COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST REGIONAL OFFICE
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July 24, 2009

Ian A. Bowles, Secretary
Executive Office of
Energy & Environmental Affairs
100 Cambridge Street
Boston MA, 02114

RE: Framingham
Birch Road Wellfield Redevelopment
and Water Treatment Plant
Birch Road
EEA # 14198

Attn: MEPA Unit

Dear Secretary Bowles:

The Department of Environmental Protection Northeast Regional Office (MassDEP-NERO) has reviewed the Draft Environmental Impact Report (DEIR) submitted by the Town of Framingham, Department of Public Works for redevelopment of the Birch Road wellfield and construction of a water treatment plant (EEA# 14198). The Department provides the following comments.

Three municipal wells located off of Riverpath Drive were regular sources of public water supply for the Town of Framingham from 1939 through 1966, and intermittently thereafter until 1979. These wells, which supplemented the Metropolitan District Commission supply, have been variously referred to as the Birch Road wells, the Cochituate wells, and the Saxonville wells. They have been shut down since 1979 due to elevated levels of naturally occurring iron and manganese that could not be mitigated by sequestration treatment, and the Town has maintained the these wells for emergency use. The wells were last used during a 15-day period in 1984.

In proposing to reactivate the Birch Road wellfield, the Town has concluded that it is now cost effective to install a water treatment facility to filter iron and manganese, and restore the Birch Road wells as a source of public water supply, given the present and anticipated future cost of water from the Massachusetts Water Resources Authority (MWRA). The Town is proposing four new wells to replace the existing wells, at locations referred to as TW-1, TW-2, TW-3, and TW-4. The Town seeks approval to withdraw from the wells a total of 4.3 million gallons per day (MGD). Considering that Framingham's average water demand in 2008 was 6.71 MGD, and its maximum day demand was 11.21 MGD, the wells would not replace the Town's total use of MWRA water, but they would significantly reduce it. According to the EIR, each well will be equipped with a pitless adapter unit, and the controls for all four wells will be located in a new pump control station located by Well TW-1.

The proposed wells are 1,500 to 2,000 feet northwest of the northern end of Lake Cochituate, and are situated in an aquifer that fills a bedrock valley extending to the south beneath the lake. The stratified drift deposits become very thick just south (upgradient) of the wells, though not all of the material is coarse-grained. Between the Birch Road site and the northern end of Lake Cochituate, bedrock has been measured at depths of 203 and 163 feet beneath the land surface. The depth to bedrock reaches 265 feet, about one-half mile southeast of the Birch Road wells, according to the *Hydrologic Data of the Lake Cochituate Drainage Basin, Framingham-Natick, Massachusetts*, U.S. Geological Survey, Massachusetts Hydrologic-Data Report No. 23, 1981. The Town of Natick's Evergreen and Springvale wells also are located in this aquifer, about 1.7 and 2.4 miles south-southeast of the Birch Road wells.

MassDEP Permits

MassDEP approved the well sites and design for a prolonged pumping test on February 8, 2006, (MassDEP Permit Category BRPWS17). The approved pumping test design included 20 observation wells, 8 piezometers, 4 staff gauges, and an ambient well. At the end of the prolonged pumping test, which was conducted from April 26 to May 8, 2006, the wells were pumping at a combined rate of 1,580 gallons per minute (2.28 MGD).

The Town conducted pilot tests of three iron-manganese treatment technologies, from May 26 to July 19, 2006, after receiving MassDEP's approval of the pilot study proposal on April 7, 2006, (MassDEP Permit Category BRPWS21), and following the pumping test and recovery measurement period. Conventional filtration and two types of membrane filtration were tested. Since Well TW-3 had the highest levels of iron and manganese during the pumping test, this well provided water for the treatment pilot testing. The pilot study report, with the results of the treatment technology testing was approved by MassDEP on March 30, 2007 (MassDEP Permit Category BRPWS22).

In February 2008, the Water Management Act permit application, (MassDEP Permit Category BRPWM03), and the pumping test final report for the Birch Road wells, (MassDEP Permit Category BRPWS19), were received by MassDEP. The Water Management Act review process evaluates the wells' potential impacts upon environmental receptors, such as wetlands and streamflow. The pumping test final report focuses on the wells as sources of public water supply, taking into consideration the quantity and quality of water produced by the wells and delineation of the Zone II wellhead protection area. The pumping test report for the Birch Road wells did not adequately evaluate the effect of intercepted discharge upon streamflow in the Sudbury River, and the effects of pumping upon Lake Cochituate. However, Chapters 6 and 7 of the EIR address these topics that were not included in the pumping test report. To make the permit application complete, two copies of an addendum to the pumping test report must be submitted to MassDEP with the information from these chapters.

