



The  
NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

hereby issues

LARGE GROUNDWATER WITHDRAWAL PERMIT

NO. LGWP-2012-0002

to the permittee

DIAMOND OAKS GOLF CLUB, LLC  
P.O. BOX 175  
PLAISTOW, NH 03865

for the withdrawal of the following volumes of groundwater from the following wells at Granite Fields Golf Club located in Kingston, New Hampshire:

For the purpose of public water supply:

PTW-1            38,880 gallons over any 24-hour period

For the purpose of irrigation water supply:

PW-2            25,920 gallons over any 24-hour period

PW-3            72,000 gallons over any 24-hour period

Date of Issuance:    December 4, 2012

Date of Expiration:    December 4, 2022

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 wells PTW-1, PW-2, and PW-3 subject to the following conditions:

1. The permittee shall comply with the requirements of Env-Wq 403 and RSA 485-C at all times.
2. Water Conservation Requirements: The permittee shall implement the approved Water Conservation Plan, dated May 29, 2012, in accordance with Env-Wq 2101 and NHDES' approval dated June 15, 2012.
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 manufacturer's specifications. 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  - a) The 24-hour peak day volume withdrawn from each source during each month; and
  - b) The cumulative total volume withdrawn from each source during each month.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 pressure transducers and data loggers and measure water levels in the following wells, as specified:

Well	Monitoring Period	Measurement Frequency
20120002PWPTW1 PTW-1	Starting at least 30 days prior to initiating a withdrawal from PTW-1 (or its back-up) and continuing indefinitely	At least once every four hours
20120002MWBOPS1 BOBS-1		
20040001IWPW2 PW-2	On an annual basis, starting at least 30 days prior to operating PW-2 or PW-3 and continuing until at least 30 days after the withdrawals cease for the irrigation season	At least once every hour
20040001IWPW3 PW-3		
20120002MWDGW1 DGW-1		

- b) Wetland and Surface Water Level Monitoring: The permittee shall install pressure transducers and data loggers and measure water levels at the following monitoring points, as specified:

Monitoring Point	Monitoring Period	Measurement Frequency
PZ-3	Starting at least 30 days prior to initiating a withdrawal from PTW-1 (or its back-up) and continuing indefinitely	At least once every hour
SG-3		
SG-4		

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 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. Monitoring shall continue indefinitely as a condition of this permit.

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 and include all field notes documenting the monitoring activities for the preceding year.

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

## 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-Wq 403.
- b) Within 90 days of receipt of this permit, the permittee shall notify in writing via certified mail the owners of all properties served by private wells or public wells not owned by the permittee within the area estimated to be the influence area of wells PTW-1, PW-2, and PW-3, as illustrated on Figure 6, titled "Conceptual Hydrologic Model" included in the final report titled "Large Groundwater Withdrawal Permit (LGWP) Application, Small Community Well and Irrigation Wells Withdrawal Test, Granite Fields Golf Club: Kingston, NH" prepared for the permittee by Geosphere Environmental Management, Inc., dated July 31, 2012. The permittee shall provide the following to NHDES: 1) one copy of the notification letter; and 2) copies of the certified mail return receipts. The permittee shall explain to property owners with wells in the identified area that their well may be influenced by the withdrawals from wells PTW-1, PW-2, and PW-3. 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 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 withdrawals from PW-2 and PW-3 in accordance with the management procedures described below:

### DROUGHT MANAGEMENT PROCEDURES

#### STAGE I

In the event that the following trigger occurs, the combined production from wells PW-2 and PW-3 shall be reduced to 75% of the combined permitted withdrawal volume.

*Trigger:* Moderate Drought conditions as determined by the U.S. Drought Monitor which is administered by the U.S. Department of Agriculture, U.S. Department of Commerce/National Oceanic and Atmospheric Administration, and the National Drought Mitigation Center.

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 15<sup>th</sup> and last day of each calendar month.

#### STAGE II

In the event that the following trigger occurs, the combined production from wells PW-2 and PW-3 shall be reduced to less than 57,600 gallons over any 24-hour period.

*Trigger:* Severe or Extreme Drought conditions as determined by the U.S. Drought Monitor which is administered by the U.S. Department of Agriculture, U.S. Department of Commerce/National Oceanic and Atmospheric Administration, and the National Drought Mitigation Center.

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.

