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Hydrogeologic Assessment
BelCal Inc. Proposed Development
6640 7th Line, Belwood (ON)
Township of Centre Wellington
Wellington County

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1.0 INTRODUCTION

This report presents the results of a hydrogeologic assessment completed on behalf of BelCal Inc. for the proposed Belwood residential development. The development lands are located at 6640 7th Line, Belwood, Ontario.

The property is within Lot 12, Concession 7 (Garafraxa), Township of Centre Wellington, County of Wellington. The site location is shown on **Figure 1**. The development proposal is shown on **Figure 2**.

1.1 BACKGROUND

The proposed Belwood development is within the identified hamlet of Belwood boundary. The site is located just northwest of the existing residential community that is developed on the northwest edge of the Belwood Lake reservoir. In addition, an array of seasonal cottages have been developed within "greenspace" (Grand River Conservation Authority lands) along the north edge of the lake, extending northeast and southwest of the residential lands. Similar to the existing community and cottage development, the new development proposes to use individual water supply wells and septic systems.

The development property is approximately 38.7 hectares (ha) in size. The proposed development includes 107 residential lots. Proposed open space includes: trails, parkland and environmental enhancement areas; a stormwater management area; and, a large wooded area that is excluded from the development envelope (Block L, 3.8 ha). The development proposal is discussed further in **Section 7.0** of this report.

1.2 STUDY OBJECTIVES

The purpose of this study is to characterize the Site using existing information sources and site-specific field investigation in order assess the feasibility of the proposed use of on-site sewage systems and private water supply wells to service the development.

The study is intended to address the Ontario Ministry of the Environment, Conservation and Parks Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment (August 1996); and, Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (August 1996). In addition, this study provides overall site characterization (e.g. high water table conditions) and impact analysis (e.g. water balance) to support engineering design components associated with the proposal. However, this report does not provide any engineering guidance with regard to design and construction activities at the site.

2.0 METHODOLOGY

This assessment included a background information review to characterize the local setting and the use of standard field and analysis methods for the site characterization and impact assessment.

2.1 INFORMATION REVIEW

Regional to local geologic and groundwater information is available from published information, reports and mapping. Site specific information is available from the geotechnical assessment completed for the development, from the stormwater

management report, fluvial geomorphology report, and, from the environmental impact study. Detailed ground surface elevation survey (contour) information is available for the property.

As part of this study the following information sources were used:

1) Stovel and Associates Inc., January 19, 2022, *Conceptual Plan (6640 Seventh Line, Belwood, Ontario - BelCal Inc.)*.

2) Chung & Vander Doelen Engineering Ltd., September 21, 2022; *Preliminary Geotechnical Characterization, Proposed Residential Subdivision, 6640 Welllington Road 19, Belwood, Ontario*.

3) Crozier Consulting Engineers, January 24, 2023; *Preliminary Onsite Sewage Servicing Assessment, Proposed Residential Development, 6640 Seventeenth Line in the Village of Belwood, Township of Centre Wellington*.

4) Stovel and Associates Inc., 2023; *Part of Lot 12, Concession 7, Belwood, Wellington County, Environmental Impact Study* (EIS).

5) AquaLogic Consulting, August 30, 2022; *Draft Headwater Drainage Feature Assessment, Fluvial Geomorphology Components, Belwood Lake Tributary, Township of Centre Wellington*.

6) Grand River Conservation Authority (GRCA), Grand River Information Network (GRIN) interactive mapping application, available at: *https://www.grandriver.ca/en/our-watershed/Maps-and-data.aspx.*

7) Ministry of the Environment Conservation and Parks (MECP) published Water Well Records, available at: *https://www.ontario.ca/page/map-well-records*.

8) Ministry of the Environment Conservation and Parks (MECP) Source Protection Atlas interactive mapping application, available at: *https://www.ontario.ca/page/source-protection*.

9) Ontario Geological Survey OGSEarth published geological mapping (KML files viewed on Google Earth); available online at: *http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth*

10) Geographic Data Information obtained through Land Information Ontario (LIO) and licensed under the Open Government Licence – Ontario; available online at: *https://geohub.lio.gov.on.ca/*

Additional general references used are noted in the text of this report.

2.2 FIELD WORK

As part of this study field work was undertaken to assess geologic and groundwater conditions at the site and in the area. The field work undertaken included:

- site inspections and obtaining access to previously installed monitoring wells;
- monitoring well development, response testing and water quality sampling;

- door to door private water wells survey to obtain additional information and obtain monitoring access at select wells;
- water supply test well drilling and installation;
- test well pump testing and water quality sampling; and,
- seasonal water level measurements to define water table conditions.

The water level monitoring program at the site is ongoing to confirm seasonal groundwater level fluctuations. The specific field methodologies used are summarized in more detail in each of the respective sections of this report.

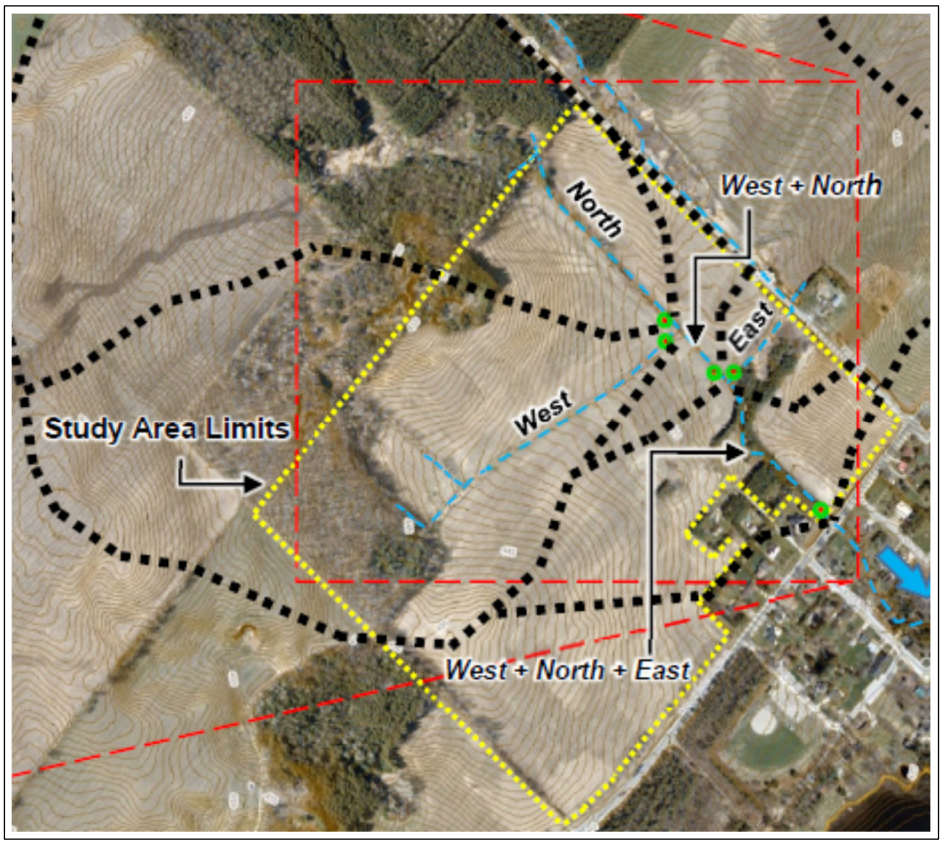
3.0 INFORMATION REVIEW

3.1 SITE TOPOGRAPHY AND DRAINAGE

The existing site and surrounding lands are illustrated in **Figure 3**. As noted in the geotechnical report (Chung & Vander Doelen):

> *The majority of the site is comprised of cultivated cropland with occasional tree clusters/rows on generally rolling topography. Thick bush and wetlands exist in the northwest and southeast areas of the property, respectively, with a number of drainage ditches traversing the site.*
>
> *The site is topographically high in the north central area of the site near Elevation 456 m and is topographically low in the southeast area of the site near Elevation 430 m, thus providing 26± m of relief across the site.*

Based on the mapped topography, overall surface drainage (overland flow) within most of the site is directed toward on-site man-made drainage features, as shown by AquaLogic (August 30, 2022) below:



Surface drainage potential within a small area at the south corner of the site moves east toward the road, and likely enters the side ditch.

As noted by AquaLogic:

None of the reaches are in historically natural alignments. The man-made planforms have nonetheless naturalized over time and currently supply flow conveyance functions in the Spring and intermittently at other times of the year. The North Reach, the West Reach

+ North Reach, and the Main Branch, provide the most significant cumulative function through the study site in terms of flow conveyance and physical feature corridor linkage. The West Reach has the smallest drainage area and nominal function with limited apparent aquatic habitat significance. The East Reach has minor functional significance but most of its drainage area is external to the study site which thus influences the need to maintain corridor linkages.

The "major" feature (East Reach and downstream system) enters the site from the north across 7th Line, then flows off-site to the southeast through the existing community and discharges to Lake Belwood. All features are characterized as essentially intermittent drainage channels.

We note that, as discussed below, two wetland features occur within the on-site woodlot (Block L). It appears that micro-topography characteristics likely direct much of the runoff that could occur within the woodlot into these wetland areas. In addition, outflow from this area is controlled by a constructed ditch and tile drain inlet that is assumed to discharge to the "west" reach just outside of the woodlot.

3.2 NATURAL HERITAGE FEATURES

Please refer to the EIS (Stovel and Associates Inc) report and development proposal Conceptual Plan (Stovel and Associates Inc) for detailed Natural Heritage feature descriptions and mapping. The following provides a summary of potential groundwater related features.

As indicated in the EIS (Stovel and Associates Inc), approximately 5% of the site consists of natural or semi-natural vegetation communities. Of these vegetation communities the 3.5 ha woodlot in the northwest corner of the site is identified as the most notable.

A Yellow Birch-Conifer Mineral Mixed Swamp (SWM3-1) wetland is mapped along the eastern limits of the hardwood woodlot. This community is described as being established on organic soils, and includes small seepage zones. As noted above, an agricultural drain has been excavated along the eastern limits of the wetland. Based on adjacent test pit logs (see **Section 3.4** for additional details), specifically TP15, this wetland is developed within a thin sand deposit that overlies clayey silt till. The wetland occupies a depression in which the organic soils have accumulated.

At the northern limit of the woodlot a Thicket Swamp / Deciduous Swamp (SWT/SWD) is mapped as potentially extending northwest onto the adjacent property, associated with a dug pond constructed in the neigbouring woodlot.

Another small Thicket Swamp / Deciduous Swamp (SWT/SWD) is mapped at the northwest edge of the site, where the North Branch drain begins. This wetland is mapped as extending further northwest of the site, with most of the wetland area within the adjacent property.

The drain system is also identified as part of the Natural Heritage system at the site, with Fresh-Moist Mixed Thicket and Fresh-Moist Mixed Meadow communities identified along the drainage channels.

The Grand River and the Belwood Lake System is identified as the most significant natural heritage feature in the local area (EIS). The site is located approximately 450 m

from Belwood Lake, with a portion of the existing Belwood community and GRCA lands between the proposed development property and the lake.

3.3 SURFICIAL GEOLOGY

Based on published physiographic mapping, the site and surrounding lands are identified as within a Kame Moraine. Belwood Lake is shown as developed within a Spillway within the moraine.

The most recent surficial geology mapping for the area of the site is shown on **Figure 4**. As mapped, clay to silt textured till (unit 5d) occurs at surface within most of the woodlot at the west corner of the site (Block L), and within the southeast/central "half" of the development area. Ice-contact sand and gravel deposits (unit 6) are mapped at surface within the northern "half" of the development area; and extending both north and south of the site. A band of fine (silt to clay) textured glaciolacustrine deposits (unit 8a) are shown along the north channel reach, extending into the field immediately east of the drainage feature. Some sandy to silt textured till deposits (unit 5b) and modern alluvial deposits are shown within the east portion of the development area (east of the drainage system).

A former (small) gravel pit, likely utilized for local/site use, is reported within the ice-contact deposit at about the mid-point of the northwest boundary of the site.

3.4 GEOTECHNICAL STUDY RESULTS

As part of the site geotechnical investigation undertaken by Chung and Vander Doelen a total of 27 test pits were completed. The test pit locations are shown on **Figure 5**. The test pit logs are summarized in **Appendix A**.

The test pits varied from 2.4 to 5.2 m in depth. Most of the test pits were in the range of 4 to 5 m deep.

Material encountered at surface varied across the site, generally corresponding to that reported by the surficial geology mapping. Fine grained material, consisting of clayey silt to silt (often categorized as till) was encountered at surface or near surface (i.e. <1 depth) at 13 locations. Where encountered the silt/clay (till) unit typically extended to depth.

Over 1 m of sand and gravel was reported at surface within 14 of the test pits, and, the sand/gravel extended to more than 2 m depth at 7 of the test pits. The most extensive surficial sand/gravel deposits occur in the area of the former pit and at the "crest" of the hill located just south of the on-site woodlot (Block L). Sand and gravel deposits where encountered at surface were generally underlain by silt till units.

3.5 BEDROCK GEOLOGY

The bedrock subcropping this area is reported to consist of the dolostone of the Guelph Formation. The Guelph Formation is part of a thick, regionally extensive, aquifer system (formerly characterized as the Guelph-Amabel aquifer) that includes underlying bedrock units generally consisting of the Eramosa Formation, Goat Island Formation and Gasport Formation (as currently identified).

This aquifer system is utilized for municipal water supply for nearby communities, and, for private water supply within the community of Belwood and surrounding rural residential/farm properties.

3.6 WELL RECORD INFORMATION

Prior to undertaking any water supply work at the site the reported MECP water well records within 500 m of the site were individually reviewed. The review area includes rural/agricultural properties, the residential development north of Lake Belwood and the seasonal cottage properties along the edge of the lake.

The reported well record locations within about 500 m of the site are shown on **Figure 6**. A total of 95 records were reviewed, and the available well record information is summarized in **Table B1** (**Appendix B)**. Copies of selected local private water well records are included in **Appendix B** for reference.

Note that the location of some well records shown on **Figure 6** have been adjusted according to the findings of the door to door private water well survey and/or closer inspection of the actual well record information. The results of the survey are outlined in **Section 4.3** of this report. We also note that subsequent to the initial review water supply test wells were drilled on-site, as discussed in **Section 4.4** of this report. Copies of the well records generate for the test wells are included in **Appendix A**.

Of the 95 records reviewed, a total of 74 represent water supply wells constructed for domestic or public use. A total of 12 records represent well modifications or abandonment, or have no associated information available. A total of 9 records represent shallow monitoring wells, some of which occur on-site, as discussed below.

The water supply wells constructed in the area are reported to be primarily drilled wells constructed in a confined bedrock aquifer, overlain by clayey overburden. These wells vary in depth from 19.8 to 82.3 metres below ground surface (mBGS). Bedrock was encountered at depths between 6.1 to 41.8 mBGS, however only 4 of these drilled wells report overburden thickness less than 10 m. Reported static levels vary from 0 to 30.5 mBGS. Recommended pumping rates varies from 15 to 76 litres per minute (Lpm), representing good capacity wells with adequate supply for average household use.

Only one shallow (bored) water supply well is reported, constructed in 1965 and having a very low capacity of 6 Lpm (generally insufficient for direct household supply). This well is shown to be located directly adjacent to Lake Belwood. We note that several shallow (dug or bored) well abandonment records are reported since that time, and this shallow well may no longer exist.

A total of 7 well records are listed within the site, 1 of which (#6703168) is reported to be a private water supply well which was constructed in 1968. Based on the well record this well likely belongs to the residence located at 53 Wellington Road 19. The other 6 well records correspond to water table monitors installed by others at the site. Copies of the site monitoring well records (MW1 to MW6) are included in **Appendix A**.

The site monitoring wells are reported to vary in depth from approximately 4.6 to 7.6 m. Clay silt to clay till was reported at surface and extending to depth at 5 of the site monitoring well records. At one location (MW5) sand and silt was reported at surface, extending to a depth of 4.6 m, underlain by clay till.

In general, the water well record review indicates that the main water supply source in this area is the bedrock aquifer. The bedrock in this area is confined, overlain by clayey

overburden that is generally over 10 m, and may be up to 42 m, thick. Since about 1955 reported static levels have remained within a relatively consistent range, indicating no long term decline in potentiometric levels within the bedrock system.

3.7 SOURCE PROTECTION CONSIDERATIONS

There is no Well Head Protection Area or Intake Protection Zone identified at the site or in the vicinity of the proposed development.

The ice-contact sand/gravel deposit area within the site is mapped as part of a Significant Groundwater Recharge area. However, given the presence of till at surface or (generally) near surface, actual recharge contribution to regional groundwater flow systems (i.e. that support municipal water taking) will likely be marginal.

The site is identified within an area of low intrinsic groundwater vulnerability. The site is also not within any identified Wellhead Water Quantity Zone.

4.0 FIELD WORK

4.1 SITE INSPECTIONS

An initial site inspection was completed on February 18, 2022 in order to locate and obtain water quality samples from the water table monitors (MW1 to MW6) installed at the site by others. The locations of on-site monitoring wells are shown on **Figure 5**. At that time snowmelt under frozen soil conditions resulted in overland flow toward the drainage system on-site, and surface water collection within on-site depressional areas. Flows were evident within most of the on-site drainage system.

Further inspections of the site, including drainage courses and woodlot/wetland area (Block L), were completed over the course of the field work undertaken at the site. Over the study period it was noted that the drainage courses are intermittent and have no (or no significant) flow during dry conditions. No outflow was observed from the woodlot/wetland (Block L), however a ditch appears to have been constructed at some point parallel to the woodlot edge to control outflows. A simple grated agricultural tile inlet was identified within the woodlot near the approximate West reach start. This tile appears to outlet within the West reach.

4.2 OBSERVATION WELL DEVELOPMENT AND MONITORING

The monitoring wells were developed by pumping until the discharge water was relatively clear and/or a steady water level response was noted. The water was pumped using an inertial pump (Waterra®).

Water level measurements were obtained as depth to water below top of well casing (established reference point at the culvert) using a Heron Instruments® (or equivalent) electronic water level tape and recorded in the field. Routine monthly measurements are obtained by Stovel and Associates Inc. Occasional measurements were obtained by Groundwater Sciencer Corp. Due to access problems (e.g. unable to open lid) some measurements at MW4 and MW6 are not available.

Surveyed ground surface and top of casing elevations are available at the monitoring well locations, as reported by Van Harten Surveying Inc. The measured water table elevations are summarized in **Appendix C**, in both table and hydrograph format. Water level monitoring at the site is on-going.

In order to characterize the seasonal shallow groundwater quality, water samples for anions (bromide, chloride, fluoride, nitrate-N, nitrite-N and sulfate) were obtained from accessible shallow observation wells on February 18, 2022 (Groundwater Science Corp), April 12, 2022 (Stovel and Associates) and November 8, 2022 (Groundwater Science Corp), according to industry standard methodologies. The November 2022 samples also included a surface water sample from the water course (creek) near MW6, and, included a standard metals scan.

The water samples were obtained from the observation wells using an inertial pump after 3 to 5 bore-volumes were purged. The surface water sample was obtained as a grab sample from the water course. The samples were collected in bottles provided by the laboratory (ALS Labs, Waterloo). The samples were submitted for analysis within 24 hours. The water quality analysis results (laboratory reports) are included in **Appendix D**.

4.3 PRIVATE WATER WELL SURVEY

In order to augment the MECP water well record database a private water well survey was completed within approximately 500 m of the site on September 28th and 29th, 2022. The survey area is shown in **Figure E1** (**Appendix E**). Address numbers, as available, are shown for each property.

As part of the survey each residence was visited and an information and response package was delivered. The package included a response form and stamped return envelope, in addition to telephone and email contact information. A copy of the survey letter and response form is included in **Appendix E**.

A total of 70 properties were visited. A total of 10 survey responses were received, as summarized in **Table E1** (**Appendix E**). The survey confirmed or corrected the location of several wells listed in the MECP database.

In general the well record review and survey response indicates that most local residential properties rely on the bedrock aquifer for water supply.

All accessible private wells were monitored during the pump test period, as described in **Section 4.5**.

4.4 TEST WELL DRILLING

As per Procedure D-5-5, based on the development area (38.6 ha) a total of 5 domestic water supply test wells were drilled on the property from October from October 11th to 21st, 2022. These wells were then pump tested, as described in **Section 4.5**. The location of the test wells are shown on **Figure 5**. Copies of the water well records for each well are included in **Appendix A**.

The wells were drilled by Franklin Drilling Services using the air rotary method and constructed with nominal 15 cm (6 inch) diameter casings set into the upper bedrock. Each well was completed as an open hole in the bedrock aquifer, and airlift developed once a sufficient quantity of water was produced.

The test well drilling results and construction details are summarized in **Table 1**.

Well #	Tag#	Depth (mBGS)					Rate (LPM)
		Static	Bedrock	Casing	Water Found	Total	
TW1	A348196	15.61	33.83	36.88	37.8, 53.6, 58.5	61.57	22.7
TW2	A335261	20.45	35.97	37.19	39.6	43.28	45.4
TW3	A335262	15.45	34.44	36.88	39.3, 42.7, 45.4	49.38	22.7
TW4	A335263	11.28	34.75	36.88	42.1, 59.1	61.26	18.9
TW5	A335270	17.25	35.66	36.88	38.7, 41.2	42.98	34.1
mBGS = metres below ground surface LPM = Litres Per Minute							

Table 1: Test Well Drilling Summary

The overburden encountered at the test well drilling locations was described as consisting primarily of clay/silt, with some sand/gravel/stones present (i.e. till). Bedrock was encountered at depths between 33.8 and 35.9 m, indicating a thick till sequence occurs over the bedrock aquifer. Static levels are above the bedrock surface, indicating the aquifer is a confined system at the site.

The drilling results indicate that the bedrock aquifer system at the site is suitable for private wells, is relatively "protected" by the confining overburden sequence and provides sufficient water supply for typical residential use.

4.5 PUMPING TEST PROGRAM

Aquifer testing was performed on the 5 bedrock test wells from October 24th to 27th, 2022 (testing period) by Simcoe Water Solutions Inc. Each well was pumped for 6 hours using a submersible pump installed for that purpose at rates that were based on well capacity determined during the airlift development process. Pumping rates were controlled using flow restricting valves. Water taking volumes remained below 50,000 Litres per day.

Pumped water was discharged to surface at a distance of approximately 8 m (downslope) from each well. We note that no recirculation effects were noted in the observed response, and none would be expected given the thick (33.8 m or more) till layer over bedrock at the site.

Wells TW1, TW2 and TW5 were each tested individually on separate days. Wells TW3 and TW4 were pumped simultaneously in order to assess the effect of multiple pumping wells on the aquifer response.

The pumping test program is summarized in **Table 2**.

Well	Rate (LPM)	Test Date	Test Start	Note
TW1	22.7	Oct. 24, 2022	10:38 am	started at 34.1 LPM, reduced to 22.7 LPM after 10 minutes
TW2	45.4	Oct. 25, 2022	9:11 am	
TW3	22.7	Oct. 26, 2022	9:15 am	
TW4	18.9	Oct. 26, 2022	10:25 am	
TW5	34.1	Oct. 27, 2022	8:52 am	

Table 2: Pump Test Summary

Dataloggers were installed in TW1 to TW4 for 3 days prior to the testing period. A datalogger was installed in TW5 the morning of the test period start (3 days prior to testing at TW5). The dataloggers were removed 4 days after the testing period. Prior to the testing period measurements were obtained at 1 hour intervals. During and after the testing period measurements were obtained at 10 minute intervals. Manual measurements were also collected during individual pump tests, and, for a 1 hour recovery period after pumping had stopped.

Water levels were also monitored at accessible private wells through the testing period in order to assess potential for off-site impact. A datalogger was installed in the private well

at 57 Wellington Road 19 to obtain detailed measurements over the testing period. At the remaining private wells measurements were obtained manually with either an electronic water level meter, or, using a Solinst® sonic water level meter.

In addition, water levels at shallow on-site observation wells MW3, MW4, MW5 and MW6 were monitored using dataloggers over the testing period. Monitors MW1 and MW2 were "dry" at that time.

The water level monitoring results are summarized as a series of hydrographs in **Appendix F**. The pump test results are further assessed in **Section 5.3**.

Water quality samples were collected at each test well for the ALS general chemistry package after 1 hour of pumping, and again for the ALS potability package just before pumping stopped. The metals samples for the 1 hour general chemistry package were field filtered and therefore represent dissolved metals. The metals samples for the potability package at the end of the test were unfiltered and therefore represent total metals (for comparison).

The water samples were obtained from a dedicated sample spigot installed at the well head. The samples were collected in bottles provided by the laboratory (ALS Labs, Waterloo). The samples were submitted for analysis within 24 hours. The water quality analysis, including relevant results compiled within a summary table and respective laboratory reports, can be found in **Appendix G**.

5.0 DATA INTERPRETATION

5.1 WATER TABLE CONDITIONS

Seasonal water level monitoring has occurred at water table monitors MW1 to MW6 for one year to date, and is ongoing. The high water table condition measured at the site occurred in March 2022. For the purposes of this assessment the March 2022 water table elevation at MW6 is estimated based on the pattern of water level change at MW1. A low water table condition at the site was observed in October/November 2022 based on the overall database.

Projected water table contours, considering both the measured water levels and surficial drainage system elevations, for high and low water table conditions at the site are shown on **Figure 7** and **Figure 8** respectively.

The corresponding high and low water level elevations, in addition to levels observed in July/August, are summarized in **Table 3**.

Monitor	Water Level (mASL)		Difference (m)
	Mar 2022	Oct/Nov 2022	
MW1	437.2	433.0	4.2
MW2	446.2	dry at 442	>4.2
MW3	440.5	439.6	0.9
MW4	439.6	439.0	0.5
MW5	435.3	433.8	1.5
MW6	432.9	431.4	1.5

Table 3: High and Low Water Table Elevations

Based on the measurements to date the water table at the site is observed to fluctuate between 0.5 and 4.2 m seasonally, depending on location. We also note the following:

- During low water table conditions monitors MW1 and MW2 are “dry”;
- In July and August 2022 the water level at MW3 was approximately 2.7 m lower than observed in October/November 2022;
- The overall water table variation (±4 m) at MW1, MW2 and MW3 is considered atypical for southern Ontario;
- The water level at MW4 is above surface (flowing condition) over most of the monitoring period, with the exception of July 2022 when the water level was slightly below ground; and,
- The seasonal water table variation at MW5 and MW6 are considered more typical of the expected shallow groundwater conditions in the area.

The water table variation at the site is likely a result of specific soil and topographical conditions at the site and in the area. The sand and gravel at surface (where it occurs) will likely result in locally enhanced infiltration, however, the sand and gravel deposit is relatively “thin” over most of the site. The nearby wetland areas (Block L and north of

the site) likely contribute to the infiltration and availability of water in the shallow zone. The underlying till unit will limit deeper infiltration and regional/local groundwater recharge. The upper till unit is likely weathered/fractured such that some horizontal flow would occur, in both the sand/gravel unit and upper till layer. In the overall area, including the site, this shallow horizontal flow could reach the local channel system and/or any tile drains where they occur.

The observation wells as installed are affected by this process, and exhibit unusually high spring water levels (and flowing condition at MW4). Through the year as conditions dry out and evapotranspiration results in a soil moisture deficit, the water levels at the monitoring wells decline to more consistent levels across the site within the till unit.

Given that off-site infiltration and shallow flow onto the site likely contributes to seasonal water table levels, on a precautionary basis the high water table as defined in **Figure 7** should be used to plan the subdivision design. For water balance assessments and any proposed LID design, recharge conditions at the till layer should be the primary consideration.

5.2 SHALLOW GROUNDWATER QUALITY

The shallow groundwater and surface water quality sampling results for nitrate are summarized in **Table 4**.

