

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

**FACT SHEET**

**DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
PERMIT TO DISCHARGE TO THE WATERS OF THE UNITED STATES**

**NPDES NO:** MA0100064

**DATE OF PUBLIC NOTICE:**

**NAME AND ADDRESS OF APPLICANT:**

Town of Pepperell  
Sewer Commission  
PO Box 319  
Pepperell, MA 01463

**NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:**

Pepperell Wastewater Treatment Plant  
47 Nashua Road, Route 111  
Pepperell, Massachusetts 01463

**RECEIVING WATER:** Nashua River (Segment MA 81-07)

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

**LATITUDE:** 42° 40' 03"N

**LONGITUDE:** 71° 34' 32"W

**I. Proposed Action, Type of Facility, and Discharge Location**

The above named applicant has requested that the U.S. Environmental Protection Agency reissue its NPDES permit to discharge into the designated receiving waters, the Nashua River. The location of the facility is shown in Figure 1.

The Pepperell Wastewater Treatment Plant (WWTP) receives domestic and industrial wastewater from sanitary sewage collection systems in the Towns of Pepperell and Groton. Because its sewerage system connects to the Pepperell WWTP, the Town of Groton appears as a co-permittee on the permit for conditions related to the operation and maintenance of collection systems. The facility also receives up to 4,000 gallons per day of septage from Pepperell and

Groton. The newly expanded WWTP has a design flow of 1.1 million gallons per day (mgd), up from 0.705 mgd. Improvements to the facility included new secondary clarifiers, chemical addition facilities, UV disinfection in lieu of chlorination, sludge dewatering equipment, odor control equipment and an alternative power source.

The Pepperell WWTP consists of headworks, grit channels, bar racks, fine bubble aeration tanks, secondary clarifiers, and ultraviolet (UV) disinfection. The waste sludge is aerobically digested and dewatered with a belt filter press. The dewatered sludge is mixed with woodchips and composted and made available to the public.

## **II. Description of Discharge**

A quantitative description of the discharge in terms of significant effluent parameters based on recent monitoring data is shown in Attachment 1.

## **III. Permit Limitations and Conditions**

The effluent limitations of the draft permit and the monitoring requirements may be found in the draft NPDES permit.

## **IV. Permit Basis and Explanation of Effluent Limitation Derivation**

The Clean Water Act (CWA or the Act) prohibits the discharge of pollutants to waters of the United States without an NPDES permit unless such a discharge is otherwise authorized by the Act. An NPDES permit is used to implement technology based and water quality based effluent limitations as well as other requirements including monitoring and reporting. This draft NPDES permit was developed in accordance with statutory and regulatory authorities established pursuant to the Act. The regulations governing the NPDES program are found in 40 CFR Parts 122, 124 and 125 and the pretreatment program are in 40 CFR Part 133.

Under Section 301(b)(1)(B) of the Clean Water Act (CWA), Publicly Owned Treatment Works (POTW's) had to achieve effluent limitations based upon secondary treatment by July 1, 1977. The secondary treatment requirements are set forth in 40 CFR Part 133. The regulations describe the secondary treatment requirements for biochemical oxygen demand (BOD<sub>5</sub>), Total Suspended Solids (TSS), and pH. The "Average Monthly" and "Average Weekly" BOD<sub>5</sub> and TSS limitations are based on the requirements of 40 CFR §133.102. Numerical limitations for pH and fecal coliform are based on state certification requirements under Section 401(a)(1) of the CWA as described in 40 CFR §124.53 and state water quality standards in 314 CMR 4.05 (b) 3 and 4, respectively.

Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The Massachusetts Surface Water Quality Standards, 314 CMR 4.00, include requirements for the regulation and control of toxic constituents and also require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site specific criteria is established. The State will limit or prohibit discharges of pollutants to surface waters to assure that surface water quality standards of the receiving waters are protected and maintained.

The permit must also limit any pollutant or pollutant parameter (conventional, non-conventional, toxic, and whole effluent toxicity) that is or may be discharged at a level that caused, or has reasonable potential to cause, or contribute to an excursion above any water quality criterion [40 CFR §122.44(d)(1)]. An excursion occurs if the projected or actual instream concentrations exceed the applicable criterion. In determining reasonable potential, EPA considers existing controls on point and non-point sources of pollution, variability of the pollutant in the effluent, sensitivity of the species to toxicity and, where appropriate, the dilution of the effluent in the receiving water.