#### STAGE III

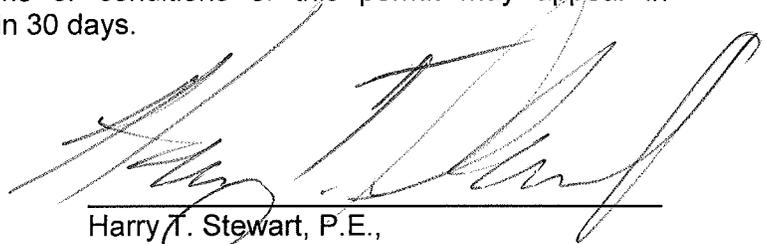
In the event that the following trigger occurs, the withdrawals from wells PW-2 and PW-3 shall cease.

*Trigger:* Exceptional Drought conditions as determined by the U.S. Drought Monitor which is administered by the U.S. Department of Agriculture, U.S. Department of Commerce/National Oceanic and Atmospheric Administration, and the National Drought Mitigation Center.

6. The permittee shall maintain its registration 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. 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.
8. This permit supersedes Large Groundwater Withdrawal Permit No. LGWP-2004-0001 issued to Granite Fields Golf Club by NHDES on April 20, 2004.

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. The signature is fluid and cursive.

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

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## PROJECT NARRATIVE

**Small Well Siting Approval/Large Groundwater Withdrawal Permit LGWP-2012-0002  
Hawk's Ridge Development, New Public Water System  
New Public Water Supply Well PTW-1 and Existing Irrigation Water Supply Wells PW-2 and PW-3  
Granite Fields Golf Club, Kingston, New Hampshire**

**December 4, 2012**

### BACKGROUND

Diamond Oaks Golf Club, LLC (Diamond Oaks) has submitted an application to the New Hampshire Department of Environmental Services (NHDES) requesting approval of a new small community bedrock production well (designated PTW-1) and issuance of a large groundwater withdrawal permit for the combined withdrawal of up to 136,800 gallons per day (gpd), or 95 gallons per minute (gpm) over a 24-hour period from PTW-1 and two existing overburden irrigation water supply wells designated PW-2 and PW-3. Diamond Oaks is requesting approval for PTW-1 to serve a proposed condominium development at Granite Fields Golf Club (GFGC) in Kingston, New Hampshire.

GFGC is located in southern Kingston near the town boundaries of Plaistow and Newton; PTW-1 is located near the southwest boundary of the course, and PW-2 and PW-3 are located approximately 2,500 feet north-northeast of PTW-1. On April 20, 2004, NHDES issued large groundwater withdrawal permit No. LGWP-2004-0001 to GFGC for the withdrawal of up to 48,960 gpd (34 gpm) from PW-2 and 82,080 gpd (57 gpm) from PW-3 for the purpose of golf course irrigation. Pumping of wells PW-2 and PW-3 into GFGC's man-made lined irrigation ponds began during the 2005 golfing season; annually, since startup, use of these two wells generally has occurred from April to November. Also on site, GFGC has operated a transient, non-community public water system (PWS ID 1277150) to supply water to the Granite Fields Sports Complex via a bedrock well since July 1997.

The GFGC property is within the Little River watershed. Two unnamed streams flow through the golf course and converge just south of the property boundary before discharging to the Little River approximately 3,000 feet downstream. The potential impact area for the withdrawal from PTW-1, PW-2, and PW-3 encompasses approximately seven square miles of the Little River watershed upgradient of this confluence.

The eastern portion of the GFGC property is underlain by mapped stratified drift deposits which increase in thickness (from west to east) to approximately 45 feet. PW-2 and PW-3 are screened from 23.5 to 28.5 feet and 28.5 to 33.5 feet below ground surface within sand and gravel deposits. This sand and gravel is interbedded with fine sand, silt, and clay at depth, and is generally not favorable for the development of large groundwater supplies.

In the western portion of the property, near PTW-1, overburden is thin and bedrock outcrops are present. Bedrock underlying the property is comprised of phyllite and metasedimentary rocks of the Elliot Formation; the geologic contact between the Elliot Formation and Berwick Formation is mapped near the western property boundary. It is reported that PTW-1 encountered 17 feet of overburden, and was completed in bedrock to a depth of 330 feet.

