Groundwater Science Corp.

Unit 2, 465 Kingscourt Drive,
Waterloo, ON N2K 3R5
Phone: (519) 746-6916
groundwaterscience.ca

Hydrogeological Investigation
Lafarge Canada Inc. Oro Pit
Wash Water Source Well
Permit To Take Water Application
Pumping Test

Prepared For:

Lafarge Canada Inc.
6509 Airport Road,
Mississauga Ontario,
L4V 1S7

Prepared By:

Groundwater Science Corp.

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1.0 BACKGROUND AND PURPOSE

Lafarge Canada Inc. (Lafarge) owns and operates several gravel pits at properties located within Lots 7, 8 and 9, Concessions 7 and 8, Township of Oro-Medonte, Simcoe County, Ontario. The pit locations are shown on **Figure 1**, and consist of the Oro Pit (largest and main site) and the associated Greek Pit, Norman Pit and Roehner Pit. All of these sites are located on Line 7 North, between Old Barrie Road West (to the south) and Bass Lake Sideroad West (to the north).

All of the Lafarge sites are Licenced for above water table extraction (only). The Greek Pit has been in operation for some time. The Oro Pit operation began in 2015 and extraction is underway. The Norman and Roehner Pit operations are in the preliminary stages, however no extraction has occurred. All of the pits will be operated in a coordinated manner, with aggregate material moving to the Oro Pit for most processing purposes (including washing as needed).

The Oro Pit Aggregate Resource Act (ARA) Licence approval includes washing operations within the defined processing area. Aggregate washing is needed to allow for a full range of products and to maximize resource use at the site. All washing operations for the Lafarge sites are to occur at the Oro Pit. The washing operation will operate as a closed loop system, taking water from a clear pond, rinsing the aggregate, and, returning the wash water to one (or more) silt ponds, where the naturally occurring silt will settle out. The silt pond(s) will overflow back into the clear pond. Based on the hydrogeologic setting (as described later in this report), the wash ponds will need to be developed above the water table, and are expected to be lined to reduce infiltration losses. Some water loss will occur due to evaporation from the pond surface and as some water adheres to the washed aggregate. Therefore a water source is needed to fill the ponds at the beginning of the operational season and to maintain the ponds during operations. A well has been constructed as the groundwater source for this purpose.

This report is prepared in support of a PTTW application for aggregate washing purposes at the Lafarge Oro Pit. This report evaluates the impact potential associated with the proposed taking and, as needed, proposes monitoring, contingency and mitigative measures that will be implemented to ensure unacceptable impacts to existing water users, local water supplies and the natural environment do not occur.

This report includes a description of: the overall geologic, surface water and hydrogeologic setting based on published information and reports; a summary of local water supplies based on MOECP well records and a private water well survey; the drilling program undertaken to obtain a water source for the site; the pump testing program completed to assess the safe yield and potential water taking impacts; a summary of the local hydrogeologic conditions based on testing and observations obtained through this study; and, an analysis of potential impacts.

2.0 SITE CHARACTERIZATION

2.1 EXISTING SOURCE WELLS AND MONITORING NETWORK

As part of respective ARA Licencing and PTTW approvals and monitoring, an existing network of pumping and monitoring wells have been established at the Lafarge, Sarjeant and Walker Pits. The monitoring network is shown on **Figure 2**.

Well details are summarized in **Table 1**, based on reported water well records or other information available to this study. Well record information is provided in **Section 2.4.1**.

Site	Monitor or Source Well	MOECP Well Record	Ground Elevation (mASL)	Drilled Depth (mASL)	Screened Interval (mASL)	Aquifer Type
Oro Pit	DC-1	n/a	366.7	332.6	333.3 to 336.3	water table
	DC-2	n/a	354.1	318.1	317.9 to 320.9	water table
	DC-4	n/a	354.6	324.7	325.2 to 328.2	water table
	DC-5	n/a	352.1	322.2	322.5 to 325.5	water table
	M6	n/a	352.3	317.3	*321.2 to 324.2*	water table
Roehener Pit	PW1	7298525	356*	272.2	273.7 to 278.3	confined
	OW1	7275814 7275815	374*	271	308	water table
	OW1/91	5728239	361*	332	336 to 337.5	dry
Greek Pit	G-OW1	5729037	343.2	270.1	309.8 to 311.5	water table
Sarjeant Oro Pit #3	S-PW1	7144576	330*	211.1	215.7 to 221.8	confined
	S-OW1-S	7157594	330*	212.0	289 to 295	water table
	S-OW1-D	7157594	330*	212.0	216 to 222	confined
Walker Edgar Pit	W-PW1	*5724958*	330*	267.0	270.0 to 276.4	confined
	W-PW2	n/a	328*	n/a	*270.0 to 276.4*	confined
	W-OW1	5724959	328*	235.0	*297.4 to 298.1*	water table

Notes:
n/a = not available
* = estimated from OBM mapping or Site Plan information (other elevations as reported)
italics = assumed

Table 1: Pumping and Monitoring Well Network

Well references listed above correspond to our nomenclature for this study, and does not necessarily correspond to other studies or permits. We note that MOECP well records are not available for some of the older Oro Pit monitors, however consultant borehole logs and/or summaries are available. The screened interval at monitor M6 is assumed based on an assumed 3 m screen length, typical of other monitors installed at the site. Monitor

OW1/91 was a borehole completed as part of site Licensing studies, however the screen was not installed deep enough to reach the water table (i.e. completed as a "dry well"). One production water well record is available for the Edgar Pit, it is assumed that this record corresponds to W-PW1 (assumed to be the original pumping well installed at the same time W-OW1 was drilled). A screened interval length is not reported for W-OW1, however is estimated based on the measured total depth and reported casing depth.

2.2 GEOLOGIC SETTING

2.2.1 Quaternary Geology

The site is located within a large-scale depositional feature known as the Oro Moraine. A map showing geologic conditions is included in **Appendix A**. Locally the surficial (Quaternary) deposits are classified as ice contact stratified (kame) deposits (mixture of sand, gravel, till). The kame deposit forms the upper layer of the moraine. The core of the moraine is reported to consist of a series of alternating till aquitard and sand/gravel aquifer layers that extend to bedrock.

Two excerpts, modified from Burt and Dodge: *Three-dimensional modelling of surficial deposits in the Barrie–Oro Moraine area of southern Ontario; Ontario Geological Survey, Groundwater Resources Study 11* (2011), illustrating the regional setting are shown below. The site location is approximate, intended to represent the general setting.

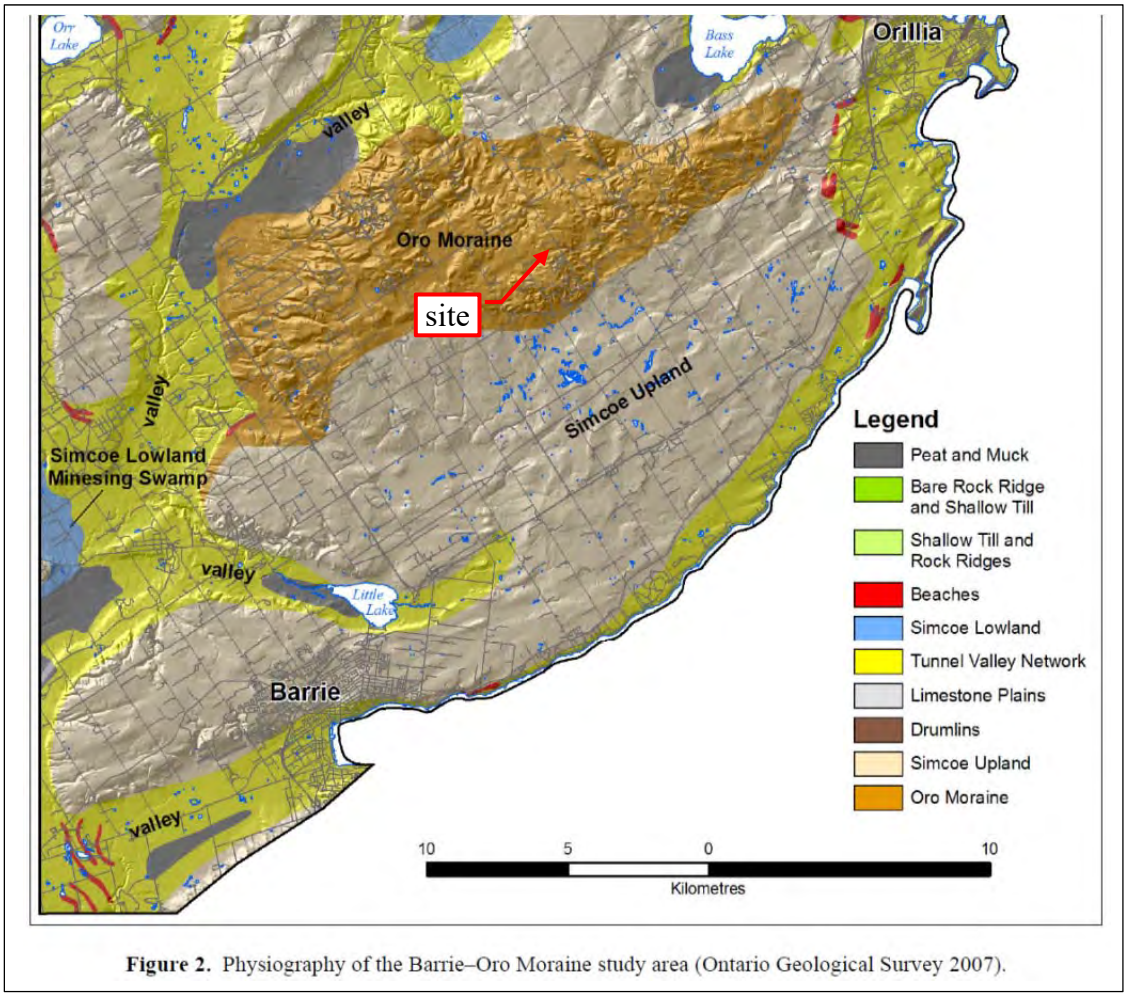


Figure 2. Physiography of the Barrie–Oro Moraine study area (Ontario Geological Survey 2007).

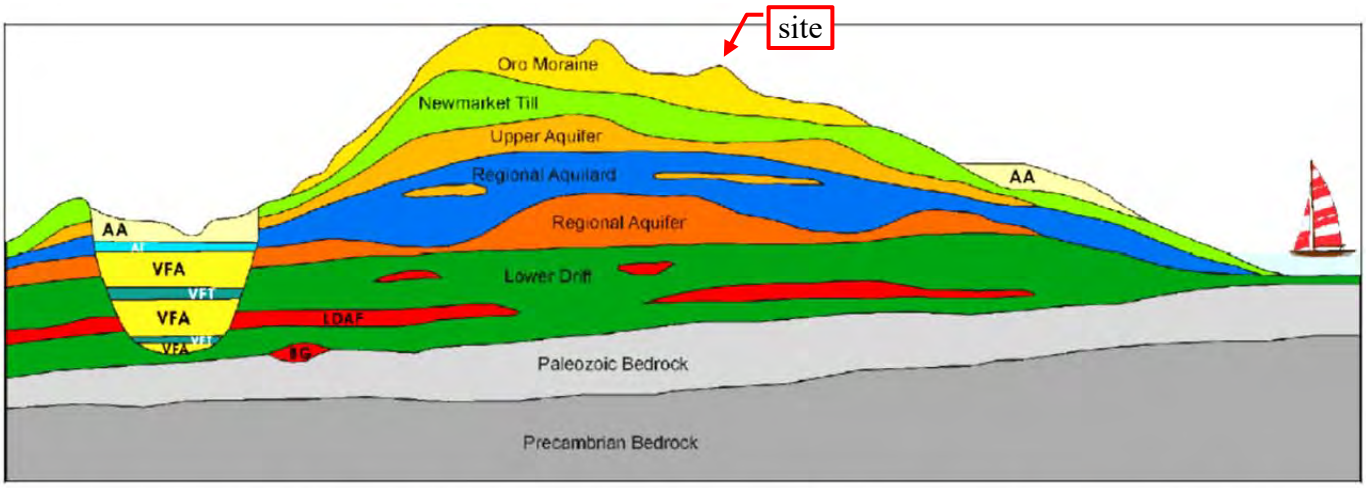


Figure 44. Conceptual geologic model for the Barrie–Oro Moraine area. Abbreviations: AA, Algonquin aquifer; AT, Algonquin aquitard; BG, basal gravel aquifer; LDAF, lower drift aquifers; VFA, valley-fill aquifer; VFT, valley-fill aquitard.

The underlying bedrock at the site is Paleozoic Limestone deposits of the Simcoe Group Bobcaygeon Formation. Bedrock elevation in the general area is reported to be approximately 160 mAMSL, with a general southwest slope. Based on one borehole extending to bedrock at the Oro Pit (WWR# 7263332, 7263333), the total overburden thickness is on the order of 179 m at the site.

2.3 LOCAL SURFACE WATER FEATURES

The site is located within the Hawkstone Creek subwatershed, as identified by Lake Simcoe Region Conservation Authority (LSRCA) Mapping. Hawkstone creek drains generally southeast into Lake Simcoe.

No surface water features occur either on-site or in the immediate area. The closest mapped surface water features occur along the southern flank of the moraine, south of the Edgar Pit at Old Barrie Road West. This feature consists of a (mapped) wetland pocket and creek outflow, approximately 1.1 kilometers (km) from Lafarge PW1. The wetland and creek elevation is approximately 305 mASL. Significant groundwater discharge, as mapped by LSRCA (e.g. *Oro and Hawkestone Creeks Subwatershed Plan*, 2013) occurs further south, at the main creek channel approximately 2.5 km southeast of the site.

2.4 LOCAL WATER SUPPLY

2.4.1 Private Water Wells

Local private water supply was assessed through a review of the MOECP water well record database, and, through door to door surveys in the area. Well records are available through the MOECP mapping application at: http://www.ontario.ca/environment-and-energy/map-well-record-data.

We note that any historical residences on the Lafarge Oro Pit, Norman Pit and Roehner Pit, in addition to the Sarjeant and Walker pits, are either demolished or no longer in use. In addition, the property to the immediate east of the Roehner Pit (Lafarge PW1) is a County Forest and not in residential use. As part of this study a survey along Line 7

North, from Old Barrie Road West to the Greek Pit was undertaken and no occupied residences were found. As such, there are no known residences occupied within 500 m of Lafarge PW1. Residences occur over 1 km from Lafarge PW1, along Line 6 North and Old Barrie Road West. This confirms a previous door to door survey undertaken as part of the Oro Pit ARA Licence mandated monitoring program over the period December 2012 to April 2013. The survey included all properties within 300 m of the Oro Pit, based on the extent of those properties, the water supply status for potential residences within 500 m of Lafarge PW1 were determined. A summary of the survey results is included in **Appendix A**.

The water well record as submitted for Lafarge PW1 is also included in **Appendix A** for reference. In addition, site borehole logs and select water well records are also included.

The location of reported MOECP water well records in the general area is shown on **Figure 3**. Well records within about 1 km of the site were reviewed. A total of 28 records were reviewed (for 26 drilling locations). No private water wells in use were located within 500 m of Lafarge PW1. One possible well record (#5077010), for a residence along Old Barrie Road West, was located within 1 km of the site, however the well is completed in a relatively shallow aquifer (43 m depth) as compared to Lafarge PW1 (82.3 m depth).

2.4.2 Wash Water Supplies and Taking

Several other established aggregate operations occur in adjacent areas, as shown on **Figure 1**. The adjacent operations include the Sarjeant Co. Ltd. Oro Pit #3 and Walker Aggregates Edgar Pit. Both of these sites have aggregate washing operations similar to that planned at the Oro Pit, and which depend on water wells to fill and maintain the wash ponds. Permit To Take Water (PTTW) details for the existing pits are summarized in **Table 2**, based on information available through the MOECP Permit To Take Water mapping application (https://www.ontario.ca/environment-and-energy/map-permits-take-water) and through this study.

Site	PTTW#	Purpose	Source	Max. Daily (L)	Water Well Record #
Sarjeant Oro Pit#3	4043-8JHKVC	Aggregate Washing	S-PW1	654,624	7144576
Walker Edgar Pit	1156-7WTJXC	Aggregate Washing	W-PW1	1,146,600	5724958
			W-PW2	382,200	n/a

Table 2: Existing PTTW Summary

Note that the Source listed above is our nomenclature for this study, and does not necessarily correspond to that listed on the PTTW. The Oro Pit #3 permit allows for pumping 24 hours per day up to 200 days per year. The Edgar Pit permit allows for pumping 24 hours per day up to 250 days per year.

2.5 SOURCE PROTECTION SETTING

According to the Source Protection studies and County of Simcoe mapping website (https://maps.simcoe.ca/public/), there are no Well Head Protection Areas (WHPA's) identified at the site, or in the vicinity of the site. The site is reportedly in a significant groundwater recharge area, as expected due to surficial geology and topography (local enclosed drainage areas). However the site is not identified to be within a "Highly Vulnerable Aquifer" area.

2.6 HYDROGEOLOGIC SETTING

As indicated by published regional studies, the site is characterized by an unconfined aquifer, underlain by a sequence of alternating till aquitard units and sand and/or gravel aquifer units. Although the ice-contact deposits are relatively thick (e.g. 35 m or more at M6), the saturated thickness of the unconfined aquifer is relatively low. For example, based on long term monitoring, static levels at M6 range from 27 to 28.5 mbgs.

In order to illustrate conditions at the site, two schematic cross-sections were developed based on available topographic mapping, site borehole logs and water well records. The section locations are shown on **Figure 4**. The sections are included as **Figure 5** and **Figure 6** respectively.

Section A runs generally west to east through the site and illustrates the topography within and along the edge of the moraine. Most private wells are installed within confined aquifers, interpreted to be primarily discontinuous in this area. Lafarge well PW1 is installed in a confined aquifer which appears to extend eastward. The nearest private wells within this aquifer appear to be 1.5 km or more from the site.

Section B runs generally north to south through the site, again illustrating moraine topography. The original reported ground surface is shown at the Greek and Sarjeant pits, as shown sand and gravel extraction has lowered the land surface in this area (elevation approximate). The Sarjeant wells shown are reported to have been drilled on the current pit floor. The current Sarjeant source well extends to a deep confined aquifer, the lateral extent of which is unknown. As shown, Lafarge PW1 is installed within the same confined aquifer as Walker W-PW1 and W-PW2.

3.0 WELL DRILLING AND TESTING PROGRAM

3.1 SOURCE WELL

A drilling program was undertaken in 2016 and 2017 in order to obtain a water source at the site. In 2016 two boreholes (WWR# 7263332 and 7263333, 7275813) were advanced at the Oro site, one extending to bedrock. An additional hole was completed at the Roehener site (WWR# 7275814 and 7275815 = Lafarge OW1). However no adequate source aquifer was located. In October 2017 a source well was completed by Country Water Systems at the Roehner site (Lafarge PW1). The well record for PW1 is included in **Appendix A**.

PW1 is located within the Roehner Pit, water is to be pumped from PW1 to the Oro Pit processing area, where wash ponds will be located.

The well was drilled to a depth of 83.8 m below ground surface (mbgs). A confined sand aquifer was encountered from 77.4 to 82.3 m depth. A nominal 146 mm diameter stainless steel well screen was installed from 77.7 to 82.3 m depth. A nominal 157 to 159 mm steel casing was installed to 77.7 m depth. The reported static level was 42.9 mbgs and the recommended pump setting is 30.2 mbgs. The measured casing stick-up is 0.6 m.

Based on the testing and development of PW1 a recommended pumping rate of 682 Litres per minute (Lpm) was determined.

3.2 TEMPORARY PERMIT TO TAKE WATER

A pumping test PTTW (1065-AXJKT7) was obtained to allow the testing of PW1. A copy of the permit is included in **Appendix B** for reference.

The permit allowed for a maximum taking of up to 909 Lpm (24 hours per day) from PW1 for a maximum of 6 days between May 15th and December 31st, 2018. An option to enlarge the well if needed to obtain additional water was included, however not used.

Monitoring conditions included the following:

4.1 Notification to Well Owners

Prior to commencement of the pumping test, the Permit Holder shall identify all wells within the area of the anticipated potential cone of influence, or within 500 metres of the test site, whichever is greater. At least 24 hours prior to beginning the pumping test, the Permit Holder shall provide written notification to the owners of the wells identified within the potential cone of influence. The notification shall include the expected date, time and duration of the pumping test, and a contact telephone number that may be used to report any interferences with water supplies.

4.2 Measuring Water Depths

To establish baseline conditions, well depths and depths to water levels for identified representative wells in the area of the water taking shall be recorded by the Permit Holder. During the pumping test, water levels in the identified wells shall be recorded. The pumping test must be of sufficient duration to accurately predict the long term impacts of the proposed water taking. Water levels in the

identified wells shall continue to be monitored beyond the water taking period until at least 85% recovery is achieved.

As noted previously, no private water supply wells in use were identified within 500 m of PW1. Wells identified for monitoring included on-site monitoring wells OW1 (Roehner Pit) and M6 (Oro Pit). In addition, to assess potential for mutual interference with other takers in the area, monitors, monitoring occurred at S-OW1 (shallow and deep wells at the Sarjeant Pit), W-OW1 (Walker Pit shallow well) and W-PW2 (Walker Pit deep well). Permission was obtained to complete this monitoring, and the two respective operators kept informed by email and phone regarding the testing schedule.

3.3 PUMP TESTING

The pumping test was completed by Country Water Systems. Water level monitoring at observation wells was completed by Groundwater Science Corp. The monitoring network is shown on **Figure 2**.

The pump test consisted of the following:

1. Installation of dataloggers at PW1 and observation wells on June 4th and 5th, 2018.
2. Pumping equipment installation and testing from June 8th to 12th, 2018.
3. Step testing on June 13, 2018 starting at 9:00 am for 30 minutes sequential steps, at rates of:
    - 323 Lpm (71 IGPM)
    - 446 Lpm (98 IGPM)
    - 546 Lpm (120 IGPM)
    - 668 Lpm (147 IGPM)
    - followed by water level recovery for 150 minutes (98% recovery).
4. Pump testing at an average rate of 564 Lpm (124 IGPM) for 3 days from June 13th at 1:30 pm to June 16th at 1:30 pm, continued recovery monitoring for 8 days until removal of dataloggers.
5. Removal of all dataloggers on June 25, 2018 (complete recovery obtained).

Flow metering equipment was supplied by Country Water Systems, and consisted of a pitot tube flow sensor at the well head, with confirmation using calibrated barrels at the discharge end. Water was discharge to surface within the Roehner Pit, approximately 140 m north of PW1. The discharge water re-infiltrated within a large enclosed drainage area.

The dataloggers used for the test consisted of Van Essen Instruments Diver® series non-vented units, with ranges of 10 or 20 m, depending on the location. The dataloggers were suspended on stainless steel wire rope to pre-determined depths within each well and secured to the well head (typically using a hose clamp). A Diver® Barologger was used to record atmospheric pressure for data compensation over the monitoring period.

