



The

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

hereby issues

LARGE GROUNDWATER WITHDRAWAL PERMIT

NO. LGWP-2009-0001

to the permittee

COLEBROOK WATER WORKS  
10 BRIDGE STREET  
COLEBROOK, NH 03576  
(603-237-4142)

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

PW-5, 302,400 gallons over any 24-hour period;

Date of Issuance: November 2, 2009

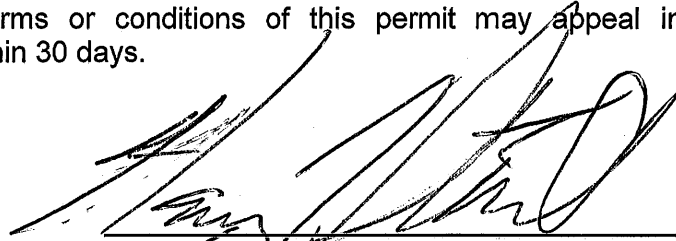
Date of Expiration: November 3, 2019

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 well PW-5 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: The permittee shall implement the approved Water Conservation Plan, dated September 9, 2009, in accordance with Env-Wq 2101 and NHDES' conditional approval dated November 2, 2009.
3. Metering Requirements: Withdrawals from all sources 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. 5 of this permit:
  - a) The 24-hour peak day volume withdrawn from each source during each month; and
  - b) The cumulative total volume withdrawn from each source during each month.
4. 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 the influence area on Figure 29, titled "180-Day Projected Pumping Conditions Head Contours", included in the final report titled "Final Report to NHDES for the Town of Colebrook, New Hampshire – New Well PW-5" prepared by HydroSource Associates, Inc. dated May 26, 2009. 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 PW-5. 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) 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 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-Ws 388.
5. The permittee shall register its new source of water with the Water Use Registration and Reporting Program and maintain the water use reporting requirements established by RSA 488 and this permit.
6. 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.

A handwritten signature in black ink, appearing to read "Harry T. Stewart", is written over a horizontal line.

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

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## PROJECT NARRATIVE

### Large Well Siting Approval/Large Groundwater Withdrawal Permit LGWP-2009-0001 Colebrook Water Works, EPA ID 0481010, PW 5 Colebrook, New Hampshire

October 14, 2009

#### BACKGROUND

The Town of Colebrook Water Department, located in Colebrook, NH, has submitted an application to the New Hampshire Department of Environmental Services (DES) requesting approval of a large community production well and issuance of a large groundwater withdrawal permit for the withdrawal of up to 302,400 gallons per day (gpd) or 210 gallons per minute (gpm) over a 24-hour period.

The purpose of the new community production well (designated PW-5) is to reduce the water system's reliance on the production wells that currently serve the water system, and provide additional water supply capacity for potential future increases in demand. The two existing wells serving the water system are shallow gravel packed wells, designated GPW-1 and GPW-2, with an estimated, combined total production volume of 650 gpm. GPW-1 and GPW-2 were installed in the 1960s within a densely populated and developed area of Colebrook Village, and their close proximity to numerous potential contaminant sources served as the basis for development of PW-5 in a location that was far less vulnerable. When PW-5 is brought online, it will operate as the primary source for the water system and GPW-1 and -2 will operate in a redundant or secondary role.

PW-5 is located approximately 1.5 miles north of Colebrook Village, on a 70+/-acre former hay field positioned along the west bank of the Connecticut River, within its floodplain. To the east of the PW-5 well site lies NH State Route 3 (approximately 1,200 feet away) and Piper Hill. Although a significant portion of the Connecticut River watershed extends north of the well site, the portion of the watershed that contributes flow directly to PW-5 is the Dyer Brook watershed which drains the west-facing flank of Piper Hill east of the well; and, to a lesser degree, the Willard Stream watershed located in Vermont, on the west side of the river. Dyer Brook drains westerly, from the till-covered bedrock highlands of Piper Hill, onto the valley floor, where it routes through numerous wetland areas and bogs to discharge into the Connecticut River greater than 1,000 feet south of the well site. The potential impact area for the withdrawal from PW-5 encompasses the entire Dyer Brook and Arlin Brook watersheds in New Hampshire, and a portion of the Willard Stream watershed in Vermont.

