



The

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

hereby issues

LARGE GROUNDWATER WITHDRAWAL PERMIT

NO. LGWP-2010-0001

to the permittee

TOWN OF JAFFREY DEPARTMENT OF PUBLIC WORKS  
23 KNIGHT STREET  
JAFFREY, NH 03452  
(603-532-6521)

for the withdrawal of the following volume of groundwater from the following well for the purpose of community water supply:

SQUANTUM ROAD WELL

170,000 gallons over any 24-hour period from April 1<sup>st</sup> through October 31<sup>st</sup>

360,000 gallons over any 24-hour period from November 1<sup>st</sup> through March 31<sup>st</sup>

Date of Issuance: February 18, 2010

Date of Expiration: February 18, 2020

Pursuant to authority in N.H. RSA 485-C:21, the New Hampshire Department of Environmental Services (NHDES), hereby grants this permit to withdraw groundwater from the Squantum Road Well subject to the following conditions:

1. The permittee shall comply with the requirements of Env-Wq 403 (formerly Env-Ws 388) and RSA 485-C at all times.
2. Water Conservation: The permittee shall implement the approved Water Conservation Plan, dated May 15, 2008, in accordance with Env-Wq 2101 (formerly Env-Ws 390) and NHDES' conditional approval dated June 20, 2008.
3. Metering Requirements: Withdrawals from the source must be metered at all times. All meters must be selected, installed, tested, and maintained in accordance with the AWWA M6 manual as referenced in Env-Wq 2101. The permittee shall provide NHDES with a certificate of calibration and performance specifications for each meter. The permittee shall document and maintain records of all meter maintenance and calibration activities and submit this information to NHDES in an annual report by January 31 of each year. The permittee shall read source water meters to adequately report the following volumes to the reporting program referenced in condition No. 6 of this permit:
  - a) The 24-hour peak day volume withdrawn from the source during each month; and
  - b) The cumulative total volume withdrawn from the source during each month.
4. Monitoring and Reporting Requirements: The permittee shall establish and maintain the monitoring and reporting program as described below.
  - a) Groundwater Level Monitoring: The permittee shall install a pressure transducer and data logger and measure water levels at a frequency of at least once every four hours in the Squantum Road Well. Water level monitoring shall commence upon initiating a withdrawal from the Squantum Road Well and shall continue indefinitely as a condition of this permit.

All water level monitoring shall be completed by a person who can demonstrate, by education or experience, competency in collecting and reporting hydrogeologic measurements.

Monitoring well locations and frequencies may be added or changed if the water level data obtained contradict the information provided in the permittee's application, or if additional data points are required to assess the potential for adverse impacts to occur.

- b) Wetland Monitoring: The permittee shall implement the wetland monitoring program as described in the Final Report Addendum titled "Supplemental Submittal: Responses to NHDES Comments on 'Final Report: Major Large Groundwater Withdrawal and New Large Production Well for Community Water Systems Permit Application for Squantum Road Well, Jaffrey, New Hampshire'" prepared for the permittee by AECOM, dated November 25, 2009, incorporated herein by reference, subject to the following conditions:
  - i. Monitoring shall occur using the methods proposed, and at the frequency proposed, at the on-site wetland monitoring locations listed in Table 1 titled "Wetland Monitoring Network" and depicted in Figure 1 titled "Wetlands Monitoring Network" of the above-referenced submittal; and the proposed

reference wetland located in Sharon, New Hampshire (Tax Map 7, Lot 6), which is outside of the zone of contribution of the Squantum Road Well.

- ii. Monitoring shall occur at the schedule proposed in Table 4 titled "Proposed Monitoring Schedule and Checklist" of the above-referenced submittal.
- iii. Critical water levels which trigger a response by the permittee shall be those listed in Table 3 titled "Wetland Monitoring Trigger Levels" of the above-referenced submittal.
- iv. To determine whether a water level monitoring trigger is met, the permittee shall obtain and review the water level monitoring data collected at those monitoring points outfitted with transducers and connected to the permittee's SCADA system on a minimum of a biweekly basis between April 1<sup>st</sup> and October 31<sup>st</sup>.
- v. In the event that the criteria for "Tier One" or "Tier Two" triggers are met, as described in Table 2 titled "Squantum Road Well Wetland Monitoring Trigger Levels and Responses" for "Wetland 1 Groundwater Levels" and "Wetland 2 Dug Pond Surface Water Levels" of the above-referenced submittal, the permittee shall increase the monitoring frequency to that presented in the response plans proposed in Table 2 of the above-referenced submittal.
- vi. In the event that the criteria for "Tier Three" triggers are met, as described in Table 2, the permittee shall follow the management procedures described in condition No. 5d of this permit.

