	E. coli (227)	Indicator bacteria	14% reduction	Yes	MS4 Stormwater General Permit DEP-PED-GP-021	
Poland River, segment 02	CT4313-00_02	E. coli (227)	Indicator bacteria	14% reduction	MS4	Stormwater General Permit DEP-PED-GP-021	
Coppermine Brook, segment 01	CT4314-00_01	E. coli (227)	Indicator bacteria	89% reduction		MS4 Stormwater General Permit DEP-PED-GP-021	Yes, cause unknown
Pequabuck River, Segment 01	CT4315-00_01	E. coli (227)	Indicator bacteria	79% reduction		CT0100374 and MS4 Stormwater General Permit DEP-PED-GP-021	Yes, cause unknown

Pequabuck River, Segment 02	CT4315-00_02	E. coli (227)	Indicator bacteria	83% reduction (at site 258) 79% reduction (at site 267)		MS4 Stormwater General Permit DEP-PED-GP-021	Yes, cause unknown
Pequabuck River, Segment 03	CT4315-00_03	E. coli (227)	Indicator bacteria	36% reduction (at site 399) 76% reduction (at site 781) 63% reduction (at site 712)		CT0100455 and MS4 Stormwater General Permit DEP-PED-GP-021	Yes, cause unknown and zinc
Pequabuck River, Segment 04	CT4315-00_04	E. coli (227)	Indicator bacteria	63% reduction	MS4	Stormwater General Permit DEP-PED-GP-021	Yes, physical substrate habitat alterations (4C)
Pequabuck River, Segment 05	CT4315-00_05	E. coli (227)	Indicator bacteria	55% reduction (at site 711) 17% reduction (at site 265)		Stormwater General Permit DEP-PED-GP-021	
Pequabuck River, Segment 06	CT4315-00_06	E. coli (227)	Indicator bacteria	62% reduction (at site 264) 61% reduction (at site 263)	MS4	CT0100463 and MS4 Stormwater General Permit DEP-PED-GP-021	

TMDL Type	Nonpoint and Point
Establishment Date (approval)*	Nov 25 , 2009
EPA Developed	No
Towns Affected *	Bristol, Burlington, Farmington, Harwinton, New Britian, Plainville, Plymouth, Wolcott