



The
NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

hereby issues

LARGE GROUNDWATER WITHDRAWAL PERMIT

NO. LGWP-2011-0001

to the permittee

WATERVILLE VALLEY WATER DISTRICT
2 TRIPOLI ROAD
PO BOX 500
WATERVILLE VALLEY, NH 03215
(603) 236-4730

for the withdrawal of up to the following volume of groundwater from the following source for the purpose of community water supply:

WTV-4 288,000 gallons over any 24-hour period, or, 432,000 gallons over any 24-hour period subject to the production rate schedule established by Condition No. 4 of this permit.

Date of Issuance: September 12, 2011
Date of Expiration: September 12, 2021

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 WTV-4 subject to the following conditions and limitations:

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 September 2011, in accordance with Env-Wq 2101 (formerly Env-Ws 390) and NHDES' conditional approval dated September 6, 2011.
3. Metering Requirements: The withdrawal from WTV-4 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. 8 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 - a) The 24-hour peak day volume withdrawn from the source during each month; and
 - b) The cumulative total volume withdrawn from the source during each month.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. Production Rate Schedule: The permittee shall implement and maintain the production schedule program as described in the submittal prepared by Emery and Garrett Groundwater, Inc. (EGGI), dated June 17, 2011, incorporated herein by reference and described below:
 - a) Year-round permissible production rate for WTV-4: 288,000 gallons per day [gpd] (200 gallons per minute [gpm]);
 - b) Limited-duration maximum permissible production rate for WTV-4: 432,000 gallons per day [gpd] (300 gpm), subject to the following restrictions:
 - i. The total consecutive days of use of WTV-4 in one production period at the maximum production rate of 300 gpm shall not exceed 60 days; and
 - ii. The total cumulative days of use of WTV-4 at the maximum production rate of 300 gpm shall not exceed 120 days per calendar year.

The production rate schedule prescribed herein shall be continuously recorded and summarized in the annual report required by condition No. 6 of this permit.

5. 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 implement the groundwater level monitoring program as described in the submittal prepared for the permittee by EGGI dated June 17, 2011, incorporated herein by reference. Monitoring shall occur using the methods proposed, and at the frequency proposed, at the following wells:

Production well WTV-4;
Monitoring wells WTV-S14, WTV-5D, WTV-5S and WTV-S11.

Groundwater level monitoring shall commence at least 30 days prior to initiating a withdrawal from WTV-4 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.

- b) Surface Water Monitoring: The permittee shall implement the surface water monitoring program as described in the submittal titled 'Proposed Long-Term Low-Flow Impact Assessment Program' prepared for the permittee by EGGI, dated June 17, 2011, and incorporated herein by reference. Monitoring shall be conducted using the methods proposed, and at the frequency proposed in the program, subject to the following conditions:
- i. The location of the stream flow measurement station within the affected stream reach of Depot Camp Brook is subject to the prior approval of the US Forest Service (USFS) as part of the Environmental Assessment for Waterville Valley's use of WTV-4 on federal lands.
 - ii. A copy of the preliminary habitat and aquatic habitat survey results shall be provided to NHDES with the first annual report referenced in Condition No. 6 of this permit.

Surface water monitoring and implementation of the low-flow assessment program shall commence at least one year prior to initiating a withdrawal from WTV-4 and shall continue indefinitely as a condition of this permit. All work shall be conducted by a person who can demonstrate, by education or experience, competency in collecting and reporting hydrologic measurements and conducting aquatic assessments. Results of the low-flow assessment program 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 as a result of the groundwater withdrawal.

- c) Wetland Monitoring: The permittee shall implement the wetland monitoring program as described in the submittal titled 'Proposed Long-Term Wetland Monitoring and Protection Program' prepared for the permittee by EGGI, dated June 17, 2011, incorporated herein by reference. Monitoring shall be conducted using the methods proposed, and at the frequency proposed in the program, subject to the following conditions:
- i. The final locations of the three wetland plots included in the monitoring program are subject to the prior approval of the USFS as part of the Environmental Assessment for Waterville Valley's use of WTV-4 on federal lands. There shall be no less than two wetland plots within the influence area of WTV-4 in areas where shallow water levels were observed to respond to pumping from the well, and one control plot outside of the estimated influence area of the well.
 - ii. A functions and values assessment of the wetlands shall be completed prior to initiating the withdrawal from WTV-4. A copy of the wetlands functions and values assessment shall be provided to NHDES with the first annual report referenced in Condition No. 6 of this permit.