Also note that according to EPA regulations 40 CFR § 122.44(l), when a permit is reissued, effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards or conditions in the previous permit, unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued. In addition, in accordance with regulations found at 40 CFR Section 131.12, MA DEP has developed and adopted a statewide antidegradation policy to maintain and protect existing in-stream water quality. The Massachusetts Antidegradation Provisions are found at Title 314 CMR 4.04. No lowering of water quality is allowed, except in accordance with the antidegradation provisions. The limits in the draft permit are based upon information in the application, the existing permit, a site visit, discharge monitoring reports, and toxicity test results.

#### Waterbody Classification and Usage

The Nashua River is classified as a Class B (WarmWater Fishery) waterbody. The Massachusetts Surface Water Quality Standards (314 CMR 4.05(3)(b)) state that Class B waters shall have the following designated uses:

*“These waters are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation. Where designated they shall be suitable as a source of public water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.”*

The *Nashua River Basin 1998 Water Quality Assessment Report* indicates that the uses of the river segment receiving the Pepperell Wastewater Treatment Plant’s discharge are assessed as partial support for aquatic life, non-support for primary contact, support for secondary contact and aesthetics, and not assessed for fish consumption. Lack of attainment is attributable to nutrients, pathogens, and turbidity. This river segment appears on the *Massachusetts Year 2004 Integrated List of Waters* [Clean Water Act, Section ‘303(d) list’] as requiring a TMDL for nutrients, pathogens, and turbidity.

The limits in the draft permit are based on information in the application, the existing permit, discharge monitoring reports, and a site visit.

### Flow and Dilution Factor

The 7-day mean stream low flow with a 10-year recurrence interval (7Q10) is used to calculate the effluent limits in the draft permit. The 30Q10 is the 30-day mean low flow with a 10-year recurrence interval and is used to calculate ammonia limits.

To estimate the 7Q10, or 30Q10, at the point of discharge from the WWTP, flow and drainage area data from nearby USGS gaging stations is examined and proportioned to the drainage area at the discharge. The nearest, upstream gaging stations are Nashua River at East Pepperell (USGS Station No. 01096500) about 1 mile upstream in the Nashua River, Nissitissit River at Pepperell (USGS Station No. 01096503) about 1 mile upstream in the Nissitissit River, and Reedy Meadow Brook at East Pepperell (USGS Station No. 01096054) just upstream of the Pepperell WWTP discharge. The 7Q10 and 30Q10 flows and drainage areas at these stations are shown in the table below. The drainage area for Nashua River station excludes 119 square miles (s.m.) diverted for use by the City of Worcester and the Massachusetts Water Resources Authority.

	Station No. <u>01096500</u>	Station No. <u>01096503</u>	Station No. <u>01096054</u>	Total
7Q10 Flow (cfs)	43.4	1.3	0.2	44.9
30Q10 Flow (summer)	78.8	2.3	0.4	81.5
30Q10 Flow (winter)	132	3.7	1.3	137
Drainage Area (sm)	316	59.6	1.9	377.5

The drainage area between the gaging stations and the outfall is only 1.5 s.m., or less than 0.5% of the total drainage area. Therefore, for the purposes of calculating the dilution factors, no adjustment is made for the additional area. The resulting 7Q10 and 30Q10 flows and dilution factors are calculated below.

$$\text{Design Flow} = 1.1 \text{ mgd} = 1.7 \text{ cfs}$$

$$7\text{Q10 Dilution Factor: } (44.9 \text{ cfs} + 1.7 \text{ cfs}) \div 1.7 \text{ cfs} = 27$$

$$30\text{Q10 Dilution Factor (summer): } (81.5 \text{ cfs} + 1.7 \text{ cfs}) \div 1.7 \text{ cfs} = 49$$

$$30\text{Q10 Dilution Factor (winter): } (137 \text{ cfs} + 1.7 \text{ cfs}) \div 1.7 \text{ cfs} = 82$$

### BOD and TSS

Under Section 301(b)(1)(B) of the Clean Water Act (CWA), Publicly Owned Treatment Works (POTW's) had to achieve effluent limitations based upon secondary treatment by July 1, 1977. The secondary treatment requirements for biochemical oxygen demand (BOD<sub>5</sub>) and total suspended solids (TSS) are set forth in 40 CFR Part 133. The 30-day average percent removal limit of at least 85% for BOD<sub>5</sub> and TSS is based on the requirements in 40 CFR §133.102.