During the pump test period water taking occurred at both the Sarjeant Oro Pit #3 and the Walker Edgar Pit. It is our understanding, based on discussions with staff at Oro Pit #3 that pumping is intermittent as needed. It is also our understanding, based on discussions with consultants for the Edgar Pit (Golder Associates), that pumping was historically intermittent a needed, on June 8th at 2 pm (prior to the Lafarge pump test) flow at W-PW1 was regulated to be constant at 798 Lpm over the testing period.

Water level monitoring results are summarized in graph format in **Appendix C**. As shown by the pre and post-test monitoring, no significant seasonal trend in water levels occurred over the 3 week monitoring period.

Due to water level range limitations, the datalogger at Lafarge PW1 had to be removed and re-installed at lower settings as drawdown occurred. Therefore during part of the step test and the initial drawdown and/or recovery periods of the long-term test, datalogger data is not available at the pumping well. Sufficient manual measurements were obtained over these periods to provide a detailed analysis.

The datalogger at OW1 was inadvertently installed at a depth close to the maximum range of the datalogger. Therefore there are periods in which data is not available (in which the datalogger was temporarily over-pressured). However a good overall data set is available to examine trends.

No pumping influence was noted at OW1, M6, and S-OW1-S (water table monitors). Monitor S-OW1-D is observed to respond to water taking at the Sarjeant Oro Pit #3, however no response to pumping at Lafarge PW1 is noted.

Monitors W-OW1 and W-PW2 are both observed to respond to water taking at the Walker Edgar Pit. A slight delayed response to water taking at Lafarge PW1 is noted at both Edgar Pit monitoring locations.

3.4 DRAWDOWN ANALYSIS

Relevant drawdown plots are included in **Appendix D**.

Water level measurements and final drawdowns observed at PW1 during the step test are summarized in **Table 3**.

Step	Rate (Lpm)	Water Level (mBTOW)	Drawdown (m)
Static	-	43.53	-
Step 1	323	56.32	12.79
Step 2	446	61.73	18.20
Step 3	546	66.44	22.91
Step 4	668	72.91	29.38

Table 3: Step Test Drawdown Summary

Based on the pump setting used for this test (73.4 mBTOW), total available drawdown (to the pump intake) was approximately 29.9 m over the pumping test period.

As indicated by the step test drawdown plot, it was determined that a test rate of approximately 568 Lpm (125 IGPM) was an appropriate target for the long-term test. Based on measurements obtained over the long-term test, the average pumping rate was approximately 564 Lpm (124 IGPM).

Water level measurements and final drawdown due to pumping PW1 as observed at each monitoring location during the 3 day pumping test is summarized in **Table 4**.

Monitor	Distance (m)	Static Level (mBTOW)	Drawdown (m)	Note
PW1	-	43.53	26.62	
OW1	298	48.67	0	no response
M6	800	27.90	0	no response
W-PW2	978	27.40*	0.20	also responds to W-PW1 pumping
W-OW1	1052	26.92*	0.10	also responds to W-PW1 pumping
S-OW1-S	1060	15.16	0	no response
S-OW1-D	1060	41.67*	0	responds to S-PW1 pumping
Notes: * = "static" level reflects pre-test water level measurement				

Table 4: Pumping Test Drawdown Summary

Drawdown observed at Lafarge PW1 after 3 days of pumping was 26.62 m. Based on the well construction and recommended pump setting, available drawdown at PW1 will be approximately 30.2 m (or more) for the final pump installation.

The Sarjeant Oro Pit #3 deep observation well (S-OW1-D) and source well (S-PW1) are both installed within a deeper confined aquifer. The deep observation well responds to pumping at the source well, but does not respond to pumping at Lafarge PW1. No response is observed within the water table to pumping at PW1 or S-PW1.

The drawdown as observed at the Walker Edgar Pit, in the range of 10 to 20 cm, is relatively minor and is not expected to result in any mutual interference issues. We note that Lafarge PW1 is installed within the same aquifer as W-PW1 and W-PW2, therefore some pumping response can be expected. The response at W-OW1, interpreted to be within the water table aquifer, to pumping at W-PW1 and Lafarge PW1 may indicate the aquifer is semiconfined at the Edgar Pit.

Pumping test analysis plots developed using the Aqtesolv® program are included in **Appendix D**. Based on a Cooper-Jacob method analysis of PW1 drawdown data the aquifer transmissivity (T) at the site is estimated to be 0.0013 m^2/s. Using a Theis method analysis of the PW1 recovery data, the aquifer T is estimated to be 0.0012 m^2/s. Based on an aquifer thickness of 4.9 m at PW1, the hydraulic conductivity (K) of the sand unit is estimated to be $2.7x10^{-4}$ m/s.

Based on a Cooper-Jacob method analysis of W-PW2 drawdown data the overall aquifer T is estimated to be 0.0098 m^2/s and the storativity is estimated to be 0.0002. Note that the aquifer thickness at the Walker Pit site is reported to be 15.5 m, therefore the estimated K is approximately $6.3x10^{-4}$ m/s.

Based on the available drawdown for the final pump installation (>30.2 m), the step test indicated a short-term well capacity of approximately 668 Lpm. The 3 day pumping test indicated the long-term well capacity is greater than 564 Lpm (>3.5 m of available drawdown remaining at the end of the test).

4.0 IMPACT ANALYSIS

Lafarge is applying for a PTTW to allow water taking from PW1 at a maximum rate of 668 Lpm (147 IGPM) to allow for full potential usage of the well.

Similar to existing takings in the area, PW1 would likely be pumped at a lower rate when run continuously over longer periods, however short-term "spikes" in taking could range up to 668 Lpm when the well is in intermittent use. The final long-term pumping rate would be refined through usage and monitoring.

The permit application is for taking 24 hours per day over the Lafarge 274 day operational period from March 1st to November 30th each year.

4.1 AREA OF INFLUENCE AND SUSTAINABILITY

The area of influence of pumping at Lafarge PW1 can be assessed using the response observed at W-PW2 (and W-OW1) to pumping at PW1, and, the response at W-PW2 and PW1 to pumping at W-PW1.

Pumping at W-PW1 occurs at rates of 798 Lpm or more. Based on the W-PW2 pre-test hydrograph, taking at W-PW1 occurred from July 6th at 3 pm to July 7th at 11 am, and again from July 7th at 3 pm to July 8th at 11 am. Reported drawdown at W-PW1 during pumping periods is approximately 10.3 m, however some of this drawdown will be due to well hydraulics and inefficiency. Based on the pre-test hydrograph at W-PW2 (see **Appendix C**), installed within the same aquifer at a distance of about 75 m, the drawdown response to W-PW1 pumping is approximately 0.8 m. Based on the pre-test hydrograph at Lafarge PW1 (see **Appendix C**), installed within the same aquifer at a distance of about 978 m, the drawdown response to W-PW1 pumping is approximately 0.05 m (with a 3 to 4 hour delay). Therefore based on established operational experience, drawdowns associated with water taking within this aquifer are limited in magnitude.

Pumping at Lafarge PW1 results in a drawdown within the aquifer at W-PW2. Discernable drawdown (i.e. greater than 2 cm) began after 100 minutes of pumping. After 3 days a drawdown of approximately 0.2 m was observed at W-PW2. The water level response at W-PW2 stabilized over the pumping test. We note that water taking occurred at W-PW1 over the Lafarge PW1 pumping test period, therefore the water levels observed represent the cumulative effect of pumping both wells.

The pumping influence due to the proposed taking for the Oro Pit is expected to be similar to the existing taking at the Edgar Pit. The area of influence of water taking at Lafarge PW1 may extend up to 1 km, however will be relatively minor in extent. As noted previously, water supply wells in the wider area (e.g. greater than 500 m from the site) are deep drilled wells. Water level changes on the order of 0.2 m should not interfere with water supply capacity in those wells.

In order to assess the sustainability of taking at PW1, a drawdown projection over 10 years of continuous taking was developed based on the pumping test semi-log (Cooper-Jacob) type plot. The plot is included in **Appendix D**. The plot utilizes the final stabilized drawdown curve, from about 2,400 minutes to 4,320 minutes (end of test) to project drawdown of continuous taking over a 10 year period. The projection is conservative in assuming continuous taking because actual taking would be intermittent on an as needed

basis for 274 days per year. However, for analysis purposes, the drawdown after 10 years is projected to be approximately 27.8 m, which is within the expected maximum available drawdown. We note that water taking at a higher rate will result in some increased drawdowns, however the maximum rate is not expected to be sustained on a long-term basis. As water taking occurs pumping rates will be refined to maximize production within the well capacity and available drawdown limits, and, a monitoring program will be in place to ensure interference with other users in the area does not occur. On a long-term basis the proposed water taking appears to be sustainable at PW1.

We recommend a monitoring well be installed in the same aquifer as, and near, Lafarge PW1, in order to allow both seasonal and long term drawdown to be confirmed.

4.2 IMPACT TO PRIVATE WELLS

Based on the observed pumping test drawdown, historical pumping activities (and lack of interference to date), and distance to the nearest private wells, no impact to water availability at private wells is expected. The proposed Lafarge monitoring well (and routine water level measurements) at the site, in addition to the quarterly water level monitoring that occurs at the site as per the ARA Licences, will provide ongoing data to confirm the influence of the proposed taking.

4.3 MUTUAL INTERFERENCE

No interference with existing water users is expected. No water level response was observed, or can be anticipated, at the Sarjeant Oro Pit #3 source well. The pumping effect at the Walker Edgar Pit source well was minor and should not interfere with water supply potential at that location. The proposed Lafarge monitoring well (and routine water level measurements) at the site, in addition to the quarterly water level monitoring that occurs at the site as per the ARA Licences, will provide ongoing data to confirm the influence of the proposed taking.

4.4 IMPACT TO NATURAL ENVIRONMENT FEATURES

Based on the hydrogeologic setting and the distance to natural environment features, no impact to those features can be expected. The proposed Lafarge monitoring well (and routine water level measurements) at the site, in addition to the quarterly water level monitoring that occurs at the site as per the ARA Licences, will provide ongoing data to confirm the influence of the proposed taking.

4.5 PROPOSED MONITORING

The following monitoring program is proposed as part of the PTTW approval:

- A monitoring well (OW2) should be constructed at the Roehner Pit within the same aquifer as PW1 within one year of issuance of the permit;
- Water levels in PW1 and the new monitoring well (OW2, after installation) should be obtained on a monthly basis.

4.6 CONTINGENCY PLANNING AND MITIGATION MEASURES

No significant impacts are expected due to the proposed water taking. Therefore no specific contingency plan or mitigation measures are proposed, beyond the standard

conditions for restoration of water supply associated with a PTTW. The conditions of a permit typically include the following:

> *Where the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of doing so.*

If water well interference due to pumping PW1 is confirmed, the site operator will need to respond according.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

Based on this assessment, we conclude the following:

1. Well PW1 (WWR# 7298525) has a safe yield of between 564 Lpm (124 IGPM) and 668 Lpm (147 IGPM).
2. Water taking at PW1 at that rate is not expected to have significant influence at, or interfere with, other water users in the area, local private water supply, or the natural environment.

5.2 RECOMMENDATIONS

Based on this assessment we make the following recommendations:

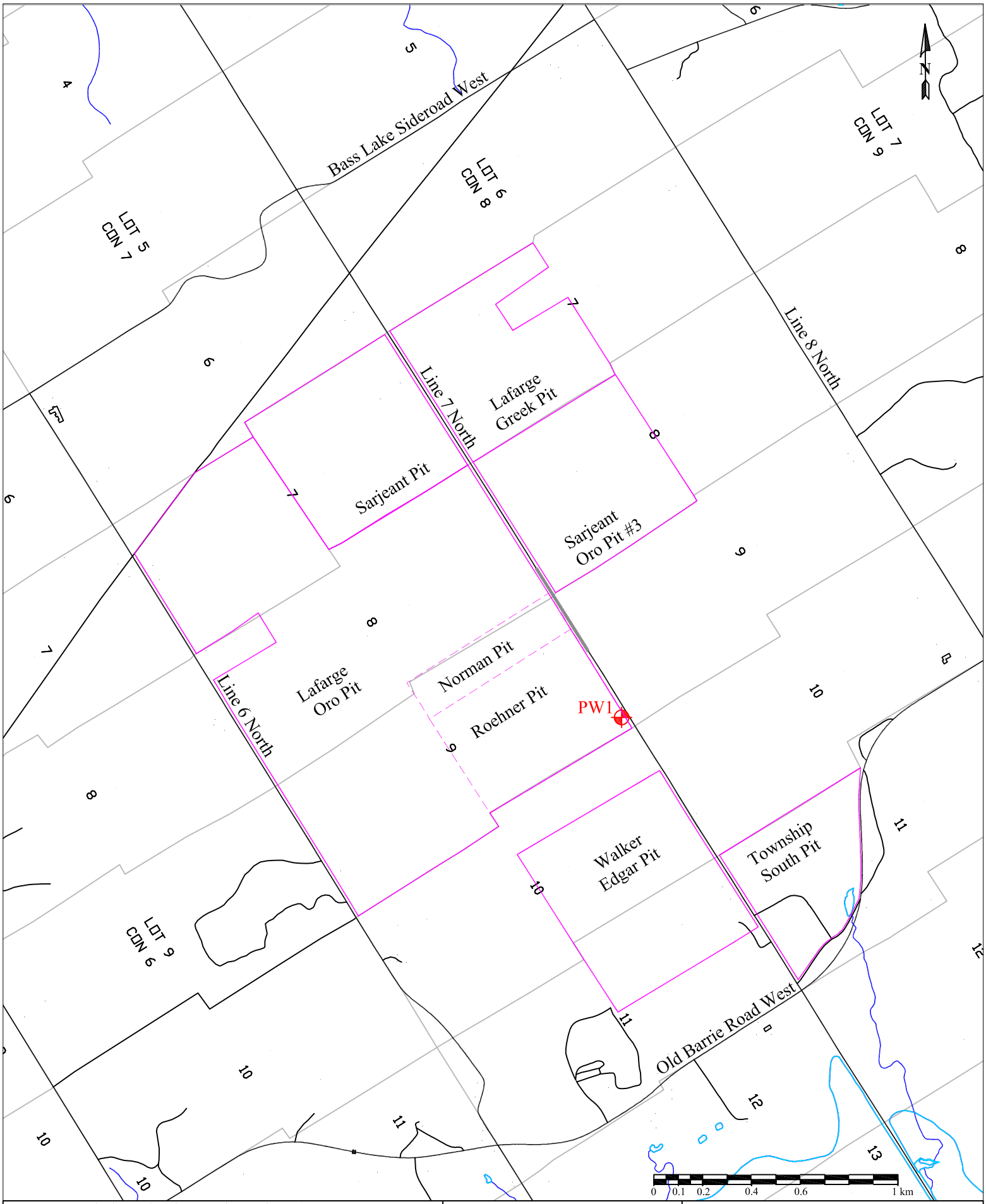
1. A PTTW application should be made to take water from PW1 at a rate of 668 Lpm (147 IGPM) for 24 hours per day for 274 days per year.
2. Within one year of issuance of the PTTW a new monitoring well (OW2) be constructed on the Roehner Pit site in the same aquifer as PW1.
3. Upon issuance of the PTTW water level monitoring occur on a monthly basis at PW1 and the new monitoring well (OW2, after installation).

5.3 CLOSURE

All of which is respectfully submitted,

Andrew Pentney, P.Geo.
Project Hydrogeologist
Groundwater Science Corp.

Figures



existing Pit Licence boundary (approx)
river, stream, pond
wetland (OBM mapping)
Lafarge source well

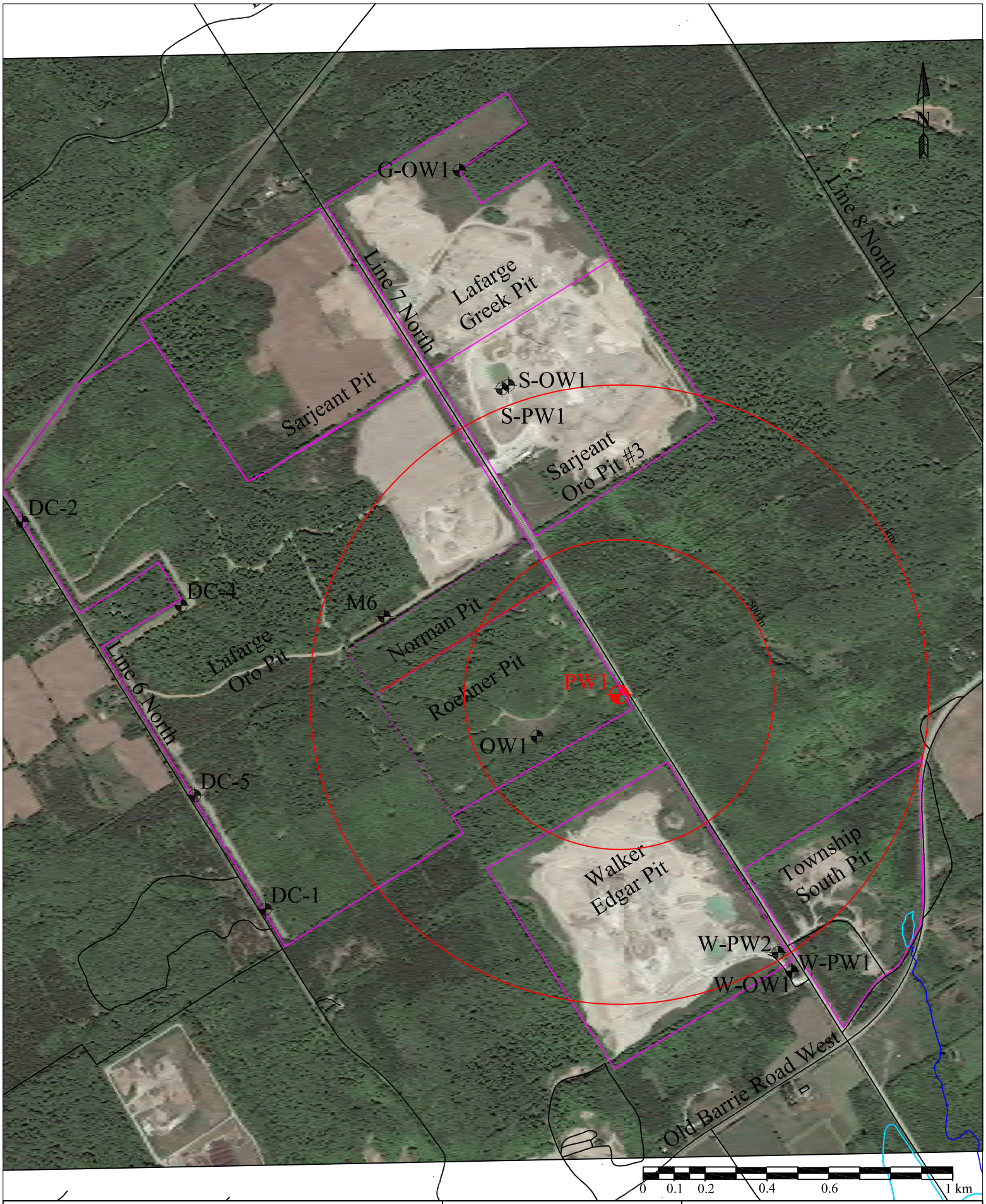
modified from: OBM mapping, Site Plan

July 2018
Scale: as shown

Groundwater Science Corp.

Figure 1: Site Location

Lafarge Canada Inc.
Oro Pit PTTW



existing monitoring or pumping well

Lafarge source well

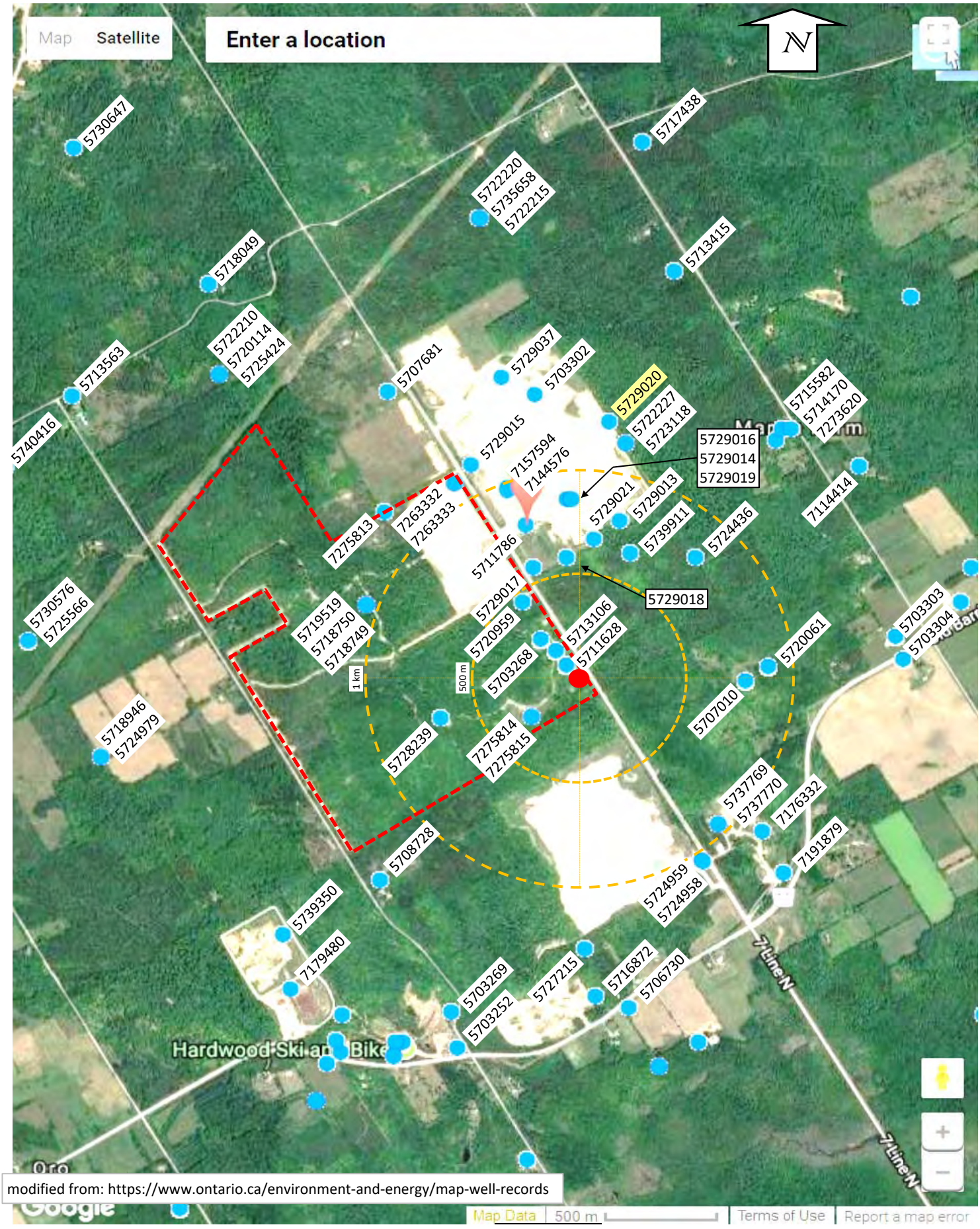
modified from: OBM mapping, Site Plan
UNDER LICENSE, WITHOUT PREJUDICE OR ENDORSEMENT, FROM THE QUEEN'S PRINTER OF ONTARIO, 2005

July 2018
Scale: as shown

Groundwater Science Corp.

