

**Hydrogeological Report for Permit to Take
Water Application
03 080832.01**

**Proposed Golf Course, Part Lots 6 and 7,
Concession 6, Burleigh Ward, Township of
North Kawartha, County of Peterborough**

March, 2010

Prepared for:
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Project No. 03 080832.01

March 2, 2010

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**Re: Hydrogeological Report for Permit to Take Water Application
Proposed Golf Course, Part Lots 6 and 7, Concession 6, Burleigh Ward
Township of North Kawartha, County of Peterborough**

Dear Mr. and Mrs. Challenger:

We understand that you intend to develop a new nine-hole golf course on the above noted property near the hamlet of Woodview, Ontario. Irrigation water for the course and water for a proposed Pro Shop is to be obtained from a dug pond and three (3) drilled wells located on the property. Existing land use surrounding the site includes several residences operated on private wells and septic services. Other adjacent areas are woodlands or fields and a significant wetland is located in the east part of the site.

The effects of the proposed golf course water takings on existing water uses and natural resources is to be demonstrated as input to an application for a Category 3 Permit to Take Water (PTTW). The Ministry of the Environment (MOE) is responsible for issuing PTTW's and will review technical information for this development proposal. If approved, MOE will recommend PTTW conditions, monitoring and mitigation requirements.

This current report addresses recommendations in a Preliminary Water Supply Assessment report that was completed by Jagger Hims Limited in February 2009. The investigations and assessments completed are based on our understanding of the development concept and proposed water uses onsite. The field program included the installation of new monitoring wells adjacent to the existing wetland area, a 24-hour pumping test of the two proposed irrigation supply wells, monitoring of groundwater and surface water drawdown effects during the pumping test, and limited water quality analysis. Procedures, findings and our recommendations are discussed in this report, and a completed application for a PTTW is appended.

We trust that you will find the information satisfactory. If requested, we can attend a development pre-consultation meeting with the MOE to discuss the report and answer any questions.

Yours truly,
GENIVAR Consultants LP



J. Stephen Ash, P. Eng., P. Geo.
Consulting Engineer/Branch Manager

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Transmittal Letter

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1. Background

Genivar was retained by Mr. Eric Challenger, in September 2009, to complete a hydrogeological assessment for an irrigation water supply for a proposed nine-hole golf course located near Highway 28 and the hamlet of Woodview, Ontario. It is understood that water for golf course irrigation will be taken from a dug pond on the site. The pond will be replenished from precipitation and from two existing drilled wells. In addition, a small Pro Shop is to be located in the western part of the site, which will be serviced by a single drilled well located nearby. The Pro Shop will have toilets and washrooms, but no showers, so water demand will be small relative to the golf course irrigation requirements.

The objective of the current hydrogeological study is establish the adequacy of the bedrock aquifer to supply make-up water for the golf course irrigation pond, without creating adverse effects on local groundwater receptors, including private wells and a wetland area onsite. A Category 3 Permit to Take Water (PTTW) is required for the total combined water takings at the subject development, and shall include the pond, the irrigation wells and the Pro Shop well as sources. The combined water taking amount will exceed 50,000 L/day during the golfing season.

By way of background, the subject development property (site) is 122 ha in total area and contains upland and lowland areas that are partially cleared or brush covered. An existing dwelling and a barn exist in the northwestern part of the site, and the existing cleared fields are accessible by dirt trails. According to an Environmental Impact Study (EIS) that was previously completed for the site in 2006, we understand that approximately 98 ha of the subject property would be designated for the golf course project. The remaining area, which includes wetlands and bush to the east of the proposed golf course, would remain undisturbed and protected by buffers. With the exception of the wetland, the EIS report concluded that there are no sensitive environmental features that will restrict the proposed recreational development.

The Applicant installed four test wells on the site in 2007, and based on the well driller's reports (copies included in Appendix --) the wells yield the following quantities:

Designation	MOE Well No.	Depth (ft)	Driller Assessed Pumping Rate	
			L/min	lgpm
Well W1	A050569	290	27	6
Well W2	A050575	65	73	16
Well W3	A062849	43	55	12
Well W4	A062850	102	2.5	0.56

Well locations are indicated on report Figure 2.

The reported well pumping rates were based on 1-hour tests completed by the well driller. It is understood that well W1 will be used for the proposed Pro Shop water supply. Wells W2 and W3 will be used to supply the make-up water for the irrigation pond, which was partially excavated in 2007 in a seasonally wet area of the site (see Figure 2). We understand that the irrigation pond is based in clayey soils, and will be lined to control seasonal water losses. Well W4 is essentially a dry well, but remains as a potential long-term monitoring well.

Preliminary Water Supply Assessments completed by Jagger Hims Limited in 2008 included stepped rate tests conducted on wells W1, W2 and W3, to confirm the reported flow rates and determine requirements for longer duration constant rate tests for the irrigation supply wells, as input to a PTTW application. Step test details are summarized in the following table.

Designation	MOE Well No.	Stepped Rate Test Pumping Rate (l/gpm)	Estimated Maximum Yield	
			L/min	l/gpm
Well W1	A050569	2.4/4.0/5.7	13	2.9
Well W2	A050575	5.5/12.4/15.2/20/23.3	60	13.2
Well W3	A062849	3.7/8.6/12.4/14.2/20/26.6	55	12.1

The estimated combined maximum yield for the irrigation supply wells is approximately 115 L/min, which should satisfy the daily demand requirements. This supply rate is subject to confirmation through a testing program, which is described subsequently in this report.

2. Water Requirements

Based on preliminary water demand estimates provided by the Applicant, we understand that the maximum daily irrigation water requirement for the golf course is 167,000 L. This should allow for approximately 6 mm (1/4") of irrigation water per day on greens, tees and fairway areas, during the season. The irrigation pond design volume is approximately 9,200 m³ and is sufficient for approximately 54 days of irrigation, assuming no recharge or significant water losses due to evaporation or infiltration. The most desirable well supply scenario is to supply the full 167,000 L/day (116 L/min) to the pond, so that the pond water level can be maintained. Limited pond drawdown would also be acceptable, but a dry pond during summer would be aesthetically and operationally undesirable. A smaller water supply of about 5,000 L/day is required for the proposed Pro Shop, which will have public washrooms but no restaurant. A single supply well (W1) is intended to supply the Pro Shop as mentioned above.

3. Site Details and Physical Settings

3.1 General

The development site is 122 ha as previously noted and is located on Part of Lots 6 and 7, Concession 6, Burleigh Ward, Township of North Kawartha, Peterborough County. The site is currently zoned for rural use (RU) and has an environmental constraint (EC) placed on the wetland area that bisects part of the southern portion. The westerly site boundary is located along Northey's Bay Road, and the northerly boundary fronts onto part of Old Burleigh Road, which is parallel to and south of Highway 28. Lands to the south and east of the property are agricultural, residential, and vacant forested lands. We understand that approximately 98 ha of the total site area would be designated for the golf course development, with protective buffers to be maintained around wetland areas where no development will occur.

The site location is indicated on Figure 1 and a site plan is included as Figure 2.

3.2 Physiography and Drainage

The subject development site is within the Georgian Bay Fringe physiographic region, which is characterized by thin soil deposits overlying bedrock, and bare rock knobs and ridges. The area of the proposed nine-hole golf course is gently undulating, and generally slopes in an easterly direction towards a wetland. There is minimal soil cover in most areas. There is approximately 10 meters of topographic relief between the western site boundary and the wetland. The wetland area and associated creek system drains southerly towards Stony Lake, which is about 2 km to the south. Julian Lake is located about 700 m northwest of the site, across Highway 28.

3.3 Hydrostratigraphy

Driller's logs for the onsite test wells provide information on the subsurface conditions and are included Appendix A. The logs indicate that little to no overburden exists over limestone (including dolomitic limestone, potential shale) bedrock, which extends to a depth of approximately 6 m to 11 m below grade. The limestone/dolostone formations are underlain by metamorphosed crystalline bedrock of the Canadian Precambrian Shield.

The site aquifer consists of a fractured bedrock system, and within the site area groundwater supplies for wells are found mainly within the Precambrian bedrock units. The overlying sedimentary bedrock is relatively thin and is inferred to be horizontally bedded and fractured in multiple directions. Shallow discontinuous and/or perched groundwater is expected to exist within the shallow bedrock, and fractures and joints likely permit limited infiltration of precipitation and groundwater recharge (i.e. leaky aquitard behaviour). It is inferred that the Precambrian bedrock is crystalline and massive on a bulk scale, with the groundwater occurring in complex fracture and joint networks related to the mineralogical and structural fabric of the material. Such networks could be connected over large distances. Based on static groundwater levels measured in onsite test wells, the inferred groundwater flow system for the bedrock aquifer is indicated on Figure 3, and flows easterly under a horizontal gradient of about 1 percent.

3.4 Groundwater and Climate

As precipitation in the form of snow and rain falls to the ground, some precipitation will evaporate, some will be taken up by plants (transpiration), some will form runoff and the remainder will infiltrate and provide groundwater recharge to shallow and deep groundwater systems. Groundwater is a dynamic system subject to seasonal variations in water levels. During the late autumn, winter and spring thaw, groundwater levels tend to rise as a result of recharge to the system. Groundwater levels typically decline from late spring through summer and fall.

Climatic data from the Trent University Climate Station was obtained to assess general precipitation trends and effects on groundwater levels at the subject site. A summary of climate and water surplus data is provided in Table E-1. The average annual precipitation rate at the site is approximately 715 mm, and about 65 percent of the precipitation occurs between May 1 to October 31, which is the typical golfing season in Ontario.

The proposed irrigation pond will collect and store some of the precipitation and runoff for use in the irrigation system. The balance of the irrigation supply is to be obtained from groundwater. Based on 30-year climate normals and a simplified Thornthwaite analysis, the site area has an estimated water surplus of approximately 280 mm per annum which contributes to groundwater recharge. Therefore, groundwater recharge on the site is expected to exceed the total water demand for the proposed development.

3.5 Existing Development and Water Supplies

Existing onsite development includes a rental dwelling and a barn owned by the Applicant. The dwelling has a drilled well and a septic system. Another private dwelling is located at the northwest corner of the site, and at the intersection of Old Burleigh Road and Northey's Bay Road, is a rental unit owned by the Applicant that also has a drilled well and a septic system.

Existing offsite development generally consists of widely spaced residences on private services. A local privately-serviced Community Center exists to the west of the site, across Northey's Bay Road. There are no other institutional or commercial properties in the immediate site area.

An offsite well survey was previously conducted as part of the 2006 Preliminary Environmental Impact Study. Survey results are included in Appendix F, for reference. The survey concluded that eighteen (18) drilled wells exist within approximately 500 m of the site boundary, with all wells taking water from the bedrock aquifer at an average depth of about 30 m (100 ft). Well yields in the site area typically range from 5 L/min to 115 L/min, with the average static water level being approximately 7 m below the ground surface. As indicated on Figure 2, the irrigation pond and proposed supply wells are 400 m from the site boundaries in all directions and no other extraction wells exist within 300 m of that area. As such, the potential for groundwater effects on existing offsite wells from the proposed irrigation pumping is expected to be negligible.

4. Hydrogeological Assessment of Irrigation Wells

4.1 Pumping Test

A temporary Permit to Take Water (MOE Reference No. 0182-7WSRST) was obtained to conduct a 24 hour controlled rate pumping test of irrigation wells W2 and W3. The test was completed on November 26 and 27, 2009. Well W2 was pumped at approximately 64 L/min and well W3 was pumped at approximately 40 L/min, for a combined total rate of 104 L/min. A minor adjustment to the W2 rate was made at the 20 minute interval. Pumping equipment was provided by the Applicant.

Irrigation wells W2 and W3 are located adjacent to the irrigation pond, as indicated on Figure 2, and are 60 m apart. The test pumping removed approximately 150 m³ of groundwater from the bedrock aquifer, which was discharged north of the wells into an adjacent soil covered field. Water recirculation into the wells is not expected to be a factor in the test. It is also noted that little or no precipitation occurred during the test.

Observations of the changes in water levels were made at the following locations: the domestic well at 37 Northey's Bay Road located about 380 m from the irrigation wells; wells W1 and W4; two 50 mm diameter PVC standpipe monitoring wells installed in boreholes drilled adjacent to the wetland boundary and designated as OW09-1 and OW09-2; and two drive-point monitors installed in the edge of the wetland designated as DP09-1 and DP09-2. Water level readings were collected manually and using electronic data loggers installed and activated several days prior to and after the pumping test.

Monitoring locations are indicated on Figure 2. Well records, monitoring well and drive point construction details are included in Appendix A.

Tabulated pumping test data and semi-log plots for pumping wells W2 and W3, and all observation well locations are summarized in Appendix B.

Relatively steady drawdown occurred in well W2 during the pumping test. A flow adjustment was made at 20 minutes which accounts for the increased drawdown at that time. See Figure B-1. The drawdown behaviour indicates that leakage into the aquifer occurred to supply the wells. Only 0.2 m of drawdown occurred in the last 840 minutes of the pumping test, indicating a relatively stable water supply condition with respect to the well pumping rate. Ignoring the effects of the simultaneous pumping at W3, which is a conservative approach, the specific capacity of well W2 relative to the pumping rate is 14 m³/day/m. The total drawdown at the end of the pumping test represents approximately 64 percent of the available drawdown in the well. The water level recovered to 94 percent of the static water level after 4022 minutes and the recovery trend matched closely with the drawdown graph.

The maximum drawdown in well W3 was 2.15 m after 1440 minutes of pumping (Figure B-2). The water level in the well remained effectively constant during the period 300 minutes to 660 minutes after pumping was started. An additional 0.17 m of drawdown occurred in the last 780 minutes of the test. Ignoring the effects of simultaneous pumping at W2, the specific capacity of well W3 is calculated as 27 m³/day/m. The maximum drawdown at the end of the test period represents approximately 30 percent of the available drawdown in the well. The static water level fully recovered after 1145 minutes, and the recovery graph closely matched the drawdown graph.

No drawdown was recorded in any of the observation wells (see Figures B-3 through B-9), with the exception of well W4 located approximately 60 m east of well W3. The water level in the proposed Pro Shop well (W1) remained relatively constant during the test. Water levels in the 37 Northey's Bay Road domestic well fluctuated due to tenant use, but, based on an inspection of the graphical data, no significant effects from the pumping test are evident. Maximum drawdown in well W4 was 0.74 m after 1389 minutes of pumping, which is only 2.6 percent of the available drawdown in this well. The water level recovered by 86 percent, within 1148 minutes after pumping was stopped.

4.2 Data Logger Monitoring

Data logger monitoring was conducted prior to, during, and following the test to confirm water level trends at selected locations. The data loggers were operational for the period November 25 through November 30, 2009. Hydrographs of the monitoring results are included in Appendix C.

The data logger monitoring confirms stable water level conditions in the pumping wells (W2 and W3) before and after the pumping test interval. Drawdown during the pumping test is consistent with the manual readings discussed previously.

For well W4, data logger monitoring confirms 0.74 m of drawdown response to the pumping test (Figures C-5 and C-6), which is consistent with manual readings. Water levels in the observation wells adjacent to the wetland, OW09-1 and OW09-2, fluctuated within a 0.5 m to 1 m range during the 5 day monitoring period (Figures C-8 and C-9), but no measureable water level effects were observed during the pumping test interval at these two locations. Further, no measureable response was observed during test pumping at drive-point monitors DP09-1 and DP09-2 installed at the edges of the wetland. The drive point monitors recorded 4 mm and 175 mm of water level change in the wetland, respectively, during the 5-day monitoring period. It is inferred that these changes are related to natural drainage and recharge of the wetland.

4.3 Aquifer Properties

Transmissivity (T) and Storativity (S) are hydraulic properties of an aquifer. Transmissivity is the rate of flow of groundwater through an aquifer for every metre of width in the aquifer. The flow rate of groundwater in an aquifer can be estimated with an understanding of its width. Storativity relates to the volume of water that an aquifer releases per metre of water level decline in the aquifer. Determination of these properties for fractured bedrock is complex, and several assumptions must be made to provide a practical estimate. Transmissivity (T) and Storativity (S) were evaluated using the distance drawdown data for well W4, assuming a virtual well between the two pumping wells. The inferred distance between the virtual point of pumping and the measurement point is 75 m. The combined pumping rate is 104 L/min (150 m³/day). Based on a simplified Cooper-Jacob analysis of the drawdown graph, the following values are obtained:

- $T = 46 \text{ m}^2/\text{day}$
- $S = 0.001$

These properties are considered to be in the normal range of a bedrock aquifer. A more complex fractured media analysis supported by additional testing may be required if these parameters are to be used in design calculations.

4.4 Groundwater Quality

A water sample from each test well (W2 and W3) was obtained after one hour and 24 hours of pumping. The samples were submitted to Caduceon Environmental Laboratories, a CALA-certified laboratory. The samples were analyzed for general chemistry, including selected metals and nutrients, and since the water will be used as a non-potable irrigation supply, results were compared to the Provincial Water Quality Objectives (PWQO's). A summary of the test results is presented in Table D-1 of Appendix D.

All of the samples contained elevated levels of hardness, which is a common occurrence in drilled wells in southern Ontario. The remaining test parameters were within the PWQO's, except for slightly elevated levels of Ammonia + Ammonium (as Nitrate), Boron and Uranium in test well W2. The PWQO for Ammonia + Ammonium is 0.02 mg/L. The 1-hour sample for W2 contained 0.09 mg/L, compared to 0.05 mg/L in the 24-hour sample. This is a 44 percent decline over the test interval. The PWQO for Boron is 0.2 mg/L. The W2 1-hour sample contained 0.264 mg/L Boron, compared to 0.256 mg/L in the 24-hour

sample, which is a three percent decline over the test interval. The PWQO for Uranium is 0.005 mg/L. The W2 1-hour sample contained 0.00847 mg/L Uranium, compared to 0.00884 mg/L in the 24-hour sample, which is a four percent increase over the test interval.

A discussion regarding groundwater quality for irrigation use is provided in the following section.

5. Effects Assessment

5.1 Identification of Potential Receptors

For a groundwater source to be successfully developed for long-term use under a PTTW, the likelihood of potential effects must be assessed. The assessment is meant to determine whether or not the proposed water taking could result in adverse effects to local receptors. Receptors identified for the subject development site include:

- Neighbouring domestic wells;
- The onsite wetland.

5.2 Observed Effects

The test data from the pumping test was provided in Appendix B and discussed in Section 3. The zone of influence for the pumping test appears to be approximately 150 m. The only significant drawdown in non-pumping wells was observed at W4, which is approximately 60 m from pumping well W3. The groundwater system appeared to approach steady state conditions after 24 hours of pumping, since the rate of change in drawdown decreased substantially during the late stages of the test period. Based on the drawdown response graphs, it is inferred that the bedrock aquifer is sustained by leakage. The bedrock aquifer is inferred to consist of a complex fracture network. Based on MOE data reports, yields for other wells the site area are similar to the onsite test wells so the observed flow rates should be sustainable.

The observed effects on the local receptors noted in the previous section are summarized as follows:

- Based on observation well monitoring there was no detectable change in groundwater levels at monitoring wells and domestic wells located along Northey's Bay Road and Old Burleigh Road. The zone of influence for the pumping wells did not expand more than about 150 m during the test period, which is well within the property limits and does not encompass any other existing supply wells. The rate of change in groundwater levels in the pumping wells was slow at the end of the test period, indicating stability.
- Water levels in the wetland observation wells and drive point monitors were not affected by the pumping test. Therefore, an impact on the wetland from the test pumping is not evident.

In summary, the observed effects during the pumping test are reasonable and acceptable in terms of the proposed development.

5.3 Predicted Effects

5.3.1 Drawdown

Predicted effects from the long-term taking of groundwater for irrigation use were premised on the maximum daily water demand of 167,000 L for the irrigation wells, assuming that the irrigation pond requires constant filling during the irrigation season. Pro Shop water use is considered to be negligible in terms of the effects assessment, as it similar to a domestic supply well rate. Water stored in the irrigation pond that is captured from precipitation will reduce the overall demand on the irrigation supply wells.

Based on the inferred aquifer properties stated previously, for 120 days (4 months) of continual pumping at the irrigation demand rate, with no aquifer recharge, it is predicted that the zone of influence will extend approximately 600 m from the irrigation supply well area. Predicted drawdown is less than 1 m at the edge of the zone of influence. The amount of drawdown will steadily increase towards the pumping wells as water is removed from the system. The distance estimate for the zone of influence should only be

used as a guide, since the bedrock aquifer is an anisotropic, complex fractured medium that contains distinct hydrogeologic boundaries to groundwater flow. The well capture zone may be irregular.

It is unlikely that 120 days of continual groundwater pumping for irrigation will be required during golf course operations without the benefit of precipitation. Therefore, the zone of influence around the irrigation wells could be significantly smaller than predicted. The flow through the bedrock aquifer towards the irrigation wells could be estimated by the following equation:

$$Q = T \times I \times W$$

where,

Q = flow rate in the aquifer, m³/day

T = Transmissivity (47 m²/day)

I = horizontal hydraulic gradient (0.01 approx.)

W = width perpendicular to flow path (500 metres approx.)

With these assumptions the flow through the aquifer across the site is approximately 240 m³/day (170 L/min). If it is assumed that 100 mm/yr of recharge infiltrates into the bedrock aquifer, then based on a total golf course area of 98 ha, recharge to the bedrock aquifer would be about 190 L/min. Therefore, the flow through the aquifer plus recharge to the bedrock aquifer on the site is approximately twice the maximum irrigation water demand. Water for irrigation will contribute to groundwater recharge, as stated previously.

Based on the above discussion, it is unlikely that drawdown effects will be measureable at offsite domestic wells, which are located more than 400 m away from the irrigation water supply area.

The onsite wetland is approximately 200 m east of the irrigation wells and no drawdown effects were observed in the wetland monitors during the pumping test. A direct hydraulic connection between the wetland and the bedrock aquifer was not observed during the investigations. As such, we do not predict significant drawdown effects on the wetland from the proposed irrigation pumping.

5.3.2 Water Quality

The elevated Ammonia/Ammonium, Boron and Uranium content in water from well W2 could be cited as a concern for irrigation water use. Concentrations of these parameters remained fairly constant over 24 hours of pumping and exceed PWQO's. The water quality might not be significant if it is demonstrated that irrigation water from well W2 will not flow directly into the wetland area. Furthermore, the water quality in well W3 is acceptable in terms of the PWQO's and dilution effects from combining the groundwater from the two wells in the irrigation pond prior to use may be sufficient to reduce elevated chemical concentrations to insignificant levels. Water quality monitoring and conditions for irrigation discharge are required pending additional test data.

6. Monitoring Program

A water monitoring program is recommended and will be a condition of a PTTW approval, to confirm expected groundwater behaviour and effects from water taking and use. Monitoring should include the following items at minimum.

- Daily monitoring of all pumping rates and volumes.
- Daily monitoring of water levels in the irrigation pond, and irrigation wells W2, W3. Monthly monitoring of groundwater levels at wells W1, W4, the domestic well at 37 Northey's Bay Road, OW09-1 and OW09-2, and DP09-1 and DP09-2. Quarterly sampling of inorganic water chemistry from the irrigation system, including wells W2, W3. Separate and combined samples should be tested.
- A quarterly review of all data by the Hydrogeologist for the first year, or a more frequent review if the drawdown behaviour or other conditions are significantly different than expected.
- Preparation of an annual monitoring report by the Hydrogeologist. The monitoring program should be reviewed after the first year to determine any modifications, and for continuance of the program.

In addition, any complaints from off-site property owners should be investigated, resolved and documented by the Hydrogeologist.

7. PTTW Application

A copy of a completed application for a Category 3 Permit to Take Water for the proposed water uses onsite, including the golf course irrigation pond, two irrigation supply wells and a Pro Shop supply well is included as Appendix G. A fee to the Ministry of Finance must be paid upon submission of the application and supporting documentation. We recommend a pre-consultation meeting be held with the MOE to discuss the site conditions and resolve any local or site specific issues that may be raised in advance of the main technical review.

8. Conclusion

The following conclusions and recommendations are premised on the data reviewed and presented in this report.

- Irrigation water for the course and water for a proposed Pro Shop is to be obtained from a dug pond and three (3) drilled wells located on the property.
- The inferred direction of groundwater movement in the bedrock aquifer is from west to east, which is similar to surface drainage conditions.
- The site is located in a rural area, and drilled domestic wells exist adjacent to the site, within 500 m of the site boundary. Based on prior surveys, most wells obtain water from the bedrock aquifer at reported rates of 5 to 115 L/min. Quality is reported as fresh.
- A 24-hour aquifer test was conducted to determine if the bedrock aquifer supply wells are capable of providing the proposed irrigation water demand of 167,000 L per day and to check for potential adverse effects on local receptors including wells.
- Based on pumping test results, there was no detectable change in groundwater levels at onsite monitoring well locations and domestic wells located along Northey's Bay Road and Old Burleigh Road. The zone of influence for the pumping wells did not appear to expand more than about 150 m during the test period, which is within the property limits and does not encompass any existing supply wells. The rate of change in groundwater levels in the pumping wells was slow at the end of the test period, indicating stability.
- Water levels in the wetland observation wells and drive point monitors were not affected by the pumping test. Therefore, an impact on the wetland from the test pumping is not evident.
- The elevated Ammonia/Ammonium, Boron and Uranium content in water from well W2 could be cited as a concern for irrigation water use. Concentrations of these parameters remained fairly constant over 24 hours of pumping and exceed PWQO's. The water quality might not be significant if it is demonstrated that irrigation water from well W2 will not flow directly into the wetland area. Furthermore, the water quality in well W3 is acceptable in terms of the PWQO's and dilution effects from combining the groundwater from the two wells in the irrigation pond prior to use may be sufficient to reduce elevated chemical concentrations to insignificant levels. Water quality monitoring and conditions for irrigation discharge are required pending additional test data.
- An application for a Permit to Take Water is attached as part of a submission to the Ontario Ministry of the Environment.