The wetland monitoring program shall continue indefinitely as a condition of this permit. All work shall be conducted under the direct oversight of a New Hampshire Certified Wetland Scientist. Results of the wetland monitoring and surveys must provide a determination as to whether or not an adverse impact has occurred, may occur, or has not occurred over the monitoring period.

An annual monitoring report and all monitoring data shall be submitted to NHDES annually by January 31 of each year. The annual monitoring report shall note any relevant observations that may affect the water level measurements or wetland plot observations and include all field notes documenting the monitoring activities for the preceding year. All field notes shall be signed and dated by the personnel responsible for collecting measurements. The results of the tri-annual wetland surveys and associated impact assessment shall be included in the annual monitoring report unless requested sooner by NHDES.

The annual monitoring report and all monitoring data collected per section 4b above shall be submitted in an electronic format and hard copy format. All water level monitoring data collected per section 4a above shall be submitted in an electronic format only.

## 5. Mitigation Requirements

- a) In the event that an adverse impact occurs, the permittee shall comply with all of the requirements below and with the impact mitigation and source replacement requirements of Env-Wq 403.

- b) Prior to initiating the large groundwater withdrawal, the permittee shall notify in writing via certified mail the owners of all properties served by private wells within the area estimated to be the influence area of the Squantum Road Well, as depicted in Figure 8 titled "180-Day Cone of Depression Evaluation" included in the Final Report titled "Final Report: Major Large Groundwater Withdrawal and New Large Production Well for Community Water Systems Permit Application for Squantum Road Well, Jaffrey, New Hampshire," prepared by AECOM, Inc. for Jaffrey, dated April 29, 2009. The permittee shall provide a map depicting the locations of the properties notified, a copy of the notification letter, and copies of the certified return mail receipts to NHDES. The permittee shall explain to property owners with wells in the identified area that their well may be influenced by the withdrawal at the Squantum Road Well. The permittee shall provide the property owners with contact information for both the permittee and NHDES in the event they believe they may be adversely impacted by the withdrawal.
- c) Where the status of an unanticipated impact is not clear, the permittee shall gather information needed to quantify the impact and determine its status relative to the adverse impact criteria defined under RSA 485-C:21, V-c and provide this information to NHDES within 48 hours of being notified by NHDES. A verified adverse impact shall be mitigated in accordance with Env-Wq 403.
- d) NHDES will routinely review the results of all monitoring data, and if water level monitoring data indicate that groundwater is being extracted at a rate that exceeds natural recharge on average, then NHDES will modify the permit in accordance with Env-Wq 403 in order to prevent adverse impacts from occurring. In addition, the permittee shall operate the Squantum Road Well in accordance with the management procedures described below:

#### STAGE I MANAGEMENT PROCEDURES

In the event that the criteria for "Tier Three" triggers are met as part of the wetland monitoring program of Wetland 1 and Wetland 2 (vernal pool), as described in Table 2 of the submittal referenced in section 4b above, production from the Squantum Road Well shall be reduced to 75% of the permitted withdrawal volume such that output from the well does not exceed 127,500 gallons over any 24-hour period.

As part of Stage I Management Procedures, the permittee shall increase the frequency of reporting of all on-site water level measurements to NHDES, and submit all measurements electronically to NHDES by the last day of each calendar month.

#### STAGE II MANAGEMENT PROCEDURES

In the event that the Wetland 1 or Wetland 2 "Tier Three" triggers cited above continue to be met for seven (7) or more consecutive days (1 week) after reducing production from the Squantum Road Well under Stage I Management Procedures, production from the Squantum Road Well shall be reduced to 50% of the permitted withdrawal volume such that output from the well does not exceed 85,000 gallons over any 24-hour period.

As part of Stage II Management Procedures, the permittee shall increase the frequency of reporting of all on-site water level measurements to NHDES, and submit all measurements electronically to NHDES by the 15<sup>th</sup> and last day of each calendar month.