Figure 2: Site Details

Lafarge Canada Inc.
Oro Pit PTTW



modified from: https://www.ontario.ca/environment-and-energy/map-well-records

site (approximate)

PW1 (approx.)

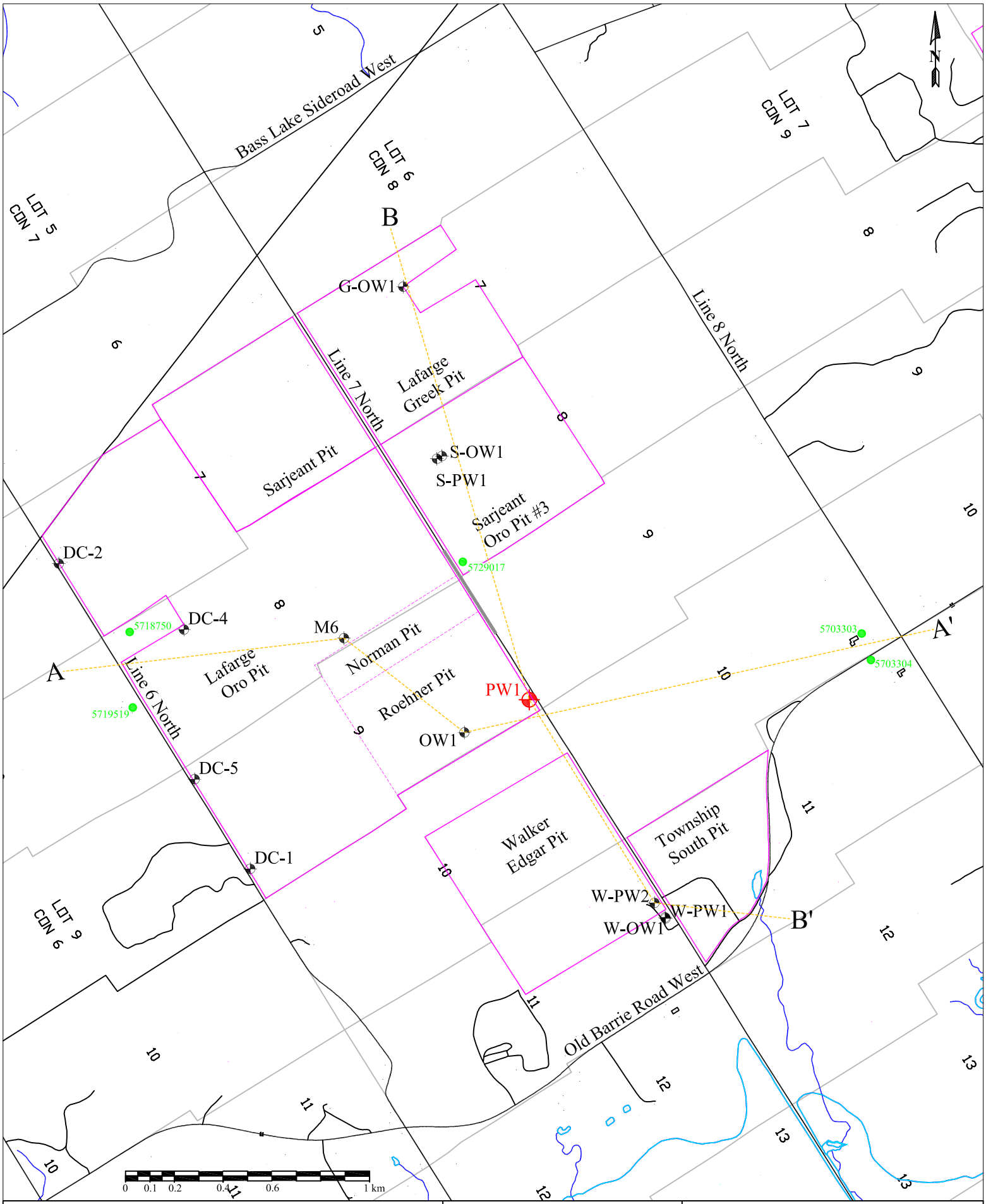
reported water well record location, reference number as shown

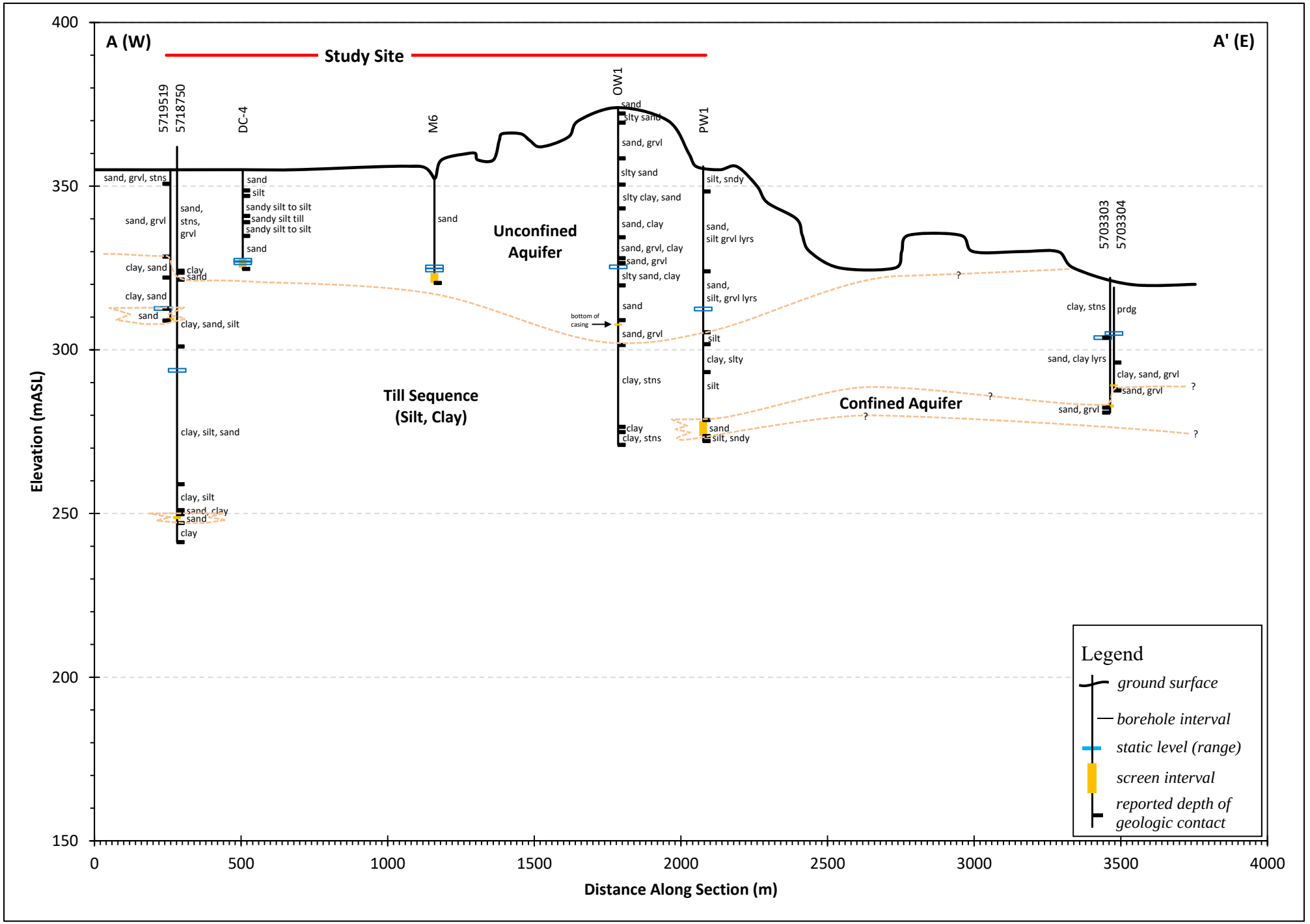
Date: July 2018
scale: not to scale

Groundwater Science Corp.

Figure 3: Reported Water Well Locations

Lafarge Canada Inc.
Oro Pit PTTW

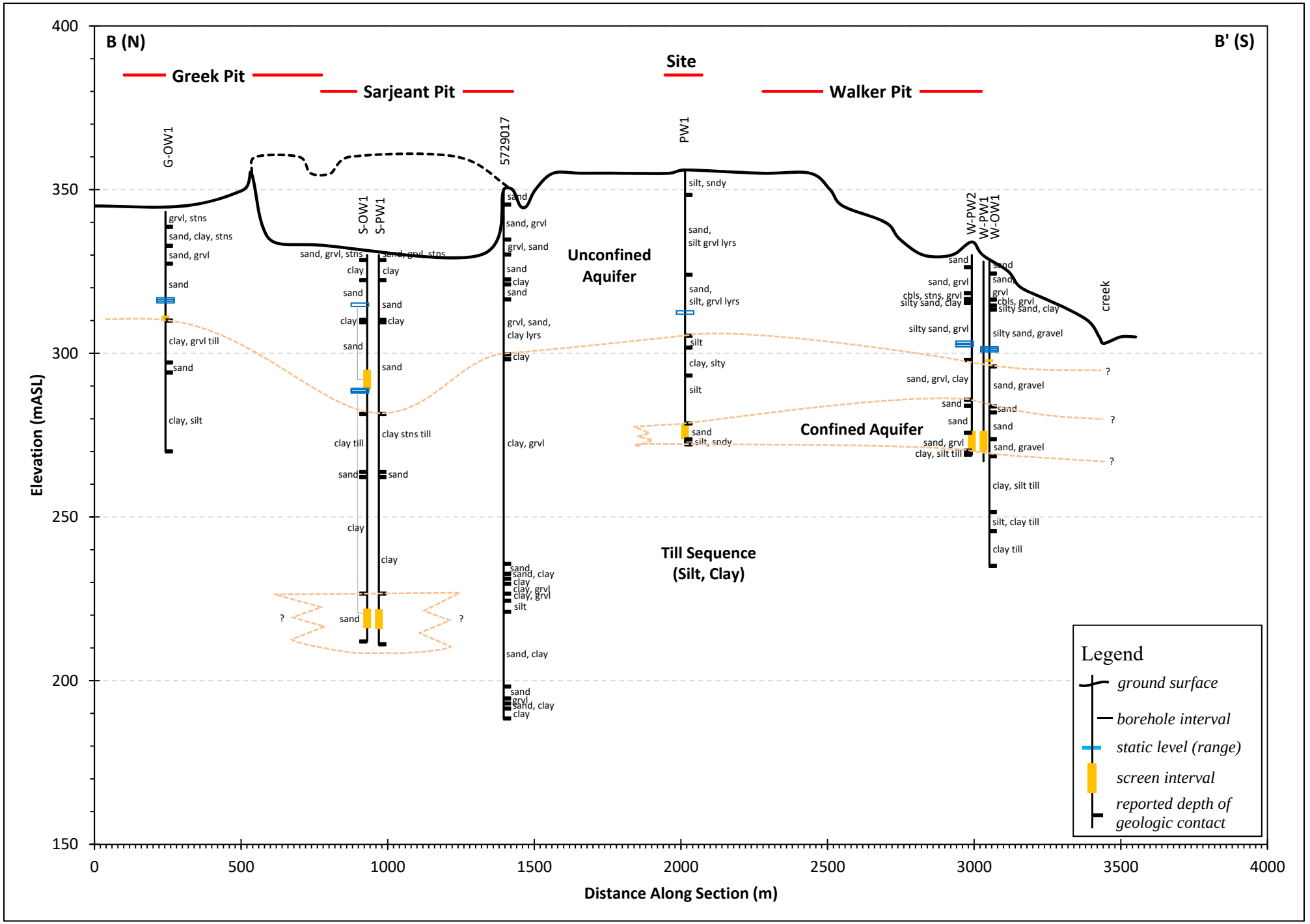

Bass Lake Sideroad West
LOT 5 CON 7
LOT 6 CON 8
LOT 7 CON 9
LOT 9 CON 6
Line 6 North
Line 7 North
Line 8 North
Old Barrie Road West
B
G-OW1
Lafarge Greek Pit
Sarjeant Pit
S-OW1
S-PW1
Sarjeant Oro Pit #3
DC-2
5729017
5718750
DC-4
M6
Norman Pit
A
Lafarge Oro Pit
5719519
Roehner Pit
PW1
OW1
5703303
A'
5703304
DC-5
DC-1
Walker Edgar Pit
Township South Pit
W-PW2
W-PW1
W-OW1
B'
0 0.1 0.2 0.4 0.6 1 km
selected water well record
modified from: OBM mapping, Site Plan
UNDER LICENSE, WITHOUT PREJUDICE OR ENDORSEMENT, FROM THE QUEEN'S PRINTER OF ONTARIO, 2005
Figure 4: Section Locations
July 2018
Scale: as shown
Groundwater Science Corp.
Lafarge Canada Inc.
Oro Pit PTTW



Lafarge Canada Inc
Oro Pit PTTW

Figure 5: Schematic Section A

Groundwater Science Corp.
Hydrogeologic Assessment



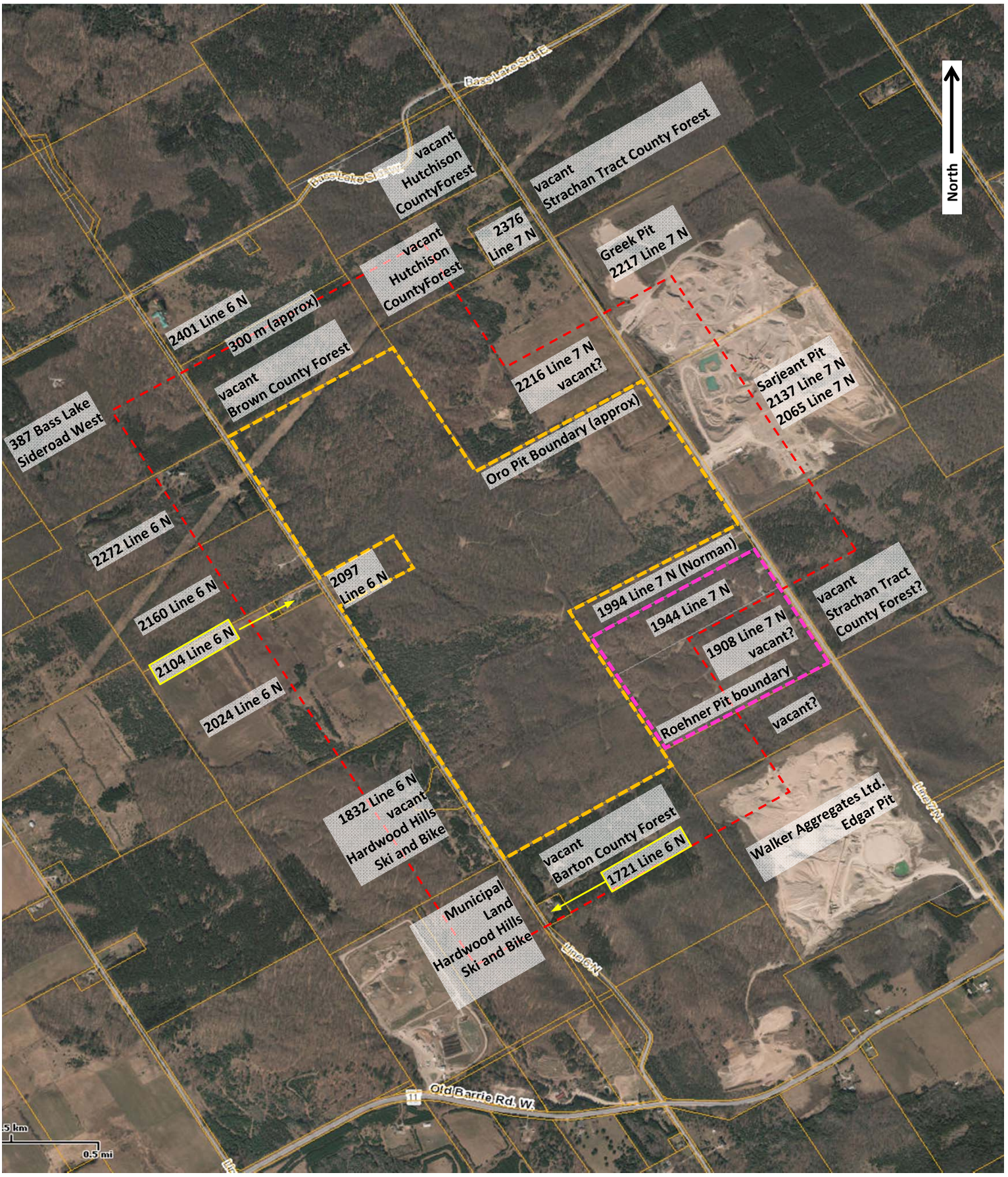
Lafarge Canada Inc
Oro Pit PTTW

Figure 6: Schematic Section B

Groundwater Science Corp.
Hydrogeologic Assessment

Appendix A
Local Water Supply Information

Well No.	Date	Purpose	Total Depth (ft)	Well Size (in.)	Screen From (ft)	To (ft)	Static Level (ft)	Rate (GPM)	DD (ft)	Source Aquifer Type	Final Status
5703268	7-Jul-55	domestic	149	4	-	-	130	1	3	confined	Roehner Pit, no longer in use
5707010	10-Jun-69	domestic	140	6	131	140	45	24	55	confined	residence along Old Barrie Rd W
5711628	13-Sep-74	domestic	167	6	164	167	127	2	26	unconfined	Roehner Pit, no longer in use
5711786	16-Dec-74	domestic	150	5	147	150	131	4	9	confined	Sarjeant Pit, status unknown
5713106	24-May-75	domestic	282	6	278	282	204	6	64	confined	Roehner Pit, no longer in use
5718749	31-Aug-83	insufficient	320	-	-	-	-	-	-	-	abandoned hole
5718750	9-Sep-83	domestic	396	6	370	373	224	4	-	confined	residence on Line 6 N
5719519	25-Sep-84	domestic	151	6	148	151	139	8	13	confined	Oro Pit, no longer in use
5720061	1-Aug-85	domestic	137	6	133	137	60	18	60	confined	residence on Line 8 N
5720959	7-Jul-86	domestic	238	5	232	235	154	7	66	confined	Norman Pit, no longer in use
5724436	24-Dec-88	domestic	230	5	210	216	193	6	12	confined	incorrect location - on Line 10 N
5724958	6-Apr-89	water supply	200	8	176	198	86.7	300	50.2	confined	Walker Pit, assumed W-PW1
5724959	10-Mar-89	obs. Well	305	2	90	-	-	-	-	unconfined	Walker Pit, W-OW1
5728239	5-Feb-91	obs. Well	95	2	77	82	dry	-	-	-	Roehner Pit dry OW1/91
5729013	31-Oct-91	obs. well	220	6	185	201	110	60	53	confined	Sarjeant Pit, status unknown
5729014	31-Oct-91	obs. well	170	8	140	155	127	20	-	unconfined	Sarjeant Pit, status unknown
5729016	31-Oct-91	obs. well	170	6	145	156	127	10	-	unconfined	Sarjeant Pit, status unknown
5729017 5729018	31-Oct-91	test hole	530	-	-	-	-	-	-	-	hole abandoned (5729018 = pg2)
5729019	31-Oct-91	test hole	260	2	150	154	127	10	-	unconfined	Sarjeant Pit, status unknown
5729021	31-Oct-91	test hole	320	2	140	144	141	-	-	unconfined	Sarjeant Pit, status unknown
5737769	17-Feb-03	obs. Well	85	2	75	85	-	-	-	confined	LSRCA well in Township Pit
5737770	14-Feb-03	obs. Well	58	2	45	55	-	-	-	confined	LSRCA well in Township Pit
5739911	12-May-05	industrial	205	8	188	201	108	39	75	confined	Sarjeant Pit, status unknown
7144576	26-Mar-10	water supply	390	8	355	375	133	72	6	confined	S-PW1
7157594	9-Nov-10	obs. well	387	2	354	374	-	-	-	confined	S-OW1
7275814 7275815	3-Nov-16	obs. Well	338	6	217	-	-	-		unconfined	Lafarge OW1 (7275815 = pg2)



Lafarge Oro Pit Address Map
Not To Scale

Private Water Well Door To Door Survey - Results Summary Lafarge Oro Pit

Street Address (emergency locate no.)	Survey Dates First	Second	Survey Response	Number of Wells	Type of Well	MOE Record Available	Well Depth (m)	Water Level (m)	Comment / Details Provided on Survey
Line 6 North									
1721 Line 6 North	19-Nov-12	21-Feb-13	8-Apr-13	1	drilled	5708728	84.1	57.0	water quality sample taken 12-Apr-13
Barton County Forest	19-Nov-12								address unknown (Line 6 N), no residence
1832 Line 6 North	19-Nov-12								includes Hardwood Hills, no residence
2024 Line 6 North	19-Nov-12	21-Feb-13	none	n/a	n/a	n/a	n/a	n/a	survey form provided
2097 Line 6 North	19-Nov-12	21-Feb-13	14-Mar-13	1	drilled	5719519	46.0	42.4	water quality sample taken 14-Mar-13
2104 Line 6 North	19-Nov-12		28-Jan-13	1	drilled	yes	55.8	39.3	water quality sample taken 21-Feb-13
2160 Line 6 North	19-Nov-12	21-Feb-13	none	n/a	n/a	n/a	n/a	n/a	survey form provided
2272 Line 6 North	19-Nov-12	21-Feb-13	12-Apr-13	1	drilled	5730576	91.7	54.9	water quality sample taken 12-Apr-13
Brown County Forest	19-Nov-12								address unknown (Line 6 N), no residence
Line 7 North									
Walker Aggregates Edgar Pit									address unknown (Line 7 N), no residence
Vacant Land north of Edgar Pit									address unknown (Line 7 N), no residence
1908 Line 7 North	19-Nov-12								vacant, no residence
Strachan Tract Count Fores	19-Nov-12								address unknown (Line 7 N), no residence
1944 Line 7 North	19-Nov-12	21-Feb-13	none	n/a	n/a	n/a	n/a	n/a	property owned by Lafarge
1994 Line 7 North	19-Nov-12		none	n/a	n/a	n/a	n/a	n/a	property owned by Lafarge
2065 Line 7 North - Sarjeant Pit									no residence
2137 Line 7 North - Sarjeant Pit									no residence
2216 Line 7 North	19-Nov-12								vacant, no residence
2217 Line 7 North - Lafarge Greek Pit									no residence
Hutcheson County Forest	19-Nov-12								address unknown (Line 7 N), no residence
2376 Line 7 North	12-Apr-13		none	n/a	n/a	n/a	n/a	n/a	

Note - Well Record correlated to address based on reported location in addition to survey details such as age, depth, well type, etc.
- details provided as reported on well record if available, or, as reported by owner
- survey response summary as of February 25, 2013 n/a = not available

Ontario — Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A221327

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	LAFARGE		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1944 LINE 7 N ORO	ORO-MEDONTE		

County/District/Municipality	City/Town/Village	Province	Postal Code
SIMCOE COUNTY		Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	612714	4932079		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
YELLOW	SILT	SANDY	HARD	0	25
YELLOW	SAND	SILT, GRVL LAYERS	DRY, HARD	25	105
BROWN	SAND	SILTY, GRVLLY LAYERS	HARD	105	166
BROWN	SILT.		HARD	166	178
GREY	CLAY	SILTY		178	206
GREY	SILT		HARD	206	254
BROWN	SAND			254	270
GREY	SILT	SANDY		270	275

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	20	BENTONITE SLURRY	15.

