**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**Region 1**
**5 Post Office Square, Suite 100**
**Boston, MA 02109-3912**

September 29, 2011

Betsey Wingfield, Chief
Bureau of Water Protection and Land Reuse
Connecticut Department of Energy & 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 Hockanum River Regional Basin** for indicator bacteria (*Escherichia coli*). The Hockanum River and Charters Brook were included on Connecticut's 2010 303(d) List as priority waters for TMDL development. TMDL analyses for the eleven waterbody segments, comprising the river and brook in the regional basin, have been submitted to EPA for approval.

The U.S. Environmental Protection Agency (EPA) hereby approves Connecticut's TMDL submission. The TMDL package was submitted to EPA in August 2011. 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 DEEP 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 Toby Stover at (617) 918-1604. Thank you very much.

Sincerely,

/s/
Stephen S. Perkins, Director
Office of Ecosystem Protection

Attachment

cc with attachment:
Rob Hust, CT DEEP
Traci Iott, CTDEEP
Chris Sullivan, CT DEEP
Steve Silva, EPA
Mary Garren, EPA
Toby Stover, EPA

# EPA NEW ENGLAND'S TMDL REVIEW

**TMDL:** A Total Maximum Daily Load Analysis for the Hockanum River Regional Basin

CT Waterbody Segments on the State of Connecticut 2010 List of Connecticut Water Bodies Not Meeting Water Quality Standards (Section 303(d) of the Federal Clean Water Act):

**Waterbody Names and Waterbody Segment ID numbers**

Hockanum River (East Hartford/Manchester/South Windsor/Vernon/Ellington): CT4500-00_01, CT4500-00_02, CT4500-00_03, CT4500-00_04a, CT4500-00_04b, CT4500-00_05, CT4500-00_06a, CT4500-00_06b, CT4500-00_07, CT4500-00_08

Charters Brook (Tolland/Ellington/Somers): CT4501-00_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 Energy & Environmental Protection (CTDEEP) submitted to EPA New England A Total Maximum Daily Load Analysis for the Hockanum River Regional Basin with a transmittal letter dated August 11, 2011.

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:** Toby Stover (617-918-1604) stover.toby@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 is for the Hockanum River Basin (page 2, main document) which encompasses the Hockanum River and Charters Brook (Figure 1). The eight Connecticut municipalities that make up the Hockanum Basin are Somers, Stafford, Ellington, Tolland, Vernon, South Windsor, East Hartford and Bolton. The waterbody segments covered in this TMDL are listed on the 2010 List of Connecticut Waterbodies Not Meeting Water Quality Standards as impaired for recreational uses due to exceedances of the state water quality standard for *Escherichia coli*. The impaired recreational uses include swimming, wading, boating, fishing, water skiing, aesthetic enjoyment and others. A total of eleven waterbody segments are listed as impaired for the Hockanum Basin, of which 10 segments are on the Hockanum River and 1 segment is on Charters Brook. Under Section 303(d) of the Clean Water Act, states are required to compile a list of impaired waterbodies in their biennial water quality report to Congress and to develop TMDLs for these waters so that they will achieve water quality standards.

All eleven listed segments were designated as "H" (high priority) meaning that a TMDL was required to be developed within three years in order to insure that the segments would attain standards (Table 1). The potential sources of bacteria that are causing exceedances of the criteria are from both point and nonpoint sources which are summarized in Table 2 of the main document. Potential sources include municipal point sources, urban stormwater (regulated and unregulated), agriculture and illicit connections/hook ups to storm sewers. The basin contains three municipal wastewater discharges of which the Manchester WPCF and the Vernon WPCF discharge to the Hockanum River. The third facility (East Hartford WPCF) discharges directly to the Connecticut River. All three municipal wastewater discharges (Table 3, main document) are permitted through the National Pollutant Discharge Elimination System (NPDES) and have required bacterial discharge limits as well as disinfection requirements during the summer months. All eight municipalities are Municipal Separate Storm Sewer System (MS4) urban communities subject to the NPDES Phase II Stormwater General Permit (Figure 2). Industrial and commercial stormwater dischargers are also covered under the MS4 permit and are generally more significant sources of bacteria.

Appendices A-1 (Hockanum River segments) and A-2 (Charters Brook segment) of the TMDL document provide detailed waterbody specific information. 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 (Table 4). Surface water classifications for each of the waterbody segments are Class B or Class B/C for the Hockanum River and Class A for Charters Brook (Appendix A-1, Appendix A-2).

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 Appendix C (pages 53-56) of the CTDEEP'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 (the method 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 3, the method document). Surface water classifications for each of the 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 8, main document).

