MODIFICATION OF AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act as amended, (33 U.S.C. §§1251 et seq.; the "CWA"), and the Massachusetts Clean Waters Act, as amended, (M.G.L. Chap. 21, §§26-53),

City of Marlborough

is authorized to discharge from the facility located at

Marlborough Westerly Waste Treatment Works
Boundary Street
Marlborough, MA 01752

to receiving water named **Assabet River**

in accordance with effluent limitations, monitoring requirements and other conditions set forth in the permit signed on May 26, 2005, with the following changes as set forth herein and listed as follows:

*** replace page 2 through page 7 of the May 26, 2005 permit with page 2 through page 7 contained in this modification.**

This permit modification shall become effective on February 1, 2010.

This permit modification and the authorization to discharge expire on November 25, 2010.

This permit modification consists of 9 pages.

Signed this 16th day of NOVEMBER, 2009

/S/ SIGNATURE ON FILE

_____
Director
Office of Ecosystem Protection
Environmental Protection Agency
Boston, MA

_____
Director
Division of Watershed Management
Department of Environmental Protection
Commonwealth of Massachusetts
Boston, MA

PART I

I.A.1. During the period beginning the effective date and lasting through expiration, or such time as the 12 month average discharge flow exceeds 2.89 MGD, the permittee is authorized to discharge from outfall serial number **001,** treated effluent to the Assabet River subject to the limits and monitoring requirements specified below.

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS					MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE[3] TYPE**
FLOW	********	********	2.89 MGD [1]	********	********	CONTINUOUS	RECORDER
FLOW [1]	********	********	Report MGD	********	Report MGD	CONTINUOUS	RECORDER
$CBOD_5$ [2] (April 1- October 31)	362 lbs/day	362 lbs/day	15 mg/l	15 mg/l	25 mg/l	2/WEEK	24-HOUR COMPOSITE[3]
$CBOD_5$ [2] (November 1 - March 31)	603 lbs/day	964 lbs/day	25 mg/l	40 mg/l	Report mg/l	2/WEEK	24-HOUR COMPOSITE[3]
TSS [2] (April 1- October 31)	362 lbs/day	362 lbs/day	15 mg/l	15 mg/l	25 mg/l	2/WEEK	24-HOUR COMPOSITE[3]
TSS [2] (November 1 - March 31)	723 lbs/day	1085 lbs/day	30 mg/l	45 mg/l	Report mg/l	2/WEEK	24-HOUR COMPOSITE[3]
pH RANGE [4]	6.5-8.3 SU SEE PERMIT PAGE 6 OF 14, PARAGRAPH I.a.3.B.					3/DAY	GRAB
TOTAL CHLORINE RESIDUAL [5,6]	**********	**********	28 ug/l	*********	48 ug/l	2/DAY	GRAB
FECAL COLIFORM [4,7]	**********	**********	200/100 ml	********	400/100 ml	3/WEEK	GRAB
DISSOLVED OXYGEN (April 1- October 31)	NOT LESS THAN 5.0 MG/L					1/DAY	GRAB
WHOLE EFFLUENT TOXICITY SEE FOOTNOTES 8, 9, 10 and 11	Acute $LC_{50} \geq 100\%$ Chronic C-NOEC $\geq 40\%$					4/YEAR	24-HOUR COMPOSITE[3]

IA.1.(continued) During the period beginning the effective date and lasting through expiration, or such time as the 12 month average discharge flow exceeds 2.89 MGD, the permittee is authorized to discharge from outfall serial number **001,** treated effluent to the Assabet River subject to the limits and monitoring requirements specified below.

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS					MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**MAXIMUM DAILY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
AMMONIA-NITROGEN (June 1 - October 31)	*********	*********	2 mg/l	2 mg/l	3 mg/l	2/WEEK	24-HOUR COMPOSITE[3]
AMMONIA-NITROGEN (November 1 - May 31)	*********	*********	10.0 mg/l [12]	Report mg/l	*********	1/WEEK	24-HOUR COMPOSITE[3]
TOTAL PHOSPHORUS (April)	Report lbs/day	Report lbs/day	0.1 mg/l[13,14]	*********	0.2 mg/l	3/WEEK	24-HOUR COMPOSITE[3]
TOTAL PHOSPHORUS (May 1 - October 31)	Report lbs/day	Report lbs/day	0.1 mg/l[13,14]	*********	Report mg/l	3/WEEK	24-HOUR COMPOSITE[3]
PHOSPHORUS, TOTAL (November 1 - March 31)	Report lbs/day	Report lbs/day	1.0 mg/l[15]	*********	Report mg/l	1/WEEK	24-HOUR COMPOSITE[3]
ORTHO PHOSPHORUS, DISSOLVED (November 1 - March 31)	Report lbs/day	Report lbs/day	Report mg/l	*********	Report mg/l	1/WEEK	24-HOUR COMPOSITE[3]
TOTAL ALUMINUM	*********	*********	218 ug/l	*********	Report mg/l	1/MONTH	24-HOUR COMPOSITE[3]
TOTAL COPPER[16]	*********	*********	13 ug/l	*********	18 ug/l	1/MONTH	24-HOUR COMPOSITE[3]

All sampling shall be representative of the effluent that is discharged through outfall 001 to the Assabet River. A routine sampling program shall be developed in which samples are taken at the same location, same time and same days of every month. Any deviations from the routine sampling program shall be documented in correspondence appended to the applicable discharge monitoring report that is submitted to EPA. In addition, all samples shall be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136.

I.A.2. During the period beginning the first month that the 12 month average discharge flow exceeds 2.89 MGD, through expiration, the permittee is authorized to discharge from outfall serial number **001,** treated effluent to the Assabet River subject to the limits and monitoring requirements specified below.

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS						MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE[3] TYPE**
FLOW	*********	*********	*********	4.15 MGD [1]	********	********	CONTINUOUS	RECORDER
FLOW [1]	*********	*********	*********	Report MGD	********	Report MGD	CONTINUOUS	RECORDER
$CBOD_5$ [2] (April 1- October 31)	362 lbs/day	362 lbs/day	603 lbs/day	10 mg/l	10 mg/l	17 mg/l	2/WEEK	24-HOUR COMPOSITE[3]
$CBOD_5$ [2] (November 1 - March 31)	603 lbs/day	964 lbs/day	Report lbs/day	17 mg/l	28 mg/l	Report lbs/day	2/WEEK	24-HOUR COMPOSITE[3]
TSS [2] (April 1- October 31)	362 lbs/day	362 lbs/day	603 lbs/day	10 mg/l	10 mg/l	17 mg/l	2/WEEK	24-HOUR COMPOSITE[3]
TSS [2] (November 1 - March 31)	723 lbs/day	1085 lbs/day	Report lbs/day	21 mg/l	31 mg/l	Report mg/l	2/WEEK	24-HOUR COMPOSITE[3]
pH RANGE [4]	6.5 - 8.3 SU SEE PERMIT PAGE 6 OF 14, PARAGRAPH I.A.3.b.						3/DAY	GRAB
TOTAL CHLORINE RESIDUAL [5,6]	**********		**********	22 ug/l	*********	39 mg/l	2/DAY	GRAB
FECAL COLIFORM [4,7]	**********		**********	200/100 ml	********	400/100 ml	3/WEEK	GRAB
DISSOLVED OXYGEN (April 1- October 31)	NOT LESS THAN 5.0 mg/l						1/DAY	GRAB
WHOLE EFFLUENT TOXICITY SEE FOOTNOTES 8, 9, 10 and 11	Acute $LC_{50} \geq 100\%$ Chronic C-NOEC $\geq 49\%$						4/YEAR	24-HOUR COMPOSITE[3]

I.A.2. During the period beginning the first month that the 12 month average discharge flow exceeds 2.89 MGD, through expiration, the permittee is authorized to discharge from outfall serial number **001,** treated effluent to the Assabet River subject to the limits and monitoring requirements specified below

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS						MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
AMMONIA-NITROGEN (June 1 - October 31)	Report lbs/day	Report lbs/day	72.3 lbs/day	1.4 mg/l	1.4 mg/l	2.1 mg/l	2/WEEK	24-HOUR COMPOSITE[3]
AMMONIA-NITROGEN (November 1 - May 31)	241 lbs/day	Report lbs/day	*********	7 mg/l [12]	Report mg/l	*********	1/WEEK	24-HOUR COMPOSITE[3]
TOTAL PHOSPHORUS (April)	2.4 lbs/day	*********	4.8 lbs/day	0.07 mg/l[13,14]	*********	0.14 mg/l	3/WEEK	24-HOUR COMPOSITE[3]
TOTAL PHOSPHORUS (May 1 - October 31)	2.4 lbs/day	*********	Report lbs/day	0.07 mg/l[13,14]	*********	Report mg/l	3/WEEK	24-HOUR COMPOSITE[3]
PHOSPHORUS, TOTAL (November 1 - March 31)	24 lbs/day	*********	Report lbs/day	.7 mg/l[15]	*********	Report mg/l	1/WEEK	24-HOUR COMPOSITE[3]
ORTHO PHOSPHORUS, DISSOLVED (November 1 - March 31)	Report lbs/day	*********	Report lbs/day	Report mg/l	*********	Report mg/l	1/WEEK	24-HOUR COMPOSITE[3]
TOTAL ALUMINUM	5.3 lbs/day	*********	Report lbs/day	152 ug/l	*********	Report mg/l	1/MONTH	24-HOUR COMPOSITE[3]
TOTAL COPPER[16]	0.31 lbs/day	*********	0.43 lbs/day	9 ug/l	*********	13 ug/l	1/MONTH	24-HOUR COMPOSITE[3]
TOTAL SILVER	Report lbs/day	*********	0.24 lbs/day	Report mg/l	*********	7 ug/l	1/MONTH	24-HOUR COMPOSITE[3]
TOTAL NICKEL	2.18 lbs/day	*********	Report lbs/day	63ug/l	*********	Report mg/l	1/MONTH	24-HOUR COMPOSITE[3]

All sampling shall be representative of the effluent that is discharged through outfall 001 to the Assabet River. A routine sampling program shall be developed in which samples are taken at the same location, same time and same days of every month. Any deviations from the routine sampling program shall be documented in correspondence appended to the applicable discharge monitoring report that is submitted to EPA. In addition, all samples shall be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136.

Footnotes:

1. This is an annual average limit, which shall be reported as a rolling average. The first value will be calculated using the monthly average flow for the first full month ending after the effective date of the permit and the eleven previous monthly average flows. Each subsequent month's DMR will report the annual average flow that is calculated from that month and the previous 11 months. The monthly average and maximum daily flows for each month shall also be reported.

   The permittee is required to comply with the following as a condition of this permitted flow increase:

   a. The permittee agrees to participate in a comprehensive evaluation of water conservation and/or water reuse opportunities to be conducted by the Massachusetts Office of Technical Assistance. The analysis will include audits of significant water users in Marlborough and Northborough and will identify and recommend opportunities for conservation and reuse.

   b. In order to minimize treatment plant flow increases and the potential for any significant lowering of water quality, the permittee shall complete a detailed evaluation of water conservation/water reuse opportunities for the 50 largest contributors of wastewater to the treatment facility (not including the facilities already evaluated by the Massachusetts Office of Technical Assistance (OTA)). The evaluations shall consist of a detailed audit of water use similar in scope to the OTA audits and a facility specific report identifying all significant opportunities for water conservation/water reuse.

2. Sampling required for influent and effluent.

3. A 24-hour composite sample will consist of at least twenty four (24) grab samples taken during a consecutive 24-hour period (e.g. 0700 Monday- 0700 Tuesday).

4. Required for state certification.

5. The minimum level (ML) for total residual chlorine is defined as 20 ug/l. This value is the minimum level for chlorine using EPA approved methods found in the most currently approved version of Standard Methods for the Examination of Water and Wastewater, Method 4500 CL-E and G, or USEPA Manual of Methods of Analysis of Water and Wastes, Method 330.5. One of these methods must be used to determine total residual chlorine. For effluent limitations less than 20 ug/l, compliance/non-compliance will be determined based on the ML. Sample results of 20 ug/l or less shall be reported as zero on the discharge monitoring report.

6. Chlorination and dechlorination systems shall include an alarm system for indicating system interruptions or malfunctions. Any interruption or malfunction of the chlorine dosing system that may have resulted in levels of chlorine that were inadequate for achieving effective disinfection or interruptions or malfunctions of the dechlorination system that may have resulted in excessive levels of chlorine in the final effluent shall be reported with the monthly DMRs. The report shall include the date and time of the interruption or malfunction, the nature of the problem, and the estimated amount of time that the reduced levels of chlorine or dechlorination chemicals occurred. The Permittee shall comply with this requirement, consistent with the schedule for the Facility upgrade contained in Section H below.

7. Fecal coliform discharges shall not exceed a monthly geometric mean of 200 colony forming units (cfu) per 100 ml, nor shall they exceed 400 cfu per 100 ml as a daily maximum. This monitoring shall be conducted concurrently with the TRC sampling.

8. The permittee shall conduct chronic (and modified acute) toxicity tests four times per year. The chronic test may be used to calculate the acute LC_{50} at the 48 hour exposure interval. The permittee shall test the daphnid, Ceriodaphnia dubia and the fathead minnow, Pimephales promelas. Toxicity test samples shall be collected during the second week of the months of March, June, September and December. The test results shall be submitted by the last day of the month following the completion of the test. The results are due April 30th, July 31st, October 31st and January 31st, respectively. The tests must be performed in accordance with test procedures and protocols specified in **Attachment A** of this permit.

Test Dates Second Week in	**Submit Results By:**	**Test Species**	**Acute Limit LC_{50}**	**Chronic Limit C-NOEC**
March June September December	April 30th July 31st October 31st January 31st	Ceriodaphnia dubia (daphnid) Pimephales promelas (fathead minnow)	≥ 100% ≥ 100%	≥ 40% (49%) ≥ 40% (49%)

9. The LC_{50} is the concentration of effluent which causes mortality to 50% of the test organisms. Therefore, a 100% limit means that a sample of 100% effluent (no dilution) shall cause no more than a 50% mortality rate.

10. C-NOEC (chronic-no observed effect concentration) is defined as the highest concentration of toxicant or effluent to which organisms are exposed in a life cycle or partial life cycle test which causes no adverse effect on growth, survival, or reproduction at a specific time of observation as determined from hypothesis testing where the test results exhibit a linear dose-response relationship. However, where the test results do not exhibit a linear dose-response relationship, the permittee must report the lowest concentration where there is no observable effect. The "40% (49%) or greater" limit is defined as a sample which is composed of 40% (49%) (or greater) effluent, the remainder being dilution water. The 49% effluent number reflects the revised dilution value at 4.15 MGD. This is a maximum daily limit.

11. If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable, the permittee shall follow procedures outlined in **Attachment A Section IV., DILUTION WATER** in order to obtain permission to use an alternate dilution water. In lieu of individual approvals for alternate dilution water required **in Attachment A**, EPA-New England has developed a Self-Implementing Alternative Dilution Water Guidance document (called "Guidance Document") which may be used to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. If this Guidance document is revoked, the permittee shall revert to obtaining approval as outlined in **Attachment A**. The "Guidance Document" has been sent to all permittees with their annual set of DMRs and Revised Updated Instructions for Completing EPA's Pre-Printed NPDES Discharge Monitoring Report (DMR) Form 3320-1 and is not intended as a direct attachment to this permit. Any modification or revocation to this "Guidance Document" will be transmitted to the permittees as part of the annual DMR instruction package. However, at any time, the permittee may choose to contact EPA-New England directly using the approach outlined in **Attachment A**.

12. The Permittee shall comply with the winter period ammonia limit in accordance with the facility upgrade schedule contained in Section H below. In the interim, the Facility shall be operated in order to maintain nitrification through the winter period whenever feasible.

13. The permittee shall comply with the 0.1 mg/l total phosphorus limit in accordance with the schedule contained in Section H. below. Upon the effective date of the permit, and until the date specified in Section H below for compliance with the total phosphorus final limit of 0.1 mg/l, an interim limit of 0.75 mg/l shall be met and monitoring shall be conducted twice per week.

14. The total phosphorus limit for the month of April is a median limit (2.4 lb/day when the 2.89 MGD average monthly flow is exceeded). The total phosphorus limit for May - October is a 60 day rolling average limit (also 2.4 lb/day when the average monthly flow of 2.89 MGD is exceeded). The 60 day average value for each day in a given month, beginning on the 60th day after May 1, must be calculated and the highest 60 day average value for that month must be reported on the monthly discharge monitoring report (DMR). For the month of May, the monthly average value shall be reported with the DMRs. Consistent with Section B.1 of Part II of the Permit, the Permittee shall properly operate and maintain the phosphorus removal facilities in order to obtain the lowest effluent concentration possible. The total phosphorus limit for the period from November 1 to March 31 is an average monthly limit.

15. The Permittee shall comply with the 1.0 mg/l monthly average total phosphorus limit within one year of the issuance date of the permit. The maximum daily concentration and loading values reported for dissolved ortho phosphorus shall be the values from the same day that the maximum daily total phosphorus concentration and loading values were measured. The permittee is required to report monthly to both EPA and the MassDEP on its efforts to meet this limit.

16. The minimum level (ML) for copper is defined as 3 ug/l. This value is the minimum level for copper using the Furnace Atomic Absorption analytical method (EPA Method 220.2). For effluent limitations of less than 3 ug/l, compliance/non-compliance will be determined based on the ML from this method, or another approved method that has an equivalent or lower ML, one of which must be used. Sample results of 3 ug/l or less shall be reported as zero on the Discharge Monitoring Report.

Part I.A.3. (Conditions apply to the effluent limitations and conditions of both Part I.A.1 and I.A.2)

a. The discharge shall not cause a violation of the water quality standards of the receiving waters.

b. The pH of the effluent shall not be less than 6.5 nor greater than 8.3 at any time.

c. The discharge shall not cause objectionable discoloration of the receiving waters.

d. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.

e. The permittee's treatment facility shall maintain a minimum of 85 percent removal of both total suspended solids and biochemical oxygen demand. The percent removal shall be based on monthly average values.

f. The results of sampling for any parameter above its required frequency must also be reported.

4. All POTWs must provide adequate notice to the Director of the following:

    a. Any new introduction of pollutants into that POTW from an indirect discharger in a primary industry category discharging process water; and

    b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

    c. For purposes of this paragraph, adequate notice shall include information on:

        (1) The quantity and quality of effluent introduced into the POTW; and

        (2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

5. Toxics Control

    a. The permittee shall not discharge any pollutant or combination of pollutants in toxic amounts.

    b. Any toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be revised or amended in accordance with such standards.

6. Numerical Effluent Limitations for Toxicants

    EPA or MassDEP may use the results of the toxicity tests and chemical analyses conducted pursuant to this permit, as well as national water quality criteria developed pursuant to Section 304(a)(1) of the Clean Water Act (CWA), state water quality criteria, and any other appropriate information or data, to develop numerical effluent limitations for any pollutants, including but not limited to those pollutants listed in Appendix D of 40 CFR Part 122.

B. LIMITATIONS FOR INDUSTRIAL USERS

1. Pollutants introduced into POTW's by a non-domestic source (user) shall not pass through the POTW or interfere with the operation or performance of the works.

2. The permittee shall develop and enforce specific effluent limits (local limits) for Industrial User(s), and all other users, as appropriate, which together with appropriate changes in the POTW Treatment Plant's Facilities or operations, are necessary to ensure continued compliance with the POTW's NPDES permit and sludge use or disposal practices. Specific local limits shall not be developed and enforced without individual notice to persons or groups who have requested such notice and an opportunity to respond. By December 31, 2005, the permittee shall prepare and submit a written

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

STATEMENT OF BASIS

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT MODIFICATION TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NO.: **MA0100480**

NAME AND ADDRESS OF APPLICANT: **City of Marlborough**

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Marlborough Westerly Waste Treatment Works
Boundary Street
Marlborough, MA 01752

RECEIVING WATER: **Assabet River**

CLASSIFICATION: **B (Warm Water Fishery)**

I. Proposed Action

The permittee has requested that EPA modify its permit to authorize an increase in the annual average flow limit from 2.89 MGD to 4.15 MGD. This draft permit modification authorizes the requested increase, provided specific conditions are first met. The permit modification also establishes effluent limitations and conditions to ensure that the authorized pollutant loadings do not increase as a result of the flow increase. These conditions are in accordance with the "*Assabet River Total Maximum Daily Load for Total Phosphorus*" (Report Number MA82B-01-2004-01; Control Number CN 201.0) and water quality standards requirements, including antidegradation provisions.

II. Permit Basis and Explanation of Effluent Limitation Derivation

Background

On September 23, 2004, EPA approved MassDEP's "*Assabet River Total Maximum Daily Load for Total Phosphorus*" (Report Number MA82B-01-2004-01; Control Number CN 201.0). The report included waste load allocations and effluent limitations for total phosphorus for the four wastewater treatment plants that discharge to the Assabet River, including the City of Marlborough West wastewater treatment plant. The TMDL included a seasonal (April - October) monthly average effluent phosphorus limitation of 0.1 mg/l for the City of Marlborough West wastewater treatment plant based on its design flow of 2.89 MGD.

The TMDL also required a 90% reduction in the phosphorus loadings from the internal recycling of phosphorus from the sediments in the receiving water. If the sediment loading reductions are not achieved, future permit limits for phosphorus may need to be made more stringent (see TMDL and April 28, 2006, EPA letter to Nancy Stevens). A current project being conducted by the Army Corps of Engineers on total phosphorus reductions in the Assabet River that may be achieved by sediment and/or dam removal may conclude that those reductions are not feasible or sufficient enough to attain water quality goals, in which case further reducing the total effluent phosphorus loads may be required. (Future permits, based on consideration of the sediment loading and dam removal study, are hereafter called Phase II permits)

The current NPDES permit was issued on May 21, 2005, and included the phosphorus limitations in the approved TMDL. Both the permittee and the Organization for the Assabet River filed petitions for review of the permit with EPA's Environmental Appeals Board (EAB). Pursuant to federal regulations found at 40 CFR Part 124.16, the entire permit was stayed until EPA identified the uncontested permit conditions that were severable from the contested conditions. On October 25 2005, EPA issued a letter to the permittee identifying the uncontested conditions and placing those conditions into effect on November 25, 2005. The phosphorus limits and condition went into effect on May 17, 2006, upon withdrawal of the permit appeals. The permit will expire November 25, 2010, five years from the date the uncontested and severable condition were put into effect.