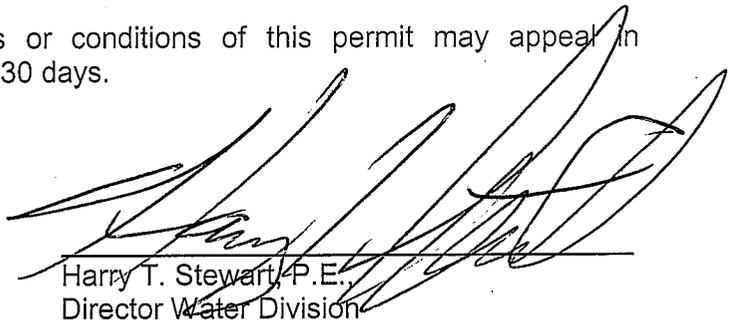
### STAGE III MANAGEMENT PROCEDURES

In the event that the Wetland 1 or Wetland 2 "Tier Three" triggers cited above continue to be met for seven (7) or more consecutive days (1 week) after reducing production from the Squantum Road Well under Stage II Management Procedures, production from the Squantum Road Well shall be reduced to less than 57,600 gallons over any 24-hour period.

As part of Stage III Management Procedures, the permittee shall continue reporting all on-site water level measurements to NHDES electronically by the 15<sup>th</sup> and last day of each calendar month.

6. The permittee shall register its new source of water with the NHDES Water Use Registration and Reporting Program and maintain the water use reporting requirements established by RSA 488, Env-Wq 2102, and this permit.
7. The permittee shall apply for renewal of this permit at least 365 days prior to its expiration date in accordance with Env-Wq 403. The permittee shall continue to comply with all conditions in this permit until the permit is renewed or the facility is closed in accordance with all applicable requirements, regardless of whether a renewal application is filed.

Any person aggrieved by any terms or conditions of this permit may appeal in accordance with RSA 21-O:7, IV within 30 days.



Harry T. Stewart, P.E.  
Director Water Division

## PROJECT NARRATIVE

### Large Well Siting Approval/Large Groundwater Withdrawal Permit LGWP-2010-0001 Jaffrey Water Works, EPA ID 1221010, Squantum Road Well Jaffrey, New Hampshire

February 18, 2010

#### BACKGROUND

The Town of Jaffrey Department of Public Works (Jaffrey) has submitted an application to the New Hampshire Department of Environmental Services (NHDES) requesting approval of a large community production well and issuance of a large groundwater withdrawal permit for the withdrawal of up to 360,000 gallons per day (gpd) or 250 gallons per minute (gpm) over a 24-hour period. Jaffrey is requesting approval for this new well to be used in combination with its existing sources for the purposes of municipal water supply.

The purpose of developing the new community production well (designated the Squantum Road Well) is to: 1) offset production from wells that currently serve the water system and are located in close proximity to sources of contamination; 2) provide source diversity and redundancy for the system; and 3) provide additional water supply capacity for potential future increases in demand.

Jaffrey is currently served by two shallow gravel packed wells, designated the Turnpike Road Well and the Contoocook Lake Well, which have an estimated, combined total production volume of 575 gpm. Both of these sources are vulnerable to nearby contamination threats. In a letter to Jaffrey dated November 24, 2004, NHDES required that the water system identify and develop additional source capacity to meet average daily demand (if either of their existing sources were taken out-of-service) and to meet future demand. These requirements and the proximity of Jaffrey's existing wells to numerous contaminant sources served as the basis for development of the Squantum Road Well in a location that is far less vulnerable to contamination.

The Squantum Road Well is located approximately 2.3 miles southeast of Jaffrey Center in a flat hayfield on the south side of Squantum Road in the east-west trending valley of Squantum Brook in the upper reaches of the Contoocook River drainage basin. To the north of the well, the hayfield grades downward into a broad wetland associated with Squantum Brook; north of the stream, the terrain is relatively flat before rising to low hills. To the south of the well site, the topography gradually rises to a low, wooded hillside.

