The

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

hereby issues

LARGE GROUNDWATER WITHDRAWAL PERMIT

NO. LGWP-2018-0003

to the permittee

HAMPSTEAD AREA WATER COMPANY
54 SAWYER AVENUE
ATKINSON, NH 03811
(603-362-4299)

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

Page Farm HWT-1: 64,800 gallons over any 24-hour period

Date of Issuance: December 4, 2018
Date of Expiration (if the withdrawal is not activated): December 4, 2023
Date of Expiration (if the withdrawal is activated): December 4, 2028

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 Page Farm well HWT-1 subject to the following conditions:

1. The permittee shall comply with the requirements of this permit, Env-Wq 403 and RSA 485-C at all times.

2. Water Conservation: The permittee shall implement the approved Water Conservation Plan, dated May 8, 2008, in accordance with Env-Wq 2101 and NHDES' approval dated June 5, 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 Env-Wq 2101. The permittee shall read the source water meter 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   a) The 24-hour peak day volume withdrawn from HWT-1 during each month and the date the water use occurred; and

   b) The cumulative volume withdrawn from HWT-1 during each month.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

      i. Off-site Private Bedrock Wells: 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 private bedrock wells serving the following properties below. Water level monitoring shall commence one month prior to initiating a withdrawal from HWT-1 and shall continue indefinitely as a condition of this permit.

Station Name	Station ID
Drinking Well House #1	20180003DW01
Drinking Well House #2	20180003DW02

      ii. On-site Production Well: 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 HWT-1. Water level monitoring shall commence upon initiating a withdrawal from HWT-1 and shall continue indefinitely as a condition of this permit. HWT-1 = 20180003PWHWT1

   Wells that supply drinking water shall be sampled for coliform bacteria [in accordance with Env-Wq 403.15(e)(5) and Env-Wq 403.15(g)] prior to and after the installation of any monitoring equipment.

   If a well owner denies permission to monitor water levels, then the permittee shall propose an alternative monitoring location to NHDES for approval.

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

   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.

   All monitoring data shall be submitted to NHDES twice a year, by January 31 and July 31. Along with the data, the permittee shall provide a written record of any relevant observations that may affect the measurements and include field notes documenting the monitoring activities and well operations. All groundwater monitoring data collected under condition No. 4a 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 areas estimated to be the influence areas of well HWT-1, as illustrated on Figure 18, titled "Water Level Elevation Contours, Wellhead Protection Area, and Groundwater Flow Lines for the 180-day Projection of Water Level Impacts to the Pumping of Well HWT-1" in the Final Well Siting Report titled "Final Hydrogeologic Investigation, Groundwater Development, Production Well HWT-1" prepared by Emery & Garrett Groundwater, a Division of GZA, dated July 31, 2018. The permittee shall provide a copy of the notification letter and copies of the certified mail return receipts to NHDES. The permittee shall explain to property owners with wells in the identified areas that their well may be influenced by the withdrawal at HWT-1 and 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.

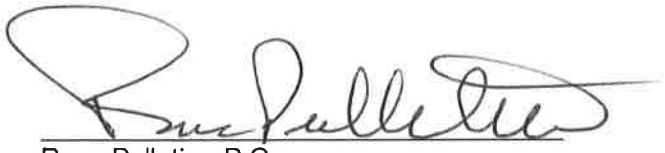
   c) Where the status of an unanticipated impact is not clear, the permittee shall gather information needed to quantify the impact and determine its status relative to the adverse impact criteria defined under RSA 485-C:21, V-c and provide this information to NHDES within 48 hours of being notified by 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.

6. The permittee shall register HWT-1 with the NHDES Water Use Registration and Reporting Program and maintain the water use reporting requirements of HWT-1 established by RSA 488, Env-Wq 2102 and this permit.

7. The permittee shall apply for renewal of this permit no more than 6 months 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.