The current permit includes an annual average flow limit of 2.89 MGD and a 54 month compliance schedule for meeting the April- October 0.1 mg/l monthly average total phosphorus limit. Because the compliance schedule for meeting the new phosphorus limit was a contested condition, the schedule did not become effective until May 17, 2006, making the final compliance date November 17, 2010. An interim total phosphorus limit of 0.75 mg/l average monthly is in effect for the months of April- October. The monthly average total phosphorus limit of 1.0 mg/l for the months of November- March was required to be met within one year of the issuance date of the permit.

In October 2007, the City completed a "Comprehensive Wastewater Management Plan and Environmental Impact Report- Final Report" (CWMP/EIR)(October 2007). The report projected flows of 4.15 MGD for the year 2025, with a flow of 2.89 MGD from the City of Marlborough and a flow of 1.26 MGD from the Town of Northborough. The CWMP/EIR report projected that the increase in flow would not have a measurable impact on the water quality of the Assabet River if the TMDL- required total phosphorus loadings of 2.4 lbs/day were maintained. The report evaluated alternatives to the flow increase, including a groundwater discharge alternative, but concluded, with MassDEP concurrence, that the ground water treatment plant alternative was not cost effective nor environmentally beneficial, thus making the expansion of the Marlborough West Wastewater Treatment Plant the preferred option.

On October 18, 2007, the City requested that its permit be modified to include the increased flow limit. Accordingly, the draft permit modification includes a flow limit of 4.15 MGD, consistent with the CWMP/EIR. However, to account for the current uncertainty regarding future permit limits and the potential that future phosphorus limits may be more stringent (reference the Army Corps of Engineers study on sediment and/or dam removal discussed previously), the permittee

is required to meet the following conditions:

a. The permittee agrees to participate in a comprehensive evaluation of conservation/reuse opportunities (Conservation/Reuse Study). The evaluation will be conducted by and under the auspices of the Massachusetts Office of Technical Assistance. The Conservation/Reuse Study will include detailed audits for significant water users in Marlborough and Northborough and will identify and recommend specific conservation and reuse opportunities.

b. Work with the MassDEP and EPA in cooperation with the Army Corps of Engineers to further understanding and implementation of the recommendations that come out of the on-going work regarding specific sediment and/or dam removal and/or modifications that could result in significant water quality improvements to the Assabet River.

Because of the flow increase, EPA made changes to the effluent limitations to ensure that the discharge does not exceed the wasteload imposed by the TMDL nor exceed applicable water quality standards. The specific changes are described below.

CBOD and TSS

Maximum daily CBOD and TSS mass limits have been included to ensure that the permit does not allow an increase in the permitted maximum daily loadings.

Total Phosphorus

The total phosphorus concentration limits in the permit modification have not been changed, but mass limits have been added, calculated using the concentration limits and a flow of 2.89 MGD. In order to achieve these mass limits as the discharge flow increases, the facility must achieve ever-lower concentrations of total phosphorus, down to 0.07 mg/l to achieve the summer limits at the new design flow and 0.7 mg/l to achieve the winter limits at the new design flow.

Ammonia Nitrogen

Mass reporting limits have been added to complement the authorized concentration limits.

Metals

A review of quarterly effluent data from 2005 - 2007 indicates that lead and cadmium effluent values have been consistently below detection levels (detection level = 1 ug/l) and zinc effluent values (range = 20 - 64 ug/l) have been consistently less than the instream chronic criterion value (68 ug/l). Therefore, permit limits have not been included for these three metals since there is no reasonable potential to cause or contribute to an excursion of the instream criteria.

aluminum:

To ensure that the instream criteria for aluminum is not exceeded and that increased loadings do

not occur as a result of the flow increase, a monthly average mass limit has been incorporated in the permit in accordance with the following calculation:

monthly average mass limit = 2.89 MGD x current effluent limit (mg/l) x 8.34
= 2.89 MGD x 0.218 mg/l x 8.34 = 5.3 lbs/day

nickel:

A total recoverable nickel limit has been included in the permit based on the water quality criteria and the current dilution factor of 2.5 due to the reasonable potential for the discharge to cause or contribute to an exceedance of the criteria. Quarterly effluent data from 2005 - 2007 indicate that nickel effluent values range from18 - 234 ug/l. The limit is based on the following calculation:

monthly average total recoverable limit = chronic criteria (hardness = 50 mg/l) x 2.5
= 29 ug/l x 2.5 = 73 ug/l

A monthly average mass limit has also been included to ensure that the instream criteria is not exceeded and that the mass loading does not increase when the discharge flow increases.

monthly average mass limit = 0.073 mg/l x 2.89 MGD x 8.34 = 1.8 lbs/day

copper:

The Massachusetts Surface Water Quality Standards were revised in December 2006 and included site-specific criteria for copper that were developed for specific receiving waters where national criteria are invalid due to site-specific physical, chemical, or biological considerations, and do not exceed the safe exposure levels determined by toxicity testing [314 CMR 4.05(5)(e) Table 28]. EPA approved these criteria on March 26, 2007, which include dissolved copper chronic criteria of 18.1 ug/l and dissolved copper acute criteria of 25.7 ug/l for the Assabet River.

MassDEP prepared *PROTOCOL FOR AND DETERMINATION OF SITE SPECIFIC COPPER CRITERIA FOR AMBIENT WATERS IN MASSACHUSETTS* (the Site Specific Copper Protocol) in conjunction with the new criteria. In this document DEP states that "While site-specific copper criteria are being established, prudence dictates that loads of copper and other metals be minimized. This, in part, is because possible impacts on sediment quality and toxicity remain an open question. Therefore, as part of the site-specific criteria, all reasonable efforts to minimize the loads of metals, and copper in this case, are part of the criteria revision protocol. So, the Department on a case-by-case basis will develop permit copper limits. Each determination will be based not only on the adjusted concentration resulting from the appropriate multiplier but will reflect the demonstrated level of copper reduction routinely achievable at the facility in order to minimize copper loads and thereby reduce its accumulation in the sediment."

Antibacksliding requirements found at Clean Water Act (CWA) 402(o) and 40 CFR 122.44(l) generally prohibit relaxation of effluent limits. Water quality-based limits can only be relaxed if

one of the exceptions found at CWA 402(o)(2) is met or if the requirements of CWA 303(d)(4) are met. In this case, none of the exceptions listed in 402(o)(2) apply. It may appear that the exception found at 402(o)(2)(B)(i) would apply. This exception is for a situation where "information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitations at the time of permit issuance". However, new water quality criteria are "revised regulations" and are therefore specifically excluded as "new information".

CWA 303(d)(4) requires that a determination be made whether the receiving water is attaining the applicable water quality standard. If the water is in attainment of the standard, a relaxation of
the limit would be allowed subject to the state antidegradation policy. If the receiving water is not in attainment of the applicable standard, the existing limit must be based on a wasteload allocation or a total maximum daily load (TMDL) and the relaxed limit is only allowed if attainment of water quality standards is ensured.

First, we calculated the limits that would be necessary to ensure that the receiving water would be in attainment of the new criteria. These limits were calculated based on the recently established site specific dissolved copper criteria of 18 ug/l chronic and 25.7 ug/l acute and the current dilution factor of 2.5. In establishing effluent limits based on site specific metals criteria, upstream concentrations are accounted for in order to ensure that instream values downstream of the discharge do not exceed the site specific criteria. Consistent with national criteria recommendations, a conversion factor (CF) of 0.96 has been used to convert copper limits based on dissolved criteria to copper limits based on total recoverable criteria. Monthly average and maximum daily effluent limits have been established in accordance with the following calculations:

average upstream copper concentration x 7Q10 flow + monthly average dissolved copper limit x design flow = chronic criteria x (7Q10 flow + design flow)

monthly average dissolved copper limit = {chronic criteria (7Q10 flow + design flow) - average upstream copper concentration (7Q10 flow)}/design flow

monthly average dissolved copper limit = {18.1 ug/l x 7.19 MGD - 4.3 ug/l (4.3 MGD}/2.89 MGD = 38.6 ug/l

monthly average total recoverable copper limit = 38.6 ug/l/CF = 38.6 ug/l/0.96 = 40 ug/l

maximum upstream copper concentration (7Q10 flow) + maximum daily dissolved copper limit (design flow) = acute criteria (7Q10 flow + design flow)

maximum daily dissolved copper limit = {acute criteria (7Q10 flow + design flow) - maximum upstream copper concentration (7Q10 flow)}/design flow

maximum daily dissolved copper limit = {25.7 ug/l x 7.19 MGD - 8.0 ug/l (4.3 MGD)}/2.89 MGD = 52 ug/l

maximum daily total recoverable copper limit = 52 ug/l/CF = 52 ug/l/.96 = 54 ug/l

In each case, the calculated limit was greater than the limit in the current permit. However, pursuant to the State's antidegradation policy and the Site Specific Protocol, the new limit will not be based entirely on these calculations, but must also reflect the demonstrated level of reduction routinely achievable at the facility in order to minimize copper loads and thereby reduce its accumulation in the sediment. Therefore, the effluent copper data from the facility for the years of 2005-2007 was reviewed to characterize the performance of the facility. The monthly average and maximum daily effluent copper concentrations are shown on Attachment 1. In order to capture the statistical variation in the data, the 99th percentile for maximum daily data and the 95th percentile for the average monthly concentration were calculated (see Attachment 1 for calculations). Based on these calculations, the monthly average limit would be 30 ug/l and the maximum daily limit would be 44 ug/l.

A description of the lognormal distribution is provided in the Technical Support Document for Water Quality-based Toxics Control, March 1991, EPA/505/2-90-001 (TSD), Appendix E, Lognormal Distribution and Permit Limit Derivations. The available copper data were fitted to a lognormal distribution using the equations provided in the TSD to determine the average monthly and maximum daily copper limits. The 95th and 99th percentiles of the lognormal distribution provide the average monthly and maximum daily limits, respectively.

In the event that there are nondetect values in the copper data set, the data is fitted to a delta-lognormal distribution. In delta-lognormal distributions, nondetect values are weighted in proportion to their occurrence in the data. The values above the detection limit are assumed to be lognormally distributed values.

Accordingly, the limitations in the draft permit are established at the more stringent of the limits calculated to achieve the new water quality criteria and those based on demonstrated performance of the facility. In this case, a monthly average limit of 30 ug/l and a maximum daily limit of 44 ug/l have been included in the permit.

Monthly average and maximum daily mass limits for copper have been included to ensure that the instream criteria is not exceeded and that the mass loading does not increase when the discharge flow increases.

monthly average mass limit = 2.89 MGD x monthly average effluent limit (mg/l) x 8.34
= 2.89 MGD x .030 mg/l x 8.34 = 0.7 lbs/day

maximum daily mass limit = 2.89 MGD x maximum daily effluent limit (mg/l) x 8.34
= 2.89 MGD x 0.044 mg/l x 8.34 = 1.1 lbs/day

Total Residual Chlorine (TRC) and Whole Effluent Toxicity (WET)

Reduced concentration limits for chlorine and whole effluent toxicity that will apply if the annual average effluent flow increase goes into effect have been included in the permit modification in accordance with the following calculations:

$$\text{Dilution Factor at 4.15 MGD} = \frac{\text{4.15 MGD + 7Q10 flow}}{\text{4.15 MGD}} = \frac{\text{4.15 MGD + 4.3 MGD}}{\text{4.15 MGD}} = 2.04$$

monthly average TRC limit = chronic criterion x dilution factor = 11 ug/l x 2.04 = 22 ug/l

maximum daily TRC limit = acute criterion x dilution factor = 19 ug/l x 2.04 = 39 ug/l

WET NOEC Limit = design flow/(design flow + 7Q10 flow)
= 4.15 MGD/(4.15 MGD + 4.3 MGD) = 49%

III. State Certification Requirements

The staff of the Massachusetts Department of Environmental Protection has reviewed this draft permit modification. EPA has requested permit certification by the State pursuant to CWA § 401(a)(1) and 40 C.F.R. § 124.53 and expects that the draft permit modification will be certified.

IV. Public Comment Period, Public Hearing, and Procedures for Final Decision

All persons, including applicants, who believe the limits of the draft permit modification is inappropriate must raise all issues and submit all reasonably available arguments and all supporting material for their arguments in full before the close of the public comment period, to the U.S. EPA, Office of Ecosystem Protection (CMP), Region 1, 1 Congress Street, Suite 1100, Boston, MA 02114-2023. Any person, prior to such date, may submit a request in writing to EPA and the state agency for a public hearing to consider the draft permit modification. Such requests shall state the nature of the issues proposed to be raised in the hearing.

A public hearing may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on the draft permit, the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office. Following the close of the comment period, and after a public hearing, if such hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Permits may be appealed to the Environmental Appeals Board in the manner described at 40 C.F.R. § 124.19.

V. EPA and MassDEP Contacts

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays from:

Roger Janson, Chief
Municipal Permits Branch (CMP)
Office Of Ecosystem Protection
US Environmental Protection Agency
Congress Street, Suite 1100
Boston, MA 02114-2023
Tele: (617) 918-1621

_____
Date

Paul Hogan, Chief
Surface Water Permit Program
Division of Watershed Management
Department of Environmental Protection
627 Main Street, Second Floor
Worcester, MA 01608
Tele: (508) 767-2796

_____
Stephen Perkins, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

EPA AND MASSDEP JOINT RESPONSE TO COMMENTS
NPDES PERMIT NO. MA0100480 MODIFICATION

From July 9, 2008 to August 13, 2008, Region 1 of the United States Environmental Protection Agency ("Region" or "EPA") and the Massachusetts Department of Environmental Protection ("MassDEP") (together, the "Agencies") solicited public comments on a draft NPDES permit modification. The draft permit modification was developed pursuant to a permit modification request from the City of Marlborough, Massachusetts (the "City" or the "permittee") and the Town of Northborough, Massachusetts. Specifically, the City requested a permit modification in a letter to the Region dated October 18, 2007, requesting an increase in the flow limit from 2.89 million gallons per day ("MGD") to 4.15 MGD. As a basis for its request, the City cited new information, including the completion of its final Comprehensive Wastewater Management Plan, or CWMP.

Upon careful consideration of the comments received on the draft permit modification, the Agencies have made a final decision to issue the permit modification. The Agencies have briefly described and responded to comments on the draft permit modification below and have also explained the reasoning behind any changes between the draft and final permit. A copy of the final permit modification may be obtained on the EPA Region 1 web site at http://www.epa.gov/region1/npdes/mass.html or from the permit writer, whose contact information is as follows:

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Boston, Massachusetts 02114-2023
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Email: janson.roger@epa.gov

Comments received from the Organization for the Assabet River, dated August 8, 2008:

The Organization for the Assabet River (OAR) is pleased to submit the following comments on the above referenced draft Modification increasing the Westerly wastewater treatment facility's average annual flow limit from 2.89 million gallons per day (mgd) to 4.15 mgd. OAR is a private non-profit watershed organization established in 1986 to protect, preserve, and enhance the natural and recreational features of the Assabet River, its tributaries and watershed. OAR has approximately 1,000 members and operates a successful EPA-approved volunteer water quality and stream flow monitoring program, a large-scale volunteer annual river clean-up, and a variety of educational workshops, canoe trips and other activities designed to foster enjoyment and good stewardship of the river.

OAR opposes the decision of EPA and MassDEP to allow the City of Marlborough to discharge an additional 1.26 mgd of treated effluent from the Marlborough Westerly

wastewater treatment plant (WWTP) [1] to the Assabet River. The additional 1.26 mgd represents a 43% increase in flow from the Westerly Plant and is nearly equal to the Town of Maynard's entire permitted discharge of 1.45 mgd. The increased discharge is proposed largely to allow a 56% increase in the wastewater allocation to the town of Northborough, which utilizes the Marlborough Westerly plant through an Intermunicipal agreement.[2] If Northborough managed its own wastewater, the City of Marlborough would already have sufficient capacity at the Westerly plant (2.89 mgd) to handle increases in its own wastewater flows over the next twenty years.[3]

OAR objects to the increased effluent discharge and associated permit modifications because these allowances will delay and likely prevent restoration of Assabet River water quality by making future (Phase 2) phosphorus load reductions at the wastewater treatment plants more expensive and technically difficult to achieve. As is discussed in the Comments section below, EPA and MassDEP may not lawfully issue permits that allow for increased discharges without a demonstration that water quality standards will be met in the receiving water. As described in the Background section immediately following this Introduction, studies undertaken to determine whether water quality standards will be met in the Assabet River with the phosphorus mass load contained in this modification have thus far *not* made such a demonstration.

The new mass limits for phosphorus do not meet water quality standards and the flow increase violates state and federal antidegradation rules and MassDEP's TMDL for the Assabet River.[4] If granted, the extensive sewering in Northborough would decrease groundwater flows and stream flows in several trout streams. Increased effluent discharges will further increase the volume of unregulated pollutants, including pharmaceuticals, entering the public drinking water supply of Billerica.[5] These concerns are described in detail following the Background section, below, which describes the Assabet River's eutrophication problem and the status of TMDL implementation.

BACKGROUND

The Assabet River

The Assabet River flows from Westborough for 31 miles through the city of Marlborough and the towns of Northborough, Berlin, Hudson, Stow, Maynard, Acton and

[1] The terms WWTF, WWTP and POTW are used interchangeably herein.

[2] This increase would be a 103% growth over Northborough's 2006 flow to the Westerly plant.

[3] CWMP Final Report, Marlborough, October 2007.

[4] *Assabet River Total Maximum Daily Load for Phosphorus, Report No: MA82B-01-2004-01*, 2004.

[5] The Assabet River is a major tributary of the Concord River a designated treated public drinking water supply, which is the Town of Billerica's sole source of public drinking water. Assabet WWTPs contribute approx. 12 million gallons of effluent to the Concord River each day. When the Assabet plants reach their currently permitted design flows, that volume will increase to 15 mgd.

Concord before joining the Sudbury River to form the Concord River, which empties into the Merrimack River, and then the Atlantic Ocean. The Assabet drains a 178-square mile watershed, home to some 177,000 residents. After decades of neglect, the Assabet began to come back to life in the late 1980s, when construction of wastewater treatment facilities eliminated discharge of raw sewage into the river. Since then the river's recreational use has grown. In 1999 the Assabet, Sudbury and Concord rivers were added to the nation's federal Wild and Scenic River system. RiverFest, an annual celebration of these three rivers, held 49 river-based events in 2008, from canoe trips to a fishing class, hosted by 57 individuals and organizations in the watershed. As the river's popularity as a recreational resource has grown, area residents have become increasingly active in its stewardship.

Yet much of the Assabet still suffers each summer and early fall from severe eutrophication--excessive nuisance plant growth, bad odors, and degraded recreation and wildlife habitat--as a result of an overload of nutrients from the WWTPs that discharge to the river (see photos in Attachment A). The river is impounded along its length by seven old mill dams and two flood control dams dating from the 1960s (Attachment B). The Assabet does not meet its designated Class B ("fishable and swimmable") state water quality standard. The current degraded condition of the River, and its causes, are well documented in MassDEP's TMDL for the Assabet River. The TMDL report describes the Assabet as an effluent-dominated, nutrient enriched (eutrophic) system. It states:

"Due to the high phosphorus loading from the four major POTWs [publicly-operated treatment works] and the effects of the impoundments, the Assabet River is experiencing abundant rooted macrophyte growth and frequent excessive accumulations of *Lemna* species (duckweed) which often cover the river's surface, particularly in the slow moving reaches, embayments, and impoundments. Decay of dying duckweed causes odors and violations of dissolved oxygen standards. Excessive growths of both floating and rooted macrophytes are detrimental to primary and secondary contact recreation." (pp. 15-16)

The TMDL concluded: "To achieve the water quality goals embodied in this TMDL, stringent control of point source discharges of phosphorus from POTWs which discharge to the Assabet River will be needed in combination with a 90% reduction of sediment phosphorus loads." (p. 7) Phosphorus recycling from the sediments occurs in the impoundments created by the 6 mill dams (the 7th is breached) where nutrients are trapped, and stimulates explosive aquatic plant growth in the summer and fall.

Progress on Meeting Water Quality Goals: TMDL Implementation to Date

The TMDL prescribes a two-phase, ten year, "adaptive management" approach in which MassDEP and EPA jointly issue Phase 1 and Phase 2 NPDES discharge permits to the four municipal WWTPs. The Phase 1 "interim" phosphorus limits on WWTP discharges were designed by MassDEP and EPA as an initial step toward meeting water quality standards. The agencies issued the Phase 1 permits in 2005 with limits of 0.1 mg/L Total Phosphorus (TP) during the growing season and ten times this (1.0 mg/L TP) during the winter. The permits remain in effect and contain a schedule for up-grading the WWTPs

to meet the growing season limit (0.1 mg/L) by 2010. The upgrade of the Marlborough WWTP is currently out of compliance with this schedule. The plant has also not met the 1.0 mg/L winter TP discharge limit currently in force.[6] During Phase 1 the communities were expected to evaluate the potential of sediment or dam removal to achieve the 90% reduction in sediment phosphorus flux specified in the TMDL.