Appendices A-1 and A-2 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, i.e. forested, urban/developed, water/wetland, and agriculture.

***Assessment:***

EPA New England concludes that the TMDL document meets the requirements for describing waterbody 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 "Cumulative Frequency Distribution Function Method." This Appendix details the entire cumulative frequency distribution methodology for this TMDL analysis. Water quality criteria supporting "all recreational uses" are applicable to these two waterbodies. There are no designated or non-designated swimming areas in these 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 CT DEEP to develop TMDLs for indicator bacteria. CTDEEP worked with EPA during the development of this method. The method was also peer reviewed by many colleagues outside CTDEEP. 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 1$^{st}$ and September 31$^{st}$ 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. CTDEEP will continue to make an assessment as to whether a waterbody is supporting its designated use according to its most currently approved CALM (page 53, Appendix C). Connecticut's anti-degradation policy (Appendix E of the State's 2002 WQS) is referenced (page 8, 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 Hockanum River and Charters 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 (page 5 and Table 4, main document). The single sample maximum of 576 col/100 ml represents the 95$^{th}$ 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 52-54) 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 WQS and has made a reasonable and appropriate interpretation of its narrative water quality criteria for the designated uses of the Still River 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 and A-2 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 |
|---|---|---|---|
| Charters Brook | CT4500-01_01 | 18% | 955 |
| Hockanum River | CT4500-00_01 | 48% | 6160 |
| | CT4500-00_02 | 48% | 120 |
| | CT4500-00_03 | 39% | 112/1175 |
| | CT4500-00_04a | 52% | 916 |
| | CT4500-00_04b | 53% | 117 |
| | CT4500-00_05 | 53% | 116 |
| | CT4500-00_06a | 48% | 114 |
| | CT4500-00_06b | 25% | 957 |
| | CT4500-00_07 | 14% | 1804 |
| | CT4500-00_08 | 0% | 956 |

Appendices A-1 and A-2 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 these appendices. Eight municipalities in the Hockanum River regional watershed contain designated urbanized areas where Connecticut's stormwater general permit (MS4 permit) is applicable (page 2, main document). The Still River and Charters Brook are located in almost entirely urban communities that are covered by the MS4 permit (Figure 2).

CTDEP's cumulative distribution function method for TMDL development calls for certain minimum data requirements (pages 60-62, 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 and A-2).

Hockanum River segment CT4500-00_01 did not originally contain a station for water quality monitoring. A new station (6160) was established for the purpose of supporting this TMDL (page 6 main document, Appendix D-1). This new sampling station is located within 150 feet of where the mouth of the Hockanum River enters the Connecticut River and is representative of the furthest downstream portion of the Hockanum River. The land use and urban development in this segment is very similar to the segment which is directly upstream. Grab samples were collected by CTDEEP to assess the bacterial load in this segment as well as to assess the bacterial load at the furthest downstream segment in the river basin. Due to similar land use and development, segment CT4500-00_01 was given the same load reduction goals as segment CT4500-00_02 which is directly adjacent and upstream from segment CT4500-00_01.

Segment CT4500-00_08 was the only segment to receive a 0% load reduction goal (pages 6-7, main document) due to the fact that all samples collected from this sampling station were below

the criteria for *E. coli* in the Connecticut Water Quality Standards. This segment is located farthest upstream in the mainstem of the Hockanum River and will be protected under the antidegradation policy contained in CT WQS.

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 59, 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 8-9, main document and Table 2, 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 waterbody will be met during the remainder of the year. CT DEEP clearly states that, "The percent reduction TMDLs for the Hockanum River Regional Basin are applicable each and every day until recreational use goals are attained." (page 2, 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 are 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 eleven segments within the Hockanum River Regional Basin are summarized in Table 5 (page 6, main document) and calculated in Appendices A-1 and A-2. 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 58-59, 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 (pages 62-63, Appendix C). The TMDL identifies urban stormwater, unknown sources and agriculture as largely contributing to the LA for the Hockanum River and Charters Brook (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, main document) and number of samples (Appendices A-1 and A-2) are:

| Waterbody | Segment ID Number | **Dry Weather** Load Allocation Avg. % Reduction | # of Dry Samples |
|---|---|---|---|
| Charters Brook | CT4501-00_01 | 17% at site 955 | 13 |
| Hockanum River | CT4500-00_01 | 43% at site 6160 | 3* |
| | CT4500-00_02 | 43% at site 120 | 13 |
| | CT4500-00_03 | 22% at site 112 | 13 |
| | | 43% at site 1175 | 13 |
| | CT4500-00_04a | 52% at site 916 | 13 |
| | CT4500-00_04b | 56% at site 117 | 13 |
| | CT4500-00_05 | 54% at site 116 | 13 |
| | CT4500-00_06a | 45% at site 114 | 13 |
| | CT4500-00_06b | 14% at site 957 | 13 |
| | CT4500-00_07 | 4% at site 1804 | 13 |
| | CT4500-00_08 | 0% at site 956 | 13 |

*Site 6160 was created for this TMDL and only consists of four sampling events: three dry and one wet. The load reduction goals for this segment are based on the upstream and adjacent segment CT4500-00_02 (Site 120).