Method of Construction

☑ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify

Well Use

☐ Public ☑ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☑ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6.25	STEEL	0.[illegible]	2 AGS	215.
6.19	STEEL	0.219	215	255.

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
5.75	SS	12	255	260
5.75	SS	16	260.5	265.5
5.75	SS	12	266	270

Status of Well

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

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth From	Depth To	Diameter (cm/in)
254 (m/ft) ☐ Gas	☐ Fresh ☑ Untested ☐ Other, specify	0	30	8
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	30	275	6.
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify			

Results of Well Yield Testing

After test of well yield, water was:
☑ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 200

Pumping rate (l/min / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 151.9

If flowing give rate (l/min / GPM): —

Recommended pump depth (m/ft): 240

Recommended pump rate (l/min / GPM): 150

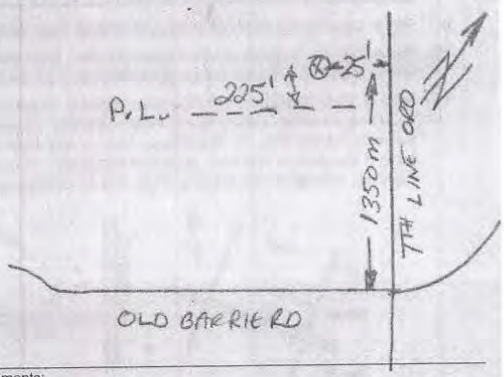
Well production (l/min / GPM): —

Disinfected? ☑ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		140.8		
1		148.1	1	144.1
2		149.9	2	141.9
3		151.2	3	140.9
4		151.2	4	140.8
5		151.3	5	140.8
10		151.3	10	140.8
15		151.5	15	140.8
20		151.6	20	140.8
25		151.7	25	140.8
30		151.7	30	140.8
40		151.8	40	140.8
50		151.8	50	140.8
60		151.9	60	140.8

Map of Well Location

Please provide a map below following instructions on the back.



Comments: Lafarge PW1

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
COUNTRY WATER SYSTEMS	7018

Business Address (Street Number/Name)	Municipality
6895 SIMCOE RD 56	UTOPIA

Province	Postal Code	Business E-mail Address
ON	L0M1T0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
8717338935 5	SCOTT, PETE

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
1667		

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☑ No	Date Work Completed 2017/10/20	Audit No. Z251867 Received

0506E (2014/11) Well Owner's Copy

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

5729037

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11

MUNICIP 57010 CON CON 08

COUNTY OR DISTRICT: SIMCOE
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: ORO
CON, BLOCK, TRACT, SURVEY, ETC.: CON 8
LOT: 7
OWNER (SURNAME FIRST): ALLAN & COOK LTD.
ADDRESS: 701 DUNLOP W BARRIE ONT
DATE COMPLETED: DAY 14 MO 11 YR 91

21 | ZONE | EASTING | NORTHING | RC | ELEVATION | RC | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FEET FROM	DEPTH FEET TO
BROWN	GRAVEL	STONES		0	15
BROWN	f. SAND.	CLAY STONES		15	34
BROWN	SAND	GRAVEL		34	52
BROWN	SAND		CLEAN sand.	52	109
GRAY	CLAY	GRAVEL TILL		109	151
GRAY	SAND.		DIRTY	151	161
GRAY	CLAY	SILT.		161	240

Finished depth 109 feet.

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
92	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
109	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH FEET FROM	DEPTH FEET TO
2	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☒ PLASTIC	Sch 40	+2	109
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE OF OPENING (SLOT NO.): .006
DIAMETER: 2 INCHES
LENGTH: 5 FEET
MATERIAL AND TYPE: PVC
DEPTH TO TOP OF SCREEN: 104 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD, PACKER, ETC.)
110	240	Hole Plug seals
0	20	Hole Plug.

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER — AIR
PUMPING RATE: 1/4 GPM
DURATION OF PUMPING: 1 HOURS
STATIC LEVEL: 92 FEET
WATER LEVEL END OF PUMPING: 105 FEET
WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY
15 MINUTES: 109 FEET
30 MINUTES: 105 FEET
45 MINUTES: 105 FEET
60 MINUTES: 105 FEET
IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: FEET
RECOMMENDED PUMPING RATE: GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.

DRILLERS REMARKS: 105677

FINAL STATUS OF WELL

1 ☐ WATER SUPPLY 2 ☒ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED ☐ DEWATERING

WATER USE

1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☒ INDUSTRIAL 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING ☐ OTHER 9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☐ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: ALLAN WRIGHT WATER WELLS
WELL CONTRACTOR'S LICENCE NUMBER: 5528
ADDRESS: R.R.#1 HILLSDALE ONT
NAME OF WELL TECHNICIAN: ALLAN WRIGHT
WELL TECHNICIAN'S LICENCE NUMBER: 10250
SIGNATURE OF TECHNICIAN/CONTRACTOR: Allan Wright
SUBMISSION DATE: DAY ____ MO ____ YR ____

OFFICE USE ONLY

DATA SOURCE
CONTRACTOR: 5528
DATE RECEIVED: APR 24 1992
DATE OF INSPECTION
INSPECTOR
REMARKS: Lafarge G-OW1

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario — Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A 068662

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	Well Constructed by Well Owner
	THE SARJEANT CO. LTD		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
15 SARJEANT DRIVE	BARRIE	ON	L4M 4T2	7057282460

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
#2131 LINE 7 N	ORO/MEDONTE	8	8

County/District/Municipality	City/Town/Village	Province	Postal Code
SIMCOE	ORO STATION.	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	612384	4933016		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	SAND GRAVEL	STONES		0	1.5
GREY	CLAY			1.5	7.6
BROWN	SAND			7.6	19.8
GREY	CLAY			19.8	20.5
BROWN	SAND		med.	20.5	48.5
GREY	CLAY	STONE TILL		48.5	66.2
BROWN	SAND			66.2	67.0
GREY	CLAY			67.0	103.4
				103.4	118.9

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	18.3 m	BENTONITE GROUT	1080 Ltr

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, specify

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[X] Other, specify WASH PLANT

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
20.5cm	STEEL	.250	+.6	108.2
21cm	S.STEEL	OSlot	107.0	108.2

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
22cm	SSTEEL	.020	108.2	114.3

Status of Well

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

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Other, specify
108m	[ ]	[ ] Fresh [X] Untested	
	[ ]	[ ] Fresh [ ] Untested	
	[ ]	[ ] Fresh [ ] Untested	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	6	38cm
6	114	34cm

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 70 m

Pumping rate (l/min / GPM): 72 USGPM

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 42.35

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft):

Recommended pump rate (l/min / GPM):

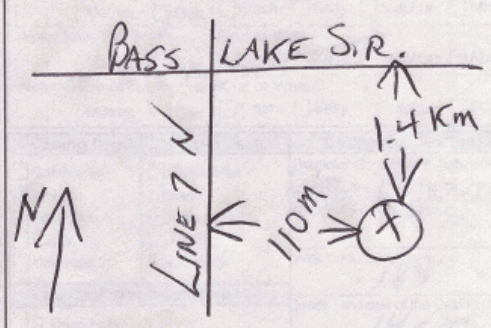
Well production (l/min / GPM):

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	40.46		
1	41.85	1	40.96
2	41.92	2	40.91
3	41.96	3	40.86
4	41.99	4	
5	42.01	5	
10	42.09	8	40.77
15	42.14	15	
20	42.18	20	
25	42.21	25	
30	42.245	30	
40	42.29	40	
50	42.32	50	
60	42.35	60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: Sarjeant S-PW1

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
ALAN WRIGHT WATER WELLS	5528

Business Address (Street Number/Name)	Municipality
4121 HWY 93	HILLSDALE

Province	Postal Code	Business E-mail Address
ON	L0L1V0	awwwebell.net.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
705 835 5646	GAVIN WRIGHT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2976		Y Y Y Y M M D D

Well owner's information package delivered	Date Package Delivered	Date Work Completed
[ ] Yes [X] No	declined	20100326

Ministry Use Only

Audit No. Z102790

Received MAY 12 2010

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Ontario Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A 068654

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	THE SARJEANT CO LTD.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
15 SARJEANT DR.	BARRIE	ON	L4M4T2	705 728 2468

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
2131 LINE 7 N	ORO/MEDONTE	8	8

County/District/Municipality	City/Town/Village	Province	Postal Code
SIMCOE	ORO STATION	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	612378	4933026		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	SAND	GRAVEL STONES		0	1.5
GREY	CLAY			1.5	2.6
BROWN	SAND			2.6	19.8
GREY	CLAY			19.8	20.5
BROWN	SAND			20.5	48.5
GREY	CLAY	TILL		48.5	66.2
BROWN	SAND			66.2	67.8
GREY	CLAY			67.8	103.4
BROWN	SAND			103.4	152

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	92m	BENTONITE GROUT	350 Ltr
92	91m	BENTONITE GROUT	375 Ltr

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, specify

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [X] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[ ] Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
5cm	PVC	Sch 40	+.6	108m
3cm	PVC	Sch 40	+.6	35m

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
5.5cm	PVC Sch 40	010	108	114m
3	PVC Sch 40	010	35	41m

Status of Well

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

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Fresh	Untested	Other, specify
10m	[ ]		[ ]	[X]	
35 m/ft	[ ] Gas		[ ]	[X]	
(m/ft)	[ ] Gas		[ ]	[ ]	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	118m	160

Results of Well Yield Testing

After test of well yield, water was:
[ ] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

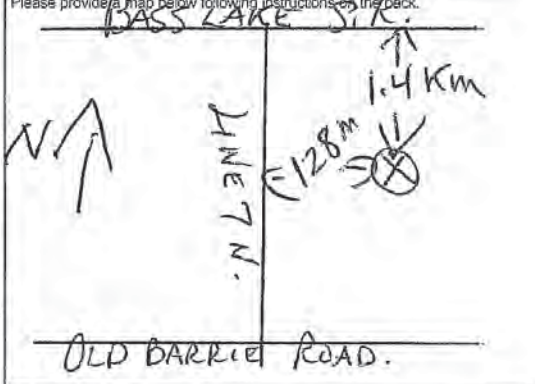
Disinfected? [X] Yes [ ] No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		40.46		
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

MONITORING PURPOSES

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Sarjeant S-OW1

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
ALLAN WRIGHT WATER WELLS	5128

Business Address (Street Number/Name)	Municipality
4121 Hwy 93	HILLSDALE

Province	Postal Code	Business E-mail Address
ON	L0L1V0	awww@bellnet.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
705 835 5646	JAKIN WRIGHT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2976		Y Y Y Y M M D D

Well owner's information package delivered	Date Package Delivered	Date Work Completed
[ ] Yes [X] No	2010/11/09	2010/11/09

Ministry Use Only

Audit No. Z102852

JAN 14 2011

Received

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Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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11 | 5724958 | MUNICIP 5,7,0,1,0 | CON CON. | 0,7

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT
Simcoe	Oro Twp.	Con. 7	11

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
Seeley & Arnill Aggreg. Ltd.	c/o Henderson Paddon & Assoc, Ltd. 945 3rd Ave.E., Owen Sound, ON N4K 2K7	DAY 6 MO Apr. YR 89.

21 | ZONE | EASTING | NORTHING | RC | ELEVATION | RC | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Sand		Fine	0	12
	Sand	Gravel	Coarse	12	38
	Cobbles	Stones, Gravel		38	44
	Silty sand	Clay	Fine	44	48
	Silty sand	Gravel	Fine	48	105
	Cenented sand	Gravel, Clay		105	145
Brown	Sand		Fine	145	151
Brown	Sand		Coarse	151	178
	Sand	Gravel	Coarse	178	196
Grey	Clay	Silt till		196	200

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
178-196	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
8	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.250	+3	180
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE OF OPENING (SLOT NO.): 3' x 0 slot; 11' x 16 slot; 4' x 20 slot; 3' x 0 slot
DIAMETER: 8 INCHES
LENGTH: 21 FEET
MATERIAL AND TYPE: Stainless Steel Telescope
DEPTH TO TOP OF SCREEN: 176 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

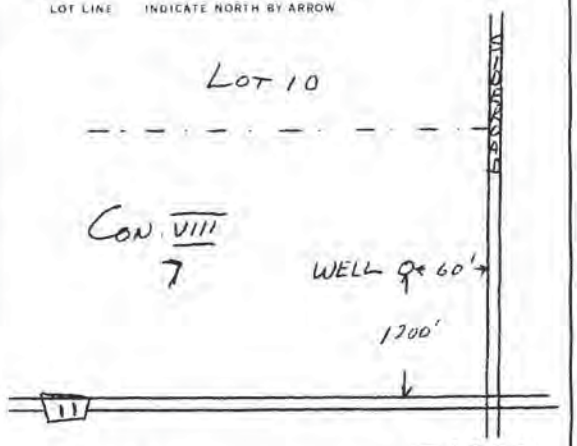
PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 300 Imp. GPM
DURATION OF PUMPING: 24 HOURS
WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
86.71' FEET	136.91' FEET	133.73' FEET	134.25' FEET	135.04' FEET	135.40' FEET

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: 160 FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 160 FEET
RECOMMENDED PUMPING RATE: 300 Im GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS: PRODUCTION WELL

34609

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED 9 ☐ DEWATERING

WATER USE

1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☒ INDUSTRIAL 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED ☐ OTHER

METHOD OF CONSTRUCTION

1 ☐ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: Davidson Well Drilling Limited
WELL CONTRACTOR'S LICENCE NUMBER: 1737
ADDRESS: Box 486, Wingham, Ontario. N0G 2W0
NAME OF WELL TECHNICIAN: Clearwater Drilling
WELL TECHNICIAN'S LICENCE NUMBER: 1583
SIGNATURE OF TECHNICIAN/CONTRACTOR
SUBMISSION DATE: DAY 28 MO Apr. YR 89.

OFFICE USE ONLY

DATA SOURCE
CONTRACTOR: 1737
DATE RECEIVED: JUN 12 1989
DATE OF INSPECTION
INSPECTOR
REMARKS: Walker W-PW1

CSS.ES

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FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
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11 | 5724959 | MUNICIP 57019 | CON. CON | 07

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Simcoe	Oro Twp.	Con. 7	11

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
Seeley & Arnill Aggreg. Ltd.	c/o Henderson Paddon & Assoc. Ltd. 945 3rd. Ave. E., Owen Sound, ON N4K 2K7	DAY 10 MO Mar. YR 89.

21 | ZONE | EASTING | NORTHING | RC | ELEVATION | RC | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Sand		Fine	0	12
	Sand	Gravel	Coarse	12	38
	Cobbles	Gravel		38	44
	Silty sand	Some clay	Fine	44	48
	Silty sand	Gravel	Fine	48	105
	Cemented sand	Gravel		105	145
Brown	Sand		Fine	145	151
Brown	Sand		Coarse	151	178
	Sand	Gravel	Coarse	178	195
Grey	Clay	Silt till		195	251
Grey	Silt	With clay till		251	270
Grey	Clay till			270	305

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	67
2	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC		0	90
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☐ BAILER | PUMPING RATE GPM | DURATION OF PUMPING HOURS MINS

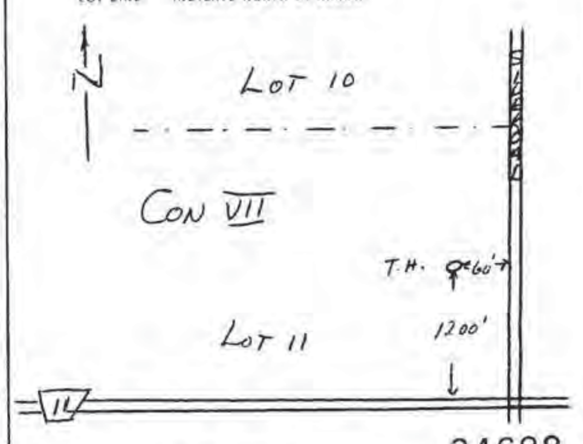
STATIC LEVEL | WATER LEVEL END OF PUMPING | WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY | 15 MINUTES | 30 MINUTES | 45 MINUTES | 60 MINUTES

IF FLOWING GIVE RATE GPM | PUMP INTAKE SET AT FEET | WATER AT END OF TEST 1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE ☐ SHALLOW ☐ DEEP | RECOMMENDED PUMP SETTING FEET | RECOMMENDED PUMPING RATE GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



FINAL STATUS OF WELL
1 ☐ WATER SUPPLY
2 ☒ OBSERVATION WELL
3 ☒ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED
9 ☐ DEWATERING

WATER USE
1 ☐ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☒ NOT USED

METHOD OF CONSTRUCTION
1 ☐ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☒ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING
☐ DIGGING ☐ OTHER

34608

DRILLERS REMARKS: TEST HOLE

CONTRACTOR

NAME OF WELL CONTRACTOR: Davidson Well Drilling Limited | WELL CONTRACTOR'S LICENCE NUMBER: 1737
ADDRESS: Box 486, Wingham, Ontario N0G 2W0
NAME OF WELL TECHNICIAN: Clearwater Drilling | WELL TECHNICIAN'S LICENCE NUMBER: 1583
SIGNATURE OF TECHNICIAN/CONTRACTOR | SUBMISSION DATE DAY 28 MO Apr. YR 89

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 1737 | DATE RECEIVED JUN 12 1989
DATE OF INSPECTION | INSPECTOR
REMARKS

Walker W-OW1

CSS.ES

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FORM NO. 0506 (11/86) FORM 9

UTM 17 Z 6 1 4 1 2 1 4 E
4 9 3 2 1 1 8 N

57 No. 3308

The Ontario Water Resources Commission Act

Elev. 8 R 1 0 6 0

WATER WELL RECORD

Basin 2 2 County or District Simcoe

Township, Village, Town or City Oro

Con 8 Lot 10 Date completed 4 (day) July (month) 66 (year)

[redacted] Address RR#2 Oro Station

Casing and Screen Record

Inside diameter of casing 6¼"

Total length of casing 132'

Type of screen slotted pipe

Length of screen 3'

Depth to top of screen 127

Diameter of finished hole 8"

Pumping Test

Static level 60'

Test-pumping rate 10 G.P.M.

Pumping level 120'

Duration of test pumping 3 hrs

Water clear or cloudy at end of test clear

Recommended pumping rate 5 G.P.M.

with pump setting of 120' feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Top soil	0	2		
Clay & stones	2	60		
Sand & clay layers	60	130		
Sand & fine gravel	130	135	135	fresh

For what purpose(s) is the water to be used? Farm Supply

Is well on (upland) in valley, or on hillside?

Drilling or Boring Firm W. J. Anderson

Address Pickering

Licence Number 2105

Name of Driller or Borer J. L. Miller

Address

Date Oct 24/66

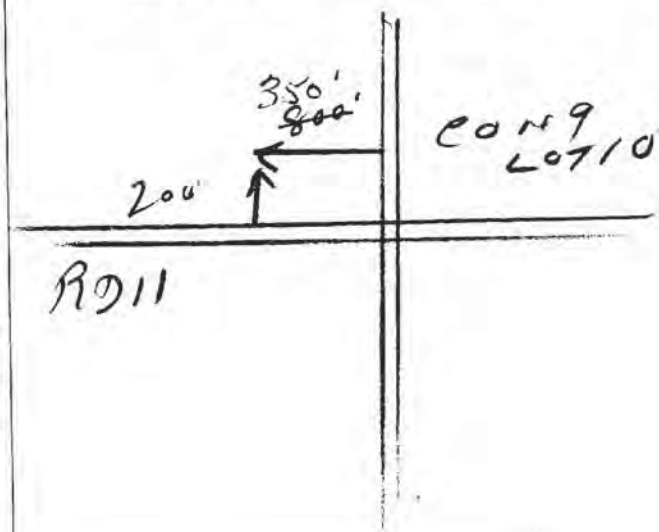
W. J. Anderson
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



UTM | 17 |z | 6 1 4 1 6 4 |E Con 5 |R | 4 9 3 2 6 0 8 |N Elev 8 |R | 1 0 6 0 | Basin 12 2

57 № 3304 B

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District: Simcoe Township, Village, Town or City: ORO

Con. 8 Lot 11 Date completed 1 (day) MARCH (month) 1966 (year)

Owner [redacted] Address RR#2 ORO Station

Casing and Screen Record	
Inside diameter of casing	6¼"
Total length of casing	97'
Type of screen	
Length of screen	
Depth to top of screen	
Diameter of finished hole	6¼"

Pumping Test	
Static level	46'
Test-pumping rate	7 G.P.M.
Pumping level	90'
Duration of test pumping	2 hrs
Water clear or cloudy at end of test	Clear
Recommended pumping rate	7 G.P.M.
with pump setting of	90' feet below ground surface

Well Log: Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Dug well	0	75		
Brown clay mixed with sand, gravel	75	102		
course sand and Gravel	102	103	103	Fresh

For what purpose(s) is the water to be used? Domestic and stock.

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm Henry Hammers

Address RR#3 Barrie Ont

Licence Number 1662

Name of Driller or Borer Al. Hammers

Address RR#3 Barrie Ont

Date March 2/66

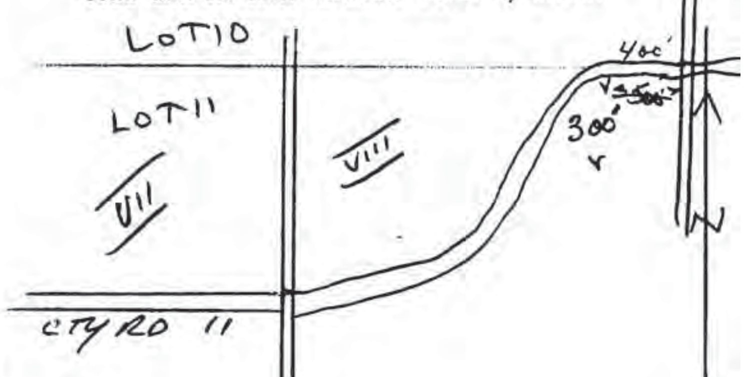
Henry Hammers
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
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11 5718750

MUNICIP | CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT
Simcoe	ORO	VII		8

[redacted] St. Vincent St., BARRIE, Ont. L4M 3Z8

DATE COMPLETED: DAY 9 MO 9 YR 83

RING | RC | ELEVATION | RC | BASIN CODE | II | III | IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	sand & stones & gravel			0	124
	clay			124	126
	medium sand			126	133
	clay & fine sand & silt			133	200
	clay & silt/fine sand			200	338
	clay & silt/grey clay			338	364
	coarse sand & clay			364	368
	medium sand			368	377
grey	clay			377	396
		total depth: 370 feet			

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
NOT TESTED	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	+6"	338
5	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	338	370
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
14	6 INCHES	3 FEET

MATERIAL AND TYPE: stainless steel wire wound

DEPTH TO TOP: ~~stone~~ packer 301 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD, PACKER, ETC.)
370	396	drill cuttings

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☐ PUMP 2 ☒ BAILER air	4 GPM	HOURS MINS

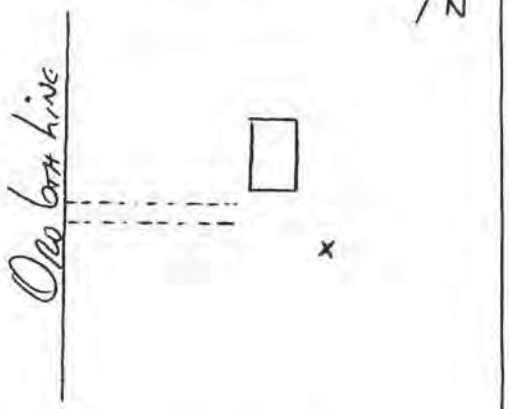
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
224 FEET	FEET		FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	FEET	1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	300 FEET	4 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL	1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED
WATER USE	1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED
METHOD OF DRILLING	1 ☒ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR	LICENCE NUMBER
Snider Drilling and Equipment Ltd.,	4816

ADDRESS: R.R.#1, (Craighurst), BARRIE, Ont. L4M 4Y8

NAME OF DRILLER OR BORER	LICENCE NUMBER
Ronald Jensen & Allan Wright	

SIGNATURE OF CONTRACTOR: Snider Drilling and Equipment Ltd. SUBMISSION DATE: MO ____ YR ____

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR | DATE RECEIVED 17 11 83

DATE OF INSPECTION | INSPECTOR

REMARKS

CSS.ES

FORM NO. 0506—4—77 FORM 7

MINISTRY OF THE ENVIRONMENT COPY

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

5729017

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11

MUNICIP 5701.0 CON. CON Part 08

COUNTY OR DISTRICT [redacted] TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE ORO CON 8 BLOCK, TRACT, SURVEY, ETC. LOT 8.