In 2010, MassDEP and EPA will establish Phase 2 phosphorus limits – limits that will achieve water quality standards - and issue the Phase 2 NPDES discharge permits. In a 2005 letter to the municipalities with public WWTPs, MassDEP and EPA warned: "Depending on whether sediment remediation can reduce sediment phosphorus contributions enough to achieve water quality standards in the Assabet River, your facility may be required in the next permitting cycle to meet a more stringent 'Phase 2' limit by 2014."[7] It further stated: "Consistent with the TMDL implementation schedule, EPA and DEP will initiate development of Phase 2 permits in Spring 2008. If we determine that sediment remediation is unlikely to achieve necessary phosphorus reductions based upon the information available at that time, the agencies will establish new Phase 2 phosphorus effluent limits designed to ensure compliance with water quality standards." These statements are a reiteration of the TMDL: "Phase 2 limitation will be established in permits to be reissued in 2009 [now 2010[8]] if sediment remediation, based upon results of the sediment/dam evaluation, is not pursued, and/or new phosphorus criteria that may be developed in the interim by DEP and EPA are applicable." (p. 9)

In 2005 the US Army Corps of Engineers (ACOE) commenced a study of sediment and dam removal under the direction of MassDEP who is acting on behalf of the communities that use WWTPs discharging to the river, known as the Assabet Consortium.[9] In the meantime, these Assabet communities have begun making multi-million dollar investments in WWTP upgrades to replace aging equipment and install new tertiary phosphorus removal technology capable of meeting the Phase 1 NPDES permit limits.

Status of the ACOE Study & Findings to Date

The ACOE commenced the *Assabet River Sediment and Dam Removal Study* in 2005 and is nearing completion. The study is intended to assess the feasibility of removing 90% of sediment phosphorus flux (i.e., phosphorus in sediment which is re-circulated in the water column) through either removing sediment, removing the 6 mill dams, or both. The study did not analyze the impact of further reducing growing season phosphorus limits at the WWTPs. It did, however, investigate the influence of winter phosphorus loads from the WWTPs on growing season instream phosphorus concentrations. The

[6] Marlborough Westerly WWTP, January 2008 Discharge Monitoring Report, 2/6/08.

[7] Letter to Nancy Stevens, Donald Cowles, Paul Blazar and Walter Sokolowski from Ira Leighton, EPA and Robert Golledge, DEP, dated April 28, 2005. Attachment C herein.

[8] The final 5-year permits went into effect in 2005.

[9] The Assabet Consortium consists of: Westborough, Shrewsbury (discharges to Westborough plant), Marlborough, Northborough (discharges to Marlborough Westerly plant), Hudson, and Maynard.

study did not model specific winter phosphorus limits at the WWTPs as part of this analysis.

At this time, the full ACOE report is not complete. However, the *Modeling Report* component of the study was completed in June 2008 by subcontractor Camp Dresser & McKee (CDM) for the ACOE. The Modeling Report concludes: "Of the alternatives evaluated in this study, no alternative or combination of alternatives is projected to result in a 90 percent reduction in phosphorus flux….Results of this modeling study suggest that the most beneficial improvements to Assabet River water quality can be achieved through planned WWTP improvements [Phase 1 limits], dam removal, and consideration of lower winter effluent limits than currently planned."[10]

The study recommended:

- Remove Ben Smith dam and if possible, Gleasondale and Hudson/Route 85 dams
- Remove sediment behind dams as part of dam removal to prevent sediment from moving downstream subsequent to dam removal
- Lower winter WWTP phosphorus discharge below 1.0 mg/L
- Dredging or sediment removal is not an effective alternative in reducing sediment flux. Dredging/sediment removal is proposed only in conjunction with dam removal to prevent the redistribution of accumulated sediment.[11]

As noted above, CDM recommended removing the Ben Smith Dam, the Gleasondale Dam and the Hudson Dam, adding: "The removal of the Ben Smith dam is a key component contributing to the system meeting the TMDL goal of 90% sediment phosphorus flux reduction…"[12] However, in May 2008 the owner of the Ben Smith Dam filed for a preliminary permit with the Federal Energy Regulatory Commission (FERC) for a hydroelectric project.[13] This project would depend upon the Ben Smith Dam remaining in place.

A: OAR'S COMMENTS ON THE DRAFT NPDES PERMIT MODIFICATION:

Comment A1: The draft permit does not comply with the federal and Massachusetts Clean Water Acts.

[10]. Assabet River Sediment and Dam Removal Study: Modeling Report. June 2008. Camp Dresser & McKee, p. ES-2.

[11] *Id*., p. 6-8.

[12]. Assabet River Sediment and Dam Removal Study: Modeling Report. June 2008. Camp Dresser & McKee, p. 6-2.

[13] Letter from Donald Clarke, Counsel to Wellesley Rosewood Maynard Mills LP to FERC, et al., dated July 11, 2008. In 2007 WRMM LP received a $500,000 grant from the Massachusetts Renewable Energy Trust to study, design and construct a hydropower system.

A. The following mass total phosphorus limits will not meet water quality standards: Total Phosphorus (TP) 2.4 lbs/day average monthly load (April, May-Oct.); the Total Phosphorus (TP) 24 lbs/day average monthly load (Nov.-March); and the Total Phosphorus (TP) 4.8 lbs/day maximum daily load (April only).

Regulations promulgated under the Clean Water Act provide that no NPDES permit may be issued "[w]hen the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States."[14] In the case of the Marlborough Easterly plant which discharges to Hop Brook in the Sudbury River watershed, the NPDES discharge permit was remanded because EPA Region 1 "failed to demonstrate . . . that the Permit, as written, will ensure compliance with applicable Massachusetts water quality standards."[15] The proposed Modification for the Marlborough Westerly plant violates this requirement.

As established in the TMDL, the above phosphorus load allocations provide reasonable assurance that the water quality standards will be met *only* if the quantity of phosphorus recycled and released by the sediments, known as "sediment phosphorus flux," is reduced by 90%. However, CDM's 2008 phosphorus flux modeling concludes that none of the dam or sediment removal alternatives would result in a 90% phosphorus flux reduction. In other words, phosphorus loads from the wastewater treatment plants must be further reduced because the 90% reduction cannot be achieved through dredging and dam removal alone. Furthermore, the Study recommended reducing winter total phosphorus limits below 1.0 mg/L at the Westerly and other treatment plants:

"This study also resulted in significant findings regarding the seasonality of sediment phosphorus flux. An additional consideration to meet the TMDL target of 90% reduction in sediment phosphorus flux is winter phosphorus discharge limits for at [sic] WWTFs. Based on results of this modeling effort, it was concluded that winter limits for the WWTFs, below the current planned limit of 1 mg/L would contribute significantly to the reduction in sediment phosphorus flux.

"If no other improvements were implemented, further reductions in summer P discharge limits, below 0.1 mg/L, would not contribute significantly to further reduction in sediment phosphorus flux. This is because the winter instream phosphorus concentration has such a strong effect on the P flux the following summer." (Sec. 6, p.7)[16]

The Study did not identify specifically what the lower winter limits should be. The Study also did not evaluate the impact of lowering phosphorus concentrations and loads from the treatment plants during the growing season. As noted above, CDM asserted in the study that lower growing season limits would provide little benefit to the river as long as

[14] 40 CFR § 122.4(d).

[15] *City of Marlborough, Massachusetts, Easterly Wastewater Treatment Facility*, NPDES Appeal No. 04-13, Environmental Appeals Board, Aug. 11, 2005, at 9 ("Hop Brook case").

[16] The current, Phase 1, permits limits for Total Phosphorus are: 1.0 mg/L (Nov.-March), 0.1 mg/L (April-Oct).

winter loads remained high, i.e., at 1.0 mg/L Total Phosphorus (TP), which corresponds to the new 24 lbs TP/day winter limit in the draft permit modification.

The TMDL, however, did establish that lower phosphorus limits at the treatment plants during the growing season would produce the same water quality results as the selected TMDL allocation[17] (the "planned improvements" in the CDM Study), with less reliance on sediment flux reductions and less uncertainty. Specifically, the TMDL documented that a growing season effluent limit of 0.05 mg/L TP would attain standards in combination with a 75%--instead of a 90%--sediment flux reduction. Despite this information, EPA and MassDEP chose as their preferred alternative for Phase 1 NPDES permitting, the TMDL allocation with the greatest uncertainty with respect to reduction of sediment phosphorus. The agencies have done this again in the draft permit modification by using mass limits for phosphorus that assume sediment phosphorus flux can be reduced 90% by means of dredging and dam removal.

In addition, the most current EPA guidance documents and reports support even lower total phosphorus limits in the range of 0.020 mg/L to 0.024 mg/L. In 2000, EPA issued its recommended nutrient criteria or "reference conditions" for river and streams located in Ecoregion XIV, which includes all of Massachusetts and three Level III sub-ecoregions.[18] EPA's Level III sub-ecoregion 59, also known as the Northeastern Coastal Zone, includes the Assabet River watershed. The recommended Total Phosphorus criterion or reference condition for this Level III sub-ecoregion is 0.02375 mg/L (hereafter rounded to 0.024 mg/L).[19] This criterion was empirically derived to represent conditions of surface waters that are minimally impacted by human activities and protective of aquatic life and recreational uses.[20]

In 2003, the New England Interstate Water Pollution Control Commission published a study, conducted by ENSR, of instream nutrient data for New England rivers and streams.[21] This EPA-funded report, which included phosphorus data collected from Massachusetts rivers and streams in 1994-1998, confirmed the earlier recommendations of EPA's 2000 guidance document. Specifically, the more comprehensive phosphorus data set analyzed by ENSR for the Northeastern Coastal Zone (EPA sub-region 59) showed that in minimally impacted rivers and streams, the expected total phosphorus

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[17] The TMDL phosphorus load allocation selected for all Assabet municipal WWTPs, assuming a 90% reduction in sediment phosphorus flux, was: 0.1 mg/L TP (April 1-Oct. 31, the "growing season"). The mass load at the Westerly plant was set at 2.4 lbs/day TP (growing season). TMDL, p. 39, Table 10.

[18] *Ambient Water Quality Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria; Rivers and Streams in Nutrient Ecoregion XIV*, US EPA, Office of Water, EPA 822-B-00-022, December 2000, AR Index Reference II.F.4.a.

[19] *Ibid*., page 15, Table 3a.

[20] Based on the 25th percentile of all nutrient data assessed from Level III, sub-ecoregion 59.

[21] *Collection and Evaluation of Ambient Nutrient Data for Rivers and Streams in New England, Data Synthesis Report, Final Report*, NEIWPCC, September 2003, AR Index Reference II.E.7.c.

concentration would be in the range of 0.020 mg/l – 0.022 mg/L,[22] slightly less than the 0.024 mg/L total phosphorus criterion recommended in EPA's 2000 guidance document.

Because the Marlborough Westerly plant and the three other municipal plants discharging to the river serve as the Assabet's major tributaries under critical low flow (7Q10) conditions and discharge directly into or upstream of impoundments,[23] the Phase 2 effluent limits for total phosphorus should be comparable to background concentrations found in New England's healthy rivers and streams. The foregoing points to a course of action supported by the new data: the agencies need to define and establish more stringent winter and growing season phosphorus limits that will allow the river to meet water quality standards.[24]

Response A1.A:

Sections 402(a)(3) and (b)(1)(B) of the Clean Water Act require permits to be issued for fixed year terms not to exceed five years in order for the process of permit re-issuance and re-examination to be conducted on an orderly and predictable cycle. *See also* 40 C.F.R. § 122.46(a). NPDES regulations establish a limited set of circumstances under which a permit issuer may, in its discretion, reopen and modify an existing permit during its term. *See* 40 C.F.R. § 122.62(a). In accordance with the policy rationale underlying the foregoing statutory and regulatory provisions, only those conditions to be modified are reopened when a new draft permit modification is prepared, and all other aspects of the existing permit remain in effect for the duration of the permit's term. 40 C.F.R. § 124.5(c)(2). Put otherwise, the opportunity to comment on a draft permit modification does not provide an opportunity to comment on, or revisit, permit terms that are unaffected by the proposed modification.

Consistent with this directive, EPA explicitly defined the scope of the modification to include only the flow limit and, concomitantly, "effluent limitations and conditions to ensure that the authorized pollutant loadings do not increase as a result of the flow increase." *See Fact Sheet* at 1, 4-5.[25] Consistent with its oft-stated position that

[22] *Ibid*. pages 6-12, Table 6-4.

[23] Discharges to impounded rivers and lakes require more stringent criteria than discharges to free-flowing rivers. *Quality Criteria for Water 1986*, EPA (EPA "Gold Book").

[24] The Syracuse NY WWTP, discharging to Lake Onondaga, has a year-round TP limit of 0.02 (12-month rolling average) with effect from Dec. 2012, and an interim year-round limit of 0.12 mg/L TP from 2006-Nov. 2012.

[25] The modification also included a revision of the preexisting copper limit based on site-specific criteria for copper, included in the Massachusetts Surface Water Quality Standards and approved by EPA in March 2007. The City in its modification request never sought an adjustment to its copper limit. EPA has decided to retain the preexisting copper limit and to make any appropriate revisions to such limit in light of the new site-specific criteria at the time of permit reissuance. As is clear from the comments on the modification, the flow increase by itself raises numerous and complex issues; unlike the other pollutants regulated by the permit, the application of the new site-specific copper criterion would have resulted in an increased loading of the pollutant. Because of this, EPA believes that this issue deserves particularly careful and extended

additional wastewater effluent flow into the river would need to satisfy applicable antidegradation requirements, EPA has established mass loadings for all pollutants limited in the permit, based on the preexisting flow limit of 2.89 MGD notwithstanding the proposed flow increase. The inclusion of mass limits on all permitted pollutants ensures that there will be no increase from the existing baseline in the total mass loading of all permitted pollutants into the receiving waters, as well as a decrease in concentrations compared to the baseline of all regulated pollutants at flows above 2.89 MGD. EPA and MassDEP have concluded that structuring the permit in this way is protective of water quality standards because it satisfies antidegradation requirements with respect to all regulated pollutants and, additionally, ensures that the mass loading remains consistent with the available EPA-approved phosphorus WLA for the discharge.

In challenging the adequacy of the 0.1 mg/l phosphorus effluent limitation and the underlying WLA, the commenter ventures far beyond the limited confines of this modification. The imposition of mass limitations followed as an arithmetic consequence of the flow increase and did not reopen the logically distinct issue of whether the 0.1 mg/l phosphorus limit was sufficient to ensure compliance with water quality standards, or whether the 0.1 mg/l limit was properly translated from the underlying WLA, or whether the WLA was still scientifically and technically valid. Challenges to these aspects of the permit were lodged in the original permit determination and were resolved as a result of litigation over the originally issued permit.[26]

The issuance of the modification with the same phosphorus mass load as the preexisting permit comports with the currently available WLA and is fully consistent with its assumptions and requirements. Due to severe man-made alterations to the Assabet River's hydrology in the form of dams and impoundments, the Agencies along with many stakeholders recognized that improving the quality of wastewater effluent discharges was but one dimension of restoring critical habitat to support the native, naturally diverse community of aquatic life, which is the goal of the Clean Water Act and the Massachusetts Surface Water Quality Standards. As OAR itself explains, one central and explicit assumption of the TMDL was that the sufficiency of the WLA would be revisited in the *next* permit cycle to determine the extent of any additional point source reductions (*i.e.*, Phase 2 limits) that would be necessary, following sediment flux reduction investigations by the United States Army Corps of Engineers, including an inquiry into the feasibility of dam removal (which would help restore the free-flowing, riverine characteristics of the Assabet). [27] This permit modification simply holds constant the

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consideration from the standpoint of antibacksliding and antidegradation, which the Agencies will undertake at the time the four Assabet River permits (including POTWs upstream and downstream of the Marlborough WWTF) are re-issued.

[26] *See* U.S. EPA Environmental Appeals Board Order Dismissing Petition for Review (with prejudice) (April 12, 2006).

[27] The commenter's call to depart from the phased approach contemplated by the TMDL and to impose a phosphorus effluent limitation equal to the ecoregional nutrient criterion of 0.024 mg/l or natural background prior to the Phase 2 permit cycle represents a reversal of its position taken in its technical comments on the TMDL:

mass loading that was effectively authorized by the 2005 permit (based on concentration and the flow of 2.89 mgd), consistent with the TMDL.

As contemplated by the TMDL, options for dam removal, dredging, and lower winter phosphorus limits are being actively evaluated relative to their ability to achieve necessary reductions in phosphorus load from river sediments. To date, the U.S. Army Corps of Engineers has completed its Draft Assabet Sediment and Dam Removal Feasibility Study (including dynamic modeling studies), and its investigation is ongoing. EPA and MassDEP have so far committed approximately $1,000,000 toward this effort. The Allen Street, Aluminum City, Gleasondale, and Hudson dams are the most likely candidates for removal. There have been stakeholder discussions regarding the advantages and disadvantages of removing dams (including through a stakeholder convening process funded by EPA's Office of Alternative Dispute Resolution). *See* Assabet River Advisory Sessions, Organization for the Assabet River and Consensus Building Institute, Fall 2008. The regulatory process for dam removal has not commenced. The issue of whether any limits more stringent than 0.1 mg/l will be necessary to ensure continuing consistency with the WLA will be squarely before the stakeholders at the time the permit is next issued. The draft permit will of course be subject to public notice and comment. When the final permit is re-issued, any party with standing may challenge the Region's permitting determinations with respect to the adequacy of the phosphorus limitations in the appropriate administrative and judicial forums.[28]

> Given data limitations and modeling uncertainties, the TMDL should be approached in an iterative or adaptive fashion, as recommended in a recent evaluation of the TMDL process by the National Research Council (NRC, 2001). Walker (2003b) describes how an iterative approach can be taken in developing phosphorus TMDL's to achieve water quality goals with the desired margin of safety in a cost-effective manner, given the uncertainties that are typically involved in setting goals, predicting the performance of control measures, and predicting impoundment responses. Beyond the above first step (<=0.1 mg/L interim permit limit), further reductions in point, nonpoint, and/or sediment loads may be necessary to achieve water quality goals. Potential needs for such measures can be assessed after implementation of interim effluent limits under an adaptive process that is supported by additional monitoring, data analysis, model refinements, evaluation and possible implementation of instream measures, and possible refinement of water quality goals.

See TMDL at 104.

[28] The sufficiency of the underlying TMDL is outside the scope of this modification, as is the derivation of the 0.1 mg/l based upon the WLA. The Agencies, however, feel it should be underscored that the studies relied on by the commenter are still underway. As such, the conclusion that the 90% sediment phosphorus flux reduction cannot (or almost certainly will not) be achieved is stated more categorically than is warranted by the record at this juncture. Such a conclusion is at best premature. As one example, the Agencies would point out while the referenced modeling report concludes that removal of all of the dams will only result in an 80% reduction of the sediment phosphorus load, the analysis significantly underestimates the benefits of dam removal, due to simplifying assumptions made in the TMDL water quality model used for the analysis. Specifically, the model assumes the same phosphorus flux rate in free-flowing sections of the river as it does in sections of the river impounded by dams. In reality, flux rates in impounded sections of the river will be significantly higher than flux rates in free-flowing sections of the river and the sediment phosphorus load reduction resulting from dam removal will be greater than what the

Comment A1.B:

B. Allowing an increase in effluent discharged by any Assabet River WWTP will undermine the ability of the Westerly plant and all WWTPs discharging to the Assabet to comply with Phase 2 limits and hence the ability to meet water quality standards.

The draft permit modification contains no mechanism to ensure compliance with Phase 2 limits, when issued, to meet water quality standards. To stay within a mass loading limit required under the TMDL, as soon as the currently permitted flow is exceeded, Marlborough's WWTP phosphorus-removal rates will have to be higher than previously anticipated. The Draft Statement of Basis shows that this would be 0.07 mg/L at the load specified in the permit modification. As a result, even higher removal efficiency in Phase 2 will be required.[29]

It is clear that the agencies recognized that the permit modification might undermine the ability of Marlborough to meet Phase 2 limits. The Draft Statement of Basis originally posted on the EPA website (Attachment D), and subsequently replaced, had clear requirements that the permittee not utilize a revised design flow until it "demonstrated that the Phase II effluent limit is technologically achievable at that facility." This requirement was eliminated from the subsequent Draft Statement of Basis.

Permitting an increase in effluent flow will have a ripple effect. The Assabet River is already dominated by effluent. During low flow conditions it is up to 80% effluent at the

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analysis has estimated. Although it broadly concurs with the conclusions of the draft Corps report, EPA has specifically questioned the validity of Corps technical analysis regarding the anticipated percent sediment phosphorus load reduction study and has requested that this issue be reconsidered and revised.

As another example, it has become apparent since the approval of the TMDL that there is a greater degree of interdependence between the external phosphorus load reductions and the sediment phosphorus release rate (*i.e.*, the sediment phosphorus release rate will drop following a significant reduction in external phosphorus loads) than originally anticipated. The recently completed draft Army Corps modeling report has concluded that the upgrades planned at the four major POTWs discharging to the Assabet will by themselves yield a 60% reduction in sediment phosphorus flux. Because the TMDL model results did not account for the interface or feedback mechanism between external and sediment phosphorus loads and assumed a constant sediment flux rate, it likely underestimated the relative impacts of planned point source phosphorus reductions, a fact that would appear to cut against arguments that an immediate default to a point source phosphorus effluent limit below 0.1 mg/l is necessary "because the 90% reduction cannot be achieved through dredging and dam removal alone."

With this said, the Agencies reiterate that no firm conclusions can be drawn until completion of the sediment phosphorus flux study, which the Agencies expect will underlie the Phase 2 permits.

[29] For example, if EPA and DEP set Phase 2 growing season limits at 0.03 mg/L, with an associated mass load limit based on the original design flow, the Westerly plant at 4.12 mgd would have to meet a growing season TP load of 0.72 lbs/day (0.03 mg/L x 8.34 conversion factor x 2.89 mgd = 0.72 lbs/day) and 0.02 mg/L TP concentration (0.72/8.34 x 4.12 mgd = 0.02 mg/L). It has not been established that the upgraded Westerly WWTP will be able to consistently achieve a 0.02 mg/L TP concentration.