Rene Pelletier, P.G.,
Assistant Director Water Division

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NHDES DECISION STATEMENT AND PROJECT NARRATIVE

Large Community Well Siting Approval/Large Groundwater Withdrawal Permit LGWP-2018-0003
Hampstead Area Water Company, PWS ID 0112080
Page Farm Well HWT-1
Atkinson, New Hampshire

December 4, 2018

1.0 BACKGROUND

Hampstead Area Water Company (HAWC) submitted an application to the New Hampshire Department of Environmental Services (NHDES) requesting approval for a large community production well and issuance of a large groundwater withdrawal permit for the withdrawal of up to 64,800 gallons per day (gpd) or 45 gallons per minute (gpm) over a 24-hour period from the Page Farm Well HWT-1 in Atkinson. The purpose of developing HWT-1 is to supply drinking water to the nearby Page Farm development and supplement the production capacity of existing wells in the Walnut Ridge/Bryant Woods System (PWS ID 0112080).

The preliminary application for the large groundwater withdrawal permit and community well siting approval for one new community water supply well was prepared on behalf of HAWC by Emery & Garrett Groundwater Investigations, a Division of GZA (EGGI) and submitted to NHDES in December 2017. NHDES approved the preliminary application for a withdrawal testing plan for the proposed production well in April 2018. Following the withdrawal testing program, EGGI submitted a final report to NHDES summarizing the results of the withdrawal testing program in August 2018.

HWT-1 is a 645 foot deep bedrock well located in the central portion of the town Atkinson within an area marked by interconnected 'pocket' wetlands that occupy topographic depressions bordered by gently to steeply sided knolls. The surficial unit at the HWT-1 well site is an approximate 40-foot thick, dense mixture of sand, silt, clay and gravel collectively interpreted as a basal till that's prevalent throughout the region. Bedrock at the wells site is the Berwick Formation, a moderately fractured/foliated iron rich granofels to calcareous schist common in southeastern New Hampshire. Notable shallow fractures were observed at a depth of 155-160 ft in HWT-1 during pump installation due to a borehole wall collapse.

2.0 WITHDRAWAL TESTING

2.1 Overview

A withdrawal testing program was conducted by EGGI, in April and May 2018. The purpose of withdrawal testing was to:

- Provide data to estimate the long-term sustainable water quantity and quality of HWT-1;
- Observe the response of the aquifer to pumping;
- Evaluate the degree of hydraulic connection between HWT-1, the overlying deposits and surrounding public and private wells; and
- Assess the potential for adverse impacts to water resources and users that may result from the proposed withdrawal.

The withdrawal testing program began with an antecedent monitoring period (non-pumping) and water levels were measured in HWT-1 and the monitoring network for at least 7 days. The seven-day pumping

period began on May 1, 2018 with an initial flow rate from HWT-1 of 54 gpm, which was reduced to 45 gpm three days into the test. Pumping of HWT-1 ended on May 8, 2018 and was followed by an approximate 7 day period of water level recovery monitoring at all monitoring locations. The water produced from HWT-1 was discharged 400 feet away from the production well to a point draining away from the site.

2.1 Water Level Monitoring

During this testing program, water levels were recorded in:

- the production well HWT-1;
- four nearby public water production wells;
- twelve domestic private water supply wells;
- two shallow wetland piezometers;
- one surface water station; and,
- one background monitoring well.

Water levels at these locations were measured continuously for approximately 21 days total, including all three phases of the withdrawal test (antecedent, pumping, and recovery periods) in order to observe the hydraulic effects of pumping from HWT-1 on the surrounding groundwater and surface water resources.

Five private water supply wells had a measurable amount of hydraulic connection with HWT-1 and seven of the domestic wells were not influenced by the pumping of HWT-1. The closest private water supply well (located 515 feet to the south of HWT-1) had an estimated 70 feet of drawdown in the well from the pumping of the proposed production well. The furthest observed drawdown (approximately 1.4 feet) was observed at a private water supply well about 2,100 feet to the south of the production well. Based on the pumping test observations, there was generally more influence in water levels in wells located to east and south compared to the area west and north of HWT-1. Based on an analysis of graphical projections of water level responses assuming 180 days of continuous pumping of HWT-1 with no net recharge to the aquifer, pumping-induced drawdown is estimated to potentially extend on the order of 2,700 feet from the well.