Report Prepared by:
GENIVAR Consultants LP



Lisa J. Gardiner, B.Sc (Hon.), A.Sc.T.
Project Manager

Reviewed by:



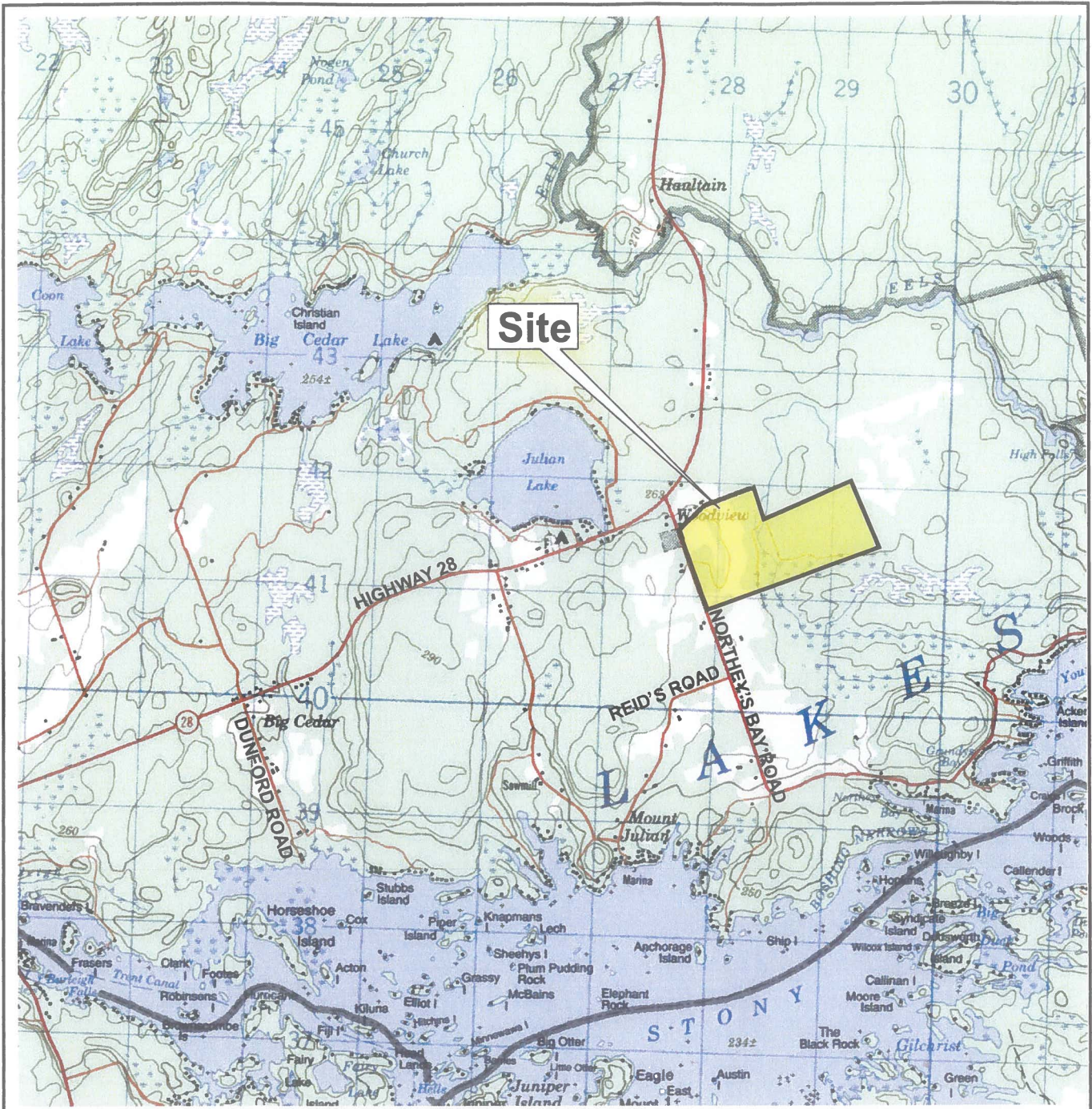
J. Stephen Ash, P. Eng., P. Geo.
Consulting Engineer/Branch Manager

Figures

Figure 1 – Location Map

Figure 2 – Site Plan

Figure 3 – Groundwater Flow Direction



LEGEND

 APPROXIMATE SITE LOCATION



MAP SOURCE:
NTS SHEET 31 D/09 Burleigh Falls

LOCATION MAP

WATER SUPPLY ASSESSMENT
Proposed Challenger Golf Course
Part Lots 6 & 7, Concession 8, Burleigh Ward,
Township of North Kawartha, Ontario
For: Eric and Diane Challenger

DATE: MARCH 2010

SCALE: 1:50,000

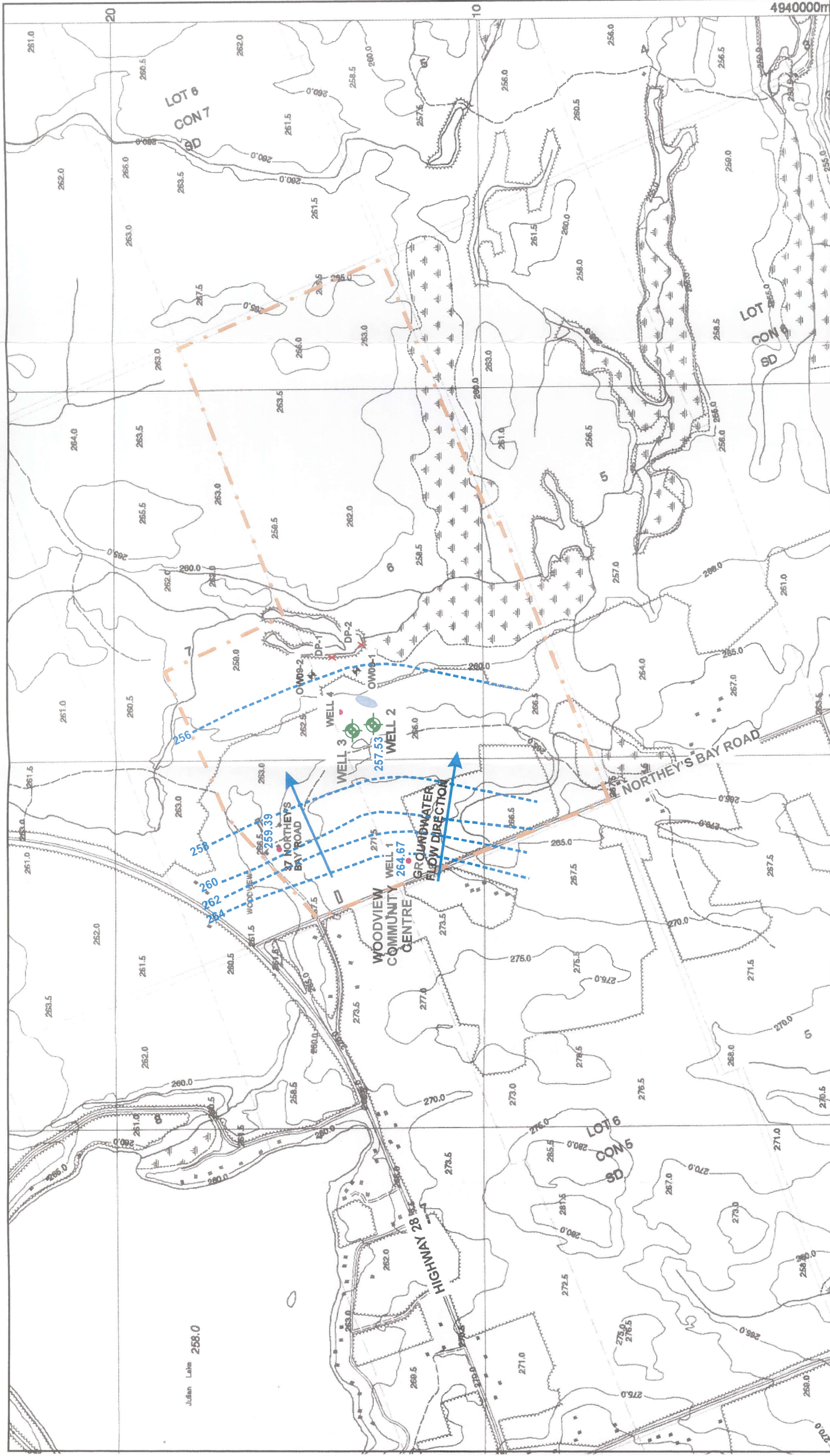
PROJECT: 03-080832.01

REF. NO.: 3-08083201F1-LM

 GENIVAR

FIGURE

1



<p>LEGEND</p> <ul style="list-style-type: none"> WELL 2 (A050575) Test Well Designation and Approximate Location Pond Approximate Location Observation Monitoring Well Designation and Approximate Location DP-1 Drive Point Designation and Approximate Location WELL 1 Observation Drilled Well Designation and Approximate Location Inferred Groundwater Contours for the Bedrock Aquifer (m) 		<p>SCALE: 1 : 10,000</p> <p>REF. NO.: 0308083201F3</p> <p>DATE: MARCH 2010</p> <p>PROJECT: 03080832.01</p>	
<p>WATER SUPPLY ASSESSMENT Proposed Challenger Golf Course Part Lots 6 & 7, Concession 8, Burleigh Ward, Township of North Kawartha, Ontario For: Eric and Diane Challenger</p>		<p>FIGURE 3</p>	
		<p>GROUNDWATER FLOW DIRECTION</p>	

Appendix A

Borehole Logs

Water Well Records

Drive Point Figures

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

<u>Soil Classification*</u>		<u>Terminology</u>	<u>Proportion</u>
Clay	<0.002 mm		
Silt	0.002 to 0.06 mm	"trace" (e.g. trace sand)	<10%
Sand	0.06 to 2 mm	"some" (e.g. some sand)	10% - 20%
Gravel	2 to 60 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	60 to 200 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>200 mm	noun (e.g. sand)	>50%

* Extension of MIT Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

<u>COHESIONLESS SOIL</u>		<u>COHESIVE SOIL</u>	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.











<u>COHESIONLESS SOILS</u>		<u>COHESIVE SOILS</u>	
Dry		DTPL	- Drier Than Plastic Limit
Moist		APL	- About Plastic Limit
Wet		WTPL	- Wetter Than Plastic Limit
Saturated		MWTPL	- Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.

	Standpipe		Geotextile Material / Liner		Granular Backfill
	Piezometer		Borehole Seal (Bentonite Grout)		Granular (Filter) Pack
	Screened Interval		Cement Seal		Native Soil Backfill / Cave / Slough
	Borehole Seal (Peltonite, Bentonite or Hole Plug)				

Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS = Split Spoon	GS = Grab Sample
ST = Thin Walled Shelby Tube	CS = Channel Sample
AS = Auger Flight Sample	WS = Wash Sample
CC = Continuous Core	RC = Rock Core

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

<u>RQD Classification</u>	<u>RQD (%)</u>
Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60° steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{x\text{Blows}}{\text{mm}}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

BOREHOLE NO. OW09-1

PROJECT NAME: PROPOSED CHALLENGER GOLF COURSE

PROJECT NO.: 3080832.01

CLIENT: ERIC AND DIANE CHALLENGER

DATE COMPLETED: Nov 10, 2009

BOREHOLE TYPE: _____

SUPERVISOR: RDJ LJG

GROUND ELEVATION: NOT DETERMINED

REVIEWER: JSA

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		REMARKS	
				TYPE	N VALUE	% WATER	% RECOVERY	PI(D)/OV (ppm)	"N" VALUE			SHEAR STRENGTH		
									10	20	30	W _p		W _L
0.0														
1.0	<u>DOLOMITIC LIMESTONE:</u> DOLOMITIC LIMESTONE, GULL RIVER FORMATION, GREY COLOUR, SOFT												GROUNDWATER AT 0.6 mbgs ON NOVEMBER 12, 2009	
2.0														
3.0														
4.0														
5.0														
6.0														
7.0														
8.0														
9.0														
10.0														
11.0														
12.0														
13.0														
14.0														
15.0				15.1										
16.0														
17.0														
18.0														
19.0														
20.0														

JHL GEOTECH B/W METRIC 03080832.01.GPJ JAGGER HIMMS BASIC.GDT 2/26/10

BOREHOLE NO. OW09-2

PROJECT NAME: PROPOSED CHALLENGER GOLF COURSE

PROJECT NO.: 3080832.01

CLIENT: ERIC AND DIANE CHALLENGER



DATE COMPLETED: Nov 12, 2009

BOREHOLE TYPE: _____

SUPERVISOR: RDJ LJG

GROUND ELEVATION: NOT DETERMINED

REVIEWER: JSA

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		REMARKS	
				TYPE	N VALUE	% WATER	% RECOVERY	PID/TOV (ppm)	"N" VALUE			SHEAR STRENGTH		
									10	20	30	W _p		W _L
0.0														
1.0	DOLOMITIC LIMESTONE: DOLOMITIC LIMESTONE, GULL RIVER FORMATION, GREY COLOUR, SOFT												GROUNDWATER AT 0.8 mbgs ON NOVEMBER 12, 2009	
2.0														
3.0														
4.0														
5.0														
6.0														
7.0														
8.0														
9.0														
10.0														
11.0														
12.0														
13.0														
14.0														
15.0														
15.1														
16.0														
17.0														
18.0														
19.0														
20.0														

JHL GEOTECH B/W METRIC 03080832.01.GPJ JAGGER HIMES BASIC.GDT 2/28/10

Well 1
 A 050569
 A 050569

Instructions for Completing Form
 For use in the Province of Ontario only. This document is a permanent legal document. Please retain for future reference.
 All Sections must be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
 Questions regarding completing this application can be directed to the Water Well Help Desk (Toll Free) at 1-888-396-9355.
 All measurements shall be reported to 1/10th of a metre.
 Please print clearly in blue or black ink only.

Ministry Use Only

Location of Well Information

Last Name: [] Mailing Address (Street Number/Name, RR, Lot, Concession): []

County: [] Municipality: [] Township/City/Town/Village: [] Province: [] Postal Code: [] Telephone Number (include area code): []

District/Municipality: [] Township: [] Lot: [] Concession: []

City/Town/Village: [] Site/Compartment/Block/Tract etc.: []

Unit Make/Model: [] Mode of Operation: Undifferentiated Averaged Differentiated, specify: []

UTM Easting: [] UTM Northing: []

Material	Other Materials	General Description	Depth From	Metres To
LIMESTONE		FRACTURED	0	12
LIMESTONE		HARD	12	57
GRANITE		HARD	37	72
		HARD	72	130
		HARD	130	155
GRANITE		HARD	155	200
GRANITE		POOROUS	200	205
GRANITE		HARD	205	290

* ALL MEASUREMENTS IN IMPERIAL *

Water Record

Depth Metres: From [] To [] Diameter Centimetres: []

Water found at: [] Kind of Water: []

Chlorinated: Yes No

Construction Record

Inside diam centimetres: [] Material: [] Wall thickness centimetres: [] Depth Metres: From [] To []

Casing: Steel Fibreglass Plastic Concrete Galvanized

Screen: Outside diam [] Slot No. []

No Casing or Screen: Open hole

Test of Well Yield

Pumping test method	Draw Down	Recovery
	Time min Water Level Metres	Time min Water Level Metres
Pump intake set at (metres): 200'	Static Level: 27	
Pumping rate (litres/min): 600	1 30	1 104
Duration of pumping 1 hrs + min	2 34.1	2 102.3
Final water level end of pumping 106.9 metres	3 36.9	3 101.0
Recommended pump type: <input checked="" type="checkbox"/> Shallow <input type="checkbox"/> Deep	4 38.2	4 100.1
Recommended pump depth: 250 metres	5 40	5 99.8
Recommended pump rate: 600 (litres/min)	10 45.1	10 82.2
	15 50.4	15 68.6
If flowing give rate - (litres/min)	20 56.4	20 55.8
	25 63.6	25 44.3
If pumping discontinued, give reason.	30 69.7	30 36.2
	40 83.9	40 31.6
	50 96	50 24.1
	60 106.9	60 27

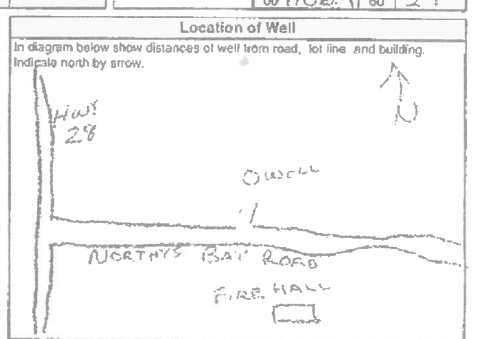
Plugging and Sealing Record

Depth set at - Metres: From [] To [] Material and type (bentonite slurry, neat cement slurry) etc.: [] Volume Placed (cubic-metres): []

Method of Construction: Cable Tool Rotary (air) Diamond Digging Rotary (conventional) Air percussion Jetting Other Rotary (reverse) Boring Drilling

Water Use: Domestic Industrial Public Supply Other Stock Commercial Not used Irrigation Municipal Cooling & air conditioning

Final Status of Well: Water Supply Recharge well Unfinished Abandoned, (Other) Observation well Abandoned, insufficient supply Dewatering Test Hole Abandoned, poor quality Replacement well



Well Contractor/Technician Information

Name of Well Contractor: [] Well Contractor's Licence No.: []

Name of Well Technician (last name, first name): []

Ministry Use Only

Audit No.: [] Date Well Completed: []

Was the well owner's information package delivered? Yes No

Date Delivered: []

Well Owner's Information

First Name: ERIC Last Name: CHALLENGER E-mail Address: [] Well Constructed by Well Owner: []
 Mailing Address (Street Number/Name, RR): 63 JAMIESON LAKE Municipality: WILMOT Province: ONT Postal Code: N1P1M1 Telephone No. (inc. area code): 519-441-1103

Part A Construction and/or Major Alteration of a Well

Address of Well Location (Street Number/Name, RR): 37 NORTH BAY ROAD Township: SUMMITTON Lot: 7 Concession: 10
 County/District/Municipality: PATERBOROUGH City/Town/Village: WOODVILLE Province: Ontario Postal Code: N4G1E1P
 UTM Coordinates: Zone: 17 Easting: 729017 Northing: 4941597 GPS Unit Make: GARMIN Model: UT-4 Mode of Operation: [] Undifferentiated [] Averaged [] Differentiated, specify: []

Overburden and Bedrock Materials (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth From (Metres)	Depth To (Metres)
GREY	LIMESTONE	SLAT	FRAC LINDS	10	20
BROWN	CLAY		CLAY	20	30
WHITE	CLAY		CLAY	30	42

* ALL MEASUREMENTS IN METERS

Annular Space/Abandonment Sealing Record

Depth Set at (Metres) From	To	Type of Sealant Used (Material and Type)	Volume Placed (Cubic Metres)
0	20	BEAUCHEMIE SLURRY	12.13

Results of Well Yield Testing

Check box if after test of well yield, water was:
 Clear and sand free
 Cannot develop to sand-free state
 If pumping discontinued, give reason: []

Time (Min)	Draw Down (Metres)		Recovery (Metres)	
	Static Level	Water Level	Static Level	Water Level
1	16.7	17.3	1	17.3
2	16.7	17.6	2	17.6
3	16.7	18	3	18
4	16.7	18.5	4	18.5
5	16.7	18.8	5	18.8
10	16.7	19.2	10	19.2
15	16.7	20.5	15	20.5
20	16.7	21.3	20	21.3
25	16.7	21.8	25	21.8
30	16.7	22	30	22
40	16.7	22.8	40	22.8
50	16.7	23.4	50	23.4
60	16.7	24.2	60	24.2

Pumping test method: SIMPLIFIED
 Pump Intake set at (Metres): 20'
 Pumping rate (Litres/min): 12.2 LPM
 Duration of pumping: 1 hrs + min
 Final water level end of pumping (Metres): 21.3 M
 Recommended pump type: [] Shallow [] Deep
 Recommended pump depth: 40' - Metres
 Recommended pump rate (Litres/min): 12.2 LPM
 If flowing give rate (Litres/min): []

Method of Construction

Cable Tool Diamond Public Commercial Not used
 Rotary (Conventional) Jetting Domestic Municipal Dewatering
 Rotary (Reverse) Driving Livestock Test Hole Monitoring
 Rotary (Air) Digging Irrigation Cooling & Air Conditioning
 Air percussion Boring Industrial Other, specify: []
 Other, specify: []

Water Use

Water Supply Dewatering Well Observation and/or Monitoring Hole
 Replacement Well Abandoned, Insufficient Supply Alteration (Construction)
 Test Hole Abandoned, Poor Water Quality Other, specify: []
 Recharge Well Abandoned, other, specify: []

Status of Well

Water Supply Dewatering Well Observation and/or Monitoring Hole
 Replacement Well Abandoned, Insufficient Supply Alteration (Construction)
 Test Hole Abandoned, Poor Water Quality Other, specify: []
 Recharge Well Abandoned, other, specify: []

Location of Well

Please provide a map below showing:
 - all property boundaries, and measurements sufficient to locate the well in relation to fixed points,
 - an arrow indicating the North direction
 - detailed drawings can be provided as attachments no larger than legal size (6.5" by 14")
 - vertical pictures of inside of well can also be provided



Water Details

Water found at Depth: 3.0 Metres Kind of Water: [] Fresh [] Salty [] Sulphur [] Minerals
 Water found at Depth: [] Metres Kind of Water: [] Fresh [] Salty [] Sulphur [] Minerals
 Water found at Depth: [] Metres Kind of Water: [] Fresh [] Salty [] Sulphur [] Minerals

Casing Used

Galvanized Fibreglass Plastic Concrete
 Steel Fibreglass Plastic Concrete

Screen Used

Galvanized Fibreglass Plastic Concrete
 Steel Fibreglass Plastic Concrete

Casing and Well Details

Diameter of the Hole (Centimetres): 1.25
 Depth of the Hole (Metres): 42'
 Wall Thickness (Metres): 1.28
 Inside Diameter of the Casing (Metres): 1.25
 Depth of the Casing (Metres): 20'

No Casing and Screen Used

Open Hole
 Disinfected? [] Yes [] No

Ministry Use Only

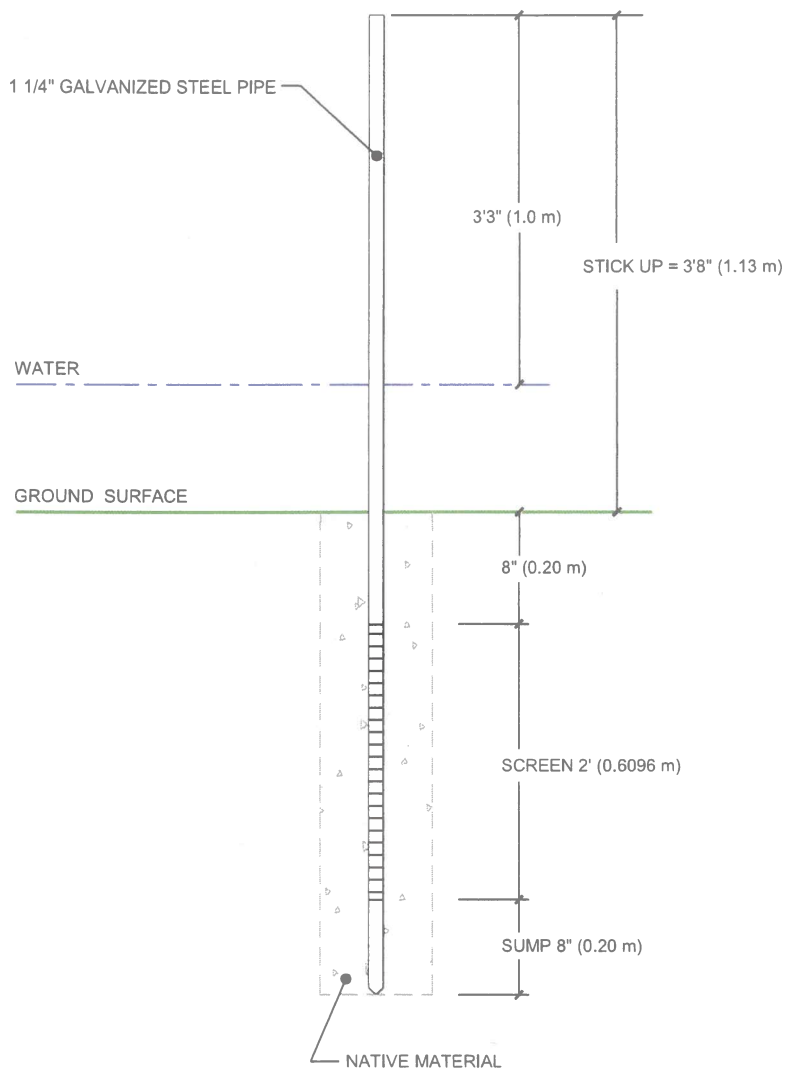
Audit No.: 269759 Well Contractor No.: []
 Date Received (yyyy/mm/dd): [] Date of Inspection (yyyy/mm/dd): []
 Remarks: []