Maynard USGS gage.[30] An increase in upstream discharge increases the proportion of effluent present in the streamflow required to dilute the discharge of downstream WWTPs. Thus an increase in effluent flow from one plant can trigger higher investments at another plant to meet Phase 2 limits. The town of Shrewsbury, which discharges via the Westborough WWTP at the Assabet headwaters, stated its intention to request an increase in effluent flow if the Marlborough request is successful: "The Town of Shrewsbury reserves its right to conduct a similar [antidegradation] study in the future concerning the impact of adding flows beyond the current flow limit of 7.68 mgd at the Westborough WWTP. Indeed, the Town of Shrewsbury might have undertaken such a study during the previous phase of this CWMP/EIR (Phase III) had it known that this option was available at the outset…"[31] This cascading effect of future effluent discharge increases should be of great concern to all communities in the watershed.

Response A1.B:

The phosphorus loading authorized in the draft permit modification is the same as in the existing permit and is consistent with the TMDL. It is not clear at this time whether lower point source limits will be necessary, what those limits might be, and whether they would be applicable in the growing or non-growing season. It is clear, however, that significant sediment load reduction will occur with the existing point source upgrades alone and thus there is no reason to expect that future discharge limits would need to be as low as 0.02 mg/l as suggested by the commenter.[32]

Given that current technology can readily and consistently achieve phosphorus concentrations below 0.05 mg/l and that many facilities are consistently achieving even lower results (see Advanced Wastewater Treatment to Achieve Low Concentration of Phosphorus (April 2007) - EPA Region 10 (Dave Ragsdale)), EPA no longer believes there is a concern relative to achieving lower limits that may be necessary in the future and hence did not believe a permit condition pertaining to this issue was necessary. EPA's understanding of phosphorus removal technologies appears to be in accord with the commenter, who has acknowledged that limits far below 0.1 mg/l are currently being achieved. ("The Syracuse NY WWTP, discharging to Lake Onondaga, has a year-round TP limit of 0.02 (12-month rolling average) with effect from Dec. 2012, and an interim year-round limit of 0.12 mg/L TP from 2006-Nov. 2012."). Furthermore, technologies currently being implemented, such as CoMag (which has been selected in Maynard) and Blue Pro (which has been selected in Marlborough), have demonstrated the ability to achieve effluent phosphorus levels below 0.05 mg/l.

EPA has authorized the discharge of additional flow by this discharger while imposing conditions that will ensure water quality criteria are achieved, and the permit remains

[30] TMDL, p. 13.

[31] Shrewsbury CWMP/FEIR, 2007, p. 2-15.

[32] The imposition of mass limits based on currently permitted flow may result in effluent discharges below applicable ambient criteria for certain pollutants when discharging above currently permitted flow of 2.89 MGD.

consistent with the assumptions and requirements of the underlying WLA. If other municipalities choose to pursue flow increases, there will need to be an independent demonstration that the flow increase is consistent with any available WLA and water quality standards, including antidegradation provisions. At this point, neither the commenter, nor the other communities, nor the Agencies have any basis to assess the merits of future flow increase requests, if any. When and if any future requests for flow increases are received by EPA, they will be assessed on their own merits and in light of all the information available at the time of the decision.

Comment A1.C:

C. Increasing the average annual flow limit from 2.89 MGD to 4.15 MGD violates state water quality regulations because EPA, MassDEP, the City of Marlborough and the Town of Northborough failed to demonstrate that there is "no feasible alternative."

Antidegradation review is absent. Under the federal Clean Water Act and Massachusetts water quality regulations (314 CMR 4.00) an antidegradation review is required for the expansion of an existing wastewater treatment facility. Marlborough's request for a permit modification to allow a discharge flow increase is based on the document in Appendix A of the Marlborough FEIR/CWMP entitled "Marlborough Massachusetts Westerly Wastewater Treatment Facility Additional Information Related to Increased Flow to the Assabet River October 2007." The contents of this document, including the evaluation of alternatives to the flow increase, were challenged in comments on the draft and final CWMPs by OAR, the Town of Stow, Conservation Law Foundation, Wild & Scenic River Stewardship Council, and 14 environmental organizations. However, we have seen no review of this document or analysis of whether and how it meets the requirements of state and federal antidegradation provisions.

Further, the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Secretary's Certificate (Ian Bowles, 12/03/07) on the final CWMPs for the Assabet Consortium states:

> "As part of the NPDES Permit Modification review process, the City of Marlborough will also be required to satisfactorily demonstrate to EPA and MassDEP that the proposed increase of the City's discharge flow limits would be in compliance with applicable water quality requirements for the Assabet River, would not cause or contribute to a violation of water quality standards, and that no feasible alternatives exist to the City's proposed wastewater flow increase, as described in the FEIR. In consultation with the MEPA Office, EPA has indicated that EPA's NPDES Permit Modification review process will require additional analysis of the City of Marlborough's proposed increase of the City's discharge flow limits and its potential impacts to the water quality standards and designated uses established for the Assabet River and its tributaries; to stream flows and watershed imbalances to the Assabet River and its tributaries; and to the Concord River, a designated Wild and Scenic River.

> "The NPDES Permit Modification review process will also require the City of Marlborough to further evaluate water conservation, I/I [infiltration and inflow] removal and water reuse alternatives to identify additional opportunities to reduce Marlborough's and Northborough's future wastewater flow estimates." (pp. 9-10)

There is no evidence that the above analysis or evaluations by the City of Marlborough or the agencies have been done. It has not been demonstrated that the flow increase would not cause or contribute to a violation of water quality standards.

EPA's Response to Comments on the Draft NPDES Permits issued in 2004 (the permits currently in effect) states:

> "The agencies encourage Marlborough to explore other alternatives to address increased flow projections. *Any groundwater recharge of wastewater would be an improvement over direct discharges of wastewater* [emphasis added]. Groundwater recharge provides additional treatment and attenuation of phosphorus in the effluent….The Assabet River is already dominated by effluents (approximately 80% of the river flow during low flow periods is wastewater.) At design discharge flows the percentage of the 7Q10 flow that is comprised of wastewater effluent is expected to approach 100%. Increasing flow still more would increase the frequency and duration of conditions in which the river is comprised almost entirely of wastewater effluent and could further degrade the health of the waterway. As the TMDL Response to Comments also notes, effluent dominated flows are of concern in terms of public health (the Assabet River is the sole source of the Town of Billerica's public drinking water supply) as well as the health of fish populations." (p. 30)

Antidegradation rules allow an increase in effluent discharge only if there is *no feasible alternative*. The proposed increase violates the state's Antidegradation rule and in so doing violates MassDEP's TMDL which states: "Based upon the modeling results current permitted flows will be allowed. However, any request to increase a discharge beyond currently permitted volumes would require supporting documentation satisfying DEP's Antidegradation Policy that no other feasible alternative exists including, but not limited to, the discharge of additional treated effluent to groundwater to help restore tributary flows." (p. 8) As the Marlborough and Northborough Comprehensive Wastewater Management Plans (CWMPs) clearly documented, feasible alternatives do exist. MassDEP and EPA have chosen to disregard state and federal Antidegradation policy.

Where feasible alternatives exist, NPDES permittees must adopt those alternatives rather than increase their flow. Simply studying the alternatives does not comply with the law. OAR has pointed out in comments on the Final Comprehensive Wastewater Management Plans (CWMPs) of Northborough and Marlborough that there are indeed alternatives to an effluent flow increase.[33] Alternatives include: I/I reduction, water conservation and

[33] OAR comments to Ian Bowles, Secretary of Energy and Environmental Affairs, Nov. 26, 2007.

reuse, controls on sewer expansion, decentralized/package WWTPs, and ground disposal at the Boundary Street site (Northborough) or other sites. For Marlborough, severing the intermunicipal agreement would provide adequate capacity for Marlborough's needs throughout the planning period, and is thus an alternative.[34]

It appears that initially the agencies recognized that alternatives, such as source reduction of wastewater through water conservation and reuse, did exist. The Draft Statement of Basis (Attachment D), originally posted on the EPA website and subsequently replaced, required that the permittee evaluate alternatives through a Conservation/Reuse study with an EPA-approved scope of work, followed by a cost-effectiveness study. Comparison of the original Draft Statement of Basis with the subsequent Draft Statement of Basis, shows that the conditions under which the requested flow increase was to be granted have been significantly weakened. Further, the requirement to "participate in a …water conservation and/or reuse" evaluation, with no requirement to adopt its recommendations, is meaningless. No permit should be issued if there are feasible alternatives.

a. Groundwater discharge is feasible: The Marlborough and Northborough CWMPs show that land has been purchased by the town of Northborough next to the wastewater treatment plant for this purpose, and that a groundwater discharge is technically feasible. While it was rejected for financial reasons, it should be no surprise that groundwater discharge is more costly than discharge to the river. As noted by Conservation Law Foundation in comments on Marlborough's final CWMP: "cost and technological considerations may not be considered in setting water quality-based limitations in NPDES permits."[35] In setting the criteria for evaluating ground disposal sites in Phase II of the CWMP, all sites outside a 5 mile radius of the Marlborough Westerly WWTP were excluded. This severely constrained the analysis of alternatives, excluding package plants and decentralized systems that could reduce the flows to the existing WWTP. Such systems are in widespread use in other communities in the watershed.

In addition, while the cost differential between groundwater discharge and increased discharge to the river needs to be re-evaluated in light of the increased costs of discharge to the river that would be imposed by a permit modification (allowing increased discharge) and Phase 2 limits that reduce phosphorus concentrations to levels that meet water quality standards. That comparison has yet to be made. Without such a cost comparison in place, it is arbitrary and capricious to rule out groundwater discharge as too costly an alternative to increased discharge to the river.

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[34] Intermunicipal Agreement for Wastewater Collection, Treatment and Disposal between City of Marlborough, Massachusetts and Town of Northborough, Massachusetts, dated January 1, 1990, amended August 22, 2003.

[35] Conservation Law Foundation, November 26, 2007, Comments on City of Marlborough final Comprehensive Wastewater Management Plan and Environmental Impact Report, Phase III/IV – Evaluation of Most Feasible Options and Recommended Plan (EOEA No. 12348). Citing EAB decision: *Westborough and Westborough Treatment Plant Board*, 10 E.A.D. 297, at 312 (2002).

b. Projected flows from the 2001 Needs Analysis (CWMP Phase I) should be revised to reflect changes in technology and successful efforts to conserve water.[36] Northborough has not reevaluated the wastewater projections of the Phase I (2001) study in light of new technologies or land use objectives. Reductions in projections were achieved by simply moving some sewer extension projects beyond the 2030 planning horizon. In addition, according to Marlborough's CWMP Phase IV report, the city has been successful in reducing wastewater flow by reducing residential per capita water use and reducing its infiltration and inflow (I/I) rate. This results in a major reduction of wastewater flow. However, the gains made by conservation have not been used to reduce effluent flows. Northborough also reduced residential water use substantially, but this sizeable savings does not appear to reduce the very high projected wastewater flows. (CWMP Phase I, p. 3-30)

c. Reduce Infiltration and Inflow. Northborough's final CWMP shows a high level of I/I into its sewer system in Industrial Area A. "During this period of seasonal groundwater elevation, infiltration represents more than half of the total wastewater flow from Northborough."[37] In addition to work performed by the town, Northborough should *require* developers to perform or fund I/I removal. A 2007 study prepared for EEA shows that MassDEP sets ratios from 4:1 to 10:1. [38] Both Marlborough and Northborough would benefit from requiring I/I offset ratios well over 3:1.

d. Require industrial and commercial enterprises to conserve water. Future industrial wastewater represents 79% of Northborough's anticipated new wastewater flows. These flow projections assume no water reuse**.** The town provides no evidence that current or future industries will be required to conserve water or reduce wastewater flows beyond basic state requirements. This is despite efforts by the Arc of Innovation 495/MetroWest Corridor Partnership to promote water reuse.[39] If the municipalities take water reuse seriously, then it should be factored into flow estimates over the 20-year time horizon.

e. Put institutional controls in place: The EEA Secretary's Certificate required the Final CWMPs to "include a description of those legal and institutional mechanisms that each Consortium community proposes to employ to control sewer connections and extensions…" (p. 10) Neither Marlborough nor Northborough have proposed or implemented bylaws to limit sewer connections in accordance with municipal plans and capacity. In contrast, other communities have taken concrete steps to preserve the

[36] See OAR comments on the Assabet Consortium CWMP/FEIRs dated Nov. 26, 2007, for a full discussion.

[37] Northborough CWMP Phase I Report, p. 2-44.

[38] In Saugus a 10:1 ratio was reduced to 6:1 once 250,000 GPD of inflow had been removed, and the ratio will go to 4:1 once 500,000 GPD removal is reached. "Minimizing Municipal Costs for Infiltration & Inflow Remediation: A Handbook for Municipal Officials", June 30, 2007, Prepared for EOEA, Watershed Improvement Program by Steven Perlman, NPRWA. p. 29.

[39] *Once is Not Enough: A Guide to Water Reuse in Massachusetts*, MAPC and 495/MetroWest Corridor Partnership, November 2005.

integrity of their flow allocation. Westborough, for example, obtained Town Meeting approval to petition the State for Special Legislation to enact flow limiting by-laws which enable the town to deny sewer connections and enforce flow allocations to needs areas.

f. Investigate Innovative/Alternative Systems: I/A systems have the potential to reduce sewer connection needs. There are around 17 I/A technologies approved by MassDEP to replace failing septic systems. Northborough should demonstrate that these alternatives have been evaluated in its sewer needs areas. Decentralized facilities discharging to the ground have been used successfully in many communities, such as Acton.

Response A1.C:

Under the Massachusetts antidegradation policy, an alternatives review is only required under certain circumstances not applicable here, *e.g.*, where there is a significant "new or increased discharge" to a High Quality Water. Specifically, section 4.04(2) provides:

> (2) Protection of High Quality Waters. High Quality waters are waters whose quality exceeds minimum levels necessary to support the national goal uses, low flow waters, and other waters whose character cannot be adequately described or protected by traditional criteria. These waters shall be protected and maintained for their existing level of quality unless limited degradation by *a new or increased discharge* [emphasis added] is authorized by the Department pursuant to 314 CMR 4.04(5). *Limited degradation also may be allowed by the Department where it determines that a new or increased discharge is insignificant because it does not have the potential to impair any existing or designated water use and does not have the potential to cause any significant lowering of water quality.* (emphasis added)

Were an alternatives review required, it would follow the procedures set forth at 314 CMR 4.04(5) ("Authorizations"), which provides:

> (a) An authorization to discharge to waters designated for protection under 314 CMR 4.04(2) [Protection of High Quality Waters] may be issued by the Department where the applicant demonstrates that:
>
> 1. The discharge is necessary to accommodate important economic or social development in the area in which the waters are located;
>
> 2. No less environmentally damaging alternative site for the activity, receptor for the disposal, or method of elimination of the discharge is reasonably available or feasible;
>
> 3. To the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices; and

4. The discharge will not impair existing water uses and will not result in a level of water quality less than that specified for the Class.

Under Massachusetts' antidegradation provisions, compliance is assessed on a parameter-by-parameter basis. *See* MassDEP's Antidegradation Implementation Procedures, dated December 29, 2006.

With respect to all permitted pollutants, the proposed modification does not trigger the alternatives review process under section 4.04(2) for one and in some cases two reasons. First, mass limits on all regulated pollutants have been incorporated into the permit in order to ensure that there is not an "increased discharge" of permitted pollutants as a result of this modification.[40] Second, the Assabet River is not a High Quality Water within the meaning of 4.04(2) for some of the permitted pollutants (*e.g.*, phosphorus).[41] In either case, the alternatives review requirements of section 4.04(5) are not triggered.

The Agencies have also evaluated the effect of the increased flow discharge on water quality for pollutants unregulated by the permit and have jointly determined that the changes are insignificant. This analysis is set forth in Response A2.B. Thus, a review of alternatives such as infiltration/inflow (I/I) removal, water conservation and reuse, controls on sewer expansions, and decentralization/groundwater discharges is not required.[42] As explained in Response A2.B below, the modification must of course comply with 314 CMR 4.04(1) (Protection of Existing Uses).

Comment A1.D:

D. Ammonia-Nitrogen loads will increase

[40] Under Massachusetts Surface Water Quality Standards, a discharge is defined as, "Any addition of *any pollutant or combination of pollutants* [emphasis added] to the waters of the Commonwealth from any source." 314 CMR 4.02.

[41] The segment into which the Marlborough WWTF discharges is listed on the Massachusetts Year 2008 Integrated List of Waters as a Category 5 Water (*i.e.*, waters requiring a TMDL) for metals, nutrients, organic enrichment/low DO, pathogens and noxious aquatic plants.

[42] While EPA sought to provide useful, environmentally informed comments on the state planning process and implicated many of these issues (including effluent dominance), the NPDES permit program's authority is confined to ensuring that authorizations to discharge to waters of the United Sates are adequately conditioned to ensure compliance with applicable federal and state law. The NPDES program cannot necessarily be a forum for consideration of every environmental aspect of a proposed project. The issues relating to groundwater recharge, land use and regional planning described above are not matters directly arising under the CWA NPDES program, unless an alternatives analysis is required pursuant to the state water quality standards. For example, potential impacts to the surface water from which the additional flow is withdrawn are addressed in the first instance by the state in its MEPA review process and water supply permitting programs. Hence, EPA "*encourage[d]* [emphasis added] Marlborough to explore other alternatives to address increased flow projections."

The state's Antidegradation Review Procedure for Discharge Requiring a Permit under 314 CMR 3.03 states: "Any existing point source discharge containing nutrients in concentration that encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practical treatment to remove such nutrients."[43] The lack of an average monthly mass load limit for Ammonia-Nitrogen will result in an increase of this nutrient pollutant in all seasons. The Anti-backsliding provision of the federal Clean Water Act prohibits modification of a permit "to "contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit." An increase in discharge without a limit on the mass load violates this provision.[44]

Response A1.D:

EPA concurs with the commenter that increasing the flow without establishing mass limits that ensure that the current permitted discharge level of ammonia is not increased is inconsistent with antidegradation. Accordingly, the final permit contains the appropriate mass limits for ammonia. The Agencies note that the commenter has relied on an antidegradation document that has been superseded.

Comment A2.A:

2. Other Impacts to Consider

A. Metals, already present in toxic levels in impoundment sediments, and other pollutants, will increase.

a. Metals will add contamination to already contaminated impoundment sediments. Average monthly copper concentration in the effluent discharged has been allowed to increase by 230%, from 13 ug/L to 30 ug/L. Given that sediments in downstream impoundments contain toxic levels of zinc, arsenic, lead, nickel, cadmium, chromium, and copper, no additional loading of metals should be allowed.[45] Unless the Hudson dam is removed, the metals will settle in the impoundment sediments, exacerbating contamination. Regarding bottom pollutants or alterations, state Water Quality Standard 314 CMR 4.05(5)(b) requires that, "all surface water shall be free from pollutants…or from alterations that adversely affect the physical or chemical nature of the bottom."

b. Antibacksliding rules, Clean Water Act (33 USC 1342(o)). The draft permit contains mass load limits for aluminum, copper and nickel, but for none of the

[43] Antidegradation Review Procedure for Discharge Requiring a Permit under 314 CMR 3.03, VII (c) 3 (Control of Eutrophication). Division of Water Pollution Control.

[44] 33 USC 1342(o).

[45] *Sediment Studies in the Assabet River, Central Massachusetts, 2003*, USGS, Scientific Investigations Report 2005-5131, 2005, Fig. 11, Hudson impoundment, p. 16.

other 120 EPA Priority Pollutants. All pollutants can be expected to increase with increased effluent flow unless proven otherwise. For example, there is no established limit for zinc, which is present in the Marlborough effluent at concentrations of 0.048 mg/L[46], discharging to the Assabet River instream concentration of 0.032, resulting in a net increase in pollutant concentration of 0.016 mg/L.[47] An increase in effluent flow will increase discharge of this pollutant.

c. The background level of nickel was not accounted for in the calculations establishing permitted nickel concentrations and loads. At low flow conditions, the receiving water is largely composed of effluent from the Westborough WWTP, which releases nickel at up to a 0.01 mg/L concentration.[48] In addition Nickel is present at a toxic probable effect level (PEL) in the Hudson impoundment downstream of the Marlborough discharge at 4 out of 7 sampling sites.[49] An increased flow discharge would add to this burden; additionally the nickel will settle on the uppermost layer of the sediment where it would have the maximum negative effect.

Response A2.A:

a. The copper limits in the draft modification were less stringent than those in the permit, based on site-specific water quality criteria approved by EPA on March 26, 2007. For the reasons explained above, EPA is retaining the preexisting copper limit. Accordingly, we have recalculated the copper limits in the modification to maintain the same mass discharge as was authorized in the previous permit. The monthly average and daily maximum concentration limits for the authorized 2.89 MGD discharge are now the same as in the 2005 permit. For the authorized 4.15 MGD discharge, a monthly average mass limit of 0.31 lbs/day and a maximum daily mass discharge limit of 0.43 lbs/day have been included as well as a monthly average concentration limit of 9 ug/l and a maximum daily limit of 13 ug/l. The calculations of the limits on the 4.15 MGD discharge are shown below.

For a flow of 2.89 MGD and a concentration of 13 ug/l, the mass discharge is:

$(2.89)(0.013)(8.34) = 0.31$ lbs/day

For a flow of 2.89 MGD and a concentration of 18 ug/l, the mass discharge is:

[46] This concentration is below recommended water quality criteria of 120 ug/L or 0.12 mg/L.

[47] Marlborough West Plant, 4th Quarter Aquatic Toxicity, December 2006, Environmental Monitoring Laboratory, Inc., Wallingford CT.

[48] Whole Effluent Toxicity Report, Westborough WWTP, 2007-2008, EnviroSystems, Hampton NH. Low flow conditions used in copper effluent limits put the proportion of Westborough wastewater to clean base flow at 6:1 under 7Q10 conditions. Draft Permit Modification Statement of Basis, p. 5.

