



The  
NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

hereby issues

LARGE GROUNDWATER WITHDRAWAL PERMIT

NO. LGWP-2008-0004

to the permittee

VILLAGE DISTRICT OF EASTMAN  
P.O. BOX 990  
GRANTHAM, NH 03753  
(603-863-6512)

for the withdrawal of the following volume of groundwater from the following on-site well located west of Bog Brook in Springfield, New Hampshire (Town of Springfield Tax Map ) for the purpose of community water supply:

BRW6 120,960 gallons over any 24-hour period

Date of Issuance: September 15, 2008  
Date of Expiration: September 15, 2018

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 BRW6 subject to the following conditions:

1. The permittee shall comply with the requirements of Env-Ws 388 and RSA 485-C at all times.
2. Water Conservation: Implement the approved Water Conservation Plan dated July 30, 2007 and approved on August 21, 2007 in accordance with Env-Ws 390.
3. Metering Requirements: Withdrawals from all sources must be metered at all times. The permittee shall read source water meters at least once every 30 days. All meters must be selected, installed, tested, and maintained in accordance with the AWWA M6 manual as referenced in Env-Ws 390. 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.
4. Monitoring and Reporting Requirements
  - a) The permittee shall establish and maintain the monitoring and reporting program as described below and as described in: Section 11.10 of the report titled "Final Pump Test Report" prepared by GS Environmental and Groundwater Associates, Inc. dated May 12, 2008 incorporated herein by reference.
  - b) Existing Off-site Private Residential Bedrock Wells Water Level Monitoring: The permittee shall install pressure transducers and data loggers and measure water levels at a frequency of at least every four hours in the following private wells starting six months prior to system startup:

Tax Map-Lot	Address
20080004DW01	
20080004DW02	

If a private well owner denies permission to monitor water levels or if the identified well cannot be monitored due to a structural limitation, then the permittee shall propose an alternative monitoring location to NHDES for approval. Upon receiving approval from NHDES, the permittee shall install the monitoring well, if not already available, and monitor water levels at the alternative location at the same frequency as the original monitoring well proposed.

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.

All monitoring data shall be submitted to NHDES annually by January 31 of each year. The submittals shall be in an electronic format and hard copy format. The annual report shall note any relevant observations that may affect water level measurements 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.

#### 5. Mitigation Requirements

- a) In the event that adverse impacts occur, the permittee shall comply with all of the requirements below and with the impact mitigation and source replacement requirements of Env-Ws 388.
- b) Prior to initiating the large groundwater withdrawal, the permittee shall notify any lot owner with a private or public well within the area identified as "180 Day Cone of Depression" on Figure 36, titled "Proposed Bedrock Well Monitoring Location Map", included in the final report titled "Final Pump Test Report" prepared by GS Environmental and Groundwater Associates, Inc. dated May 12, 2008. The permittee shall provide a copy of the notification letter and copies of certified returned mail receipts to NHDES. The permittee shall explain to lot owners with wells in the identified area that their well may be influenced by the withdrawal at well BRW6. The permittee shall provide these owners with contact information for both the permittee and NHDES in the event they believe they may be adversely impacted by the withdrawal.
- c) The permittee shall notify NHDES of any adverse impact within 12 hours of receiving such information. Furthermore, the permittee shall provide potable water for drinking and cooking purposes to a well owner that NHDES has determined to be adversely impacted. The permittee shall have 12 hours to provide drinking and cooking water after being notified of an occurrence of an adverse impact. The permittee shall provide potable water for other domestic uses within 36 hours of being notified of an adverse impact (e.g., lower well pump, install higher capacity well pump, drill a new well, or truck bulk water to the property). A permanent alternative water supply that produces water quality that complies with Federal and State drinking water quality requirements and a quantity of water that complies with the requirements of RSA 485-C:21 V-c, shall be provided to an adversely impacted water user within 30 days of NHDES determining that a water user had been adversely impacted.