Date Well Completed (yyyy/mm/dd): 2007/12/19 Was the well owner's information package delivered? [] Yes [] No Date the Well Record and Package Delivered to Well Owner (yyyy/mm/dd): 2007/12/18

Well Contractor and Well Technician Information

Business Name of Well Contractor: WEAVER WATER WELL Well Contractor's Licence No.: 6151715
 Business Address (Street No./Name, number, RR): RR #2 LAKEHURD Municipality: PATERBOROUGH
 Province: ONT Postal Code: N9C1R4P Business E-mail Address: []
 Bus Telephone No. (inc. area code): 519-441-1103 Name of Well Technician (Last Name, First Name): JERRY WEAVER
 Well Technician's Licence No.: 10161512 Signature of Technician: [] Date Submitted (yyyy/mm/dd): 2007/12/18

DP-1



DRIVEPOINT DP-1

WATER SUPPLY ASSESSMENT
 PROPOSED CHALLENGER GOLF COURSE
 Part Lots 6 & 7, Conc. 8, Burleigh Ward
 Township of North Kawartha
 For Eric & Diane Challenger

DATE: MARCH 2010

SCALE: NOT TO SCALE

PROJECT: 3-080832.01

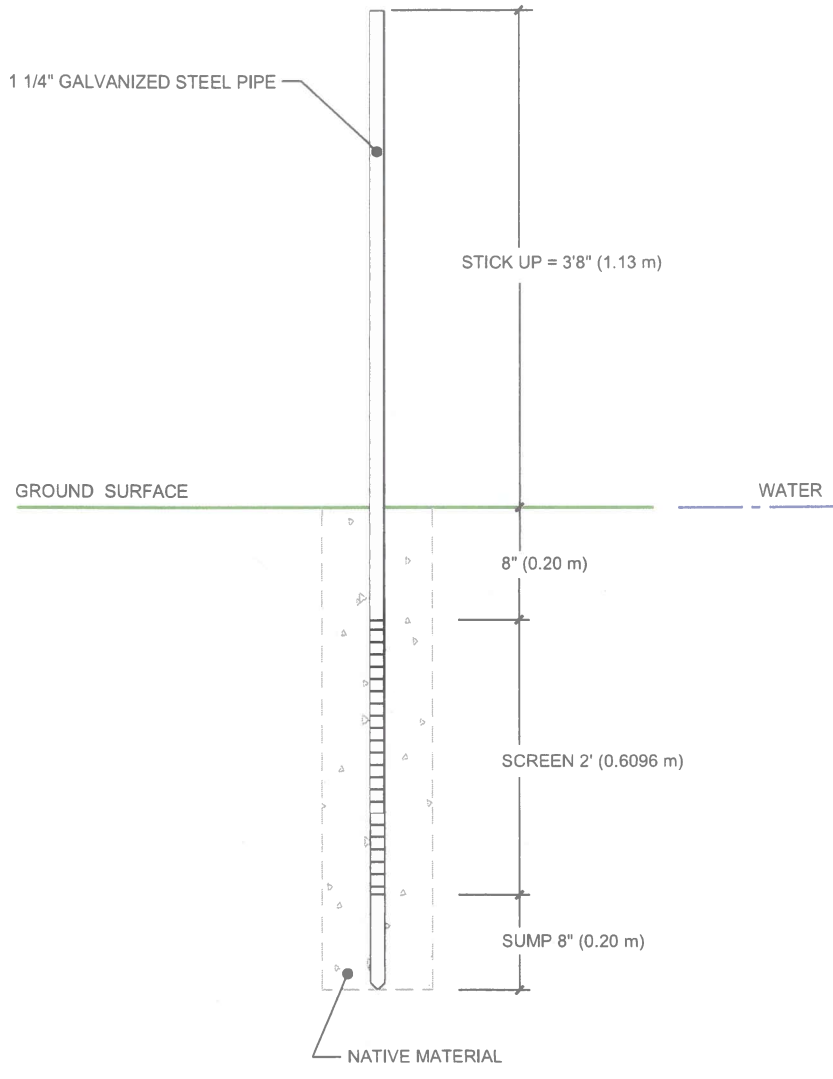
REF. NO.: 3-08083201FA1-DT



FIGURE

A-1

DP-2



DRIVEPOINT DP-2

WATER SUPPLY ASSESSMENT
PROPOSED CHALLENGER GOLF COURSE
Part Lots 6 & 7, Conc. 8, Burleigh Ward
Township of North Kawartha
For Eric & Diane Challenger

DATE: MARCH 2010	SCALE: NOT TO SCALE
PROJECT: 3-080832.01	REF. NO.: 3-08083201FA2-DT

Appendix B

Pump Test Data

TABLE B-1: RECORD OF PUMPING WELL 2 (A050575)

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: Well 2 DEPTH(m bgl): 19.81 mp (m agl): 0.56
 PW: Well 2 SWL(m bmp): 9.66 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 DATE: 26-Nov-09 I.D. (mm): 152 Radius from Well 2: n/a
 TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
0.5	9.80	0.14	0.5	15.18	0.39	6% recovery
1	10.30	0.64	1	14.67	0.90	
1.5	10.60	0.94	1.5	14.25	1.32	
2	10.80	1.14	2	14.01	1.56	
2.5	10.96	1.30	2.5	13.61	1.96	
3	11.12	1.46	3	13.32	2.25	
3.5	11.23	1.57	3.5	13.12	2.45	
4	11.42	1.76	4	12.92	2.65	
4.5	11.42	1.76	4.5	12.72	2.85	
5	11.50	1.84	5	12.62	2.95	
6	11.58	1.92	6	12.42	3.15	
7	11.70	2.04	7	12.28	3.29	
8	11.76	2.10	8	12.14	3.43	
9	11.81	2.15	9	12.04	3.53	
10	11.86	2.20	10	11.97	3.60	
12	11.94	2.28	12	11.79	3.78	
14	11.97	2.31	14	11.67	3.90	
16	12.05	2.39	18	11.48	4.09	
18	12.12	2.46	20	11.40	4.17	
20	12.15	2.49	22	11.32	4.25	
22	13.14	3.48	25	11.21	4.36	
25	13.74	4.08	30	11.07	4.50	
30	14.13	4.47	35	10.93	4.64	
35	14.32	4.66	40	10.80	4.77	
40	14.48	4.82	45	10.68	4.89	pH 7.51, 8.7°C, 557 µs/cm 0.74 ntu 64% recovery
45	14.59	4.93	50	10.57	5.00	
50	14.65	4.99	55	10.47	5.10	
55	14.75	5.09	60	10.39	5.18	
60	14.80	5.14	1153	9.62	5.96	
70	14.93	5.27	4022	9.59	5.98	
80	15.03	5.37				
90	15.12	5.46				
100	15.20	5.54				
110	15.22	5.56				
120	15.30	5.64				
135	15.34	5.68				
150	15.39	5.73				
165	15.46	5.80				
180	15.50	5.84				
200	15.54	5.88				
220	15.57	5.91				
240	15.62	5.96				
270	15.66	6.00				
300	15.72	6.06				
330	15.76	6.10				
360	15.75	6.09				
420	15.81	6.15				
480	15.83	6.17				

TABLE B-1: RECORD OF PUMPING WELL 2 (A050575)

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: Well 2 DEPTH(m bgl): 19.81 mp (m agl): 0.56
 PW: Well 2 SWL(m bmp): 9.66 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 DATE: 26-Nov-09 I.D. (mm): 152 Radius from Well 2: n/a
 TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
540	15.84	6.18				
600	15.85	6.19				
660	15.89	6.23				
720	15.89	6.23				
780	15.90	6.24				
840	15.93	6.27				
900	15.93	6.27				
960	15.95	6.29				
1020	15.99	6.33				
1080	16.01	6.35				
1140	16.01	6.35				
1200	16.01	6.35				
1260	16.01	6.35				
1320	16.04	6.38				
1380	16.05	6.39				
1440	16.05	6.39				

pH 7.51, 8.4°C, 571 µs/cm
0.49 ntu

Q: discharge r: distance from pumped well DIA: diameter mbmp: metres below measuring point
 SWL: static water level PW: pumped well mp: measuring point mbgl: metres below ground level
 L/sec: litres per second

FIGURE B-1 RECORD OF PUMPING WELL 2 (A050575)

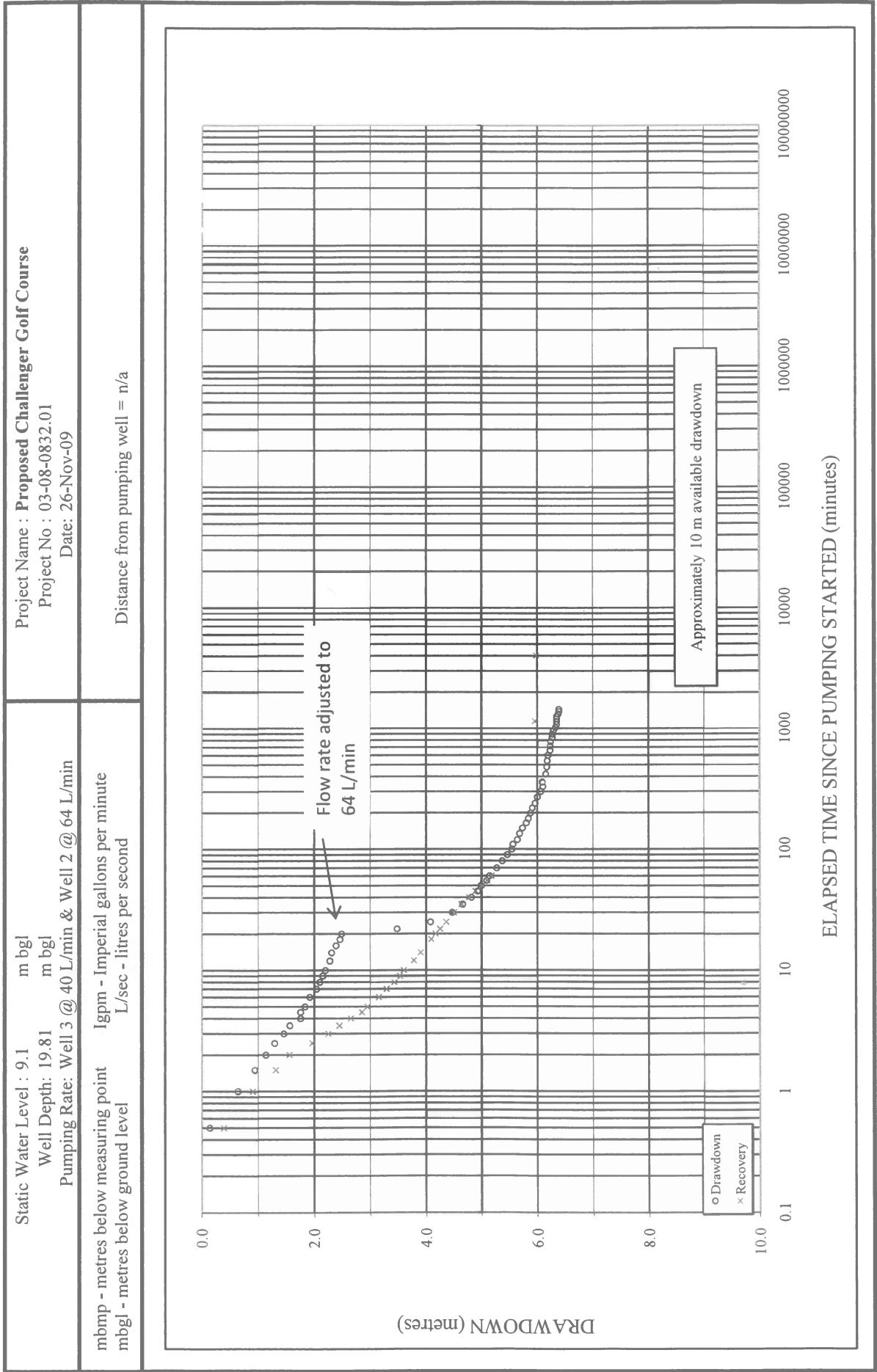


TABLE B-2: RECORD OF PUMPING WELL 3 (A062849)

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: Well 3 DEPTH(m bgl): 12.19 mp (m agl): 0.42
 PW: Well 3 SWL(m bmp): 4.33 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 DATE: 26-Nov-09 I.D. (mm): 152 Radius from Well 3: n/a
 TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
0.5	4.48	0.15	0.5	6.30	0.18	8% recovery
1	4.54	0.21	1	6.25	0.24	
1.5	4.59	0.26	1.5	6.20	0.28	
2	4.64	0.31	2	6.16	0.32	
2.5	4.68	0.35	2.5	6.13	0.35	
3	4.71	0.38	3	6.09	0.40	
3.5	4.75	0.42	3.5	6.06	0.42	
4	4.77	0.44	4	6.03	0.45	
4.5	4.82	0.49	4.5	6.01	0.48	
5	4.83	0.50	5	5.98	0.50	
6	4.89	0.56	6	5.93	0.55	
8	4.97	0.64	7	5.89	0.59	
10	5.02	0.69	8	5.86	0.63	
12	5.11	0.78	9	5.82	0.67	
14	5.17	0.84	10	5.78	0.71	
16	5.23	0.90	12	5.71	0.77	
20	5.33	1.00	14	5.66	0.82	
25	5.41	1.08	16	5.60	0.88	
30	5.54	1.21	18	5.53	0.95	
35	5.57	1.24	20	5.47	1.01	
40	5.62	1.29	25	5.39	1.10	
45	5.66	1.33	30	5.29	1.19	
50	5.71	1.38	35	5.20	1.28	pH 7.49, 8.9°C, 487 µs/cm 0.61 ntu
55	5.75	1.42	40	5.13	1.35	
60	5.78	1.45	45	5.08	1.41	
70	5.82	1.49	50	5.01	1.47	
80	5.89	1.56	55	4.96	1.52	
90	5.94	1.61	60	4.92	1.56	69% recovery 102% recovery
100	5.98	1.65	1145	4.26	2.22	
110	6.01	1.68	3975	4.27	2.22	
120	6.04	1.71				
135	6.07	1.74				
150	6.12	1.79				
165	6.14	1.81				
180	6.18	1.85				
200	6.19	1.86				
220	6.20	1.87				
240	6.21	1.88				
270	6.26	1.93				
300	6.30	1.97				
330	6.31	1.98				
360	6.30	1.97				
420	6.29	1.96				
480	6.29	1.96				
540	6.28	1.95				

TABLE B-2: RECORD OF PUMPING WELL 3 (A062849)

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: Well 3 DEPTH(m bgl): 12.19 mp (m agl): 0.42
 PW: Well 3 SWL(m bmp): 4.33 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 DATE: 26-Nov-09 I.D. (mm): 152 Radius from Well 3: n/a
 TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
600	6.30	1.97				
660	6.31	1.98				
720	6.33	2.00				
780	6.36	2.03				
840	6.36	2.03				
900	6.32	1.99				
960	6.35	2.02				
1020	6.38	2.05				
1080	6.42	2.09				
1140	6.42	2.09				
1200	6.41	2.08				
1260	6.44	2.11				
1320	6.45	2.12				
1440	6.48	2.15				
						pH 7.49, 8.6°C, 495 µs/cm 0.54 ntu

Q: discharge r: distance from pumped well DIA: diameter mbmp: metres below measuring point
 SWL: static water level PW: pumped well mp: measuring point mbgl: metres below ground level
 L/sec: litres per second

FIGURE B-2 RECORD OF PUMPING WELL 3 (A062849)

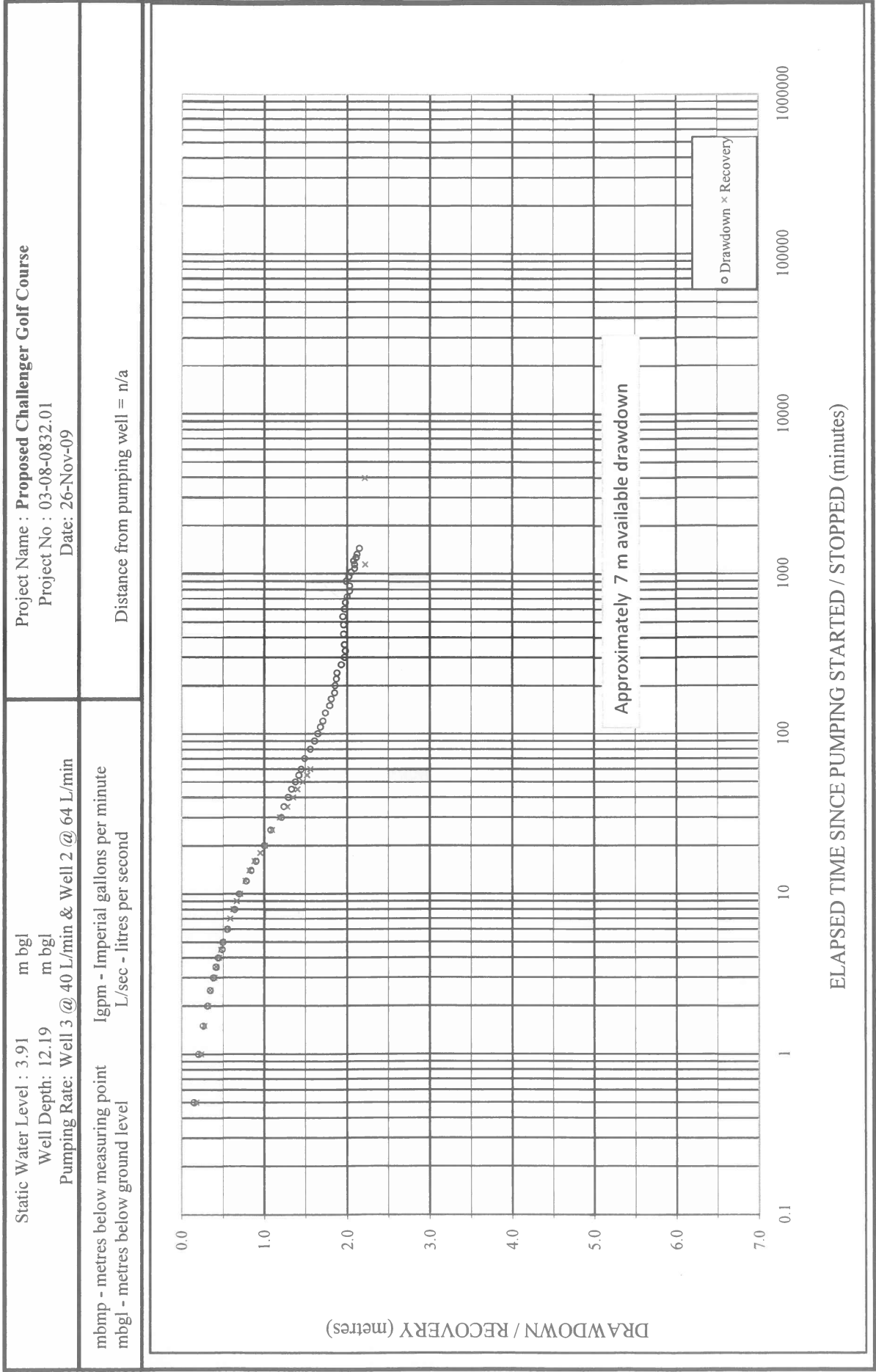


TABLE B-3: RECORD OF OBSERVATION WELL 4 (A062850)

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: Well 4 DEPTH(m bgl): 31.01 mp (m agl): 0.41
 PW: Well 2 & 3 SWL(m bmp): 3.45 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 DATE: 26-Nov-09 I.D. (mm): 152 Radius from Wells 2 and 3: 60 m
 TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
76	3.48	0.03	30	4.27	-0.08	
142	3.54	0.09	1148	3.55	0.64	
184	3.59	0.14				
267	3.67	0.22				
311	3.69	0.24				
371	3.76	0.31				
429	3.80	0.35				
486	3.84	0.39				
548	3.86	0.41				
608	3.87	0.42				
669	3.96	0.51				
729	3.99	0.54				
785	4.02	0.57				
847	4.03	0.58				
906	4.07	0.62				
968	4.08	0.63				
1026	4.11	0.66				
1095	4.12	0.67				
1156	4.13	0.68				
1206	4.14	0.69				
1268	4.15	0.70				
1327	4.18	0.73				
1389	4.19	0.74				

Q: discharge r: distance from pumped well DIA: diameter mbmp: metres below measuring point
 SWL: static water level PW: pumped well mp: measuring point mbgl: metres below ground level
 L/sec: litres per second

FIGURE B-3 RECORD OF OBSERVATION WELL 4 (A062850)

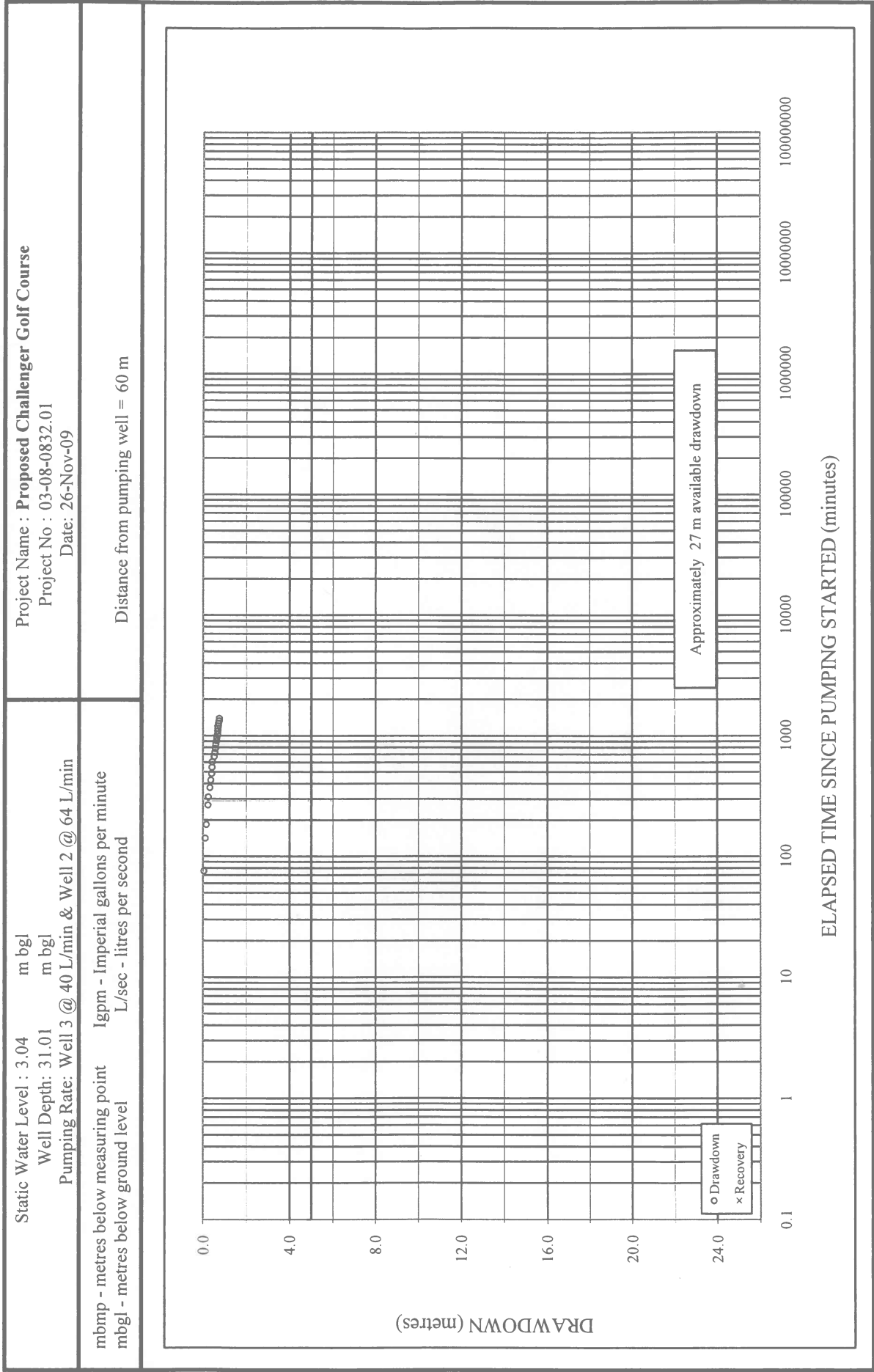


TABLE B-4: RECORD OF OBSERVATION WELL 1 (A050569)

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: Well 1 DEPTH(m bgl): 88.20 mp (m agl): 0.41
 PW: Well 2 & 3 SWL(m bmp): 7.05 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 DATE: 26-Nov-09 I.D. (mm): 152 Radius from Wells 2 and 3: 150 m
 TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
82	7.03	-0.02	30	6.96	0.00	
147	7.03	-0.02				
195	7.02	-0.03				
267	7.02	-0.03				
320	7.01	-0.04				
379	7.00	-0.05				
436	6.99	-0.06				
491	6.99	-0.06				
557	6.98	-0.07				
615	6.97	-0.08				
674	6.97	-0.08				
735	6.97	-0.08				
790	6.97	-0.08				
853	6.96	-0.09				
911	6.97	-0.08				
973	6.96	-0.09				
1031	6.96	-0.09				
1099	6.96	-0.09				
1160	6.96	-0.09				
1214	6.96	-0.09				
1273	6.96	-0.09				
1335	6.96	-0.09				
1400	6.96	-0.09				