[redacted] Sargeant Drive Barrie DATE COMPLETED DAY 31 MO 10 YR 91

ELEVATION BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BROWN	SAND		FINE	0	15
"	GRAVEL	SAND		15	50
"	SAND	GRAVEL	COARSE	50	65
"	SAND		"	65	90
GREY	CLAY			90	95
RED	SAND			95	110
GREY	GRAVEL,	SAND, LAYERS OF CLAY		110	165
"	CLAY			165	170
"	CLAY, GRAVEL			170	375
BROWN	SAND		COARSE	375	385
BROWN	SAND,	CLAY	COARSE	385	390

(SEE PG 2 OF 2)

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
10-11	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			13-16
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			20-23
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

PUMPING TEST METHOD 1 ☐ PUMP 2 ☐ BAILER

PUMPING RATE GPM

DURATION OF PUMPING HOURS MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
19-21 FEET	22-24 FEET	26-28 FEET	29-31 FEET	32-34 FEET	35-37 FEET

IF FLOWING, GIVE RATE 38-41 GPM

PUMP INTAKE SET AT FEET

WATER AT END OF TEST 42 1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE ☐ SHALLOW ☐ DEEP

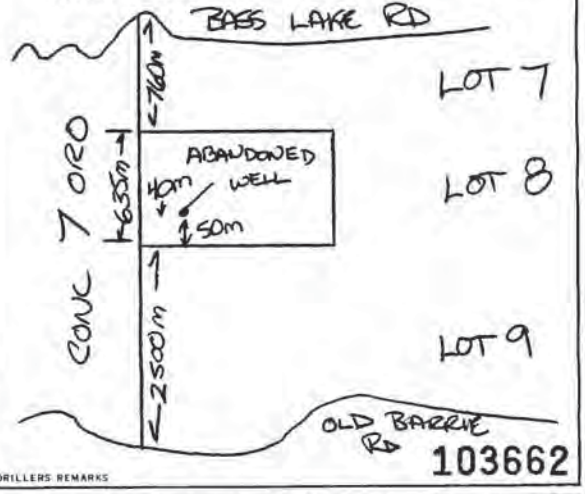
RECOMMENDED PUMP SETTING 43-45 FEET

RECOMMENDED PUMPING RATE 46-49 GPM

50-53

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE INDICATE NORTH BY ARROW.



DRILLERS REMARKS

103662

FINAL STATUS OF WELL (58)

1 ☐ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED ☐ DEWATERING

WATER USE (55-56)

1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION (57)

1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR — WELL CONTRACTOR'S LICENCE NUMBER

ADDRESS

NAME OF WELL TECHNICIAN — WELL TECHNICIAN'S LICENCE NUMBER

SIGNATURE OF TECHNICIAN/CONTRACTOR — SUBMISSION DATE DAY 31 MO 10 YR 91

OFFICE USE ONLY

DATA SOURCE 58 — CONTRACTOR 58 82: 1456 — DATE RECEIVED: APR 21 1992 (63-68) 80

DATE OF INSPECTION — INSPECTOR

REMARKS

CSS.ES

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PG 2 OF 2

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

5729018

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11

MUNICIP 5,7,0,1,0 CON C,O,N, 08

COUNTY OR DISTRICT: [redacted]

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: ORO

CON, BLOCK, TRACT, SURVEY, ETC: 8

LOT: 8

Sorjeant Dr. Barrie

DATE COMPLETED: DAY 31 MO 10 YR 91

ELEVATION | RC | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BROWN	CLAY			390	395
"	CLAY	GRAVEL		395	405
GREY	CLAY	GRAVEL		405	412
"	SILT.			412	423
"	SAND	CLAY	FINE	423	498
RED	SAND			498	510
GREY	GRAVEL		CEMENTED	510	515
"	SAND	CLAY	FINE	515	520
"	CLAY			520	530

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
10-11	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			13-16
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			20-23
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33 | DIAMETER 34-38 INCHES | LENGTH 39-40 FEET

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN 41-44 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☐ BAILER | PUMPING RATE GPM | DURATION OF PUMPING HOURS MINS

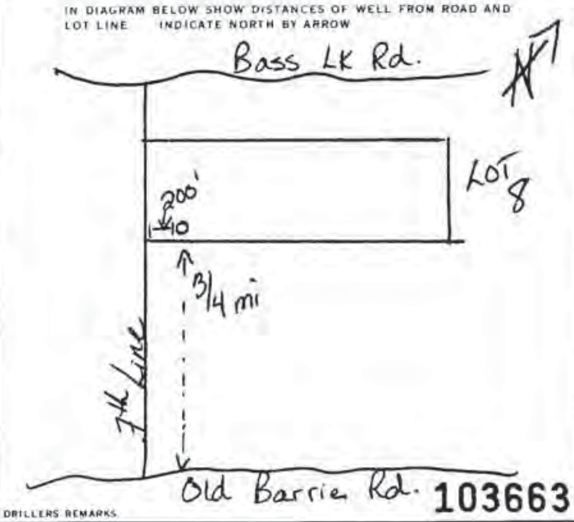
STATIC LEVEL | WATER LEVEL END OF PUMPING | WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY: 15 MINUTES, 30 MINUTES, 45 MINUTES, 60 MINUTES (FEET)

IF FLOWING GIVE RATE GPM | PUMP INTAKE SET AT FEET | WATER AT END OF TEST: 1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP | RECOMMENDED PUMP SETTING FEET | RECOMMENDED PUMPING RATE GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



103663

DRILLERS REMARKS

FINAL STATUS OF WELL: 1 ☐ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☒ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED ☐ DEWATERING

WATER USE: 1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☒ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION: 1 ☐ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: Burton Drilling | WELL CONTRACTOR'S LICENCE NUMBER: 1456

ADDRESS: RR#1 ORO STATION

NAME OF WELL TECHNICIAN: DAVID R BURTON | WELL TECHNICIAN'S LICENCE NUMBER: T0547

SIGNATURE OF TECHNICIAN/CONTRACTOR: D R Burt | SUBMISSION DATE: DAY 31 MO 10 YR 91

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 1456 | DATE RECEIVED APR 21 1992

DATE OF INSPECTION | INSPECTOR

REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Oro Pit Borehole Logs
(source as shown)

HYDROGEOLOGICAL ASSESSMENT
of
PROPOSED SAND AND GRAVEL PIT

West 1/2 Lots 7,8,& 9,
Concession 7
Oro Township

REPORT
to
James Dick Construction Ltd.

Prepared by

Charlesworth & Associates

Job # 91-107

November 21, 1991

Copies:

1	James Dick Ltd
1	Keewatin-Aski
1	MacNaughton Ltd
1	D. Hindson
2	File

Charlesworth & Associates

APPENDIX A

BOREHOLE LOGS AND INSTALLATION DETAILS
DC-1 to DC-5

Project: Proposed Oro Pit No.: 91-107

Borehole Location: Southwest Corner, Conc. 7, Lot 9.

Borehole No.: DC-1

Piezometers: DC-1

Sheet 2 of 2

Scale (ft.)	Scale (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Static Level	Piezometer Details	Sample No.	Sample Type	Blows /0.3m
	16					12	ss	31
55	17		- becoming finer at 17.3m			13	ss	32
		349.0 / 17.7						
	18		SAND - very fine to fine - grey brown, compact, dry to moist - interbedded silt layers from 18.8-18.9m			14	ss	37
60	19	19.4						
65	20		SAND - fine to medium - light brown - some beds darker - trace coarse sand, gravel, silt			15	ss	45
	21		- occasional silt seams		Native Backfill			
70	22		- compact			16	ss	38
75	23							
						17	ss	55
	24		- dry to moist					
80	25		- slightly coarser below 24.9m			18	ss	50
85	26					19	ss	45
	27							
90	28					20	ss	53
95	29		- very fine sand seams, 2.5 cm thick, at 29.1 and 29.5m - becoming finer at 30.5m					
	30		- wet at 30.8m			21	ss	74
100	31	335.20 / 31.5	(May 13, 1991) ▼	▼	Artificial Pack	22	ss	100 / 3"
105	32		SILTY SAND TILL - grey					
	33		- trace gravel and cobbles - dense					
110	34	332.60 / 34.1	- moist to wet			23	ss	150 / 3"
			End of Borehole at 34.1m					

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

Project Proposed Oro Pit No.: 91-107

Date Drilled March 28/91 to April 2/91 Driller: Longyear

Borehole Location: Northwest Corner, Conc. 7, Lot 7.

Drilling Supervised by: K. Henderson

Drilling Method CME 75, 4 1/4" ID HSA

Piezometer Details

Type of Pipe 51mm ID Schedule 40 PVC

Type of Screen 10 Slot PVC

Borehole No. DC-2

Piezometers: DC-2

Sheet 1 of 3

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
RX Rock Core
Piezometer Screen (water level elev. m, Y/M/D)

Scale (ft) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Static Level	Piezometer Details	Sample No	Sample Type	Blows /0.3m
		Ground Surface 354.07 mgsd					
0	353.84 / .23	Topsoil, dark brown, rootlets, soft, moist		Cement Holeplug	1	ss	4
5 — 1	352.87 / 1.2	SAND - fine to medium - light brown, uniform, loose, moist			2	ss	20
— 2	351.47 / 2.6	coarse SAND & GRAVEL - brown grey, trace silt, loose, moist to wet			3	ss	25
10 — 3		SILTY SAND - very fine - grey brown - uniform - compact - moist					
— 4							
15 — 5					4	ss	59
20 — 6				Native Backfill			
— 7							
25 — 8	346.17 / 7.9	SILT - some very fine sand - grey brown - dense - moist to wet - dilatant			5	ss	146
30 — 9							
— 10							
35 — 11					6	ss	100/4"
— 12		- occasional pebbles					
40 — 13							
— 14							
45 — 15					7	ss	100/5"
50							

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

Project: Proposed Oro Pit No.: 91-107

Borehole Location: Northwest Corner, Conc. 7, Lot 7.

Borehole No.: DC-2

Piezometers: DC-2

Sheet 2 of 3

Scale (ft.)	Scale (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Static Level	Piezometer Details	Sample No.	Sample Type	Blows /0.3m
	16							
		337.37						
55	17	16.7	SANDY SILT TILL - grey brown - dense - moist			8	ss	124/6"
60	18							
	19							
65	20	334.27						
		19.8	SAND - fine to medium - grey brown - trace coarse sand - dense - dry			9	ss	123
70	21							
	22							
75	23		- sandy silt zone at 21.8m, .1m thick		Native Backfill			
	24					10	ss	142
80	25							
85	26							
	27							
90	28					11	ss	156
						12	ss	166
95	29							
	30							
100	31		- becoming finer from 30m to 30.8m			13	ss	173
		321.87						
105	32	32.2				14	ss	170/10"
	33		SAND - very fine to fine - some silt - grey (May 13, 1991) - dense - dilatant - wet	▼	Artificial Pack	15	ss	101
110	34							

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

Project: Proposed Oro Pit No.: 91-107

Borehole Location: Northwest Corner, Conc. 7, Lot 7

Borehole No.: DC - 2

Piezometers: DC - 2

Sheet 3 of 3

Scale (ft)	Scale (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Static Level	Piezometer Details	Sample No.	Sample Type	Blows / 12 in
115	35	318.97 / 35.1				16	ss	148 / 11"
	36	318.07 / 36.0	SILT - grey, some clay, wet - sand seams at 35.5 & 35.6 m, 1cm thick - occasional silty clay seams					
120	37		End of Borehole at 36.0m					
125	38							
	39							
130	40							
	41							
135	42							
	43							
140	44							
	45							
145	46							
	47							
150	48							
	49							
155	50							
	51							
160	52							
	53							
165	54							
170								
175								

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

Project: Proposed Oro Pit — No.: 91-107

Date Drilled: April 13th 1991 — Driller: Longyear

Borehole Location: South Central Portion of Conc.7, Lot 8.

Drilling Supervised by: K. Henderson

Drilling Method: CME 75, 3 1/4" ID HSA

Piezometer Details

Type of Pipe: 51mm ID Schedule 40 PVC

Type of Screen: 10 Slot PVC

Borehole No.: DC-3

Piezometers: DC-3

Sheet 1 of 1

SS Split Spoon Sample — RX Rock Core

WA Wash Sample

AU Auger Sample

CN Continuous Sample

Piezometer Screen (water level elev. m, Y/M/D)

Scale (ft) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Static Level	Piezometer Details	Sample No	Sample Type	Blows /0.3m
		Ground Surface 355.0 mgsd (estimated)					
	354.92 / .08	Topsoil, dark brown, rootlets, moist			1	ss	4
5 — 1		SAND - fine to medium - light brown, uniform, loose, moist - dark bedding			2	ss	9
10 — 2							
		- becoming coarser with trace gravel at 3.0m			3	ss	21
15 — 3							
	350.4 / 4.6						
20 — 4		SAND - medium to coarse - grey brown - some gravel, pebbles and cobbles - dense - dry to moist			4	ss	102/7"
25 — 5							
30 — 6					5	ss	105
	344.9 / 10.1						
35 — 7		SILTY SAND TILL - grey - trace gravel and cobbles - moist to wet - sand seam at 11.9m, 7.5cm thick - dense					
40 — 8					6	ss	87
45 — 9		- boulders from 13.7m to 15.5m					
50 — 10	339.5	End of Borehole at 15.5m			7	ss	70/2"

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

Project: Proposed Oro Pit No.: 91-107

Date Drilled: April 3/91 to April 4/91 Driller: Longyear

Borehole Location: Northwest Portion of Conc.7, Lot 8.

Drilling Supervised by: K. Henderson

Drilling Method: CME 75, 4 1/4" ID HSA

Piezometer Details

Type of Pipe: 51mm ID Schedule 40 PVC

Type of Screen: 10 Slot PVC

Borehole No.: DC-4

Piezometers: DC-4

Sheet 1 of 2

SS Split Spoon Sample RX Rock Core

WA Wash Sample

AU Auger Sample

CN Continuous Sample

Piezometer Screen (water level elev. m, Y/M/D)

Scale (ft) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Piezometer Details	Sample No	Sample Type	Blows /0.3m
		Ground Surface 354.62 mgsd					
	354.47 / .15	Topsoil - dark brown, moist		Cement	1	ss	5
1				Holeplug			
5 — 2	352.82 / 1.8	SILTY SAND - brown, rootlets, loose, moist					
		SAND - fine to medium - grey brown - trace fine gravel - compact, uniform, moist			2	ss	27
10 — 3							
4							
15 — 5					3	ss	33
	348.72	- sandy silt seam at 5.7m, 2.5cm thick		Native Backfill			
20 — 6	5.9	SILT - grey, moist - sand seam at 6.0m					
7							
25 — 8	347.02 / 7.6	SANDY SILT TO SILT - grey - compact - wet			4	ss	100
30 — 9							
10							
35 — 11		- increasing silt content with depth			5	ss	145
12							
40 — 13							
45 — 14	340.92 / 13.7	SANDY SILT TILL - grey - trace gravel - dense, moist			6	ss	100/4"
50 — 15							

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

Project: Proposed Oro Pit No.: 91-107

Borehole Location: Northwest Portion of Conc.7, Lot 8

Borehole No.: DC-4

Piezometers: DC-4

Sheet 2 of 2

Scale (ft.)	Scale (m)	Elev. (m GSD) / Depth (m)	Geological Log – Description	Strat. Plot	Piezometer Details	Sample No.	Sample Type	Blows /0.3m
		339.02 / 15.6	SANDY SILT to SILT - grey - dense - dilatant - wet			7	ss	100/4"
55	16							
	17							
60	18		- moist, not dilatant at 18.5m - pebble at 18.6m					
	19							
65	20	334.82 / 19.8	SAND - fine to medium - brown, darker bedding - uniform - compact - dry to moist		Native Backfill	8	ss	105
70	21							
	22							
75	23		- grading to SAND, very fine to fine - trace silt			9	ss	115
	24							
80	25							
85	26							
	27				Artificial Pack	10	ss	141
90	28		SAND - fine to medium (May 13, 1991) - trace coarse sand and gravel - wet at 28.3m	▼	Natural Pack	11	ss	70/2"
95	29	324.72 / 29.9			Cave			
	30		End of Borehole at 29.9m					
100	31							
105	32							
	33							
110	34							

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

Project: Proposed Oro Pit No.: 91-107

Date Drilled: April 4/91 to April 5/91 Driller: Longyear

Borehole Location: Southwest Corner of Conc.7, Lot 8.

Drilling Supervised by: K. Henderson

Drilling Method: CME 75, 5 1/4" ID HSA

Piezometer Details

Type of Pipe: 51mm ID Schedule 40 PVC

Type of Screen: 10 Slot PVC

Borehole No.: DC-5

Piezometers: DC-5

SS Split Spoon Sample RX Rock Core
WA Wash Sample
AU Auger Sample
CN Continuous Sample
Piezometer Screen (water level elev. m, Y/M/D)

Scale (ft) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Static Level	Piezometer Details	Sample No	Sample Type	Blows /0.3m
		Ground Surface 352.05 mgsd					
0	351.82	Topsoil - dark brown, rootlets, soft, dry		Cement Holeplug	1	ss	5
1	.23	SAND - very fine to fine, some silt - brown, uniform, loose, dry					
5 / 2							
10 / 3							
4		- becoming coarser, fine to medium SAND at 4.0m - pebbles and cobbles from 4.1m			2	ss	21
15 / 5							
	346.25						
20 / 6	5.8						
7		SANDY SILT TILL - grey brown - trace gravel - compact to dense - moist, some wet zones		Native Backfill			
25 / 8							
30 / 9					3	ss	66/11"
10							
35 / 11							
12							
40 / 13							
45 / 14		- becoming very dense - pebbles and cobbles			4	ss	152
50 / 15							

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

Project: Proposed Oro Pit No.: 91-107

Borehole Location: Southwest Corner of Conc.7, Lot 8.

Borehole No.: DC-5

Piezometers: DC-5

Sheet 2 of 2

Scale (ft.)	Scale (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Static Level	Piezometer Details	Sample No.	Sample Type	Blows /0.3m
	16	335.85						
		16.2	SILTY SAND - fine to medium (Till) - grey - trace coarse sand and gravel - very dense - moist			5	ss	100/5"
55	17							
60	18							
	19				Native Backfill			
65	20							
70	21							
	22					6	ss	100/6"
75	23		- silt rich zones at 22.9 and 23.2m					
80	24							
	25							
85	26	325.95		(May 13, 1991) ▼		7	ss	105/6"
		26.1	SAND - very fine to fine - grey - some silt, trace coarse sand and gravel - dilatant - dense - wet		Artificial Pack			
90	27							
	28	323.75				8	ss	100/3"
		28.3						
95	29		SAND (medium to coarse) and GRAVEL - trace to some silt - grey brown - dense - wet		Natural Pack	9	ss	100/3"
	30	322.15						
100		29.9						
	31							
105	32		Borehole Ends at 29.9m					
	33							
110								
	34							

Borehole Record

Kirsten Henderson /D.A.
Prepared by

DAVID L. CHARLESWORTH & ASSOCIATES INC.
Consulting Hydrogeologists

APPENDIX B

BOREHOLE LOG AND MONITOR DETAILS

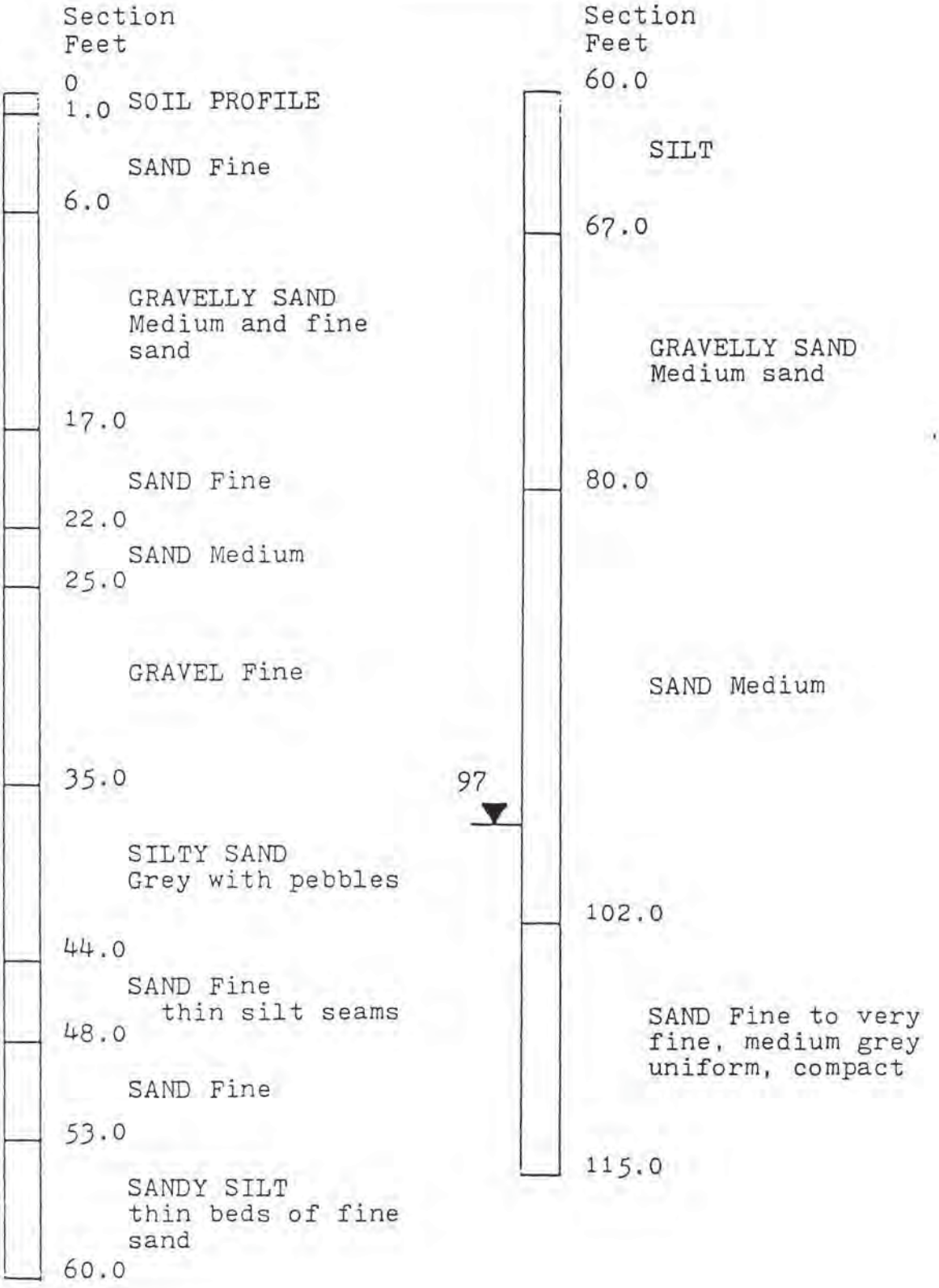
MONITOR M6

Table B-1 M6 Monitor Details

Top of Casing Elev. mgsd	352.955*
Ground Elevation mgsd	352.305*
Stick Up m	.65*
Screen Interval	
Top metres	Unknown
Bottom metres	31.85(Measured by DLC-May 13/91)
Top mgsd	Unknown
Bottom mgsd	320.455(Measured by DLC-May 13/91
Screened Material	Sand(Based on Borehole Log)

*Taken from Young and Young, November,1991
mgsd = Elevation metres, ground surface datum

BOREHOLE NO. 6



Appendix B
Pumping Test Permit To Take Water

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

PERMIT TO TAKE WATER

Pumping Test
NUMBER 1065-AXJKT7

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

Lafarge Canada Inc.
6509 Airport Rd
Mississauga, Ontario, L4V 1S7
Canada

For the water taking from: TW1 (WWR 7298525), TW1A

Located at: 1908 Line 7 N Lot 9 Concession 7
Oro-Medonte, County of Simcoe

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

(a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34.1, OWRA.