Because the Town is requesting an increase in the permitted flow and antidegradation applies, the mass loadings (i.e. lbs/day) for BOD and TSS from the existing permit are retained and the revised concentration limits are calculated as follow:

$$\begin{aligned} \text{concentration limits} &= \text{lbs/day} \div (\text{Flow} \times \text{Conversion Factor}) \\ \text{average monthly} & 176 \text{ lbs/day} \div (1.1 \text{ mgd} \times 8.34 \text{ (lb)(l)/(mg)(gal)}) = 19 \text{ mg/l} \\ \text{average weekly} & 264 \text{ lbs/day} \div (1.1 \text{ mgd} \times 8.34 \text{ (lb)(l)/(mg)(gal)}) = 29 \text{ mg/l} \end{aligned}$$

### pH and Fecal Coliform

The limitations for pH and fecal coliform are based upon the Massachusetts state certification requirements under Section (401) (a) (1) of the Clean Water Act, as defined in 40 CFR§124.53 and water quality standards. The fecal coliform limits are year-round in order to conform with discharges to Class B waters used as a water supply downstream.

### Phosphorus

Phosphorus interferes with water uses and reduces instream dissolved oxygen. State water quality standards (314 CMR 4.04(5) Control of Eutrophication) require any existing point source discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practicable treatment to remove such nutrients. As discussed above, this segment of the Nashua River appears on the Massachusetts 303(d) list for nutrients.

EPA has published national guidance documents which contain recommended total phosphorus criteria and other indicators of eutrophication. EPA's *Quality Criteria for Water 1986* (the Gold Book) recommends, in order to control eutrophication, that in-stream phosphorus concentrations should be less than 100 ug/l (0.100 mg/l) in streams or other flowing waters not discharging directly to lakes or impoundments. Using the dilution factor of 27 calculated above and the Gold Book criteria, the monthly average phosphorus limit would be:

$$27 * 100 \text{ ug/l} = 2900 \text{ ug/l} = 2.7 \text{ mg/l}$$

More recently, EPA released Ecoregional Nutrient Criteria, established as part of an effort to reduce problems associated with excess nutrients in water bodies in specific areas of the country. The published ecoregion-specific criteria represent conditions in waters minimally impacted by human activities, and thus representative of water without cultural eutrophication. The Pepperell Wastewater Treatment Plant is within Ecoregion XIV, Eastern Coastal Plain, Northeastern Coastal Zone. Recommended criteria for this ecoregion is found in *Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion XIV*, published in December, 2001, and includes a total phosphorus criteria of 23.75 ug/l (0.024 mg/l). Using the dilution factor and this ecoregion criteria, the monthly average phosphorus limit would be:

$$27 * 0.024 \text{ mg/l} = 0.648 = 0.65 \text{ mg/l}$$

An examination of the data in Attachment 1 indicates that the discharge from the Pepperell

WWTP has the reasonable potential to exceed the proposed water quality standards. Consequently, as an interim step, the draft permit includes an average monthly permit limit of 1 mg/l. If additional data or the completion of a Total Maximum Daily Loading (TMDL) indicates the need for more stringent limits, EPA and DEP may exercise the reopener clause of Part II A. 4 of this permit and modify the phosphorus numerical limits. The Average Weekly and Maximum Daily requirements are for reporting, only, as in the current permit. This data will support the development of the TMDL.