[49] *Sediment Studies in the Assabet River, Central Massachusetts, 2003*, USGS, Scientific Investigations Report 2005-5131, 2005, Fig. 11, Hudson impoundment, p. 16.

(2.89)(0.018)(8.34) = 0.43 lbs/day

For a mass discharge of 0.31 lb/day at a flow of 4.15 MGD, the concentration is:

0.31/(8.34)(4.15) = 0.009 mg/l = 9 ug/l

For a mass discharge of 0.43 lbs/day at a flow of 4.15 MGD, the concentration is:

0.43/(8.34)(4.15) = 0.012 mg/l = 13 ug/l

The Agencies disagree with the assertion (which is not accompanied by supporting evidence) that discharges of metals will add to the contamination of sediments in impoundments.[50] Only a small percentage of metals discharged by the facility will be in the non-dissolved form, as can be seen by reviewing the conversion factors for metals shown in Appendix A of *National Recommended Water Quality Criteria: 2002.* The conversion factor is used for converting total recoverable metals to dissolved metals. If, for example, the conversion factor is 0.95, a criterion expressed as a total metal would be 95 percent of that value as dissolved metal, meaning that 95 percent of the metal would be in dissolved form, and only 5 percent would be in a non-dissolved form. At a hardness of 100, which is typical of hardness in New England waters receiving POTW discharges, conversion factors for metals measured in the discharge range from 0.79 (lead) to 0.997 (nickel), meaning that the majority of total metal discharge is in the dissolved form and accordingly less likely to settle.[51] Further, the imposition of concentration-based limits in the permit (when calculated based on a discharge flow of 4.15 MGD) will result in a reduction of the metals load to the river.

In addition, the potential for the increased discharge to cause increased receiving water concentration of metals is discussed in detail below, in Response A2.B, but in short, the Agencies expect that the increase in flow will not have the potential to impair any existing or designated water use and will not adversely affect the physical or chemical nature of the bottom.[52]

b. Antibacksliding applies to "effluent limitations that are less stringent than the comparable effluent limitations in the previous permit." *See* CWA § 402(o). As the commenter acknowledges, there are no existing permit limits for certain pollutants in the discharge due to a lack of reasonable potential to cause or contribute to violation of water

[50] EPA has not yet derived recommended sediment criteria for metals. *See* http://www.epa.gov/waterscience/criteria/sediment/.

[51] EPA also notes that wastewater effluent will increase the receiving water hardness and effectively lessen the toxicity of hardness dependant metals, a fact which also informed the Agencies' conclusion with respect to toxicity.

[52] With respect to protection of aquatic life, in addition to water quality based effluent limitations for numerous individual pollutants, the permit modification contains provisions on toxicity, which are intended to address mortality. These provisions address the potential acute as well as chronic toxicity of the effluent, taking into account the increase in flow.

quality standards. The commenter's theory would require the imposition of effluent limitations for every pollutant discharged by the facility based on anti-backsliding even in the absence of a "comparable effluent limitation," effectively interpreting *the lack* of an effluent limitation as *the existence* of an effluent limitation. The commenter's approach would also require the imposition of effluent limitations in the continuing absence of any reasonable potential for these pollutants to cause or contribute to a violation of water quality standards. Even at the increased flow, the discharge and upstream concentrations detailed in the comment do not demonstrate a reasonable potential to exceed the applicable criteria. Accordingly, EPA does not believe that antibacksliding concerns are reasonable grounds for establishing limits for pollutants unregulated by the current permit, including zinc.[53] EPA has reviewed data submitted by the permittee for unregulated pollutants to ensure that the information indicates that the increased discharge will not cause these pollutants to have a reasonable potential to cause or contribute to exceedances of water quality criteria, and will result in insignificant increases under applicable antidegradation provisions. A summary of EPA's analysis is included in Response A2.B.

c Regarding the specific comments concerning nickel, the nickel limit in the draft permit modification was included based on a re-evaluation of the reasonable potential for the discharge from the existing treatment plant. The concentration limitation was calculated by multiplying the dilution factor calculated at a treatment plant design flow of 2.89 MGD by the chronic criterion, and the mass limit was established using the concentration limit and a flow of 2.89 MGD. In Response A2.B below, EPA evaluated whether the increase in the authorized flow results in the reasonable potential of the discharge to cause or contribute to an exceedance of water quality criteria, including antidegradation.[54] While EPA did not find a reasonable potential to cause or contribute to an exceedance of applicable water quality criteria, it did determine that the projected increase in nickel would consume more than 10% of remaining assimilative capacity. EPA thus included a more stringent nickel limitation in the final permit modification to comply with applicable antidegradation provisions.

Comment A2.B:

B. The Modification fails to protect existing uses. Increased flow violates Antidegradation Provisions of the Massachusetts Surface Water Quality Standards at 314 CMR 4.04 and the federal Clean Water Act (40 CFR 131.12(a)(l)):

a. The existing uses of "aquatic life" are not protected. EPA guidance on protecting existing aquatic life/wildlife uses states: "Water quality should be such that it results in no mortality and no significant growth or reproductive impairment of resident

[53] EPA has, however, specifically addressed zinc in its response to the comments regarding antidegradation.

[54] The analysis was done using data collected in conjunction with whole effluent toxicity tests collected from September 2007 to June 2009, a slightly different period that was used for the reasonable potential analysis in the draft modification. Because these data are more recent, EPA believes that they will be more representative of current effluent discharge quality and ambient conditions.

species. Any lowering of water quality below this full level is not allowed."[55] Aquatic life is defined (314 CMR 4.02) as: "A native, naturally diverse, community of aquatic flora and fauna…" Recent studies show that WWTP effluent, typically containing pharmaceuticals and personal care products (PPCPs) and other endocrine disruptors, has a damaging effect on fish populations. See Attachment E. Assuming that the Marlborough Westerly WWTP discharge contains average quantities of these unregulated substances, it would be likely that the Assabet River aquatic life is negatively affected. In particular, male fish in effluent dominated streams have been found to develop female characteristics, leading to reproductive failure. The draft Modification provides no information about these and other contaminants. Nor does it document upstream concentrations of regulated pollutants.

b. The existing uses of "treated water supply" are not protected. The Assabet River is a major tributary to the Concord River which is the sole public drinking water supply of the town of Billerica. The permitted wastewater flow contributed by the Assabet is 15 mgd. The concentration of unregulated pollutants in the untreated water, including contaminants of emerging concern such as PPCPs, will increase with additional effluent discharged to the Assabet, increasing overall pollution levels. There is no evidence that the current treatment systems of the Billerica drinking water supply system remove these pollutants. The Modification provides no information about these and other contaminants.

Response A2.B:

(a) Federal antidegradation policy establishes three tiers of protection. The first tier, which is relevant to this comment, establishes a standard that is applicable to all waters, and requires that all "existing uses" of a water body and the level of water quality necessary to protect those existing uses be maintained and protected.[56] 40 C.F.R. § 131.12(a)(1). Under Massachusetts' antidegradation requirements, "in all cases existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." 314 CMR 4.04. Existing uses are defined as, "Those designated uses and any other uses that do not impair the designated uses that are actually attained in a water body on or after November 28, 1975; except that in no case shall assimilation or transport of pollutants be considered an existing use." *Id*. at 4.02. Massachusetts' Implementation Procedures for the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards require (1) an identification of existing uses, (2) a determination of water quality impacts and (3) a comparison with criteria. Currently, the river is used for a wide variety of recreational activities (canoeing, kayaking, fishing, hiking and bird watching) and serves as a habitat for aquatic life and wildlife. As evidenced by the comments above, the Massachusetts Year 2008 Integrated List and the TMDL documentation, existing aquatic life uses in the Assabet River are not

[55] *Water Quality Handbook*, Ch. 4: Antidegradation. EPA, updated 2007, p.5.

[56] The second and third tiers are oriented to the protection and maintenance of water bodies that have been designated as high quality water bodies and outstanding water bodies respectively. 40 C.F.R. § 131.12(a)(2)-(3).

achievng the designated use to the extent they are impaired for metals, nutrients, organic enrichment/low DO, pathogens and noxious aquatic plants.

For those pollutants with limitations in the existing permit, EPA has established mass limitations in the permit modification based on the effluent concentration limitations in the permit and on the flow limit in the permit (2.89 MGD). This ensures that the mass loading for these pollutants will not increase with the increase in the authorized flow. The final permit modification also contains concentration limits for these pollutants, based on this mass and a flow of 4.15 MGD, which become effective when the treatment plant 12 month average flow exceeds 2.89 MGD. When writing permits, EPA typically uses design flow to calculate water quality-based limits. Doing so is particularly appropriate for continuous discharges into waters where there are severe existing impairments, warranting a reasonably conservative approach to minimize overall pollutant loading into the water body. Upon re-evaluation of the permit record, particularly the comments on the draft permit modification with respect to antidegradation and the significance of any increased loading of unregulated pollutants, as well as comments (and EPA's own record statements) pertaining to the issue of effluent dominance, and the relatively large size of the flow increase (i.e., approximately 40%), EPA has determined that it is appropriate to use design flow to calculate permit limits. *See* 314 CMR 4.03(1)(a) (requiring "a reasonable margin of safety to account for any lack of knowledge concerning the relationship between the pollutants being discharged and their impact on water quality."). While it is true that the flow increase will also increase the frequency and duration that the river will be primarily comprised of wastewater effluent, using concentration limits based on design flow will reduce the magnitude of the pollutants in the receiving water. These concentration limits will ensure that the upgraded treatment plant is efficiently operated, which will result in enhanced removal of both regulated and unregulated pollutants. Framing the permit as the Agencies have will also provide an incentive for the City to remain within currently permitted flows for as long as possible, since they will require a reduction in load compared to the 2.89 MGD baseline immediately upon the increase of flow above 2.89 MGD.[57] For example, while the treatment plant flow is less than 2.89 MGD the monthly effluent limitation for phosphorus is 0.1 mg/l, which calculates to a mass discharge of 2.4 lbs/day. As soon as the discharge flow exceeds 2.89 MGD the more stringent phosphorus concentration limit of 0.07 mg/l becomes effective, which at a discharge flow of, for example, 3 MGD calculates to a mass discharge of 1.75 lbs/day.[58]

For those currently unregulated pollutants for which the Agencies have both receiving water data and effluent data, they have evaluated the reasonable potential for the discharge to impair existing uses or cause or contribute to a violation of water quality

[57] Rather than applying the concentration limits based on 4.14 MGD at the outset, EPA deliberately structured the permit so to provide an incentive for City to remain below the 2.89 MGD for as long as possible. EPA fashioned this break point in the permit to address concerns over effluent dominance.

[58] Using design flow to calculate water quality-based limits will also ensure that by the time achievement of the concentration limits become most critical, *i.e.*, when at some future point the treatment plant is in fact operating at design flow, the permittee will have resolved any operational issues in achieving the limits.

standards and, where Tier 2 review applies, also calculated whether the increased discharge is insignificant within the meaning of applicable antidegradation requirements.[59] MassDEP has interpreted its antidegradation provisions in a document called Implementation Procedures for the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards (12/29/06) and views increased loading that utilizes less than 10 percent of the available assimilative capacity of the receiving water that is high quality for that pollutant as insignificant and thus not requiring an antidegradation authorization/alternatives analysis under 314 CMR 4.04(5). The results for the currently unregulated metals are shown on Attachment 1. For illustrative purposes, the following shows the calculation made in the analysis for zinc.

First, the instream concentration of zinc downstream of the discharge is calculated based on an authorized flow of 2.89 MGD, and the average effluent concentration and the average upstream concentration:

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where:
Q_r = receiving water flow downstream of the discharge (Qd + Qs)
C_r = zinc concentration in the receiving water downstream of the discharge
Q_d = design flow of the facility
C_d = zinc concentration in the discharge
Q_s = receiving water flow upstream of the discharge (7Q10 flow)
C_s = zinc concentration upstream of the discharge

So, $$C_r = \frac{Q_dC_d + Q_sC_s}{Qr}$$

$$Cr_{2.89} = \frac{(2.89\ MGD)(43\ ug/l) + (4.3\ MGD)(64\ ug/l)}{7.04\ MGD}$$

$$Cr_{2.89} = 399/7.2 = 55\ ug/l$$

[59] Neither the state antidegradation provisions in the water quality standards nor the implementation procedures establish a specific methodology for determining whether an increase has the "potential to impair any existing or designated water use" under Tier 2 antidegradation review. To determine whether the increase will result in the potential for impairment, the Agencies have employed the closely similar standard of 'reasonable potential to cause or contribute to a violation of state water quality standards,' because this mode of analysis is well established under NPDES regulations. A lack of reasonable potential to cause or contribute to a water quality standards violation would appear to logically amount to the lack of potential for impairment.

The calculated receiving water concentration shows that the instream concentration of 55 ug/l is less than the water quality criterion of 148 ug/l, meaning that the receiving water is high quality for zinc. [60]

The assimilative capacity of the receiving water can then be calculated by subtracting the instream concentration from the chronic water quality criterion of 148 ug/l, which yields an assimilative capacity of 93 ug/l. Ten percent of the assimilative capacity is, therefore about 9.3 ug/l.

The projected instream concentration at the increased discharge flow of 4.15 MGD is then calculated using the same upstream concentration and effluent concentration as used to calculate the current instream concentration (*i.e*, no improvement in upstream receiving water concentration or effluent concentration was assumed).

$$C_r = \frac{Q_d C_d + Q_s C_s}{Qr}$$

$$Cr_{4.15} = \frac{(4.15\ MGD)(43\ ug/l) + (4.3\ MGD)(64\ ug/l)}{8.45\ MGD}$$

$$Cr_{4.15} = 454/8.45 = 54\ ug/l$$

The change in downstream concentration can then be calculated by subtracting the two calculated instream concentrations:

Increase in instream concentration = $Cr_{4.15} - Cr_{2.89}$

54 ug/l – 55 ug/l = -1 ug/l

In this case, there is no increase in instream concentration, because the concentration in the effluent is actually less than the receiving water concentration upstream of the discharge. Zinc loading is therefore insignificant because an increase in the authorized flow does not cause a decrease in the assimilative capacity.

Attachment 1 shows similar calculations for the unregulated metals for which EPA has upstream receiving water data and effluent data, including cadmium, lead, nickel, and zinc. The data shows that the increased discharge will not cause or contribute to exceedances of water quality standards and will be less than 10 percent of the assimilative capacity for all of these pollutants except nickel.

In order for the increase in the nickel discharge to be insignificant pursuant to antidegradation, the increase in the instream concentration resulting from the increased WWTP flow must be 10 percent or less of the receiving water's assimilative capacity.

[60] The water quality criteria for zinc are hardness dependent. The hardness of the receiving water downstream of the discharge was calculated to be 128 ug/l. The chronic criteria for total recoverable zinc, using the equation in the 2002 National Recommended Water Quality Criteria is 148 ug/l.

The downstream concentration at 2.89 MGD was calculated at 0.0277 and ten percent of the assimilative capacity was calculated to be 0.0036 mg/l (see calculation on Attachment 1). The allowable downstream concentration is the sum of these two values, 0.031 mg/l. The necessary effluent limitation can then be calculated using a mass balance equation, shown below.

$Q_rC_r = Q_dC_d + Q_sC_s$

Where:
Q_r = receiving water flow downstream of the discharge (Qd + Qs)
C_r = nickel concentration in the receiving water downstream of the discharge
Q_d = design flow of the facility
C_d = nickel concentration in the discharge (the permit limit)
Q_s = receiving water flow upstream of the discharge (7Q10 flow)
Cs = nickel concentration in the receiving water upstream of the discharge

Solving for C_d

$$C_d = \frac{Q_rC_r - Q_sC_s}{Q_d}$$

$$C_d = \frac{(8.45)(0.032 \text{ mg/l}) - (4.3)(0.0024)}{4.15}$$

C_d =0.063 mg/l = 63 ug/l

The permit includes a monthly average effluent limitation of 63 ug/l.

The Agencies have also reviewed the effluent data submitted to EPA by the City in its 2004 permit application as part of the expanded testing data required for POTWs with design flows greater than 1.0 MGD to assess whether there are any currently unregulated pollutants that would have the reasonable potential to cause or contribute to exceedances of water quality standards, or to be inconsistent with antidegradation requirements, if discharged at the increased flow rate. The majority of the pollutants sampled in the expanded effluent data testing portion of the application (see Part D of the application), which includes priority pollutants, were reported as non-detect. Only copper, nickel, silver, zinc and total phenolic compounds were reported as greater than non-detect. The Agencies have previously addressed copper, nickel and zinc.

The average silver concentration reported in the application was 0.003 mg/l (n=3) and the maximum value was 0.007 mg/l. There is no chronic water quality criterion for silver, but the acute criterion for total silver is 0.0058 mg/l at 128 mg/l hardness.[61] There are no available receiving water data for silver, so a numerical evaluation of insignificance using upstream data cannot be performed. If a receiving water concentration of zero is assumed, the instream concentration can be calculated by dividing the effluent

[61] The calculated hardness of the receiving water with the treatment plant discharging 4.15 MGD.

concentration by the dilution factor. For a discharge flow of 2.89 MGD, the dilution factor is 2.5, so the instream concentration resulting from a discharge concentration of 0.007 mg/l (the maximum value) is .003 mg/l (.007/2.50). The dilution factor at a discharge flow of 4.15 MGD is 2.0, so the resulting instream concentration is 0.0035 mg/l (.007/2.0). These calculations show that the discharge does not have the reasonable potential to cause or contribute to an exceedance of water quality standards at the increased discharge flow. If zero background concentration is assumed, the assimilative capacity is 0.0028 mg/l (.0058 mg/l - 0.003 mg/l) and 10 percent of that assimilative capacity is only 0.00028 mg/l. In order to ensure that there in no increase in the instream concentration (thereby satisfying antidegradation) a maximum daily limit of 0.006 mg/l (7 ug/l) has been added to final permit modification. This limit was calculated by multiplying the instream concentration projected to occur at a discharge flow of 2.89 MGD (0.003 mg/l), adding the10 percent of the assimilative capacity of 0.00028 mg/l and multiplying it by the dilution factor calculated at a discharge flow of 4.15 MGD (2.0). A maximum daily mass limit, based on the concentration limit and a flow of 4.15 MGD has also been included.

The average concentration for total phenolic compounds reported in the application was 0.03 mg/l (n=3) and the maximum was 0.041 mg/l. The 2002 National Recommended Water Quality Criteria list phenol as a priority toxic pollutant with human health criteria of 21 mg/l (water + organism) and 1,700 mg/l (organism only). Additionally, phenol is listed for organoleptic (taste and odor) effects with an "organoleptic effect criteria" of 0.3 mg/l. As can be seen, the discharge concentration is far less than either of these criteria. Assuming no background concentration of phenols in the receiving water (there are no upstream data for phenols available), the calculated average instream concentration at 2.9 MGD would be about 0.012 mg/l (.03/2.5) and the average instream concentration at 4.15 MGD would be about 0.015 mg/l (0.03/2). The assimilative capacity of the stream therefore be about 0.29 mg/l (0.3 – 0.012). The percent of assimilative capacity used by the increase would be about one percent [((0.015-0.012)/0.29))*100]. Therefore the change is insignificant pursuant to antidegradation.

The application data for the remaining pollutants are reported as non-detect.

With respect to the potential for emerging contaminants to impact existing uses, the Agencies have carefully considered this issue and have determined that the increased flow from the Marlborough facility will result in water quality that protects the existing uses, as explained below.

Background on Emerging Contaminants

Chemicals used everyday in homes and industry can enter the environment through a variety of pathways, including wastewater. For example, residues from medication may pass out of the body and into sewer lines, externally-applied drugs and personal care products may wash down the shower drain, or expired medications may be flushed down the toilet. Emerging contaminants are pollutants not currently included in routine monitoring programs and may be candidates for future regulation depending on their

toxicity, potential health effects and frequency of occurrence in environmental media. One category of emerging contaminants, Pharmaceuticals and Personal Care Products (PPCPs) includes, in general, any product used by individuals for personal health or cosmetic reasons or used by agribusiness to enhance growth or health of livestock, including chemical substances from human and veterinary drugs (including antibiotics), hormones, detergents, disinfectants, plasticizers, fire retardants, insecticides, and antioxidants. Endocrine disruptors are another subcategory of emerging contaminants and include chemicals that have the potential to negatively interact with the endocrine systems of humans and wildlife.

Emerging contaminants may include pollutants that have long been present in the environment, but whose presence and significance are only now being recognized and evaluated. Studies have measured the presence of emerging contaminants in the nation's water bodies,[62] yet relatively little is known about the extent of environmental occurrence, transport, and ultimate fate of many synthetic organic chemicals after their intended use, particularly pharmaceuticals and personal care products that are designed to stimulate a physiological response in humans, plants, and animals. *See, e.g.*, "Pharmaceuticals and personal care products in the environment: Agents of subtle change?," Environmental Health Perspectives 1999, 107 (suppl 6). While EPA has promulgated national effluent limitation guidelines to control the discharge of pharmaceuticals, synthesis materials, and by-products from manufacturing from a technology-based perspective, *see Development Document for Final Effluent Limitations Guidelines and Standards for the Pharmaceutical Manufacturing Point Source Category*, Office of Water, EPA-921-R-98-005, September 1998, still more work needs to be done prior to developing scientifically valid aquatic life and human health water quality criteria for such substances. *See, e.g.*, "Aquatic Life Criteria for Contaminants of Emerging Concern: General Challenges and Recommendations." SAB Advisory on Aquatic Life Water Quality Criteria for Contaminants of Emerging Concern, EPA-SAB-09-007 (2008). Indeed, until recently, there have been few analytical methods capable of even detecting most of the target compounds at low concentrations which might be expected in the environment. Even with such data, there have been few definitive conclusions about the effects of these compounds (alone or in combination) on the environment. *See* "PPCPs in the Environment: Future Research — Beginning with the End Always in

[62] During 1999 and 2000, the U.S. Geological Survey (USGS) conducting sampling to provide baseline information on the environmental occurrence of "emerging contaminants" such as human and veterinary pharmaceuticals, industrial and household wastewater products, and reproductive and steroidal hormones in water resources. As part of this "national reconnaissance" effort, 142 streams, 55 wells, and 7 effluent samples were collected across 36 states. A majority of the sites sampled were those suspected to be susceptible to emerging contaminants from animal or human wastewaters. The results show that a broad range of chemicals found in residential, industrial, and agricultural wastewaters commonly occurs in mixtures at low concentrations in streams in the United States. The chemicals detected include human and veterinary drugs, natural and synthetic hormones, detergent metabolites, plasticizers, insecticides, and fire retardants. One or more of these chemicals were found in 80% of the streams sampled. Half of the streams contained 7 or more of these chemicals, and about one-third contained 10 or more of these chemicals. This study was the first national-scale examination of emerging contaminants in streams of the United States.