Location	Nitrate Concentration (mg/L)		
	18-Feb-22	12-Apr-22	8-Nov-22
MW 1	6.65	0.10	-
MW 2	6.49	6.08	-
MW 3	0.06	0.03	0.10
MW 4	-	0	0.13
MW 5	0.22	0.14	0.11
MW 6	-	-	0.15
Creek	-	-	0.74
		Average:	1.6

Table 4: Shallow Groundwater Nitrate Concentrations

Based on the sample results the shallow groundwater nitrate concentrations can vary between <1 mg/L to 6+ mg/L, depending on location and time of year. This can be expected within an agricultural setting, particularly considering the water table at the site remains primarily within the till unit and has a large seasonal variation in level. Where the effects of enhanced recharge can occur (e.g. MW1 and MW2), a significant volume of fertilizer can be "flushed" through the system. The nitrate concentrations at other locations within the site, including the water course, represent more natural (background) conditions.

Overall the average observed nitrate concentration, considering both seasonal and areal distribution at the site, of 1.6 mg/L can be used to represent expected future site background conditions within the nitrate loading analysis.

5.3 PUMP TEST ANALYSIS

The total drawdown for each test, as observed at monitored locations, is summarized in **Table 5**.

Monitored Location	Well Type	Drawdown Response (m) to Pump Test At:			
		TW1	TW2	TW3+TW4	TW5
TW1	bedrock	13.53	0.26	0	0
TW2	bedrock	0.13	2.23	0	0
TW3	bedrock	0	0	3.45	0.21
TW4	bedrock	0	0	15.06	0
TW5	bedrock	0	0	0.13	0.43
49 Wellington Rd 19	bedrock	0	0	0.17	0.28
57 Wellington Rd 19	bedrock	0	0	0	0.24
8714 Well. Rd 19	bedrock	0	0	0	0.17
4 North Broadway St	bedrock	0	0	0	0.14
6684 7th Line	bedrock	0	0	0	0
MW3	shallow	0	0	0	0
MW4	shallow	0	0	0	0
MW5	shallow	0	0	0	0
MW6	shallow	0	0	0	0

Table 5: Drawdown Drawdown Summary

Drawdown and recovery analysis was completed for each pumping test using the Aqtesolv® program. An analysis was completed for each pumping well, and, selected observation wells where sufficient response data was available. The analysis provides Transmissivity (T, m^2/s) and Storativity (S) estimates for the bedrock aquifer. A uniform 30 m thick aquifer was assumed for the analysis. The analysis output included in **Appendix F**. The pumping test analysis results are summarized in **Table 6**.

The aquifer type (confined, leaky) and corresponding solution (Theis, Cooper-Jacob or Hantush-Jacob) was selected for each analysis to best fit the setting and data. From the individual test results a conductive upper zone appears to have been encountered at TW2, TW3 and TW5 (shallower higher producing wells). TW1 and TW4 (deeper lower producing wells) appear to obtain water from less conductive lower zones. The lower zone appears to have leaky type response, likely from the upper conductive zone.

As indicated in **Table 6**, the estimate aquifer Transmissivity and Storativity was relatively consistent over the range of tests, with average values of approximately 3.8 x 10^{-4} m/s and 4.7 x 10^{-5} respectively. The calculated bulk hydraulic conductivity of the bedrock system is approximately 1 x 10^{-5} m/s. These values are fairly representative of this aquifer system.

Test	Observation Well	Aquifer Type	Solution	T (m^2/s)	S
TW1	TW1	Leaky	Hantush-Jacob	6.10E-06	-
	TW2	Confined	Cooper-Jacob	5.00E-04	4.20E-05
TW2	TW2	Confined	Theis	9.50E-04	-
	TW1	Confined	Cooper-Jacob	3.80E-04	4.70E-05
TW3/TW4	TW3	Leaky	Hantush-Jacob	1.20E-04	-
	TW4	Leaky	Hantush-Jacob	2.10E-05	-
	TW5	Leaky	Hantush-Jacob	4.10E-04	5.60E-05
	49 Well Rd 19	Leaky	Hantush-Jacob	4.70E-04	2.70E-05
TW5	TW5	Confined	Cooper-Jacob	5.50E-04	-
	TW3	Confined	Theis	3.50E-04	5.10E-05
	49 Well Rd 19	Confined	Theis	3.30E-04	6.80E-05
	57 Well Rd 19	Confined	Theis	4.50E-04	3.90E-05

Table 6: Pump Test Analysis Summary

5.4 BEDROCK (WATER SUPPLY) AQUIFER WATER QUALITY

Water quality sampling at the test wells during the pump test program provides a detailed assessment of the bedrock aquifer water quality in this area. As indicated by the water quality results, the samples obtained at the start and end of each test were similar, indicating that the wells were sufficiently developed and the samples represent aquifer conditions.

In general the water quality is considered good, with almost all health related drinking water criteria met. One exception is the end of test total arsenic result at TW3, which is slightly elevated above the drinking water criteria. We note that the filtered sample at the beginning of that test was within the drinking water criteria limit, which suggests that a filtration system may be needed at this well. Other treatment options also exist, such as reverse osmosis for drinking water. Alternatively, TW3 is one of the two shallower wells constructed at the site, this well could be also be deepened to intercept lower water producing zones in order to mitigate arsenic. We recommend that TW3 be pumped (developed) further and re-sampled prior to household connection, and that well alteration or water treatment options be developed prior to use for drinking water.

Sodium is also very slightly elevated above the drinking water chemical (health related) standards of 20 mg/L, which is considered common in southern Ontario. The sodium levels are well below the aesthetic guideline of 200 mg/L.

The sample results meet all microbiological standards. In addition, nitrate levels were “non-detect”, indicating that the bedrock aquifer system is not significantly affected by surficial influences, such as agricultural fertilizer use or septic system effluent. Overall water quality is typical for bedrock aquifers in this area of Southern Ontario, and can be considered hard.

6.0 SITE HYDROGEOLOGIC SETTING

The hydrogeologic setting of the proposed Belwood development site is discussed in context of the known regional setting, information review undertaken for this site, and, monitoring and testing completed as part of this study.

In order to illustrate the hydrogeologic setting in the area of the site 3 schematic cross-sections were developed based on reported topographic contours, select water well records and site-specific testing. The section locations are shown on **Figure 9**. The sections are attached to this report as **Figure 10**, **Figure 11** and **Figure 12**.

Section A (**Figure 10**) runs northwest to southeast through the middle of the site. The section illustrates the overall topographic slope and relationship between surface water features (pond, ditch, lake). As shown, the surficial sand and gravel deposit is limited in area and depth, and most of the overburden consists of the till sequence. The water table slope mirrors topography, and overall flow is generally southeast. Local wells (including test wells at the site and off-site domestic wells) are installed into the bedrock system. The vertical hydraulic gradient between the water table and the bedrock potentiometric surface is evident.

Section B (**Figure 11**) runs southwest to northeast through the middle of the site. Overall conditions as shown are similar to Section A.

Section C (**Figure 12**) runs generally west to east, through the hill within the southern portion of the site. The section illustrates the enhanced infiltration potential west of TP19, and transition to the till deposit to the east (by TW2/MW2). As shown, the water table is within the till unit and slopes generally toward the lake.

The surficial sand and gravel forms a relatively thin layer over some of the site. Localized spring infiltration rates can be expected to be high where the sand/gravel is present, particularly if there is enclosed drainage. However, only a portion of this infiltration can be expected to result in groundwater system recharge that would contribute to intermediate/regional flow systems or the bedrock aquifer. Much of the water infiltrating on-site likely flows along the surface of the underlying till unit, or within the upper weathered zone, and moves rapidly into the local drain system. The water table falls to within the till unit over summer/fall periods. This leads to the relatively large (2+ m) seasonal water level fluctuations observed at most locations on-site.

Till units comprise most of the overburden sequence, and directly overlie the bedrock. The till sequence at the site is very thick and provides a “protective” cover for the confined bedrock aquifer. The water table within the till unit is sloped generally toward Lake Belwood, and contributes flow toward that feature. A downward vertical gradient also exists from the water table to the bedrock aquifer, and some groundwater contribution from the site to this deeper regional system is also expected.

Based on the test well static levels at the site, local flow within the bedrock system appears to be east/southeast, generally toward Belwood Lake.

The primary groundwater function of the proposed development area is recharge. This recharge supports groundwater conditions and flow in the surrounding area. The overall

contribution of the site to intermediate/regional flow systems will be relatively small relative to the volume of flow within those systems.

The primary aquifer in the area is the confined bedrock system. At the site, and in the surrounding area, the bedrock aquifer is protected by a thick till sequence.

The wetland features at the site are developed within depressions, that may include a thin layer of sandy deposits, within the till sequence. Seepage areas as noted within the woodlot (Block L) originate from either localized infiltration within the woodlot or from shallow flow within the upper soils originating from off-site to the west/northwest. Based on the site topography, these wetlands also depend on direct precipitation or runoff contributions from the surrounding wooded areas (extending off-site). There is no runoff or groundwater contributions from the proposed development lands to the wetland areas identified at the site.

7.0 DEVELOPMENT PROPOSAL

For the purposes of this assessment the proposal is summarized as follows:

- the study area (ownership parcel) is approximately 38.7 ha in size;
- the 3.8 ha western woodlot (Block L) will be preserved (undisturbed);
- the development area includes 1.37 ha stormwater management area (open space);
- includes additional parkland open space;
- streets occupy approximately 5.28 ha; and,
- 107 residential lots occupying approximately 26.53 ha.

The development is to be serviced by individual private wells and septic systems. Septic systems are expected to use tertiary treatment in order to mitigate nitrate loading and ensure local groundwater conditions are maintained for both on-site and off-site uses. Standard development approaches and controls, such as natural environment set-backs, construction controls (e.g. erosion mitigation), stormwater management and Low Impact Development (LID) designed to mitigate flows and site recharge, are expected in order to reduce development impact and maintain both on-site and off-site natural environment conditions.

8.0 IMPACT ASSESSMENT

The development plan to date does not include specific details that are needed for a finalized impact assessment, such as grading plans, streetscape details, final lot definitions, proposed building envelopes, driveway limits, foundation elevations, service trench elevations, etc. In general, it is expected that the grading plan will meet Township requirements such as lot grading/slopes, street grading and design, gravity foundation drainage to storm sewers, etc. As such, all building foundations are expected to remain above the water table. Service trenches that may extend below the water table can also be designed as needed, with seepage collars for example, to ensure progressive dewatering of the site does not occur. In general, at this time it is assumed that impacts related to building and service design and construction will be avoided or mitigated using standard practices. Appropriate Natural Heritage Feature set-back and floodline limits on grading or building are expected to be incorporated into the final plans.

In order to address initial development requirements, and to show the feasibility of the proposal, this impact assessment is intended to address MECP Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment (August 1996); and, Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (August 1996); in addition to establishing existing water balance recharge in order to set targets for stormwater management and LID design implementation.

8.1 WATER BALANCE CALCULATIONS

Water balance calculations are included in **Appendix H**. The water balance analysis was completed for existing site conditions in order to characterize targets for stormwater management LID implementation. The assessments examine average annual conditions and are developed according to standard water balance input/output methodology.

"Average" climate data for the area is based on monthly precipitation and temperature climate normals (1981 to 2010) as reported by Environment Canada for the Fergus Shand Dam weather station. Evapotranspiration, runoff and infiltration rates are estimated in accordance with MECP development application guidelines (*Hydrogeological Technical Information Requirements for Land Development Applications, April 1995*) and stormwater management guidelines (*Stormwater Management Planning and Design Manual, March 2003*).

Based on the climate data monthly actual evapotranspiration (AET) estimates were calculated for the sand/gravel and till surficial soils and site setting (hilly landscape, primarily agricultural land cover) using the *Computer Program for Estimating Evapotranspiration Using the Thornthwaite Method, United States Department of Commerce, National Oceanic and Atmosphere Administration (NOAA) Technical Memorandum ERL GLERL-101* (November 1996).

The AET estimates are developed according to a Soil Moisture Retention (SMR) value of 75 mm for the sand/gravel deposit (moderately deep rooted crops on fine sand soil), and, 200 mm for the till soils (moderately deep rooted crops on silt loam). The SMR reflects the fact that a soil moisture deficit, which limits the amount of water available for evapotranspiration, typically occurs during summer months.

A climate and Thornthwaite analysis summary for "average" monthly and annual conditions is provided in **Appendix H**. Annual average precipitation is estimated to be 945.9 mm/yr. The AET on sand/gravel and till soil types is estimated to be 551.29 mm/yr and 571.29 mm/yr respectively.

The difference between precipitation falling on the assessment area (direct input) and evaporation/evapotranspiration (direct initial output) is termed the water "surplus". Surplus water within an assessment area can either infiltrate to recharge the groundwater system or form surface water runoff. Land surface runoff rates at the site are calculated according to the MECP development application guidelines methodology, which assigns an infiltration factor (IF) to apply to the water "surplus" in order to calculate recharge. The IF depends on individual factors related to topography, soil type and vegetation/cover.

The site is generally open hilly lands in which it is assumed that natural runoff could occur. Surficial sand/gravel deposits areas of the site have open sandy loam type soils and can be considered "cultivated". Therefore, an IF of 0.6 (60%) is estimated. The remainder of the surplus (40%) in this area can become runoff. Similarly, the surficial till soils (cultivated medium clay + loam) have an estimated IF value of 0.4 (40%) and runoff of 0.6 (60%).

The site is approximately 38.7 ha, of which approximately 19.8 ha (51%) is estimated to have sand/gravel at surface and 18.9 ha (49%) is estimated to have till soils at surface. Under existing conditions average on-site annual recharge is therefore estimated to occur at a rate of 0.195 m/yr.

It is expected that in order to mitigate any water balance within the proposed development area deficit clean (roof and open land) runoff will be directed to LID lot level and/or conveyance control measures. In addition end-of-pipe infiltration measures can also be considered.

8.2 NITRATE LOADING

MECP Procedure D-5-4 (*Technical Guideline For Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment*, August 1996) indicates that for the proposed development a 3 step process is appropriate, consisting generally of:

1. Determination of lot size.
2. System isolation identification.
3. Contaminant attenuation (risk) assessment.

We note that this is a risk assessment, and not a predictor of actual nitrate concentrations in the groundwater system. This type of methodology acknowledges that it does not account for all dilution and denitrification processes, and therefore we can consider the method as an approximation that allows for relative risk to be determined. If the nitrate loading calculation has a result of 10 mg/L (drinking water limit) or less, the "risk" of associated environmental impact to groundwater systems associated with the proposed development is considered relatively low.

Lot Size

The proposed 107 residential lots (Group A to Group G) have an average lot size of approximately 0.25 ha, with a minimum lot size of 0.21 ha. Given that the proposed lots are less than 1 ha, then system isolation should be considered as the next "step" in the assessment process.

System Isolation

System isolation can be considered in the context of the hydrogeologic setting.

The shallow water table system is the primary "receiver" for septic system impacts. The water table system flows generally southeast, below the existing community, and is expected to discharge to Belwood Lake.

Overall vertical flow through the till layer to the bedrock system will be limited due to the geologic setting. The till sequence will promote horizontal flow within any shallow (water table) flow systems associated with either sand/gravel or weathered till horizons at, or near surface.

The proposed subdivision is to be serviced using bedrock wells. Existing water supply between the proposed subdivision and Belwood Lake appears to be limited to the bedrock aquifer. The bedrock aquifer is protected by the overlying till sequence. Therefore the water supply aquifer known to be in use in the area, and proposed to be used at the site, is relatively isolated from septic system impacts.

The test water quality sampling within the existing subdivision confirms that the bedrock aquifer is relatively isolated from surficial influences, including nitrate loading impacts associated with both agricultural fertilizer use and local septic system use.

Based on system isolation considerations, and assuming well construction meets applicable provincial regulations and standards, local bedrock water supplies are interpreted to be at relatively low "risk" from septic loading impacts within the overburden system due to the proposed development. However, for completeness a contaminant attenuation assessment is also provided.

Contaminant Attenuation Assessment

The following nitrate loading calculation (predictive assessment) is provided as part of the risk assessment. It is our understanding that tertiary treatment septic systems are proposed as part of this development. Crozier (January 2023) indicates that the tertiary treatment (Level IV) systems under consideration can achieve between 50% and 65% nitrogen reduction. The MECP Procedure D-5-4 specifies that an effluent nitrate-N concentration of 40 mg/L from a standard Level II septic system be assumed. At 50% reductions the nitrate-N concentration would be 20 mg/L. At 65% reduction the nitrate-N concentration would be 14 mg/L. As noted above, the shallow water table system is the primary receptor of septic loading impacts, however consideration is also given to any potential vertical migration to the deeper bedrock aquifer system.

Based on the proposed 107 residential lot subdivision, each residence with individual tertiary treatment septic systems (MECP specified effluent volume of 1,000 L/day) achieving 20 mg/L nitrate concentration at the septic bed, the daily nitrate loading would be expected to be 2,140,000 mg/day. Assuming 0.195 m/yr recharge over 38.7 ha

(recharge volume to be maintained post development), and incorporating septic volumes, total site recharge would be 313,223 L/day. Therefore, expected nitrate loading due to the proposed development would result in nitrate concentrations of 6.8 mg/L at the water table. At 65% reduction the expected nitrate loading due to the development would result in nitrate concentrations of 4.8 mg/L.

The existing shallow groundwater background nitrate concentration is 1.6 mg/L on average, and would be expected to decline once the site is no longer in agricultural production, therefore the resulting final nitrate concentration in the shallow groundwater system related to the proposed septic systems would be well below 10 mg/L. Therefore, according to a predictive assessment the proposal satisfies the MECP Procedure D-5-4 septic loading risk assessment criteria.

Given that additional dilution can be expected if groundwater does move vertically to depth, both within the overburden aquitard and due to aquifer flow, potential impact to the bedrock water supply aquifer supplying both existing and planned new wells is also projected to be low.

8.3 WATER SUPPLY

We note that the pumping tests were completed for extended periods at rates well above typical expected residential water taking, therefore are a very conservative assessment of potential water supply interference. Procedure D-5-5 specifies a minimum test rate of 13.7 L/min, and, a test rate of 3.75 L/min/person within the expected household. The procedure states number of persons is estimated as the number of bedrooms plus one. Based on the servicing assessment (Crozier) the proposed residential dwellings are expected to have between 2 and 4 bedrooms. Therefore, the test rates required to meet MECP requirements vary from 13.7 L/min (minimum) to 18.75 L/min (4 bedroom residence). The pumping test rates at the BelCal Inc proposed Belwood subdivision test wells exceeded the MECP requirements.

As indicated by **Table 5**, the pumping tests indicate that no significant interference can be expected due to the proposed water supply wells within the development, either on-site at newly constructed wells, or off-site at existing wells in the area.

The test well water quality sampling results indicate that the bedrock aquifer in this area can provide good potable water to the development. The thick till aquitard system in the area of the site protects the bedrock aquifer from surficial influences.

We note that based on a visual review and search for water well records using the MECP mapping application, the existing number of wells within the settled area of Belwood (e.g. existing lots northwest and southeast of Belwood Lake) is on the order of 200+. Numerous other wells also occur at cottages along Belwood Lake. The existing development is a model of the water supply capability and sustainability of the bedrock aquifer in this area.

The pump test results also show that no impact is expected on shallow groundwater conditions at wetland areas or surface water drainage features at, or near, the site due to the proposed private well use.

9.0 CONCLUSIONS

Based on the results of the hydrogeologic assessment, the proposed BelCal Inc Belwood development site is suitable to support development of a 107 lot subdivision using private water wells and private sewage systems with tertiary treatment (i.e. Level IV achieving at least 65% nitrate removal) without causing impact to the local groundwater resources or natural heritage features.

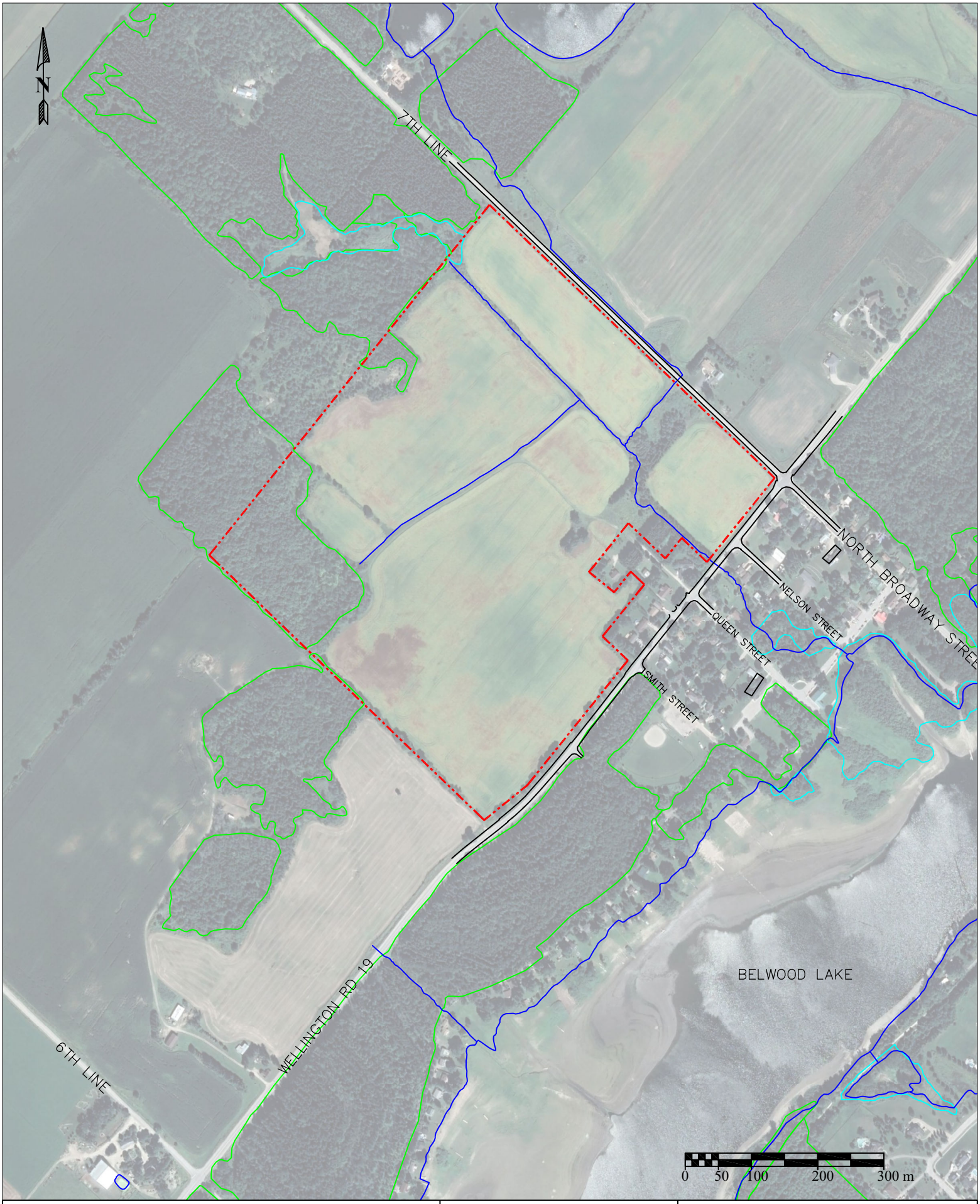
The following recommendations are made with respect to the proposed development:

- Tertiary sewage treatment systems capable of achieving at least 50% nitrate removal are to be provided to residences constructed as part of the proposed development.
- Private water wells servicing the proposed development are recommended to be completed within the bedrock aquifer and constructed according to all applicable regulations.
- Test well TW3 should be re-developed prior to use and re-sampled for arsenic. If arsenic concentrations persist at or near drinking water limits then the residence using this well should either be provided with adequate treatment to remove arsenic prior to household use, or, alternate arrangements made to reduce the arsenic levels at the well (e.g. such as deepening the well followed by re-development and resampling).

All of which is respectfully submitted,

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

Figures



stream, pond (LIO, Site Plan)

wetland (LIO)

wooded area (LIO)

Site (approximate)

air photo: Google Earth (Sept 2021)

Modified from: geographic data obtained through Land Information Ontario

May 2023
Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 1: Site Location

BelCal Inc
Proposed Belwood Development

Group/Block	Lot #'s	Area (±)	Land Use
Group A	1-21	4.25ha	Residential Lots
Group B	22-33	2.60ha	Residential Lots
Group C	34-58	6.17ha	Residential Lots
Group D	59-77	4.98ha	Residential Lots
Group E	78-87	2.16ha	Residential Lots
Group F	88-100	3.45ha	Residential Lots
Group G	101-107	2.92ha	Residential Lots
Block I	-	4.31ha	Open Space / Parkland / Environmental Enhancements
Block J	-	1.37ha	Stormwater Management Facilities
Block K	-	0.26ha	Path / Trail
Block L	-	3.80ha	Existing Forest
Block M	-	5.28ha	Proposed Roadway
Block N	-	0.8ha	Existing Wooded Area

Group	Average Lot Size (m^2) (±)	Minimum Lot Size (m^2) (±)	Minimum Lot Frontage (m) (±)
Group A	2125.19	2025.59	24.0
Group B	2165.80	2046.35	32.0
Group C	2469.24	2028.40	24.0
Group D	2609.26	2062.80	22.0
Group E	2163.88	2033.04	28.0
Group F	2652.44	2036.50	21.0
Group G	3662.10	2059.07	22.0

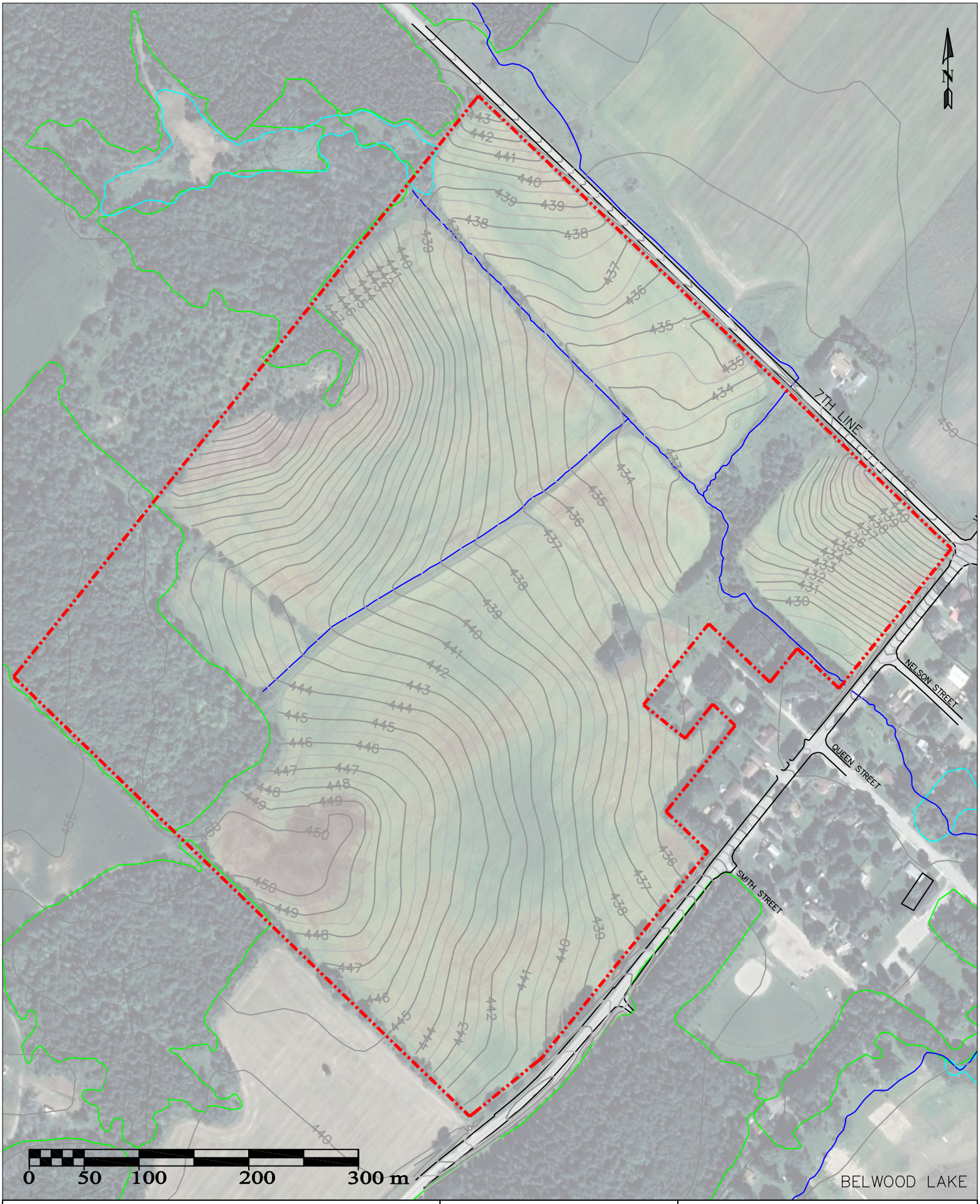
modified from: Stovel and Associates Inc. *Conceptual Plan*

Date: March 2023
scale: not to scale

Figure 2: Development Proposal

GROUNDWATER SCIENCE CORP.