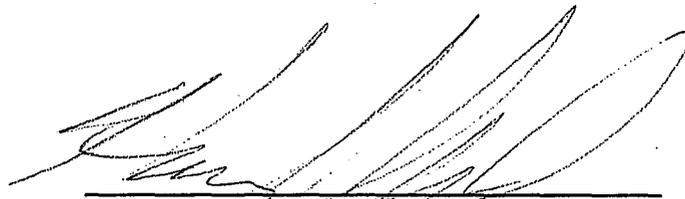
Contracts with companies capable of providing water and well services (including drilling of new wells) must be developed and maintained prior to and after initiating the withdrawal such that in the event that impacts are noted at private wells, mitigation steps can be undertaken expeditiously. Copies of these contracts shall be provided to NHDES prior to initiating the large groundwater withdrawal.

- d) Where the status of unanticipated impact is not clear, the permittee shall gather information needed to quantify the impact and determine its status relative to 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 as described in paragraph c), above.

- e) 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-Ws 388 in order to prevent adverse impacts from occurring.
- 6. The permittee shall register its new sources of water under the Registered Water User Program and maintain the water use reporting requirements established by RSA 488.
- 7. The permittee shall apply for renewal of this permit at least 365 days prior to its expiration date. 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-2008-0004  
Village District of Eastman, EPA 0951010  
Well BRW6  
Grantham, New Hampshire**

### BACKGROUND

The Village District of Eastman (VDE), located in Grantham and Springfield, NH, has submitted documentation to the New Hampshire Department of Environmental Services (NHDES) requesting approval of a large community water supply well and issuance of a large groundwater withdrawal permit for the withdrawal of up to 120,960 gallons per day (gpd) or 84 gallons per minute (gpm) over a 24-hour period.

The purpose of the new community bedrock production well (designated BRW6) is to supplement the potable water needs of VDE. VDE is seeking additional supply capacity to: offset a loss in water supply capacity that the system experienced due to failure of an approved source approximately four years ago; bring the water system into compliance with the large community water system design standards; and, prepare for the potential addition of 240 new homes to the system which would bring the development to full build-out. Currently, VDE has a total pumping capacity of approximately 385,920 gpd from two sources; one of which is a wellfield of 19 dug wells [Source #1] that produces a combined yield of between 110 and 150 gpm, the other is a gravel packed well [Source #RW4] with a permitted production volume of 158 gpm. In 2005, VDE lost production capacity from a second gravel packed well [Source #2] and its replacement [Source RW#2] due to declines in yield and poor water quality. Since 2005, VDE has drilled numerous wells near their existing water treatment plant to acquire more capacity with little to no success.

BRW6 is located in VDE's existing water supply wellfield, near the western limit of the town of Springfield and within the watershed of Bog Brook. The watershed upgradient of the new well covers an area of about 20 square miles, draining the western slopes of hills that border the eastern limit of Springfield (within the Giles State Forest) and the catchment for McDaniels Marsh (a state designated wildlife management area). The Bog Brook watershed drains southwesterly to the greater watershed of the Sugar River via its north branch, a portion of which was included in the potential impact area for BRW6.

The watershed of Bog Brook is characterized by moderately sloped hillsides mantled with a relatively thin layer of glacial till. These hills generally transition into an extensive coarse-grained stratified drift deposit that occupies topographically flat areas within the center axis of the Bog Brook valley. VDE's dug well field and gravel packed water supply well are installed in this stratified drift unit proximal to Bog Brook. BRW6 is located about 500 feet west of the limit of the stratified drift deposits and is reported to have encountered about 25 feet of glacial till. BRW6 was completed to a total depth of approximately 1,200 feet within bedrock that was observed to be a weakly fractured gneiss with one, predominant water bearing fracture located at a depth of about 596 feet below ground surface.

## WITHDRAWAL TESTING AND CONCLUSIONS

A withdrawal test program was conducted by GS Environmental and Groundwater Associates, Inc. (GS Environmental) from January 23, 2008 to March 5, 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 between private water supply wells and Bog Brook; 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 BRW6 was originally pumped at 115 gpm between February 7 and 11, 2008; and then reduced to 85 gpm between February 11 and 14 when it was determined that the higher pumping rate may cause drawdown below the predominant water bearing zone in the well.