(b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.

(c) "Ministry" means Ontario Ministry of the Environment and Climate Change.

(d) "District Office" means the Barrie District Office.

(e) "Permit" means this Permit to Take Water No. 1065-AXJKT7 including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

(f) "Permit Holder" means Lafarge Canada Inc..

(g) "OWRA " means the *Ontario Water Resources Act,* R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated March 26, 2018 and signed by Krysta Paudyn, and all Schedules included in this Permit.

1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.

1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.

1.4 This Permit is not transferable to another person.

1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.

1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.

2. General Conditions and Interpretation

2.1 Inspections

The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act* , R.S.O. 1990, the *Pesticides Act* , R.S.O. 1990, or the *Safe Drinking Water Act,* S. O. 2002.

2.2 Other Approvals

The issuance of, and compliance with this Permit, does not:

(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act* , and the *Environmental Protection Act* , and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 **Expiry**

This Permit expires on **December 31, 2018**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken:	Zone/ Easting/ Northing:
1	TW1 (WWR 7298525)	Well Drilled	Pumping Test	Miscellaneous	909	24	1,309,248	6	17 612774 4932079
2	TW1A	Well Drilled	Pumping Test	Miscellaneous	1,364	24	1,963,872	6	17 612774 4932079
						Total Taking:	1,963,872		

3.3 Should the results of the step-test not be satisfactory, then the step-test (only) may be repeated on an enlarged well at the same location and with the same depth as the original well. If well TW1 is enlarged, then upon completion of the enlarged well (TW1A), a new Well Record Form shall be submitted to the ministry and the Permit signing Director shall also be notified.

3.4 This permit authorizes a single pumping test on either TW1 or TW1A.

3.5 Notwithstanding Table A, this permit is valid for six (6) days of water taking from the sources located in Table A between the date of issuance and December 31, 2018.

4. Monitoring

4.1 Notification to Well Owners
Prior to commencement of the pumping test, the Permit Holder shall identify all wells within the area of the anticipated potential cone of influence, or within 500 metres of the test site, whichever is greater. At least 24 hours prior to beginning the pumping test, the Permit Holder shall provide written notification to the owners of the wells identified within the potential cone of influence. The notification shall include the expected date, time and duration of the pumping test, and a contact telephone number that may be used to report any interferences with water supplies.

4.2 Measuring Water Depths
To establish baseline conditions, well depths and depths to water levels for identified representative wells in the area of the water taking shall be recorded by the Permit Holder. During the pumping test, water levels in the identified wells shall be recorded. The pumping test must be of sufficient duration to accurately predict the long term impacts of the proposed water taking. Water levels in the identified wells shall continue to be monitored beyond the water taking period until at least 85% recovery is achieved.

4.3 The Permit Holder shall maintain a record of all water takings. This record shall include the dates and times of water takings, and the total measured amounts of water pumped per day for each day that water is taken under the authorization of this Permit. The Permit Holder shall keep all required records up to date and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request. The total amounts of water pumped shall be measured using a calibrated flow metering device(s) and maintained as per manufactures requirements. The Permit Holder, unless otherwise required by the Director, shall submit, on or before March 31st in every year, the daily water taking data collected and recorded for the previous year to the ministry's Water Taking Reporting System.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 Restoration of Water Supply

Where the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of doing so.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water Resources Act* , Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.

2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.

3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

Schedule A

This Schedule "A" forms part of Permit to Take Water 1065-AXJKT7 dated May 15, 2018.

1. Groundwater Science Corp., 2018. Category 2 Permit To Take Water (PTTW) Application for Pumping Test, Oro Pit Well, Township of Oro-Medonte, Ontario signed by Andrew Pentney, February 2, 2018, includes application signed by Krysta Paudyn, March 26, 2018.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, as amended, provides that the Notice requiring the hearing shall state:

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

a. The name of the appellant;
b. The address of the appellant;
c. The Permit to Take Water number;
d. The date of the Permit to Take Water;
e. The name of the Director;
f. The municipality within which the works are located;

This notice must be served upon:

The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5
Fax: (416) 326-5370
Email: ERTTribunalsecretary@ontario.ca

AND

The Director, Section 34.1, Ministry of the Environment and Climate Change
8th Floor
5775 Yonge St
Toronto ON M2M 4J1
Fax: (416) 325-6347

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by Telephone at
(416) 212-6349
Toll Free 1(866) 448-2248

by Fax at
(416) 326-5370
Toll Free 1(844) 213-3474

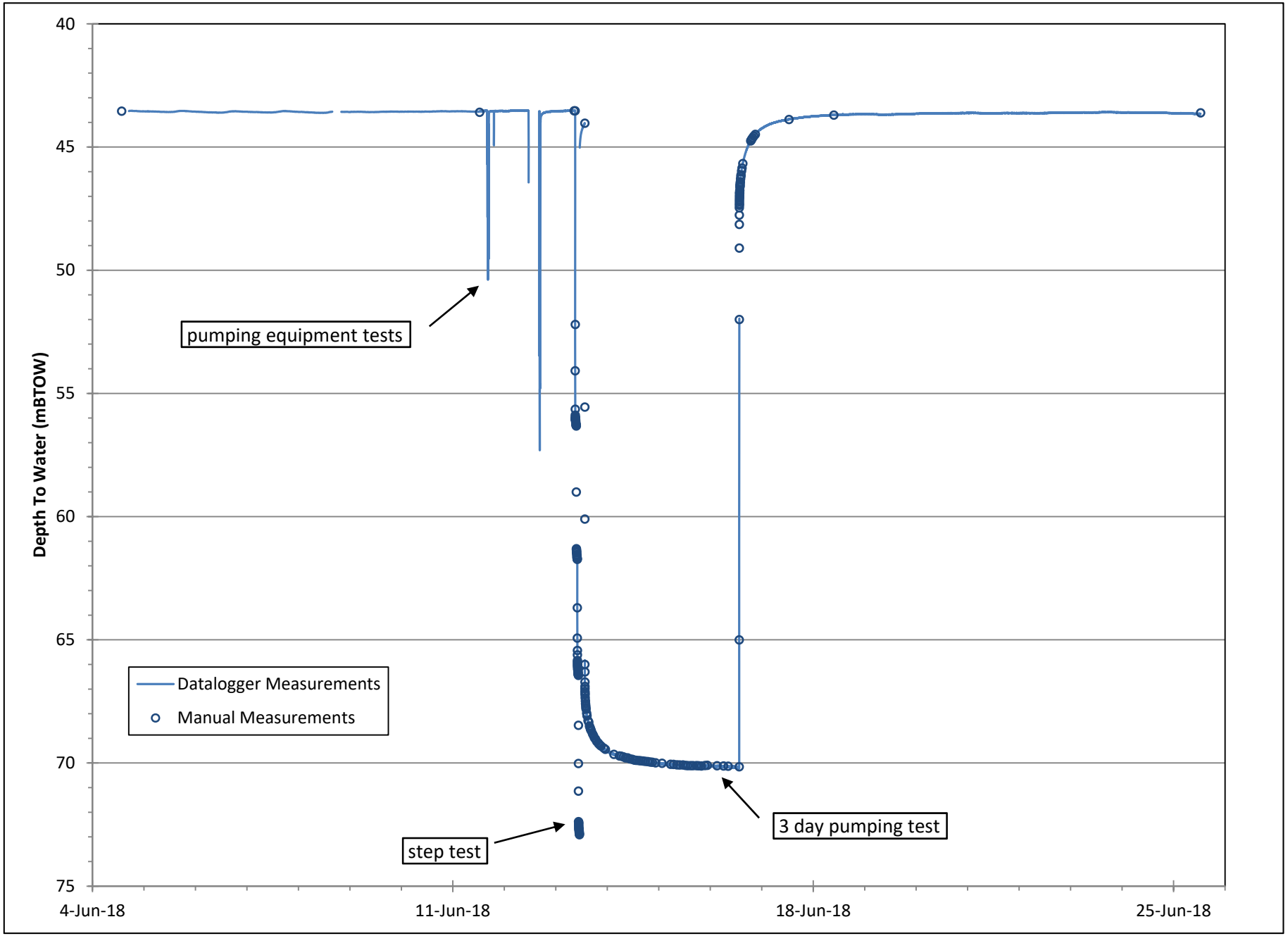
by e-mail at
www.ert.gov.on.ca

Dated at Toronto this 15th day of May, 2018.

Cynthia Doughty

Cynthia Doughty
Director, Section 34.1
Ontario Water Resources Act , R.S.O. 1990

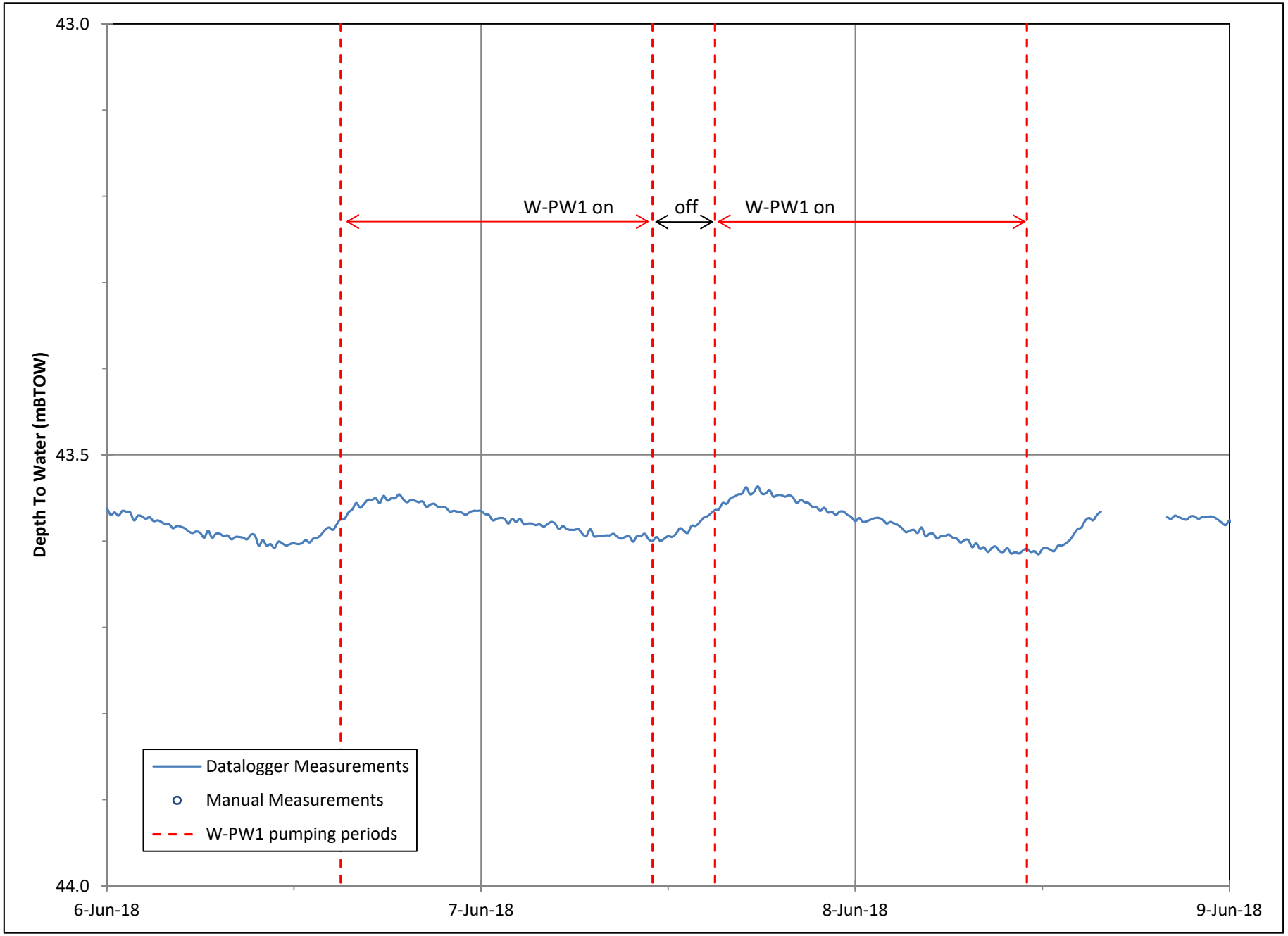
Appendix C
Water Level Hydrographs



Lafarge Canada Inc
Oro Pit PTTW

Lafarge PW1 Hydrograph

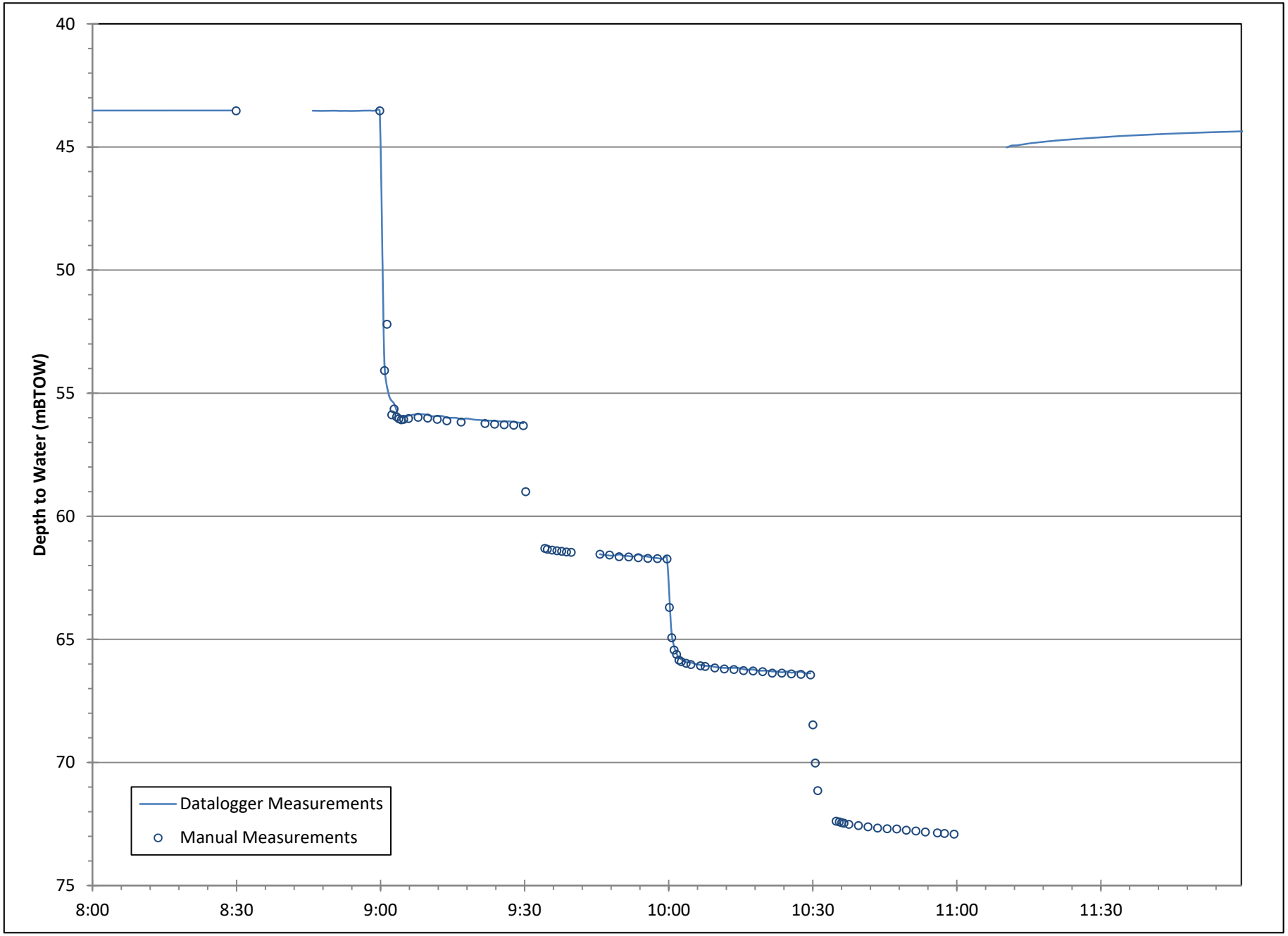
Groundwater Science Corp
Hydrogeologic Assessment



Lafarge Canada Inc
Oro Pit PTTW

Lafarge PW1 Pre-Test Hydrograph

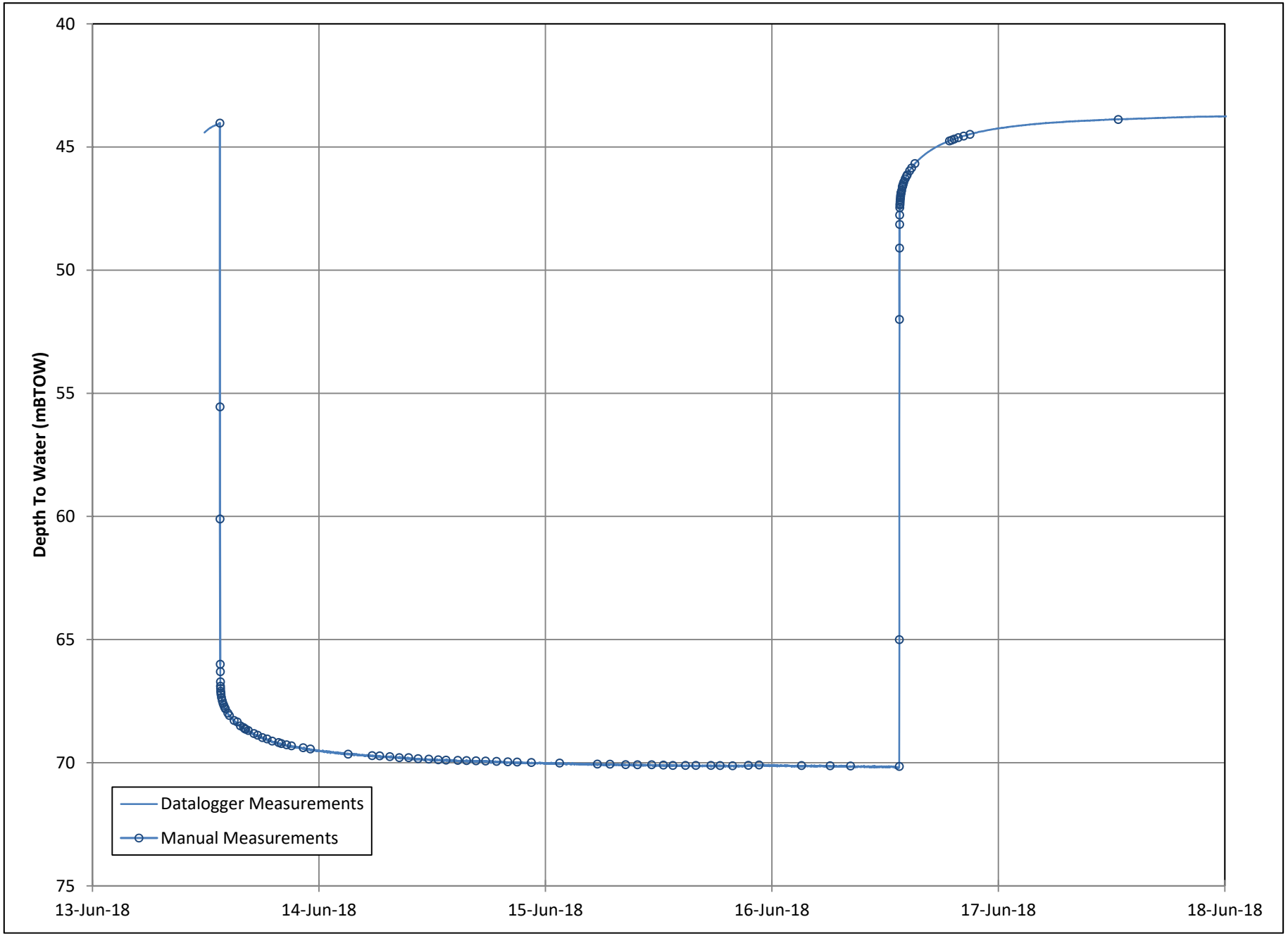
Groundwater Science Corp
Hydrogeologic Assessment