### Total Residual Chlorine

Although the recently completed improvements to the facility included replacing chlorination facilities with UV disinfection, the facility intends to add chlorine to its plant water system. Although the plant water is withdrawn after the UV disinfection, chlorinating the plant water provides an additional measure of safety when being handled and can be used for algae control in the clarifiers. Because chlorine tablets will be used for this purpose, the resulting levels of chlorine being discharged cannot be determined at this time. Therefore, the draft permit contains a total residual chlorine (TRC) limit which will be in effect when the plant water is being chlorinated. The *National Recommended Water Quality Criteria* for chlorine is 11 ug/l as the chronic criteria and 19 ug/l as the acute criteria. The chlorine limit calculations are as follows:

Average monthly limit	11 ug/l * 27 dilution factor = 297 ug/l
Maximum daily limit	19 ug/l * 27 dilution factor = 513 ug/l

Since the addition of chlorine is limited to the operation and maintenance uses described above, the permit contains a provision allowing the elimination of the chlorine limits after one year upon request by the permittee and approval by EPA.

### Ammonia

Because ammonia can be toxic to aquatic life at elevated levels and can impact the dissolved oxygen concentration of the receiving water, EPA and the MA DEP are concerned about ammonia levels impacting the receiving water. In addition, because the design flow for the Pepperell WWTF has increased, the antidegradation provisions also apply.

The *1999 Update of Ambient Water Quality Criteria for Ammonia* established instream criteria for toxicity dependent upon the pH and temperature of the receiving water. The Federal Register, Volume 64, No. 245 published on December 22, 1999, recommended a 30Q10 flow to generate the average monthly concentration limits.

For the summer months, a pH of 7.1 and an estimated temperature of 26° C were used to determine the instream criteria and the theoretical summer permit limit is calculated as follows.

$$2.7 \text{ mg/l (instream criteria)} * 49 \text{ (30Q10 dilution factor)} = 132 \text{ mg/l}$$

For the winter months, a pH of 7.1 and an estimated temperature of 0° C were used to determine the instream criteria and the theoretical winter permit limit is calculated as follows.

$$5.67 \text{ mg/l (instream criteria)} * 82 \text{ (30Q10 dilution factor)} = 465 \text{ mg/l}$$

The examination of data from the Pepperell WET tests suggests that the ammonia levels in the discharge are below these calculated limits. However, the antidegradation provisions must also be applied due to the particular concern of oxygen demand exerted by ammonia in the summer months during periods of low flow.

Discharges from a secondary treatment facility normally contain approximately 15 - 20 mg/l of ammonia. With the existing permitted flow of 0.705 mgd, the Pepperell WWTF discharged approximately 88 lbs/day of ammonia as shown below.

$$0.705 \text{ mgd} * 8.34 \text{ conversion factor} * 15 \text{ mg/l} = 88 \text{ lbs/day}$$

Maintaining this mass loading of ammonia with the revised design flow requires a concentration limit of:

$$88 \text{ lbs/day} \div (8.34 * 1.1 \text{ mgd}) = 9.6 = 10 \text{ mg/l}$$

Consequently, the draft permit contains a seasonal monthly average ammonia limit of 10 mg/l for the period of May through October when dissolved oxygen levels are typically the lowest. The weekly average limit for ammonia is calculated as twice the average monthly limit in accordance with the National Recommended Water Quality Criteria.

### Copper

EPA is required to limit any pollutant that is or may be discharged at a level that causes, or has reasonable potential to cause, or contributes to an excursion above any water quality criterion (40 CFR §122.44(d)). Because the design flow at the Pepperell WWTF has increased, acute and chronic copper limits are calculated.

The *EPA Quality Criteria for Water, 1986 (Gold Book)* set forth the methodology for establishing water quality criteria for copper, a hardness dependent pollutant. In the *National Recommended Water Quality Criteria: 2002* EPA updated its national recommended water quality criteria for pollutants. 314 CMR 4.05(5)(e) Toxic Pollutants of the state water quality standards specifies “*The Department shall use the water quality criteria for the protection of aquatic life expressed in terms of the dissolved fraction of metals.*” Using a hardness of 35 mg/l for the Nashua River and a conversion factor (CF) to convert recoverable to dissolved copper, the chronic and acute criteria calculations for the State water quality standards are as follows.

Chronic instream criteria	$e^{(0.8545 * \ln 35) + (-1.702)} * 0.96 \text{ (CF)} = 3.65 \text{ ug/l}$
Acute instream criteria	$e^{(0.9422 * \ln 35) + (-1.700)} * 0.96 \text{ (CF)} = 5.00 \text{ ug/l}$

EPA regulation 40 CFR §122.45(c) *Metals* requires that all permit effluent limitations for a metal be expressed in terms of “total recoverable metal”. Thus, the copper limits in the permit are derived by multiplying the criteria by the dilution factor and dividing by a conversion factor. The calculations are shown below.