Following approval of these permits, the plans and specifications for construction of the permanent pumping facilities and the water treatment facility need to be submitted to MassDEP for review and approval prior to construction. (MassDEP Permit Category BRPWS20 and MassDEP Permit Category BRPWS24), respectively. The Town also may include the permanent pumping facilities for the wells in the BRPWS24 submittal. Once the pumping and treatment

facilities are constructed, MassDEP will inspect the finished facilities before granting final approval for the wells to be used as a public water supply.

A Sewer Connection/Extension Permit, (MassDEP Permit Category BRPWP74), will be required for the discharge of treatment plant wastewater and residuals to the sewer. Even if only one percent waste volume from the treatment plant is discharged to the sewer, the projected wastewater flow generated would be 59,000 gallons per day (gpd), which exceeds the 50,000 gpd threshold for a Sewer Connection/Extension Permit. The EIR estimates that following backwash recycling, one percent of the average daily flow treated by the facility will end up as a wastewater stream to be conveyed to the sewer. The *Process Evaluation and Technology Review Report*, in Appendix F indicated that the membrane filtration system would generate a waste volume that is only about one-half of one percent of the treated flow. These two estimates seem low, considering that a nearby town reported recently that its new membrane filtration plant is designed to limit wastewater losses to two percent.

The Massachusetts Water Resources Commission staff has indicated previously that the existing wells will have to be abandoned in order for the new Birch Road wells to replace the grandfathered capacity of the existing wells.[1] The EIR indicates that the pumping stations for the existing wells will be demolished as part of the project. The plans for demolition and decommissioning these wells should be included in either the BRPWS20 or BRPWS24 application, when submitted. MassDEP will declare the existing wells to be abandoned when the new wells are placed into service.

Additionally, MassDEP cannot grant final approval for the Birch Road wells to be activated until the Town of Framingham has implemented zoning and non-zoning controls that meet the requirements of 310 CMR 22.21(2) to protect the Zone II wellhead protection area from incompatible land uses. Although the Town passed a Groundwater Protection District Bylaw in October 2004 that met most of these requirements, to be in full compliance with the requirements of 310 CMR 22.21(2), the Town also must do the following.

1. Implement a prohibition on floor drains in the Zone II, including in existing facilities, in accordance with 310 CMR 22.21(2)(a)8. This is generally accomplished by adopting a board of health regulation.

2. Revise the town's Groundwater Protection District overlay map, as necessary, to include the entire Zone II area for the wells.

3. Demonstrate that the Town of Framingham has used its best efforts to get the Town of Wayland to apply zoning and non-zoning controls, meeting the standards in 310 CMR 22.21(2), within the Zone II area that lies within Wayland.

The EIR states that the Town intends to propose a Floor Drain Bylaw at its Fall 2009 Town Meeting to prohibit floor drains town-wide. To ensure that the proposed controls will

[1] MassDEP uses the term "abandonment" to refer to the administrative closure of a public water source, and "decommissioning" to refer to the physical closure.

satisfy all regulatory requirements, MassDEP strongly recommends that a draft of the bylaw be provided to MassDEP NERO for review before Town Meeting.

The Department encourages the proponent to adopt the sustainable design elements under consideration to meet LEED standards for the water treatment facility to the extent that they are feasible. According to the EIR, energy efficiencies resulting from passive solar and energy efficient lighting, green roofs, photovoltaics, and recycled materials are being evaluated. According to the American Water Works Association Research Foundation, pumps consume most of the power at water treatment facilities, with about 85 percent of the power for distribution and 9 percent to convey raw water to the plant. The proposed facility also should optimize pump equipment and operations for greater energy efficiency and to reduce greenhouse gas emissions. Additional information on energy efficiency/renewable rating systems is available at a number of websites including: http://energystar.gov/, www.cee1.org/, and www.a4we.org. For new construction, core and shell, and commercial interiors relating to LEED certified buildings, information is available on the following website: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222.

The EIR, (page 1-8), also states that a water-source heat pump geothermal system for heating/cooling is under consideration. While MassDEP supports the proponent's efforts to reduce greenhouse gas emissions by designing a project that incorporates energy efficiency measures such as geothermal wells, the proponent should be aware that if geothermal wells are installed, they may not be discharged within the Zone I of the Birch Road wells. In addition, geothermal wells must be registered with MassDEP, (MassDEP Permit Category BRPWS06 a,b,c). If the Town decides to proceed with a geothermal heat pump system, please contact Joseph.Cerutti@state.ma.us in the MassDEP-Boston Drinking Water Program, at (617) 292-5859 for additional guidance.