2.2 Water Quality

During the pumping test, water quality samples were collected on the first day, the third day and at the end of pumping period (day 7) to characterize the quality of the water derived from the well. Results of the water quality sampling conducted during the withdrawal testing program indicate that each parameter was below the applicable Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL) in water derived from HWT-1 except for manganese, which was detected slightly above the SMCL. Per- and polyfluoroalkyl substances (PFAS) were not detected above the laboratory reporting limits. The microscopic particulate analysis performed due to the well's proximity to surface water indicates the well is at low risk of being influenced by surface water.

3.0 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) are required to be sent (via certified mail) to municipalities and public water suppliers in the potential impact area of the withdrawal. In this case, applications were sent to the Towns of Atkinson and Hampstead and the Coach Run Condominium, Commons of Atkinson, and Wright Farm Condominium community water systems. No public hearings were requested after the submittal of the preliminary application.

After the submittal of the Final Report, The Town of Atkinson requested a public hearing to review and comment on the report. NHDES subsequently held a public hearing on the Final Report at the Atkinson Community Center on September 26, 2018. At the hearing, a summary of the regulations governing large groundwater withdrawals was presented by NHDES, results of the withdrawal testing program were presented by EGGI, a question and answer session was held, and an opportunity to submit oral testimony was offered, although none was submitted. After the public hearing, the 45-day written comment period on the application commenced, and subsequently closed on November 10, 2018. Eight written comments were received by NHDES during this period and responses to those comments relevant to the testing program, permit process, and administrative rules are included in Section 5.0 (below).

4.0 LARGE GROUNDWATER WITHDRAWAL PERMIT MONITORING, REPORTING AND WITHDRAWAL REQUIREMENTS

To provide a means for notification in the event of an unforeseen impact, the large groundwater withdrawal permit requires HAWC to notify any property owner with a private or public well within the estimated zones of influence of HWT-1 prior to initiating a large groundwater withdrawal from the well. As part of the notification, HAWC must explain to each property owner that their well may be influenced by the withdrawals at the production well and provide them with contact information at HAWC and the 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.

In association with the use of HWT-1, the large groundwater withdrawal permit requires HAWC to conduct a water level monitoring program that includes monitoring of the production well and two off-site private bedrock water supply wells. General monitoring requirements are summarized as follows:

- On-site well – The permit requires that water levels in HWT-1 be monitored so that water level fluctuations in off-site monitored wells can be compared to the operation of the production well.

- Off-site wells – The permit requires that water levels in two private bedrock water supply wells which responded to pumping HWT-1 be monitored to assess the potential for or detect the occurrence of an adverse impact.

The large groundwater withdrawal permit requires a reduction in the withdrawal from HWT-1 if:

- Trigger water levels are met or exceeded in off-site monitored wells; or

- The 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. The program would implement actions necessary to mitigate the impact including reducing the withdrawal volume or ceasing the withdrawal from the production well(s), establishing water use restrictions for customers of the water system, modifying or replacing an impacted source at no initial capital cost to the user, and expanding (or establishing) a monitoring network to assess the effectiveness of the mitigation program. More information concerning these requirements is provided in the large groundwater withdrawal permit under condition No. 5.

As stipulated in the permit, HAWC is required to submit all withdrawal monitoring information to NHDES by January 31st and July 31st of each year. All water levels associated with this monitoring 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.

5.0 NHDES RESPONSE TO PUBLIC INPUT

NHDES received eight letters during the public comment period, one from the Town of Atkinson Conservation Commission and seven from residents of Atkinson and Hampstead. Since some of the written testimony contained similar content, responses are grouped into the common-topic sections below. In general, the comments expressed concerns about HAWC, potential impacts to the Sawmill Swamp wetlands, and drawdown of bedrock water levels, and reductions in yield from private wells both around Page Farm and more generally in the area.

Potential for Impacts to Wetlands

The town of Atkinson Conservation Commission provided written testimony pertaining to concerns regarding the potential for pumping at HWT-1 to impact the Sawmill Swamp prime wetlands, north of the Page Farm development. Specifically, the commission commented that any changes to the wetland would not be observable during a seven-day test and requested that long term monitoring be undertaken to assess for any potential impacts. Comments from residents of Atkinson and Hampstead provided similar concerns for Sawmill Swamp and stated that the water levels in the swamp were elevated 12 to 18 inches at the time of the test by a beaver dam.