Chronic copper limit	$3.65 \text{ mg/l} * 27 \div 0.96 \text{ (CF)} = 102.7 \text{ ug/l} = 0.103 \text{ mg/l}$
Acute copper limit	$5.00 \text{ ug/l} * 27 \div 0.96 \text{ (CF)} = 140.6 \text{ ug/l} = 0.141 \text{ mg/l}$

Data from the chemical analysis performed with the WET tests in May, 2002, and May, 2003, showed copper concentrations of 0.123 mg/l and 0.138 mg/l. Because these results indicate a reasonable potential to exceed the water quality criteria, the draft permit includes the above copper limits.

### Whole Effluent Toxicity

National studies conducted by the Environmental Protection Agency have demonstrated that domestic sources contribute toxic constituents to POTWs. These constituents include metals, chlorinated solvents and aromatic hydrocarbons among others. The Region's current policy is to include toxicity testing requirements in all municipal permits, while Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts.

Based on the potential for toxicity resulting from domestic and industrial contributions, and in accordance with EPA regulation and policy, the draft permit includes acute toxicity limitations and monitoring requirements. (See, e.g., "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants", 50 Fed. Reg. 30,784 (July 24,1985); see also, EPA's Technical Support Document for Water Quality-Based Toxics Control). EPA Region I has developed a toxicity control policy which requires wastewater treatment facilities to perform toxicity bioassays on their effluents.

The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measured only by biological analyses; (2) bioavailability of pollutants after discharge is best measured by toxicity testing including any synergistic effects of pollutants; and (3) pollutants for which there are inadequate chemical analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in conjunction with pollutant specific control procedures to control the discharge of toxic pollutants.

Although the EPA Region 1 policy and MADEP's Implementation Policy for the Control of Toxic Pollutants in Surface Waters recommend discharges having a dilution ratio between 20:1 and 100:1 to be tested four times per year for acute toxicity, the current permit required WET testing only twice per year. This reduction in testing frequency had been approved based upon successful test results and in accordance with the policies. The data in Attachment 1 indicates there were no exceedances during the examined period. Consequently, the draft permit retains the same WET testing limits as the existing permit.

### **V. Sludge**

The Pepperell WWTF generates about 100 dry metric tons of sludge each year by dewatering with on-site belt filter presses. The dewatered sludge is mixed with a bulking agent and composted. The final product is available for reuse to local citizens and businesses.

Section 405(d) of the Clean Water Act requires that sludge conditions be included in all POTW permits. The sludge conditions in the draft permit satisfy this requirement and are taken from EPA's standard for the disposal of sewage sludge (40 CFR 503).

## **VI. Essential Fish Habitat**

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16U.S.C. §1801 et seq. (1998)), EPA is required to consult with the National Fisheries Services (NOAA Fisheries) if EPA's action or proposed action that it funds, permits, or undertakes, may adversely impact any essential fish habitat (EFH). The Amendments broadly define essential fish habitat as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855 (b) (1)(A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The Nashua River is not covered by the EFH designation for riverine systems and thus EPA and MA DEP have determined that a formal EFH consultation with the NMFS is not required.

## **VII. State Certification Requirements**

EPA may not issue a permit unless the Massachusetts Department of Environmental Protection (MA DEP) certifies that the effluent limitations included in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate State Water Quality Standards. The MA DEP has reviewed the draft permit and advised EPA that the limitations are adequate to protect water quality and continue to meet the requirements of the antidegradation policy. EPA has requested permit certification by the State pursuant to 40 CFR §124.53 and expects the draft permit will be certified.

## **VIII. Comment Period and Procedures the Final Decision**

All persons, including applicants, who believe any condition of the permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period to the contacts listed below. Any person prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. Such requests shall state the nature of the issues to be raised in the hearing. A public hearing may be held after at least thirty (30) 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 the public hearing, if held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and to each person who has submitted written comments or requested notice.

## **IX. Contacts**

Requests for additional information or questions concerning the draft permit may be addressed

Monday through Friday, between the hours of 9:00 am and 5:00 pm, to:

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