Q: discharge r: distance from pumped well DIA: diameter mbmp: metres below measuring point
 SWL: static water level PW: pumped well mp: measuring point mbgl: metres below ground level
 L/sec: litres per second

FIGURE B-4 RECORD OF OBSERVATION WELL 1 (A050569)

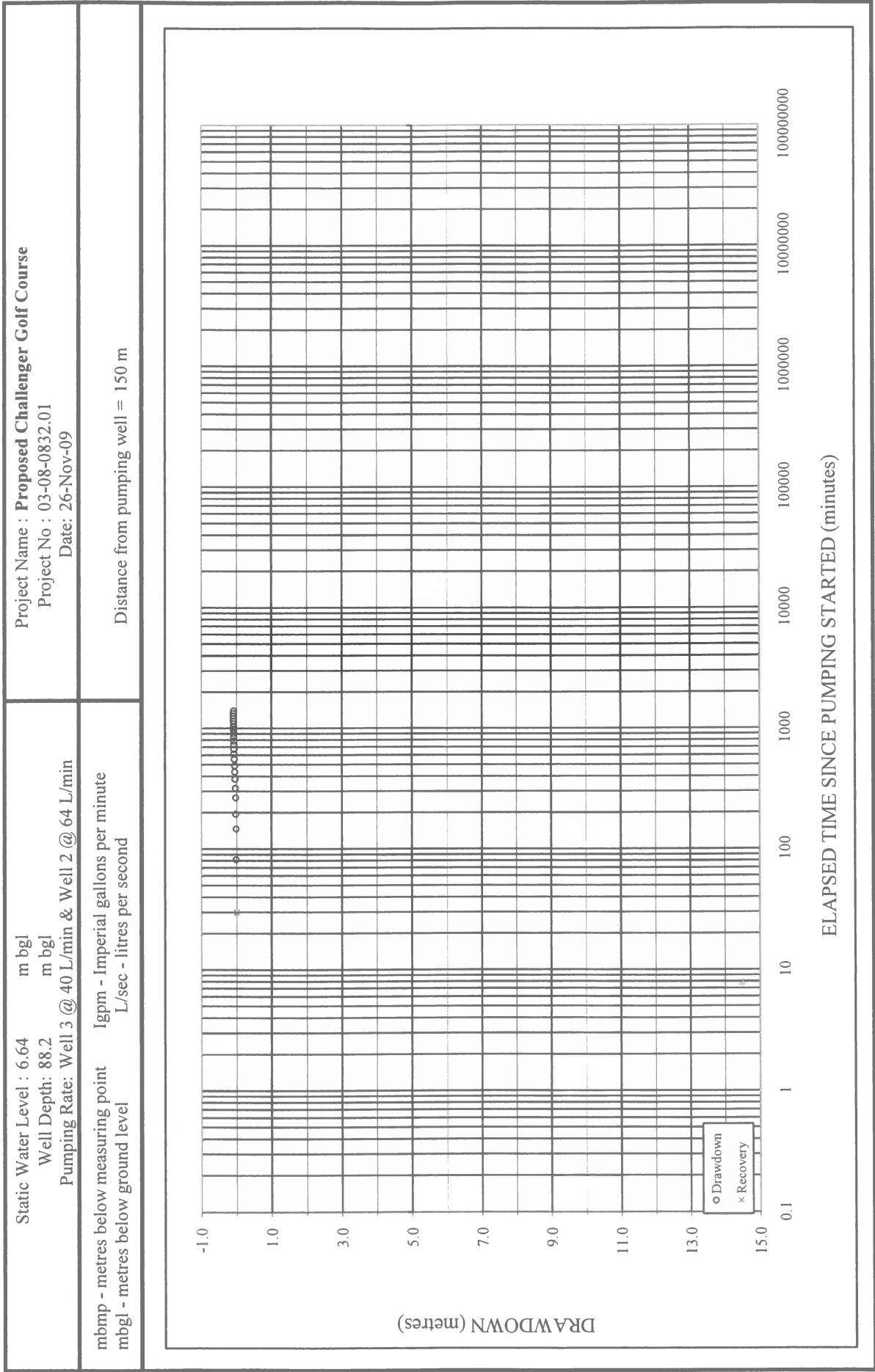


TABLE B-5: RECORD OF OBSERVATION WELL OW09-1

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: OW09-1 DEPTH(m bgl): 15.07 mp (m agl): 0.88
 PW: Well 2 &3 SWL(m bmp): 1.24 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 DATE: 26-Nov-09 I.D. (mm): 51 Radius from Wells 2 and 3: 150 m
 TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
73	1.24	0.00	30	1.27	-0.01	
139	1.24	0.00	4005	1.25	0.01	
189	1.24	0.00				
248	1.25	0.01				
306	1.25	0.01				
366	1.25	0.01				
425	1.25	0.01				
482	1.25	0.01				
544	1.25	0.01				
604	1.25	0.01				
665	1.25	0.01				
725	1.26	0.02				
781	1.25	0.01				
842	1.25	0.01				
903	1.26	0.02				
964	1.26	0.02				
1022	1.26	0.02				
1084	1.26	0.02				
1152	1.26	0.02				
1215	1.26	0.02				
1266	1.26	0.02				
1324	1.26	0.02				
1382	1.26	0.02				

Q: discharge r: distance from pumped well DIA: diameter mbmp: metres below measuring point
 SWL: static water level PW: pumped well mp: measuring point mbgl: metres below ground level
 L/sec: litres per second

FIGURE B-5 RECORD OF OBSERVATION WELL OW09-1

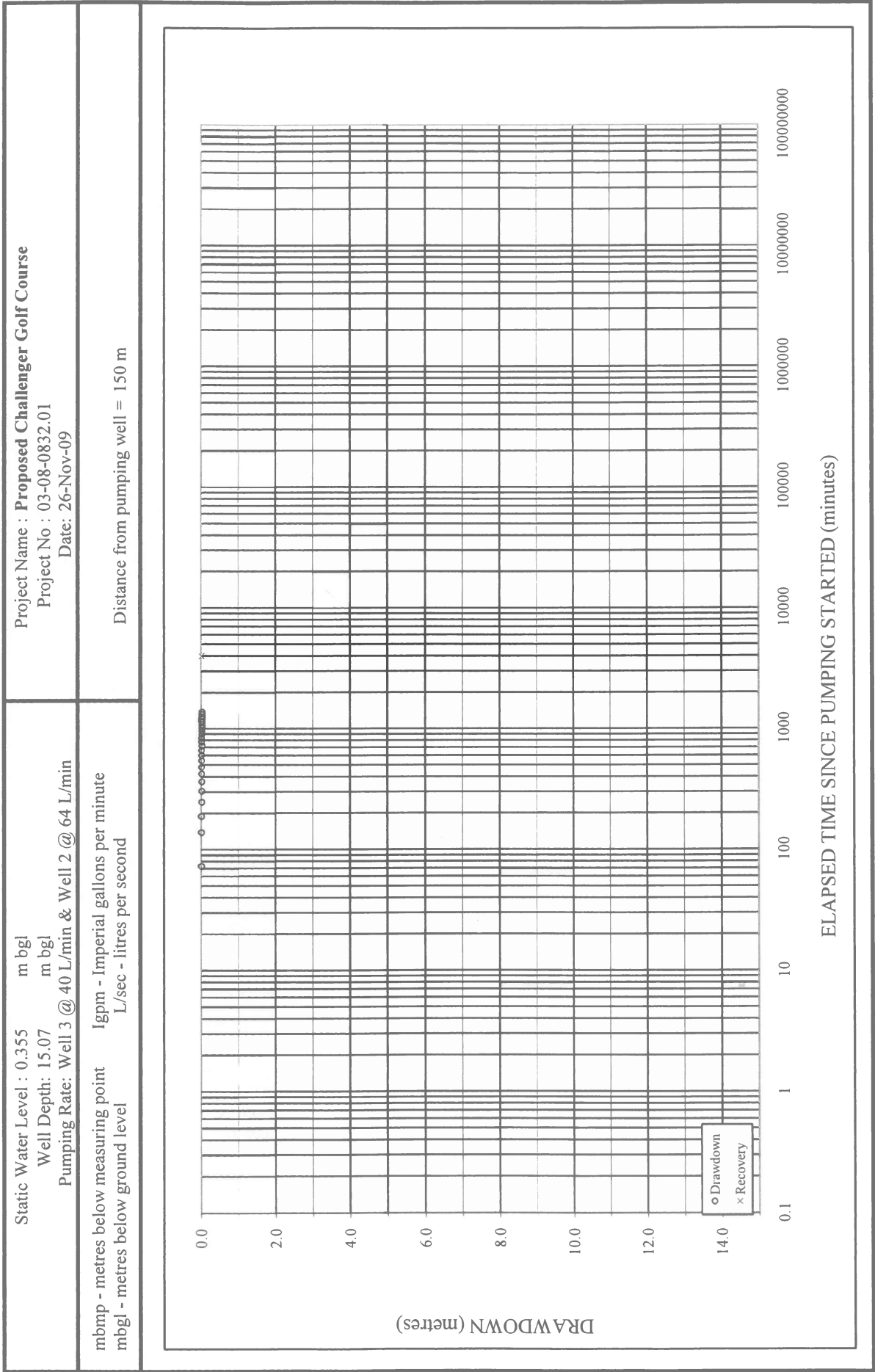


TABLE B-6: RECORD OF OBSERVATION WELL OW09-2

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: OW09-2 **DEPTH(m bgl):** 15.08 **mp (m agl):** 0.9
PW: Well 2 & 3 **SWL(m bmp):** 1.40 **Discharge:** Well 3 @ 40 L/min & Well 2 @ 64 L/min
DATE: 26-Nov-09 **I.D. (mm):** 51 **Radius from Wells 2 and 3:** 200 m
TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
70	1.40	0.00	30	1.43	0.00	
136	1.40	0.00	3993	1.40	0.03	
190	1.40	0.00				
242	1.41	0.01				
302	1.41	0.01				
362	1.41	0.01				
421	1.41	0.01				
478	1.42	0.02				
540	1.41	0.01				
600	1.41	0.01				
661	1.41	0.01				
720	1.42	0.02				
778	1.42	0.02				
839	1.42	0.02				
901	1.42	0.02				
961	1.42	0.02				
1020	1.43	0.03				
1080	1.43	0.03				
1150	1.43	0.03				
1200	1.43	0.03				
1260	1.43	0.03				
1320	1.43	0.03				
1380	1.43	0.03				

Q: discharge **r:** distance from pumped well **DIA:** diameter **mbmp:** metres below measuring point
SWL: static water level **PW:** pumped well **mp:** measuring point **mbgl:** metres below ground level
L/sec: litres per second

FIGURE B-6 RECORD OF OBSERVATION WELL OW09-2

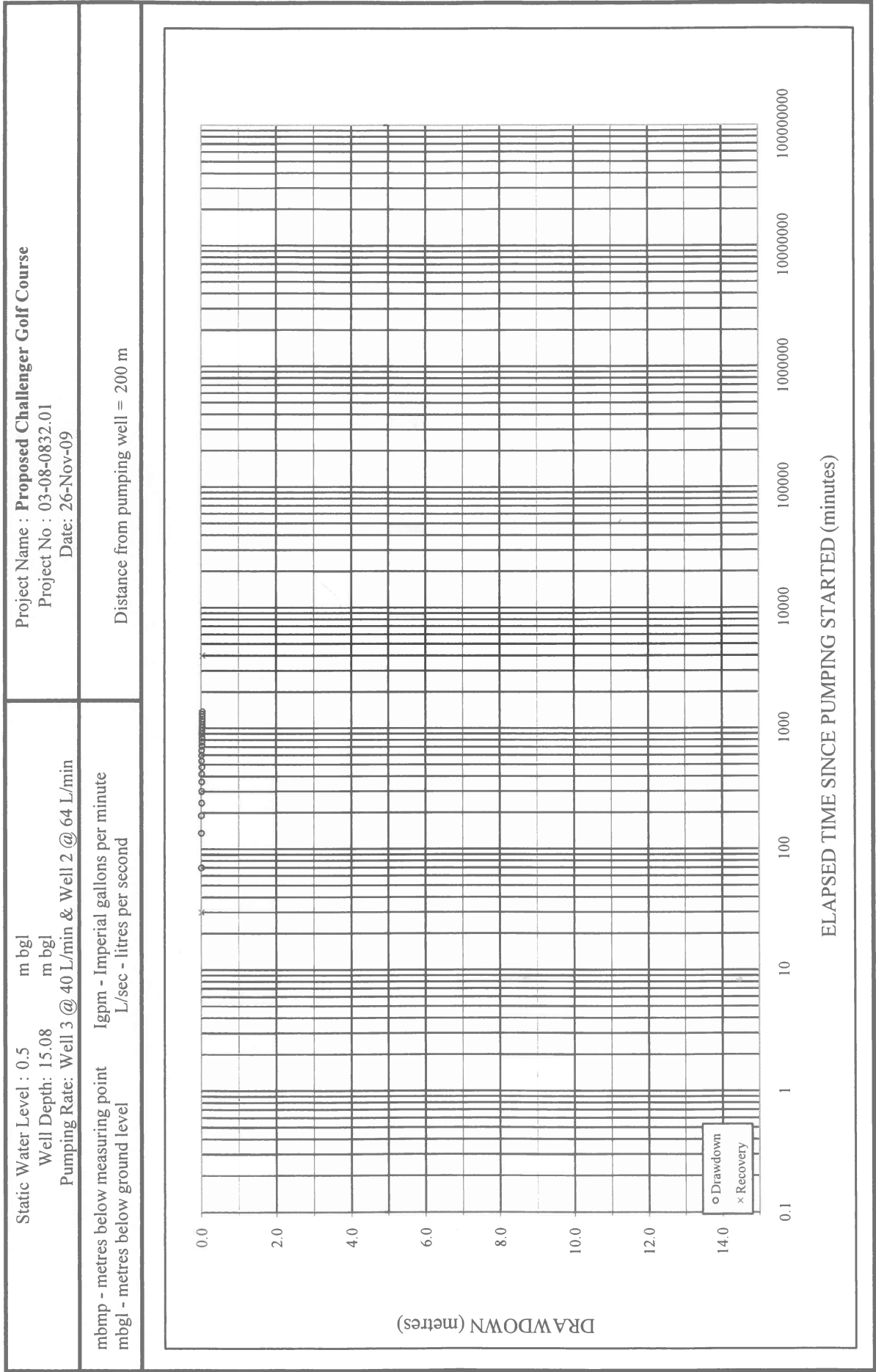


TABLE B-7: RECORD OF OBSERVATION DP09-1

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: DP09-1
 PW: Well 2 & 3
 DATE: 26-Nov-09
 TIME: 4:15 p.m.

DEPTH(m btop): 2.15
 SWL(m bmp): 0.99
 I.D. (mm): 38

mp (m agl):
 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 Radius from Wells 2 and 3: 200 m

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
1093	0.99	0.00	4000	0.99	0.00	

Q: discharge

r: distance from pumped well

DIA: diameter

mbmp: metres below measuring point

SWL: static water level

PW: pumped well

mp: measuring point

mbgl: metres below ground level

L/sec: litres per second

FIGURE B-7 RECORD OF OBSERVATION DP09-1

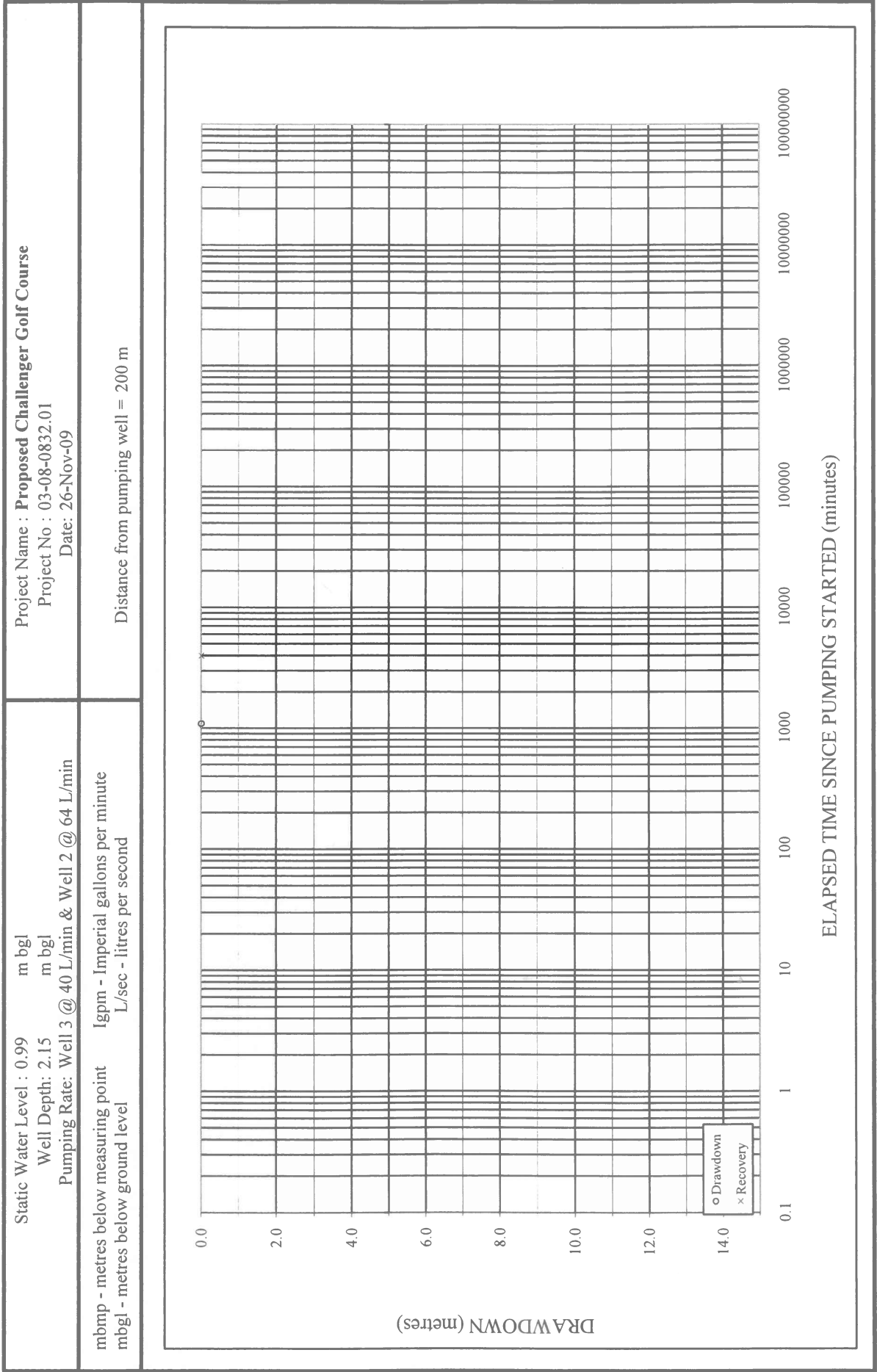


TABLE B-8: RECORD OF OBSERVATION WELL DP09-2

24 Hour Test

Proposed Challenger Golf Course 03-08-0832.01

OW: DP09-2
 PW: Well 2 & 3
 DATE: 26-Nov-09
 TIME: 4:15 p.m.

DEPTH(m bgl): 2.13
 SWL(m bmp): 0.81
 I.D. (mm): 38

mp (m agl):
 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 Radius from Wells 2 and 3: 210 m

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
1086	0.82	0.01	4013	0.82	0.00	

Q: discharge

r: distance from pumped well

DIA: diameter

mbmp: metres below measuring point

SWL: static water level

PW: pumped well

mp: measuring point

mbgl: metres below ground level

L/sec: litres per second

FIGURE B-8 RECORD OF OBSERVATION WELL DP09-2

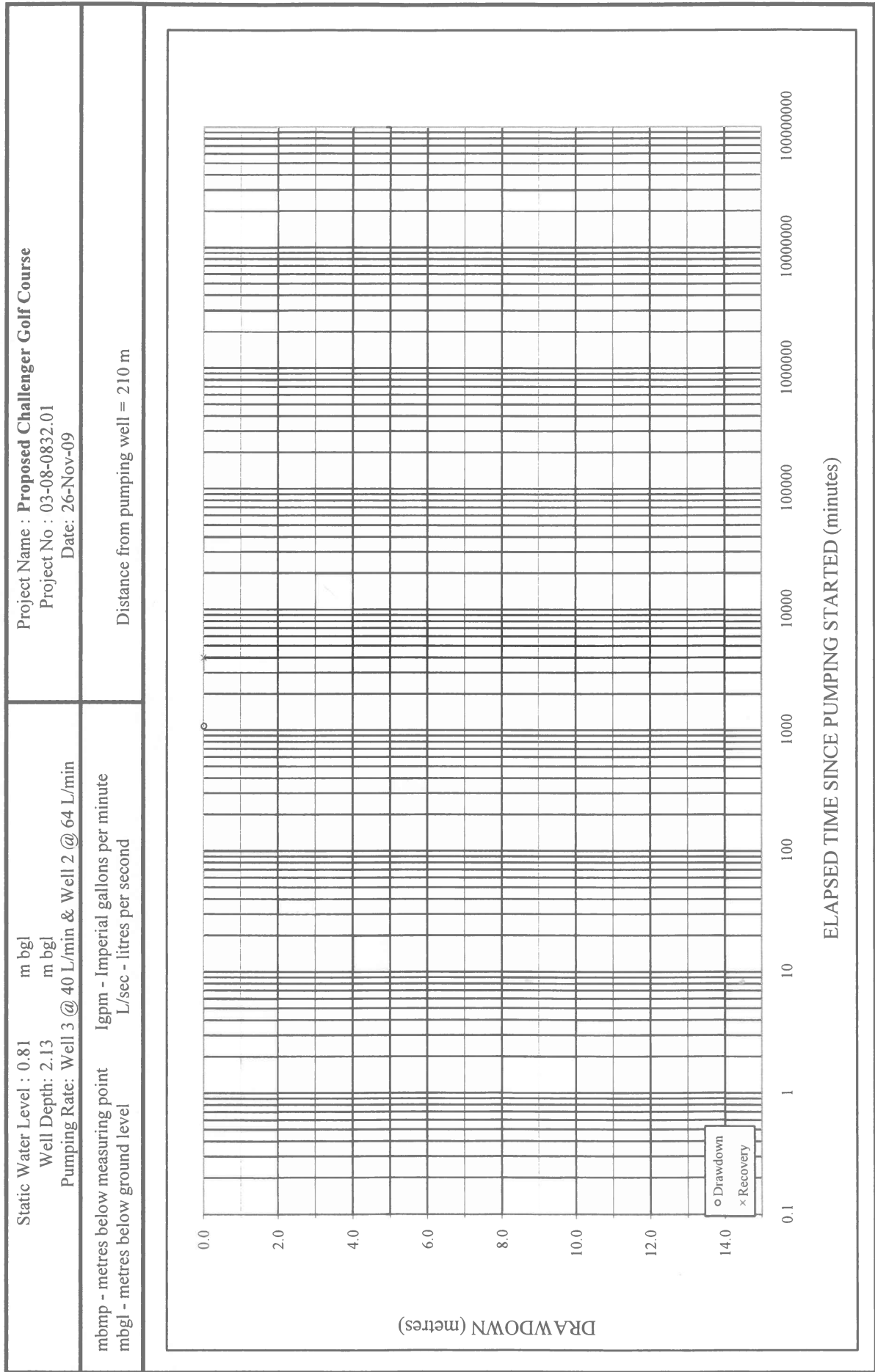


TABLE B-9: RECORD OF OBSERVATION #37 Northey's Bay Road

24 Hour Test

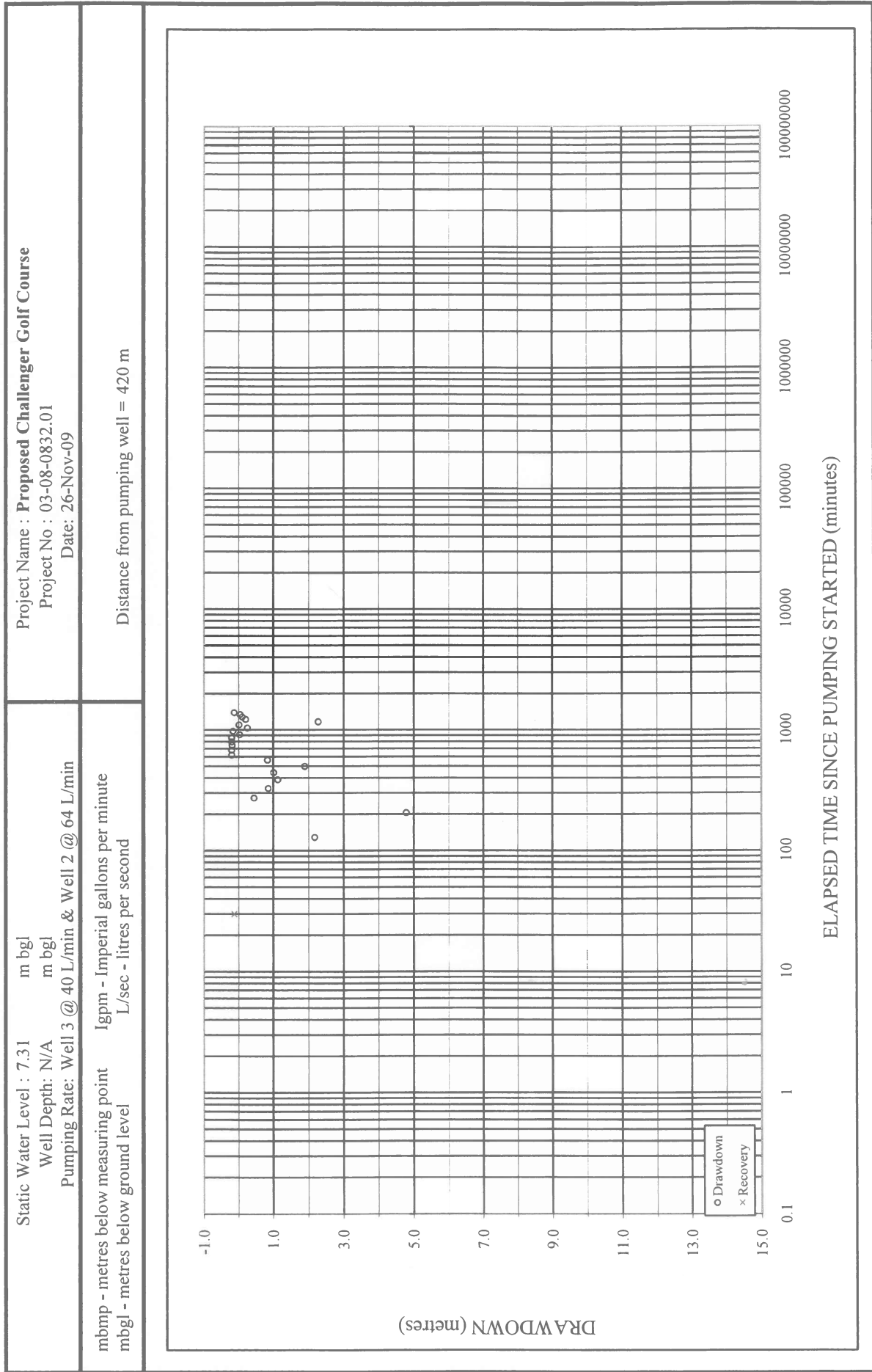
Proposed Challenger Golf Course 03-08-0832.01

OW: #37 DEPTH(m bgl): N/A mp (m agl): 0.54
 PW: Well 2 & 3 SWL(m bmp): 7.85 Discharge: Well 3 @ 40 L/min & Well 2 @ 64 L/min
 DATE: 26-Nov-09 I.D. (mm): 152 Radius from Wells 2 and 3: 420 m
 TIME: 4:15 p.m.