BelCal Inc
Proposed Belwood Subdivision



Site (approximate)

contours as shown, interval varies (mASL)

air photo: Google Earth (Sept 2021)

Modified from: geographic data obtained through Land Information Ontario

Figure 3: Site Details

May 2023
Scale: as shown

GROUNDWATER SCIENCE CORP.

BelCal Inc
Proposed Belwood Development

Grand River Conservation Authority

Date: Oct 26, 2022

Surficial Geology

Figure 4: Surficial Geology

Legend

- Municipal Boundary (GRCA)
- Watercourse - Local (GRCA)
- CA Boundary - Local (GRCA)
- Waterbody - Local (GRCA)

Surficial Geology (MNDM)

- Clay
- Diamicton
- Fill
- Gravel
- Organic deposits
- Paleozoic Bedrock
- Sand
- Silt

BelCal Inc

Proposed Belwood Subdivision

Groundwater Science Corp

Hydrogeologic Assessment

0 35 70 140 210 Metres

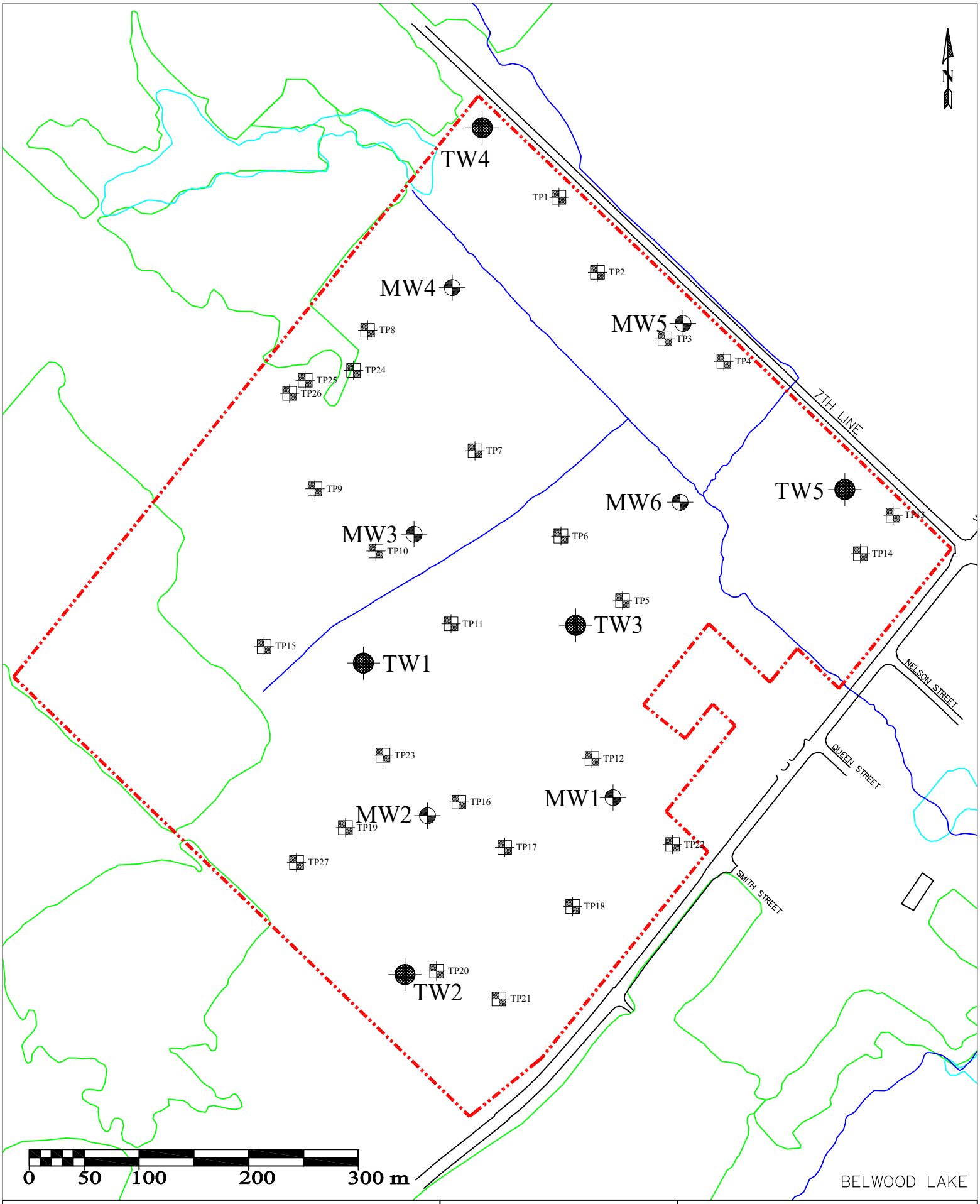
N

Map Centre (UTM NAD83 z17): 554,080.47 4,849,192.68

This map is not to be used for navigation | 2020 Ortho (ON)

NAD 1983 UTM Zone 17N

Scale: 5,873



Site (approximate)

water table monitor

test well

test pit

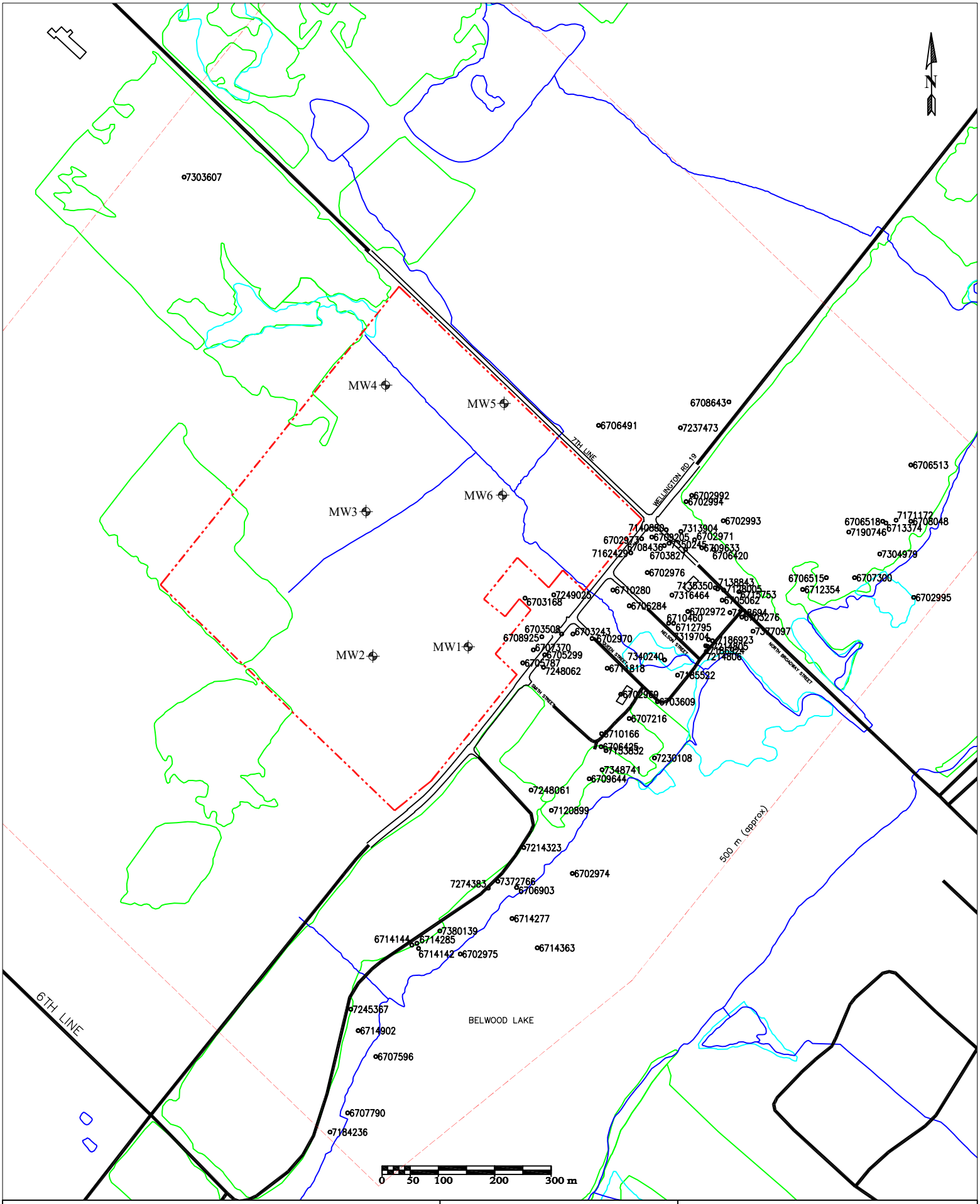
Modified from: geographic data obtained through Land Information Ontario

Figure 5: Monitor Locations

May 2023
Scale: as shown

GROUNDWATER SCIENCE CORP.

BelCal Inc
Proposed Belwood Development



Site (approximate)

reported water well record location and reference as shown

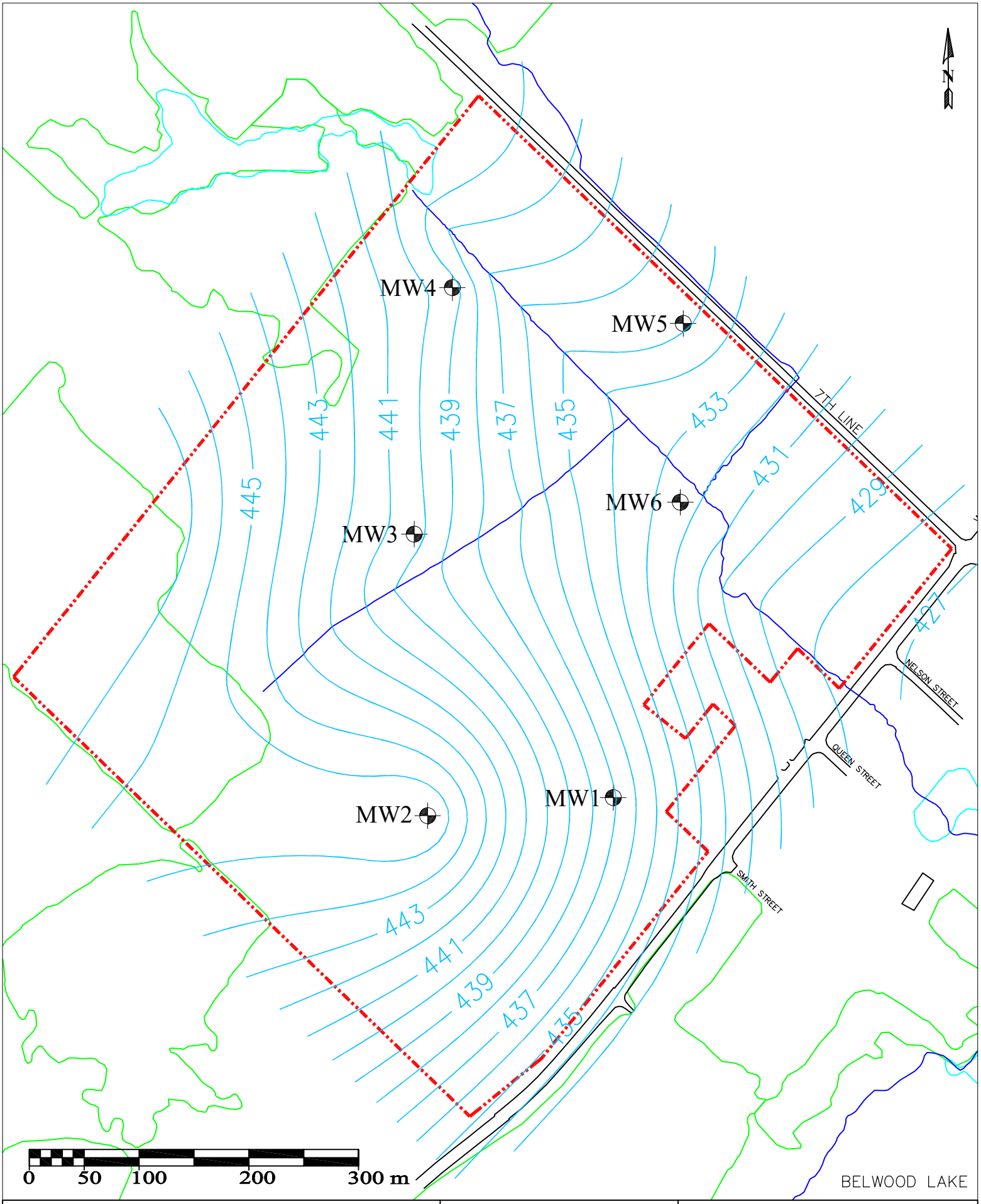
Modified from: geographic data obtained through Land Information Ontario

Figure 6: Reported Water Well Locations

May 2023
Scale: as shown

GROUNDWATER SCIENCE CORP.

BelCal Inc
Proposed Belwood Development



Site (approximate)

water table monitor

projected water table contours as shown (mASL)

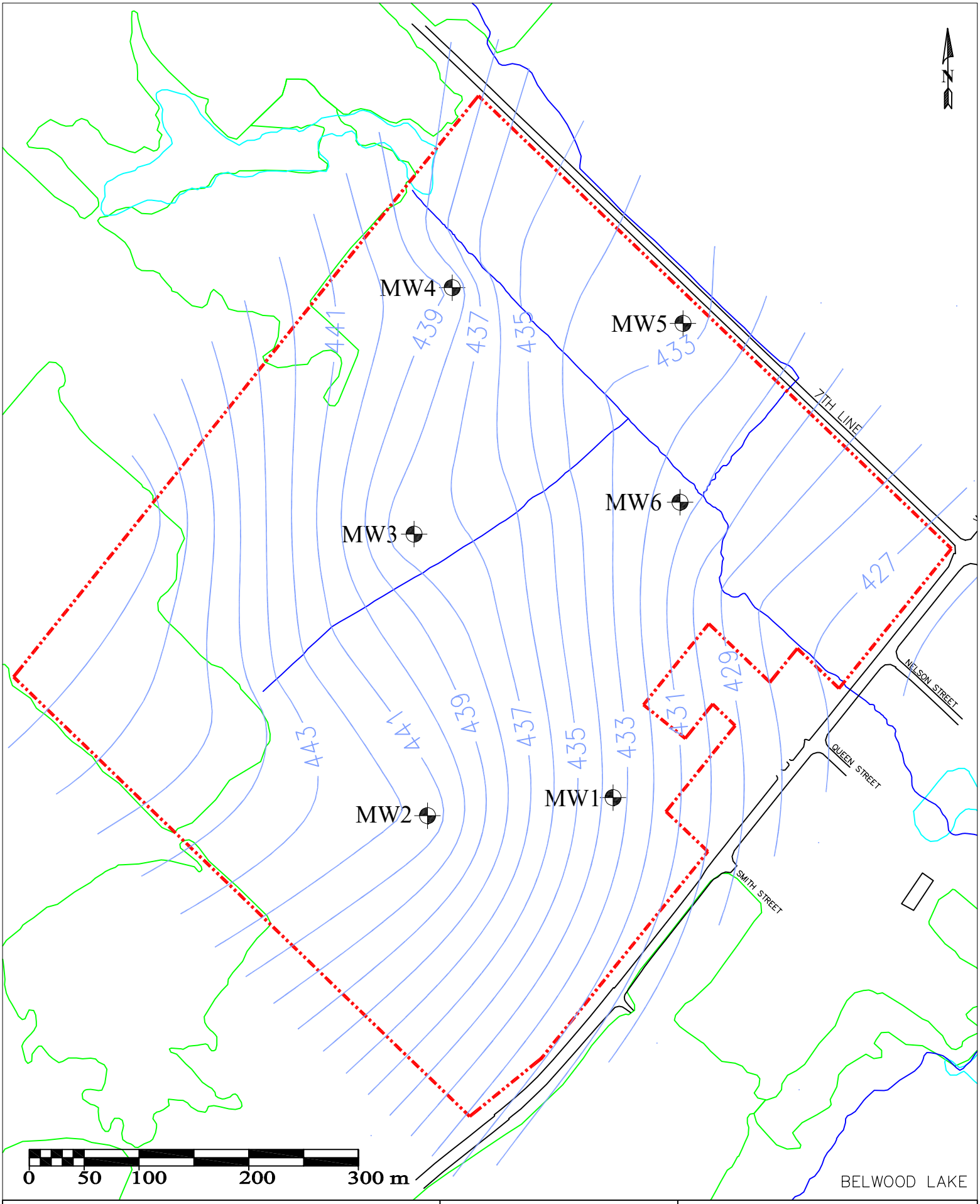
Modified from: geographic data obtained through Land Information Ontario

May 2023
Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 7: High Water Table Conditions

BelCal Inc
Proposed Belwood Development



Site (approximate)

water table monitor

projected water table contours as shown (mASL)

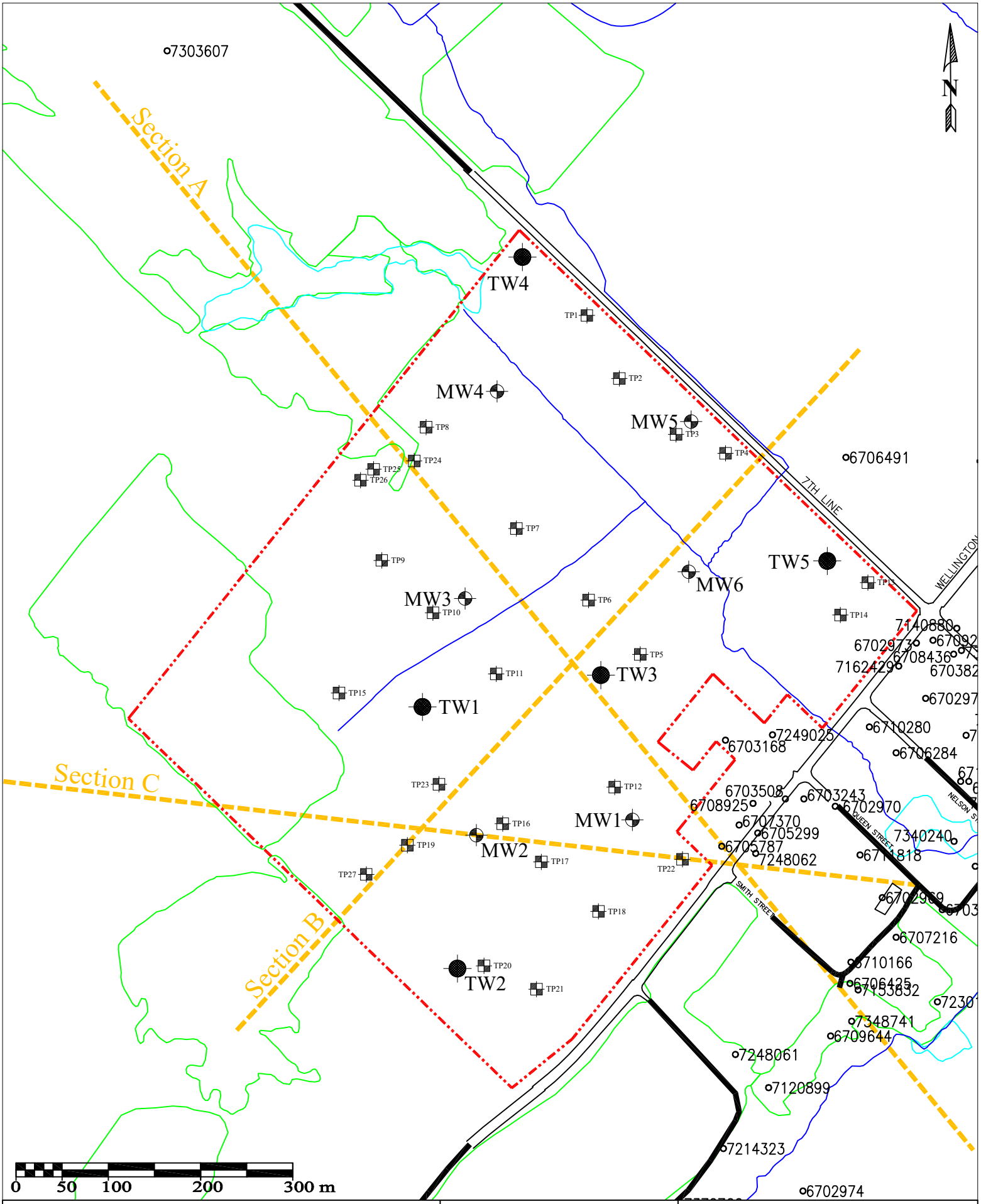
Modified from: geographic data obtained through Land Information Ontario

May 2023
Scale: as shown

GROUNDWATER SCIENCE CORP.

Figure 8: Low Water Table Conditions

BelCal Inc
Proposed Belwood Development



Site (approximate)

schematic section location and reference

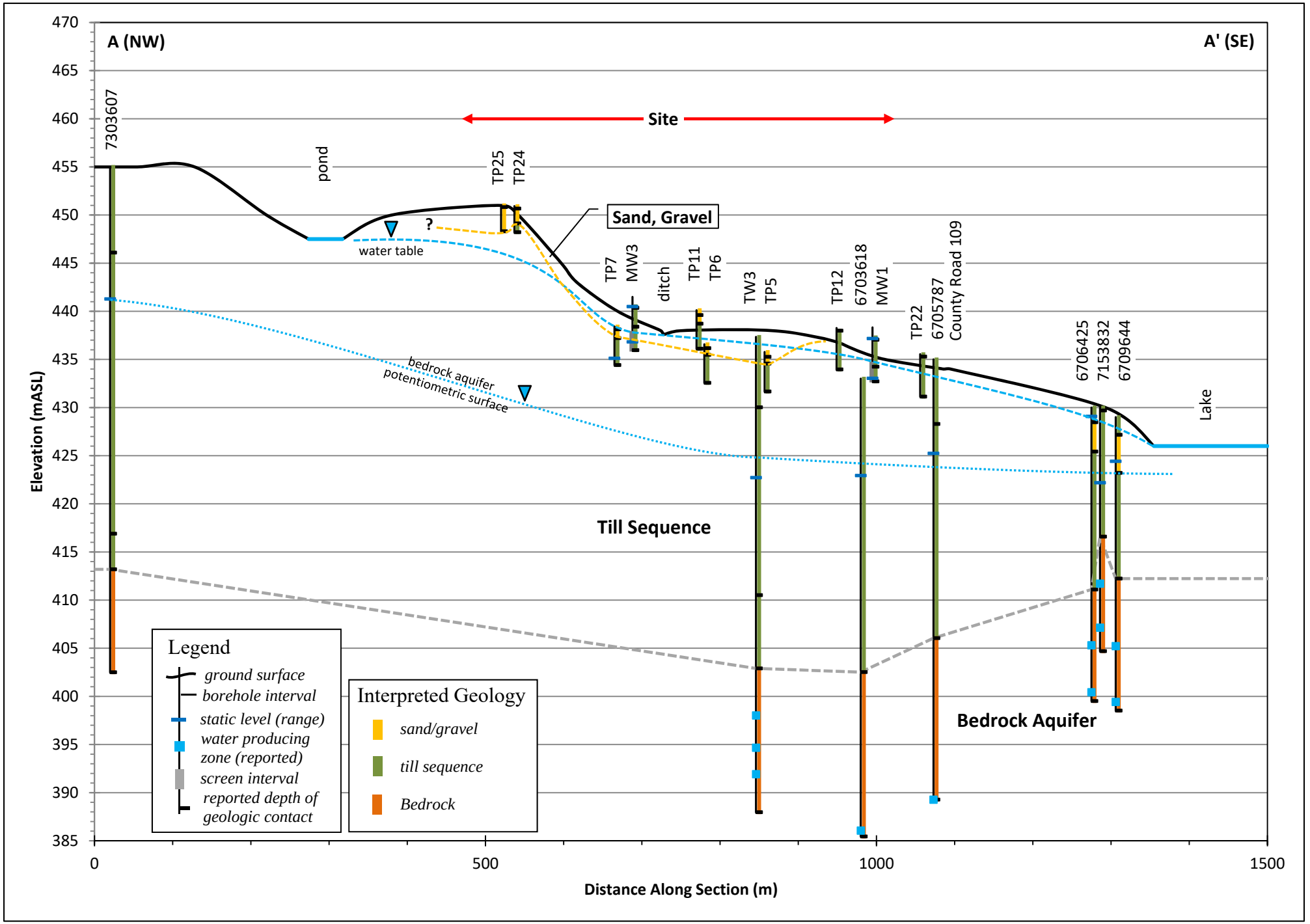
Modified from: geographic data obtained through Land Information Ontario

Figure 9: Cross Section Locations

May 2023
Scale: as shown

GROUNDWATER SCIENCE CORP.