Birch Road Wells

MassDEP guidelines allow overburden wells to be approved for a water withdrawal rate of up to twice the rate at which the pumping test stabilized, when the pumping test is conducted using smaller test wells than the finished production wells. This is done to accommodate the difference in well efficiency between a gravel-walled test well (8 to 12 inches in diameter) and a finished gravel-packed well. Accordingly, the maximum pumping rate that is approvable by MassDEP is the **lower** of 1) twice the pumping test stabilization rate, and 2) the calculated approvable yield (CAY), which is based on pumping rate, drawdown, and available water column. The approval rate that the Town is seeking is slightly less than twice the stabilization rate. As part of the permitting process, MassDEP will determine the CAY for the four proposed Birch Road wells to determine the appropriate total approvable pumping rates for the wells.

The EIR evaluation of the impact of pumping on the Sudbury River was conservative, assuming that streamflow would be decreased by the entire 4.3 MGD volume that would be pumped by the wells. MassDEP is satisfied that this approach reflects the worst-case scenario for the wells' impact upon streamflow in the Sudbury River.

To evaluate potential pumping impacts upon Lake Cochituate, a numerical water budget model was developed. The model used a U.S. Geological Survey (USGS) streamflow dataset

(1977-1979) for Lake Cochituate and Cochituate Brook, from a 1985 study of water and nutrient inflows and outflows to Lake Cochituate, to create and calibrate a model that converts precipitation data into the resultant streamflow in the inflow streams to Lake Cochituate. After the model was calibrated, precipitation data from 2003 to 2007 was used, along with pumping data from Natick's Evergreen and Springvale wells, to evaluate the lake level in both wet and dry years, and to determine the additional impact that pumping the Birch Road wells would have upon the lake level. In the pumping simulations presented in the EIR, the maximum short-term drop in the Lake Cochituate level caused by pumping the Birch Road wells was 3.33 inches.

The main shortcomings in the water budget analysis are that the aquifer characteristics of the Birch Road wells and/or the pumping test data were not used in the modeling. A consequence is that any extremely high or extremely low transmissivities of the aquifer at the Birch Road wells would not affect the model in any way. The model only has included an estimate for the portion of the Birch Road well water that is induced infiltration from Lake Cochituate. This is referred to in the EIR as the "induced infiltration coefficient," and its estimate is based on a 2001 USGS report, which used an isotope analysis to determine that 64 percent of the water pumped by Natick's Springvale wells was induced infiltration from the lake. An equation in the Birch Road wells analysis, (page 6-12), uses the Springvale coefficient of 0.64 to compute a 0.30 coefficient for Birch Road wells, assuming that the amount of induced infiltration is directly proportional to the wells' distance from the lake. This means that model estimated that 30 percent of the water pumped by the Birch Road wells would be induced infiltration. The methodology also assumes that the aquifer characteristics of the Birch Road wells are the same as at the Springvale wells. Given the thickness and areal extent of the aquifer at the Birch Road wells, and the distance between the wells and the lake, a 30 percent estimate for induced infiltration from Lake Cochituate seems reasonable. Since the proposed pumping rate is 4.3 MGD, the effect of the Birch Road wells was projected to result in a 1.29 MGD daily outflow from the lake. However, the model is not based on any actual data from the Birch Road wells except the proposed pumping rate.

The Birch Road wells are about 0.8 miles from any of the Town of Wayland's municipal wells. Given this distance and the minimal overlap of the aquifers contributing to the two water supplies, MassDEP does not expect the Birch Road wells to have any direct effect upon the Wayland municipal wells. It is possible that during prolonged dry periods, the Birch Road wells' effect upon the Sudbury River streamflow might limit the amount of infiltration that Wayland's Meadowview Well could induce from the river, however.

MassDEP notes that Chapter 7 appears to include errors or omissions. The Town should clarify the following issues.

- In Table 7-6, the units for "Minimum Lake Water Surface Elevation" are not given; based on the text, it appears that the data are in inches.
- It is not clear what a value of zero for the "minimum lake water surface elevation" represents.
- Although page 7-34 states that the locations of the piezometers and staff gauges used during the pumping test are shown on Figure 7-18, only PZ-5/SG-5 is shown.

- On page 7-37, silt and clay deltaic deposits along the Wayland-Framingham border are said to act as a recharge boundary. MassDEP believes that this statement is in error; silt and clay deposits have a low permeability and would not function as a recharge boundary. It is unclear whether this statement is intended to show that the pond, just to the east of the wells, is a recharge boundary, or that the silt and clay deposits act as an impermeable boundary.

Water Treatment Plant

The proposed water treatment plant will use membrane filtration and treatment processes that include aeration, pre-oxidation with potassium permanganate, and disinfection to remove the naturally occurring iron and manganese from the well water. Most of the backwash water is to be recycled, and the remaining wastewater and residuals will be discharged to the municipal sewer system, as described previously.