RSA 485-C:21 and the large groundwater withdrawal permitting rules require that an applicant evaluate the impacts on water-related natural resources caused by a large groundwater withdrawal and requires that no unmitigated adverse impact results from the withdrawal. Env-Wq 403.11 requires that an applicant inventory water resources within the estimated impact area of the withdrawal and Env-Wq 403.12 requires the applicant to estimate the effect on water resources that may result from the withdrawal. RSA 485-C:21, V-c establishes the criteria for adverse impacts to wetlands and surface water caused by a large groundwater withdrawal. Specifically, no large groundwater withdrawal shall cause an unmitigated impact as determined by the following:

(f) Reducing surface water levels or flows that will, or do, cause a violation of surface water quality rules adopted by the department; and

g) Causing a net loss of values for submerged lands under tidal and fresh waters and its wetlands as set forth in RSA 482-A;

HAWC's preliminary application and supplemental material described the monitoring network for the Page Farm withdrawal testing program to include water level monitoring at two overburden piezometers in nearby wetlands and one surface water staff gage installed in the nearby stream. These monitoring points are located in small stranded wetlands that drain northeasterly into the designated prime wetland of Sawmill Swamp.

Based on the monitoring results presented in EGGI's August 2018 Final Report, no influence on water levels in the piezometers or surface water station was observed due to pumping from HWT-1. The water levels fluctuations in the surface water stations that did occur appeared to be associated with rain events, not the pumping from HWT-1. Since HWT-1 was installed in bedrock with a steel casing to 60 feet, water produced from the well is likely derived from a larger area of interconnected shallow bedrock

fractures that surround the well site, and not directly from surface water. Microscopic particulate analysis (MPA) sampling was performed on a sample collected from HWT-1 in order to verify that surface water organisms and/or particulates indicative of surface water are not entering the well. The results of the MPA sample did not identify any particulates from surface water in the sample and imply no direct connection to any wetlands/surface water.

In the Final Report, the area where groundwater is affected by the pumping of HWT-1, projected out to simulate 180-days of continuous pumping, is geographically limited to an area within approximately 2,700 feet of the well and does not include the Sawmill Swamp prime wetland. The Department finds that observations of bedrock water levels and surface water levels indicate that impacts to the Sawmill Swamp or wetlands adjacent to the HWT-1 well site are not likely and do not trigger the adverse impact criteria established in RSA 485-C:21. Additionally the Department finds long-term wetland monitoring is not warranted as part of this large groundwater withdrawal permit based on the data collected during the testing program.

Impacts to Groundwater Levels in Private Wells Surrounding the Site

The comment letters provided by Atkinson and Hampstead residents expressed concern about the pumping of HWT-1 on surrounding private water supply wells. The letters cited the potential for reductions in static water levels due to pumping of HWT-1 and noted other private well issues in the Hampstead area that are not related to the Page Farm large groundwater withdrawal. None of the letters referred to deficiencies of aspects of the geologic conceptual model for the impact area or the evaluation program for the proposed withdrawals, or provided other specific technical reasons for the idea that other water supply wells over a broad area would be impacted consequently beyond use as a function of HAWC's use of the new well.

The large groundwater withdrawal permitting process requires an applicant to assess the relative impact that the withdrawal may cause on other water users (Env-Wq 403.19). In reference to the conceptual geologic model developed for the withdrawal site and surrounding area (Env-Wq 403.09), the applicant must estimate a zone of influence and potential impact area of the withdrawal based on the conservative assumption of continuous operation of the withdrawal for a period of 180-days (RSA 485-C:21,V-e.) with no net recharge to groundwater from precipitation. The applicant must inventory water users within the potential impact area, and offer to monitor all water users within 1,000 feet of the withdrawal and representative water users within an area that extends a distance of 1,000 feet from its estimated zone of influence (Env-Wq 403.11 and 403.13), during the withdrawal testing program required by Env-Wq 403.13. The withdrawal testing program thereby collects data and measurements that quantify the actual level of impact that the withdrawal has on other water users and serves to refine the zone of influence of the withdrawal based on observed water level influences.