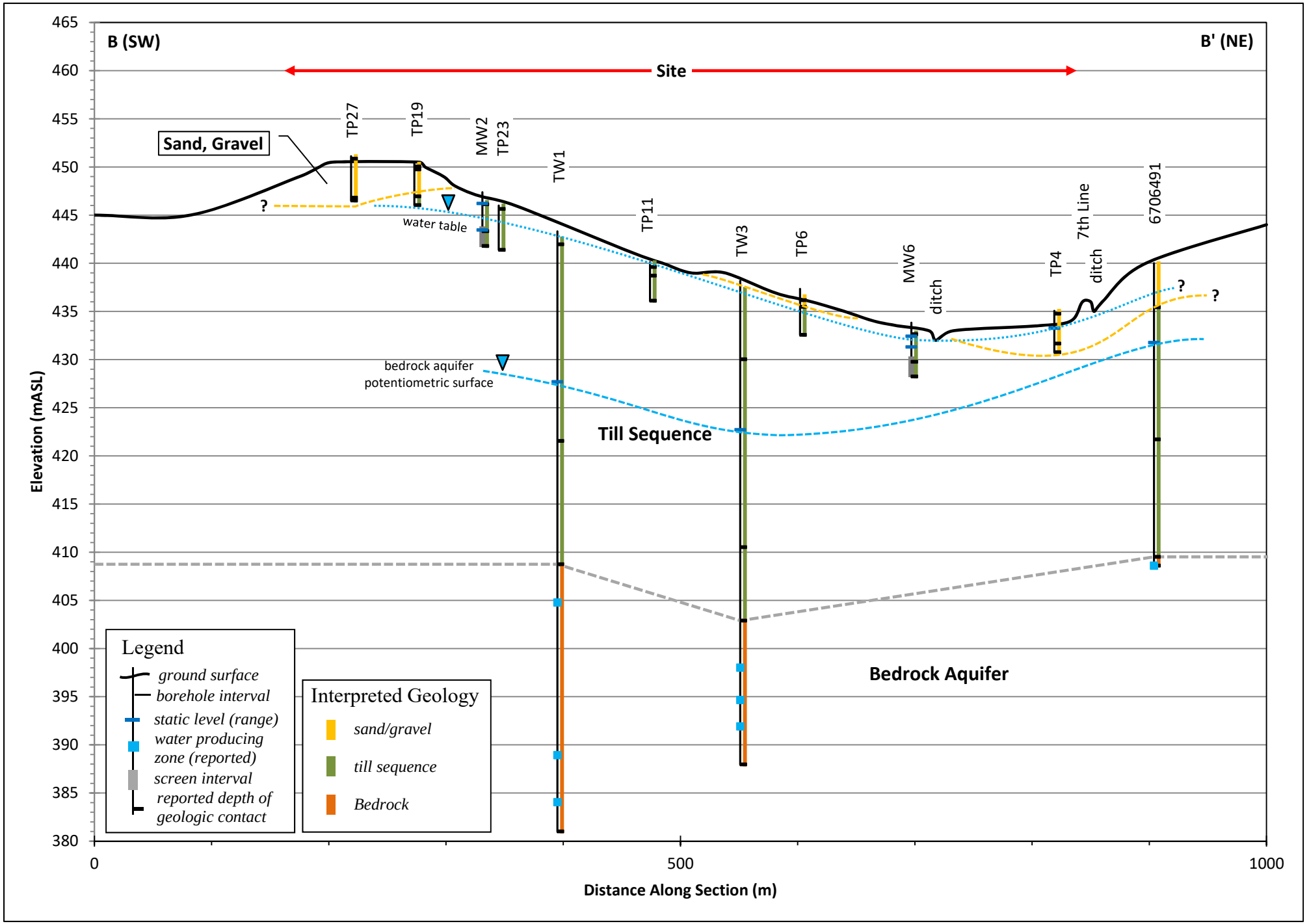
BelCal Inc
Proposed Belwood Development



BelCal Inc
Proposed Belwood Development

Figure10: Schematic Section A

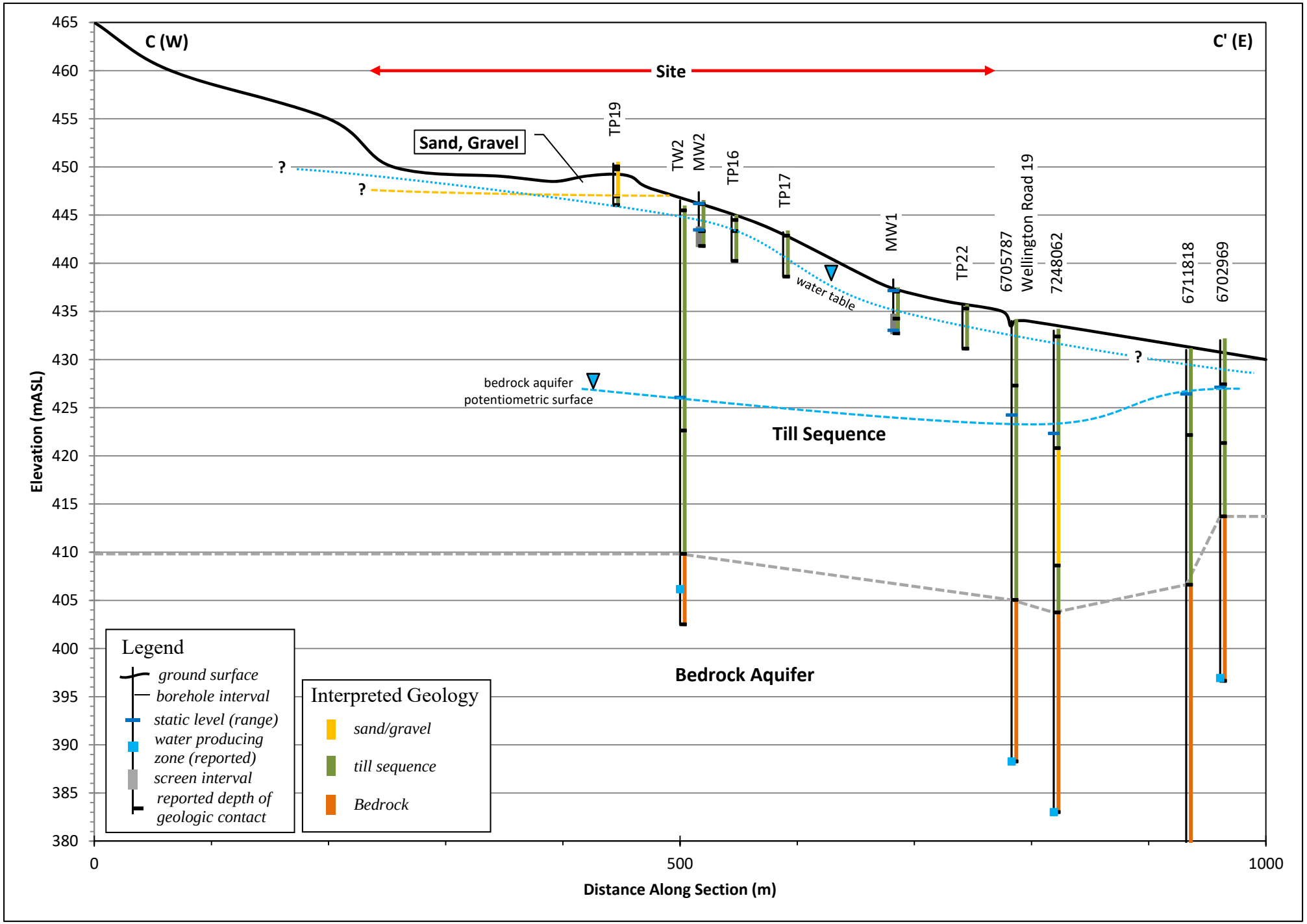
Groundwater Science Corp
Hydrogeologic Assessment



BelCal Inc
Proposed Belwood Development

Figure 11: Schematic Section B

Groundwater Science Corp
Hydrogeologic Assessment



BelCal Inc
Proposed Belwood Development

Figure 12: Schematic Section C

Groundwater Science Corp
Hydrogeologic Assessment

Appendix A
Site Logs and Well Records

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 310257

MW1

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
[redacted]	

Organization	Email Address
Terra View Custom Homes Ltd.	[redacted]

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
		[redacted]	

Country	Province	Postal Code	Telephone Number
Canada	Ontario	[redacted]	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	n/a	Queen Street	

Lot	Concession	County/District/Municipality
Part Lot 12	7	WELLINGTON

City/Town	Province	Postal Code
Belwood	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	554156	4849026	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 15 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Black	Topsoil			0	0.8
Brown	Clay	Silt	Dense	0.8	10
Grey	Clay	Silt	Dense	10	15

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	0.6	CONCRETE	0.2
0.6	9	BENTONITE	3.334
9	15	SILICA SAND	2.27

5. Method of Construction *

- [ ] Cable Tool
- [x] Rotary (Conventional)
- [ ] Rotary (Reverse)
- [ ] Boring
- [ ] Air percussion
- [ ] Diamond
- [ ] Jetting
- [ ] Driving
- [ ] Digging
- [ ] Rotary (Air)
- [x] Augering
- [ ] Direct Push
- [ ] Other (specify) _____

6. Well Use *

- [ ] Public
- [ ] Industrial
- [ ] Cooling & Air Conditioning
- [ ] Domestic
- [ ] Commercial
- [ ] Not Used
- [ ] Livestock
- [ ] Municipal
- [x] Monitoring
- [ ] Irrigation
- [x] Test Hole
- [ ] Dewatering
- [ ] Other (specify) _____

7. 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) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
4	Steel	0.125	-3	1
2	Plastic	0.188	-3	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	0.01	10	15

10. Water Details

Water found at Depth 0 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	15	8.5

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	0													

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? *
				☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☑ No		2021/01/18

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
LONDON SOIL TEST LTD.	7190

Business Address

Unit Number	Street Number	Street Name *
	712078	SOUTHGATE SDRD 71

City/Town/Village *	Province	Postal Code *
DUNDALK	Ontario	N0C 1B0

Business Telephone Number	Business Email Address
519-455-5777	INFO@LONDONSOIL.COM

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Collette	Ray	3552

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Collette	Ray	INFO@LONDONSOIL.COM

Signature	Date Submitted (yyyy/mm/dd)
Ray Collette Digitally signed by Ray Collette DN: cn=Ray Collette, o=London Soil Test Ltd., ou, email=info@londonsoil.com, c=CA Date: 2021.06.16 12:47:59 -04'00'	2021/06/16

17. Ministry Use Only

Audit Number

MZ95 ISFY

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 310258

MW2

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
[redacted]	

Organization	Email Address
Terra View Custom Homes Ltd.	[redacted]

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
		[redacted]	

Country	Province	Postal Code	Telephone Number
Canada	Ontario	[redacted]	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	n/a	Queen Street	

Lot	Concession	County/District/Municipality
Part Lot 12	7	WELLINGTON

City/Town	Province	Postal Code
Belwwod	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	554062	4849035	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 15 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Black	Topsoil			0	0.8
Brown	Clay	Silt	Dense	0.8	10
Grey	Clay	Till	Dense	10	15

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	0.6	CONCRETE	0.2
0.6	9	BENTONITE	3.34
9	15	SILICA SAND	2.27

5. Method of Construction *

- [ ] Cable Tool
- [x] Rotary (Conventional)
- [ ] Rotary (Reverse)
- [ ] Boring
- [ ] Air percussion
- [ ] Diamond
- [ ] Jetting
- [ ] Driving
- [ ] Digging
- [ ] Rotary (Air)
- [x] Augering
- [ ] Direct Push
- [ ] Other (specify) _____

6. Well Use *

- [ ] Public
- [ ] Industrial
- [ ] Cooling & Air Conditioning
- [ ] Domestic
- [ ] Commercial
- [ ] Not Used
- [ ] Livestock
- [ ] Municipal
- [x] Monitoring
- [ ] Irrigation
- [x] Test Hole
- [ ] Dewatering
- [ ] Other (specify) _____

7. 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) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
4	Steel	0.125	-3	1
2	Plastic	0.188	-3	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	0.01	10	15

10. Water Details

Water found at Depth 0 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	15	8.5

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	0													

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? *
				☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☑ No		2021/01/18

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
LONDON SOIL TEST LTD.	7190

Business Address

Unit Number	Street Number	Street Name *
	712078	SOUTHGATE SDRD 71

City/Town/Village *	Province	Postal Code *
DUNDALK	Ontario	N0C 1B0

Business Telephone Number	Business Email Address
519-455-5777	INFO@LONDONSOIL.COM

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Collette	Ray	3552

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Collette	Ray	INFO@LONDONSOIL.COM

Signature

Ray Collette

Digitally signed by Ray Collette
DN: cn=Ray Collette, o=London Soil Test Ltd., ou, email=info@londonsoil.com, c=CA
Date: 2021.06.16 12:52:01 -04'00'

Date Submitted (yyyy/mm/dd)

2021/06/16

17. Ministry Use Only

Audit Number

M254 NNV9

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 310259

MW3

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
[redacted]	

Organization	Email Address
Terra View Custom Homes Ltd.	[redacted]

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
		[redacted]	

Country	Province	Postal Code	Telephone Number
Canada	Ontario	[redacted]	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	n/a	Queen Street	

Lot	Concession	County/District/Municipality
Part Lot 12	7	WELLINGTON

City/Town	Province	Postal Code
Belwwod	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	554024	4849262	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 15 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Black	Topsoil		Loose	0	0.6
Brown	Clay	Silt	Dense	0.6	7
Grey	Clay	Till	Dense	7	15

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	0.6	CONCRETE	0.2
0.6	9	BENTONITE	3.334
9	15	SILICA SAND	2.27

5. Method of Construction *

- [ ] Cable Tool
- [x] Rotary (Conventional)
- [ ] Rotary (Reverse)
- [ ] Boring
- [ ] Air percussion
- [ ] Diamond
- [ ] Jetting
- [ ] Driving
- [ ] Digging
- [ ] Rotary (Air)
- [x] Augering
- [ ] Direct Push
- [ ] Other (specify) _____

6. Well Use *

- [ ] Public
- [ ] Industrial
- [ ] Cooling & Air Conditioning
- [ ] Domestic
- [ ] Commercial
- [ ] Not Used
- [ ] Livestock
- [ ] Municipal
- [x] Monitoring
- [ ] Irrigation
- [x] Test Hole
- [ ] Dewatering
- [ ] Other (specify) _____

7. 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) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
4	Steel	0.125	-3	1
2	Plastic	0.188	-3	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	0.01	10	15

10. Water Details

Water found at Depth 0 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	15	8.5

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	0													

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? *
				☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☑ No		2021/01/19

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
LONDON SOIL TEST LTD.	7190

Business Address

Unit Number	Street Number	Street Name *
	712078	SOUTHGATE SDRD 71

City/Town/Village *	Province	Postal Code *
DUNDALK	Ontario	N0C 1B0

Business Telephone Number	Business Email Address
519-455-5777	INFO@LONDONSOIL.COM

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Collette	Ray	3552

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Collette	Ray	INFO@LONDONSOIL.COM

Signature

Ray Collette

Digitally signed by Ray Collette
DN: cn=Ray Collette, o=London Soil Test Ltd., ou, email=info@londonsoil.com, c=CA
Date: 2021.06.16 12:55:47 -04'00'

Date Submitted (yyyy/mm/dd)

2021/06/16

17. Ministry Use Only

Audit Number

6VGA OL7J

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 310256

MW4

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
[redacted]	

Organization	Email Address
Terra View Custom Homes Ltd.	[redacted]

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
		[redacted]	

Country	Province	Postal Code	Telephone Number
Canada	Ontario	[redacted]	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	n/a	Queen Street	

Lot	Concession	County/District/Municipality
Part Lot 12	7	WELLINGTON

City/Town	Province	Postal Code
Belwwod	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	554041	4849426	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 15 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Black	Topsoil		Loose	0	0.75
Brown	Clay	Till	Dense	0.75	7.5
Grey	Clay	Till	Dense	7.5	15

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	0.6	CONCRETE	0.3
0.6	14	BENTONITE	5.01
14	25	SILICA SAND	4.14

5. Method of Construction *

- [ ] Cable Tool
- [x] Rotary (Conventional)
- [ ] Rotary (Reverse)
- [ ] Boring
- [ ] Air percussion
- [ ] Diamond
- [ ] Jetting
- [ ] Driving
- [ ] Digging
- [ ] Rotary (Air)
- [x] Augering
- [ ] Direct Push
- [ ] Other (specify) _____

6. Well Use *

- [ ] Public
- [ ] Industrial
- [ ] Cooling & Air Conditioning
- [ ] Domestic
- [ ] Commercial
- [ ] Not Used
- [ ] Livestock
- [ ] Municipal
- [x] Monitoring
- [ ] Irrigation
- [x] Test Hole
- [ ] Dewatering
- [ ] Other (specify) _____

7. 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) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
4	Steel	0.125	-3	1
2	Plastic	0.188	-3	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	0.01	10	15

10. Water Details

Water found at Depth 0 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	15	8.5

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	0													

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? *
				☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☑ No		2021/01/19

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
LONDON SOIL TEST LTD.	7190

Business Address

Unit Number	Street Number	Street Name *
	712078	SOUTHGATE SDRD 71

City/Town/Village *	Province	Postal Code *
DUNDALK	Ontario	N0C 1B0

Business Telephone Number	Business Email Address
519-455-5777	INFO@LONDONSOIL.COM

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Collette	Ray	3552

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Collette	Ray	INFO@LONDONSOIL.COM

Signature

Ray Collette

Digitally signed by Ray Collette
DN: cn=Ray Collette, o=London Soil Test Ltd., ou, email=info@londonsoil.com, c=CA
Date: 2021.06.16 13:03:29 -04'00'

Date Submitted (yyyy/mm/dd)

2021/06/16

17. Ministry Use Only

Audit Number

84PC WR97

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 237604

MW5

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
[redacted]	

Organization	Email Address
Terra View Custom Homes Ltd.	[redacted]

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
	[redacted]		

Country	Province	Postal Code	Telephone Number
Canada	Ontario	[redacted]	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	n/a	Queen Street	

Lot	Concession	County/District/Municipality
Part Lot 12	7	WELLINGTON

City/Town	Province	Postal Code
Belwwod	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	554225	4849436	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 25 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Black	Topsoil			0	0.915
Brown	Sand	Silt	Dense	0.915	15
Grey	Clay	Till	Dense	15	25

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	0.6	CONCRETE	0.2
0.6	14	BENTONITE	5.01
14	25	SILICA SAND	4.14

5. Method of Construction *

- [ ] Cable Tool
- [x] Rotary (Conventional)
- [ ] Rotary (Reverse)
- [ ] Boring
- [ ] Air percussion
- [ ] Diamond
- [ ] Jetting
- [ ] Driving
- [ ] Digging
- [ ] Rotary (Air)
- [x] Augering
- [ ] Direct Push
- [ ] Other (specify) _____

6. Well Use *

- [ ] Public
- [ ] Industrial
- [ ] Cooling & Air Conditioning
- [ ] Domestic
- [ ] Commercial
- [ ] Not Used
- [ ] Livestock
- [ ] Municipal
- [x] Monitoring
- [ ] Irrigation
- [x] Test Hole
- [ ] Dewatering
- [ ] Other (specify) _____

7. 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) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
4	Steel	0.125	-3	1
2	Plastic	0.188	-3	15

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	0.01	15	25

10. Water Details

Water found at Depth 15 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	25	8.5

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	5													

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? *
				☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☑ No		2021/01/18

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
LONDON SOIL TEST LTD.	7190

Business Address

Unit Number	Street Number	Street Name *
	712078	SOUTHGATE SDRD 71

City/Town/Village *	Province	Postal Code *
DUNDALK	Ontario	N0C 1B0

Business Telephone Number	Business Email Address
519-455-5777	INFO@LONDONSOIL.COM

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Collette	Ray	3552

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Collette	Ray	INFO@LONDONSOIL.COM

Signature

Ray Collette

Digitally signed by Ray Collette
DN: cn=Ray Collette, o=London Soil Test Ltd., ou, email=info@londonsoil.com, c=CA
Date: 2021.06.16 13:07:06 -04'00'

Date Submitted (yyyy/mm/dd)

2021/06/16

17. Ministry Use Only

Audit Number

IKAD YWJ2

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 310255

MW6

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
[redacted]	

Organization	Email Address
Terra View Custom Homes Ltd.	[redacted]

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
		[redacted]	

Country	Province	Postal Code	Telephone Number
Canada	Ontario	[redacted]	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	n/a	Queen Street	

Lot	Concession	County/District/Municipality
Part Lot 12	7	WELLINGTON

City/Town	Province	Postal Code
Belwwod	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	554237	4849247	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 15 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Black	Topsoil		Loose	0	0.6
Brown	Clay	Till	Dense	0.6	10
Grey	Clay	Till	Dense	10	15

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	0.6	CONCRETE	0.2
0.6	9	BENTONITE	3.14
9	15	SILICA SAND	2.27

5. Method of Construction *

- [ ] Cable Tool
- [x] Rotary (Conventional)
- [ ] Rotary (Reverse)
- [ ] Boring
- [ ] Air percussion
- [ ] Diamond
- [ ] Jetting
- [ ] Driving
- [ ] Digging
- [ ] Rotary (Air)
- [x] Augering
- [ ] Direct Push
- [ ] Other (specify) _____

6. Well Use *

- [ ] Public
- [ ] Industrial
- [ ] Cooling & Air Conditioning
- [ ] Domestic
- [ ] Commercial
- [ ] Not Used
- [ ] Livestock
- [ ] Municipal
- [x] Monitoring
- [ ] Irrigation
- [x] Test Hole
- [ ] Dewatering
- [ ] Other (specify) _____

7. 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) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
4	Steel	0.125	-3	1
2	Plastic	0.188	-3	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	0.01	10	15

10. Water Details

Water found at Depth 0 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	15	8.5

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	0													

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? *
				☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☑ No		2021/01/19

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
LONDON SOIL TEST LTD.	7190

Business Address

Unit Number	Street Number	Street Name *
	712078	SOUTHGATE SDRD 71

City/Town/Village *	Province	Postal Code *
DUNDALK	Ontario	N0C 1B0

Business Telephone Number	Business Email Address
519-455-5777	INFO@LONDONSOIL.COM

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Collette	Ray	3552

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Collette	Ray	INFO@LONDONSOIL.COM

Signature

Ray Collette

Digitally signed by Ray Collette
DN: cn=Ray Collette, o=London Soil Test Ltd., ou, email=info@londonsoil.com, c=CA
Date: 2021.06.16 13:09:45 -04'00'

Date Submitted (yyyy/mm/dd)

2021/06/16

17. Ministry Use Only

Audit Number

8U5R NYFY

FILE No: G22459

TEST PIT No. 1

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **439.59 m**						FIELD VANE: Peak ⊗ Rem. ×; LAB TEST: Unc. ■ P.P. □; 50 100 150 200; STANDARD ● DYN. CONE ○; 20 40 60 80	W_P W W_L; 10 20 30			
	500 mm TOPSOIL										
439.09		0.5								0.5	
0.50	stiff brown CLAYEY SILT trace sand moist	1.0								1.0	
		1.5								1.5	
				1	GS			○			
	------ very stiff	2.0								2.0	
437.19											
2.40	dense grey SILT TILL trace to some sand and clay trace gravel moist	2.5								2.5	
		3.0		2	GS			○		3.0	
		3.5								3.5	
		4.0								4.0	
		4.5		3	GS			○		4.5	
434.89											
4.70	End of Test Pit										test pit open and dry at completion
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

Enclosure No.: 2
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 2

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **437.46 m**						FIELD VANE: Peak ⊗ Rem. ×; LAB TEST: Unc. ■ P.P. □; 50 100 150 200; STANDARD ● DYN. CONE ○; 20 40 60 80	W_P W W_L; 10 20 30			
437.16	300 mm TOPSOIL										
0.30	stiff to very stiff mottled brown SILT TILL trace to some sand and clay trace gravel moist	0.5 1.0 1.5 2.0 2.5 3.0		1	GS			W		0.5 1.0 1.5 2.0 2.5 3.0	
434.06	------ grey										
3.40	End of Test Pit	3.5 4.0 4.5 5.0 5.5								3.5 4.0 4.5 5.0 5.5	test pit open and dry at completion

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
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Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

Enclosure No.: 3
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 3

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

SOIL LITHOLOGY

Ground Elevation: **434.48 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL
434.20	280 mm TOPSOIL		
0.28	loose, brown SAND AND GRAVEL, trace silt, moist		
434.03 / 0.45	loose to compact, brown Fine to Medium SAND, trace to some silt, moist	0.5	
		1.0	
		1.5	
	------ saturated	2.0	
		2.5	
		3.0	
431.08 / 3.40	stiff, grey CLAYEY SILT, trace sand, moist to wet	3.5	
		4.0	
429.88 / 4.60	End of Test Pit	4.5	
		5.0	
		5.5	

SAMPLE

SAMPLE ID	TYPE	N-VALUE
1	GS	
2	GS	

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)	REMARKS
0.5	
1.0	
1.5	
2.0	moderate to heavy seepage below 1.8 m depth
2.5	sidewalls frequently collapsing
3.0	
3.5	
4.0	
4.5	
5.0	
5.5	

PROJECT MANAGER: **RVD**

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Enclosure No.: 4
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 4

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **435.06 m**								
434.76	300 mm TOPSOIL								
0.30	loose to compact brown SILTY SAND occ. silt lenses moist	0.5 1.0 1.5		1	GS			0.5 1.0 1.5	
	------ wet to saturated	2.0 2.5 3.0						2.0 2.5 3.0	some seepage below 1.8 m depth sidewalls frequently collapsing
431.66 3.40	loose to compact brown Fine to Coarse SAND trace silt saturated	3.5 4.0						3.5 4.0	
430.76 4.30	End of Test Pit	4.5 5.0 5.5						4.5 5.0 5.5	

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G22459

TEST PIT No. 5

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **435.77 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
	500 mm TOPSOIL										
435.27		0.5								0.5	
0.50	loose, orangey brown GRAVELLY SAND trace silt			1	GS						
	moist	1.0								1.0	
434.57											
1.20	compact to dense brown SANDY SILT TILL trace clay and gravel	1.5		2	GS					1.5	
	occ. cobbles and boulders										
	moist	2.0								2.0	
		2.5								2.5	
		3.0								3.0	
	------ very dense	3.5								3.5	
431.67		4.0								4.0	
4.10	End of Test Pit										test pit open and dry at completion
		4.5								4.5	
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
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Kitchener, Ontario N2H 5E1
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Enclosure No.: 6
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 6

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
	Ground Elevation: **436.57 m**						
436.17	400 mm TOPSOIL						
0.40	compact, orangey brown Fine SAND some silt moist	0.5					
		1.0		1	GS		
435.47							
1.10	compact to dense brown SANDY SILT TILL trace gravel, trace clay occ. cobbles and boulders moist	1.5		2	GS		
		2.0					
		2.5					
	------ very dense	3.0					
	------ grey	3.5					
432.57							
4.00	End of Test Pit	4.0					test pit open and dry at completion
		4.5					
		5.0					
		5.5					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
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Enclosure No.: 7
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 7

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **438.42 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
438.12	300 mm TOPSOIL										
0.30	loose dark brown to brown SILTY SAND trace gravel moist	0.5								0.5	
		1.0		1	GS			○		1.0	
437.22											
1.20	compact mottled brown SILT trace clay, trace sand wet to saturated	1.5		2	GS			○		1.5	
	------ grey ------	2.0								2.0	
	occ. saturated sand seams/pockets	2.5								2.5	
	------	3.0							▼	3.0	moderate seepage at 3.3 m depth
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
433.42											
5.00	End of Test Pit	5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

Enclosure No.: 8
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 8

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

Ground Elevation: **445.70 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
445.30	400 mm TOPSOIL					
0.40	loose, brown SILTY SAND trace clay moist	0.5				
444.80						
0.90	stiff brown CLAYEY SILT trace gravel, trace sand occ. sand pockets moist ------ grey	1.0	1	GS		trace seepage at 1.2 m depth
		1.5				
		2.0				
		2.5				
443.00						moderate seepage at 2.7 m depth
2.70	compact brown Fine to Medium SAND trace silt saturated	3.0	2	GS		sidewalls collapsing
		3.5				
441.70						
4.00	compact grey SANDY SILT TILL trace gravel and clay occ. sand seams/layers moist	4.0	3	GS		
		4.5				
		5.0				
440.50						
5.20	End of Test Pit	5.5				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G22459

TEST PIT No. 9

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **446.10 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
445.77	330 mm TOPSOIL										
0.33	loose, dark brown SAND AND SILT moist	0.5		1	GS			○		0.5	
445.20											
0.90	compact mottled brown SILT TILL trace to some sand and clay trace gravel moist to wet	1.0								1.0	
		1.5		2	GS			○		1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
	------ dense, grey	3.5								3.5	
		4.0								4.0	
	------ very dense	4.5		3	GS			○		4.5	
441.10											
5.00	End of Test Pit	5.0								5.0	test pit open and dry at completion
		5.5								5.5	

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
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Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

Enclosure No.: 10
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 10

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

Ground Elevation: **441.49 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE	WELL DATA	REMARKS
441.19	300 mm TOPSOIL						
0.30	stiff mottled brown CLAYEY SILT TILL some sand, trace gravel moist	0.5 1.0 1.5 2.0 2.5	1	GS			
438.79 2.70	dense grey SILT TILL trace to some sand and clay trace gravel moist	3.0 3.5	2	GS			
437.49 4.00	End of Test Pit	4.0 4.5 5.0 5.5					test pit open and dry at completion

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 11

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **440.11 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
	500 mm TOPSOIL										
439.61		0.5								0.5	
0.50	compact brown SANDY SILT moist	1.0		1	GS			W		1.0	
438.71											
1.40	compact mottled brown SILT TILL trace to some sand and clay trace gravel moist --- dense	1.5		2	GS			W		1.5	
	--- grey	2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
436.11		4.0								4.0	
4.00	End of Test Pit										test pit open and dry at completion
		4.5								4.5	
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 12