DRAWDOWN			RECOVERY			COMMENTS
ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	DRAWDOWN (metres)	ELAPSED TIME (minutes)	WATER LEVEL (m bmp)	RECOVERY (metres)	
129	10.02	2.17	30	7.85	-0.13	
206	12.63	4.78				
273	8.29	0.44				
328	8.70	0.85				
387	8.97	1.12				
443	8.86	1.01				
498	9.74	1.89				
563	8.68	0.83				
622	7.65	-0.20				
682	7.65	-0.20				
743	7.66	-0.19				
797	7.65	-0.20				
861	7.65	-0.20				
917	7.88	0.03				
981	7.69	-0.16				
1037	8.10	0.25				
1104	7.86	0.01				
1167	10.12	2.27				
1223	8.05	0.20				
1282	7.95	0.10				
1342	7.89	0.04				
1395	7.72	-0.13				

Q: discharge r: distance from pumped well DIA: diameter mbmp: metres below measuring point
 SWL: static water level PW: pumped well mp: measuring point mbgl: metres below ground level
 L/sec: litres per second

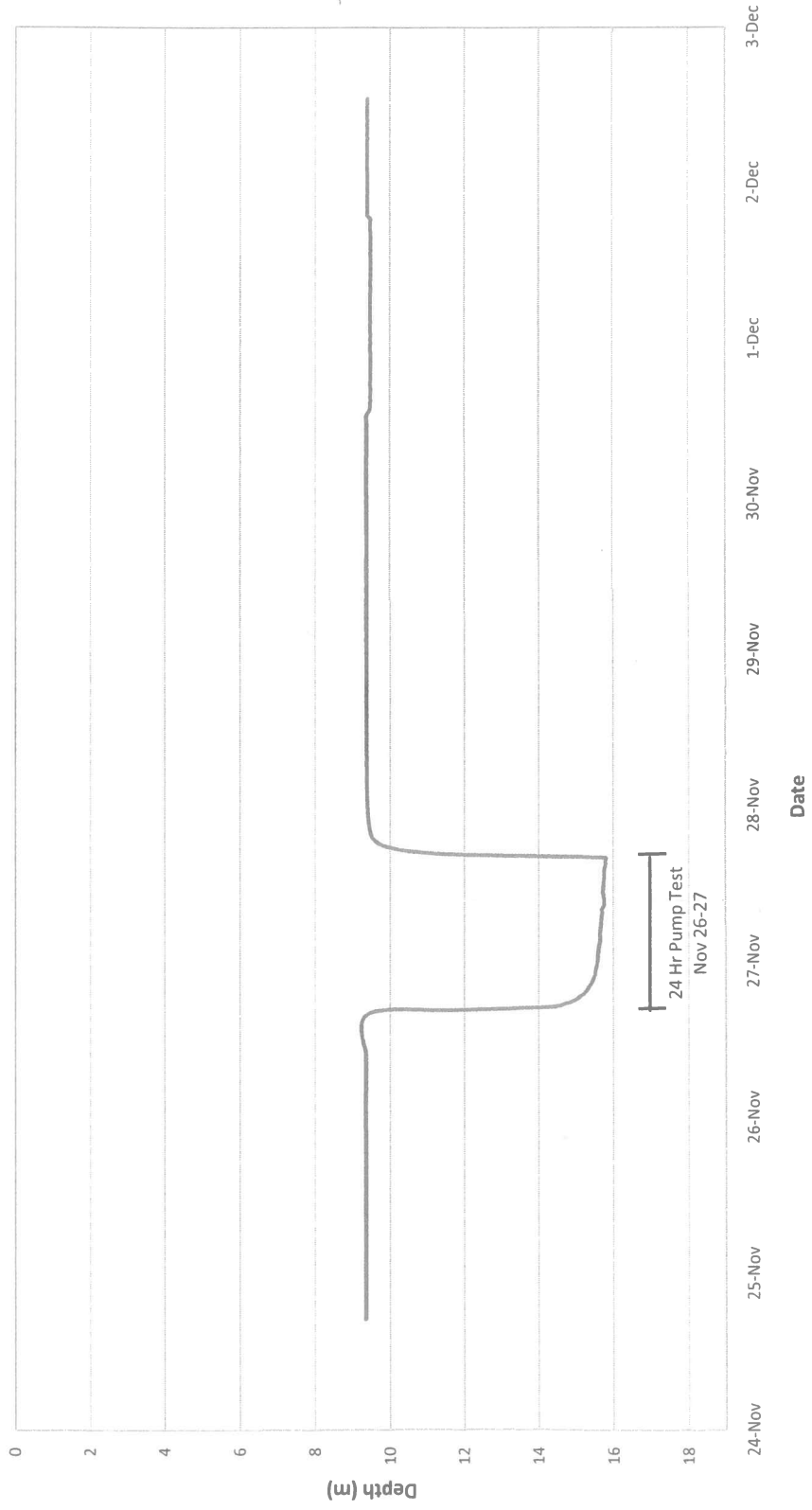
FIGURE B-9 RECORD OF OBSERVATION #37 Northey's Bay Road



Appendix C

Data Logger Figures

FIGURE C-1
DATALOGGER AT WELL 2



**FIGURE C-1
DATALOGGER AT WELL 2**

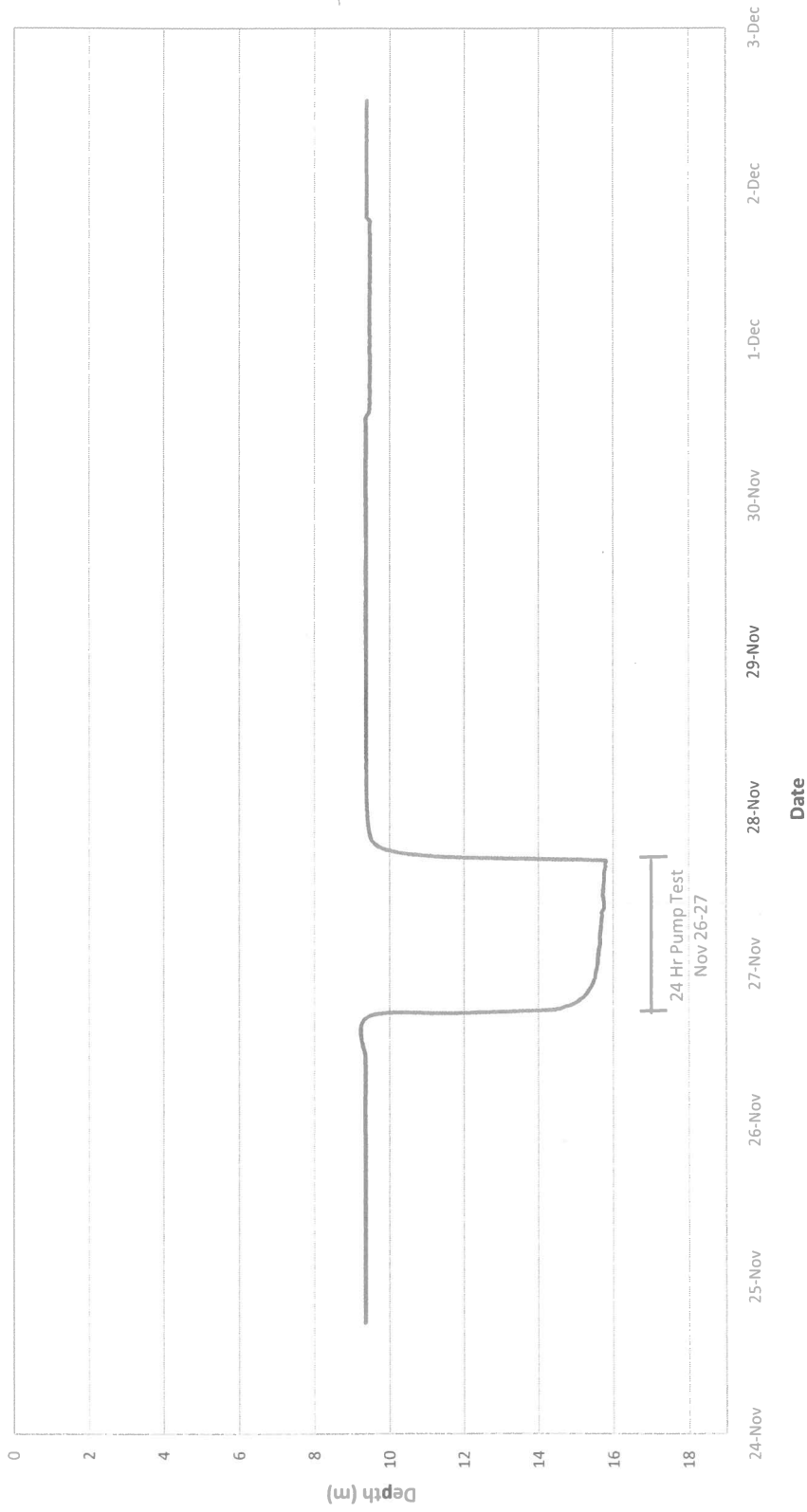
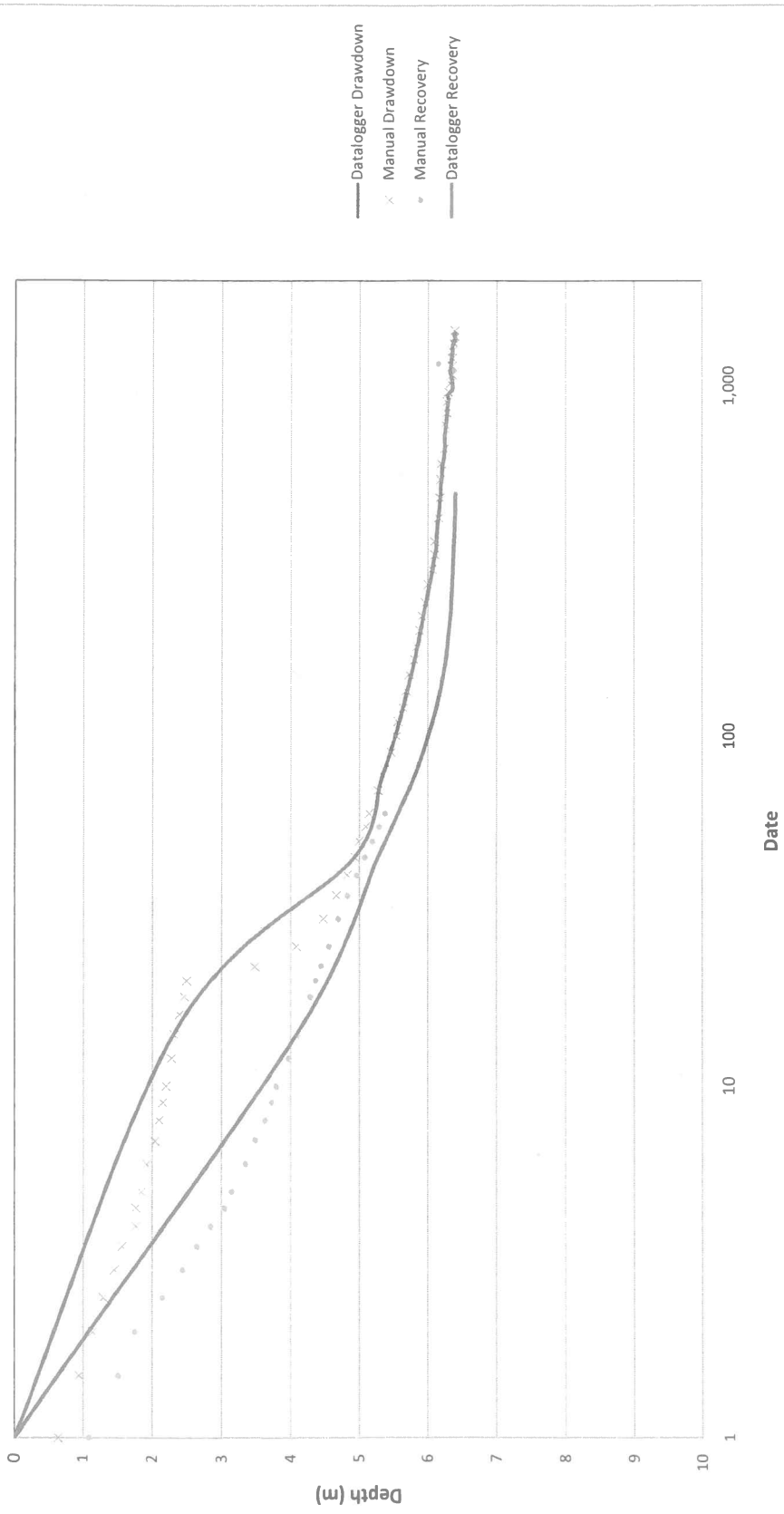
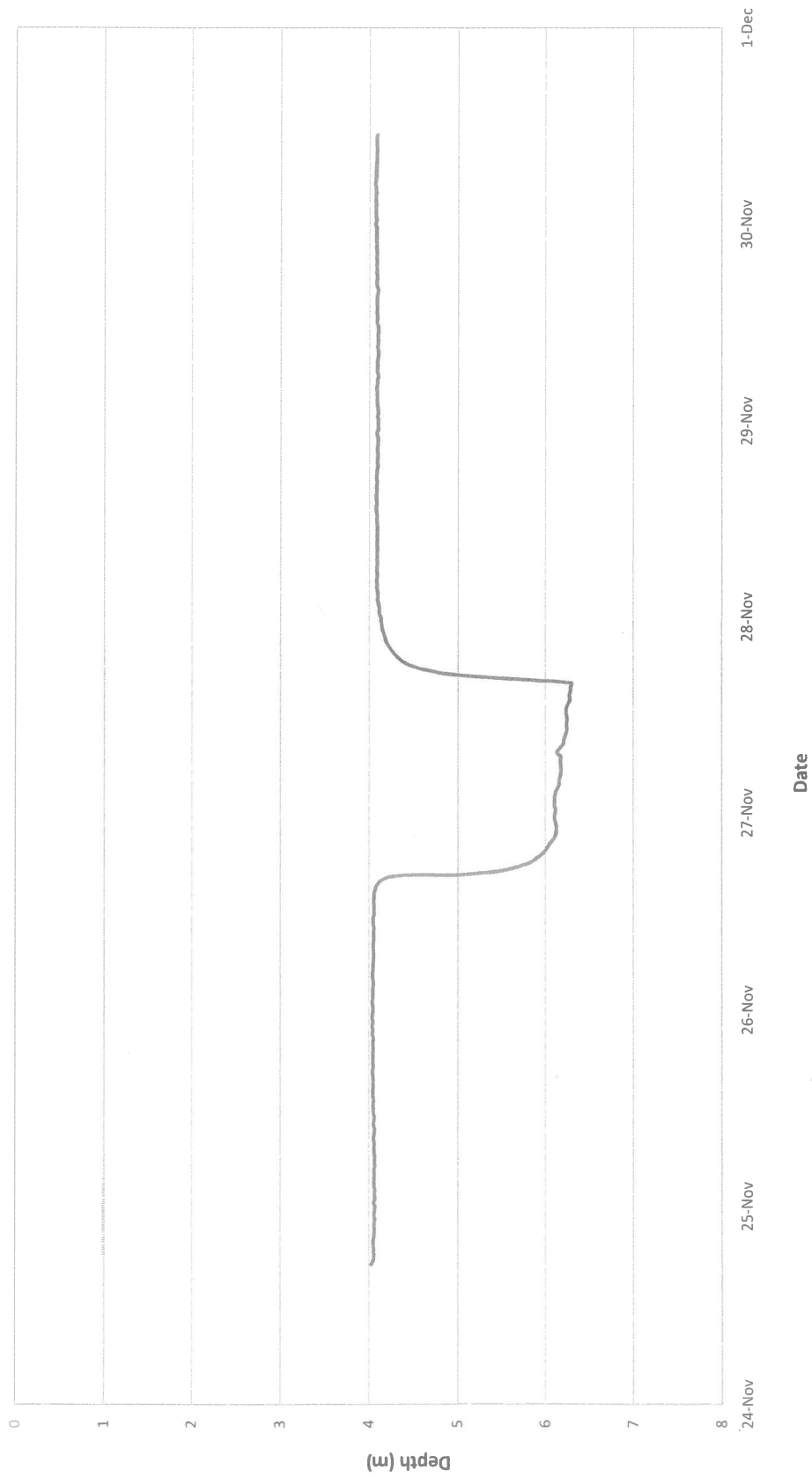