Lafarge Canada Inc
Oro Pit PTTW

Lafarge PW1 Step Test Hydrograph

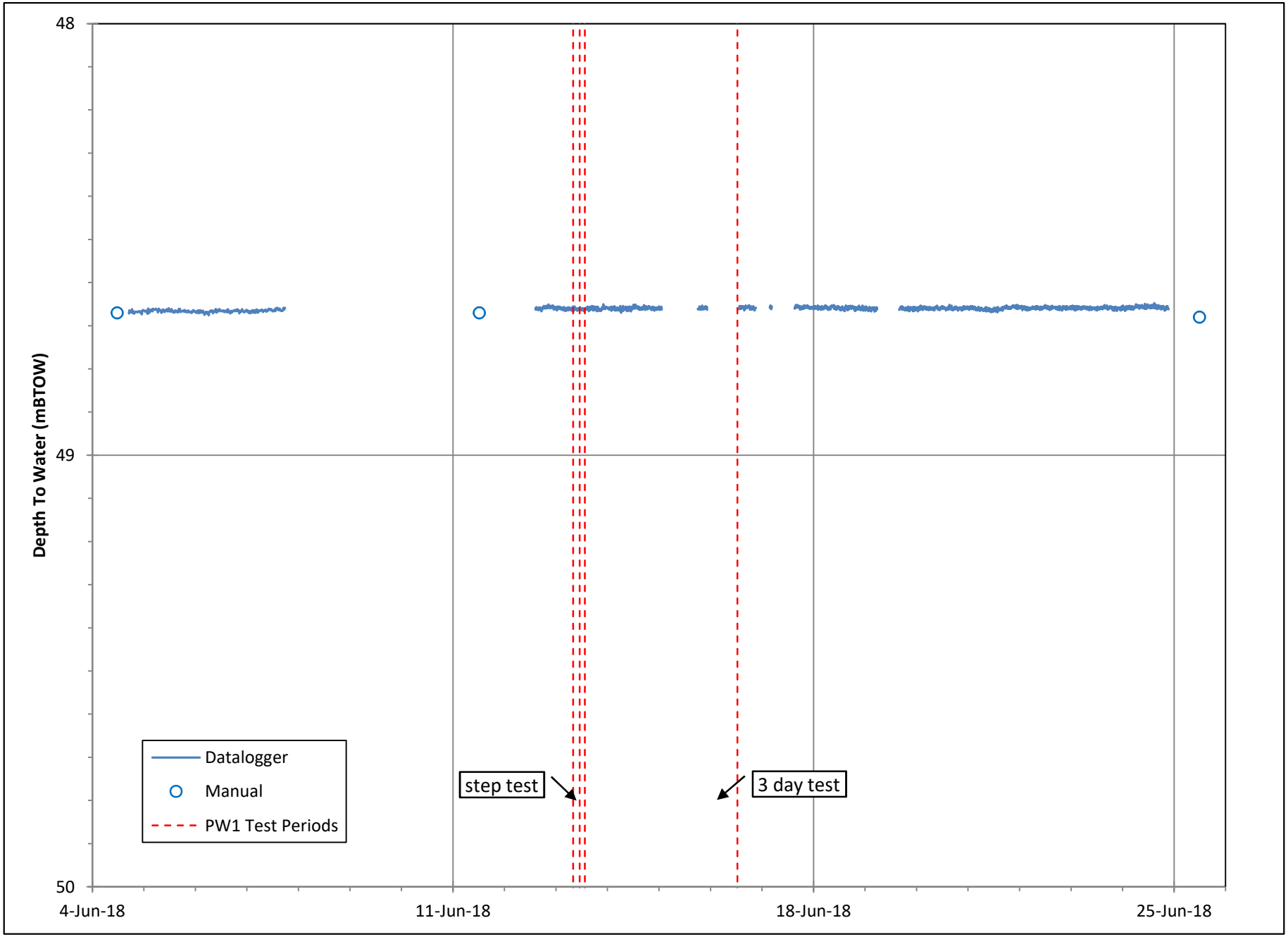
Groundwater Science Corp
Hydrogeologic Assessment



Lafarge Canada Inc
Oro Pit PTTW

Lararge PW1 Pumping Test Hydrograph

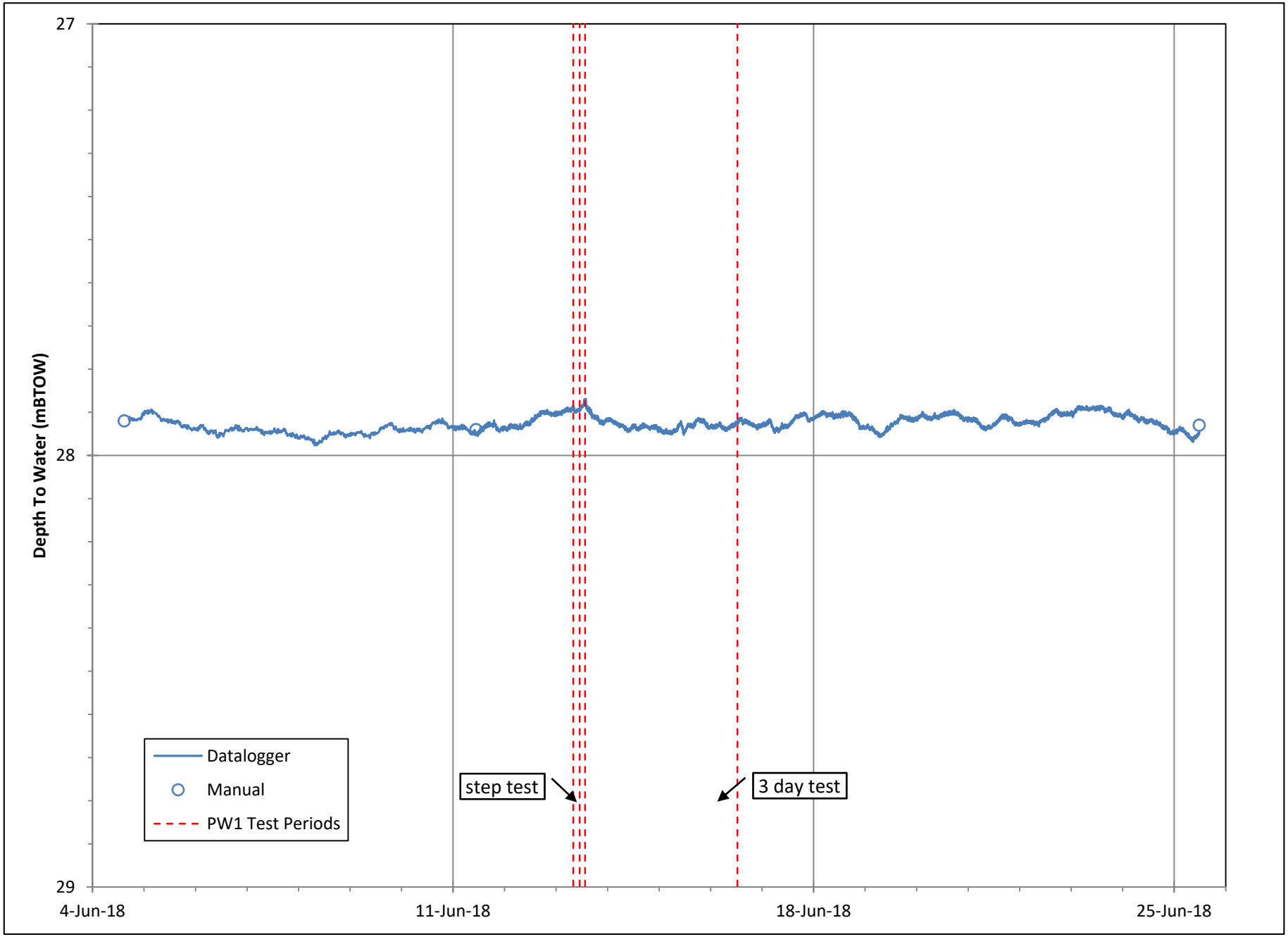
Groundwater Science Corp
Hydrogeologic Assessment



Lafarge Canada Inc
Oro Pit PTTW

Lafarge OW1 Hydrograph

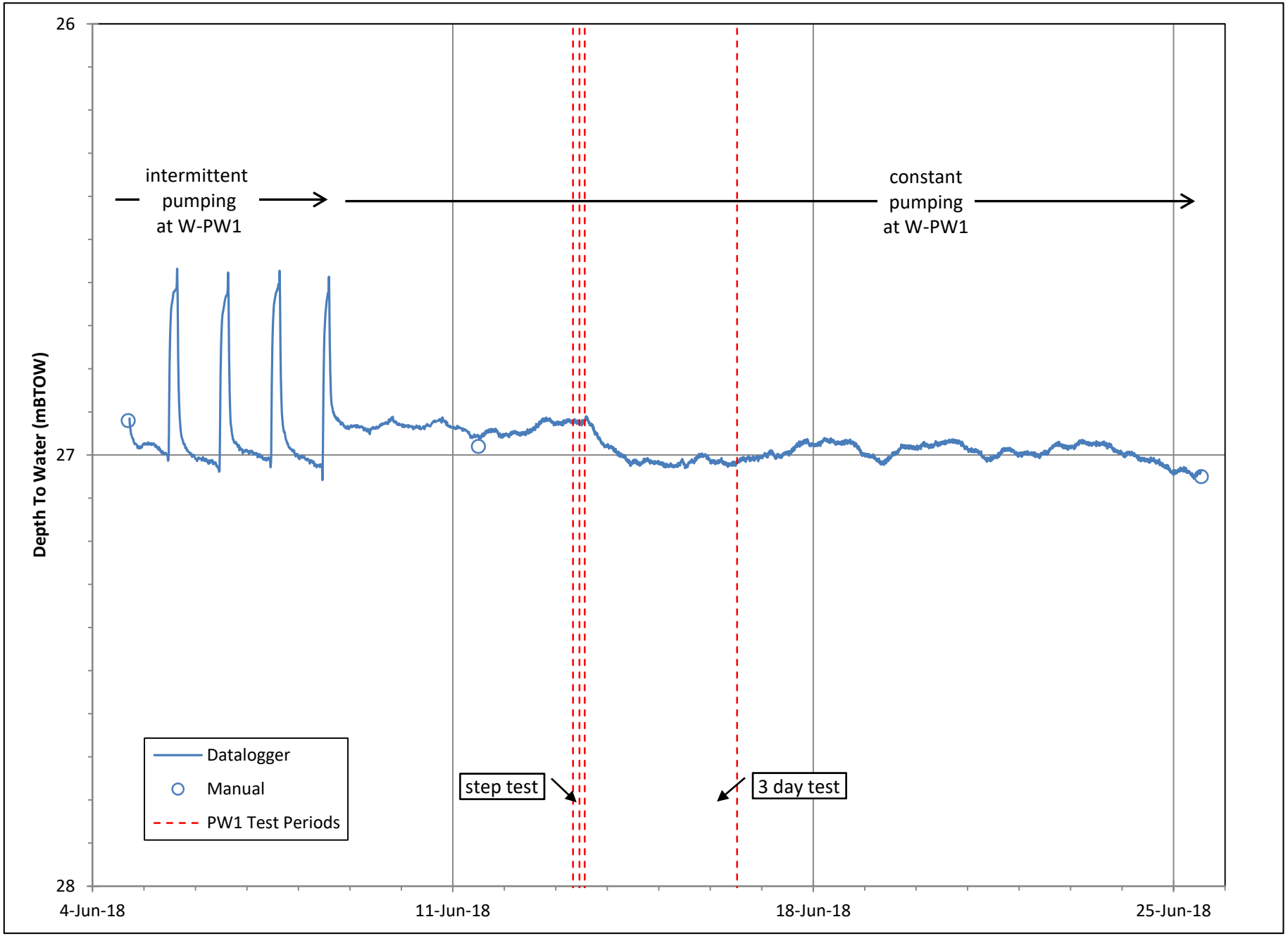
Groundwater Science Corp
Hydrogeologic Investigation



Lafarge Canada Inc
Oro Pit PTTW

Lafarge M6 Hydrograph

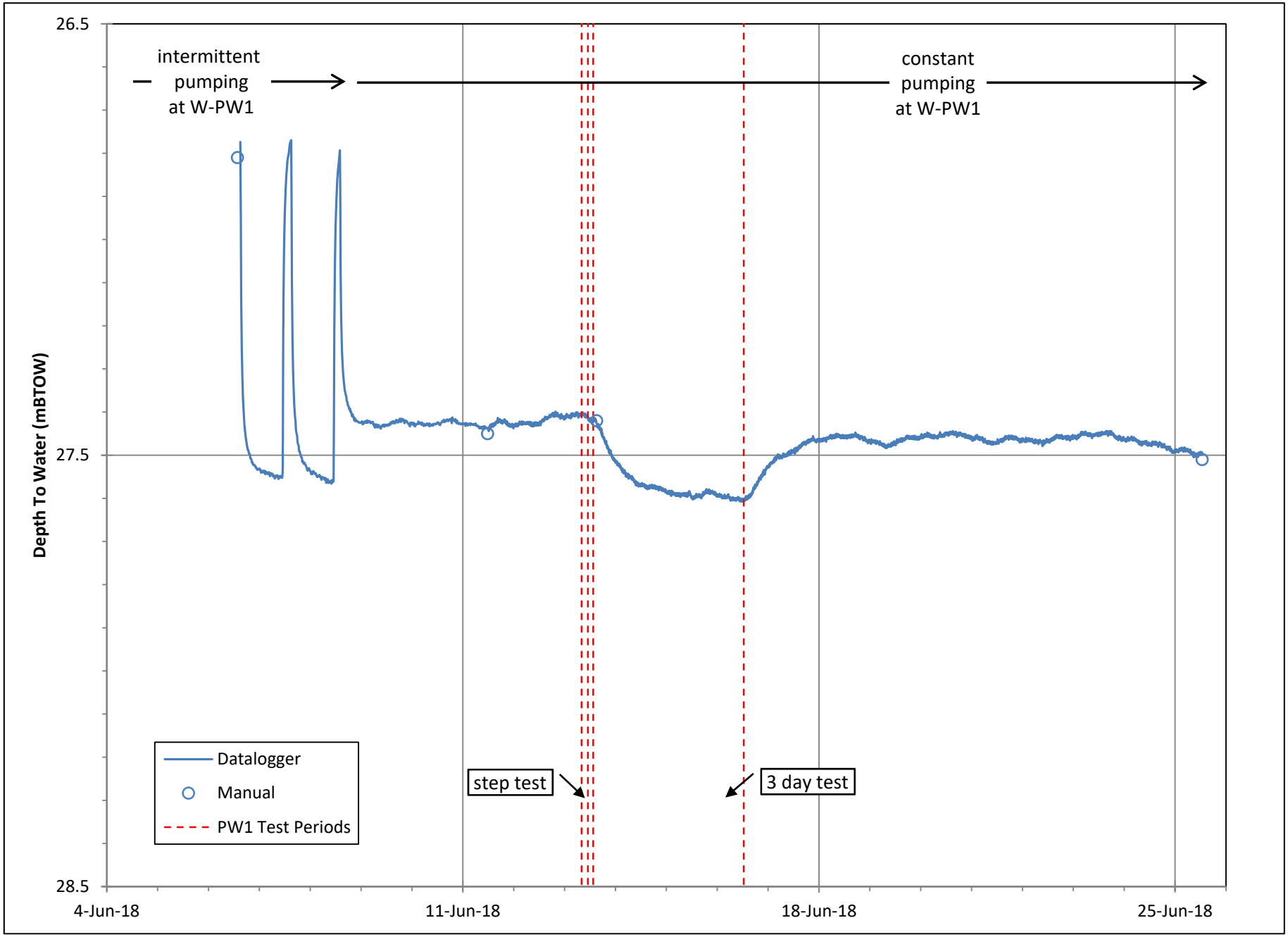
Groundwater Science Corp
Hydrogeologic Investigation



Lafarge Canada Inc
Oro Pit PTTW

Walker W-OW1 Hydrograph

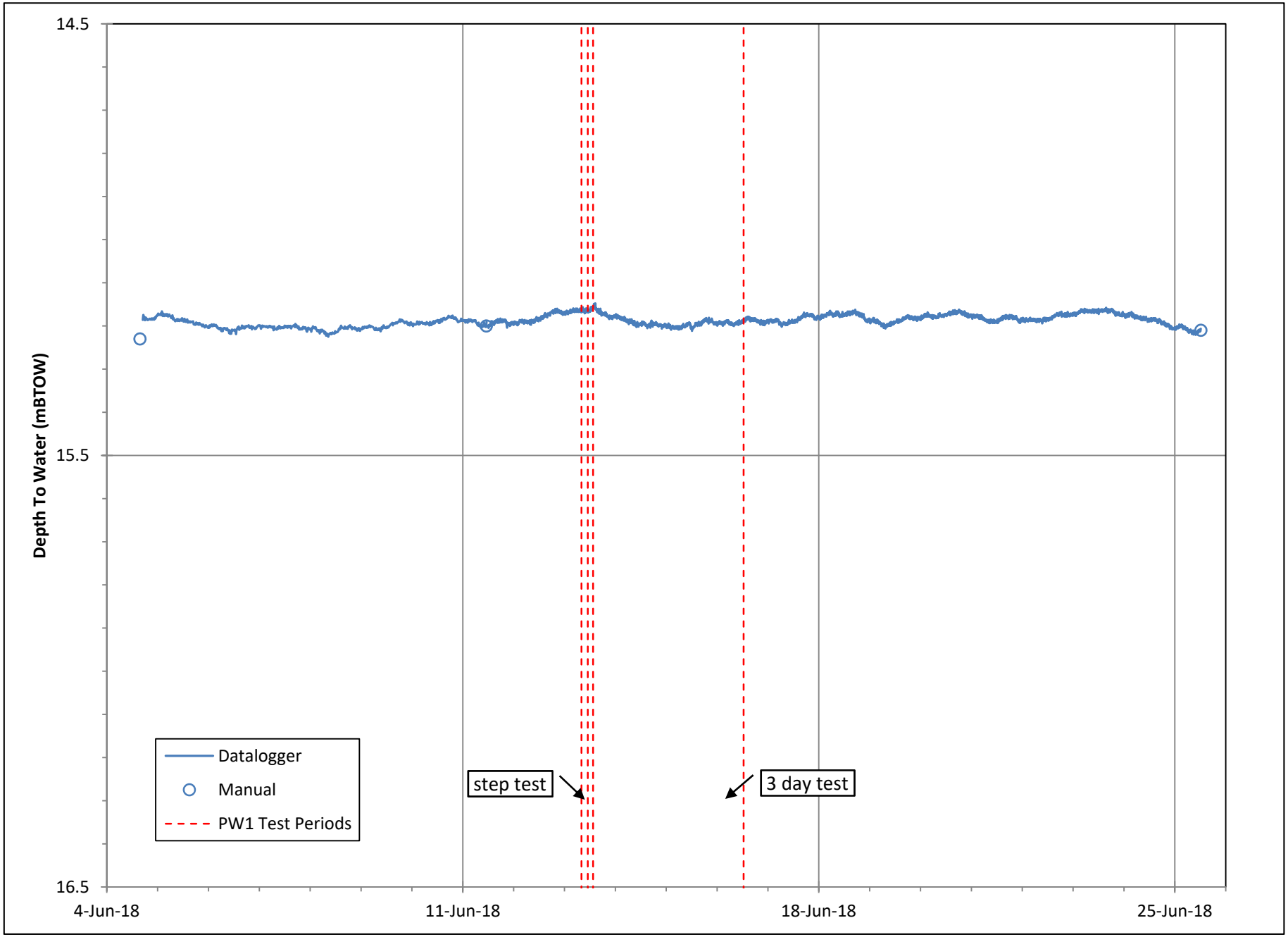
Groundwater Science Corp
Hydrogeologic Assessment



Lafarge Canada Inc
Oro Pit PTTW

Walker W-PW2 Hydrograph

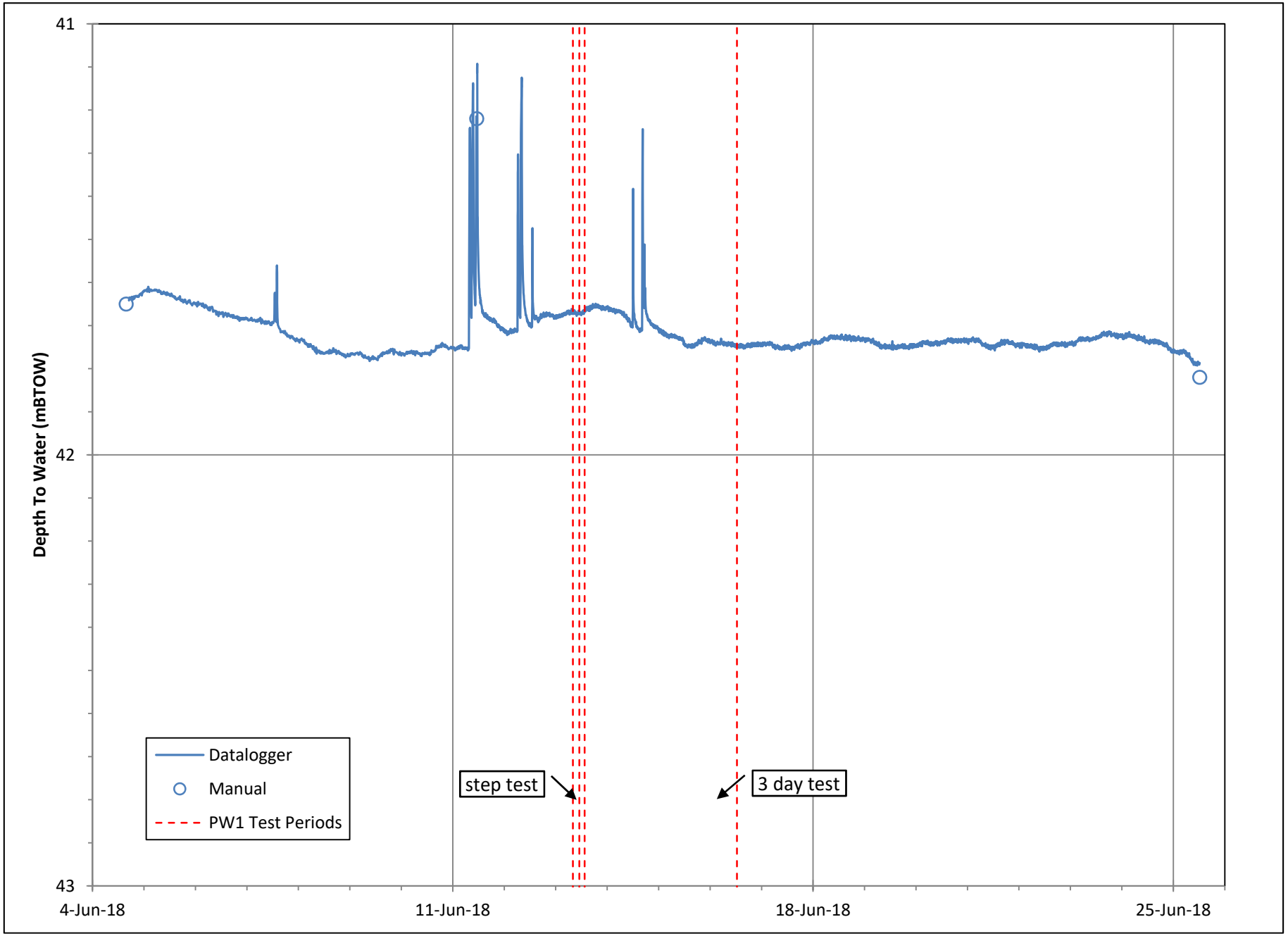
Groundwater Science Corp
Hydrogeologic Assessment