Mind," CG Daughton, in "Pharmaceuticals in the Environment," Kümmerer K (Ed.), 2nd edition, Springer, 2004, Chapter 33, pp. 463-495.

EPA is aware of the growing body of literature that suggests that certain emerging contaminants may cause ecological harm. *See* http://www.epa.gov/ppcp/citations.pdf. EPA is concerned about detection of a number of emerging contaminants in our water and continues to evaluate exposure pathways, levels of exposure, and potential effects on public health and aquatic life. EPA has been actively working with other federal agencies and state and local government partners to better understand the implications of emerging contaminants such as pharmaceuticals, endocrine disrupting chemicals, and personal care products detected in drinking water, wastewater, surface water and ground water. *See also* EPA Office of Research and Development Multi-Year Plan for Endocrine Disruptors (FY 2007-2013) (draft 2007). The Region, nonetheless, does not believe that it is reasonable to draw the inference that "it would be likely that the Assabet River aquatic life is negatively affected" from the fact (or rather assumption) "that the Marlborough Westerly WWTP discharge contains average quantities of these unregulated substances." Even if it were established that either the wastewater effluent or receiving waters contained these yet undefined substances, the detection of compounds by itself does not necessarily constitute a cause for concern or a basis for assuming a negative effect on either human or aquatic life. Rather, the available science underscores the extreme analytical challenges associated with assessing the environmental impacts of emerging contaminants such as pharmaceuticals and personal care products exhibiting endocrine disrupting activity or other toxic mechanisms. The Region notes that the commenter merely provided a list of academic literature citations related to emerging contaminants. Without more, this is insufficient to draw firm and defensible conclusions that there would be adverse impacts resulting from this modification. The available science does not support a per se conclusion that any increase in flow volume necessarily correlates to an increased load of PPCPs or endocrine disruptors, much less that any incremental increase would necessarily correspond to an incremental increase in any negative effect on human health or aquatic life caused by such compounds in the receiving water.

In addition to being unable to conclude that emerging contaminants from any source are adversely affecting these receiving waters by contributing to toxicity, it is unclear how much is currently instream, how much is currently in the Marlborough POTW effluent and to what extent the flow increase will in fact lead to a greater load of emerging contaminants than under existing flows. The Agencies note that as part of the plant expansion the City is improving its activated sludge process, which will allow it to enhance the facility's solids retention time (SRT) and hydraulic residence time (HRT). Researchers have found that in activated sludge systems, SRT and/or HRT "seem to be especially important factors in EDC [and PPCP] removal." [63] Although the City is not undertaking these improvements with EDCs or PPCPs in mind, to the extent that EDCs or PPCPs were in the effluent, these improvements should result in a reduction of any

[63] See Scruggs, C.; Hunter, G.; Snyder, E.; et al. EDCS In Wastewater: What's the Next Step. Proceedings of the Water Environment Federation, WEFTEC 2004: Session 41 through Session 50, pp. 642-664 (23).

such EDCs or PPCPs, as the City has indicated in its responses to comments on the CWMP. *See* "Marlborough, MA Phase III/IV CWMP/EIR Comment Responses" at 31. The WWTF expansion will likely therefore enhance the ability of the City to remove these pollutants.[64]

With this said, the importance of identifying emerging risks is reflected in one of the top goals of the U.S. Environmental Protection Agency's 2009-2014 Strategic Plan Change Document (September 30, 2008):

> EPA has articulated a four-pronged approach to address contaminants of emerging concern found in the aquatic environment. Specifically, it has committed to: (1) strengthening the science about the health and environmental effects of these emerging contaminants; (2) improving risk communication and public communication about them; (3) preventing their entry into our waterways and promoting good stewardship; and, (4) taking regulatory actions where appropriate.

The Region has therefore committed to undertake a water quality sampling program for emerging contaminants in the effluent and receiving waters that can help form the basis of water quality-based effluent limitations if such limitations become necessary in the future. In addition, the Region is working in cooperation with the Department of Interior agencies (USGS, USFWS, NPS) to design and conduct a screening study during 2010 for EDCs and potential impacts that will focusing primarily on Endocrine Disrupting Chemicals (EDCs), a sub-set of PPCPs that have been implicated with fish feminization. *See* Attachment 2 ("An Investigation into the Extent and Biological Impacts of Endocrine Disrupting Chemicals (EDCs) in a Highly Effluent-Dominated River in New England") (pending Regional Applied Research Effort proposed for fiscal year 2010). The scope has not been finally determined but will likely include sampling and chemical analysis of WWTP effluents and river water, and collection and analysis of fish for indicators of exposure, including histopathology and vitellogenin (an egg yolk protein produced by female fish) induction in male fish. Following the results of this study, further studies may be considered. The Region believes that this measured, step-wise approach, which will augment the overall scientific knowledge of emerging contaminants as well as bear on site-specific concerns, is consistent with EPA's national strategy on this important environmental issue as well as with the commenter's suggested course of action ("We also urge the agencies to provide for an assessment of the impacts of contaminants of emerging concern, particularly pharmaceuticals, on Assabet River aquatic life without delay."). It will also allow the Agency to narrow the range of issues that could be of concern but prove otherwise, so that limited resources can be deployed in a manner that maximizes their environmental benefit.

[64] With respect to protection of aquatic life, in addition to water quality based effluent limitations for numerous individual pollutants, the permit modification contains provisions on toxicity, which are intended to address mortality. These provisions address the potential acute as well as chronic toxicity of the effluent, taking into account the increase in flow.

(b) With regard to Class B waters and the use of treated water supply, Massachusetts Standards provide, in relevant part, that "[w]here designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply")." *See* 314 CMR 4.05(3)(b). The Concord River is designated in 314 CMR 4.06 as a Treated Water Supply from the confluence with the Assabet River to the Billerica water supply intake. Consistent with the WQS, the water in this segment shall be suitable as a source of public water supply "with appropriate treatment." This means that following treatment by the public drinking water treatment plant, the water is required to comply with all applicable state and federal safe drinking water standards. The Agencies are not aware of any pollutants in the effluent that would preclude or interfere with the Billerica drinking water treatment plant's ability to comply with applicable state and federal drinking water standards. The commenter has not identified any such pollutants. Accordingly, the Agencies have concluded that the existing and designated use of Treated Water Supply will be maintained and protected under the permit modification.[65]

Moreover, for the reasons stated in the previous response, the Agencies are not aware of any information indicating that the flow increase would impermissibly degrade the water quality of the Concord River and the commenter has supplied none. Relative to the issue of PPCPs in treated water supply sources, MassDEP is supporting ongoing U.S. Geological Survey (USGS) research on this issue. The USGS study includes the Merrimack River, into which the Concord River flows, which is designated as a Treated Water Supply and source of drinking water for the City of Lowell, Massachusetts. The objectives of this national study include: 1) to determine the occurrence and concentrations of a broad list of anthropogenic organic compounds ("AOCs") in certain rivers that have large withdrawals for drinking water supplies; and 2) for AOCs found to occur most frequently in source water, to characterize the extent to which these compounds are present in finished water. So far, the initial results for the Merrimack River indicate that of the range of PPCPs analyzed, only two were detected in the source water – caffeine and acetaminophen - and both were detected at close to detection limits. Of course, the presence of PPCPs and EDCs in the environment has been attributed to a variety of sources, including, for example, septic systems, agricultural runoff, fertilizers and insecticides.

C. The Modification will exacerbate water imbalance. This draft permit modification will enable sewering plans to proceed, which are predicted to reduce streamflow in Assabet tributaries in Northborough upstream of the Marlborough WWTP. A 2004 USGS

[65] EPA recently released its third list of drinking water contaminants that are known or anticipated to occur in public water systems and *may* require regulation. EPA will continue to evaluate and collect data on the contaminants, and determine by 2013 for some of them whether or not to propose drinking water regulations. The contaminant candidate list (CCL3) includes 104 chemical contaminants or groups and 12 microbes. Among them are contaminants, pesticide, disinfection by- products, pharmaceuticals, chemicals used in commerce, waterborne pathogens and algal toxins. EPA will make regulatory determinations for at least five contaminants in accordance with the Safe Drinking Water Act. For those CCL3 contaminants that lack sufficient information for a regulatory determination by 2013, EPA will encourage research to provide the information needed. More information on the contaminant candidate list can be found at: http://www.epa.gov/safewater/ccl.

study showed that increasing sewering (particularly in Northborough), increasing water withdrawals to permitted volumes, and increasing WWTP discharge to permitted flows, will result in a significant increase in the percentage of streamflow which enters the Assabet River as wastewater.[66] The simulation also shows a 0.2 mgd decrease in September (the critical low-flow month) of non-storm tributary streamflows in Cold Harbor and Howard brooks in Northborough (Fig. 36 in the USGS Study), a 49% decrease in streamflow (see Attachment F to this letter). The simulation showed that Hop Brook would experience a 23% decrease in September streamflow. Northborough's Howard and Hop brooks both support brook trout populations. This model anticipated less sewer system expansion than proposed in the CWMP, and no increase in WWTP permitted flow, and is likely to underestimate the impact of Northborough's proposed sewer extensions.

D. Effluent discharge limits are based on dilution by streamflow. The TMDL notes the centrality of streamflow in determining effluent discharge limits: "While non-point sources must be considered, the seasonality of the eutrophication problem, as manifested by nuisance aquatic plant growth, is most directly related to the presently high loadings of phosphorus from the POTWs combined with limited inflow from groundwater during the natural growing season for aquatic vegetation." (p. 19) When WWTP discharges reach currently permitted design flows, in late summer and fall the river water will consist of nearly 100% effluent. Restoring streamflow, rather than depleting it, would have broad benefits

Responses A2.C and D:

Response A2.C:

Over the past decade or more, the Region has consistently raised concerns over the issue of effluent dominance in New England waters. The Region's position stems from the fact that effluent dominance increases the frequency and duration of conditions under which a water body is comprised almost entirely of wastewater effluent, a hydrological condition that could further degrade the health of a waterway. In deciding whether to proceed with the flow increase in this case, the Agencies balanced concerns over effluent dominance, emerging contaminants and phosphorus (and in particular those issues raised by the Department of the Interior, the National Park Service and the Fish and Wildlife Service with respect to federally protected resources located some distance downstream of the discharge) against other factors militating in favor of the increase. As described below, the Agencies determined to increase the permitted flow from the Marlborough facility based on several factors, neither the presence nor absence of which would have carried definitive weight, but which in combination led the Agencies to conclude that a flow increase was reasonable. In addition, however, the Agencies imposed a suite of conditions specifically designed to address reasonable concerns over the draft permit modification raised by certain commenters. In particular, given the severe existing impairments in the Assabet River, the Agencies concur that it would be advisable to

[66] *Simulation of Ground-Water Flow and Evaluation of Water-Management Alternatives in the Assabet River Basin, Eastern Massachusetts*, USGS, Scientific Investigations Report 2004-5114, 2004, p. 69.

minimize and delay to the extent reasonably possible the introduction of any further environmental uncertainties (and *potential* adverse impacts) that might accompany an alteration of the river's flow regime in this particular case. The conditions, which include water conservation measures and structural incentives in the permit for the City to remain below the currently permitted flow for as long as possible, are described more fully below.

As a threshold matter, the Agencies determined that there is no standard, limitation or state policy addressing the amount of wastewater that can be authorized to be discharged into any particular Massachusetts' water body. No upper threshold has been identified for the Assabet River by any commenter or scientific investigator from the standpoint of ambient water quality. Provided that the limitations in the permit are sufficient to ensure compliance with all applicable Clean Water Act requirements, there is no strict legal impediment to establishing an alternative flow limit. Thus, a decision on whether to grant the flow increase would involve an exercise of the Agencies' scientific and technical expertise judgment, as well as policy discretion.[67]

In arriving at its determination, the Agencies considered the period over which the flow increases would in actuality occur at the facility. In this particular case, the impacts of the permitted flow increase will be felt over an extremely protracted period, which will encompass as many as seven permit cycles. The wastewater planning projections underlying the flow increase request were made over a thirty-five year period (the wastewater planning process typically uses a 20 year horizon). This fact leads to several implications that tend in favor of a flow increase. From the first month it exceeds a flow of 2.89 MGD, the facility will be subject to permit limits based on the new design flow of 4.15 MGD, which the Agencies used to calculate available dilution flow and to establish water quality-based effluent limits. So, the City will be subject to the same effluent limits as in the 2005 permit while it maintains its 12 month average flow below 2.89 MGD, but it will become immediately subject to more stringent limits upon exceeding that flow, and it is expected to be many years before the discharge flow approaches 4.15 MGD. Second, by the time the City reaches its permitted flow, the decreases in sediment phosphorus flux rates resulting from the external load reductions and/or successful dam removal will have occurred, allowing any beneficial impacts of increased flow that are contingent on sediment flux reductions to take hold. Third, it is likely that over this period, the wastewater treatment plants will have been upgraded, if not effectively rebuilt, with corresponding improvements in effluent quality reflecting technological advances.

Moreover, EPA has added provisions to the final permit modification requiring enhanced efforts by the City to promote water conservation and reuse. Such provisions are

[67] The Region also observed that no commenter had provided any specific information that would clearly document, demonstrate, or project any adverse water quality impact on the main stem of the Assabet River because of the increase, which was noteworthy given the extent to which the river has been studied and modeled in recent years by expert private and governmental entities, including DOI subagencies.

consistent with the City's commitment, as stated in its October 18, 2007, letter that requested the flow increase, for "continued investment in water conservation for residential, commercial, and industrial users" and to "pursuit of any and all opportunities for water re-use in the service area."[68] Specifically, the final permit modification requires the City to complete a detailed evaluation of water conservation/water reuse opportunities for the 50 largest contributors of wastewater to the treatment facility (not including the facilities already evaluated by the Massachusetts Office of Technical Assistance (OTA)). The evaluations will consist of a detailed audit of water use similar in scope to the OTA audits and a facility specific report identifying all significant opportunities for water conservation/water reuse. Also, as discussed previously, the final permit modification puts more stringent concentration limits in effect upon the treatment facility reaching above an annual average flow of 2.89 MGD, which provides an incentive for the City to enhance efforts to limit the increase in flow to the treatment plant.

Furthermore, regarding the concern that increased flow to the Marlborough facility will exacerbate water imbalances in the Assabet River and its tributaries, the Agencies note that Marlborough and Northborough currently import most of their water from out of Assabet basin. The Agencies recognize that Marlborough withdraws some water from the Assabet basin and Northborough plans to withdraw all of its water from the Assabet basin in the future. Through the Water Management Act ("WMA"), MassDEP can restrict pumping of groundwater wells during critical stream flow periods in order to reduce the impact on stream flows. The inclusion of pumping restrictions through the WMA could result in minimizing the impacts associated with the increased withdrawals from the basin.

When assessing the additional loading of unregulated pollutants that will occur, EPA also weighed the fact that groundwater disposal alternatives would potentially carry adverse impacts of their own. The fate of emerging contaminants in groundwater is not well understood and may present a future problem if these pollutants are not degraded. Put otherwise, they may carry environmental consequences whether discharged into surface waters or used as drinking water. The increase in authorized effluent flow to the river did not represent an environmentally deleterious choice compared to other environmentally beneficial choices, but rather each alternative carried with it drawbacks.

The Agencies, in addition, took account of the undeniably valid public purpose articulated by the City of Marlborough as a basis for its flow request —to accommodate economic opportunity and job growth for its residents and for the Commonwealth.

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[68] Marlborough recognizes the value of water conservation and re-use measures and has publicly underscored its commitment to such efforts to stakeholders over the course of the CWMP process. *See* Marlborough, MA Phase III/IV CWMP/EIR Comment Responses at 31 ("[T]he City of Marlborough has and will continue to work to reduce infiltration and inflow, promote water conservation and pursue reuse opportunities in the service area. Marlborough recognizes that this philosophy is a sustainable approach to water and wastewater management and will concurrently reduce the cost of operations of the water supply and distribution system as well as wastewater collection and treatment.") and 26 ("The City continues to move forward with I/I removal and water conservation efforts to minimize flow to the WWTF that is ultimately discharged to the river and commits to pursuing water reuse alternatives within the service areas.").

Finally, while remaining cognizant of its obligations under section 301(b)(1)(C) to impose any necessary conditions on the discharge to ensure compliance with water quality standards, the Agencies also took notice of the extended and in-depth public process that accompanied the CWMP and influenced the City's decision to seek authorization to discharge additional effluent into the river as opposed to the other alternatives under consideration.[69]

3. CORRECTIONS TO DRAFT PERMIT MODIFICATION

Total Residual Chlorine limit in parentheses should be in micrograms (ug) not milligrams (mg). Winter CBOD maximum daily concentration should be in mg/L not lbs/day.

Response A3:

The noted correction relative to the total chlorine residual limits has been made in the final permit modification.

Comment:

CONCLUSIONS

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[69] The new design flow is consistent with the recommendations of the state and was developed through the state planning process. MassDEP carries out continuing watershed-based resource assessments. A community's Comprehensive Water Resource Management Plan identifies its water resource needs/problems, evaluates alternative means of meeting those needs, selects the most cost-effective and environmentally appropriate remedy, and proposes an implementation plan and schedule. Comprehensive wastewater management plans evaluate a community's wastewater infrastructure/management needs and may be subject to the MEPA regulations, (301 CMR 11.00), which establish thresholds, procedures and a timetable for public review of the environmental impacts of activities funded or permitted by state agencies. The MEPA process requires public agencies and project proponents to fully consider the environmental impacts of wastewater collection, treatment, and disposal projects, and to minimize and mitigate adverse impacts. The goal of the MEPA process is to elicit public comment on the direct and indirect environmental impacts of the range of wastewater alternatives, and to ensure that the planning effort is consistent with local and regional planning and applicable environmental regulations. Mitigation measures to minimize any adverse environmental impacts identified through the public participation process may be formally required through the issuance of a Certificate From the Secretary of Environmental Affairs. The allocation of water resources is thus addressed primarily as a matter of state policy through the continuing planning process, basin plans, MEPA, as well as the Water Management Act.

The WMA governs future water withdrawals that would have the potential to deplete tributary flow in Marlborough and Northborough, and procedures under that statute would provide another ongoing forum to consider stream flow and water balance issues. The WMA authorizes MassDEP to regulate the quantity of water withdrawn from both surface and groundwater supplies. *See* M.G.L. c. 21G. MassDEP has promulgated regulations (310 CMR 36.00) to ensure adequate water supplies for current and future water needs. The WMA consists of several key components, including a registration program and a permit program. Increased withdrawals from existing withdrawal points may require MEPA review. Northborough, for example, is currently buying most if not all of their water from the Massachusetts Water Resources Authority. In the future it plans on getting all of its water from local wells. It currently is only authorized to withdraw 0.74 MGD. The Town's long term sewering plans are for 1.5 MGD. At some point, it will need a WMA permit in order to exceed the 0.74 MGD limit.

The proposed Modification does not meet the requirements of the Clean Water Act. The TMDL and new information from the government-funded ACOE study show that reductions in sediment phosphorus flux from dam removal and associated dredging alone will not be a solution. Hence, the phosphorus loading from wastewater discharges will need to be reduced from the Phase 1 permit levels. This Modification, with added phosphorus mass loading limits, should have limits that meet water quality standards. As noted earlier, the agencies are engaged in developing Phase 2 limits at this time. All permits and permit modifications issued from this point onwards should contain discharge limits that will meet water quality standards given this new information, and contain enforceable schedules for meeting such discharge limits. We also urge the agencies to provide for an assessment of the impacts of contaminants of emerging concern, particularly pharmaceuticals, on Assabet River aquatic life without delay.

Response:

EPA respectfully disagrees. Please see responses above.

B. COMMENTS FROM UNITED STATES DEPARTMENT OF THE INTERIOR; FISH AND WILDLIFE SERVICE

The Fish and Wildlife Service (FWS) comments have been summarized below.

Comment B1:

The FWS is concerned that the proposed increase in discharge of treated effluent upstream of the Refuge will make it less likely that the Assabet River will meet those water quality standards (the Assabet River is designated as a Class B water under the Massachusetts Surface Water Quality Standards). The FWS also points out that the Assabet River National Wildlife Refuge (NWR) is one of eight refuges within the Eastern Massachusetts NWR Complex.

Response B1:

EPA is aware of the federally protected resource areas downstream of the discharge. These resources will be protected by the conditions in the permit that ensure the discharge will not cause or contribute to a violation of applicable Massachusetts Surface Water Quality Standards. The permit modification places mass loading limitations on various effluent parameters, including total phosphorus, based on the limitations imposed in the currently effective permit in order to assure consistency with the approved WLA for the Marlborough facility.

Please see responses above for more detail.

Comment B2:

The nutrient load and concentration limits in the draft permit modification assume that the sediment phosphorus flux has been reduced by 90%. Since this has not occurred, a more conservative permitting of discharges from the wastewater treatment plants on the river would be appropriate rather than allowing increased discharge.

Response B2:

The commenter should be aware that the total mass of phosphorus will not increase as a result of the permit modification and when the 12 month average flow exceeds 2.89 MGD, the effluent concentration will be reduced to 0.07 mg/l.