The well site is underlain by a mapped stratified drift aquifer that extends generally from Hubbard Pond southeast of the well site, northwestward and westward toward Contoocook Lake and the Contoocook River valley. The portion of the aquifer that underlies the well site is an east-west trending band of drift deposits that are constricted between till-covered/bedrock hills to the north and south. The deposits underlying the well site are comprised mostly of interlayered sands and gravels; poor sorting and finer-grained layers are common within the deposits. The aquifer is thin and shallow, with a total thickness on the order of 30 feet and a saturated thickness of approximately 22 feet, and may be considered unconfined or semi-confined. The Squantum Road Well is screened from a depth of 24 feet to 29 feet below ground surface in the stratified sand and gravel deposits. The drift deposits are underlain by till, which in turn is underlain by schist and metasandstone bedrock of the Rangely Formation.

Squantum Brook drains the valley between the hills to the north and south of the well site and flows westward past the well site to Contoocook Lake approximately 0.75 miles downstream. Upgradient of the well site, the potential impact area for the withdrawal from the Squantum Road Well encompasses the entire watershed of Squantum Brook, extending into the towns of New Ipswich, Rindge, and Sharon. In the downgradient direction, the potential impact area includes the mapped extent of the stratified drift aquifer deposits, and terminates at Contoocook Lake.

## **WITHDRAWAL TESTING AND CONCLUSIONS**

A withdrawal testing program was conducted by AECOM, Inc. (AECOM) from November 5, 2008 through November 21, 2008. The purpose of withdrawal testing is to provide data to estimate long-term sustainable water quantity and quality; observe the response of the aquifer to pumping; evaluate the degree of hydraulic connection with overlying deposits; and, assess the potential for adverse impacts to water resources and users that may result from the proposed withdrawal. The withdrawal testing program included monitoring during pre-pumping, pumping, and water level recovery periods, where the Squantum Road Well was pumped at 250 gpm between November 12, 2008 and November 18, 2008.

Discharge from the well was metered during the withdrawal testing program to maintain a constant pumping rate, and water quality samples were collected during the pumping period to characterize the quality of the water derived from the well.

During the withdrawal testing program, water level measurements were collected at: the Squantum Road Well; seven on-site overburden monitoring wells; three off-site overburden monitoring wells; seven on-site piezometer couplets; and eight on-site surface water staff gauges. Surface water flow measurements were also collected in Squantum Brook at two gauging stations, one upgradient and one downgradient of the well site. Piezometer and surface water level and flow measurements were recorded to assess the degree of hydraulic connection between the aquifer, Squantum Brook, and the surrounding wetlands.

The nearest private domestic wells to the well site (within the 180-day zone of influence of the withdrawal and its 1,000-foot buffer) are approximately 0.8 miles southeast and are presumed to be installed in bedrock as stratified drift deposits are not mapped in the area. As such, no private domestic wells were monitored during the withdrawal testing program.

Water level measurements collected during the withdrawal testing program indicate that all of the on-site overburden monitoring wells and most of the piezometer couplets and some wetland staff gauges responded to pumping of the Squantum Road Well. Water levels in the off-site overburden monitoring wells did not respond to pumping of the Squantum Road Well. Additionally, observations of surface water levels and flows in Squantum Brook during the withdrawal testing program indicate that the withdrawal from the well did not affect streamflow.

Pumping-induced drawdown of water levels in the on-site monitoring wells ranged from approximately 0.6 feet to 5.4 feet and was greatest in wells located closest to the production well. In the piezometer couplets (predominantly located in wetland areas), pumping-induced drawdown was on the order of 2 feet to 4 feet and was generally greater in piezometers screened at greater depth intervals (4 feet to 6 feet) than in those screened at shallower depth intervals (2 feet to 3 feet).

Based on graphical projections of water level responses in the overburden monitoring wells that assume 180 days of continuous pumping with no net recharge from precipitation to the aquifer, and inference from the refined conceptual hydrologic model of the withdrawal, pumping-induced drawdown is estimated to extend on the order of 3,050 feet to the east (upgradient) of the well site. To the north and south (side-gradient) of the well site, the 180-day zone of influence of the withdrawal is estimated to extend to the mapped limits of the stratified drift aquifer deposits. To the west (downgradient) of the well site, the 180-day zone of influence is estimated to extend 600 feet.

Under the same projected conditions (i.e., 180 days of continuous pumping with no net recharge), the pumping-induced drawdown of the shallow water table beneath the wetland north of the well and a dug pond (vernal pool) to the west of the well, is estimated to range from approximately 4.9 feet to 7.7 feet.