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

Ground Elevation: **438.26 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
437.98	280 mm TOPSOIL						
0.28	stiff to very stiff brown SILT sand, trace clay moist to wet	0.5					
		1.0		1	GS		
		1.5					
		2.0		2	GS		
		2.5					
		3.0					
	---- hard	3.5					
		4.0					
433.96							
4.30	End of Test Pit	4.5					test pit open and dry at completion
		5.0					
		5.5					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 13

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

Ground Elevation: **438.98 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	WATER CONTENT (%) W_P W W_L	WELL DATA	DEPTH (m)	REMARKS
438.58	400 mm TOPSOIL									
0.40	compact brown SILT TILL trace to some sand and clay trace gravel occ. cobbles moist	0.5							0.5	
		1.0							1.0	
		1.5		1	GS		○		1.5	
436.88		2.0							2.0	
2.10	very stiff to hard brown CLAYEY SILT TILL trace gravel and sand occ. cobbles damp to moist	2.5							2.5	
		3.0							3.0	
				2	GS		○			
		3.5							3.5	
		4.0							4.0	
		4.5							4.5	
434.08										
4.90	End of Test Pit	5.0							5.0	test pit open and dry at completion
		5.5							5.5	

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
10 20 30

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 14

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **434.92 m**						FIELD VANE: Peak ⊗ Rem. ×; LAB TEST: Unc. ■ P.P. □; 50 100 150 200; PENETRATION RESISTANCE STANDARD ● DYN. CONE ○; 20 40 60 80	W_P W W_L; 10 20 30			
434.64	280 mm TOPSOIL										
0.28	stiff brown SILT trace clay moist	0.5 1.0 1.5 2.0		1	GS			○		0.5 1.0 1.5 2.0	
432.42											
2.50	compact to dense brown SILT TILL trace to some sand and clay trace gravel occ. cobbles moist ------ very dense, grey	2.5 3.0 3.5 4.0 4.5								2.5 3.0 3.5 4.0 4.5	
430.22											
4.70	End of Test Pit	5.0 5.5								5.0 5.5	test pit open and dry at completion

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 15

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 22 22** TO **Jun 22 22**

Ground Elevation: **443.58 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE	WELL DATA	REMARKS
443.28	300 mm TOPSOIL						
0.30	loose, brown SANDY SILT trace gravel moist	0.5	1	GS			
442.78							
0.80	stiff brown CLAYEY SILT TILL trace gravel and sand occ. cobbles and boulders moist	1.0	2	GS			clay tile encountere4d at 0.9 m depth
		1.5					
441.58		2.0					
2.00	dense grey SILT TILL trace sand, trace clay trace gravel moist	2.5	3	GS			
		3.0					
		3.5					
439.88							
3.70	dense grey SANDY SILT wet to saturated	4.0	4	GS			
		4.5					
438.68							
4.90	End of Test Pit	5.0					test pit open and dry at completion
		5.5					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 16

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **444.84 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
444.49	350 mm TOPSOIL										
0.35	firm brown CLAYEY SILT trace sand moist to wet	0.5								0.5	
		1.0		1	GS			W		1.0	
443.34		1.5								1.5	
1.50	compact mottled brown SILT TILL trace to some sand and clay trace gravel moist with wet seams			2	GS			W			
	------ dense	2.0								2.0	
		2.5								2.5	
		3.0								3.0	
	------ very dense, grey	3.5								3.5	
		4.0								4.0	
440.24		4.5								4.5	
4.60	End of Test Pit										test pit open and dry at completion
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

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TEST PIT No. 17

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
	Ground Elevation: **443.21 m**						
	350 mm TOPSOIL						
442.86							
0.35	compact to dense mottled brown SILT TILL trace to some sand and clay trace gravel occ. cobbles moist	0.5 1.0 1.5 2.0 2.5		1	GS		
	------ very dense occ. silt seams	3.0		2	GS		
	------ grey	3.5 4.0 4.5					
438.61							
4.60	End of Test Pit						test pit open and dry at completion
		5.0 5.5					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 18

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
	Ground Elevation: **439.60 m**						
439.35	250 mm TOPSOIL						
0.25	compact brown SANDY SILT trace clay moist to wet	0.5					
		1.0		1	GS		
438.20							
1.40	compact brown SILTY SAND wet ------ occ. mottled brown silt seams	1.5		2	GS		
		2.0					
		2.5		3	GS		
		3.0					
436.40							
3.20	dense grey SILT TILL trace to some sand and clay trace gravel moist ------ very dense	3.5		4	GS		
		4.0					
		4.5					
434.60							
5.00	End of Test Pit	5.0					test pit open and dry at completion
		5.5					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 19

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **450.34 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
450.04	300 mm TOPSOIL										
0.30	loose, brown GRAVELLY SAND trace silt moist	0.5								0.5	
449.74 0.60	loose to compact brown Fine to Medium SAND trace gravel, trace silt damp	1.0		1	GS			○		1.0	sidewalls frequently collapsing
		1.5								1.5	
		2.0		2	GS			○		2.0	
		2.5								2.5	
		3.0								3.0	
446.94 3.40	compact brown SILT trace sand, trace clay occ. clayey seams/lenses moist to wet	3.5		3	GS			○		3.5	
		4.0								4.0	
446.04 4.30	End of Test Pit	4.5								4.5	
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 20

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **444.27 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
443.92	350 mm TOPSOIL										
0.35	firm brown CLAYEY SILT trace to some sand trace gravel occ. cobbles wet	0.5								0.5	
		1.0		1	GS			○		1.0	
		1.5								1.5	
442.27		2.0								2.0	
2.00	dense brown SILT TILL trace to some sand and clay trace gravel occ. cobbles moist			2	GS			○			
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
	------ very dense, grey	4.0								4.0	
		4.5								4.5	
439.27		5.0								5.0	test pit open and dry at completion
5.00	End of Test Pit										
		5.5								5.5	

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 21

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

SOIL LITHOLOGY

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE
	Ground Elevation: **441.21 m**					
	350 mm TOPSOIL					
440.86						
0.35	loose, brown Fine SAND trace to some silt moist	0.5		1	GS	
440.61						
0.60	stiff brown SILT trace clay, trace sand occ. clayey layers moist	1.0		2	GS	
		1.5		3	GS	
		2.0				
	------ occ. sand seams	2.5				
		3.0				
		3.5				
		4.0				
	------ grey	4.5				
436.61						
4.60	very dense, grey SILT TILL trace to some sand and clay trace gravel moist	5.0		4	GS	
436.01						
5.20	End of Test Pit	5.5				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)	REMARKS
0.5	
1.0	plastic drainage tile encountered at 0.9 m depth
1.5	
2.0	
2.5	
3.0	
3.5	
4.0	
4.5	seepage from sand seam at 4.5 m depth
5.0	
5.5	

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 22

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **435.54 m**						FIELD VANE: Peak ⊗ Rem. ×; LAB TEST: Unc. ■ P.P. □; 50 100 150 200; PENETRATION RESISTANCE STANDARD ● DYN. CONE ○; 20 40 60 80	W_P W W_L; 10 20 30			
435.29	250 mm TOPSOIL										
0.25	dense to very dense brown SANDY SILT TILL trace to some gravel trace clay occ. cobbles and boulders damp to moist	0.5								0.5	clay tile encountered at 0.6 m depth
		1.0		1	GS			○		1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
	------ grey	4.0		2	GS			○		4.0	
431.14											
4.40	End of Test Pit	4.5								4.5	test pit open and dry at completion
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 23

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **445.99 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
445.64	350 mm TOPSOIL										
0.35	loose, brown Fine SAND trace to some silt moist	0.5		1	GS			○		0.5	
445.19											
0.80	stiff mottled brown SILT trace clay, trace sand occ. cobbles occ. clayey pockets moist	1.0		2	GS			○		1.0	
		1.5								1.5	
		2.0								2.0	
	------ very stiff to hard	2.5								2.5	
	------ grey	3.0								3.0	
		3.5								3.5	
		4.0								4.0	
441.39		4.5								4.5	
4.60	End of Test Pit										test pit open and dry at completion
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

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FILE No: G22459

TEST PIT No. 24

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **450.92 m**						FIELD VANE: Peak ⊗ Rem. ×; LAB TEST: Unc. ■ P.P. □; 50 100 150 200; PENETRATION RESISTANCE STANDARD ● DYN. CONE ○; 20 40 60 80	W_P W W_L; 10 20 30			
450.67	250 mm TOPSOIL										
0.25	loose to compact brown SILTY SAND trace gravel damp	0.5								0.5	
		1.0		1	GS			○		1.0	
		1.5								1.5	
449.12											
1.80	compact brown SILT TILL trace to some sand and clay trace gravel moist	2.0								2.0	
		2.5								2.5	
448.22											
2.70	End of Test Pit	3.0								3.0	test pit open and dry at completion
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

Enclosure No.: 25
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 25

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **451.01 m**						FIELD VANE: Peak ⊗ Rem. ×; LAB TEST: Unc. ■ P.P. □; 50 100 150 200; STANDARD ● DYN. CONE ○; 20 40 60 80	W_P W W_L; 10 20 30			
450.86	150 mm TOPSOIL										
0.15	loose to compact brown Fine to Medium SAND trace gravel, trace silt damp	0.5		1	GS			○		0.5	
		1.0								1.0	sidewalls occasionally collapsing
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
448.31											
2.70	End of Test Pit										test pit open and dry at completion
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

Enclosure No.: 26
Sheet 1 of 1

FILE No: G22459

TEST PIT No. 26

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **451.20 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
450.75	450 mm TOPSOIL										
0.45	loose to compact brown Fine to Medium SAND trace gravel, trace silt damp to moist	0.5								0.5	
		1.0								1.0	sidewalls occasionally collapsing
		1.5		1	GS			○		1.5	
449.10		2.0								2.0	
2.10	compact, brown SILT TILL moist										
448.80											
2.40	End of Test Pit	2.5								2.5	test pit open and dry at completion
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G22459

TEST PIT No. 27

Client: **BelCal Inc.**

Project: **Potential Residential Subdivision**

Location: **6640 Wellington Road 19, Belwood, Ontario**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jun 23 22** TO **Jun 23 22**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **451.11 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
450.86	250 mm TOPSOIL										
0.25	compact brown Fine to Medium SAND trace silt damp	0.5								0.5	
		1.0		1	GS			○		1.0	sidewalls frequently collapsing
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
	------ wet to saturated	4.0		2	GS			○		4.0	
446.81											
4.30	compact, brown SILT TILL moist	4.5								4.5	test pit open and dry at completion
446.51											
4.60	End of Test Pit										
		5.0								5.0	
		5.5								5.5	

PROJECT MANAGER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

Ontario — Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. (Place Sticker and/or Print Below): Tag#:A348196 (A348196)

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

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

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2407 Upper James St	Mount Hope	ON	L8R 1W10	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
0 Wellington Road 19	West Garafraxa	Pt 17	7

County/District/Municipality	City/Town/Village	Province	Postal Code
Wellington	Belwood	Ontario	N0B 1J0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	515391	4814911	27	

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	Topsoil			0	2
Grey	Clay	Slt. Sand		2	69
Brown	Sandy Gravel	Clay		69	111
Brown	Limestone			111	202

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	22	Bentonite	6.9

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	Steel	.188	+2	121
6	Open Hole		121	202

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

Construction Record - Screen

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

Water Details

Water found at Depth	Kind of Water	Other, specify
124 (m/ft) ☐ Gas	☐ Fresh ☒ Untested	
176 (m/ft) ☐ Gas	☐ Fresh ☒ Untested	
192 (m/ft) ☐ Gas	☐ Fresh ☒ Untested	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	22	10
22	121	7
121	202	6

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Franklin Drilling Services Inc	7171 19

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6891 Sdrd 7 West	Mount Forest	ON	N0G 2L0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
5196014750	Franklin Liam	3519		

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): 150

Pumping rate (l/min / GPM): 6

Duration of pumping: 6 hrs + 0 min

Final water level end of pumping (m/ft): 95.6

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft): 150

Recommended pump rate (l/min/GPM): 6

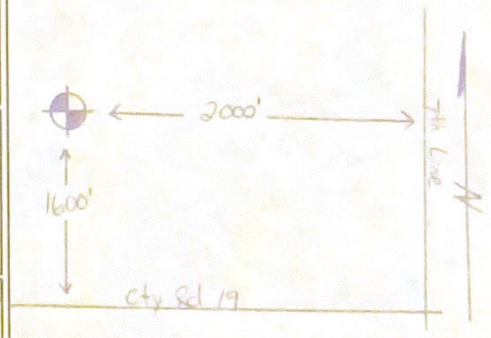
Well production (l/min/GPM)

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	51.2		
1	62.6	1	92.7
2	66.5	2	89.2
3	70.3	3	86.2
4	72.7	4	83.0
5	76.0	5	80.7
10	89.0	10	70.8
15	91.5	15	64.5
20	93.5	20	60.0
25	93.0	25	58.5
30	93.5	30	57.1
40	94.2	40	55.6
50	94.4	50	55.0
60	94.6	60	54.6

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered: 2021/06/25

Date Work Completed: 2021/06/16

Ministry Use Only

Audit No. Z384559

Received

TW2

Ontario — Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. (Place Sticker and/or Print Below): Tag#:A335261 A335261

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

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

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2907 Upper James St	Mount Hope	ON	L0R1W0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
0 Wellington Road 19	West Garafraxa	12	7

County/District/Municipality	City/Town/Village	Province	Postal Code
Wellington	Belwood	Ontario	N0B1W0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	515398	4848810		

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	Topsoil			0	1
Grey	Clay	odd stone		1	76
Brown	Sandy Gravel	Clay, Silt		76	118
Brown	Limestone			118	142

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	21	Bentonite	6.8

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	Steel	.188	+2	22
6	Open Hole		22	142

Construction Record - Screen

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

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 (m/ft)	Kind of Water	Gas	Other, specify
130	☐ Fresh ☒ Untested	☐	
	☐ Fresh ☐ Untested	☐	
	☐ Fresh ☐ Untested	☐	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	21	10
21	122	7
122	142	6

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): 100

Pumping rate (l/min / GPM): 12

Duration of pumping: 6 hrs + 0 min

Final water level end of pumping (m/ft): 74.4

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft): 90

Recommended pump rate (l/min/GPM): 10

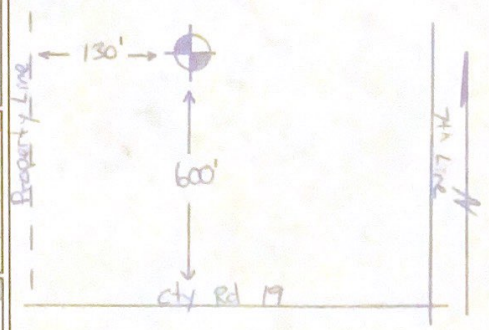
Well production (l/min/GPM)

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	67.1		
1	68.9	1	72.9
2	69.3	2	72.3
3	69.7	3	72.0
4	69.9	4	71.7
5	70.1	5	71.6
10	70.8	10	70.8
15	71.4	15	70.5
20	71.6	20	70.3
25	71.9	25	70.1
30	72.0	30	70.0
40	72.2	40	69.7
50	72.4	50	69.5
60	72.6	60	69.4

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No
Franklin Drilling Services Inc	7119

Business Address (Street Number/Name)	Municipality
6891 Sdrd 7 West	Mount Forest

Province	Postal Code	Business E-mail Address
ON	N0G2L0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5197014750	Franklin Liam

Well Technician's Licence No	Signature of Technician and/or Contractor	Date Submitted
3519		2020/06/25

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered: 2020/06/25

Date Work Completed: 2020/06/12

Ministry Use Only

Audit No: Z398594

Received

TW3

Ontario — Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. (Place Sticker and/or Print Below): Tag#:A335262 (A335262)

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

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

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2907 Upper James St	Mount Hope	ON	L0R1W0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
0 Wellington Road 19	West Garafraxa	12	7

County/District/Municipality	City/Town/Village	Province	Postal Code
Wellington	Belwood	Ontario	N0B1J0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD	8	517411	4849156		

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	Gravel	Sand, clay		0	24
Grey	Clay	Gravel, silt, sand		24	88
Brown	Gravel	silt, Sand, Cby		88	113
Brown	Limestone			113	162

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	20	Bentonite	6.7

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	Steel	.188	+2	121
6	Open Hole		121	162

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

Construction Record - Screen

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

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Other, specify
109	☐	☐ Fresh ☒ Untested	
140	☐	☐ Fresh ☒ Untested	
149	☐	☐ Fresh ☒ Untested	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	20	10
20	121	7
121	162	6

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): 100

Pumping rate (l/min / GPM): 6

Duration of pumping: 6 hrs + 0 min

Final water level end of pumping (m/ft): 62.0

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft): 80

Recommended pump rate (l/min/GPM): 6

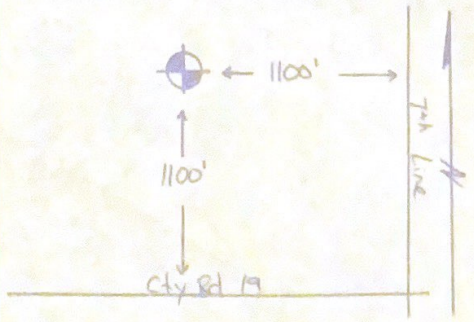
Well production (l/min/GPM)

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	50.7		
1	54.7	1	58.0
2	56.3	2	57.0
3	57.4	3	55.9
4	58.1	4	55.0
5	58.7	5	54.6
10	60.3	10	53.6
15	61.1	15	53.2
20	61.4	20	52.9
25	61.4	25	52.7
30	61.1	30	52.5
40	61.3	40	52.3
50	61.6	50	52.1
60	61.6	60	52.0

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Franklin Drilling Services Inc	7119

Business Address (Street Number/Name)	Municipality
6891 Sdrd 7 West	Mount Forest

Province	Postal Code	Business E-mail Address
ON	N0G2L0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5197914750	Franklin Liam

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3514		2022/06/25

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2022/06/25	2022/06/13

Ministry Use Only

Audit No. Z398593

Received

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Contractor's Copy

TW4

Ontario — Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. (Place Sticker and/or Print Below) Tag#:A335263 A335263

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

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

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2907 Upper James St	Mount Hope	ON	L0R1W0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
0 Wellington Road 19	West Garafraxa	12	7

County/District/Municipality	City/Town/Village	Province	Postal Code
Wellington	Belwood	Ontario	N0B1N0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	551016	4849615		

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	Sandy Topsoil			0	2
Brown	Sandy Clay	Gravel		2	24
Grey	Silty Clay			24	88
Grey	Silty Clay	Sand, Gravel		88	114
Brown	Limestone			114	201

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	21	Bentonite	6.9

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	Steel	.188	+2	121
6	Open Hole		121	201

Construction Record - Screen

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

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 (m/ft)	Gas	Kind of Water	Other, specify
138	☐	☐ Fresh ☒ Untested	
194	☐	☐ Fresh ☒ Untested	
	☐	☐ Fresh ☐ Untested	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	21	10
21	121	7
121	201	6

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): 100

Pumping rate (l/min / GPM): 5

Duration of pumping: 6 hrs + 0 min

Final water level end of pumping (m/ft): 86.4

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft): 100

Recommended pump rate (l/min/GPM): 5

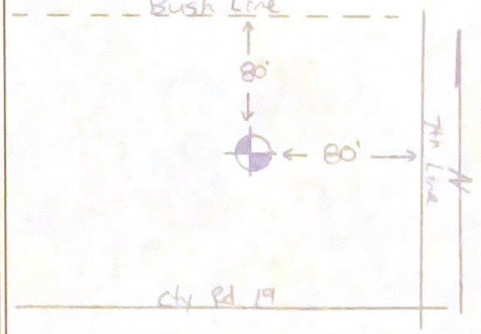
Well production (l/min/GPM)

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		37.0		
1	42.3		1	80.4
2	45.15		2	79.9
3	48.0		3	78.0
4	50.6		4	77.5
5	52.95		5	73.4
10	62.2		10	64.0
15	68.8		15	57.4
20	75.25		20	52.7
25	76.3		25	49.3
30	78.3		30	47.0
40	80.9		40	44.4
50	82.3		50	42.9
60	83.15		60	42.2

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Franklin Drilling Services Inc	7119

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6891 Sdrd 7 West	Mount Forest	ON	N0G2L0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
5199501475	Franklin, Liam	3519		2021/11/25

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2021/11/25	2021/10/14

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Ontario — Ministry of the Environment, Conservation and Parks

TWS

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. (Place Sticker and/or Print Below): Tag#:A335270 A335270

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

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

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2907 Upper James St	Mount Hope	ON	L0R1W0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
0 Wellington Road 19	West Garafraxa	12	7

County/District/Municipality	City/Town/Village	Province	Postal Code
Wellington	Belwood	Ontario	N0B1N0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	554382	4849293		

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	To
Brown	Sandy Topsoil			0	2
Brown	Clay	Sand, Gravel		2	28
Grey	Clay	Silt, odd stone		28	76
Grey	Gravel	Clay, Silt, Sand		76	117
Brown	Limestone			117	141

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	21	Bentonite	6.9

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	To
6	Steel	.188	+2	121
6	Open Hole		121	141

Construction Record - Screen

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

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 (m/ft)	Gas	Kind of Water	Other, specify
127	☐	☐ Fresh ☒ Untested	
135	☐	☐ Fresh ☒ Untested	
	☐	☐ Fresh ☐ Untested	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	21	10
21	121	7
121	141	6

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): 100

Pumping rate (l/min / GPM): 9

Duration of pumping: 6 hrs + 0 min

Final water level end of pumping (m/ft): 58.0

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft): 80'

Recommended pump rate (l/min/GPM): 10

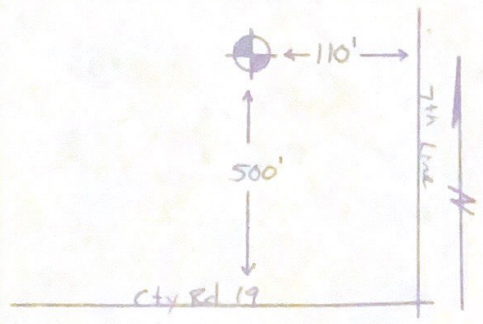
Well production (l/min/GPM)

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		56.6		
1		57.2	1	57.6
2		57.2	2	57.6
3		57.2	3	57.6
4		57.21	4	57.55
5		57.21	5	57.55
10		57.23	10	57.55
15		57.32	15	57.52
20		57.3	20	57.5
25		57.31	25	57.45
30		57.32	30	57.45
40		57.4	40	57.4
50		57.41	50	57.4
60		57.45	60	57.35

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No
Franklin Drilling Services Inc	7119

Business Address (Street Number/Name)	Municipality
6891 Sdrd 7 West	Mount Forest

Province	Postal Code	Business E-mail Address
ON	N0G2L0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5197014750	Franklin, Liam

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3519		2021/10/25

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2021/10/25	2021/10/21

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Audit No. Z398587
Received

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Appendix B
Local Water Well Record Summary

Record No.	Date Constructed	Total Depth (m)	Type		Use	Static Level (m)	Bedrock Depth (m)	Recommended Rate (Lpm)	Source Classification
			constr.	source unit					
6702969	01/02/1955	35.4	drilled	bedrock	domestic	4.9	18.3	57	semi-confined bedrock aquifer
6702970	29/03/1957	32.0	drilled	bedrock	domestic	4.3	21.6	30	confined bedrock aquifer
6702971	21/06/1957	46.6	drilled	bedrock	domestic	10.7	23.2	30	confined bedrock aquifer
6702972	22/08/1957	21.0	drilled	bedrock	domestic	4.6	10.7	34	confined bedrock aquifer
6702973	21/11/1959	41.1	drilled	bedrock	domestic	9.1	22.9	34	confined bedrock aquifer
6702974	12/07/1962	36.9	drilled	bedrock	domestic	5.8	21.9	45	confined bedrock aquifer
6702975	19/07/1962	29.0	drilled	bedrock	domestic	1.8	15.2	57	confined bedrock aquifer
6702976	23/04/1966	44.2	drilled	bedrock	public	6.7	21.9	42	confined bedrock aquifer
6702992	22/09/1956	45.7	drilled	bedrock	domestic	13.7	28.3	19	confined bedrock aquifer
6702993	08/10/1956	50.9	drilled	bedrock	domestic	11.3	25.3	19	confined bedrock aquifer
6702994	13/08/1960	45.7	drilled	bedrock	domestic	15.2	25.9	26	confined bedrock aquifer
6702995	30/10/1965	9.1	bored	sand/clay	domestic	7.0	-	6	unconfined aquifer
6703168	21/12/1968	47.5	drilled	bedrock	stock, domestic	10.1	30.5	38	confined bedrock aquifer
6703243	11/09/1968	33.5	drilled	bedrock	domestic	3.7	23.5	42	confined bedrock aquifer
6703276	29/02/1968	36.6	drilled	bedrock	domestic	5.2	11.6	45	confined bedrock aquifer
6703508	16/09/1969	38.1	drilled	bedrock	domestic	6.7	25.0	45	confined bedrock aquifer
6703609	13/02/1970	44.5	drilled	bedrock	domestic	9.1	23.8	38	confined bedrock aquifer
6703827	04/12/1970	82.3	drilled	bedrock	domestic	10.7	18.6	38	confined bedrock aquifer
6705062	03/10/1973	51.8	drilled	bedrock	domestic	14.6	21.6	30	confined bedrock aquifer
6705299	13/08/1974	59.4	drilled	bedrock	domestic	7.0	24.4	26	confined bedrock aquifer
6705787	14/11/1975	45.7	drilled	bedrock	domestic	9.8	29.0	19	confined bedrock aquifer
6706284	14/11/1976	50.3	drilled	bedrock	domestic	5.2	21.9	34	confined bedrock aquifer
6706420	10/06/1977	46.9	drilled	bedrock	domestic	16.5	27.4	30	confined bedrock aquifer
6706425	27/05/1977	30.5	drilled	bedrock	domestic	0.9	18.9	15	confined bedrock aquifer
6706491	14/07/1977	31.4	drilled	bedrock	domestic	8.2	30.5	19	confined bedrock aquifer
6706513	17/08/1977	35.7	drilled	bedrock	domestic	6.4	11.6	38	confined bedrock aquifer
6706515	20/08/1977	21.9	drilled	bedrock	domestic	5.2	6.1	38	confined bedrock aquifer
6706518	24/08/1977	38.7	drilled	bedrock	domestic	5.2	10.1	38	confined bedrock aquifer
6706903	20/06/1978	35.1	drilled	bedrock	domestic	3.7	17.4	38	confined bedrock aquifer
6707216	24/05/1979	41.5	drilled	bedrock	domestic	0.0	19.2	34	confined bedrock aquifer
6707300	24/04/1980	29.6	drilled	bedrock	domestic	5.5	12.8	15	confined bedrock aquifer
6707370	18/12/1980	61.6	drilled	bedrock	domestic	8.2	29.6	38	confined bedrock aquifer
6707596	01/06/1981	38.1	drilled	bedrock	domestic	0.0	14.3	38	confined bedrock aquifer