Water level measurements were collected during the withdrawal testing program at on-site locations consisting of three overburden wells, three bedrock wells, two shallow piezometers and two surface water monitoring points. Additionally, water level measurements were collected off-site at ten private residential bedrock wells. The distance between the private wells monitored and BRW6 ranged from 2,000 to 7,800 feet; where half of the wells were north of BRW6, in and around west Springfield, and the other half to the south within close proximity to Grantham/Springfield town boundary. The discharge was metered to maintain a constant rate during the withdrawal test and water quality samples were collected during the pumping period to characterize the water quality derived from the well.

Results of water level measurements collected during the withdrawal testing program indicate that one of the on-site bedrock monitoring wells responded to the pumping of BRW6. The pumping-induced drawdown of the water level in the bedrock monitoring well was approximately 241 feet after seven days of pumping and, when compared to no response in the two other on-site bedrock monitoring wells at the well field, implies a relatively discrete nature to the influence area of BRW6, consistent with observations made during well drilling. None of the overburden wells, piezometers or surface water monitoring points responded to pumping BRW6, indicating that the glacial till overlying bedrock at this location has low vertical permeability and may isolate shallow groundwater flow and/or surface water from the effects of pumping within the bedrock aquifer. In addition, no water level response was observed in any of the private residential wells monitored during the withdrawal testing program. Overall, based on withdrawal test monitoring results presented in the final report, a production rate of 120,960 gpd (84 gpm) appears to be a rate that the well and the geologic formation can sustain.

Results of water quality sampling conducted during the withdrawal testing program indicate acceptable water quality, with all standard drinking water parameters below applicable Maximum Contaminant Levels (MCLs). In addition to the standard analytical parameters, a microscopic particulate analysis (MPA) sample was collected at the end of the pumping test program to assess the potential for the water from the well to be designated groundwater under the direct influence of surface water (GWUDI). Although results of the MPA sample indicated a moderate risk of BRW6 being GWUDI due to the presence of algae in water pumped from the well, lack of supporting information from field screening data and water level monitoring conducted during the withdrawal test indicates that the presence of algae may be a relic of ambient conditions in the bedrock aquifer.

## **PUBLIC INVOLVEMENT**

Pursuant to RSA 485-C:21-II through V-a, materials submitted in support of the large groundwater withdrawal permit (the preliminary permit application, final report, supplemental materials etc.) were sent (via certified mail) to municipalities and public water suppliers in the potential impact area. The entities that were sent copies of the above-referenced materials included 13 towns and 11 community water systems. Although a public hearing was not requested following submission of the preliminary application for the withdrawal, an informal meeting regarding the large withdrawal permitting process was requested by the town of Springfield and held at the Springfield town hall on August 2, 2007. No comments were received by NHDES following the informal meeting. A public hearing was requested by the town of Springfield following submission of the final report and was held by NHDES on June 17, 2008 at the Springfield town hall. NHDES received no comments at the public hearing or during the 45-day comment period following the public hearing.

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

The large groundwater withdrawal permit requires VDE to notify any lot owner with a private or public well within an area surrounding BRW6 identified as the zone of influence after 180 days of pumping at 84 gpm with no recharge to groundwater from precipitation or snowmelt. As part of this notification, VDE must explain to the lot owners with wells in the identified area that their well may be influenced by the withdrawal at BRW6 and provide them with contact information at VDE and NHDES in the event they believe they may be adversely impacted by the withdrawal. More information concerning this requirement is provided in the large groundwater withdrawal permit (LGWP-2008-0004) under condition No. 5.b).

VDE is required to conduct a water level monitoring program that includes the monitoring of two off-site private residential bedrock wells to assess the potential for and/or detect the occurrence of adverse impacts. An impact mitigation program would be implemented in accordance with conditions of the large groundwater withdrawal permit and Env-Ws 388 if an adverse impact is observed and verified. The program would implement actions necessary to mitigate the impact including reduction of the withdrawal volume, implementation of water use limitations, replacement of impacted sources with an alternative water supply at no initial capital cost to the user, and increases in the monitoring frequency of the withdrawal monitoring network to assess performance of the mitigation program.

VDE is required to submit an annual report in hard copy format and electronic format to NHDES by January 31 of each year. As stipulated in the permit, the annual report will include a summary of trends and variability observed in the site monitoring network, all monitoring data and records required by the permit, and an assessment of the potential impacts associated with the withdrawal. The annual report will be made 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 (LGWP-2008-0004) under condition No. 4.