The Assabet River TMDL indicates that a 90% reduction in the sediment phosphorus flux in conjunction with the appropriate phosphorus effluent limitations at the various wastewater treatment plants will result in the attainment of water quality standards. As the commenter points out this has yet to occur, but the TMDL did not assume such a reduction would occur before the end of the first permitting cycle. Please see responses to OAR above for additional detail.

Comment B3:

The higher discharge will also increase many of the unregulated pollutants which may affect the aquatic life (see definition at 314 CMR 4.02). The negative effects of wastewater on aquatic life, particularly through endocrine disruption, are becoming better understood and are a cause for concern.

Response B3:

Please see Response A2.B above.

C: COMMENTS FROM THE UNITED STATES DEPARTMENT OF THE INTERIOR; NATIONAL PARK SERVICE

The National Park Service (NPS) comments have been summarized below.

Comment C1:

The NPS supports the current permit issued by EPA and DEP which recognizes the serious water quality issues facing the Assabet. In the TMDL the agencies recognized that the point source phosphorus limits of 0.1 mg/l were not enough to fully attain water quality standards and so set a direction for continuing to reduce phosphorus possibly through the removal of sediments, if feasible, or through lower phosphorus limits at the wastewater treatment plants.

This permit modification negates all of the good work and effort that was included in the current permit, and should not be approved. It contradicts the conclusions of the Assabet

TMDL which embraces current flows. Additionally, the city has not considered all of the feasible alternatives, and has not met the requirements of the antidegradation rules.

Response C1:

See Responses B1 and B2 above. The Agencies respectfully disagree with NPS's contention that the modification "negates" the current permit. While the modification allows a flow increase, it does not allow any increase of regulated pollutants, including phosphorus, as explained above. The proposed increase does not contradict the TMDL conclusions. To be consistent with the TMDL the agencies have included a more stringent total phosphorus limit of 0.07 mg/l, which is based on the mass loading calculated from the 2005 permit and is consistent with the TMDL. The Agencies have also adjusted other parameters as appropriate to assure that the discharge will not cause or contribute to any water quality impairments in the Assabet River.

The TMDL establishes maximum phosphorus loads, not flow requirements. The value was used to calculate the allowable phosphorus load, which EPA has maintained in this modification through the imposition of mass limitations. The TMDL supporting document states, "As noted elsewhere, any proposed increased in wastewater flows beyond present design capacities must address a number of questions and needs to be done in a comprehensive fashion. This TMDL is not intended nor is it assessing the substantive questions associated with such a proposal." *See* TMDL at 85. The TMDL specifically contemplated the use of other flows so long as appropriate procedures were followed. *Id*. at 8-9 ("However, any request to increase a discharge beyond currently permitted volumes would require supporting documentation satisfying DEP's Antidegradation Policy that no other feasible alternative exists including, but not limited to, the discharge of additional treated effluent to groundwater to help restore tributary flows. Based upon the modeling results current permitted flows will be allowed.")

Please also see Response A1 above pertaining to antidegradation.

Comment C2:

There are other alternatives that should be considered before the flow increase is permitted. Water conservation and reuse options should be evaluated and recommended projects implemented before a flow increase is permitted. Likewise the recommendations from the Corps study should also be evaluated and implemented prior to considering any flow increase. Infiltration/inflow reduction should also be aggressively pursued.

Response C2:

See Responses A1.C and C1 above. The Massachusetts Office of Technology Assessment is working with the City to identify opportunities for water conservation for the City and its larger water consumers. Likewise, the City is required by the permit to properly operate and maintain its treatment works, including the collection and transport system, to control infiltration and inflow.

The final permit modification requires the City to expand the number of wastewater contributors to its collection system that are evaluated for water conservation/reuse opportunities (See Footnote 1.b. of the modification). Specifically, the City will be required to evaluate the 50 largest contributors (not including the facilities already evaluated by the Massachusetts Office of Technical Assistance (OTA)). The evaluations will consist of a detailed audit of water use similar scope to the OTA audits and a facility specific report identifying all significant opportunities for water conservation/water reuse.

As an added incentive to promote water conservation/reuse and I/I reduction, the permit modification also links the point from which the more stringent effluent limitation apply to the treatment plant discharge flow. Specifically, the City does not become subject to more stringent concentration limits based on the 4.15 MGD discharge flow until the annual average discharge flow exceeds 2.89 MGD. Under this condition, the City will have an incentive to minimize the rate of treatment plant flow increases to delay the effective date of the more stringent concentration limits.

Comment C3:

DEP and EPA must establish winter phosphorus levels in the permit below 1.0 mg/l.

Response C3:

As explained above, this issue is outside the scope of the modification. As the commenter alludes to the current permit has a winter phosphorus limit of 1.0 mg/l. It is expected that the study currently being undertaken by the Corps of Engineers will address winter phosphorus sediment impacts. The results of this study along with other available information will be assessed during permit re-issuance. If appropriate and supported by the information available to the permit writer, a revised winter phosphorus limit will be proposed. Also see Response A1.A above.

COMMENT D: COMMENTS RECEIVED FROM A COALITION OF ENVIRONMENTAL GROUPS AND WATERSHED ASSOCIATIONS

Comment D1:

Rather than permitting increased wastewater discharges to the Assabet River we request that EPA and the MassDEP require analysis and implementation of feasible alternatives.

Response D1:

As explained above, an NPDES permit is not the appropriate vehicle for requiring a permittee to undertake an analysis of feasible alternatives except to the extent required by applicable antidegradation provisions. The Agencies note that alternatives for the City to consider were analyzed through the CWMP process.

Comment D2:

By authorizing an increase in the quantity of effluent discharged by the Marlborough Westerly plant the draft Permit Modification will undermine progress toward meeting water quality standards and the Assabet River's designated uses. Surface waters across the state are increasingly stressed by wastewater and stormwater pollution; this is exacerbated by disruption of the water balance and loss of base flow caused by impervious surfaces, lack of recharge and groundwater withdrawals. We can expect that water bodies like the Assabet suffering from severe eutrophication will only get worse as climate change and development results in diminished flow and warmer water temperatures in summer with flashier floods, unless the Clean Water Act and Mass. Water quality regulations (314 CMR 4.00) are wholeheartedly implemented.

Response D2:

For the reasons explained above, an increase in the flow discharged from the Westerly facility will not undermine progress toward meeting water quality standards and designated uses in the Assabet River. The Agencies find it difficult to assess the premise that receiving water conditions will worsen from the existing baseline going forward on the basis of generalized future concerns over global warming and development. It is certainly true that any regulatory action taken today will be subject to a variety of future environmental and socio-economic uncertainties that cannot be precisely predicted. However, the Agencies believe the four major treatment plant upgrades (with their attendant pollutant reductions) currently underway will markedly improve ambient conditions in the Assabet River. When the new Westerly facility exceeds current flows, it will discharge phosphorus at a concentration lower than that now authorized. Other effluent parameters have also been held to existing or more stringent levels, consistent with antidegradation requirements. Also see Responses A1-A2 above.

Comment D3:

The EPA-approved Nutrient Total Maximum Daily Load (TMDL) issued by MassDEP in 2004 for the Assabet clearly identifies nutrients discharged from wastewater treatment plants as the main cause and sets forth a plan for meeting water quality standards. The TMDL study, Assabet River Total Maximum Daily Load/or Total Phosphorus, EOEA, Report no.: MA82B-OI-Z00401, demonstrates that even under the current wastewater treatment plant load allocations, the Assabet River will fail to meet water quality standards until phosphorus recycling from the river sediment is reduced by 90%. By allowing an increase in wastewater discharge before the sediment phosphorus recycling has been reduced, or water quality standards have been met, the draft Permit Modification will undermine the implementation of the TMDL and violate anti-degradation policies under the state and federal Clean Water Acts.

Response D3:

Please see Responses A1-A2 above.

Comment D4:

The draft Permit Modification would increase the discharge limit of the Marlborough Westerly WWTF from 2.89 mgd to 4.15 mgd, or a 40% increase in wastewater discharged by the facility to the Assabet River. The main source of this increase would be the Town of Northborough. Northborough's Comprehensive Wastewater Management Plan (CWMP) shows that this would be a 103% increase over 2006 wastewater flows. Many of our groups in previous comments on the CWMPs of the Assabet Consortium, and in particular those of Marlborough and Northborough stated that an increase in flow should not be permitted given the fact that there were existing alternatives that would protect the water quality of the Assabet, help to achieve designated uses, and help to restore the water balance in the watershed. (June 22, 2007 comments on DEIR/draft CWMPs). Water balance is essential for maintaining streamflow, diluting wastewater flows, and protecting wildlife habitat und public drinking water supplies.

The 2004 TMDL (at p. 8) states:

> Based upon the modeling results current permitted flows will be allowed. However, any request to increase a discharge beyond currently permitted volumes would require supporting documentation satisfying DEP's Antidegradation Policy that no other feasible alternative exists including, but not limited to, the discharge of additional treated effluent to groundwater to help restore tributary flows.

As documented in the Marlborough and Northborough CWMPs, there are feasible alternatives to permitting a 40% increase in effluent discharge. It is our understanding that a groundwater discharge in Northborough on land already purchased for that purpose is a practical alternative. Decentralized package plants with local groundwater discharge are being installed and in operation throughout the watershed in many major development projects. MassDEP, recognizing the importance of wastewater treatment and local infiltration, is promoting this approach as reflected in the proposed changes to its groundwater discharge regulations. Reduced wastewater generation is also a highly cost-effective alternative, and Northborough in particular could reduce infiltration and inflow, promote water reuse by businesses and industry, reduce household water consumption through incentives—especially for residential retrofits for low water use toilets and fixtures,--and utilize alternatives to planned sewer system extensions. These options are actively being promoted by the Commonwealth, and there is considerable technical support available to the municipalities to develop the relevant bylaws, policies and programs.

The draft Permit Modification fails to comply with the Secretary's Certificate (12/03/07) at p. 9 on the final CWMPs for the Assabet Consortium, which states that "As part of the NPDES Permit Modification review process, the City of Marlborough will also be required to satisfactorily demonstrate to EPA and MassDEP that the proposed increase of the City's discharge flow limits would be in compliance with applicable water quality requirements for the Assabet River, would not cause or contribute to a violation of water quality standards, and that no feasible alternatives exist to the City's proposed wastewater

flow increase, as described in the FEIR." We understand there has been no demonstration that the increase will not cause or contribute to water quality standards' violations and conditions in the draft permit modification regarding further studies fails to ensure that the alternatives have been thoroughly evaluated.

Response D4:

Please see responses to OAR above concerning antidegradation, the alternatives analysis and expected impacts on stream flow. The Agencies have also expanded water conservation and re-use requirements in the permit to reasonably forestall the need for the communities to access the additional flow.

Comment D5:

The draft permit fails to protect the river's existing and designated uses. Although the draft permit regulates loads of certain pollutants, many are not regulated. An increase in effluent discharges will necessarily result in an increased discharge of pollutants not removed by the WWTF. This is of particular concern given that pharmaceuticals and personal care products are generally not removed by standard wastewater treatment. Recent studies indicate that the likely effect of municipal wastewater discharges on aquatic life include endocrine disruption and impacts on reproduction. Since the Assabet flows into a designated public drinking water supply, the Concord River, this is a matter of concern for human health as well.

Given that many rivers in the Commonwealth receive point-source nutrient pollution and suffer from low streamflow, the proposed Permit Modification will set a poor precedent that flies in the face of recent efforts by state decision-makers to "keep water local" and it will undermine attainment of surface water quality statewide. We hope the draft permit modification will be revised to better protect the environment.

Response D5:

For pollutants regulated by the permit, the permit modification mass loadings are set equivalent to the limits in the 2005 NPDES permit, so for these pollutants there will be no net increase in pollutant load and no lessening of water quality. For pollutants known to be in the effluent and not regulated by the 2005 permit, the Agencies have determined that existing uses and the level of water quality necessary to protect existing uses will be maintained and protected and the increase in loadings, relative to which the water is high quality, will be insignificant and therefore will satisfy the State's antidegradation requirements. Please see Responses A1-A2 above.

COMMENT E: COMMENTS FROM THE TOWN OF STOW, MASSACHUSETTS; BOARD OF SELECTMEN

Comment E1:

One of our comments (previously made on the EIRs for the Assabet River Consortium CWMP) was that the permit conditions consider an amendment to Marlborough's permit conditions to reduce its winter phosphorus limits to equal its summer limits (winter: 1.0 mg/l, summer 0.1 mg/l).

Response E1:

As explained above, this issue is outside the scope of the modification. The agencies will consider all of the applicable data when the current permit is being evaluated for reissuance in 2010.

Comment E2:

Any request to increase a discharge beyond currently permitted volumes would require supporting documentation satisfying DEP's Antidegradation policy that no other feasible alternative exists including, but not limited to, the discharge of additional treated effluent to groundwater to help restore tributary flows.

Response E2:

This comment is nearly verbatim to that made in Comment D4 above. See Response D4 above.

Comment E3:

The Town questions whether some of the alternatives originally dismissed in the Draft and Final EIRs as too expensive may now be feasible and may need to be re-evaluated. The Town is also concerned that Phase 2 limits may be stringent and more expensive.

Response E3:

There is no requirement for the City to further evaluate additional or previously rejected alternatives to the proposed increase in flow. The proposed increase commits the City to a discharge limit of 0.07 mg/l during the critical growing season months based on limiting the phosphorus mass to a level equivalent to a concentration of 0.1 mg/l and the current design flow of 2.89 MGD. As indicated above in a number of responses, the Agencies will undertake the Phase 2 analysis when evaluating the current permit for reissuance in 2010, an approach consistent with the assumptions underlying the TMDL. The Agencies will impose limits deemed to be appropriate given the data and information available at that time.

Comment E4:

The Town is concerned that the proposed increase, without an accurate and updated evaluation of alternatives, may violate the State and Federal Antidegradation Policies.

Response E4:

Please see Responses A1-A2 above.

Comment E5:

The Town is aware that OAR is preparing a detailed analysis of the specific proposed conditions of the draft permit modifications. We concur with many of the comments proposed by OAR, including that regulatory highest and best practicable treatment be considered for winter phosphorus discharge in the issuance of any permit modification.

Response E5:

The issue of whether the winter phosphorus limit must be made more stringent is outside the scope of the modification, expect to the extent that it has been limited to ensure there is no increased mass loading as a result of the flow increase. Please see Response C4 above.

COMMENT F: COMMENTS SUBMITTED BY THE CONSERVATION LAW FOUNDATION

Comment F1: Similar (to phosphorus) mass limitations on ammonia-nitrogen are required.

Response F1: A mass loading for ammonia-nitrogen has been added to the final permit in addition to the concentration limit. *See* Response A1.D above.

Comment F2: CLF sought leave to intervene in connection with the petitions to the Environmental Appeals Board for review of the current Permit by the Organization for the Assabet River ("OAR") primarily on the ground that, given the TMDL's conclusions that a 0.1 mg/l summertime phosphorus limit would not result in attainment of the required water quality standards in the phosphorus-impaired receiving waters without a 90% reduction in the flux from the river bottom sediments and that substantially lower concentration limits would be required if the flux were reduced by only 75%, the Permit did not meet the requirements of section 30 l(b)(l)(C) of the Clean Water Act and 40 CFR § 122.4(d) that its conditions *"ensure* compliance with the applicable water quality requirements of all affected States" (emphasis added). As we noted in our letters commenting on the CWMPs, cost and technological considerations may not be considered in setting water quality-based limitations in NPDES permits (Westborough and Westborough Treatment Plant Board, 10 E.A.D. 297, at 312 (EAB, 2002)). We continue to believe that the current Permit fails to meet these requirements and that, had the petitions for review not been withdrawn, it would have suffered the same fate at the EAB as the permit for Marlborough's other wastewater treatment plant, In re City of Marlborough. Massachusetts Easterly Wastewater Treatment Facility, 12 E.A.D. ___ (EAB, 2005).

The recently completed Army Corps of Engineers Assabet River Sediment and Dam Removal Study makes it even more clear that a mere warning that an unspecified more stringent limit "may" be required to be achieved by 2014 – four years after the expiration of the current permit – is not justifiable and does not meet the requirements of the Clean Water Act. Certainly, it can not possibly be demonstrated that, at the permit's current phosphorus effluent limits, the proposed flow increase will not "cause, have the reasonable potential to cause, or contribute to an excursion above [Massachusetts'] water quality standard, including … narrative criteria for water quality", as required by 40 CFR § 122.44(d)(1)(i).

The June, 2008 Camp Dresser & McKee Modeling Report, included in the Army Corps Study, now makes it abundantly clear that the likelihood of the 90% reduction in the flux from the river bottom sediments on which the Permit's April- October 2.4 lbs/day - 0.1 mg/l phosphorus limitations were predicated is virtually nil.[70] The Report also concludes that a reduction in the November-March limits below the current 24 lbs/day – 1.0 mg/l will be required for any significant reduction in the phosphorus flux. Since "dredging or sediment removal is not an effective alternative in reducing sediment flux"[71], and since the likelihood of removal of the Ben Smith and other dams in the foreseeable future is remote, no other means for reducing the flux are available.

Response F2: Please see Response A1.A regarding the scope of the modification.

Comment F3: The two conditions to the increase in the flow limit contained in the Modification, - that the City "participate" in a comprehensive evaluation of water conservation and/or reuse (with no reduction in the flow limit or other permit changes based on its recommendations), and that it agrees to "work with the MassDEP and EPA…to further an understanding of the results of the Corps' analysis of improvements that could be made to the Assabet River's water quality through addressing sediments and/or dam removal/modifications", - are little, if any, better in meeting the requirements of the Clean Water Act than the mild admonition in the Region's April 2006 letter about possible more stringent limits in future permits. The Region's Statement of Basis attempts to justify these conditions as having been included "to account for the current uncertainty regarding future permit limits and the potential that future phosphorus limits may be more stringent". But, given the Modeling Report, there clearly is no longer any significant "uncertainty" that a 90% reduction in the sediment flux is not going to happen and that substantially more stringent growing season and winter phosphorus effluent limitations will be required in order to "ensure" compliance with water quality standards as required by the Act.

[70] "Of the alternatives evaluated in this study, no alternative or combination of alternatives is projected to result in a 90 percent reduction in phosphorus flux." Furthermore, one of the alternatives, - removal of the Ben Smith dam, - may no longer be a possibility due to the owner's proposal to use the dam for a hydro electric power generation.

[71] Modeling Report, pg. 6-8.

Response F3: The Agencies have discussed the role of water conservation in their assessment of the flow increase and whether granting such increase is an appropriate exercise of the Agencies' policy discretion. It is one factor among many in the Agencies' decision making. The Agencies agree that the second condition is overly general and does not establish clear, meaningful, substantive obligations on the part of the permittee. It has been deleted.

Comment F4: As noted in the TMDL, under Massachusetts' anti-degradation rule authorization of any increase in the Permit's flow limits requires a demonstration by the City that, among other things, "no less environmentally damaging alternative site for the activity, source of disposal, or method of elimination of the discharge is reasonably available or feasible." (314 CMR 4.04(4)(2)). As noted in OAR's comments on the CWMPs, several such alternatives do exist.

Response F4: The NPDES permit is designed to meet the Massachusetts surface water quality standards and is not an open forum to consider all environmental aspects of a permitting action. The alternatives analysis was part of the review of the "Comprehensive Wastewater Management Planning" effort undertaken as part of the whole Assabet River project. *See also* Responses A1-A2.

Comment F5: We accordingly believe that the Modification cannot be issued in compliance with the Clean Water Act without specific, substantially reduced growing season and winter mass and concentration effluent limits for phosphorus, to be achieved in accordance with a reasonable compliance schedule commencing with the effective date of the Modification rather than with the expiration of the current Permit. The winter limit should be no higher than 0.2 mg/l, MassDEP's official "highest and best practical treatment" standard as required by 314 C.M.R. 4.04(5), and the growing season limit should be in the range of 0.02 mg/l, a level that has been achieved at other WWTPs.[72] In addition, as noted above, specific mass limitations for ammonia-nitrogen consistent with the TMDL should be included in the modification.

Response F5: Please see Response A1.A above regarding the scope of the modification.

COMMENT G: COMMENTS SUBMITTED BY DONALD L. ANGLEHART ON BEHALF OF THE CITY OF MARLBOROUGH

Comment G1: The City interprets footnote 1 of the permit modification as authorizing the increased flow of 4.15 MGD, based upon the City's continued participation with the Massachusetts Office of Technical Assistance in the evaluation of water conservation and reuse opportunities and identification of significant water users and the City's agreement to review the results of the referenced Army Corps of Engineers analysis. The City does not interpret paragraph b of Footnote 2 to require the City to undertake, or agree to undertake, activities involving sediment treatment or removal, or dam removal or modifications.

[72] The Syracuse, NY wastewater treatment plant discharging into Lake Onondaga has a year-round total phosphorus limit of 0.02 mg/l, effective in December 2012.

Response G1: The City's interpretation of Footnote 1, paragraphs a and b is correct. As discussed in Response F3, paragraph (b) has been removed from the final permit modification.

Comment G2: Footnote 1 appears in the "Average monthly" column, but no explanation of the parenthetical is given. We suggest adding this language to Footnote 1: "Upon exceeding the design flow of 2.89 MGD on an annual average basis, the modified concentration-based permit limits in parentheses shall be in effect."

Response G2: The footnote in the draft permit modification was incorrect and has been corrected in the final permit modification.

Comment G3: Footnote 1 appears in the "Chronic" row for this parameter. We suggest adding this language to Footnote 1: "Upon exceeding the design flow of 2.89 MGD on an annual average basis, the modified concentration-based permit limits in parentheses shall be in effect."

Response G3: The comment is addressed in Response G2 above.

Comment G4: The City requests that the requirement to report monthly on the status of meeting the "winter" phosphorus limits be deleted from the permit as the City has informed EPA and DEP that due to the fact that chemical feed lines are not winterized thus, the permit limit will not be met until the project upgrade is completed.