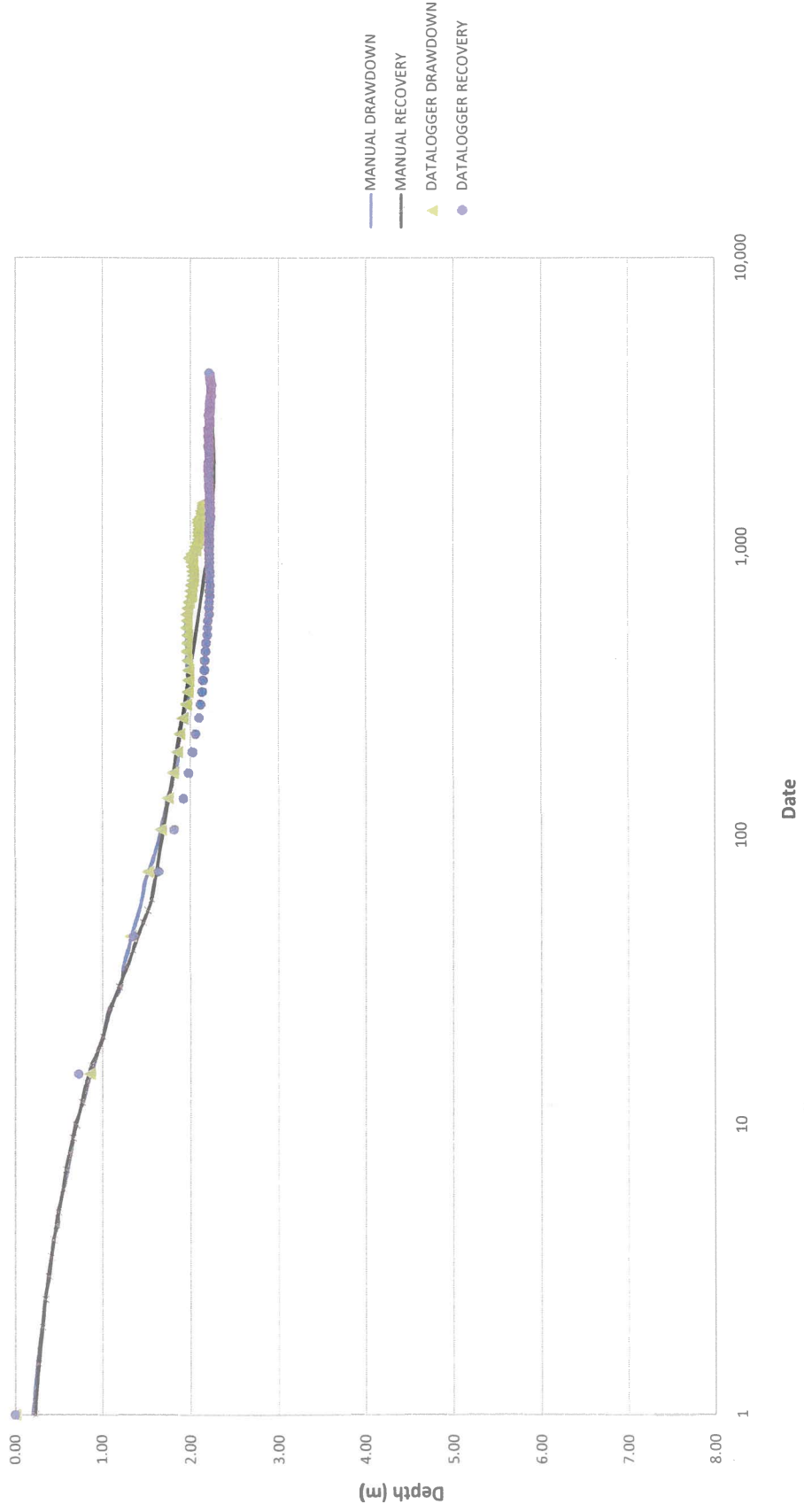
FIGURE C-2
DATALOGGER AT WELL 2



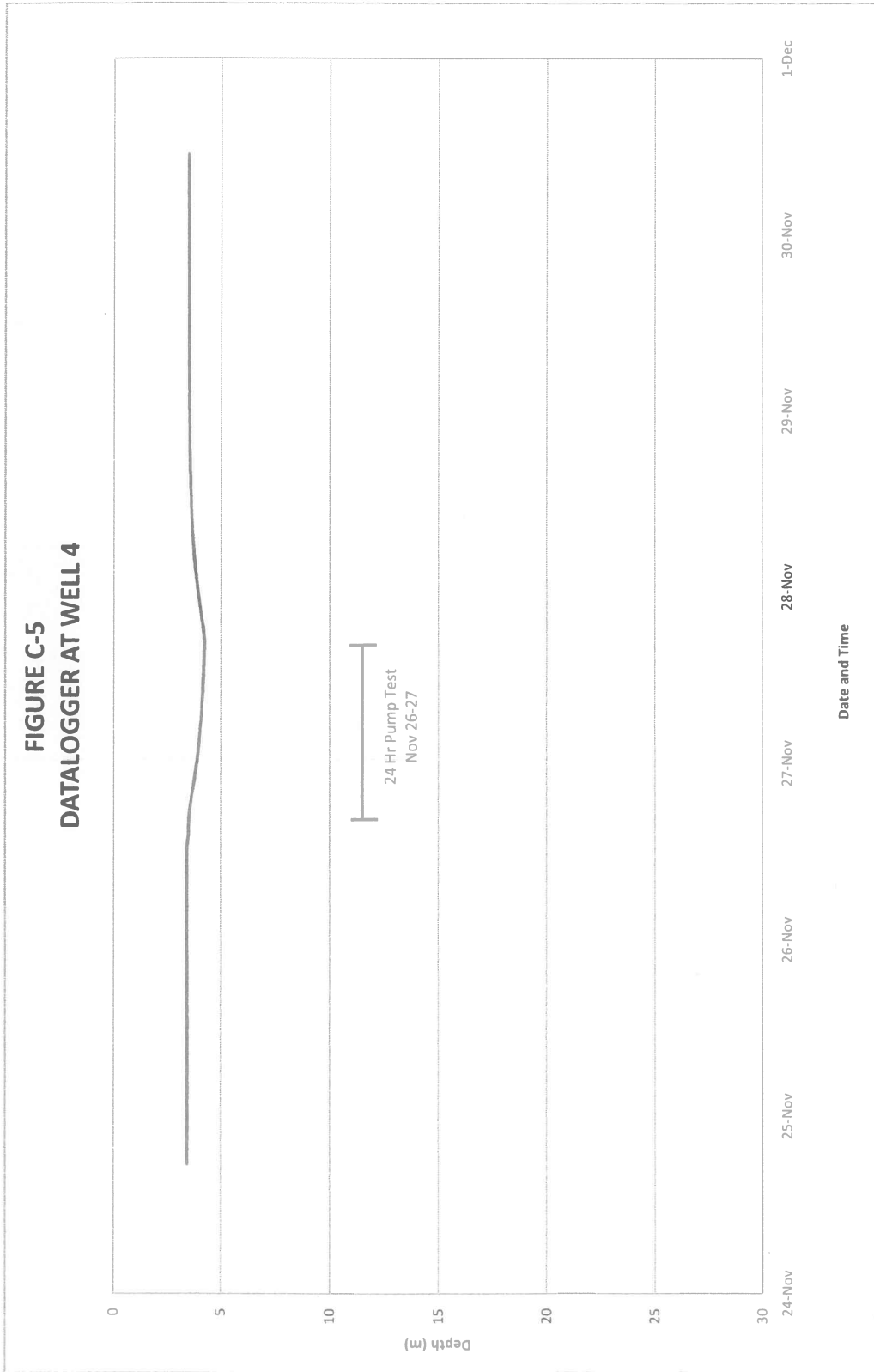
**FIGURE C-3
DATALOGGER AT WELL 3**



**FIGURE C-4
DATALOGGER AT WELL 3**



**FIGURE C-5
DATALOGGER AT WELL 4**



**FIGURE C-6
DATALOGGER AT WELL 4**

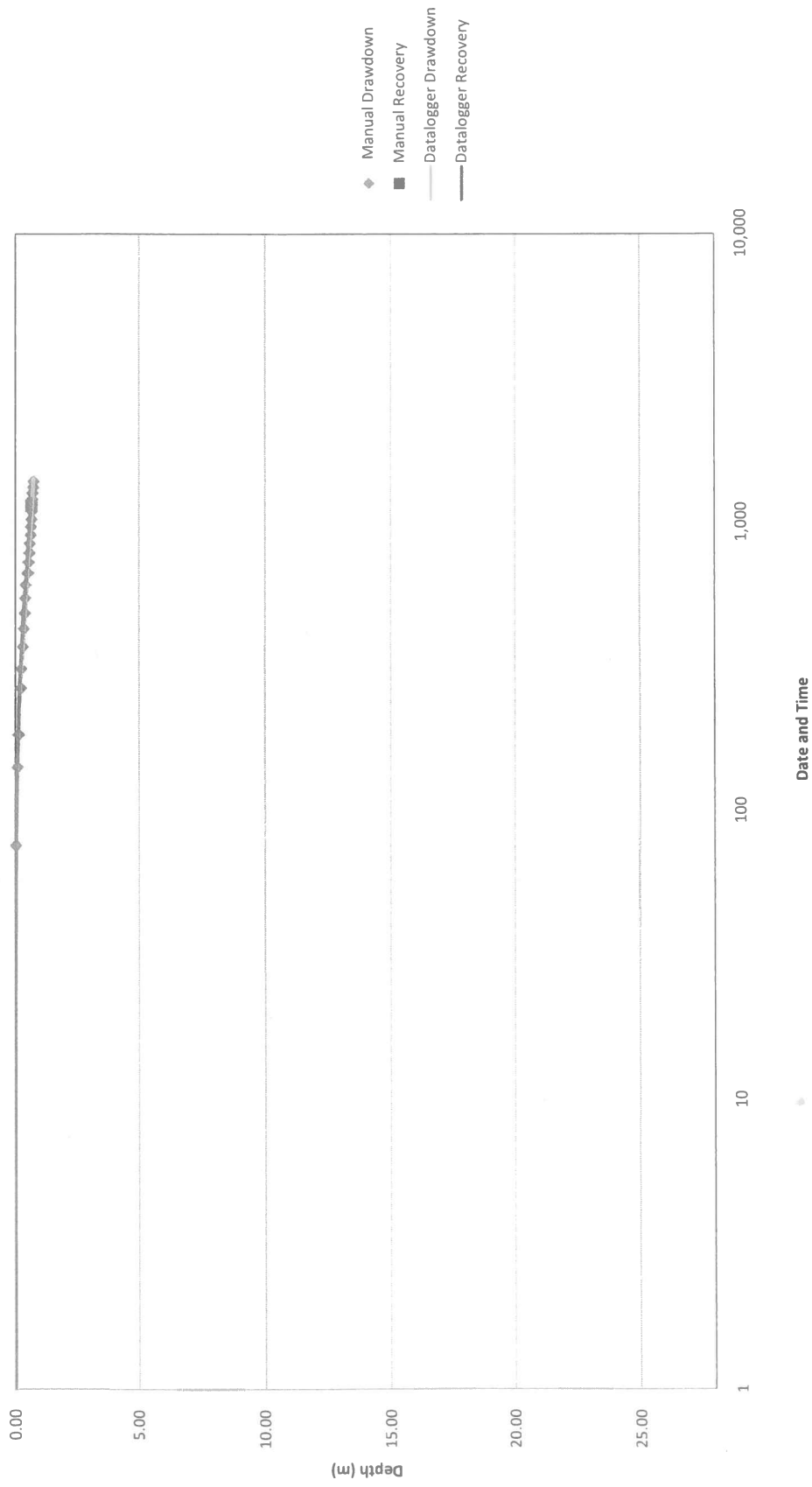


FIGURE C-7
DATALOGGER AT Well 1

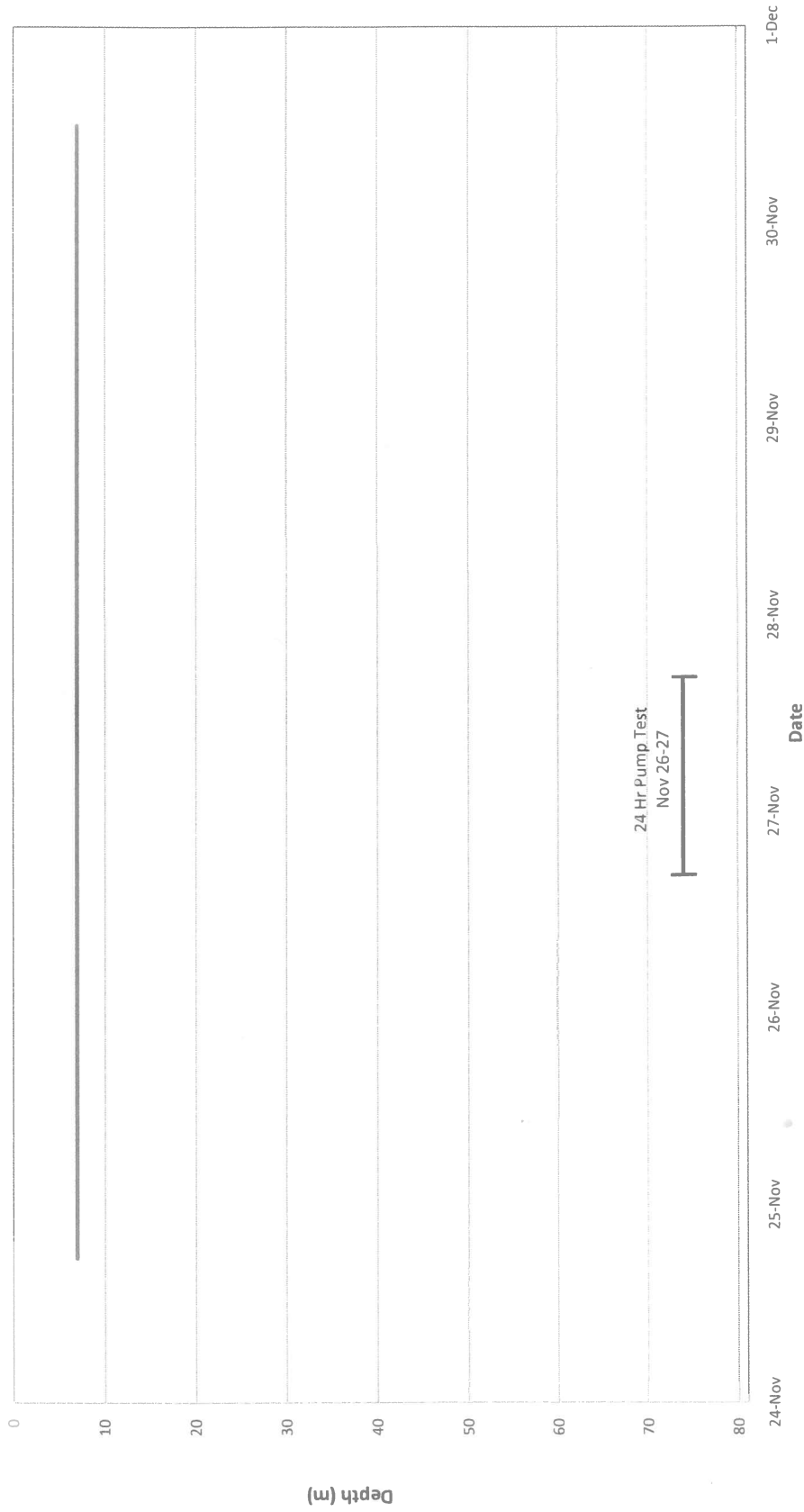
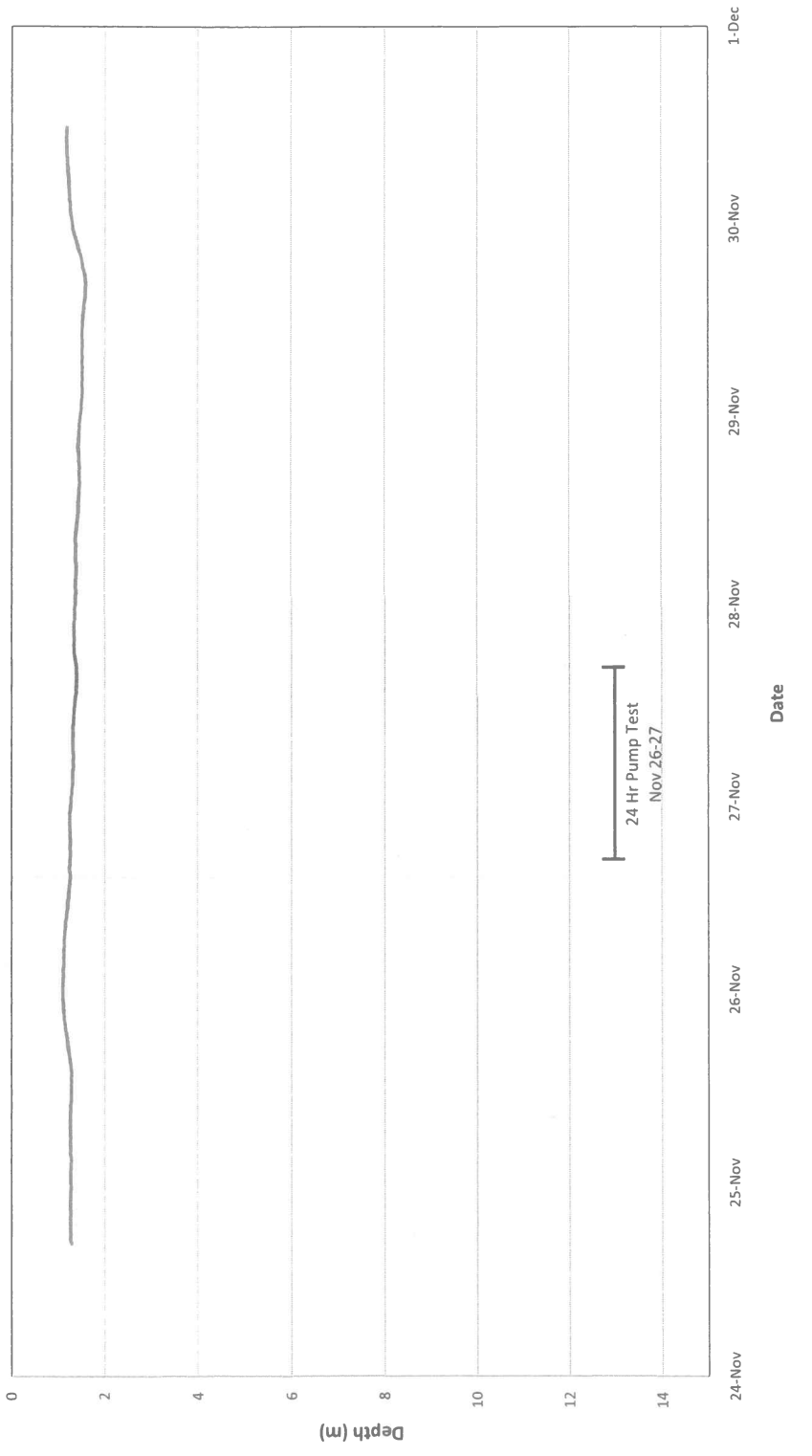


FIGURE C-8
DATALOGGER AT OW09-1



**FIGURE C-9
DATALOGGER AT OW09-2**

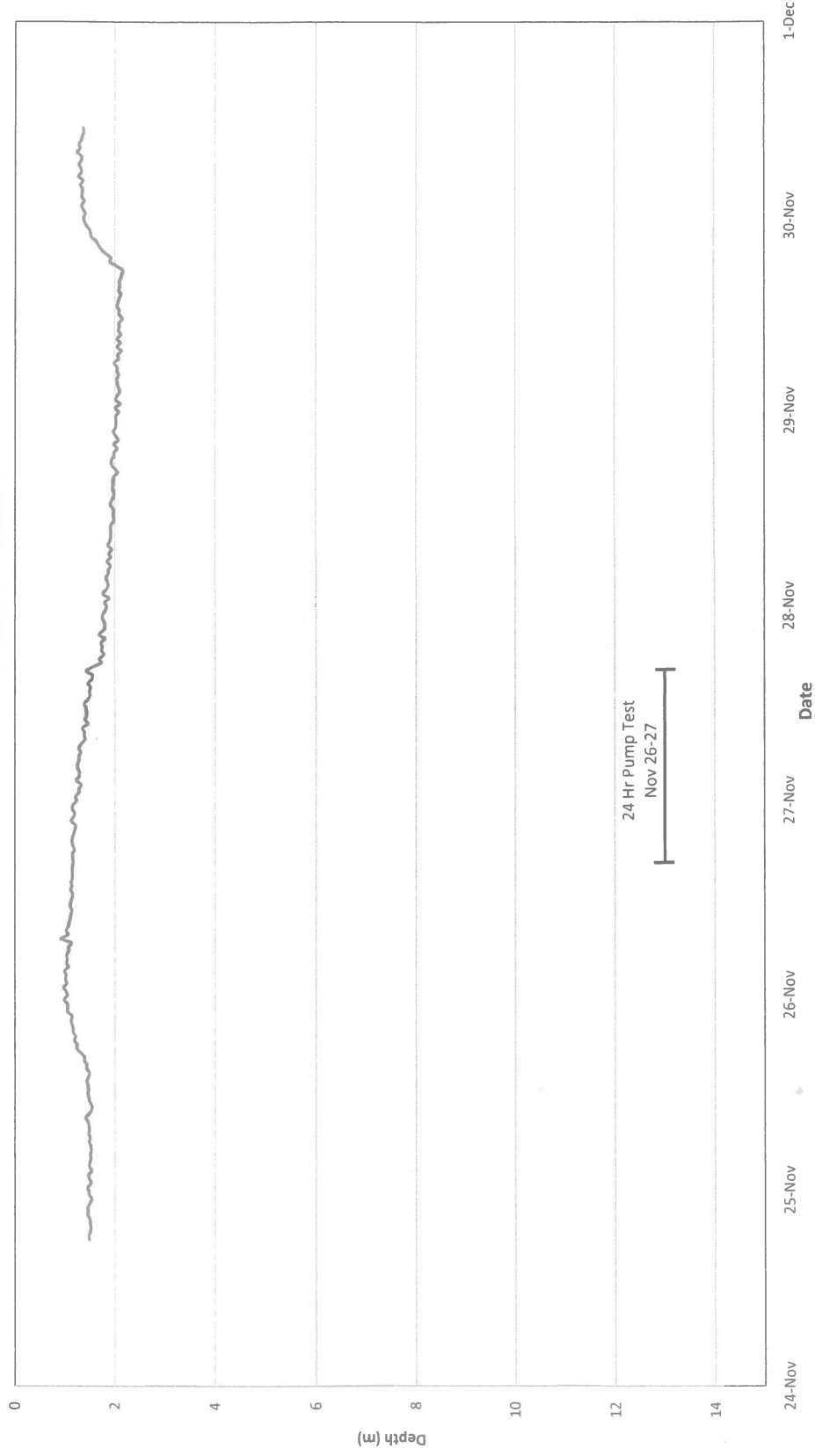
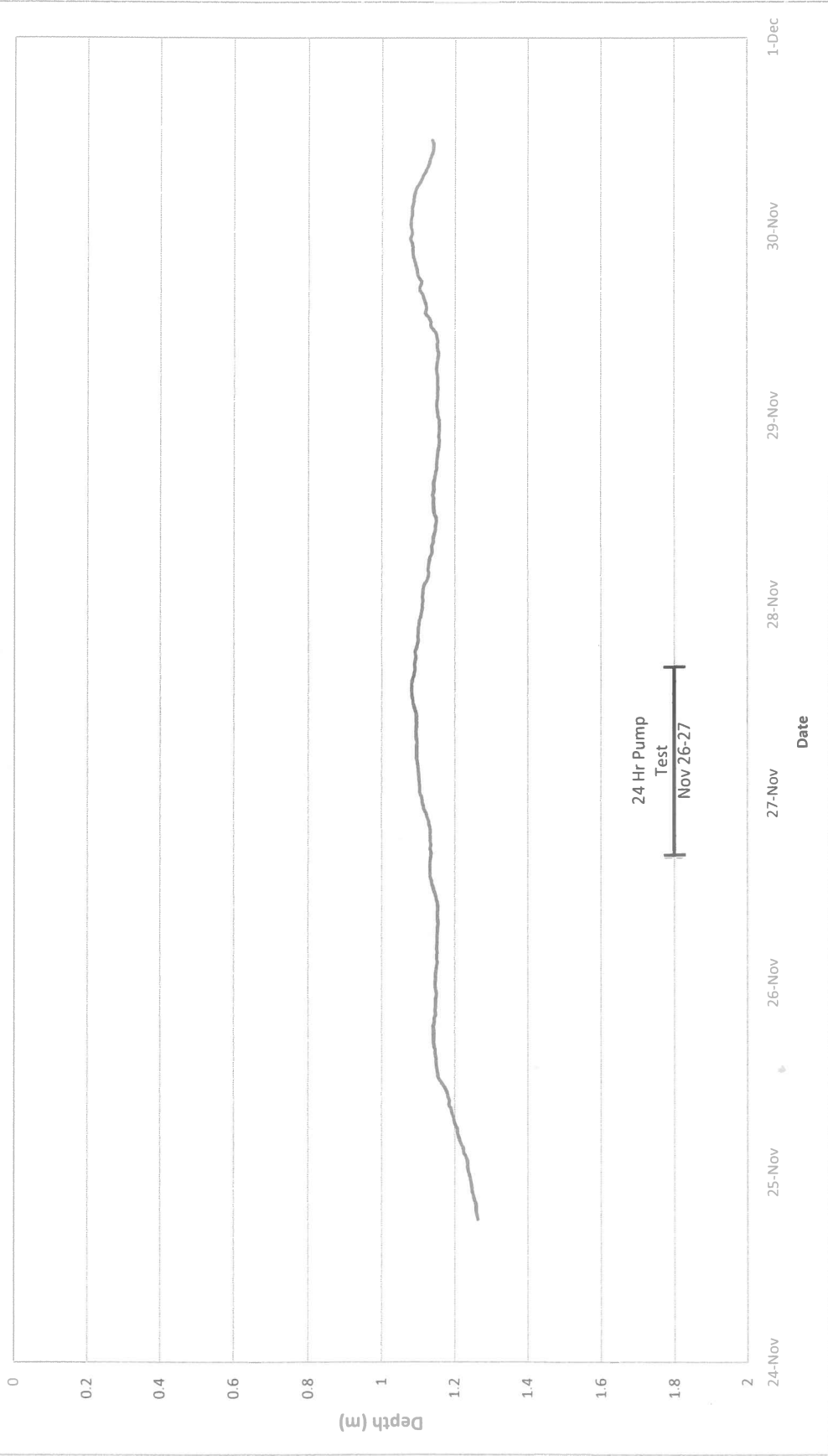


FIGURE C-10
DATALOGGER AT DP-1



FIGURE C-11
DATALOGGER AT DP-2



Appendix D

Chemistry Results

**TABLE D-1: CHEMICAL TEST RESULTS FOR GROUNDWATER: GENERAL CHEMISTRY
PROPOSED CHALLENGER GOLF COURSE (03080832.01)**

CHEMICAL	PWQO	UNITS	Well 2 1 hour (A050575) 11/26/2009	Well 2 24 hour (A050575) 11/27/2009	Well 3 1 hour (A062849) 11/26/2009	Well 3 24 hour (A062849) 11/27/2009
pH	6.5-8.5	pH Units	7.35	7.43	7.29	7.46
Conductivity		µmho/cm	579	602	512	526
Alkalinity (as CaCO3)		mg/L	213	240	264	260
Carbonate (as CaCO3)		mg/L	<1	<1	<1	<1
Bicarbonate(as CaCO3)		mg/L	213	240	264	260
Chloride		mg/L	8	7	4	4
Fluoride		mg/L	0.4	0.4	0.2	0.2
Nitrite (N)		mg/L	< 0.1	<0.1	<0.1	<0.1
Nitrate (N)		mg/L	0.1	0.2	0.4	0.4
Sulphate		mg/L	80	87	11	15
Colour		TCU	< 2	<2	<2	<2
Turbidity		NTU	<1.0	<1.0	<1.0	<1.0
Ammonia + Ammonium (N)	0.02	mg/L	0.09	0.05	<0.05	<0.05
o-Phosphate (P)		mg/L	<0.01	0.01	<0.01	<0.01
Dissolved Inorganic Carbon		mg/L	57.1	59.3	68.5	66.6
Dissolved Organic Carbon		mg/L	0.7	0.5	0.8	0.6
Hardness (as CaCO3)		mg/L	294	301	285	283
Aluminum	0.075	mg/L	< 0.01	< 0.03	< 0.02	< 0.04
Antimony	0.02	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	0.1	mg/L	<0.0001	0.0002	<0.0001	<0.0001
Barium		mg/L	0.029	0.029	0.277	0.278
Boron	0.2	mg/L	0.264	0.256	0.027	0.037
Calcium		mg/L	83.1	84.4	79.5	78.8
Cadmium	0.0005	mg/L	< 0.00002	<0.00006	< 0.00002	< 0.00002
Chromium	0.001	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Cobalt	0.0009	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Copper	0.005	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Iron	0.3	mg/L	0.023	0.007	<0.005	0.021
Lead	0.025	mg/L	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Magnesium		mg/L	21	21.8	21	20.9
Manganese		mg/L	0.006	0.002	<0.001	<0.001
Nickel	0.025	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Potassium		mg/L	5	4.7	1.2	1.2
Silver	0.0001	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Thallium		mg/L	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Sodium		mg/L	6.2	7.4	1.8	1.9
Strontium		mg/L	5.99	5.55	1.32	1.42
Titanium		mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	0.005	mg/L	0.00847	0.00884	0.00115	0.00167
Vanadium	0.006	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.03	mg/L	< 0.005	< 0.005	< 0.005	< 0.005

Notes:

1. PWQO: Provincial Water Quality Objectives. Exceedences highlighted in Green
2. mg/L: milligrams per litre.

C.O.C.: C13087

REPORT No. B09-37000

Report To:

Jagger Hims Limited
 294 Rink St. Suite 301
 Peterborough, ON, K9J 2K2

Attention: Lisa Gardiner

Caduceon Environmental Laboratories

160 Charlotte St. Suite 206
 Peterborough, Ontario, K9J 2T8
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 Fax: 705-748-6514

DATE RECEIVED: 27-Nov-09

DATE REPORTED: 11-Dec-09

SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Challenger

P.O. NUMBER: 03080832.00

WATERWORKS NO.