## WITHDRAWAL TESTING AND CONCLUSIONS

A withdrawal testing program was conducted by Geosphere Environmental Management, Inc. (Geosphere) from June 14, 2012 through June 27, 2012. The purpose of withdrawal testing is to provide data to estimate long-term sustainable water quantity and quality of PTW-1; observe the response of the overburden and bedrock aquifers to pumping and evaluate their degree of hydraulic connection; 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 PTW-1 was pumped at 27 gpm between June 21, 2012 and June 26, 2012, and PW-2 and PW-3 were pumped at 18 gpm and 50 gpm, respectively, between June 22, 2012 and June 25, 2012.

During the withdrawal testing program, water level measurements were collected at: PTW-1, PW-2, PW-3; two on-site bedrock monitoring wells; four on-site overburden monitoring wells; two on-site piezometers; four on-site surface water staff gauges; the public bedrock water supply well serving GFGC; four off-site private bedrock water supply wells; and one unused off-site private overburden water supply well. The five private water supply wells are located at distances ranging from approximately 1,050 to 3,100 feet from PTW-1 in residential areas abutting the GFGC property. Shallow groundwater and surface water level measurements were recorded to assess the degree of hydraulic connection between the overburden and bedrock aquifers, the unnamed streams that flow through the property, and associated wetlands. Discharge from the wells was metered during the withdrawal testing program to maintain constant pumping rates, and water quality samples were collected from PTW-1 during the pumping period.

Water level measurements collected during the withdrawal testing program indicate that wetland piezometer PZ-3 located closest to PTW-1 was the only monitoring point that responded to pumping of this well. Pumping induced drawdown of water levels in PZ-3 were on the order of 3.3 feet and a graphical projection of drawdown based on 180 days of continuous pumping with no net recharge is approximately 4 feet. Observations related to the pumping of PW-2 and PW-3 were consistent with those made during the pumping test and long-term monitoring performed in support of GFGC's current large groundwater withdrawal permit; two of the four on-site overburden monitoring wells responded to pumping and pumping effects were generally concentrated in the northeast portion of the property. Where affected by pumping of PW-2 and PW-3, drawdown in overburden monitoring wells ranged between 0.2 and 0.5 feet, with 180 day projected drawdowns between 1.6 and 4 feet, respectively. Water levels in the on-site bedrock monitoring wells, public bedrock water supply well serving GFGC, surface water staff gauges, and off-site private water supply wells did not respond to pumping of PTW-1, PW-2, or PW-3.

Based on a distance-drawdown analysis of graphical projections of water level responses in the monitored bedrock 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 1,000 to 2,000 feet from the well sites.

Overall, based on monitoring results presented in the final report, a production rate of 136,800 gpd (95 gpm) is a production rate that the overburden and bedrock aquifers can sustain.

Results of the water quality sampling of PTW-1 conducted during the withdrawal testing program indicate that each parameter was below the applicable Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL). Testing results of water samples collected

near the beginning, middle, and end of the pumping period showed concentrations of toluene, a volatile organic compound (VOC), in water derived from PTW-1 equal to 7.0 micrograms per liter ( $\mu\text{g/l}$ ), 1.3  $\mu\text{g/l}$ , and 0.7  $\mu\text{g/l}$ , respectively, which are less than the MCL of 1,000  $\mu\text{g/l}$ . No other VOCs were detected in water samples collected from PTW-1. Iron [SMCL of 0.3 milligrams per liter ( $\text{mg/l}$ )] and manganese (SMCL of 0.05  $\text{mg/l}$ ) were also detected in water samples collected from PTW-1 at concentrations of 0.09  $\text{mg/l}$  and 0.03  $\text{mg/l}$ , respectively. Results of the water quality sampling program also indicate that the concentration of radon is elevated in water derived from PTW-1.

NHDES' approval of the preliminary application and acceptance of the proposed pumping test program for the subject withdrawal required additional groundwater level monitoring and water quality sampling to assess the potential influence of past activities at the former site of ASAP Auto Salvage (NHDES Site No. 200608045; approximately 700 feet southwest of PTW-1) on the quality of groundwater derived from PTW-1. Of concern were results of water quality samples collected in 2007 as part of site cleanup efforts from nearby bedrock water supply wells that showed concentrations of MTBE in groundwater ranging from 0.8  $\mu\text{g/l}$  to 1.6  $\mu\text{g/l}$  (no other VOCs were detected in samples collected). As part of the current pumping test program, water levels were monitored in the private bedrock water supply well (1,050 feet west-southwest of PTW-1) serving . Additionally, water samples were collected from the private well before, during, and after the pumping period and analyzed for VOCs. Testing results showed the presence of MTBE in groundwater derived from the private well before and during the pumping test at concentrations ranging from 0.5  $\mu\text{g/l}$  to 0.7  $\mu\text{g/l}$ , which are less than the MCL of 13  $\mu\text{g/l}$ . MTBE was not detected above the laboratory method detection limit of 0.5  $\mu\text{g/l}$  in the post-test sample. Toluene was only detected in the sample collected on the final day of pumping PTW-1 at a concentration of 0.5  $\mu\text{g/l}$ , which is the laboratory method detection limit. Based on the available water level data, no hydraulic connection between PTW-1 and the private well serving is apparent.