Overall, based on monitoring results presented in the final report, a production rate of 360,000 gpd (250 gpm) is a production rate that the well and aquifer can sustain. However, a functions and values assessment of the wetland complex completed by AECOM concluded that a groundwater withdrawal at this rate during the growing season (April 1<sup>st</sup> through October 31<sup>st</sup>) would cause groundwater level drawdowns that could negatively affect wetland plant communities and result in a net loss of wetlands values, which is a criterion for adverse impacts under RSA 485-C:21, V-c. Therefore, Jaffrey is requesting approval of the Squantum Road Well at a reduced production rate of 170,000 gpd (approximately 118 gpm) during the growing season, a production rate that is projected not to cause drawdowns that could result in adverse impacts to wetlands.

Results of the water quality sampling conducted during the withdrawal testing program indicate that each parameter, with the exception of manganese and pH, was below the applicable Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL). Water quality testing results indicated an increasing trend in the concentration of manganese in water derived from the Squantum Road Well; over the course of the withdrawal testing program, the manganese concentration increased from "Not Detected" to 0.24 milligrams per liter (mg/l), which exceeds the SMCL of 0.05 mg/l. Results of the water quality sampling program also indicate that the concentration of radon is slightly elevated in water derived from the Squantum Road Well.

## **PUBLIC INVOLVEMENT**

Pursuant to RSA 485-C:21, II through V-a, materials submitted in support of the large groundwater withdrawal permit (the preliminary application, final report, and supplemental materials) were sent (via certified mail) to municipalities and public water suppliers in the potential impact area of the withdrawal. Municipalities that were sent copies of the above-referenced materials are the towns of Jaffrey, New Ipswich, Rindge, and Sharon. No public water suppliers other than the permittee are in the potential impact area. No public hearings were requested, and no public meetings were held regarding the application for this large groundwater withdrawal permit.

## **LARGE GROUNDWATER WITHDRAWAL PERMIT PUBLIC NOTIFICATION, MONITORING, REPORTING AND WITHDRAWAL REQUIREMENTS**

To provide a means for notification in the event of an unforeseen impact, the large groundwater withdrawal permit requires Jaffrey to notify any property owner with a private well within the estimated zone of influence of the Squantum Road Well prior to initiating a large groundwater withdrawal from the well. As part of the notification, Jaffrey must explain to each property owner that their well may be influenced by the withdrawal at the production well and provide them with contact information at Jaffrey and NHDES in the event they believe their well may be impacted by the withdrawal. More information concerning this requirement is provided in the large groundwater withdrawal permit under condition No. 5.

The large groundwater withdrawal permit requires Jaffrey to implement an impact monitoring and reporting program that includes monitoring of the water level in the production well and monitoring of on-site wetlands. General monitoring requirements are summarized as follows:

- On-site well – The permit requires that water levels in the Squantum Road Well be monitored so that water level fluctuations in on-site wetlands can be compared to the operation of the production well.
- Wetlands – The permit requires that Jaffrey establish a wetland monitoring program to assess the potential for and/or detect the occurrence of an adverse impact in on-site wetlands via observations of groundwater and surface water levels at piezometers and staff gauges and plant communities in the on-site wetlands and a vernal pool, and a reference wetland located in the town of Sharon, outside the zone of contribution of the Squantum Road Well.

The large groundwater withdrawal permit requires a reduction in the withdrawal from the Squantum Road Well if:

- Trigger water levels are met in the wetland or vernal pool during the growing season; or
- NHDES determines that the withdrawal is not sustainable based on a review of the monitoring data.

In the event that an adverse impact is reported and verified, an impact mitigation program would be implemented in accordance with conditions of the large groundwater withdrawal permit and Env-Wq 403. More information concerning these requirements is provided in the large groundwater withdrawal permit under condition No. 5.

Jaffrey is required to submit an annual monitoring report in hard copy and electronic format to NHDES by January 31<sup>st</sup> of each year. As stipulated in the permit, the annual report shall include a summary of trends and variability observed in the monitoring data, all monitoring data and records required by the permit, and an assessment of the potential impacts associated with the withdrawal from the Squantum Road Well. The annual report will be available to the public for review. A complete description of monitoring and reporting requirements is presented in more detail in the large groundwater withdrawal permit under condition No. 4.