Client I.D.:	W2 1 hour	W3 1 hour	
Sample I.D.:	B09-37000-1	B09-37000-2	
Date Collected:	26-Nov-09	26-Nov-09	

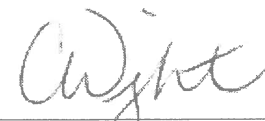
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed	ODWS Guideline	W2	W3	
pH	pH Units		SM 4500	28-Nov-09/P	6.5-8.5	7.35	7.29	
Conductivity	µmho/cm	1	SM 2510	28-Nov-09/P		579	512	
Alkalinity (as CaCO3)	mg/L	1.0	SM 2320-B	28-Nov-09/P	30-500	213	264	
Carbonate (as CaCO3)	mg/L	1	SM 2320-B	28-Nov-09/P		< 1	< 1	
Bicarbonate(as CaCO3)	mg/L	1	SM 2320-B	28-Nov-09/P		213	264	
Colour	TCU	2	SM2120A	02-Dec-09/K	5	< 2	< 2	
Turbidity	NTU	1.0	FWPCA275	28-Nov-09/P	5	< 1.0	< 1.0	
Chloride	mg/L	1	SM4110	03-Dec-09/K	250	8	4	
Fluoride	mg/L	0.1	SM4110	03-Dec-09/K	1.5	0.4	0.2	
Nitrite (N)	mg/L	0.1	SM4110	03-Dec-09/K	1.0	< 0.1	< 0.1	
Nitrate (N)	mg/L	0.1	SM4110	03-Dec-09/K	10.0	0.1	0.4	
Sulphate	mg/L	1	SM4110	03-Dec-09/K	500	80	11	
Ammonia + Ammonium (N)	mg/L	0.05	EPA 350.2	04-Dec-09/K		0.09	< 0.05	
o-Phosphate (P)	mg/L	0.01	PE4500-S	04-Dec-09/K		< 0.01	< 0.01	
Dissolved Inorganic Carbon	mg/L	0.2	EPA 415.1	02-Dec-09/O		57.1	68.5	
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	02-Dec-09/O	5	0.7	0.8	
Hardness (as CaCO3)	mg/L	1	SM 3120	02-Dec-09/O	80-100	294	285	
Aluminum	mg/L	0.01	SM 3120	02-Dec-09/O	0.1	< 0.01	< 0.01	
Antimony	mg/L	0.0001	EPA 200.8	04-Dec-09/O	0.006	< 0.0001	< 0.0001	
Arsenic	mg/L	0.0001	EPA 200.8	04-Dec-09/O	0.025	< 0.0001	< 0.0001	
Barium	mg/L	0.001	SM 3120	02-Dec-09/O	1	0.029	0.277	
Boron	mg/L	0.005	SM 3120	02-Dec-09/O	5	0.264	0.027	
Calcium	mg/L	0.02	SM 3120	02-Dec-09/O		83.1	79.5	
Cadmium	mg/L	0.00002	EPA 200.8	04-Dec-09/O	0.005	< 0.00002	< 0.00002	
Chromium	mg/L	0.002	SM 3120	02-Dec-09/O	0.05	< 0.002	< 0.002	

ODWS = Ontario Drinking Water Standards

The Sodium Aesthetic Objective is 200 mg/L. The local MOH will be notified when the Sodium concentration exceeds 20 mg/L.

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,P-Peterborough,M-Moncton



Christine Wright
 Lab Supervisor

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: C13087

REPORT No. B09-37000

Report To:

Jagger Hims Limited
 294 Rink St. Suite 301
 Peterborough, ON, K9J 2K2
Attention: Lisa Gardiner

Caduceon Environmental Laboratories

160 Charlotte St. Suite 206
 Peterborough, Ontario, K9J 2T8
 Tel: 705-748-1506
 Fax: 705-748-6514

DATE RECEIVED: 27-Nov-09

JOB/PROJECT NO.: Challenger

DATE REPORTED: 11-Dec-09

P.O. NUMBER: 03080832.00

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.:	W2 1 hour	W3 1 hour
Sample I.D.:	B09-37000-1	B09-37000-2
Date Collected:	26-Nov-09	26-Nov-09

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed	ODWS Guideline			
Cobalt	mg/L	0.005	SM 3120	02-Dec-09/O		< 0.005	< 0.005	
Copper	mg/L	0.002	SM 3120	02-Dec-09/O	1	< 0.002	< 0.002	
Iron	mg/L	0.005	SM 3120	02-Dec-09/O	0.3	0.023	< 0.005	
Lead	mg/L	0.00002	EPA 200.8	04-Dec-09/O	0.01	< 0.00002	< 0.00002	
Magnesium	mg/L	0.01	SM 3120	02-Dec-09/O		21.0	21.0	
Manganese	mg/L	0.001	SM 3120	02-Dec-09/O	0.05	0.006	< 0.001	
Nickel	mg/L	0.01	SM 3120	02-Dec-09/O		< 0.01	< 0.01	
Potassium	mg/L	0.1	SM 3120	02-Dec-09/O		5.0	1.2	
Silver	mg/L	0.005	SM 3120	02-Dec-09/O		< 0.005	< 0.005	
Thallium	mg/L	0.00005	EPA 200.8	04-Dec-09/O		< 0.00005	< 0.00005	
Sodium	mg/L	0.2	SM 3120	02-Dec-09/O	200	6.2	1.8	
Strontium	mg/L	0.001	SM 3120	02-Dec-09/O		5.99	1.32	
Titanium	mg/L	0.005	SM 3120	02-Dec-09/O		< 0.005	< 0.005	
Uranium	mg/L	0.00005	EPA 200.8	04-Dec-09/O	0.02	0.00847	0.00115	
Vanadium	mg/L	0.005	SM 3120	02-Dec-09/O		< 0.005	< 0.005	
Zinc	mg/L	0.005	SM 3120	02-Dec-09/O	5	< 0.005	< 0.005	
Anion Sum	meq/L		Calc.	02-Dec-09/O		6.18	5.65	
Cation Sum	meq/L		Calc.	02-Dec-09/O		6.27	5.80	
% Difference	%		Calc.	02-Dec-09/O		0.769	1.34	
Ion Ratio	AS/CS		Calc.	02-Dec-09/O		0.985	0.973	
Sodium Adsorption Ratio	-		Calc.	02-Dec-09/O		0.158	0.0469	
TDS(ion sum calc.)	mg/L		Calc.	02-Dec-09/O		332	279	
Conductivity (calc.)	µmho/cm		Calc.	02-Dec-09/O		591	522	
Langelier Index(25°C)	S.I.		Calc.	02-Dec-09/O		0.156	0.170	

ODWS = Ontario Drinking Water Standards

The Sodium Aesthetic Objective is 200 mg/L. The local MOH will be notified when the Sodium concentration exceeds 20 mg/L.

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,P-Peterborough,M-Moncton



Christine Wright
 Lab Supervisor

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C.O.C.: C13088

REPORT No. B09-37035

Report To:

Jagger Hims Limited
 294 Rink St. Suite 301
 Peterborough, ON, K9J 2K2
Attention: Lisa Gardiner

Caduceon Environmental Laboratories
 160 Charlotte St. Suite 206
 Peterborough, Ontario, K9J 2T8
 Tel: 705-748-1506
 Fax: 705-748-6514

DATE RECEIVED: 30-Nov-09

JOB/PROJECT NO.: Challenger

DATE REPORTED: 11-Dec-09

P.O. NUMBER: 03080832.00

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed	ODWS Guideline	Client I.D.:		W2 - 24 hour		W3 - 24 hour	
						Sample I.D.:	Date Collected:				
						B09-37035-1	27-Nov-09	B09-37035-2	27-Nov-09		
pH	pH Units		SM 4500	30-Nov-09/P	6.5-8.5		7.43		7.46		
Conductivity	µmho/cm	1	SM 2510	30-Nov-09/P			602		526		
Alkalinity (as CaCO3)	mg/L	1.0	SM 2320-B	30-Nov-09/P	30-500		240		260		
Carbonate (as CaCO3)	mg/L	1	SM 2320-B	30-Nov-09/P			< 1		< 1		
Bicarbonate(as CaCO3)	mg/L	1	SM 2320-B	30-Nov-09/P			240		260		
Colour	TCU	2	SM2120A	02-Dec-09/K	5		< 2		< 2		
Chloride	mg/L	1	SM4110	03-Dec-09/K	250		7		4		
Fluoride	mg/L	0.1	SM4110	03-Dec-09/K	1.5		0.4		0.2		
Nitrite (N)	mg/L	0.1	SM4110	03-Dec-09/K	1.0		< 0.1		< 0.1		
Nitrate (N)	mg/L	0.1	SM4110	03-Dec-09/K	10.0		0.2		0.4		
Sulphate	mg/L	1	SM4110	03-Dec-09/K	500		87		15		
Ammonia + Ammonium (N)	mg/L	0.05	EPA 350.2	04-Dec-09/K			0.05		< 0.05		
o-Phosphate (P)	mg/L	0.01	PE4500-S	04-Dec-09/K			0.01		< 0.01		
Turbidity	NTU	1.0	FWPCA275	30-Nov-09/P	5		< 1.0		< 1.0		
Dissolved Inorganic Carbon	mg/L	0.2	EPA 415.1	02-Dec-09/O			59.3		66.6		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	02-Dec-09/O	5		0.5		0.6		
Hardness (as CaCO3)	mg/L	1	SM 3120	02-Dec-09/O	80-100		301		283		
Aluminum	mg/L	0.01	SM 3120	02-Dec-09/O	0.1		< 0.01		< 0.01		
Antimony	mg/L	0.0001	EPA 200.8	04-Dec-09/O	0.006		< 0.0001		< 0.0001		
Arsenic	mg/L	0.0001	EPA 200.8	04-Dec-09/O	0.025		0.0002		< 0.0001		
Barium	mg/L	0.001	SM 3120	02-Dec-09/O	1		0.029		0.278		
Boron	mg/L	0.005	SM 3120	02-Dec-09/O	5		0.256		0.037		
Calcium	mg/L	0.02	SM 3120	02-Dec-09/O			84.4		78.8		
Cadmium	mg/L	0.00002	EPA 200.8	04-Dec-09/O	0.005		0.00006		< 0.00002		
Chromium	mg/L	0.002	SM 3120	02-Dec-09/O	0.05		< 0.002		< 0.002		

ODWS = Ontario Drinking Water Standards

The Sodium Aesthetic Objective is 200 mg/L. The local MOH will be notified when the Sodium concentration exceeds 20 mg/L.

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,P-Peterborough,M-Moncton



Christine Wright
 Lab Supervisor

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C.O.C.: C13088

REPORT No. B09-37035

Report To:

Jagger Hims Limited
 294 Rink St. Suite 301
 Peterborough, ON, K9J 2K2
Attention: Lisa Gardiner

Caduceon Environmental Laboratories
 160 Charlotte St. Suite 206
 Peterborough, Ontario, K9J 2T8
 Tel: 705-748-1506
 Fax: 705-748-6514

DATE RECEIVED: 30-Nov-09

JOB/PROJECT NO.: Challenger

DATE REPORTED: 11-Dec-09

P.O. NUMBER: 03080832.00

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.:	W2 - 24 hour	W3 - 24 hour
Sample I.D.:	B09-37035-1	B09-37035-2
Date Collected:	27-Nov-09	27-Nov-09

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed	ODWS Guideline		
Cobalt	mg/L	0.005	SM 3120	02-Dec-09/O		< 0.005	< 0.005
Copper	mg/L	0.002	SM 3120	02-Dec-09/O	1	< 0.002	< 0.002
Iron	mg/L	0.005	SM 3120	02-Dec-09/O	0.3	0.007	0.021
Lead	mg/L	0.00002	EPA 200.8	04-Dec-09/O	0.01	< 0.00002	< 0.00002
Magnesium	mg/L	0.01	SM 3120	02-Dec-09/O		21.8	20.9
Manganese	mg/L	0.001	SM 3120	02-Dec-09/O	0.05	0.002	< 0.001
Nickel	mg/L	0.01	SM 3120	02-Dec-09/O		< 0.01	< 0.01
Potassium	mg/L	0.1	SM 3120	02-Dec-09/O		4.7	1.2
Silver	mg/L	0.005	SM 3120	02-Dec-09/O		< 0.005	< 0.005
Thallium	mg/L	0.00005	EPA 200.8	04-Dec-09/O		< 0.00005	< 0.00005
Sodium	mg/L	0.2	SM 3120	02-Dec-09/O	200	7.4	1.9
Strontium	mg/L	0.001	SM 3120	02-Dec-09/O		5.55	1.42
Titanium	mg/L	0.005	SM 3120	02-Dec-09/O		< 0.005	< 0.005
Uranium	mg/L	0.00005	EPA 200.8	04-Dec-09/O	0.02	0.00884	0.00167
Vanadium	mg/L	0.005	SM 3120	02-Dec-09/O		< 0.005	< 0.005
Zinc	mg/L	0.005	SM 3120	02-Dec-09/O	5	< 0.005	< 0.005
Anion Sum	meq/L		Calc.	03-Dec-09/O		6.82	5.65
Cation Sum	meq/L		Calc.	03-Dec-09/O		6.45	5.77
% Difference	%		Calc.	03-Dec-09/O		2.82	1.01
Ion Ratio	AS/CS		Calc.	03-Dec-09/O		1.06	0.980
Sodium Adsorption Ratio	-		Calc.	03-Dec-09/O		0.185	0.0491
TDS(ion sum calc.)	mg/L		Calc.	03-Dec-09/O		357	280
Conductivity (calc.)	µmho/cm		Calc.	03-Dec-09/O		623	522
Langelier Index(25°C)	S.I.		Calc.	03-Dec-09/O		0.284	0.328

ODWS = Ontario Drinking Water Standards

The Sodium Aesthetic Objective is 200 mg/L. The local MOH will be notified when the Sodium concentration exceeds 20 mg/L.

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,P-Peterborough,M-Moncton



Christine Wright
 Lab Supervisor

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Appendix E

Climate Data

TABLE E-1
30 YEAR WATER BUDGET
Proposed Challenger Golf Course (3080832.00)

MONTH	MEAN TEMPERATURE (°C)	I	E (mm)	DAYLIGHT FACTOR	E ADJ. (mm)	TOTAL PRECIPITATION (mm)	SURPLUS (mm)	DEFICIT (mm)
January	-8.5	0.0	0.0	0.8	0.0	60.3	60.3	0.0
February	-7.0	0.0	0.0	0.8	0.0	49.7	49.7	0.0
March	-1.5	0.0	0.0	1.0	0.0	67.9	67.9	0.0
April	6.1	1.4	28.5	1.1	31.9	66.1	34.2	0.0
May	12.9	4.2	63.0	1.3	80.0	77.5	0.0	2.5
June	17.7	6.7	88.0	1.3	112.7	78.9	0.0	33.8
July	20.5	8.4	102.9	1.3	133.7	68.4	0.0	65.3
August	19.3	7.7	96.5	1.2	115.8	91.6	0.0	24.2
September	14.6	5.0	71.8	1.0	74.7	84.3	9.6	0.0
October	8.2	2.1	39.0	1.0	37.0	70.6	33.6	0.0
November	2.1	0.3	9.2	0.8	7.5	80.6	73.1	0.0
December	-4.8	0.0	0.0	0.8	0.0	73.8	73.8	0.0
TOTAL	6.6	35.8			593.2	869.7	402.3	125.8

Water Surplus **276.5 mm**

- NOTES: 1) I = Heat Index
E = Evapotranspiration
2) Water budget based on Thornthwaite Method.
3) (°C) - Represents calculated mean of daily temperatures for the month.
4) Data from the Peterborough Trent University Climatological Station.

Appendix F

Selected Historic Report Data

MoE Water Well Records within 500 metre Radius of Site
Eric and Diane Challenger

MAP ID	CON	LOT	MoE WELL NUMBER	EASTING	NORTHING	ELEVATION	DATE DRILLED	DRILLER	CASING DIAMETRE (m)	KIND OF WATER	WATER FOUND (m)	STATIC LEVEL (m)	PUMP LEVEL (m)	TIME HOUR	TIME MINUTE	TIME RATE (L/min)	WATER USE	DEPTH TOS (m)	OWNER	Monitor Depth (m)	O/B or B
W1	05:SS	7	5102514	727165.00	4941673	271	02/07/1975	2104	0.15	FR	40.54	8.23	45.11	2	30	18.00	DO	0.00	GATIS BARRY	46.61	B
W2	05:SS	7	5100491	727113.00	4941566	274	30/03/1953	2327	0.15	FR	6.10	3.05	0.00	0	0	9.00	DO	0.91	THOMPSON, P	6.10	B
W3	05:SS	7	5107704	727165.00	4941573	274	17/11/1975	2104	0.15	FR	25.60	6.10	50.90	2	0	5.00	DO	0.00	CEDARWOOD GIFT SHOP	52.41	B
W4	05:SS	7	5108131	727165.00	4941573	271	10/06/1975	1904	0.15	FR	6.71	3.05	11.89	2	0	23.00	DO	0.91	LANE LYNN	12.19	B
W5	05:SS	7	5107705	727165.00	4941523	274	12/11/1975	2104	0.00	FR	0.00	0.00	0.00	0	0	0.00	DO	0.00	CFDARWOOD GIFT SHOP	83.82	B
W6	05:SS	7	5100493	727436.00	4941613	274	20/10/1955	3532	0.15	FR	15.85	8.84	0.00	0	0	5.00	PS	6.40	SCHOOL	18.29	B
W7	05:SS	7	5107643	727515.00	4941623	274	30/09/1975	5102	0.00	FR	0.00	12.19	43.28	1	30	5.00	DO	0.00	NIKULKA, ART	44.20	B
W8	05:SS	7	5110164	727515.00	4941573	274	28/10/1980	1455	0.15	FR	21.95	12.19	71.34	3	10	36.00	DO	0.00	BURLEIGH	22.86	B
W9	05:SS	6	5100489	727541.00	4941447	274	28/04/1964	2516	0.15	FR	12.19	9.45	13.72	1	0	32.00	DO	2.44	NIKULKA, A	14.02	B
W10	7	5	A013128	727478.00	4941482	0	19/11/2004	7052	0.15	FR	65.00	9.80	20.00	1	0	113.00	DO	0.00	LANDMARK LOG HOMES	67.00	B
W11	6	7	A013147	727680.00	4941793	0	15/12/2004	7052	0.15	FR	91.00	7.63	35.00	1	0	55.00	DO	0.00	CZEKALA, HANNA	91.00	B
W12	6	7	A034845	727793.00	4941883	0	03/05/2006	7052	0.15	FR	147.00	17.90	20.00	1	0	59.00	DO	0.00	MCQUAID, SHANNE	160.00	B
W13	06:SS	7	5105607	727605.00	4942063	271	12/06/1971	1666	0.00	FR	18.59	16.76	0.00	72	0	91.00	DO	1.83	STACK, T	18.59	B
W14	06:SS	8	5108546	727915.00	4942323	268	23/04/1976	1904	0.15	FR	9.75	4.27	9.14	3	0	114.00	DO	3.05	CAMPBELL, KINGSLEY	10.06	B
W15	06:SS	8	5116135	728074.00	4942561	0	30/10/1992	1455	0.15	FR	15.24	2.44	15.85	1	0	68.00	DO	0.00	SEARLE, CARL	17.37	B
W16	06:SS	7	5112348	727645.00	4942135	0	20/05/1987	1748	0.15	FR	12.50	0.00	0.00	1	0	23.00	DO	0.00	NORTHEY, RANDY	19.81	B
W17	06:SS	7	5118187	728294.00	4942017	0	12/07/1999	5020	0.15	FR	57.91	6.10	88.39	1	0	46.00	DO	6.71	HENRY BOB	91.44	B
W18	6	6	A007636	727984	4941050	0	06/04/2004	3651	0.15	FR	0.00	4.20	24	1	0.00	18	DO	0	BUTTON	30.50	B

Average	30.33	7.34
Max	147.00	17.90
Min	0.00	0.00

Average Depth	44.80
Max	160.00
Min	6.30

Notes:
TOS Top of Screen
FR Fresh
O/B Overburden
B Bedrock
DO Domestic
PS Public Supply

Appendix G

Permit to Take Water Application

For Office Use Only			
Reference Number	Payment Received	Date (y/m/d)	Initials
	\$		

General Information and Instructions

General:

Information requested in this form is collected under the authority of the *Ontario Water Resources Act*, R.S.O. 1990 (OWRA) and the *Environmental Bill of Rights, C. 28*, Statutes of Ontario, 1993, (EBR) and will be used to evaluate applications for a Permit to Take Water as required by Section 34 (OWRA).

Instructions:

- Applicants are responsible for ensuring that they complete the most recent application form.** When completing this form, please refer to the "Guide to Permit to Take Water Application Form" (referred to as the Guide). Application forms and supporting documentation are available from your local Regional or District Office of the Ministry of the Environment, and in the "Publications" section of the Ministry of the Environment website at <http://www.ene.gov.on.ca/envision/gp/index.htm>.
- Questions regarding completion and submission of this application should be directed to local Regional Office of the Ministry of the Environment. Contact information for these offices is available in the Guide or on the Ministry of the Environment website at <http://www.ene.gov.on.ca/envision/org/op.htm>
- This form must be completed with respect to all the requirements of the Guide for it to be considered an application for approval. **Incomplete applications will be returned to the applicant.**
- A complete application consists of:
 - a completed, signed application form
 - all required supporting information identified in this form and the Guide, and
 - a certified cheque or money order, in Canadian funds, made payable to the **Ontario Minister of Finance** for the application fee when required. Payment may also be made by Visa, MasterCard or American Express,

The Ministry may require additional information during the technical review of any application initially accepted as complete.

- The original application, along with supporting information and the application fee should be sent to:

**Ministry of the Environment,
Attention: Permit to Take Water Director
Director, Environmental Assessment and Approvals Branch,
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario, M4V 1L5**

- Information contained in this application form is not considered confidential and will be made available to the public upon request. Information submitted as supporting information may be claimed as confidential but will be subject to the *Freedom of Information and Protection of Privacy Act* (FOIPPA) and the *EBR*. If you do not claim confidentiality at the time of submitting the information, the Ministry of the Environment may make the information available to the public without further notice to you. If you are identifying confidential material, please indicate why you believe the information is confidential.

1. Permit Administration

Please indicate if this is an application for a:

- New Permit
 Amendment to Permit (attach a photocopy of permit)
 Renewal of Permit (attach a photocopy of permit)

2. Classification

Classification	Fee Required	No Fee Required
<input type="checkbox"/> Category 1	<input type="checkbox"/> \$750	<input type="checkbox"/> Reason _____
<input type="checkbox"/> Category 2	<input type="checkbox"/> \$750	<input type="checkbox"/> Reason _____
<input checked="" type="checkbox"/> Category 3	<input checked="" type="checkbox"/> \$3,000	<input type="checkbox"/> Reason _____

3. Applicant Information

Applicant Name <i>(legal name of individual or organization as evidenced by legal documents such as a copy of Driver's Licence or Master Business Licence)</i> Eric Challenger		Business Identification Number	
Business Name <i>(the name under which the entity is operating or trading if different from the Applicant Name - also referred to as trade name)</i>			
Applicant Type: <input type="checkbox"/> Corporation <input checked="" type="checkbox"/> Individual <input type="checkbox"/> Partnership <input type="checkbox"/> Sole Proprietor		<input type="checkbox"/> Federal Government <input type="checkbox"/> Municipal Government <input type="checkbox"/> Provincial Government <input type="checkbox"/> Other <i>(describe):</i> _____	
		North American Industry Classification System (NAICS) Code 1 1 2 1 1 1	

4. Applicant Physical Address

Civic Address - Street information <i>(street number/name/type/direction/unit/suite/emergency 911 location number and street)</i> 63 Jamieson Crescent				
City / Town Whitby	County/District Durham Region	Province/State Ontario	Country Canada	Postal Code L1R 1V1
Telephone Number <i>(including area code)</i> 905-666-1139		Fax Number <i>(including area code)</i>		E-mail Address challengereric@rogers.com

5. Applicant Mailing Address

Same as Applicant Physical Address? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, complete below			
Civic Address - Street information <i>(street number/name/type/direction/unit/suite/emergency 911 location number and street/P.O.Box/Rural Route Number)</i>			
City / Town	Province/State	Country	Postal Code

6. Project Technical Information Contact

Same as Applicant? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, complete below			
Name J. Stephen Ash		Company Jagger Hims Limited	
Address Information: Same as Applicant Mailing Address? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, please provide technical information contact mailing address below			
Civic Address - Street information <i>(street number/name/type/direction/unit/suite/emergency 911 location number and street/P.O.Box/Rural Route Number)</i> 294 Rink Street, Suite 103			
City / Town Peterborough	Province/State Ontario	Country Canada	Postal Code K9J 2K2
Telephone Number <i>(including area code & extension)</i> 705-743-6850		Fax Number <i>(including area code)</i> 705-743-6854	
E-mail Address sash@jaggerhims.com			

7. Source Information – Note: Source Information must be provided separately for each source. Please complete and submit multiple copies of this Source Information section (pages 3 and 4 of this form) if your application includes more than one source.

Number of Water Taking Sources Included in this Application (do not include domestic uses that do not require a permit)			
Total Number of Wells 3	Total Number of Lake Intakes	Total Number of Ponds 1	Total Number of Watercourse Intakes
Source Location Information (if multiple sources are included in application, provide information for each source)			
Civic Address - Street information (street number/name/type/direction/unit/suite/emergency 911 location number and street)			
Lot Pt Lots 6 and 7	Concession Concession 6	Part	Reference Plan
Municipality/Unorganised Township Township of North Kawartha (Burleigh)	County/District Peterborough County	Original Geographic Township	
Geographic (GPS) Coordinates (to be provided in Datum NAD83)			
Method of Collection Garmin Unit	Accuracy Estimate +/- 10 m	UTM Zone 17	Easting 728097 Northing 4941520
Is the Applicant the owner of the site where water taking will occur?			
<input checked="" type="checkbox"/> Yes			
<input type="checkbox"/> No if no, attach the owner's name, address and a signed letter granting consent for the applicant to access the water taking location			
Is the site where water taking will occur located in an area of development control as defined by the <i>Niagara Escarpment Planning & Development Act</i> ?			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Is the site where water taking will occur located on the Oak Ridges Moraine Conservation Area as defined by the <i>Oak Ridges Moraine Conservation Plan</i> (a regulation made under the <i>Oak Ridges Moraine Conservation Act</i>)?			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Are you aware of any complaints or impacts resulting from water takings at the site?			
<input type="checkbox"/> Yes if yes, please describe: _____			
<input checked="" type="checkbox"/> No			
Will water from the site be packaged in a container (bottled water, tanks)?			
<input type="checkbox"/> Yes if yes, what size of containers? <input type="checkbox"/> greater than 20 litres <input type="checkbox"/> 20 litres or less			
<input checked="" type="checkbox"/> No			
Are wells located within 500 m of the site where water taking will occur?			
<input checked="" type="checkbox"/> Yes			
<input type="checkbox"/> No if no, what is the distance to the nearest well? _____			
Is municipal water available to all dwellings within 500m of the site where water taking will occur?			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown			
Estimated start date of water taking	Water taking to extend for a period of: _____ <input type="checkbox"/> days <input type="checkbox"/> weeks <input type="checkbox"/> months <input type="checkbox"/> years <input type="checkbox"/> indefinite		
Is activity subject to the <i>Environmental Assessment Act</i> ?			
<input type="checkbox"/> Yes if yes, please attach approval or Notice of Completion			
<input checked="" type="checkbox"/> No			
If yes, did the project receive any Part II Orders / Bump-Up requests?			
<input type="checkbox"/> Yes if yes, what was the date of the Minister's Decision? _____ <input type="checkbox"/> Decision pending			
<input checked="" type="checkbox"/> No			
List any public consultation/notification that has occurred related to the proposed water taking (i.e., public hearings, notification of First Nations, etc.)			