## **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. Copies of the above-referenced materials were sent to the towns of Hampstead, Kingston, Newton, and Plaistow and the Meadowview Apartments, Rainbow Ridge, Sargent Woods, and Willow Grove Trailer Park community water systems.

On September 22, 2011, the towns of Kingston and Newton requested a public hearing following submittal of the preliminary application; NHDES subsequently held a public hearing on the application in Kingston on October 19, 2011. At the hearing, a summary of the regulations governing large groundwater withdrawals was presented by NHDES, a project summary was presented by Geosphere, a question and answer session was held, and oral testimony was recorded. After the public hearing, the 45-day written comment period on the application commenced, and closed on December 3, 2011. Testimony and comments received during the public hearing and written comment period related to: the location and depth of some monitoring points, an elevation survey for the site, potential for influencing water levels in private wells, and alternative sources that may be available to the applicant for irrigation.

On August 16, 2012, the town of Kingston requested a public hearing following submittal of the final report; NHDES subsequently scheduled a public hearing with the town in Kingston for

September 5, 2012. Although scheduled at the request of the town, and publicly noticed in accordance with RSA 485-C:21, IV, neither Kingston residents nor Kingston town officials or board members were present at the hearing site on September 5<sup>th</sup> for the public hearing. Given that no town officials/residents were present and no access to a town-owned building for the hearing was provided, NHDES staff could not convene the public hearing. However, representatives of Diamond Oaks and Geosphere, and a consultant for the Kingston planning board were present at the hearing site; as such, NHDES staff held informal discussions with these parties about findings presented in the final report.

NHDES contacted town officials on September 6, 2012 (the day after the scheduled hearing) to follow-up on the town's lack of attendance at the public hearing they requested, stating that NHDES would accept public comments through the 45-day written comment period following the scheduled hearing date. During the written comment period, which closed on October 20, 2012, NHDES received written comments from the consultant for the Kingston planning board related to: frequency of monitoring data reporting; radon concentrations in production well water quality samples; storage estimates for nearby surface waters; and, long-term administration of water conservation obligations if permit ownership changes. No comments received, however, contradicted NHDES' issuance of the 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 Diamond Oaks to notify any property owner with a private well or public well not owned by the permittee within the estimated zone of influence of PTW-1, PW-2, and PW-3 within 90 days of receipt of the permit. As part of the notification, Diamond Oaks must explain to each property owner that their well may be influenced by the withdrawal at PTW-1, PW-2, or PW-3 and provide them with contact information at Diamond Oaks and NHDES in the event they believe their well may be impacted by the withdrawals. More information concerning this requirement is provided in the large groundwater withdrawal permit under condition No. 5.

The large groundwater withdrawal permit requires Diamond Oaks to conduct a water level monitoring program that includes monitoring of PTW-1, PW-2, and PW-3 and on-site monitoring wells, and at points in the stream closest to PTW-1. General monitoring requirements are summarized as follows:

- On-site wells – The permit requires that water levels in PTW-1, PW-2, and PW-3, one bedrock monitoring well, and one overburden monitoring well be monitored so that groundwater level trends in the overburden and bedrock aquifers can be tracked over time under operating conditions.
- On-site piezometer and staff gauges – The permit requires that water levels in one wetland piezometer and at two surface water level staff gauges be monitored to assess the potential influence of pumping PTW-1 on nearby surface water resources under operating conditions.

The large groundwater withdrawal permit requires a reduction in the withdrawal from PW-2 and PW-3 if:

- Moderate, or worse, drought conditions are declared by the U.S. Drought Monitor; or
- NHDES determines that the withdrawals are 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, 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.

Diamond Oaks 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 PTW-1, PW-2, and PW-3. 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.