The overburden unit encountered at the PW-5 well site is typical of that present through much of the Connecticut River valley in this area. The upper 15 to 30 feet of soil consists of a combination of silt, sand and occasional gravel, which is interpreted as a mixture of over bank (flood bank) deposits and reworked (eroded) materials deposited on the floodplain by tributaries that drain the bordering till-covered hillsides. Below these near surface deposits, a silty clay unit that ranges in thickness from 67 to 188 feet is prevalent, at the PW-5 location this unit was observed to be approximately 115 feet thick. This clay and silt sequence is interpreted to be a lakebed or 'varve' deposit which developed from still-water sediment accumulating at the bottom of Glacial Lake Colebrook, which, itself, is believed to have occupied much of the Connecticut River valley in this area of the state. Underlying these clay deposits is a basal gravel unit with a

range in thickness up to about 55 feet. This unit appears to have originated as outwash from fast-moving glacial meltwater present at the base or terminus of an actively receding glacier. This gravel layer is the water bearing zone screened by PW-5 where approximately 19 feet of the unit was encountered at about 141 feet below the ground surface.

## **WITHDRAWAL TESTING AND CONCLUSIONS**

A withdrawal testing program was conducted by Hydrosource Associates Inc. (Hydrosource) from December 3, 2008 through December 18, 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 PW-5 was pumped at 210 gpm between December 10 and 16, 2008.

Water level measurements were collected during the withdrawal test program at five on-site overburden well locations, two on-site shallow groundwater piezometers, three surface water staff gauges, one stream flow gage in Dyer Brook, and four off-site private water supply wells. Shallow piezometer and surface water measurements were recorded to assess the degree of hydraulic connection between the well and Dyer Brook, surrounding wetlands and the Connecticut River. The private domestic wells monitored during the pumping test are located off of NH Route 3 to the east of the well site, at distances ranging between 1,500 feet and 3,500 feet from PW-5, respectively. Based on records at DES and a review of drilling records conducted by Hydrosource, all of the private water supply wells are installed in bedrock. Discharge was metered during the withdrawal testing program to maintain a constant rate, and water quality samples were collected during the pumping period to characterize the quality of the water derived from the well.

Water level measurements collected during the withdrawal testing program indicate that most of the on-site wells screened in the basal gravel layer responded to pumping of PW-5. The pumping-induced drawdown of water levels ranged from 7 feet to 62 feet in these wells and was greatest in wells located closest to the production well. Based on a graphical projection of water level response that assumes 180-days with no net recharge to the basal gravel unit, pumping-induced drawdown in the unit is estimated to extend on the order of 1,600 feet from the well and be elongated in the direction in which the unit is most continuous. In contrast, a lack of water level response in shallow piezometers, staff gages and the flow metering station installed around/in Dyer Brook and wetlands areas (relative to nearby deeper monitoring points) indicates that the overlying lakebed clay unit is an effective confining unit that restricts direct hydraulic connection between the basal gravel unit and shallower deposits. Water level drawdown on the order of 3 feet was observed in one of the private bedrock wells located northeast (upgradient) of PW-5 and imply that the basal gravel unit is in hydraulic communication with a shallow fracture network in the vicinity of this well. Relative to the volume of water available in the well, its pump depth, and its total depth; however, a drawdown on the order of that observed under an assumed condition of constant pumping of PW-5 does not present the potential to cause an adverse impact. Overall, based on monitoring results presented in the final report, a production rate of 302,400 gpd [210 gpm] is a production rate that the well and 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).

## **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 of the withdrawal. The towns of Colebrook and Stewartstown were sent copies of the above-referenced materials. No public meetings 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**

No initial monitoring of water levels at water users or resources are incorporated into the permit due to the lack of substantial influence of PW-5 on these entities. In order to provide a means for notification in the event of an unforeseen impact, Colebrook Water Works is required to notify and provide contact information to all public and private water users within the potential zone of influence of PW-5 once the water system brings the well online. 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-Ws 388. 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 establishing a monitoring network to assess performance of the mitigation program. More information concerning these requirements is provided in the large groundwater withdrawal permit (LGWP-2009-0001) under condition No. 4.