Record No.	Date Constructed	Total Depth (m)	Type constr.	Type source unit	Use	Static Level (m)	Bedrock Depth (m)	Recommended Rate (Lpm)	Source Classification
6707790	04/06/1982	35.4	drilled	bedrock	domestic	3.7	17.4	38	confined bedrock aquifer
6708048	23/08/1983	25.3	drilled	bedrock	domestic	4.9	12.5	38	confined bedrock aquifer
6708436	02/06/1986	51.8	drilled	bedrock	domestic	12.8	27.7	30	confined bedrock aquifer
6708643	01/12/1986	68.9	drilled	bedrock	domestic	12.8	27.7	30	confined bedrock aquifer
6708925	10/09/1987	49.7	drilled	bedrock	domestic	9.1	27.7	38	confined bedrock aquifer
6709205	23/06/1987	50.3	drilled	bedrock	domestic	13.4	27.1	38	confined bedrock aquifer
6709633	22/09/1988	59.7	drilled	bedrock	domestic	19.8	25.3	38	confined bedrock aquifer
6709644	10/02/1989	30.5	drilled	bedrock	domestic	4.6	16.8	26	confined bedrock aquifer
6710166	31/05/1989	53.0	drilled	bedrock	domestic	3.7	23.8	76	confined bedrock aquifer
6710280	25/04/1990	22.9	drilled	bedrock	domestic	4.9	8.5	45	confined bedrock aquifer
6710460	17/10/1990	29.6	drilled	bedrock	domestic	7.3	17.1	38	confined bedrock aquifer
6711818	13/07/1995	54.9	drilled	bedrock	domestic	4.6	24.4	64	confined bedrock aquifer
6712354	24/09/1997	24.4	drilled	bedrock	domestic	6.1	10.7	38	confined bedrock aquifer
6712795	11/11/1998	33.5	drilled	bedrock	domestic	8.2	13.4	38	confined bedrock aquifer
6713374	31/05/2000	41.1	drilled	bedrock	domestic	6.1	14.0	30	confined bedrock aquifer
6714142	26/06/2002	30.5	drilled	bedrock	domestic	1.2	14.9	38	confined bedrock aquifer
6714144	29/05/2001	30.5	drilled	bedrock	domestic	1.8	15.2	38	confined bedrock aquifer
6714277	02/11/2002	53.6	drilled	bedrock	domestic	19.2	25.6	38	confined bedrock aquifer
6714285	26/11/2002	33.5	drilled	bedrock	domestic	8.2	19.2	45	confined bedrock aquifer
6714363	20/12/2002	33.5	drilled	bedrock	domestic	19.0	24.1	30	confined bedrock aquifer
6714902	27/05/2004	36.0	drilled	bedrock	domestic	2.0	15.2	30	confined bedrock aquifer
6715753	24/05/2006	35.1	drilled	bedrock	domestic	7.3	17.4	30	confined bedrock aquifer
7120899	22/09/2008	42.9	drilled	bedrock	domestic	6.5	20.0	38	confined bedrock aquifer
7128005	29/01/2008	55.8	drilled	bedrock	domestic	13.0	17.4	n/a	confined bedrock aquifer
7128694	14/09/2007	42.4	drilled	bedrock	domestic	10.5	14.0	38	confined bedrock aquifer
7135350	17/09/2009	well abandonment record (of WWR#7128005)				-	-	-	-
7138843	17/08/2009	65.9	drilled	bedrock	domestic	11.6	18.8	38	confined bedrock aquifer
7140880	09/11/2009	well head extension upgrade to drilled well				-	-	-	-
7153832	15/10/2010	25.3	drilled	bedrock	domestic	7.8	13.4	76	confined bedrock aquifer
7162429	01/12/2010	43.3	drilled	bedrock	domestic	14.3	24.7	38	confined bedrock aquifer
7184236	12/05/2012	37.8	drilled	bedrock	domestic	4.3	17.4	38	confined bedrock aquifer
7185522	13/06/2012	well head extension upgrade to drilled well				-	-	-	-
7186923	21/06/2012	4.5	drilled	overburden	monitoring	-	-	-	water table

Record No.	Date Constructed	Total Depth (m)	Type		Use	Static Level (m)	Bedrock Depth (m)	Recommended Rate (Lpm)	Source Classification
			constr.	source unit					
7186924	21/06/2012	4.5	drilled	overburden	monitoring	-	-	-	water table
7190746	25/10/2012	well abandonment record (dug we			-	-	-	-	-
7214323	22/02/2013	23.2	drilled	bedrock	domestic	7.9	20.1	38	confined bedrock aquifer
7214805	06/11/2013	well head modification (monitorin			-	-	-	-	-
7214806	06/11/2013	well head modification (monitorin			-	-	-	-	-
7230108	08/10/2014	well head extension upgrade to drilled well				-	-	-	-
7237473	06/11/2014	76.2	drilled	bedrock	domestic	30.5	39.6	38	confined bedrock aquifer
7245367	20/05/2015	30.5	drilled	bedrock	domestic	1.5	15.2	76	confined bedrock aquifer
7248061	04/06/2015	well abandonment record (dug we			-	-	-	-	-
7248062	04/06/2015	50.0	drilled	bedrock	domestic	10.7	29.3	38	confined bedrock aquifer
7249025	03/09/2015	31.1	drilled	bedrock	domestic	11.3	22.6	76	confined bedrock aquifer
7274383	07/06/2016	30.5	drilled	bedrock	domestic	5.8	22.6	76	confined bedrock aquifer
7303607	02/10/2017	52.5	drilled	bedrock	domestic	13.7	41.8	38	confined bedrock aquifer
7304979	07/12/2017	30.5	drilled	bedrock	domestic	7.3	9.4	30	confined bedrock aquifer
7313904	01/06/2018	well head extension upgrade to drilled well				-	-	-	-
7316464	06/06/2018	31.1	drilled	bedrock	domestic	9.1	21.6	38	confined bedrock aquifer
7319704	09/08/2018	4.1	drilled	overburden	monitoring	-	-	-	water table
7340240	31/05/2019	no informa	-	-	-	-	-	-	-
7348741	08/11/2019	well head extension upgrade to drilled well				-	-	-	-
7350245	13/12/2019	well head extension upgrade to drilled well				-	-	-	-
7372766	28/10/2020	37.5	drilled	bedrock	domestic	10.4	24.0	20	confined bedrock aquifer
7377097	15/08/2020	19.8	drilled	bedrock	domestic	3.0	9.8	76	confined bedrock aquifer
7380139	29/01/2021	22.9	drilled	bedrock	domestic	6.3	16.8	76	confined bedrock aquifer
7390474	18/01/2021	4.6	drilled	overburden	monitoring	-	-	-	water table (site monitor)
7390475	19/01/2021	4.6	drilled	overburden	monitoring	-	-	-	water table (site monitor)
7390488	18/01/2021	7.6	drilled	overburden	monitoring	-	-	-	water table (site monitor)
7390489	19/01/2021	4.6	drilled	overburden	monitoring	-	-	-	water table (site monitor)
7390490	19/01/2021	4.6	drilled	overburden	monitoring	-	-	-	water table (site monitor)
7390491	18/01/2021	4.6	drilled	overburden	monitoring	-	-	-	water table (site monitor)

Well ID

Well ID Number: 7303607
Well Audit Number: *Z244506*
Well Tag Number: *A171818*

Survey Response R1

Select Water Well Records:
Survey Response Locations
Monitored During Pump Testing

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	6684 7TH LINE
Township	WEST GARAFRAXA TOWNSHIP
Lot	013
Concession	CON 07
County/District/Municipality	WELLINGTON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 17 Easting: 553674.00 Northing: 4849834.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BRWN	CLAY			0 m	8.9 m
	CLAY	GRVL		8.9 m	38.1 m
	GRVL	CLAY		38.1 m	41.8 m
GREY	LMSN			41.8 m	52.5 m

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 m	7 m	BENTONITE	

Method of Construction & Well Use

Method of Construction	Well Use
Rotary (Convent.)	
	Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
15.9 cm	STEEL	-0.8 m	43.4 m
15.6 cm	OPEN HOLE	43.4 m	52.5 m

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 6865

Results of Well Yield Testing

After test of well yield, water was	CLEAR
If pumping discontinued, give reason	
Pump intake set at	22 m
Pumping Rate	50 LPM
Duration of Pumping	1 h:0 m
Final water level	14.33 m
If flowing give rate	
Recommended pump depth	22 m
Recommended pump rate	38 LPM
Well Production	
Disinfected?	Y

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL	13.72 m		
1	13.93 m	1	14.11 m
2	13.96 m	2	14.08 m
3	13.99 m	3	14.07 m

4	14.01 m	4	14.05 m
5	14.02 m	5	14.04 m
10	14.08 m	10	14 m
15	14.11 m	15	13.97 m
20	14.14 m	20	13.94 m
25	14.19 m	25	13.93 m
30	14.2 m	30	13.91 m
40	14.25 m	40	13.89 m
45		45	
50	14.28 m	50	13.88 m
60	14.33 m	60	13.86 m

Water Details

Water Found at Depth	Kind
	Untested

Hole Diameter

Depth From	Depth To	Diameter
0 m	7 m	25.1 cm
7 m	43.4 m	22.3 cm
43.4 m	52.5 m	15.6 cm

Audit Number: Z244506

Date Well Completed: October 02, 2017

Date Well Record Received by MOE: January 19, 2018

Ontario Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A171427.

A171427

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

[redacted]

Survey Response R2
WWR# 7237476

Address of Well Location (Street Number/Name)	Township	Lot	Concession
8714 WELLINGTON ROAD 19	W GARAFRAXA	PT 12	8

County/District/Municipality	City/Town/Village	Province	Postal Code
WELLINGTON	BELWOOD	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	17	554596	4849386		

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	CLAY		HARD	0	18
GREY	CLAY	STONES	SOFT	18	92
GREY	HARDPAN			92	130
LT BRN	LIMESTONE		HARD	130	165
MED BRN	LIMESTONE			165	250

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	134	BENTONITE SLURRY	

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	STEEL	.188	+2	134
6	OPEN HOLE		134	250

Construction Record - Screen

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

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 (m/ft)	Kind of Water	Other, specify
190	☐ Fresh ☐ Untested ☐ Gas	
220	☐ Fresh ☐ Untested ☐ Gas	
245	☐ Fresh ☐ Untested ☐ Gas	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	134	8 3/4
134	250	6 1/4

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): 150

Pumping rate (l/min / GPM): 16

Duration of pumping: 1 hrs + ____ min

Final water level end of pumping (m/ft): 150

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

Recommended pump depth (m/ft): 130

Recommended pump rate (l/min / GPM): 10

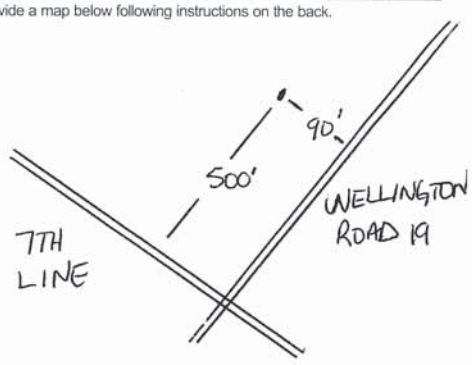
Well production (l/min / GPM): 25

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		100		
1		150	1	127
2			2	119
3			3	114
4			4	111
5			5	108
10			10	104
15			15	102
20			20	102
25			25	101
30			30	101
40			40	100
50			50	100
60		150	60	100

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

APPROX.

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Durl Hopper Ltd.	2644

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
RR#7	St. Marys	Ont	N4X1C9	hopper@cvg.net

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5192717860	HOPPER, DOUGLAS

Well Technician's Licence No.	Signature of Well Technician or Contractor	Date Submitted
2323	[redacted]	11/17/2014

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☑ No	11/6/2014	11/6/2014

Ministry Use Only

Audit No: Z 196020

Received FEB 13 2015

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Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

Survey Response R5

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

11 **6708436**

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC	LOT	DATE COMPLETED
Wellington	West Garafraxa	Con. 7	11	DAY 02 MO 06 YR 86

[redacted] R. 5 Belwood, Ontario

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
brown	clay	sand		0	30
grey	hardpan	boulders		30	91
brown	limestone			91	170

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
155	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
170	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
5	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	93
5	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		93	170
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

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

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☐ PUMP 2 ☐ BAILER: air	8 GPM	1 HOURS ___ MINS

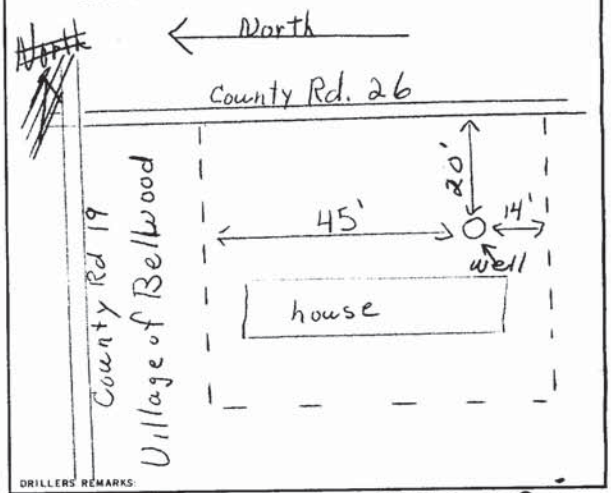
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
42 FEET	65 FEET		FEET	FEET	FEET	65 FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	85 FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	85 FEET	8 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: Hugh Morrison Water Well Drilling Ltd.
LICENCE NUMBER:
ADDRESS: R.R. 5 Mount Forest, Ontario.
NAME OF DRILLER OR BORER: Hugh Morrison
LICENCE NUMBER: 3740
SIGNATURE OF CONTRACTOR: H Morrison
SUBMISSION DATE: DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR | DATE RECEIVED: 27 06 86
DATE OF INSPECTION | INSPECTOR
REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77 FORM 7

Ontario — Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☐ Imperial

Well Tag No. (Place Sticker and ...): 146101 Tag#: A146101

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Survey Response R7
WWR# 7249025

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	WEST GARAFRAXA	11	7

County/District/Municipality	City/Town/Village	Province	Postal Code
WELLINGTON		Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	554353	4849112		

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	SILT & CLAY & STONES			0	46ft
GRAY	CLAY & STONES			46ft	74ft
BROWN	LIMESTONE			74ft	102f

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	90ft	BENTONITE SLURRY 80gal	

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
6¼	steel	.188	0	90ft
6in	open hole		90ft	102ft

Construction Record - Screen

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

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)
7ft (m/ft) ☐ Gas	☒ Fresh ☐ Untested ☐ Other, specify	0	90ft	8.75in
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	90ft	102ft	6in
(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): 40ft

Pumping rate (l/min / GPM): 20gpm

Duration of pumping: 2 hrs + 0 min

Final water level end of pumping (m/ft): 37ft

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

Recommended pump depth (m/ft): 50ft

Recommended pump rate (l/min / GPM): 20gpm

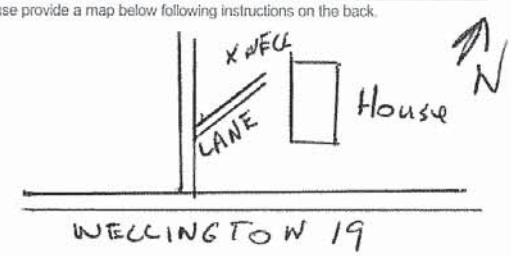
Well production (l/min / GPM):

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	27ft		
1		1	
2		2	
3		3	
4		4	
5	32ft	5	30ft
10	34ft	10	27ft
15	35ft	15	
20	36ft	20	
25	37ft	25	
30		30	
40		40	
50		50	
60	37ft	60	27ft

Map of Well Location

Please provide a map below following instructions on the back.



Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
KEITH LANG WELL DRILLING INC	7154

Business Address (Street Number/Name)	Municipality
51 ELDON ST GODERICH	

Province	Postal Code	Business E-mail Address
ONT	N7A3R9	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
	KEITH LANG

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T446		

Comments:

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☒ Yes ☐ No	Date Work Completed: 2015 9 3	Audit No. Z220204

Received OCT 05 2015

506E (2014/11)

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6703168 Survey Response R9

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40P/16W

7

Water management in Ontario

FEB 5 1969

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District WELLINGTON Township, Village, Town or City WEST GARAFRAXA

Con. 7 Lot 12 EAST HALF Date completed 21 (day) DEC (month) 1968 (year)

[redacted] ress Belwood

Casing and Screen Record	
Inside diameter of casing	4"
Total length of casing	105 FT
Type of screen	NONE
Length of screen	
Depth to top of screen	
Diameter of finished hole	4"

Pumping Test	
Static level	33 FT
Test-pumping rate	10 G.P.M.
Pumping level	55 FT
Duration of test pumping	1 hr
Water clear or cloudy at end of test	CLEAR
Recommended pumping rate	10 G.P.M.
with pump setting of	75 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
CLAY - ROCKS	0	100	154 FT	
LIGHT GREY LIMESTONE	100	156		FRESH

For what purpose(s) is the water to be used? FARM DOMESTIC AND STOCK

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

Drilling or Boring Firm LANG DRILLING HILLSBURG R R #1

Address

Licence Number 2987

Name of Driller or Borer THOMAS LANG

Address HILLSBURG R R #1

Date Dec 21/68

T. Lang

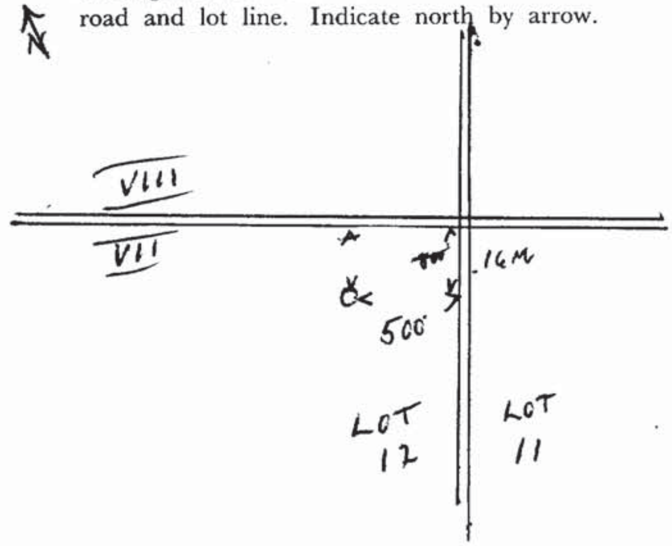
(Signature of Licensed Drilling or Boring Contractor)

Form 7

OWRC COPY

Location of Well

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

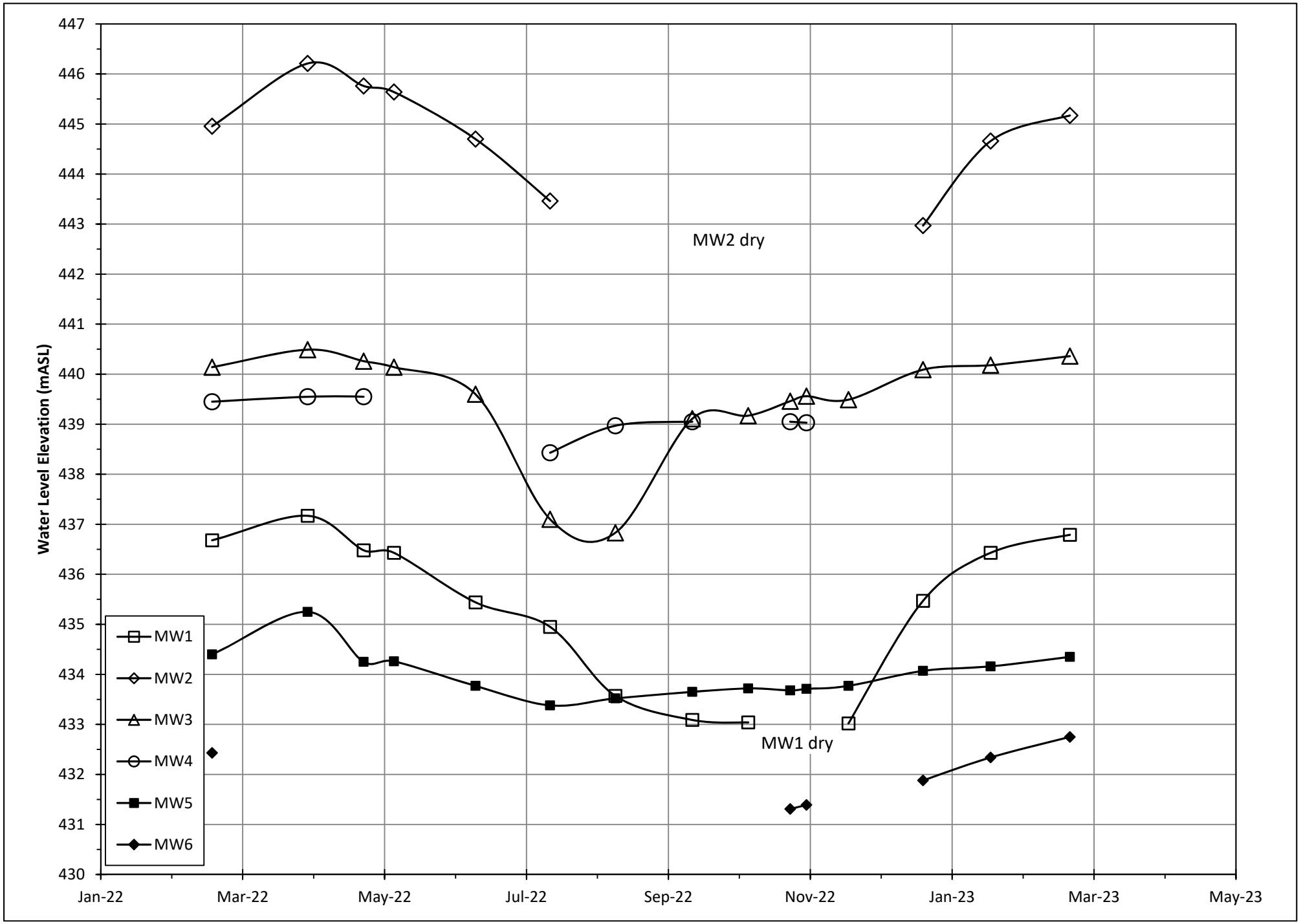


CSS.S8

Appendix C
Water Level
Monitoring Summary

Water Level Elevation (mASL)						
Date	MW1	MW2	MW3	MW4	MW5	MW6
TOW:	438.32	447.37	441.49	439.55	436.07	433.83
18-Feb-22	436.68	444.96	440.14	439.45	434.40	432.43
31-Mar-22	437.17	446.21	440.49	439.55	435.25	#N/A
24-Apr-22	436.48	445.76	440.26	439.55	434.25	#N/A
7-May-22	436.43	445.64	440.14	#N/A	434.26	#N/A
11-Jun-22	435.44	444.70	439.60	#N/A	433.77	#N/A
13-Jul-22	434.95	443.46	437.10	438.43	433.38	#N/A
10-Aug-22	433.57	dry	436.83	438.97	433.52	#N/A
12-Sep-22	433.09	dry	439.11	439.05	433.65	#N/A
6-Oct-22	433.04	dry	439.17	#N/A	433.72	#N/A
24-Oct-22	dry	dry	439.46	439.05	433.68	431.31
31-Oct-22	dry	dry	439.56	439.03	433.71	431.39
18-Nov-22	433.02	dry	439.49	#N/A	433.77	#N/A
20-Dec-22	435.47	442.97	440.09	#N/A	434.07	431.88
18-Jan-23	436.43	444.66	440.18	#N/A	434.16	432.34
21-Feb-23	436.79	445.17	440.36	#N/A	434.35	432.75

notes:
mASL = metres above sea level
n/a = not available
TOW = top of well



BelCal Inc
Proposed Belwood Development

Water Level Hydrograph

Groundwater Science Corp.
Hydrogeologic Assessment

Appendix D
Site Monitor Water Quality Sampling Results

	Detection		MW1		MW2		MW3		
Parameter	Limit	Units	18-Feb-2022	12-Apr-2022	18-Feb-2022	12-Apr-2022	18-Feb-2022	12-Apr-2022	08-Nov-2022
Anions and Nutrients									
Bromide (Br)	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chloride (Cl)	0.50	mg/L	25.6	91.3	32.2	31.5	8.88	8.87	8.24
Fluoride (F)	0.020	mg/L	0.155	0.129	0.079	0.061	0.194	0.165	0.147
Nitrate (as N)	0.020	mg/L	6.65	0.102	6.49	6.08	0.056	0.032	0.097
Nitrite (as N)	0.010	mg/L	<0.010	0.051	0.032	<0.010	<0.010	<0.010	<0.010
Sulfate (SO4)	0.30	mg/L	41.7	45.9	29.1	24.0	46.8	41.8	61.7
Metals									(Dissolved)
aluminum	0.0030	mg/L	-	-	-	-	-	-	0.0054
antimony	0.00010	mg/L	-	-	-	-	-	-	0.00014
arsenic	0.00010	mg/L	-	-	-	-	-	-	0.00073
barium	0.00010	mg/L	-	-	-	-	-	-	0.0851
beryllium	0.000020	mg/L	-	-	-	-	-	-	<0.000020
bismuth	0.000050	mg/L	-	-	-	-	-	-	<0.000050
boron	0.010	mg/L	-	-	-	-	-	-	0.055
cadmium	0.0000050	mg/L	-	-	-	-	-	-	<0.0000050
calcium	0.050	mg/L	-	-	-	-	-	-	56.0
cesium	0.000010	mg/L	-	-	-	-	-	-	<0.000010
chromium	0.00050	mg/L	-	-	-	-	-	-	<0.00050
cobalt	0.00010	mg/L	-	-	-	-	-	-	<0.00010
copper	0.00050	mg/L	-	-	-	-	-	-	0.00042
iron	0.010	mg/L	-	-	-	-	-	-	<0.010
lead	0.000050	mg/L	-	-	-	-	-	-	<0.000050
lithium	0.0010	mg/L	-	-	-	-	-	-	0.0123
magnesium	0.0050	mg/L	-	-	-	-	-	-	35.6
manganese	0.00010	mg/L	-	-	-	-	-	-	0.00552
molybdenum	0.000050	mg/L	-	-	-	-	-	-	0.00365
nickel	0.00050	mg/L	-	-	-	-	-	-	<0.00050
phosphorus	0.050	mg/L	-	-	-	-	-	-	<0.050
potassium	0.050	mg/L	-	-	-	-	-	-	2.41
rubidium	0.00020	mg/L	-	-	-	-	-	-	0.00056
selenium	0.000050	mg/L	-	-	-	-	-	-	0.000508
silicon	0.10	mg/L	-	-	-	-	-	-	6.50
silver	0.000010	mg/L	-	-	-	-	-	-	<0.000010
sodium	0.050	mg/L	-	-	-	-	-	-	16.0
strontium	0.00020	mg/L	-	-	-	-	-	-	0.433
sulfur	0.50	mg/L	-	-	-	-	-	-	21.6
tellurium	0.00020	mg/L	-	-	-	-	-	-	<0.00020
thallium	0.000010	mg/L	-	-	-	-	-	-	<0.000010
thorium	0.00010	mg/L	-	-	-	-	-	-	<0.00010
tin	0.00010	mg/L	-	-	-	-	-	-	<0.00010
titanium	0.00030	mg/L	-	-	-	-	-	-	<0.00030
tungsten	0.00010	mg/L	-	-	-	-	-	-	<0.00010
uranium	0.000010	mg/L	-	-	-	-	-	-	0.00229
vanadium	0.00050	mg/L	-	-	-	-	-	-	0.00063
zinc	0.0030	mg/L	-	-	-	-	-	-	<0.0010
zirconium	0.00020	mg/L	-	-	-	-	-	-	<0.00030

	Detection		MW4		MW5			MW6	CREEK
Parameter	Limit	Units	12-Apr-2022	08-Nov-2022	18-Feb-2022	12-Apr-2022	08-Nov-2022	08-Nov-2022	08-Nov-2022
Anions and Nutrients									
Bromide (Br)	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chloride (Cl)	0.50	mg/L	1.16	0.96	1.31	1.37	0.82	30.2	5.14
Fluoride (F)	0.020	mg/L	0.115	0.124	0.289	0.284	0.234	0.153	0.051
Nitrate (as N)	0.020	mg/L	<0.020	0.126	0.216	0.137	0.108	0.145	0.736
Nitrite (as N)	0.010	mg/L	<0.010	0.034	0.011	<0.010	0.040	<0.010	<0.010
Sulfate (SO4)	0.30	mg/L	14.7	15.8	3.64	3.89	3.06	38.4	6.96
Metals				(Dissolved)			(Dissolved)	(Dissolved)	(Total)
aluminum	0.0030	mg/L	-	0.0031	-	-	0.0159	0.0041	0.0190
antimony	0.00010	mg/L	-	0.00044	-	-	0.00010	<0.00010	<0.00010
arsenic	0.00010	mg/L	-	0.00488	-	-	0.00941	0.00060	0.00032
barium	0.00010	mg/L	-	0.0947	-	-	0.0254	0.0525	0.0202
beryllium	0.000020	mg/L	-	<0.000020	-	-	<0.000020	<0.000020	<0.000020
bismuth	0.000050	mg/L	-	<0.000050	-	-	<0.000050	<0.000050	<0.000050
boron	0.010	mg/L	-	0.034	-	-	0.182	0.064	<0.010
cadmium	0.0000050	mg/L	-	<0.0000050	-	-	0.0000063	<0.0000050	<0.0000050
calcium	0.050	mg/L	-	45.4	-	-	13.3	62.2	84.8
cesium	0.000010	mg/L	-	<0.000010	-	-	<0.000010	<0.000010	<0.000010
chromium	0.00050	mg/L	-	<0.00050	-	-	<0.00050	<0.00050	0.00087
cobalt	0.00010	mg/L	-	0.00016	-	-	0.00016	<0.00010	<0.00010
copper	0.00050	mg/L	-	<0.00020	-	-	0.00101	0.00032	<0.00050
iron	0.010	mg/L	-	<0.010	-	-	<0.010	<0.010	0.038
lead	0.000050	mg/L	-	0.000064	-	-	<0.000050	<0.000050	<0.000050
lithium	0.0010	mg/L	-	0.0041	-	-	0.0015	0.0098	<0.0010
magnesium	0.0050	mg/L	-	21.6	-	-	6.80	30.3	21.2
manganese	0.00010	mg/L	-	0.0350	-	-	0.0366	0.00370	0.0118
molybdenum	0.000050	mg/L	-	0.00182	-	-	0.0126	0.00544	0.000160
nickel	0.00050	mg/L	-	0.00070	-	-	0.00097	<0.00050	<0.00050
phosphorus	0.050	mg/L	-	<0.050	-	-	<0.050	<0.050	<0.050
potassium	0.050	mg/L	-	1.43	-	-	0.715	3.73	1.13
rubidium	0.00020	mg/L	-	0.00065	-	-	0.00047	0.00055	0.00040
selenium	0.000050	mg/L	-	0.000093	-	-	0.000055	0.000125	0.000098
silicon	0.10	mg/L	-	7.68	-	-	4.66	8.57	4.89
silver	0.000010	mg/L	-	<0.000010	-	-	<0.000010	<0.000010	<0.000010
sodium	0.050	mg/L	-	8.26	-	-	33.5	15.4	2.47
strontium	0.00020	mg/L	-	0.289	-	-	0.163	0.262	0.126
sulfur	0.50	mg/L	-	5.14	-	-	0.97	13.4	2.85
tellurium	0.00020	mg/L	-	<0.00020	-	-	<0.00020	<0.00020	<0.00020
thallium	0.000010	mg/L	-	<0.000010	-	-	0.000012	<0.000010	<0.000010
thorium	0.00010	mg/L	-	<0.00010	-	-	<0.00010	<0.00010	<0.00010
tin	0.00010	mg/L	-	<0.00010	-	-	<0.00010	<0.00010	<0.00010
titanium	0.00030	mg/L	-	<0.00030	-	-	<0.00030	<0.00030	0.00050
tungsten	0.00010	mg/L	-	<0.00010	-	-	<0.00010	<0.00010	<0.00010
uranium	0.000010	mg/L	-	0.000677	-	-	0.000415	0.00123	0.000641
vanadium	0.00050	mg/L	-	0.00218	-	-	0.00163	0.00094	<0.00050
zinc	0.0030	mg/L	-	<0.0010	-	-	<0.0010	<0.0010	<0.0030
zirconium	0.00020	mg/L	-	<0.00030	-	-	<0.00030	<0.00030	<0.00020

Appendix E
Door To Door Water Well Survey Results

Groundwater Science Corp.