The *Process Evaluation and Technology Review Report*, (Appendix F), suggests that the treatment plant will use chloramines as the disinfectant, in order for the water to be chemically similar to that provided by the MWRA system. The report also suggests use of potassium hydroxide for pH adjustment, hydrofluosilicic acid for fluoridation, and an unspecified coagulant to improve removal of organic carbon. Since the well water contains a high level of naturally occurring dissolved carbon dioxide, an unspecified aeration process is proposed to remove the carbon dioxide. This will raise the pH of the water and lower the dose of pH adjustment chemical that must be added.

Aeration also will help to mitigate any radon or volatile organic compounds (VOCs) that may be present. A release of tetrachloroethylene by Foster-Miller, Inc., at the adjacent New England Sand and Gravel property in the 1980s was once thought to pose a potential contamination threat to the wells. However, the contaminant level in the groundwater has dropped by 95 percent since 1987, and MassDEP no longer considers the release a significant threat to the wells. Even so, the release has the potential to cause low-level detections of VOCs, particularly at Well TW-2, and the proposed aeration will help to mitigate any such detections.

The inorganic chemical perchlorate was detected at a level of 2.19 micrograms per liter (µg/L), in an October 2007 sample from an observation well beside Well TW-1. This is just above the drinking water standard of 2.0 µg/L for perchlorate. The treatment plant will be designed with available space so that ion exchange treatment can be added for perchlorate removal between the membrane filtration and the clearwell if it becomes necessary.

As described in the EIR and the appended *Process Evaluation Report*, the plant is being designed with the understanding that in the future the wells could be determined to be "Groundwater Under the Direct Influence of Surface Water" (GWUDI), in which case, the well water would be subject to the treatment requirements of the Federal Surface Water Treatment Rule. The GWUDI designation is a determination of vulnerability to *Giardia sp.* contamination, and not a determination that a well draws in surface water. A well can draw in all of its water from surface water via induced infiltration without being considered GWUDI, if the soils are straining out the organisms before they reach the well. GWUDI is evaluated through microscopic particulate analysis (MPA), which determines whether a well is capturing surface water

organisms of roughly the same size as a *Giardia sp.* cyst. The MPA tests for GWUDI are conducted after wells have been on-line for six months, when a long-term drawdown cone has been established. The ponds within 150 feet of the wells, including the small perched pond between wells TW-1 and TW-4, and the larger pond just east of Well TW-4 could potentially cause a GWUDI determination.

The access road for delivery trucks and staff makes almost a complete loop around the facility, rather than simply coming off Riverpath Drive on the west side of the facility. MassDEP presumes that grading affects the access road layout, as the site presently slopes down from Riverpath Drive to the wells. For the roadway around the plant to ease the grade for vehicular access, it seems likely that fill will have to be deposited.

The water treatment plant, access road, and parking area are directly uphill from Well TW-1 and the groundwater pump control station. Much of the facility and roadway are within the Zone I of Well TW-1. The EIR does not indicate where runoff from the access road, parking area, and roof runoff from the facility will be directed. Infiltration basins for road runoff must not be sited within Zone I of the wells. In addition, sodium chloride should not be used for de-icing purposes on the access road and parking area.

The EIR does not explain how the facility will be heated. If heating oil is used, secondary containment should be installed around the storage tanks. Cleanup materials such as absorbent pads and booms should be maintained at the facility in case a release occurs during delivery.

High tension electrical lines pass through the wellfield, and will be in close proximity to the treatment plant and pump control station. Do these lines pose any hazards to operations at either facility? Massachusetts Department of Agricultural Resources regulations (310 CMR 11.00) prohibit herbicide applications on rights-of-way within Zone I of a public ground water source, and restrict applications within Zone II. Given how long the existing Birch Road Wells have been inactive, the Town should contact the electrical company that owns the lines to ensure that the water supply protection areas are properly identified on the company's Vegetation Management Plan/Yearly Operating Plan.

Based on its review of the EIR, MassDEP believes that all remaining issues identified in the EIR will be able to be addressed through its permitting process.

The MassDEP Northeast Regional Office appreciates the opportunity to comment on this proposed project. Please contact James.Persky@state.ma.us, (978) 694-3227 for further information on the water supply issues and Jack.Zajac@state.ma.us, at (978) 694-3240 for additional information on wastewater issues. If you have any general questions regarding these comments, please contact Nancy.Baker@state.ma.us , MEPA Review Coordinator at (978) 694-3338.

Sincerely,

John D. Viola
Deputy Regional Director

cc: Brona Simon, Massachusetts Historical Commission
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