Wetland monitoring shall commence at least one year prior to initiating a withdrawal from WTV-4 and 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 as a result of the groundwater withdrawal.

Monitoring locations and frequencies may be added or changed if the 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.

6. Reporting Requirements

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 groundwater, surface water, or wetland 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 low-flow assessment program and wetland surveys and associated impact assessment shall be included in the annual monitoring report unless requested sooner by NHDES. The annual report shall also summarize the production rate schedule and use of WTV-4 to demonstrate adherence to condition No. 4 of this permit.

The annual monitoring report and all monitoring data collected per conditions Nos. 4 and 5 above shall be submitted in an electronic format and hard copy format. All water level monitoring data collected per condition No. 5a above shall be submitted in an electronic format only.

7. 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) Where the status of an unanticipated impact is not clear, the permittee shall obtain 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.
 - c) 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 withdrawal in accordance with the production rate schedule described in condition No. 4.
8. 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.
 9. 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.

A handwritten signature in black ink, appearing to read 'Harry T. Stewart', is written over a solid 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-2011-0001 Waterville Valley Water District, PWS ID 2441010, WTV-4 Waterville Valley, New Hampshire

September 12, 2011

BACKGROUND

The Town of Waterville Valley Water District, located in Waterville Valley, NH, 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 432,000 gallons per day (gpd) or 300 gallons per minute (gpm) over a 24-hour period.

The purpose of the new community production well (designated WTV-4) is to provide additional water supply capacity for potential future increases in demand. The system is currently served by three shallow gravel wells with an estimated, combined total production volume of about 270 gpm; one well is relatively low yield (40 gpm) and is designated a backup well only. When WTV-4 is brought online, it will operate as one of the water system's primary sources.

WTV-4 is located approximately one-half mile north of the village of Waterville Valley in a topographic 'bowl' occupying a relatively mountainous region of the Sandwich Range. The well location and surrounding area is in the upper headwater area of the Mad River and within the White Mountain National Forest; as such, use of WTV-4 is subject to a Special Use Permit issued by the US Forest Service (USFS) to the Town of Waterville Valley. The area surrounding the well is not developed and primarily wooded with a well-established network of trails used for hiking, biking, skiing and other outdoor recreation. WTV-4 is installed on the eastern flank of a gently sloped, flat-topped hill that resides between the Mad River and its West Branch, within a small subwatershed of the river referred to as the Depot Camp Brook watershed. Four tributaries present a few hundred feet east of WTV-4 converge south of the well to form Depot Camp Brook, which, in turn, flows southerly into the Mad River about 1,500 feet from the well. The potential impact area for the withdrawal from WTV-4 is limited by topographic divides along ridge lines to the west, north, and east of the well and extends southerly along the Mad River about 2.5 miles, encompassing an approximate 25 square mile area that makes up much of the Mad River's upper headwater area in the valley.

The overburden unit encountered at the WTV-4 well site consists of a combination of fine- to coarse-grained sand with variable amounts of gravel, cobbles and boulders, and is interpreted as deltaic deposits that were deposited within a glacial lake that is believed to have occupied much of the valley area. This unit is the water bearing formation for WTV-4 and is observed to range in thickness from 14 to 75 feet in the vicinity of the well. Farther to the east/northeast of the well site this unit is locally overlain/interlayered with finer grained and less permeable silt and clay deposits of similar origin. To the east and south, the extent of this deltaic unit is constrained by bordering finer grained units interpreted as post-glacial stream terrace and/or alluvial deposits that are comprised of reworked or eroded native material from the surrounding hillsides. Underlying these shallow soil deposits at the well site and throughout most of the valley is a dense glacial till which, in turn, veneers much of the surrounding highlands and mountainous areas.

WITHDRAWAL TESTING AND CONCLUSIONS

A withdrawal testing program was conducted by Emery & Garrett Groundwater, Inc. (EGGI) from October 17, 2007 through November 12, 2007. 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 that may result from the proposed withdrawal. The withdrawal testing program included monitoring during pre-pumping, pumping, and water level recovery periods, where WTV-4 was pumped at 300 gpm between October 25 and November 1, 2007.