Following the withdrawal testing program, the applicant gauges the impacts observed against the adverse impact criteria of RSA 485-C:21, V-c, inclusive of those for private water supply wells. To address any remaining uncertainties related to the observed impacts from the proposed withdrawals and the extent of the observed influence area, the applicant must develop a long-term impact monitoring program in accordance with Env-Wq 403.26, to ensure adverse impacts do not occur, provided that available information does not suggest that an impact is irreversible or will occur immediately. In the event that a confirmed adverse impact occurs that is related to the permitted withdrawal, the permittee shall implement a source replacement program to mitigate the impact in accordance with Env-Wq 403.31 and Env-Wq 403.32.

The estimated zone of influence presented in HAWC's Final Report extended to a distance of approximately 2,700 feet at certain geologically controlled orientations from the proposed withdrawal. During the withdrawal testing program, HAWC monitored 12 private water supply wells and four other public water supply wells between 500 and 2,700 feet from the proposed new well. This monitoring network allowed HAWC to evaluate the extent of the impact area of the withdrawal.

NHDES finds that the impact assessment and evaluation program completed by HAWC meets the requirements of Env-Wq 403. NHDES finds that water levels in a limited number of private water supply wells will be influenced by the withdrawal from HAWC's new well HWT-1, however those impacts to private wells are not irreversible or immediate, and do not meet the definition of adverse impact in RSA 485-C:21, V-c. Further, NHDES finds that the long-term impact monitoring and reporting program for water levels in private wells as described in condition 4 of the large groundwater withdrawal permit meets the requirements of Env-Wq 403.26.

Condition 4 of the large groundwater withdrawal permit requires that HAWC conduct a long-term water level monitoring program in the production well and at two private water supply wells located within the influence area of HWT-1 in order to track the effect of pumping HWT-1 on water levels over time and validate assumptions made in the conceptual geologic model for the site. Condition 5a. of the permit requires HAWC to mitigate an adverse impact in the event that one should occur. Condition 5b. of the large groundwater withdrawal permit requires HAWC to notify all lot owners with private wells within the revised zone of influence of HWT-1 and provide appropriate contact information should they experience a problem with their private well that they believe is attributable to HWT-1.

NHDES will regularly review water level data from the long-term monitoring program and track production volumes in well HWT-1 in relation to its permitted production volume. NHDES can modify the permit at any point in order to prevent any adverse impacts from occurring in the future, should there be any unanticipated impacts to the withdrawal from HWT-1.

Other Comments

Other written comments were received that related to the timing and weather conditions of the pumping test in May 2018. The comments noted that the test should not be considered representative of typical conditions since it was a wet time of year when HAWC's and other domestic water use is generally lower. The comments noted that there were several precipitation events both prior to and during the pumping test, and indicated that the results may have been different if it was performed later in the summer.

NHDES does not believe that the time of year of the test significantly influenced the results of the test in this project. The HWT-1 is bedrock well that receives water from deeper interconnected bedrock fractures that are saturated with water and therefore does not directly derive water from the surface and shallow groundwater that is more influenced by seasonal trends. As noted earlier, the surface water monitoring did not indicate any direct connection between wetlands and the pumping well, which supports the fact that the well is relatively separate from near surface influences.

The Large Community Well permitted rules require that a conservative approach is used to evaluate the pumping test results. It is required that water levels are plotted on a chart verses time to visually evaluate the drawdown curve during the test. Then, the observed drawdown curve in the well at the end of the pumping test is extended out from the end of the test to 180 days to estimate what the drawdown would be after 180 days of continuous pumping without recharge, in essence simulating drought conditions for 6 months. This approach and the longer-term storage of water in the bedrock aquifer, minimize any

potential issues related to seasonal changes in groundwater levels and effects of precipitation events during the withdrawal testing program.

Additional comments were made in the written testimony related to concerns about additional water supply demands from the recent development of new homes and condominiums within Atkinson, and concerns about the HAWC's operations, water use and water billing rates. The Department did not respond to these comments as they are not pertinent to this large groundwater withdrawal permit application, the withdrawal testing program conducted on the proposed well, or the impacts observed and reported in the final report for the Page Farm Well HWT-1.