***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 waterbodies are summarized in Table 5 (main document) and calculated in Appendices A-1 and A-2. 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. CT DEEP 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 (pages 62-63, Appendix C). The WLA is based on the average bacteria loading reduction needed in regulated point source loadings to comply with the criteria (pages 58-59, Appendix C). The TMDL identifies regulated urban stormwater, illicit connections/hook ups to storm sewers and municipal point sources as largely contributing to the WLA for the Hockanum River and Charters Brook (Table 2, main document). There are three regulated point sources present in the basin. There are two individually-permitted municipal point source discharges (Manchester WPCF and Vernon WPCF) to the Hockanum River (Table 3, main document) and one individually-permitted municipal point source discharge (East Hartford WPCF) to the Connecticut River. These permits require disinfection during the summer season. The East Hartford municipal water pollution control facility is not considered to contribute a significant amount of indicator bacteria to the watershed due to the fact that it discharges directly to the Connecticut River. All of the eight towns in the

watershed contain area that is located within the MS4 boundary. Many of these MS4 discharges of stormwater are contributing factors in the WLA. The Waste Load Allocations (Table 5, main document) are:

| Waterbody | Segment ID Number | **Wet Weather** WasteLoad Allocation Avg. % Reduction | # of Wet Samples |
|---|---|---|---|
| Charters Brook | CT4501-00_01 | 20% at site 955 | 10 |
| Hockanum River | CT4500-00_01 | 54% at site 6160 | 1* |
| | CT4500-00_02 | 54% at site 120 | 10 |
| | CT4500-00_03 | 35% at site 112 | 10 |
| | | 61% at site 1175 | 10 |
| | CT4500-00_04a | 54% at site 916 | 10 |
| | CT4500-00_04b | 50% at site 117 | 10 |
| | CT4500-00_05 | 50% at site 116 | 10 |
| | CT4500-00_06a | 52% at site 114 | 10 |
| | CT4500-00_06b | 40% at site 957 | 10 |
| | CT4500-00_07 | 28% at site 1804 | 10 |
| | CT4500-00_08 | 0% at site 956 | 10 |

*Site 6160 was created for this TMDL and only consists of four sampling events: three dry and one wet. The load reduction goals for this segment are based on the upstream and adjacent segment CT4500-00_02 (Site 120).

***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 (page 8 and Table 5, 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 Hockanum River and Charters Brook do not include official 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 4-8, main document and TMDL summaries in Appendices A-1 and A-2) are primarily not from human fecal matter, but from stormwater runoff.

The analytical methodology (pages 60-61, 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 8, main document; page 52, Appendix C). Bacteria densities are highest during warm months (page 8-9, 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, CTDEEP 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 10-12, main document and Appendix B).

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 12, main document and Appendix B). Stormwater monitoring has been a requirement for MS4 communities since 2004 (page 11, main document). The required monitoring is scheduled to take place during stormwater runoff events. Municipalities have the option, however, to request that CTDEEP approve an alternate sampling plan of equivalent or greater scope. A fixed station ambient water quality monitoring program is recommended by CTDEEP to most effectively assess BMP implementation. CTDEEP commits to investigating funding sources for local communities and to providing technical assistance (page 12, 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 52, 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 CTDEEP 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.*

CTDEEP presents a plan as to how the TMDLs for the Hockanum River and Charters Brook will be effectively implemented (pages 9-10, 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. CTDEEP'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 10, main document). References to specific EPA and CTDEEP guidance on BMP implementation are suggested to assist the municipalities.