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

September 26, 2022

RE: Private Water Well Survey – Properties Surrounding 6640 7th Line, Belwood
Part Lot 12, Concession 7, Township of Centre Wellington.

Dear Resident:

Groundwater Science Corp. is completing a baseline survey of private water wells in the area of the above referenced property on behalf of BelCal Developments. The survey is part of a groundwater assessment being completed for the site. The survey includes residences located within (approximately) 500 metres of the subject property. Your residence is in the survey area.

The survey will collect background information on existing local water wells, such as age, type and location of well, in addition to general comments on well water quality and quantity. The survey results will augment public information (water well records) obtained from the Ontario Ministry of the Environment Conservation and Parks regarding local water supplies and sources of groundwater. Completing the survey will ensure that local water supplies are fully considered in the assessment and establish a "baseline" of information.

Participation in the private water well survey program is voluntary; this letter is to inform you of the survey and to request your participation. A representative of Groundwater Science Corp. will be going door-to-door this week during business hours to complete the survey. A copy of this letter will be provided to each residence in the survey area. If no one is at home at the time of the survey, the survey package will be left in the mailbox or at the door.

Attached to this letter is a survey response form. If you are interested in participating please complete and return the survey form (only) in the self-addressed stamped envelope. Alternatively you can also send a scan (e.g. PDF or image file) or photo of the response to the email address listed below.

We would like to have the survey complete, and all responses received, by **October 14, 2022**.

If you have any questions regarding the survey, or require assistance with the survey form, please call Dave Nahrgang at 519-504-1446 (cell) or contact us by email at: dnahrgang@rogers.com.

Thank-you in advance for your consideration in this matter.

Sincerely,

Dave Nahrgang, P.Geo.
Hydrogeologist.

Water Well Survey Sheet	Project: 6640 7th Line Groundwater Study	Date:

Some personal information (name, address and phone number) is collected as part of this survey for the sole purpose of identifying and communicating with the respondent. There will be no electronic copy made of this personal information and it will not be disclosed to third parties or referenced in the environmental study report.

☐ I consent to the collection and use of the following personal information for the above stated purpose.

Respondent: _____ Emergency Locate (Road) No.: _____

Mailing Address: _____ Telephone No.: _____

_____ Email: _____

1. How old is the house? _____ **2. How old is the well?** _____

3. Water Use:

Domestic ☐ Pool ☐ Livestock ☐ Garden ☐ other: _____

Well Water Treatment (filter, softener, etc.): _____

4. Alternative Water Sources Used:

Bottled ☐ Cistern ☐ Bulk Delivery ☐ other: _____

5. Well Water Quality and Quantity Comments/Summary:

Quality (is there any colour, odour, taste, staining, etc?) _____

_____

Quantity (does the well go dry?) _____

_____

Has the well ever been tested for quality or quantity? _____

Test Results: _____

6. Water Well Record:

Do you have a copy of the MECP Water Well Record? ☐ yes (include copy) ☐ no

Who drilled the well? _____

7. Well Construction:

Well Type Drilled ☐ Dug ☐ **Well Casing** Cement Tile ☐ Steel ☐ Buried ☐ Diameter: _____

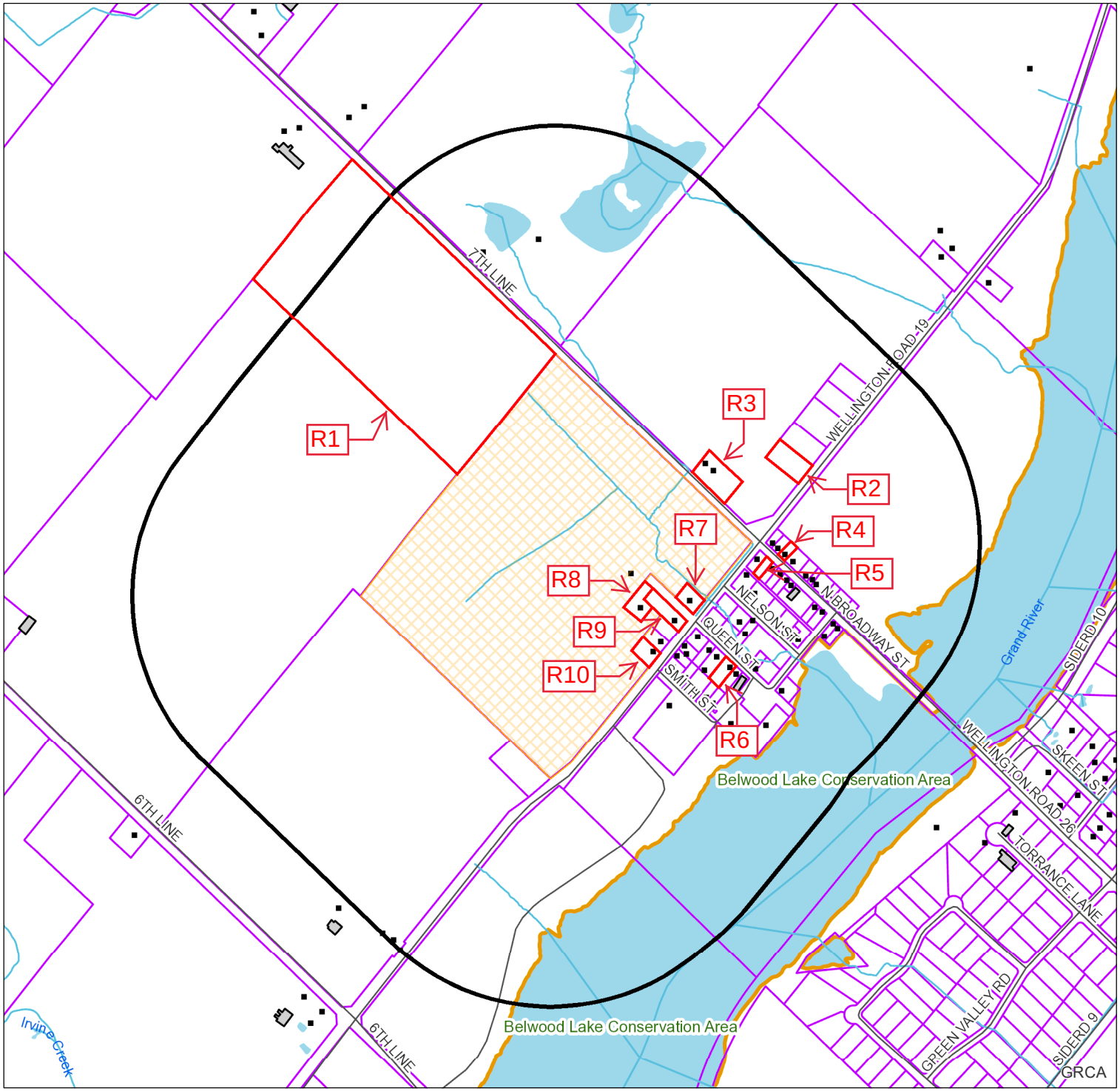
Describe well access (easy / not easy): _____ Well Depth: _____

8. Pump Details:

Type: jet ☐ submersible ☐ other ☐ intake setting (depth): _____

9. Sketch Map of Well Location (show road, driveway, house, well, septic bed and north arrow)

Signature and date:



Grand River Conservation Authority

Date: Nov 15, 2022

Water Well Survey Response

500 m survey boundary shown in black, and, survey response properties outlined in red

Legend

- Building Symbolized (GRCA)
- Building to Scale (GRCA)
- Municipal Boundary (GRCA)
- Watercourse - Local (GRCA)
- Parcel - Assessment Public (MPAC/MNRF)
- CA Boundary - Local (GRCA)
- Waterbody - Local (GRCA)
- Great Lakes - Local (GRCA)

0 75 150 300 450 Metres

N

Map Centre (UTM NAD83 z17): 554,065.73 4,849,218.76

This map is not to be used for navigation

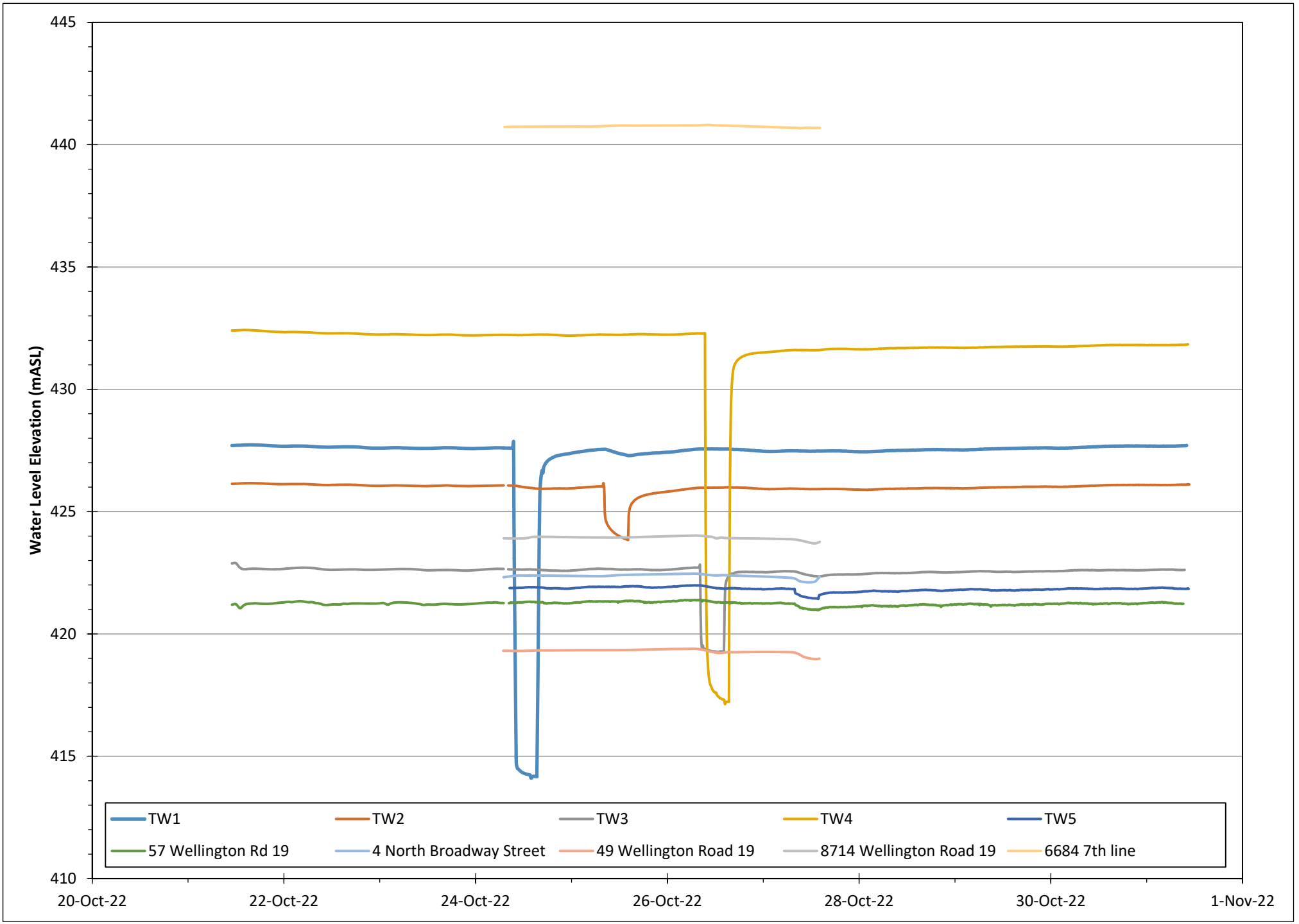
NAD 1983 UTM Zone 17N

Scale: 12,260

911 Locate Number	Road	Date of Survey	Survey Response				MECP WWR		Note (Water Well Record match information, etc.)
			#	Date	Well Age/Date	Depth (m)	Well #	Well Type	
none	6th Line	29-Sep-22	-	-	-	-	-	-	no houses on 6th Line within 500 m
8610	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
parcel in 8610	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	no residence
33	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
37	Wellington Road 19	29-Sep-22	R10	4-Oct-22	unknown	unknown	6705787	-	possible match based on location
41	Wellington Road 19	29-Sep-22	-	-	-	-	6707370	-	as per WWR map
42	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
45	Wellington Road 19	29-Sep-22	-	-	-	-	6708925	-	possible match based on location
46	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
49	Wellington Road 19	29-Sep-22	R9	5-Oct-22	41 yrs	180 ft	6703168	drilled 4"	possible match
57	Wellington Road 19	29-Sep-22	R7	29-Sep-22	2015	102 ft	7249025	drilled 4"	included WWR copy
53	Wellington Road 20	29-Sep-22	R8	18-Oct-22	unknown	unknown	6703168	-	shared well
78	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
8714	Wellington Road 19	29-Sep-22	R2	28-Sep-22	8 yrs	200 ft	7237473	drilled	
8716	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
8718	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
8722	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
8730	Wellington Road 19	29-Sep-22	-	-	-	-	-	-	-
6633	7th Line	29-Sep-22	R3	5-Oct-22	60 yrs	80+ ft	6706491	drilled	age and mapped location
6640	7th Line	29-Sep-22	-	-	-	-	-	-	-
6681	7th Line	29-Sep-22	-	-	-	-	-	-	-
6684	7th Line	29-Sep-22	R1	17-Oct-22	5 yrs	52.5 m	7303607	drilled	
4	Smith Street	29-Sep-22	-	-	-	-	-	-	park and ball diamond
5	Smith Street	29-Sep-22	-	-	-	-	-	-	-
9	Smith Street	29-Sep-22	-	-	-	-	-	-	-
13	Smith Street	29-Sep-22	-	-	-	-	-	-	-
17	Smith Street	29-Sep-22	-	-	-	-	-	-	-
?	Smith Street	29-Sep-22	-	-	-	-	-	-	-
4	Queen Street	29-Sep-22	-	-	-	-	-	-	-
5	Queen Street	29-Sep-22	-	-	-	-	-	-	-
8	Queen Street	29-Sep-22	-	-	-	-	-	-	-
9	Queen Street	29-Sep-22	-	-	-	-	-	-	-
12	Queen Street	29-Sep-22	-	-	-	-	-	-	-
16	Queen Street	29-Sep-22	-	-	-	-	-	-	-
20	Queen Street	29-Sep-22	R6	28-Sep-22	unknown	unknown	6711818	drilled	
24	Queen Street	29-Sep-22	-	-	-	-	-	-	-
28	Queen Street	29-Sep-22	-	-	-	-	-	-	-
29	Queen Street	29-Sep-22	-	-	-	-	-	-	-
?	Queen Street	29-Sep-22	-	-	-	-	-	-	building (N corner with George)
?	Queen Street	29-Sep-22	-	-	-	-	-	-	building (beween 28 and 36)
?	Queen Street	29-Sep-22	-	-	-	-	-	-	building (S corner with George)
36	Queen Street	29-Sep-22	-	-	-	-	-	-	-

911 Locate Number	Road	Date of Survey	Survey Response				MECP WWR		Note
			#	Date	Well Age/Date	Depth (m)	Well #	Well Type	(Water Well Record match information, etc.)
4	George Street	29-Sep-22	-	-	-	-	-	-	-
5	George Street	29-Sep-22	-	-	-	-	-	-	-
6	George Street	29-Sep-22	-	-	-	-	-	-	-
4	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
5	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
9	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
12	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
16	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
17	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
21	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
22	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
25	Nelson Street	29-Sep-22	-	-	-	-	-	-	-
4	North Broadway St	29-Sep-22	R5	30-Sep-22	1986	170 ft	6708436	drilled	included WWR copy
5	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
8	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
9	North Broadway St	29-Sep-22	-	-	-	-	7313904	drilled	address listed on record
12	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
13	North Broadway St	29-Sep-22	R4	12-Oct-22	1957	153 ft	6702971	drilled 4"	static 65 ft
16	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
17	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
20	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
24	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
25	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
29	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
33	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
36	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
41	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
44	North Broadway St	29-Sep-22	-	-	-	-	-	-	-
49	North Broadway St	29-Sep-22	-	-	-	-	-	-	-

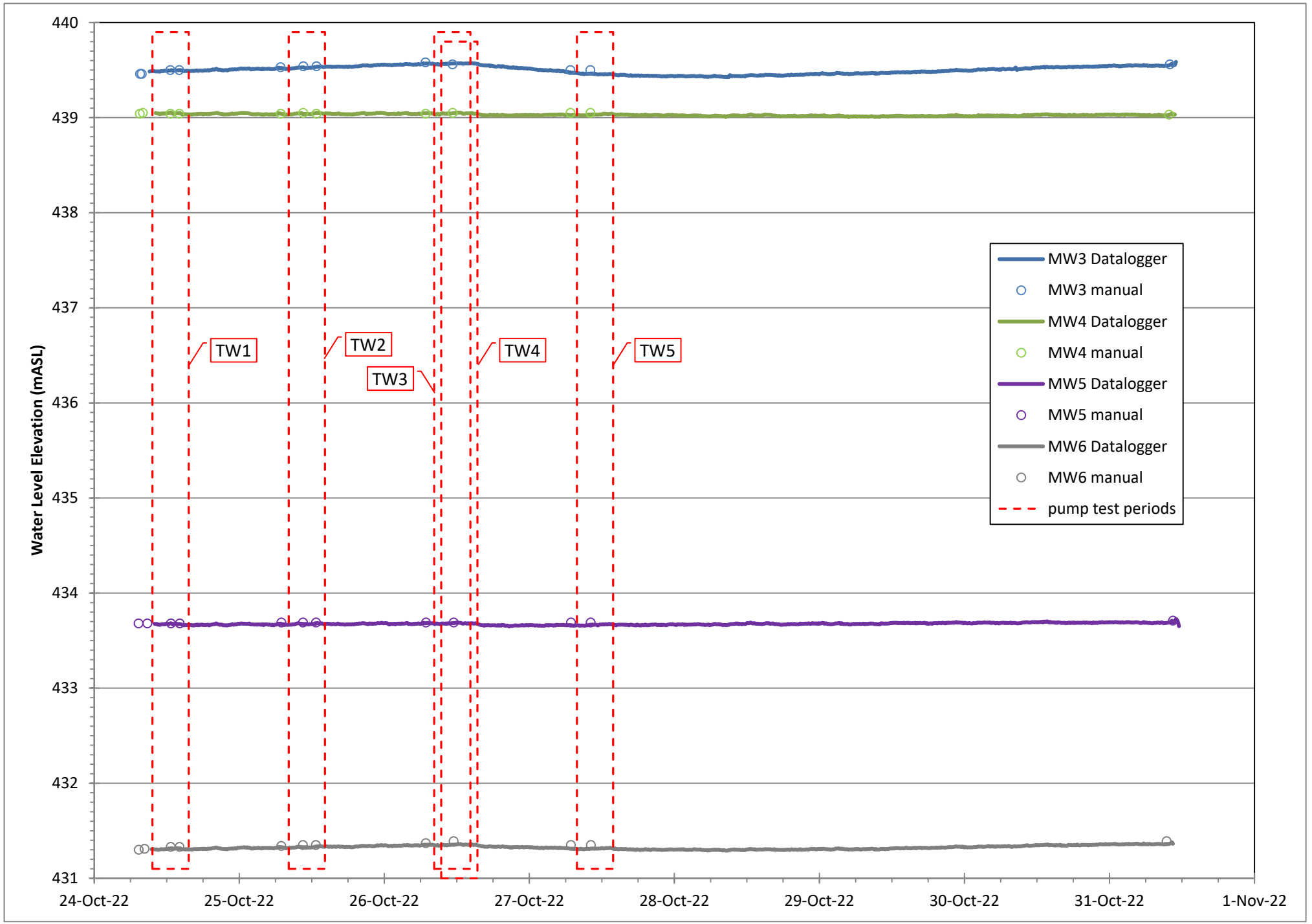
Appendix F
Pump Test Data
And Analysis



BelCal Inc
Proposed Belwood Development

Pump Test Bedrock Well Hydrograph

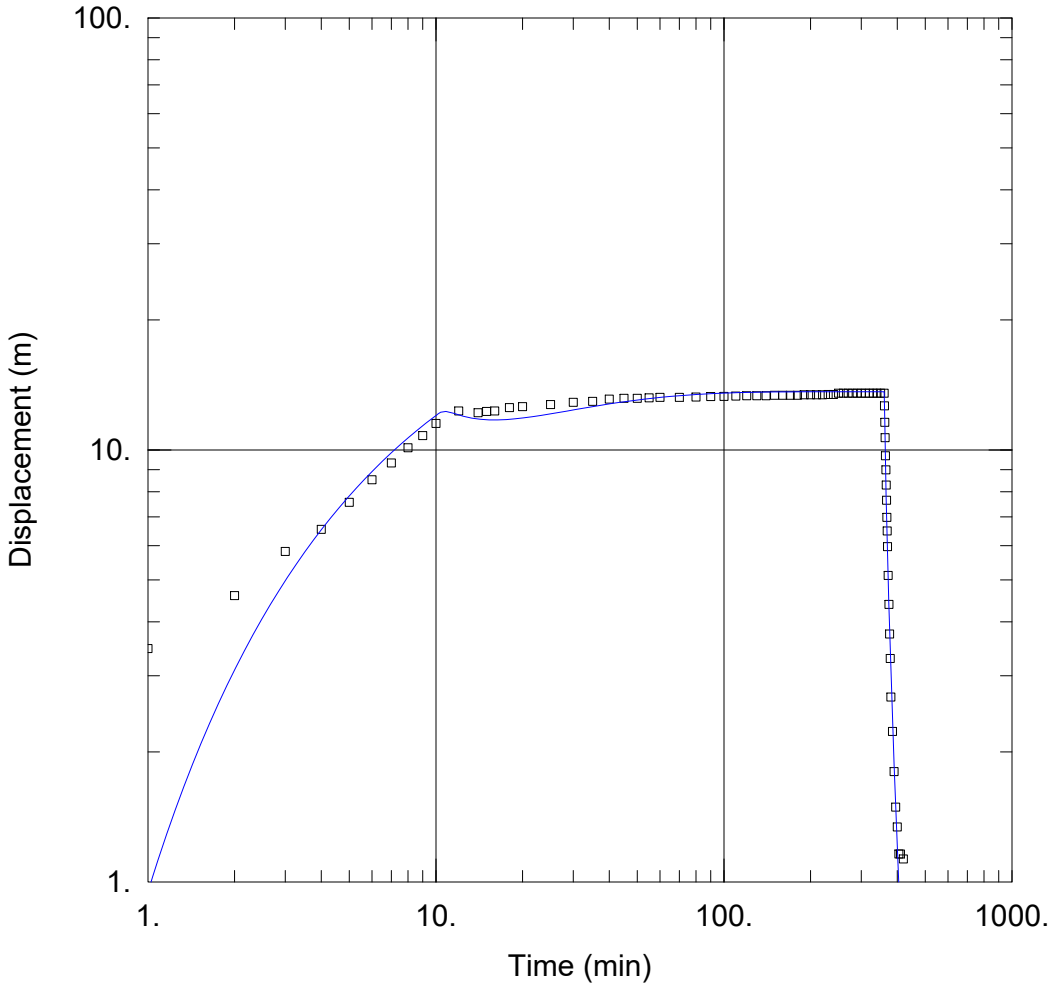
Groundwater Science Corp
Hydrogeologic Assessment