Lafarge Canada Inc
Oro Pit PTTW

Sarjeant S-OW1-S Hydrograph

Groundwater Science Corp
Hydrogeologic Assessment

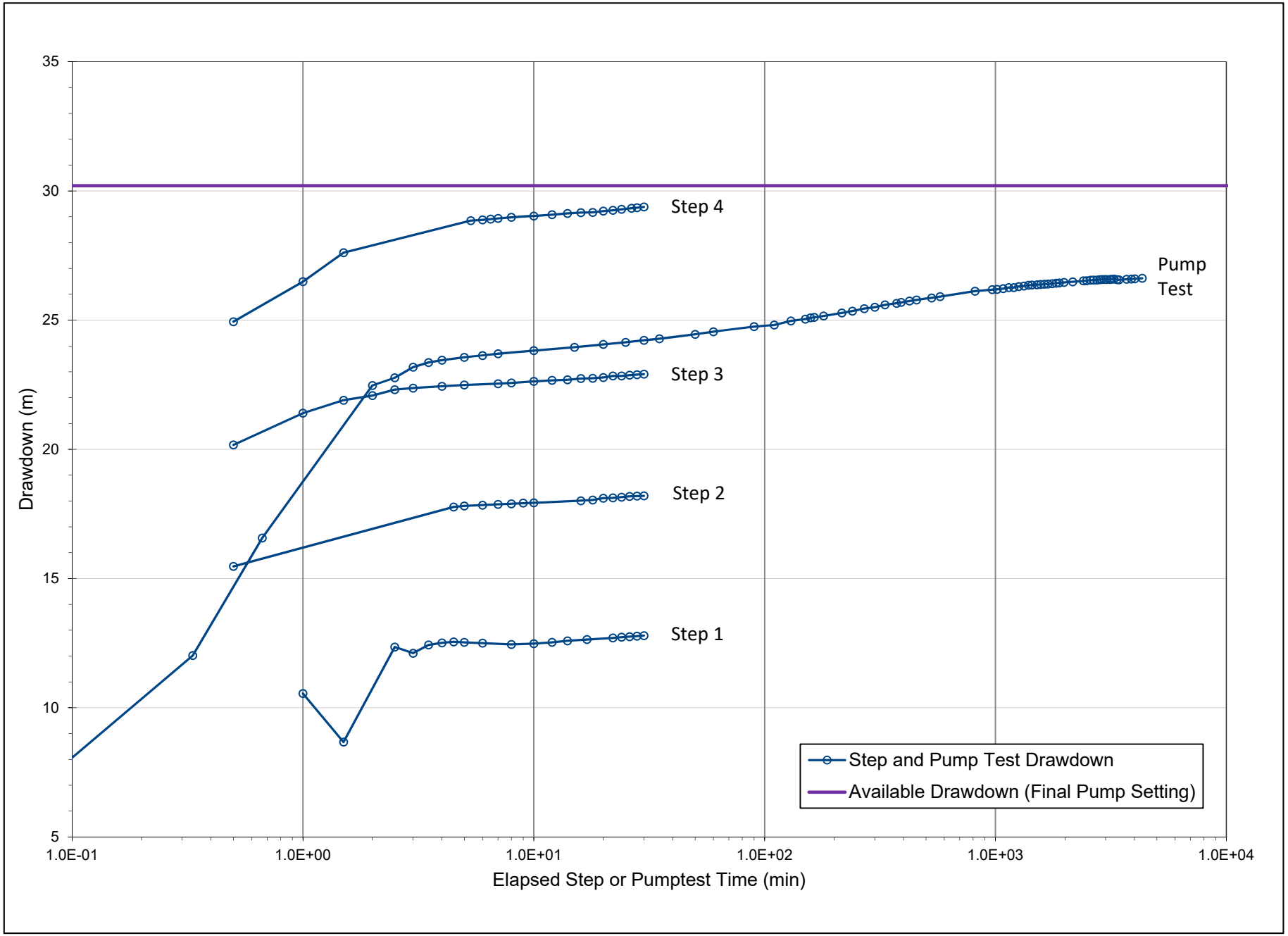


Lafarge Canada Inc
Oro Pit PTTW

Sarjeant S-OW1-D Hydrograph

Groundwater Science Corp
Hydrogeologic Assessment

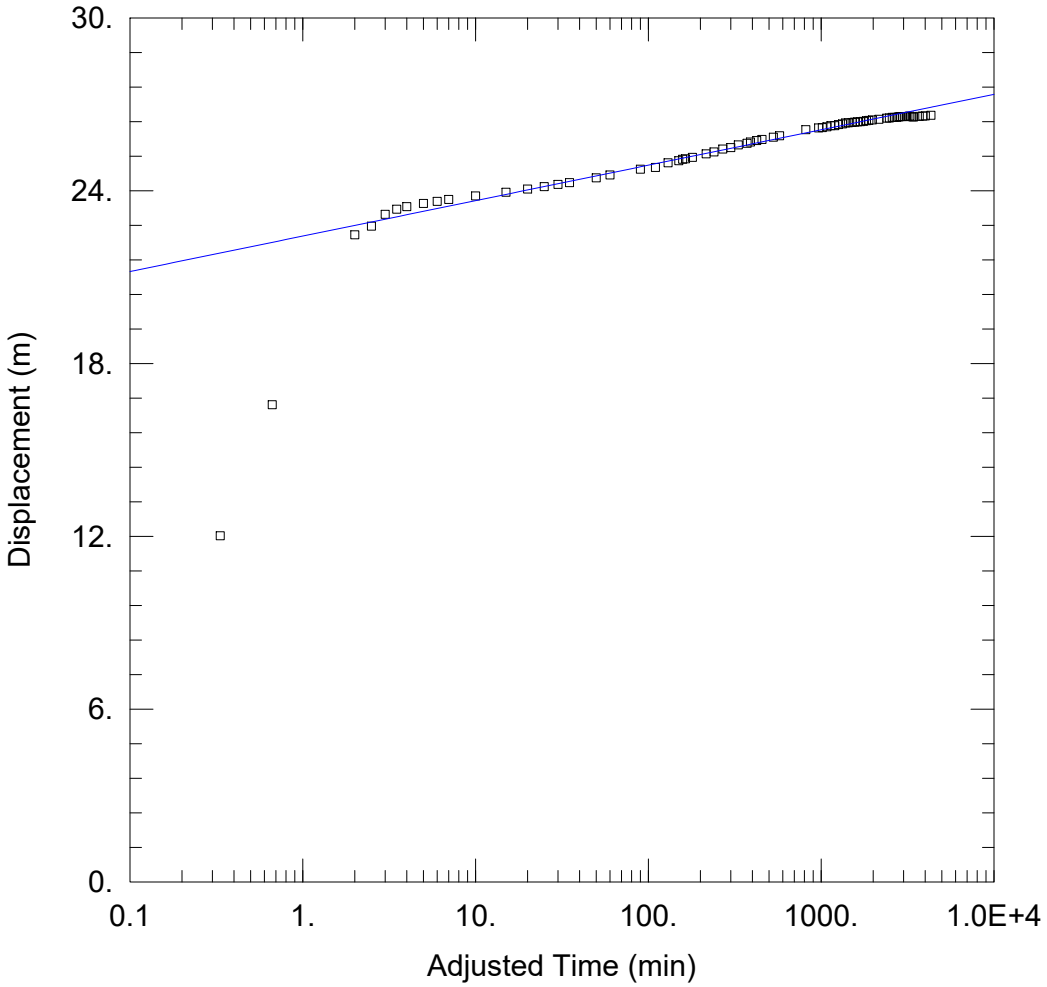
Appendix D
Drawdown Plots and Analysis



Lafarge Canada Inc
Oro Pit PTTW

Lafarge PW1 Drawdown Summary

Groundwater Science Corp
Hydrogeologic Assessment



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: Lafarge Canada Inc
Location: Oro Pit
Test Well: PW1

AQUIFER DATA

Saturated Thickness: 4.9 m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW1	0	0

Observation Wells

Well Name	X (m)	Y (m)
PW1	0	0

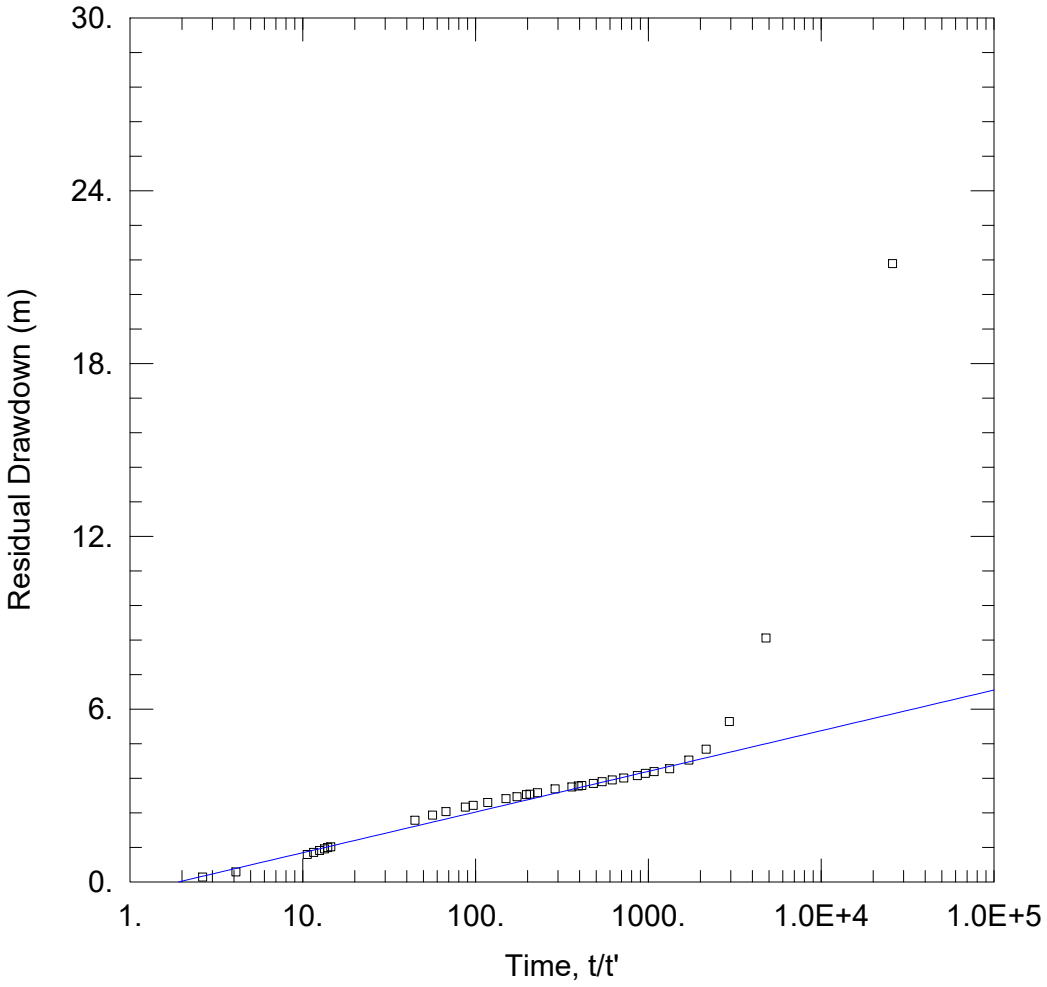
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.001332 m^2/sec

S = 2.015E-17



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: Lafarge Canada Inc
Location: Oro Pit
Test Well: PW1

AQUIFER DATA

Saturated Thickness: 4.9 m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW1	0	0

Observation Wells

Well Name	X (m)	Y (m)
PW1	0	0

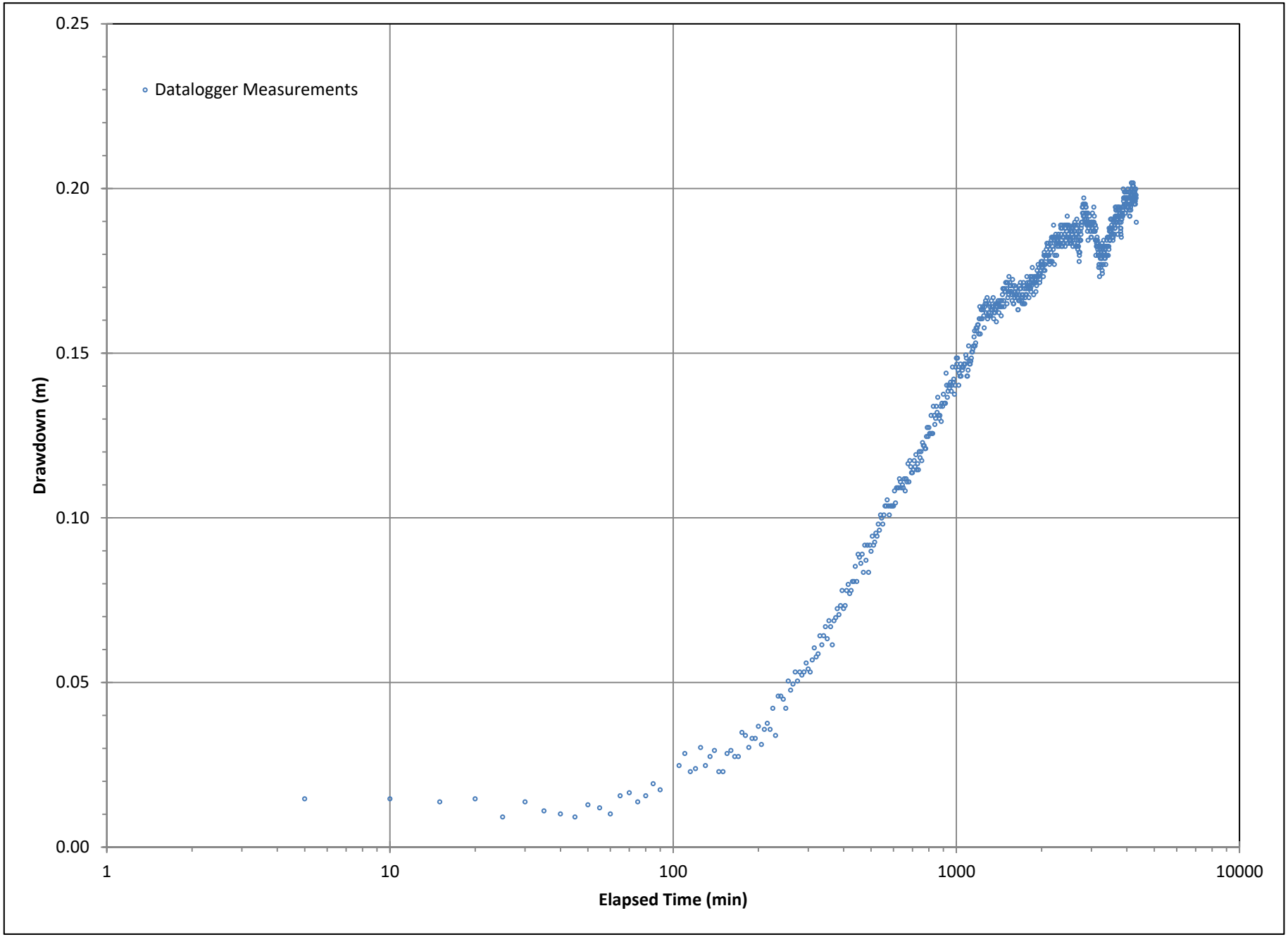
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 0.001161 m^2/sec

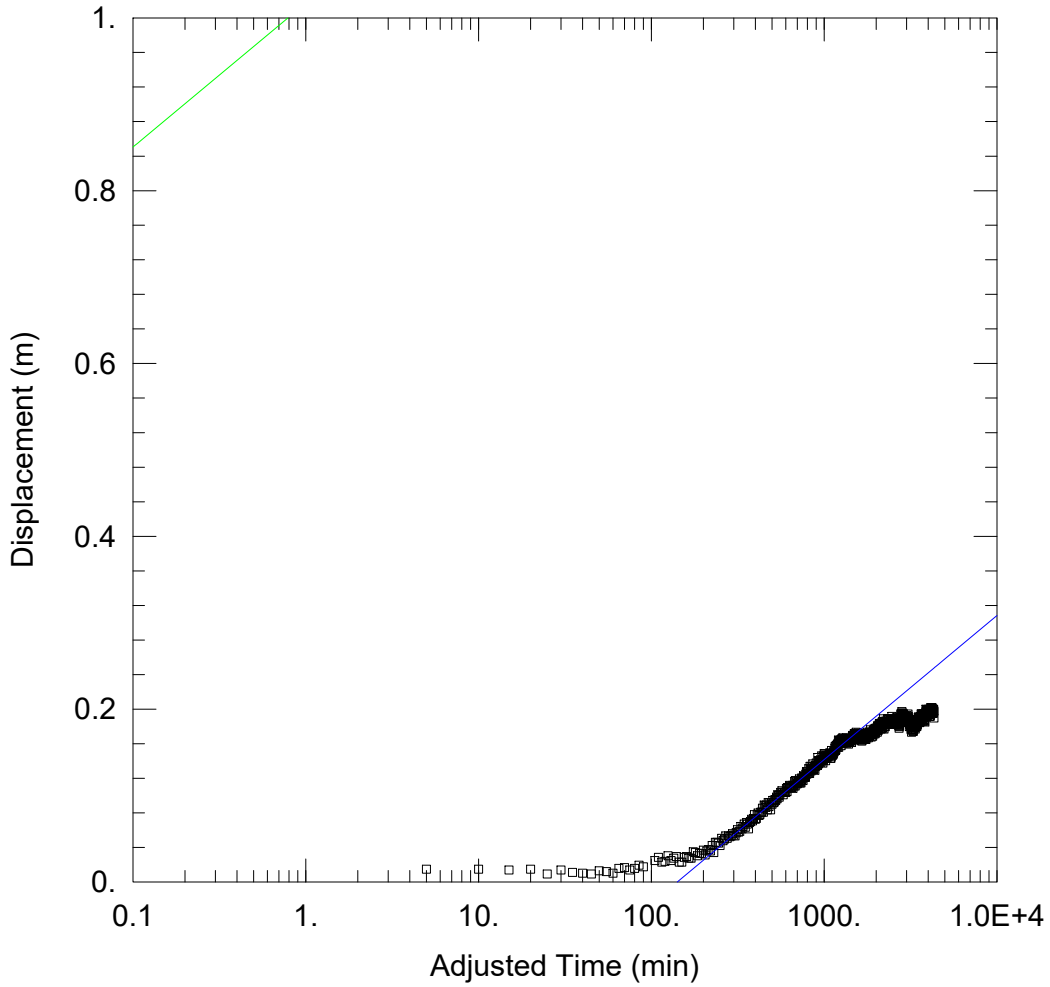
S/S' = 1.913



Lafarge Canada Inc
Oro Pit PTTW

Walker W-PW2 Drawdown Semi-Log Plot

Groundwater Science Corp
Hydrogeologic Assessment



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: Lafarge Canada Inc
Location: Oro Pit
Test Well: PW1

AQUIFER DATA

Saturated Thickness: 15.5 m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW1	0	0

Observation Wells

Well Name	X (m)	Y (m)
PW1	0	0
W PW2	978	0

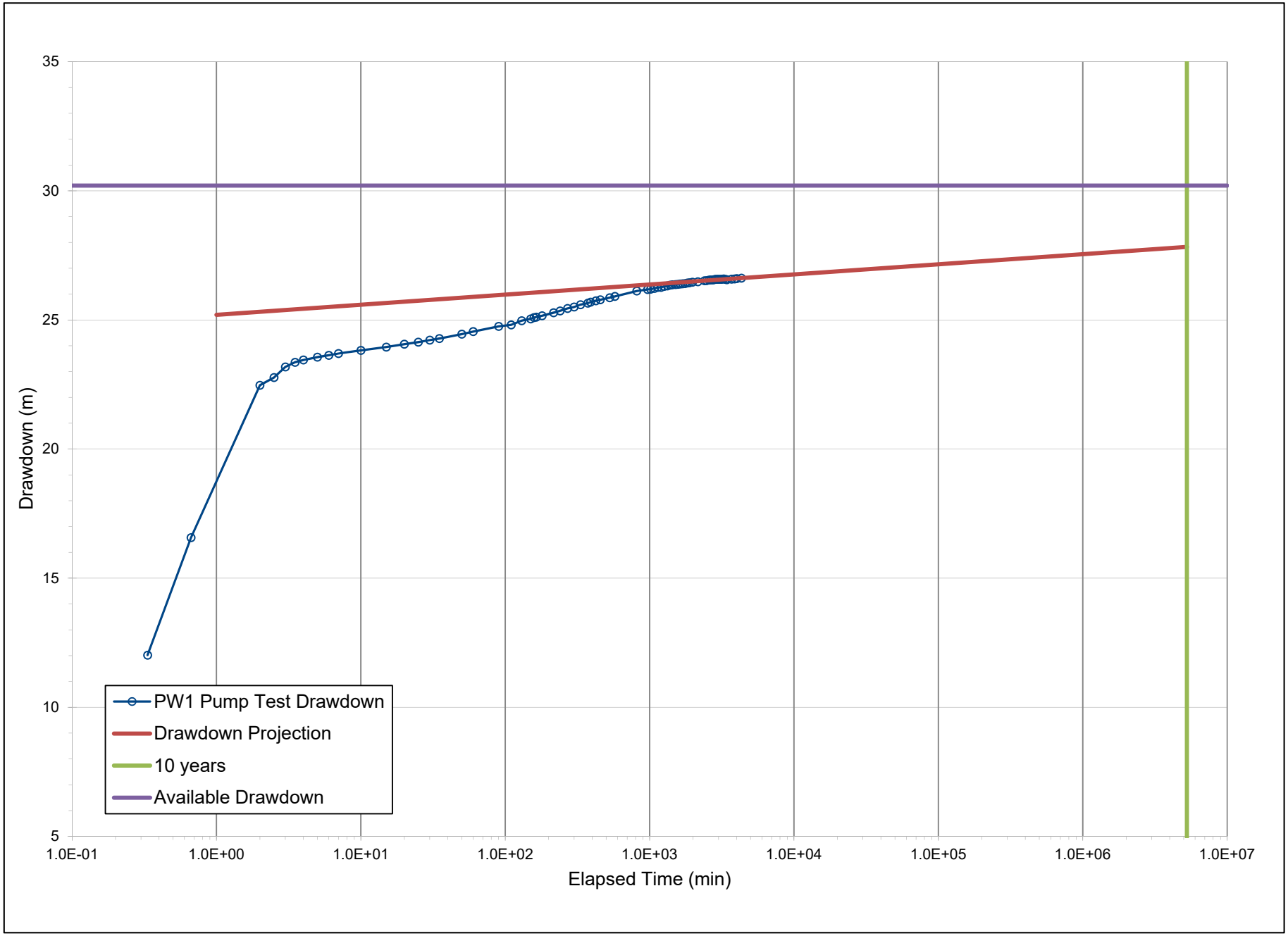
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.009836 m^2/sec

S = 0.0001958



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Drawdown Projection

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Hydrogeologic Investigation