Watercourse - please complete this table if applying to take water from a watercourse (i.e., stream, municipal ditch, open drain, etc.)

Watercourse Name	Tributary to
Does flow in the watercourse stop at any time during the year?	
<input type="checkbox"/> Yes if yes, during which months? _____ For what period of time? _____	
<input type="checkbox"/> No	
Do you move/relocate the water intake (pump)?	
<input type="checkbox"/> Yes if yes, please provide primary and secondary locations on attached map	
<input type="checkbox"/> No	


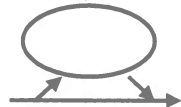
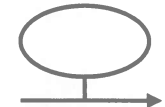
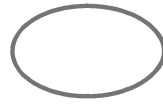
Well - please complete this table if applying to take water from a well (includes sumps for mines and quarries)

Well Name / Identifier Well W1 (Pro Shop)	Water Well Record Number A050569	If not available, provide name of property owner at time of well construction	
Has the well been deepened? <input type="checkbox"/> Yes if yes, what was the date of deepening? _____ <input checked="" type="checkbox"/> No			
Type of Well: <input checked="" type="checkbox"/> Drilled <input type="checkbox"/> Bored <input type="checkbox"/> Dug <input type="checkbox"/> Driven or Jetted (sandpoints/wellpoints) If 'Driven or Jetted', provide the following: Total number of sandpoints/wellpoints: _____ Number of interconnected sandpoint/wellpoint systems: _____			
Can you measure the depth to water in this well? <input checked="" type="checkbox"/> Yes if yes, what is the depth to static water level? <u>7.1 m</u> Date Measured: <u>Nov. 26/09</u> <input type="checkbox"/> No			
Has a pumping test been done? <input type="checkbox"/> Yes if yes, please attach report <input checked="" type="checkbox"/> No			

Lake - please complete this table if applying to take water from a lake

Lake Name

Pond/Reservoir - please complete this table if applying to take water from a pond/reservoir

Pond Name / Identifier				
Was the pond constructed (man made)? <input type="checkbox"/> Yes if yes, please provide date of construction _____ <input type="checkbox"/> No				
Pond Size				
Average Length	Average Width	Average Depth of Water	Maximum Depth of Water	Approximate Volume of Pond
Pond Type				
Select the diagram that most accurately resembles your pond:				
				
<input type="checkbox"/> online	<input type="checkbox"/> by-pass	<input type="checkbox"/> connected	<input type="checkbox"/> dugout	
Source of pond water (select all that apply)				
<input type="checkbox"/> Seepage / springs / groundwater				
<input type="checkbox"/> Surface water runoff (including tile drains, does not include watercourse or open channel)				
<input type="checkbox"/> Pumped water (if water is pumped into a pond, complete section information for source from which water is pumped - i.e., well, lake or watercourse)				
<input type="checkbox"/> Flowing water (watercourse, open drains, ditches, etc.)				
If "flowing water",				
1. Does water flow into the pond (inflow)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, is there a structure to regulate the inflow?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, describe: _____
2. Does water flow out of the pond (outflow)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, is there a control structure to regulate the outflow?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, describe: _____


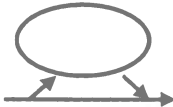
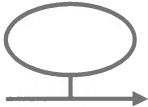

Well - please complete this table if applying to take water from a well (includes sumps for mines and quarries)

Well Name / Identifier Well W2 (irrigation)	Water Well Record Number A050575	If not available, provide name of property owner at time of well construction	
Has the well been deepened? <input type="checkbox"/> Yes if yes, what was the date of deepening? _____ <input checked="" type="checkbox"/> No			
Type of Well: <input checked="" type="checkbox"/> Drilled <input type="checkbox"/> Bored <input type="checkbox"/> Dug <input type="checkbox"/> Driven or Jetted (sandpoints/wellpoints) If 'Driven or Jetted', provide the following: Total number of sandpoints/wellpoints: _____ Number of interconnected sandpoint/wellpoint systems: _____			
Can you measure the depth to water in this well? <input checked="" type="checkbox"/> Yes if yes, what is the depth to static water level? <u>9.7 m</u> Date Measured: <u>Nov. 26/09</u> <input type="checkbox"/> No			
Has a pumping test been done? <input checked="" type="checkbox"/> Yes if yes, please attach report <input type="checkbox"/> No			

Lake - please complete this table if applying to take water from a lake

Lake Name

Pond/Reservoir - please complete this table if applying to take water from a pond/reservoir

Pond Name / Identifier				
Was the pond constructed (man made)? <input type="checkbox"/> Yes if yes, please provide date of construction _____ <input type="checkbox"/> No				
Pond Size				
Average Length	Average Width	Average Depth of Water	Maximum Depth of Water	Approximate Volume of Pond
Pond Type				
Select the diagram that most accurately resembles your pond:				
 <input type="checkbox"/> online	 <input type="checkbox"/> by-pass	 <input type="checkbox"/> connected	 <input type="checkbox"/> dugout	
Source of pond water (select all that apply)				
<input type="checkbox"/> Seepage / springs / groundwater <input type="checkbox"/> Surface water runoff (including tile drains, does not include watercourse or open channel) <input type="checkbox"/> Pumped water (if water is pumped into a pond, complete section information for source from which water is pumped - i.e., well, lake or watercourse) <input type="checkbox"/> Flowing water (watercourse, open drains, ditches, etc.)				
If "flowing water",				
1. Does water flow into the pond (inflow)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, is there a structure to regulate the inflow?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, describe: _____
2. Does water flow out of the pond (outflow)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, is there a control structure to regulate the outflow?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, describe: _____


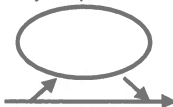
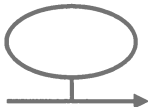

Well - please complete this table if applying to take water from a well (includes sumps for mines and quarries)

Well Name / Identifier Well W3 (irrigation)	Water Well Record Number A062849	If not available, provide name of property owner at time of well construction		
Has the well been deepened? <input type="checkbox"/> Yes if yes, what was the date of deepening? _____ <input checked="" type="checkbox"/> No				
Type of Well: <input checked="" type="checkbox"/> Drilled <input type="checkbox"/> Bored <input type="checkbox"/> Dug <input type="checkbox"/> Driven or Jetted (sandpoints/wellpoints) If 'Driven or Jetted', provide the following: Total number of sandpoints/wellpoints: _____ Number of interconnected sandpoint/wellpoint systems: _____				
Can you measure the depth to water in this well? <input checked="" type="checkbox"/> Yes if yes, what is the depth to static water level? <u>4.3 m</u> Date Measured: <u>Nov 26/09</u> <input type="checkbox"/> No				
Has a pumping test been done? <input checked="" type="checkbox"/> Yes if yes, please attach report <input type="checkbox"/> No				

Lake - please complete this table if applying to take water from a lake

Lake Name

Pond/Reservoir - please complete this table if applying to take water from a pond/reservoir

Pond Name / Identifier Irrigation (Dug out)				
Was the pond constructed (man made)? <input checked="" type="checkbox"/> Yes if yes, please provide date of construction <u>partially, 2007</u> <input type="checkbox"/> No				
Pond Size				
Average Length 61 m	Average Width 61 m	Average Depth of Water 2.4	Maximum Depth of Water 2.4	Approximate Volume of Pond 9,200 m3
Pond Type				
Select the diagram that most accurately resembles your pond:				
				
<input type="checkbox"/> online	<input type="checkbox"/> by-pass	<input type="checkbox"/> connected	<input checked="" type="checkbox"/> dugout	
Source of pond water (select all that apply)				
<input type="checkbox"/> Seepage / springs / groundwater				
<input checked="" type="checkbox"/> Surface water runoff (including tile drains, does not include watercourse or open channel)				
<input checked="" type="checkbox"/> Pumped water (if water is pumped into a pond, complete section information for source from which water is pumped - i.e., well, lake or watercourse)				
<input type="checkbox"/> Flowing water (watercourse, open drains, ditches, etc.)				
If "flowing water",				
1. Does water flow into the pond (inflow)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, is there a structure to regulate the inflow?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, describe: _____
2. Does water flow out of the pond (outflow)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, is there a control structure to regulate the outflow?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, describe: _____

10. Attachments

The following must be attached for all applications (Category 1, 2 and 3) to be complete:

- Map Requirements**
On a 1:10 000 OBM (Ontario Base Map) (1:50 000 only acceptable in locations where 1:10 000 is not obtainable), mark and label:
 - all existing and proposed water taking locations with sources corresponding with source name
 - all of the following features within 500m of each source: existing wells (indicate use of existing well, springs, watercourses, wetlands, water bodies, property lines, locations and name of property owners, nearest road intersection, dwellings.

- Describe in detail how, where and when all water is obtained, stored, transferred, used and returned to the environment (if applicable). Details must include the source of all water takings (and corresponding source name if applicable), purpose of the water taking, period of water taking; and maximum quantity requested (see Guide for further instruction).
Note: If your application is subject to posting on the Environmental Bill of Rights (EBR) Registry, this description will be used to create the Proposal Notice. The ministry may change the wording as required, to meet the EBR posting requirements.

- Describe how water taking needs (rates, amounts and time periods) were determined. Provide all relevant information and calculations to demonstrate the water takings requested are warranted. Calculation worksheets are available. Refer to Appendix E of the Guide.

- Attach completed water conservation Schedule 1.

The following must be attached for all Category 2 applications:

- Completed Schedule 2 and/or Schedule 3 signed by a Qualified Person.

The following must be attached for all Category 3 applications:

- Study Hydrogeological Report for PTTW Application, March 2010

11. Statement/Signature of Applicant

I, the undersigned, hereby declare that to the best of my knowledge:

- The information contained herein and the information submitted in support of this application is complete and accurate in every way and I am aware of the penalties against providing false information.
- The Project Technical Information Contact identified in Section 6 of this form is authorized to act on my behalf for the purpose of obtaining this approval.

Print Name	Signature	Date (yyyy/mm/dd)
Eric Challenger		2010/03/23



Application for Permit to Take Water

Ce formulaire est disponible en français

For Office Use Only			
Reference Number	Payment Received	Date (y/m/d)	Initials
	\$		

12. Payment Information

Application Category <input type="checkbox"/> Category 1 (\$750) <input type="checkbox"/> Category 2 (\$750) <input checked="" type="checkbox"/> Category 3 (\$3000)		Amount Enclosed \$ 3,000.00 <input type="checkbox"/> no fee required	
Method of Payment <input type="checkbox"/> Certified Cheque <input type="checkbox"/> Money Order <input checked="" type="checkbox"/> MasterCard <input type="checkbox"/> American Express			
Credit Card Information (if paying by VISA, MasterCard or American Express)*			
Name on Card (please print) ERIC CHALLENGER		Credit Card Number 5446120001578738	Expiry Date (yy/mm) 10/06
Cardholder Signature 		Date (y/m/d) 2010/03/23	

*NOTE: credit card accepted for payments UNDER \$10,000.00 only.

APPENDIX E

Schedule for Water Conservation Measures

Schedule 1 – Implementation of Water Conservation in accordance with Best Management Practices and Standards for the Relevant Sector

General Information and Instructions

Section 1: General Information

Information on this Schedule is collected under the authority of the *Ontario Water Resources Act, R.S.O. 1990* (OWRA), and the new *Environmental Bill of Rights, C. 28*, Statutes of Ontario, 1993, and will be used to evaluate applications for a Permit to Take Water as required by Section 34 (OWRA).

Instructions:

1. This Schedule forms part of the Permit to Take Water application form and is subject to all provisions and instructions where applicable.
2. All questions of Section 2 of this Schedule must be answered for this Schedule to be considered complete.

Purpose:

The purpose of this Schedule is to allow persons applying for a permit required by the Ministry to document in the application all water conservation measures and practices that are currently being undertaken or that is anticipated to be undertaken for the duration of the permit. Persons applying for a permit are encouraged to take all reasonable and practical measures to conserve water and to be up to date with sector-specific best management practices and standards for water conservation (i.e. whether you are currently implementing or anticipate implementing water conservation best water management standards and practices relevant to your sector). Various sector associations publish information on best practices that may be useful in determining practices and standards for water conservation. Examples of these sector-specific associations include the following:

- **Municipal Sector** -- Ontario Water Works Association
- **Agricultural Sector** -- Ontario Ministry of Agriculture (Fact Sheets and Guides on Best Management Practices containing information on efficient irrigation systems, staggering irrigation schedules and preparing Environmental Farm Plans)
- **Other Sectors** -- For information on up-to-date best management practices and measures for water conservation, contact your relevant sector association.

Section 2: Water Conservation Best Management Practices and Standards

Use this section of the Schedule to indicate what conservation measures and practices you are currently implementing or anticipate implementing. Where relevant, additional information can be attached as an appendix to this Schedule.

State your goals for reducing the use, loss or waste of water or for increasing the efficiency of water use (e.g., litres per day per unit of production or litres per day per capita for the residential sector).

Maintain water use within appropriate levels to ensure continued operation of the golf course with respect for site area water resources and their protection, and implementation of good turf management practices and materials to reduce the overall water needs and operate the facility with water conservation in mind.

Schedule 1 continued

Check off which of the following water conservation best management measures and practices that you have implemented or will implement for the duration of the permit:

	Implemented	To be Implemented
Water Use Audit	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Universal metering of all users (municipalities)	<input type="checkbox"/>	<input type="checkbox"/>
Water Efficient Fixtures/Equipment/Technology	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Develop and Implement an Overall Water Conservation and Efficiency Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Leak Detection/Loss Prevention/Control Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Public/Employee Information/Education/Outreach	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Landscaping techniques/Site and Urban Design Principles	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Water Efficient production processes/practices (e.g. re-use of water)	<input type="checkbox"/>	<input type="checkbox"/>
Economic Incentives/Cost-Share/Full Costing recovery/tax credits/rebate programs	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify): _____

Of the measures and practices checked off above, provide specific details of the best management practices applied or to be applied including equipment (e.g. pump specification), processes, such as water used for industrial production and/or irrigation system(s), current and proposed technology, approach, processes and procedures:

Irrigation will be carried out on an as-needed basis to the permitted maximum. A groundwater and surface water monitoring program will be implemented to assess impacts on the site area water resources.

For the above measures and practices, list information relevant for your sector and/or other sources of information used in determining water conservation and efficiency management practices and measures:

- Turf Management Planning Guides for Golf Courses
- Operations Manuals

List dates of when the best management measures and practices were or will be applied for the duration of the permit:

From approval and on-going.









Identify any approval or certification that you have received for implementing water conservation and efficiency best management practices, e.g. Environmental Farm Plan, Audubon Cooperative Sanctuary Program for Golf Courses:

N/A

ERIC & DIANE CHALLENGER

37 Northey's Bay Road
Woodview, Ontario

LEGEND

-  Property Boundary
-  500 metre buffer from property boundary
-  Water Well Location
-  Building
-  Contour
-  Lot / Concession Line
-  Roads
-  Water



Scale: 1:14,000



Base Data obtained from Ontario Ministry of Natural Resources L10, 2006

TITLE

WATER WELL LOCATION MAP

CLIENT

Eric & Diane Challenger



GRACE & ASSOCIATES INC.
Geological & Environmental Consultants

DRAWN

R05-313

FIGURE NO.

6

DATE

July, 2006

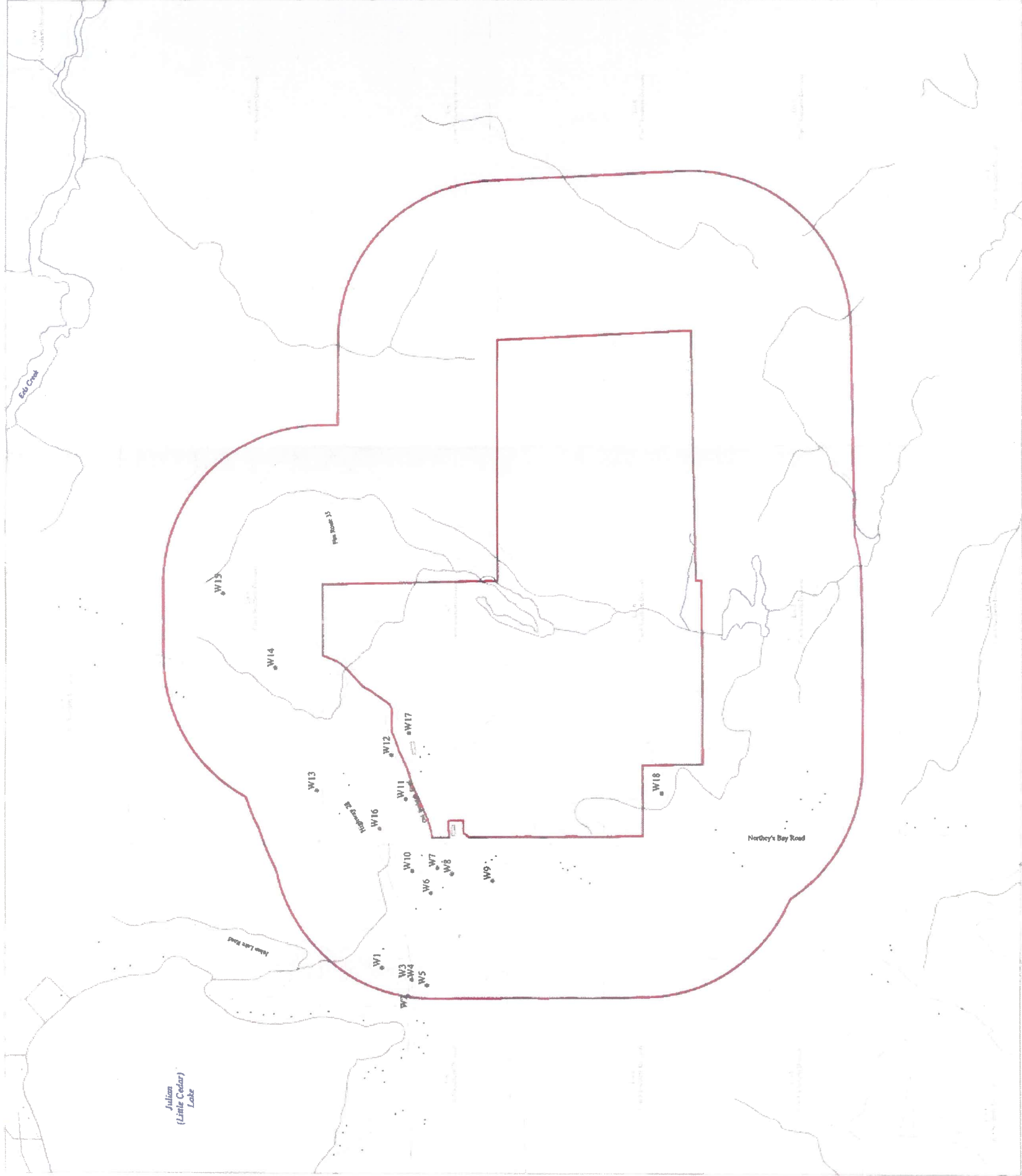
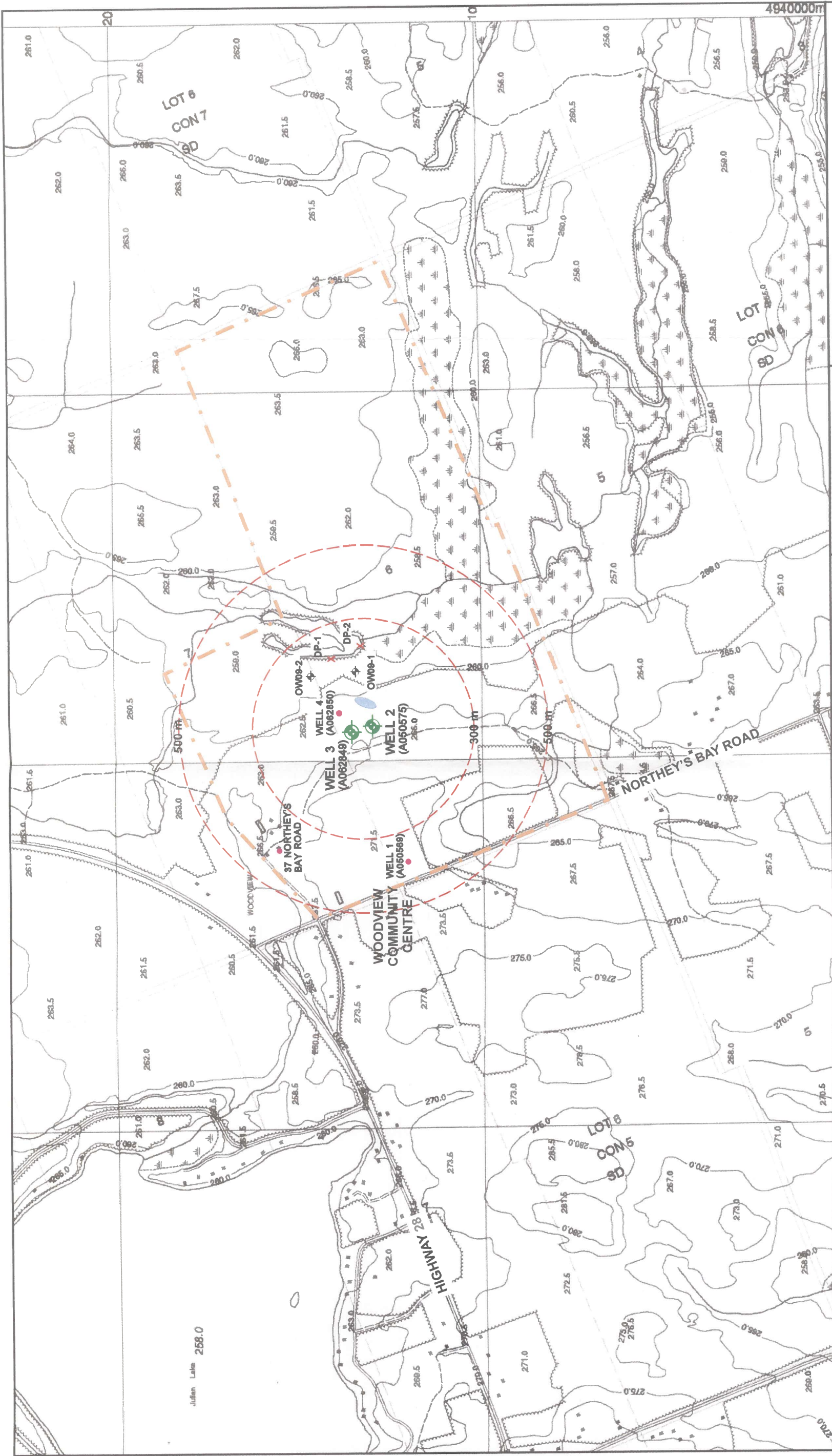


TABLE 4
WATER WELL SUMMARY

<u>Number of Wells</u>	Drilled	15	83%	
	Dug/Bored	0	0%	
	Data N/A	3	17%	
	Total	18	100%	
<u>Aquifer Sources</u>	Overburden	0	0%	
	Bedrock	18	100%	
	Dry	0	0%	
	Data N/A	0	0%	
<u>Well Test Pumping Rate</u>	Bedrock Wells	Average	40.01 L/min	(8.8 igpm)
		Range	5 - 114 L/min	(1.1 - 25.1 igpm)
	Well Yield	Dry	0	0%
		< 9 L/min	3	17%
		9-22 L/min	3	17%
		23-45 L/min	4	22%
		> 45 L/min	7	39%
Data N/A	1	5%		
<u>Static Water Level</u>	Bedrock Wells	Average	7.34 m	(24.1 ft)
		Range	2.44 - 17.90 m	(8 - 59 ft)
<u>Depth Water Encountered</u>	Drilled Wells	Average	30.33 m	(99.5 ft)
		Range	6.10 - 147 m	(20 - 482 ft)

NOTE: Data from MoE well records, pumping test well and door-to-door survey.
 Refer to Appendix E for Water Well Survey Results

N/A Data not available.



LEGEND WELL 2 (A050575) Test Well Designation and Approximate Location Pond Approximate Location Observation Monitoring Well Designation and Approximate Location DP-1 Drive Point Designation and Approximate Location WELL 1 (A050568) Observation Drilled Well Designation and Approximate Location 300 m and 500 m radius around proposed test wells		SITE PLAN WATER SUPPLY ASSESSMENT Proposed Challenger Golf Course Part Lots 6 & 7, Concession 8, Burleigh Ward, Township of North Kawartha, Ontario For: Eric and Diane Challenger	
		SCALE: 1 : 10,000 REF. NO.: 0308083201F2 DATE: MARCH 2010 PROJECT: 03080832.01	
		FIGURE 2	