Response G4: Reporting requirements for winter phosphorus are outside the scope of this modification. EPA intends to address effective and fully enforceable effluent limitations and conditions that have not been complied with by the City as an enforcement matter. EPA does not believe that piecemeal adjustments to permit compliance schedules, which would be subject to unpredictable delays resulting from notice, comment and appeal, would be sensible or efficient expenditures of administrative resources. EPA expects to issue an enforcement order with an updated schedule to address compliance with several effluent limitations in the permit.

Comment G5: The city does not feel it is appropriate to have a nickel limit in the permit. If there is a limit, the instream and effluent hardness values should be used rather than the default value of 50 mg/l. The effluent chronic limit at 2.89 MGD would be 119 ug/l and at 4.15 MGD the limit would be 106 ug/l.

Response G5: The basis for the nickel limit in the final permit modification is discussed in Response A2.B. Instream hardness was considered in setting the limit.

Comment G6: Using the revised water quality standards, the copper limit would increase to 40 ug/l and 54 ug/l for average monthly and maximum daily limits, respectively. Also, there should not be mass loading limits for copper at the higher flow of 4.15 MGD.

Response G6: Please see Response A2.A regarding the Agencies' treatment of the copper limit for the purposes of this permit modification, as well as the rationale behind mass limiting all regulated pollutants based on preexisting flows of 2.89 MGD.

Comment G7: The City believes that rather than calculating a total mass load for aluminum, setting the aluminum limit at a concentration of 177 ug/l based on the revised dilution is more appropriate. There is no reason to include a mass loading limitation of 5.3 pounds per day. The Fact Sheet does not provide any justification for the mass loading limit and the mass load should be deleted from the permit.

Response G7: The Agencies have set a limit of 218 ug/l for flows up to 2.89 MGD, and as suggested in the comment, used the new dilution factor to determine the limit at the higher flow of 4.15 MGD, resulting in a concentration limit of 177 ug/l. Because the adherence to mass loading requirements is integral to the Agencies' permitting determination in this case (and in particular, though not limited to, its antidegradation analysis), the Agencies have retained the mass limit so as to ensure that it is an independently enforceable condition of the permit. As the commenter is aware, concentration limitations and mass limitations have distinct environmental functions. Concentration limitations alone do not provide a ceiling on the total amount of a pollutant that can be discharge from a facility, which EPA has determined will be necessary to satisfy antidegradation requirements in this case as explained above.[73]

Comment G8: The City requests a different compliance schedule that that included in the current permit. The proposed schedule would still result in the City achieving the seasonal phosphorus limit by April 1, 2011.

Response G8: Reporting requirements for winter phosphorus are outside the scope of this modification. EPA intends to address effective and fully enforceable effluent limitations and conditions that have not been complied with by the City as an enforcement matter. EPA does not believe that piecemeal adjustments to permit compliance schedules, which would be subject to unpredictable delays resulting from notice, comment and appeal, would be a sensible or efficient expenditure of administrative resources. EPA expects to issue an enforcement order with an updated schedule to address compliance with several effluent limitations in the permit.

Comments G9-11: The City made suggestions for deletions and changes to the "Statement of Basis."

Response G9-11: The "Statement of Basis" is not changed after it is put on public notice. The recommended changes are noted and will be part of the Administrative Record.

[73] Retaining both concentration and mass limits in a permit is within the contemplation of applicable NPDES permitting regulations. *See* 40 C.F.R. § 122.45(f)(2) (pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations).

Attachment 1

Marlborough Westerly WWTP
Chemistry From WET Test Samples

WWTP Effluent

	6/9/2009	3/9/2009	12/8/2008	9/10/2008	6/9/2008	3/10/2008	12/10/2007	9/10/2007	Average	Water Quality Criteria* Chronic	Acute
Cadmium (mg/l)**	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0005	0.0002	0.00027	0.002
Nickel (mg/l)	0.0235	0.0227	0.0231	0.0496	0.0933	0.0156	0.083	0.227	0.0672	0.052	0.47
Lead (mg/l)**	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.0005	0.0005	0.00031	0.0031	0.081
Zinc (mg/l)	0.07	0.0387	0.0405	0.0283	0.0398	0.0064	0.064	0.052	0.0425	0.12	0.12
Hardness- CaCO3 (mg/l)	202	152	121	322	223	102	145	260	191		

Receiving Water

	6/9/2009	3/9/2009	12/8/2008	9/10/2008	6/9/2008	3/10/2008	12/10/2007	9/10/2007	Average	Water Quality Criteria* Chronic	Acute
Cadmium (mg/l)**	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	***	***	0.0001	0.00027	0.002
Nickel (mg/l)	0.0021	0.0018	0.0021	0.0026	0.0022	0.0011	0.003	0.004	0.0024	0.052	0.47
Lead (mg/l)**	0.0005	0.0007	0.0018	0.00025	0.00025	0.00025	0.0005	0.0005	0.00059	0.0031	0.081
Zinc (mg/l)	0.0246	0.0122	0.183	0.0362	0.0376	0.0445	0.083	0.087	0.0635	0.12	0.12
Hardness- CaCO3 (mg/l)	107	57.2	73.6	52.5	93	33.4	174	91.9	85		

* Cadmium, Copper, Nickel, Lead, and Zinc criteria are hardness - based. The criteria shown in the table are based on 100 mg/l hardness and are expressed as total recoverable metal

** Non detects averaged as a value 1/2 of detection level

Marlborough Westerly WWTP

Antidegradation Calculations

	Average Upstream Receiving Water Concentration (C_s)	Average Effluent Concentration (C_d)	Calculated Downstream Concentration at 2.89 MGD ($Cr_{2.89}$)	Chronic Criteria at Hardness = 128 mg/l	Assimilative Capacity (AC)	10 percent of AC
Cadmium (mg/l)	0.0001	0.0002	0.000140	0.00033	0.00019	0.00002
Nickel (mg/l)	0.0024	0.0672	0.0284	0.064	0.03557	0.0036
Lead (mg/l)	0.00059	0.00031	0.00048	0.00400	0.00352	0.00035
Zinc (mg/l)	0.0635	0.0425	0.0551	0.148	0.09295	0.0093
Hardness- CaCO3 (mg/l)	85	191	128			

	Calculated Downstream Concentration at 4.15 MGD ($C_{r4.15}$)	Increase in Concentration at 4.15 MGD ($C_{r4.15}$-$C_{r2.89}$)	10% AC -Increase in Concentration at 4.15 MGD	
Cadmium (mg/l)	0.000149	0.000009	0.000010	(increase less than 10 percent of assimilative capacity)
Nickel (mg/l)	0.0342	0.0058	-0.0022	(increase greater than 10 percent of assimilative capacity)
Lead (mg/l)	0.00046	-0.00003	0.00038	(increase less than 10 percent of assimilative capacity)
Zinc (mg/l)	0.053	-0.002	0.0112	(increase less than 10 percent of assimilative capacity)
Hardness- CaCO3 (mg/l)	137			

Nickel Calculation

Nickel (mg/l)

Instream Concentration Using 10 percent of AC = 0.0320 mg/l (0.0284 + 0.0036)

Concentration Limit at 4.15 MGD = 0.063 mg/l ((0.0320)(8.45) - (4.3)(0.0024))/4.15

Attachment 2

Proposal FY 2010 - EPA New England Regional Applied Research Effort (RARE)

TITLE: An Investigation into the Extent and Biological Impacts of Endocrine Disrupting Chemicals (EDCs) in a Highly Effluent-Dominated River in New England

REGIONAL CONTACT: Katrina Kipp (OEME ECA, 617-918-8309, kipp.katrina@epa.gov)

ORD CONTACT: Jim Lazorchak (ORD Cincinnati National Exposure Research Laboratory, 513-569-7076, lazorchak.jim@epa.gov)

ABSTRACT

The contamination of waterbodies with pharmaceuticals and personal care products (PPCPs) has been a growing concern in New England and nationally. No comprehensive studies have been conducted to determine the extent of PPCP contamination and impacts on biota in the heavily wastewater treatment plant (WWTP) effluent-dominated rivers that are common in New England. This study will examine the Assabet River, a highly effluent-dominated system with a strong likelihood of PPCPs being present, and there is a concern that some of these PPCPs are having an impact on the river biota. Focusing primarily on endocrine disrupting chemicals (EDCs), a subset of PPCPs that have been implicated with fish feminization, the EPA New England Regional Laboratory and the EPA ORD Cincinnati Laboratory will work in cooperation with federal partners (U.S. Geological Survey (USGS), U.S. Fish and Wildlife Service (USFWS), National Park Service (NPS)) and others during 2010-2011 to conduct a study of the Assabet River to evaluate EDC levels and sources, and potential biological impacts. The project will include sampling and chemical analysis of WWTP effluents and river water, and collection and analysis of fish for indicators of EDC exposure, including histopathology and vitellogenin (egg yolk protein) induction in male fish. Study results will inform NPDES permit reissuance regarding EDCs in WWTP effluents.

RESEARCH PROBLEM STATEMENT

In 2002, USGS published the results of a comprehensive study of pharmaceuticals and personal care products (PPCPs) in 139 streams throughout the United States (Barnes et al., 2002; Kolpin et al., 2002). PPCPs were found in 80% of sampled streams. This first of its kind study focused national attention on this issue. Since then, numerous studies by USGS, EPA and others have found PPCPs to be widespread, and it has become clear that the most significant source of PPCPs is effluent from WWTPs. Studies have also shown that PPCPs are found in finished drinking water drawn from streams (Stackelberg et al., 2004).

There has been limited sampling for PPCPs in New England. Some data collected in New England as part of larger national studies by USGS, EPA and others indicate that PPCPs are relatively ubiquitous. EPA's New England Regional Laboratory (OEME) has conducted some limited studies including sampling several WWTP effluents and receiving water streams in various locations throughout New England in 2002. The results found the target PPCPs present in wastewater treatment effluents, and to a lesser extent, in the receiving waters (Decelle et al., 2006). OEME also sampled the Charles River in Boston several times and consistently found trace levels of pharmaceuticals (Faber, 2006). Due to New England's historical patterns of development along rivers and streams to use hydropower for industrial purposes, there are numerous highly effluent-dominated streams. As described above, some sampling has been conducted in New England; however there have been no comprehensive studies of EDCs in New England waters. The potential cumulative impacts of EDCs in these effluent-dominated waterbodies are of particular concern, but none have been thoroughly evaluated.

While the environmental and human health effects of both chronic and acute exposure to low levels of PPCPs through contact with surface water continue to be studied, there have been several studies demonstrating that many of these compounds act as endocrine disruptors and can induce feminization in fish (Hinck et al., 2009; Iwanowicz et al., 2009). Endocrine disrupting chemicals (EDCs) are a sub-set of PPCPs that have been implicated with fish feminization or intersex, which is the induction of female reproductive characteristics (e.g., oocytes, ovaries, vitellogenin, etc.) in male fish. Most dramatically, a controlled exposure to EDCs over a seven year period led to the collapse of a fish population (Kidd et al., 2007).

RESEARCH OBJECTIVES

The Assabet River in central Massachusetts is a highly effluent-dominated stream, receiving the treated wastewater discharges from four major municipal wastewater treatment plants and three minor facilities. At times during low flow conditions, the Assabet River is composed almost entirely of wastewater effluent (up to 95%). As such, it would be expected that the river would contain high levels of EDCs, and that these EDCs would be impacting the biota. The objective of this project is to characterize the extent of EDC contamination in the Assabet River and the contributions from the WWTPs, and to determine if there are chronic effects on the fish living in the river. There have been several studies that have examined the efficacy of WWTP treatment technologies in removing PPCPs from wastewater (Boyd et al., 2003; Scruggs et al., 2004; Lee et al., 2008; Ramirez et al., in press). The outcomes of this research will be used during reissuance of the NPDES permits of these WWTPs to help determine the need for reductions in the discharge of EDCs into the Assabet. This can serve as a model for other effluent-dominated rivers in New England and possibly the nation.

The overall project objective is to investigate EDC contamination in a highly effluent-dominated river, establish the link between EDCs in the effluents and impacts on fish, and use the results of this study to develop management strategies to reduce EDCs in New England rivers.

The specific research objectives are as follows:

1. Characterize the extent of EDC contamination in a highly effluent-dominated river system in New England (the Assabet River in MA).
2. Characterize EDCs in the effluents from the four WWTPs on the river.
3. Evaluate the impacts of EDCs on fish (bass and forage fish, i.e., minnows) reproductive health in the river.
4. Provide data that informs NPDES permit decisions regarding the need for reductions of inputs of EDCs to the Assabet River and similar effluent-dominated rivers.

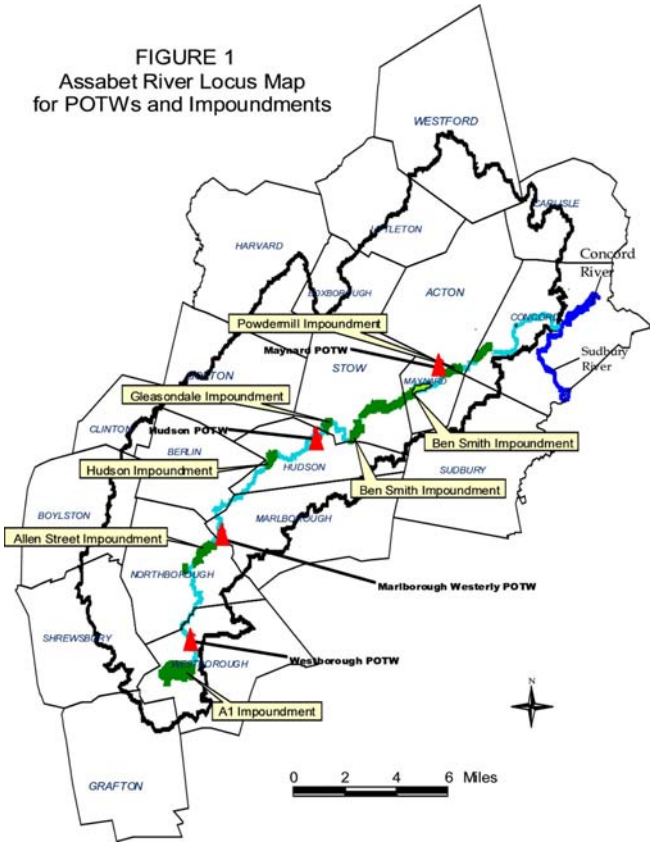
Additional objectives that may be pursued:

5. Develop an ongoing interagency collaborative process to address the issue of EDCs in NE.
6. Develop a regional policy for regulating the discharges of EDCs from WWTPs in NE.
7. Pending funding of a Regional Methods proposal to develop a Whole Effluent Toxicity (WET) testing protocol for assessing exposure to EDCs, participate in field testing the WET assay at one or more WWTPs on the Assabet River.

RESEARCH APPROACH

The Assabet River (see Figure 1) flows northeasterly from Westborough to Concord where it joins with the Sudbury River to form the Concord River, which discharges into the Merrimack River in Lowell. The river is impounded by seven dams and receives the discharge from four major wastewater treatment plants which serve at least portions of seven communities. With the exception of the Maynard WWTP, these facilities discharge to the river above the USGS gage in Maynard and comprise approximately 80% of the flow at the USGS gage during low flow periods. The Assabet River is designated as a Class B water under the Massachusetts water quality standards [314 CMR 4.05(3)b] and as such is designated as

capable of providing and supporting habitat for fish and other aquatic wildlife, for primary and secondary contact recreation, and for drinking water (with treatment).



A portion of the Assabet River is designated as a Wild and Scenic River and the river also flows through the Assabet River National Wildlife Refuge. Therefore, Department of the Interior agencies including the NPS, USGS, and USFWS are equally interested in this issue and will be partners on this project. USGS and USFWS both have expertise in this type of research study, including sample collection and analysis, and will participate in designing and implementing this project. EPA will establish an interagency workgroup (Workgroup), including USGS, USFWS, NPS, Massachusetts Division of Fisheries and Wildlife (MADFW), Massachusetts Department of Environmental Protection (MassDEP) and others, which will provide input to the development of the workplan and participate in the sampling and analysis. Workgroup meetings will commence in November of 2009.

The field collection portion of this study will involve collection and analysis of 1) fish from the river, 2) water from the river, and 3) effluent from the four major WWTPs. Assuming funding is in place, sampling design agreed to, and the QAPP approved, and in keeping with previous, similar study protocols, at least one sampling event for each parameter would be carried out in mid-summer 2010, following the spawning period. Additional sampling events will be conducted as needed. From the initiation of planning through field work, sample analysis, and report production, the project should last approximately 2 years. The number of samples, protocols, and labs that will conduct the analyses proposed below will be determined by the project Workgroup and the willingness of participating agencies to provide services gratis.

Fish: The proposed approach will involve collecting targeted fish by electrofishing from at least two sites in the Assabet River to analyze their reproductive systems for symptoms indicating the influence of EDCs. Reference fish will be collected from the Westborough Reservoir (A1 Impoundment on Fig.1)

which is upstream and separated by a dam from the WWTPs. Sample fish will be collected near Sudbury Rd. in Stow, MA, in the vicinity of the Assabet River National Wildlife Refuge, located downstream from three of the four WWTPs that discharge into the Assabet River. A possible third sample site would be in Concord just upstream from where the Assabet River joins the Concord River and downstream of the four major WWTPs. Target species will be bass (*Micropterus* spp.) and forage fish that have a short reproductive maturity, such as minnows, shiners or dace. Numbers of fish to be collected will be determined during Workgroup scoping meetings which will be held during the winter of 2009. Electrofishing will be conducted by EPA, USFWS and/or USGS.

Fish will analyzed for three commonly accepted biomarkers indicative of exposure to EDCs:

- Histopathology – abnormal gonad development as evidenced by intersex in males and altered oogenesis in females is indicative of long-term exposures (weeks to months). This is done by lab dissection. To be consistent with a USFWS study of National Wildlife Refuges currently underway, USFWS collection protocols will be followed and the fish will be analyzed by the USGS lab in Kearneysville, WV.
- Levels of vitellogenin (VTG) in plasma – indicative of exposure for days to weeks. This analysis is done by ELISA or GC-MS and will likely be conducted by the EPA ORD Cincinnati lab.
- Levels of vitellogenin gene (Vg) expression in the fish liver – indicative of current exposure. This analysis can be done by qPCR and will either be conducted by OEME or ORD Cincinnati.

In addition, some direct exposure of fish to effluent studies will be conducted. This approach will help establish a direct link between EDCs in effluent and impacts on fish. In addition, the Assabet River is a highly nutrient-enriched system. Since a recent study found that Vg expression was reduced at higher nutrient levels (Gordon et al., 2006), there may be concerns that the nutrients in the Assabet River mask the EDC impacts on fish. The exposure studies will provide useful information for both issues.

Water: Water samples will be collected concurrently with fish sampling, unless a different time (e.g., low flow) is selected. River samples will be collected at the same location as the fish collection. Effluent will be collected from the four major WWTPs. Influent sampling will be considered. Additional sampling events will be conducted based on the final study design as needed to characterize the river and effluents, as determined by the Workgroup. Water samples will be analyzed for 54 pharmaceuticals and several estrogens and androgens, consistent with the protocols used in EPA's National Rivers and Streams Assessment (NRSA). NRSA sample collection was just completed in 2009 and samples are being analyzed at the Cincinnati lab.

WWTP Treatment Technology: An inventory will be made of current treatment technologies currently employed by the four WWTPs and technologies that will be in place after the implementation of planned modifications are in place. Based on the findings of this project, and research studies of treatment efficacy in removing EDCs, information would be made available to inform dischargers regarding technologies that provide increases in EDC removal.

RESEARCH PRODUCTS

Products will include an executive summary and a final data report. The final report will incorporate data reports from various contributing agencies and should be completed within nine months of receipt of all data. Reviewed data will be made available to NPDES permit program staff and cooperating federal and state agencies as soon as possible after receipt, prior to publication. Additional reports, in the form of journal articles or presentations at national or regional meetings are also expected. A final presentation will be made to the Regional Science Council.

PROPOSAL CALENDAR AND BUDGET

This is a collaborative effort among EPA, USGS, USFWS, NPS, MassDEP, and others. Each agency will bring resources to the project which are yet to be determined. Based on services (field, analytical, data analysis, etc.) provided, the project scope and budget will be modified. Budget estimates are preliminary pending further discussions among the agencies. For analytical work not provided gratis, existing contracts will be used.

Budget:

Fish histopathology	$20,000
Fish plasma vitellogenin	$20,000
Fish vitellogenin gene expression	$20,000
Water chemistry	$30,000
Peer review	$ 3,000
Report production	$ 7,000
Total	$100,000

Calendar:

Milestone	**Date**
Interagency Workgroup kickoff meeting	November 2009
Workgroup project scoping meetings	Winter 2010
Draft workplan and QAPP	April 2010
QAPP approved	June 2010
Fish collection, water and effluent sampling	Summer 2010
Exposure studies	Summer 2010
Analyze samples	Fall 2010/Winter 2011
Review preliminary data and plan additional sampling if necessary	Spring 2011
Draft data report	June 2011
Additional sampling if needed (this may add up to a year to the project)	Summer 2011
Workshop to review findings	Fall 2011
External peer review	Winter 2012
Final report	Winter 2012

PROJECT MANAGEMENT

Overall management of this project will be the responsibility of EPA and will be provided by Katrina Kipp, Ecosystems Assessment Unit (ECA) Manager. Technical direction will be provided by Jim Lazorchak of ORD Cincinnati. Field components will be managed by OEME staff in coordination with the interagency workgroup. EPA lab analyses will be overseen by Jim Lazorchak. EPA will be responsible for Quality Assurance Project Plan (QAPP) development and approval, with input from cooperating agencies. Oral and written quarterly progress reports will be provided to OEME senior management by the project team.

OFFICE DIRECTOR SIGNATURE:

"I approve this proposal and agree that the project is an office priority."

Office Director Signature: _____

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