Water level measurements were collected during the withdrawal testing program at 18 overburden well locations, five shallow groundwater piezometers installed within or adjacent to nearby wetlands, one dug [tile] well, three surface water staff gauges, and two stream flow gages in tributaries to Depot Camp Brook. Shallow piezometer and surface water measurements were recorded to assess the degree of hydraulic connection between the well and Depot Camp Brook and the surrounding wetlands. No private wells were monitored during the test as none were present in the estimated 180-day potential zone of influence of the withdrawal or surrounding area on USFS lands. 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 ten of the on-site wells and all of the piezometers responded to pumping of WTV-4. The pumping-induced drawdown of water levels ranged from less than 1 foot to approximately 19 feet in the monitoring wells and was greatest in wells located closest to the production well and deeper in the deltaic sand unit. In the piezometers (predominantly located near/within wetlands or surface water) pumping-induced drawdown was on the order of 0.1 to about 5 feet, implying that some leakage from more shallow deposits occurred during the pumping of WTV-4. Additionally, surface water level declines at a staff gage closest to WTV-4, and flow measurements at a downstream weir indicate that pumping at WTV-4 caused a reduction in base flows in Depot Camp Brook of about 30 gpm during the test.

Based on projections of water level responses in the monitoring points that responded to pumping of WTV-4 under the condition of 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 1,100 feet to the west/southwest and about 700 feet to the east/northeast of WTV-4. In general, limits of the well's zone of influence were constrained by the areal extent of the deltaic sand unit that serves as the source formation for WTV-4.

Overall, based on monitoring results presented in the final report, a production rate of 432,000 gpd (300 gpm) is a production rate that WTV-4 can sustain for a fixed duration of time. However, the limited areal extent of the recharge area for the withdrawal [and Depot Camp Brook] and EGGI's recharge estimates suggest that a *sustained* groundwater withdrawal at this rate could exceed the long-term predictable rate of replenishment of the aquifer, which is a criterion for adverse impact under RSA 485-C:21, V-c. As such, for a given water use year, the duration of use of the well at the 300 gpm withdrawal rate is limited and a lower rate of 200 gpm is fixed for the remainder of the year. Additionally, observations of the effects of pumping on flow in Depot Camp Brook and water levels in bordering wetland areas suggest that WTV-4 could cause

drawdowns or flow reductions that may negatively affect wetlands or more critical low surface water flows in the brook [see large groundwater withdrawal permit conditions discussion below].

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 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 Livermore (unincorporated township) and the US Forest Service 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 MONITORING, REPORTING AND WITHDRAWAL REQUIREMENTS

The large groundwater withdrawal permit requires Waterville Valley to implement an impact monitoring and reporting program that includes monitoring of on-site wells, Depot Camp Brook, and wetlands. General monitoring requirements are summarized as follows:

- Groundwater – The permit requires that Waterville Valley record water levels in WTV-4 and four overburden monitoring wells to monitor the trend of groundwater levels in the aquifer over time.
- Surface water – The permit requires Waterville Valley to implement a surface water monitoring program to assess the potential for and/or detect the occurrence of an adverse impact in Depot Camp Brook via observations of flow in the brook at a location downstream of WTV-4, and annual performance of an aquatic habitat survey along the reach of the brook most likely affected by the withdrawal.
- Wetlands – The permit requires that Waterville Valley implement 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 shallow groundwater levels at piezometers and plant communities in the on-site wetlands, and a reference wetland located outside the influence area of the withdrawal.

The large groundwater withdrawal permit also requires Waterville Valley to implement a pumping plan for WTV-4 that would limit the cumulative days in which the well could be operated at a maximum production rate of 300 gpm to 120 days per year, during which the well's consecutive day use at 300 gpm can not exceed 60 days; for the remainder of the year, the well's maximum production rate is restricted to 200 gpm.

Waterville Valley is required to submit an annual monitoring report in hard copy and electronic format to NHDES by January 31st 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 WTV-4. 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 conditions No. 5 and 6.

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. 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-2011-0001) under condition No. 7.