***Assessment:***

CT DEEP 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 waterbody 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. The East Hartford, Manchester and Vernon Water Pollution Control Facilities are

located within the Hockanum River Regional Basin. The municipal treatment plant point sources are currently regulated by NPDES permits that require disinfection of plant effluent from May 1 to September 30 to reduce indicator bacteria below levels of concern (page 7, main document). The 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. 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 CTDEEP. Six minimum control measures that must be addressed by the community are listed (pages 9-10, main document). All minimum control measures were to be implemented by January 8, 2009. The MS4 permit is a legally enforceable mechanism by which CTDEEP can mandate, if necessary, that communities reduce stormwater point source discharges of bacteria (pages 12-13, main document). CTDEEP also has the authority to designate municipal discharges outside the urbanized area as regulated by the MS4 permit (page 12, main document)

Nonpoint source loading from unregulated sources are partitioned into the LA for these TMDLs (pages 58-59, Appendix C). The TMDL document states that CTDEEP's watershed coordinator will provide assistance to local municipalities and stakeholders as part of the CTDEEP's nonpoint source program. BMPs that address nonpoint sources are highlighted for consideration within local watershed management plans (pages 9-10, main document). Some suggested non-point source BMPs for the Hockanum River Regional Basin include, nuisance wildlife control plans and pet waste ordinances.

***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. CTDEEP 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 Hockanum River and Charters Brook.* The notice of intent was posted on the Department's website on October 6, 2010 and was also was published in the Hartford Courant on the same day. The comment period ran through November 24, 2010. The notice was mailed to municipalities, businesses, and non-governmental organizations in the area, as well as interested parties on CTDEEP's mailing list. No comments were submitted to CTDEEP related to these notices. Copies of the public notice and mailing list were submitted to EPA along with the TMDL. CTDEEP recognizes that participation by the public is a necessity when resolving water quality impairments in the State (page 3, main document).

***Assessment:***

EPA concludes that CTDEEP has involved the public during the development of the TMDL, has provided adequate opportunities for the public to comment on the TMDL.

## 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 Hockanum River Regional Basin is dated August 11, 2011. CTDEEP 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 public notice provide all the required identifying information for the Hockanum River Regional Basin.

***Assessment:***

CTDEEP's letter of August 11, 2011 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 * | **Hockanum River Regional Basin ( 11 segments)** | | | | | | |
| Number of TMDLs* | 11 | | | | | | |
| 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?*** |
| Charters Brook (Tolland/Ellington) Segment 01 | CT4501-00_01 | *E. coli (227)* | 227 (*E.coli*) | (at 955) - 18% | | DEP-PED-GP-021 | |
| Hockanum River (East Hartford) Segment 01 | CT4500-00_01 | *E. coli (227)* | 227 (*E.coli*) | (at 6160) - 48% | Yes | DEP-PED-GP-021 | |
| Hockanum River (East Hartford/Manchester) Segment 02 | CT4500-00_02 | *E. coli (227)* | 227 (*E.coli*) | (at 120) - 48% | | DEP-PED-GP-021 CT0100293 | Yes, cause unknown |
| Hockanum River (Manchester) Segment 03 | CT4500-00_03 | *E. coli (227)* | 227 (*E.coli*) | (at 112) - 39% (at 1175) - 39% | | DEP-PED-GP-021 | Yes, cause unknown |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hockanum River (Manchester/Vernon) Segment 04a | CT4500-00_04a | *E. coli (227)* | 227 (*E.coli*) | (at 916) - 52% | | DEP-PED-GP-021 | Yes, cause unknown |
| Hockanum River (Vernon) Segment 04b | CT4500-00_04b | *E. coli (227)* | 227 (*E.coli*) | (at 117) – 53% | | DEP-PED-GP-021 | Yes, cause unknown |
| Hockanum River (Vernon) Segment 05 | CT4500-00_05 | *E. coli (227)* | 227 (*E.coli*) | (at 116) - 53% | | DEP-PED-GP-021 CT0100609 | Yes, cause unknown |
| Hockanum River(Vernon/Ellington) Segment 06a | CT4500-00_06a | *E. coli (227)* | 227 (*E.coli*) | (at 114 ) - 48% | | DEP-PED-GP-021 | Yes, cause unknown |
| Hockanum River (Vernon) Segment 06b | CT4500-00 06b | *E. coli (227)* | 227 (*E.coli*) | (at 957) - 25% | | DEP-PED-GP-021 | Yes, cause unknown |
| Hockanum River (Vernon) Segment 07 | CT4500-00 07 | *E. coli (227)* | 227 (*E.coli*) | (at 1804) - 14% | Yes | DEP-PED-GP-021 | |
| Hockanum River (Tolland/Ellington/Somers) Segment 08 | CT4500-00_08 | *E. coli (227)* | 227 (*E.coli*) | (at 956) - 0% | Yes | DEP-PED-GP-021 | |

| | |
|---|---|
| TMDL Type | Point and Nonpoint |
| Establishment Date (approval)* | September 29, 2011 |
| EPA Developed | No |
| Towns Affected * | Somers, Stafford, Ellington, Tolland, Vernon, South Windsor, East Hartford, Bolton |