BelCal Inc
Proposed Belwood Subdivision

Pump Test Monitoring Well Hydrograph

Groundwater Science Corp
Hydrogeologic Assessment



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW1	0	0

Observation Wells

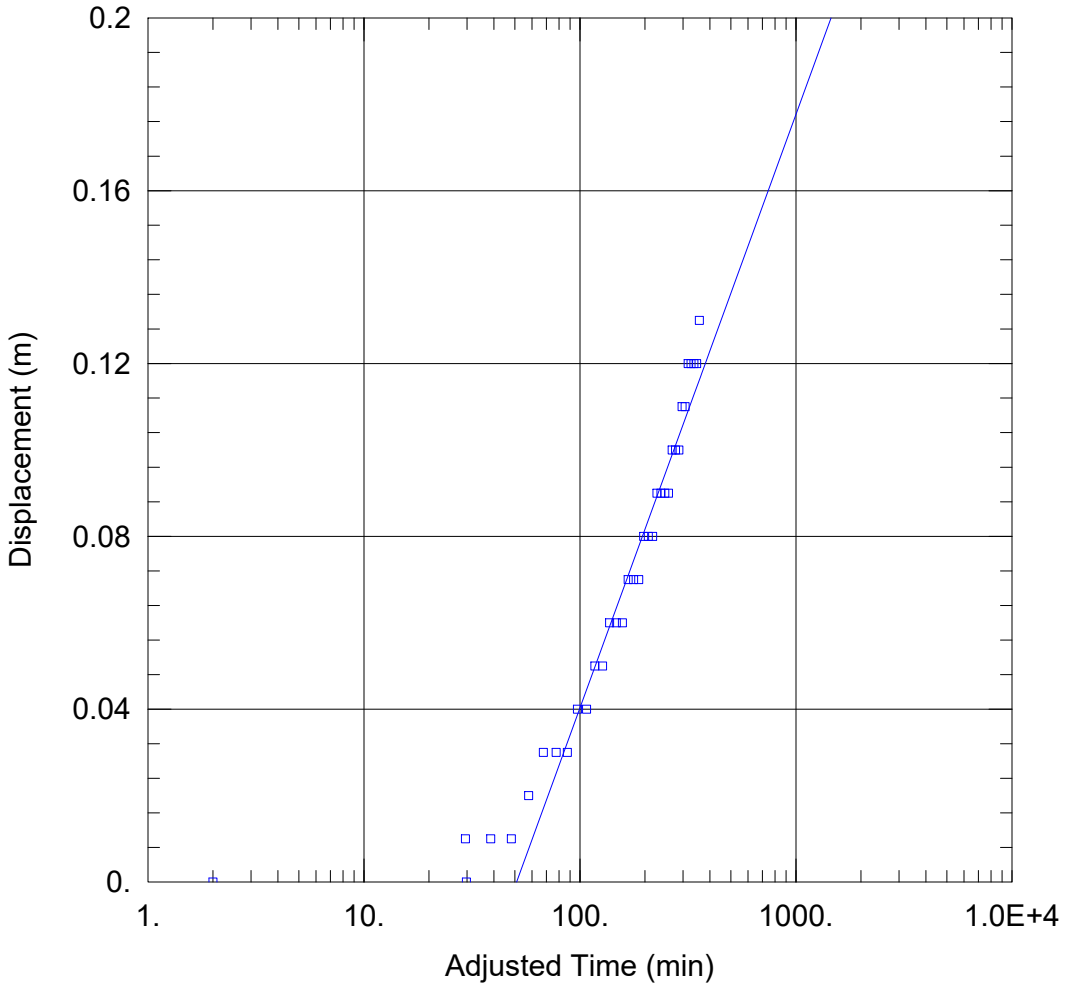
Well Name	X (m)	Y (m)
TW1	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 6.109E-6 m^2/sec
r/B = 0.388
b = 30. m

S = 0.3323
Kz/Kr = 0.1



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW1

AQUIFER DATA

Saturated Thickness: 30. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW1	0	0

Observation Wells

Well Name	X (m)	Y (m)
TW2	286	0

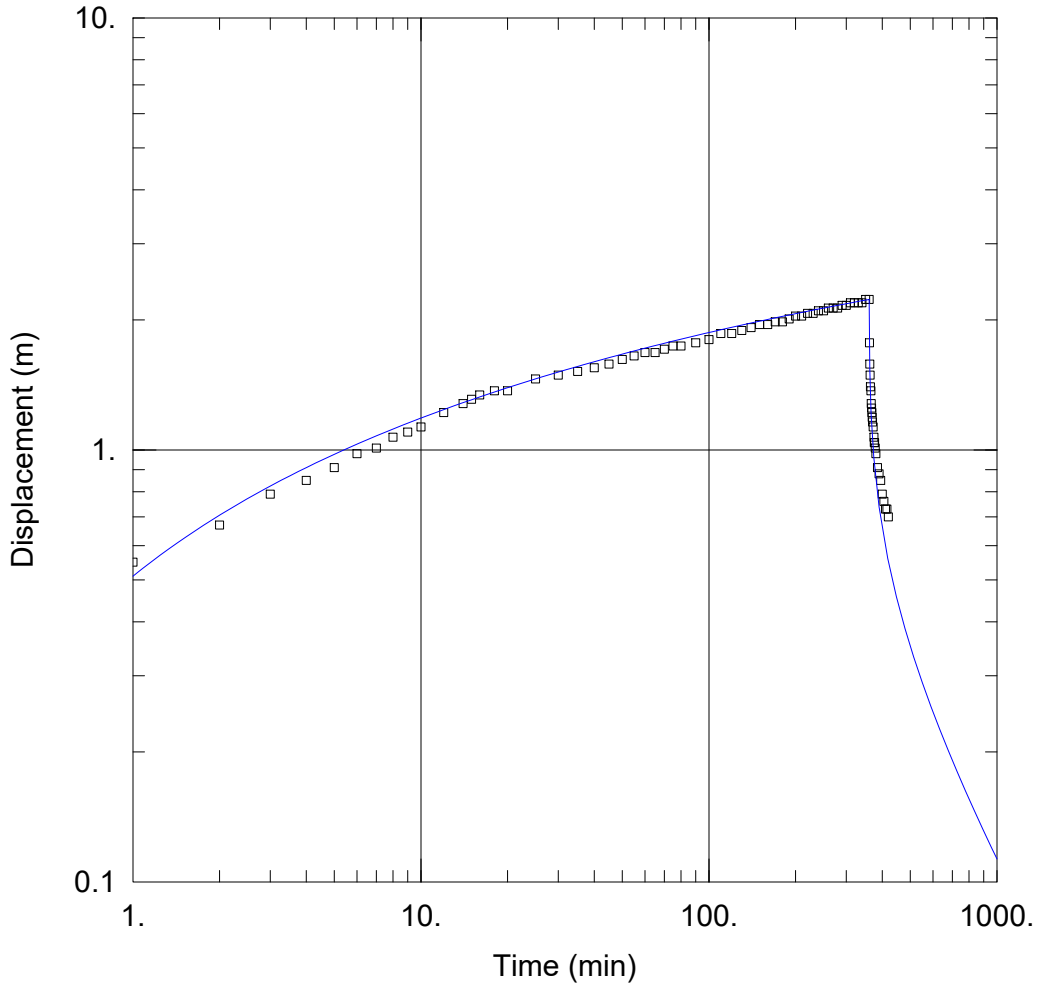
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.0005046 m^2/sec

S = 4.234E-5



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW2

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW2	0	0

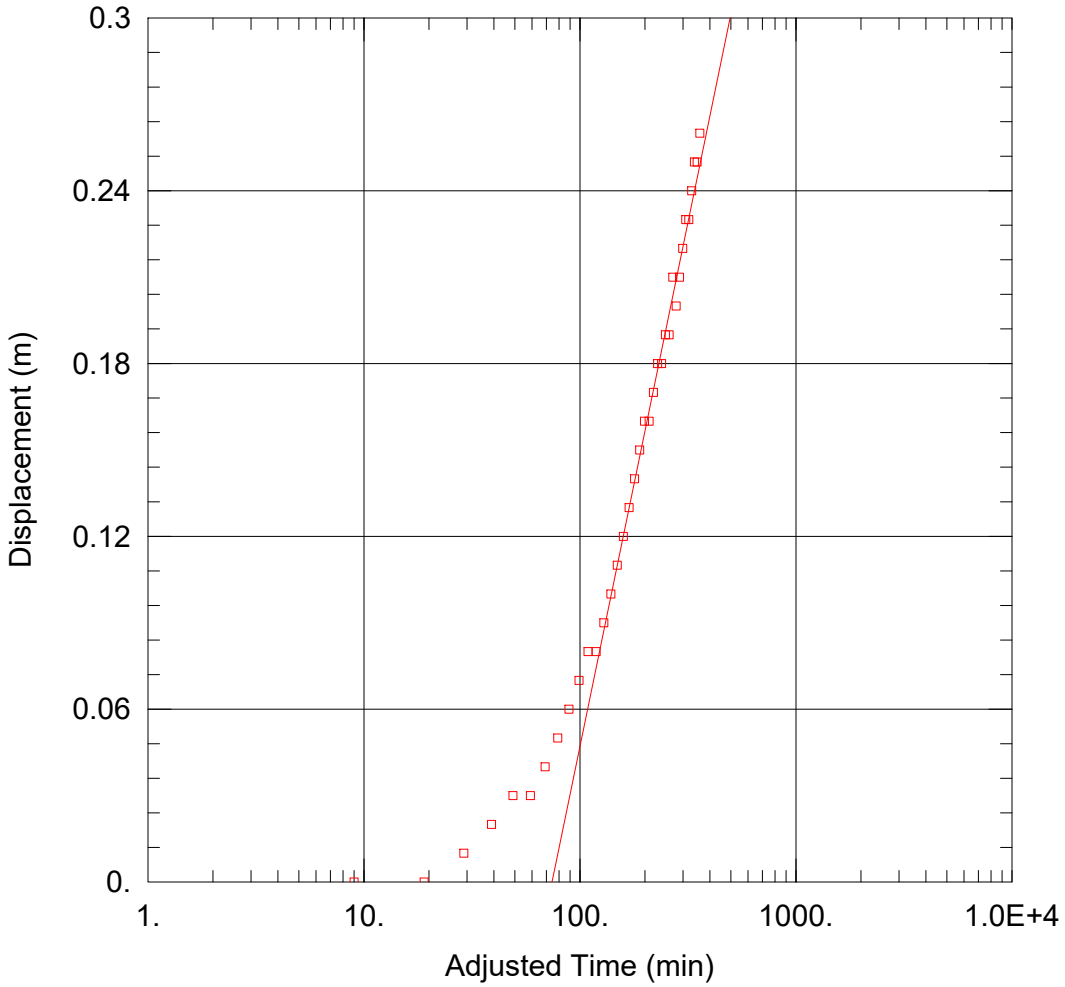
Observation Wells

Well Name	X (m)	Y (m)
▫ TW2	0	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.0009519 m^2/sec
S = 4.329
Kz/Kr = 0.1
b = 30. m



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW2

AQUIFER DATA

Saturated Thickness: 30. m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW2	0	0

Observation Wells

Well Name	X (m)	Y (m)
TW1	286	0

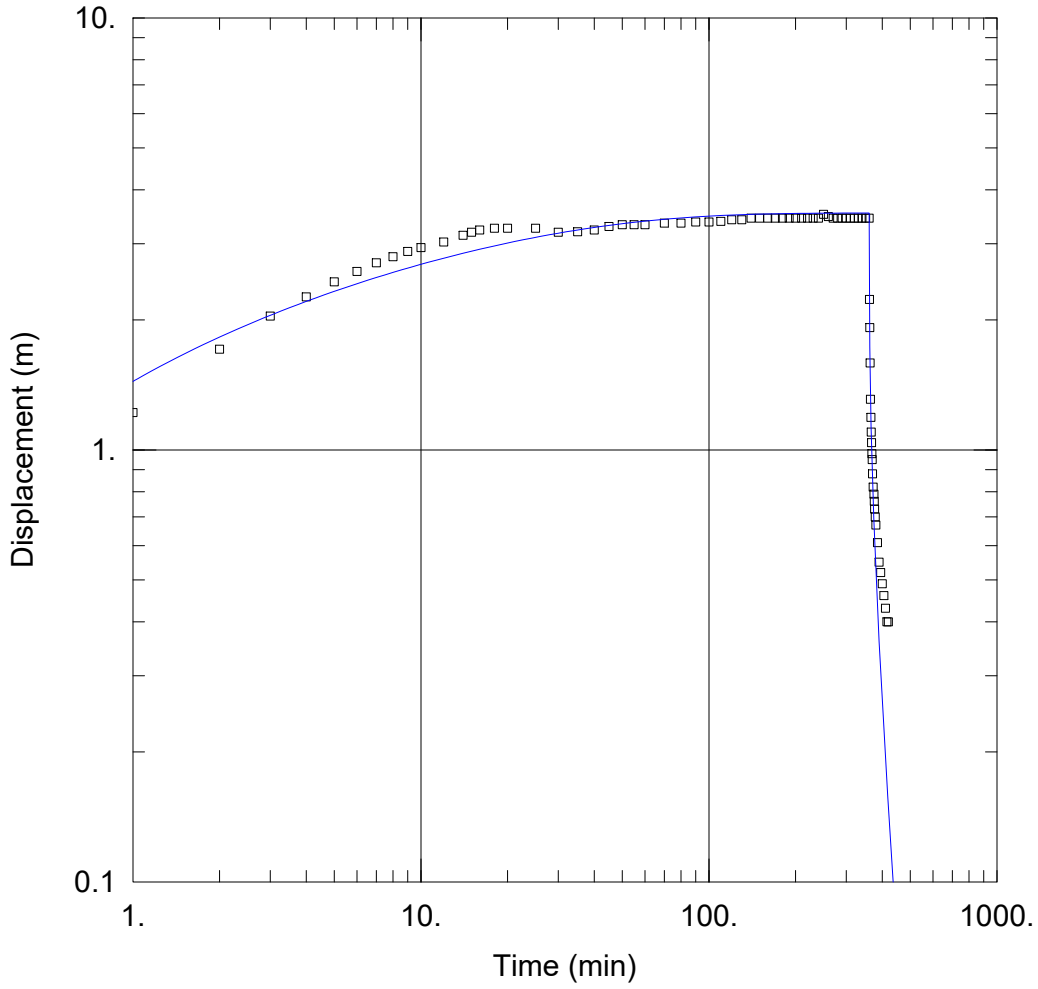
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.0003811 m^2/sec

S = 4.663E-5



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW3 and TW4

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW3	0	0
TW4	-85	453

Observation Wells

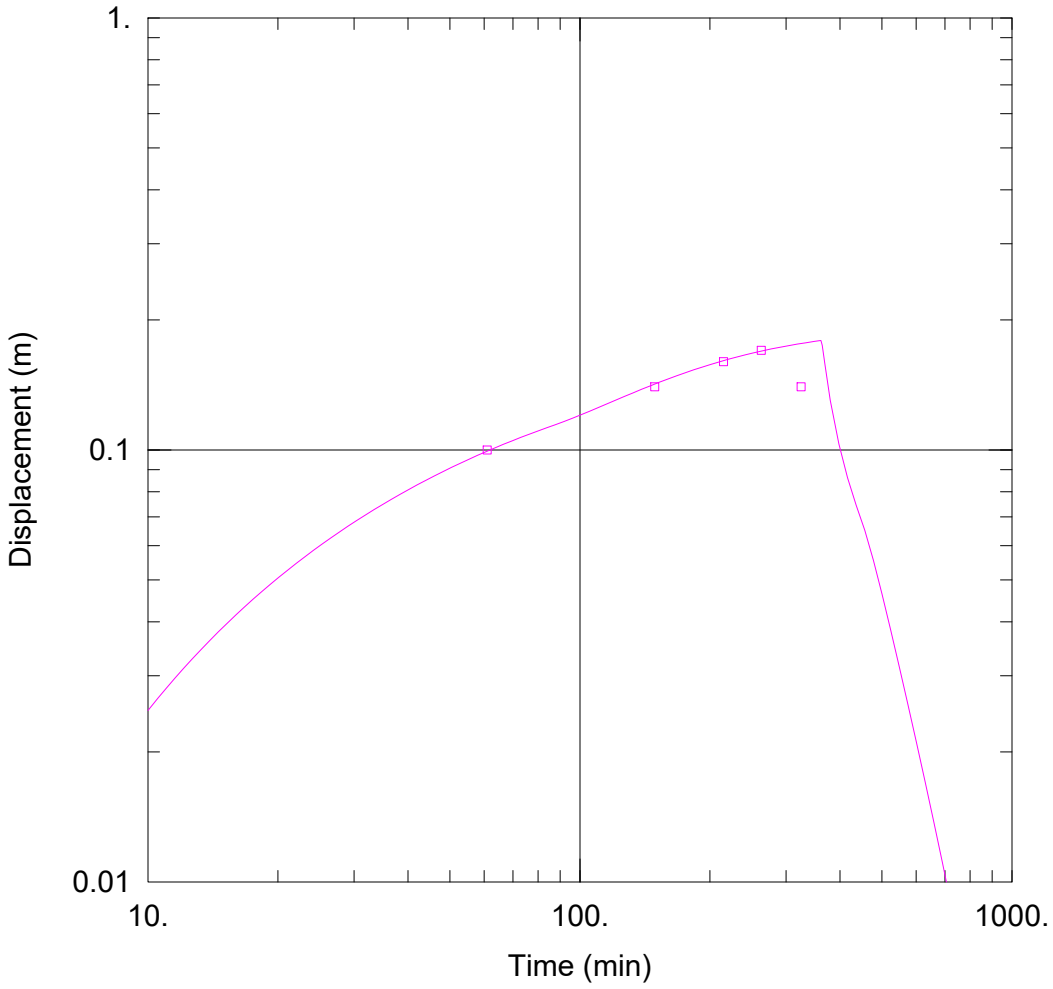
Well Name	X (m)	Y (m)
▫ TW3	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 0.0001223 m^2/sec
r/B = 0.05451
b = 30. m

S = 0.2307
Kz/Kr = 0.1



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW3 and TW4

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW3	0	0
TW4	-85	453

Observation Wells

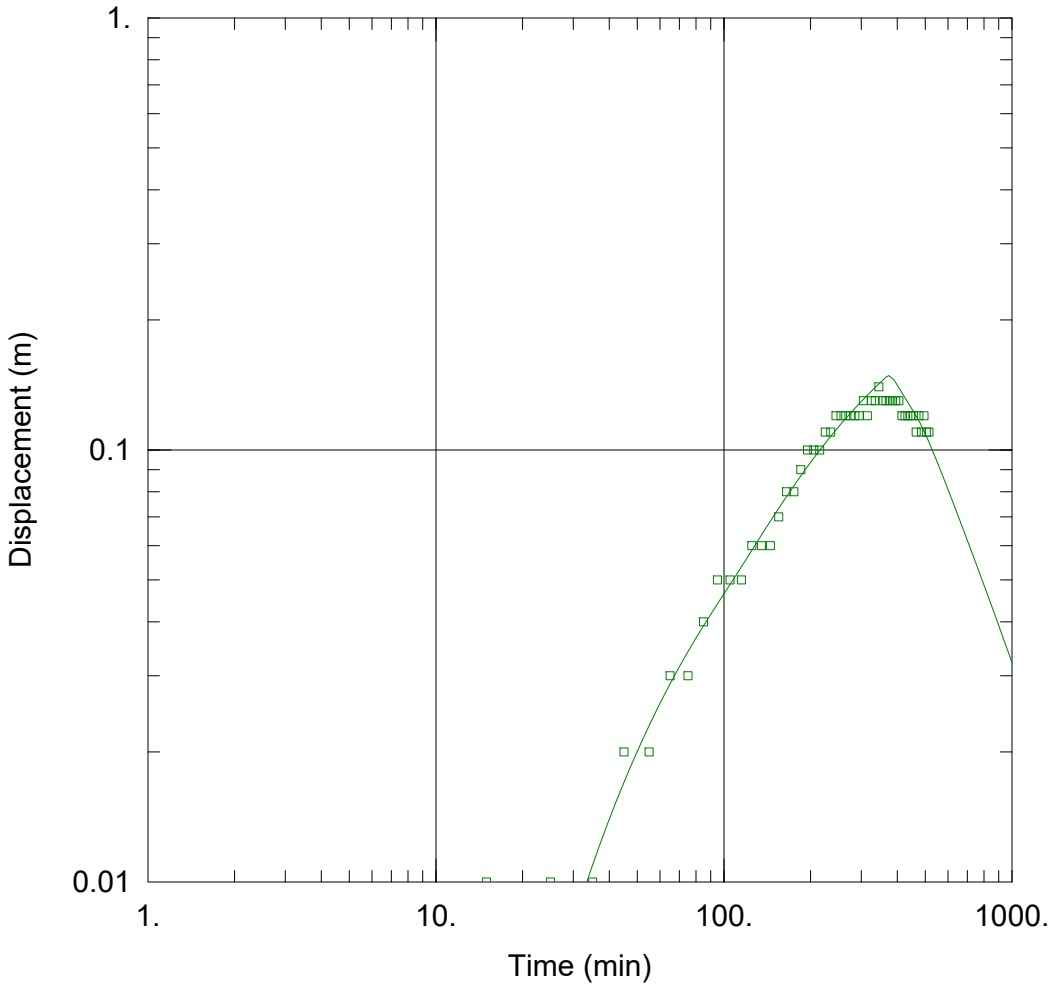
Well Name	X (m)	Y (m)
49 Well Rd 19	153	-65

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 0.0004741 m^2/sec
r/B = 0.3525
b = 30. m

S = 2.727E-5
Kz/Kr = 0.1



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW3 and TW4

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW3	0	0
TW4	-85	453

Observation Wells

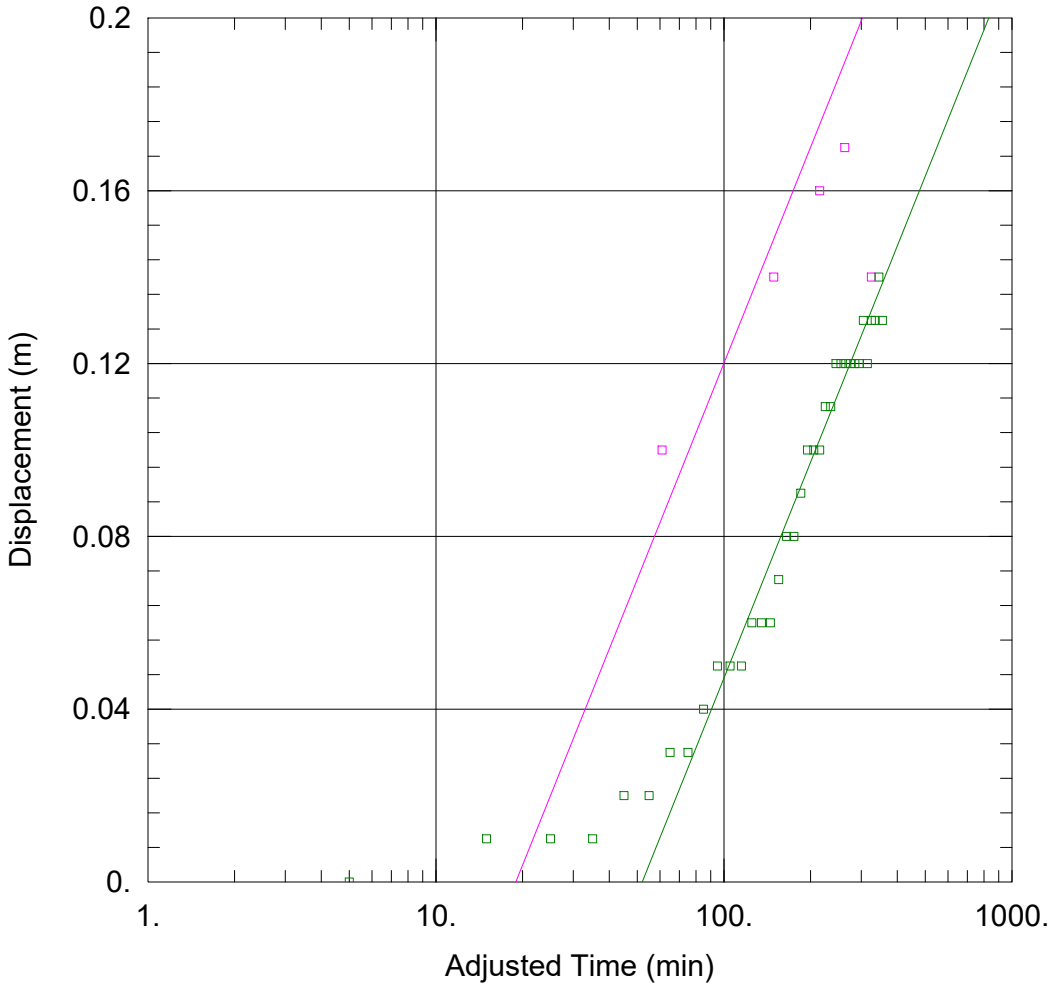
Well Name	X (m)	Y (m)
TW5	246	124

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 0.00041 m^2/sec
r/B = 0.3525
b = 30. m

S = 5.571E-5
Kz/Kr = 0.1



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW3 and TW4

AQUIFER DATA

Saturated Thickness: 30. m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW3	0	0
TW4	-85	453

Observation Wells

Well Name	X (m)	Y (m)
TW5	246	124
49 Well Rd 19	153	-65

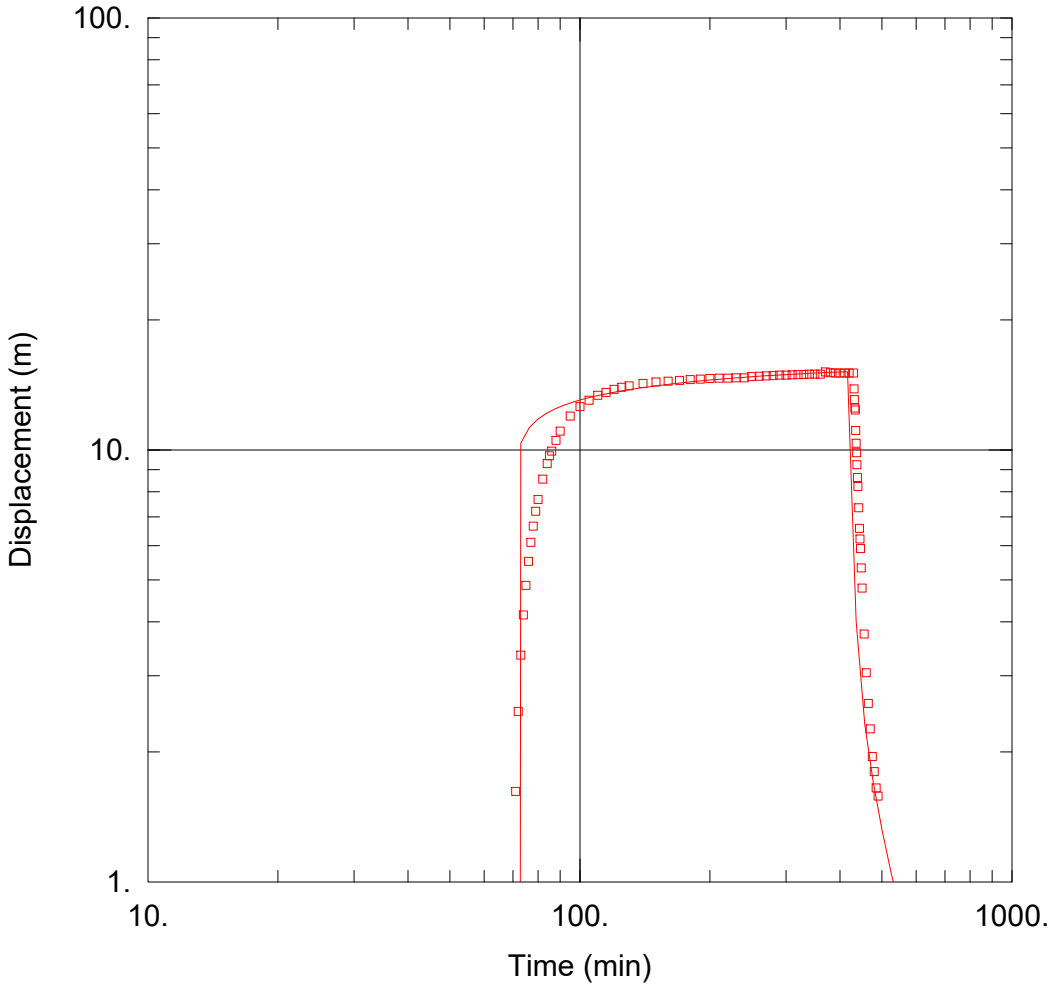
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.0004172 m^2/sec

S = 3.854E-5



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW3 and TW4

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW3	0	0
TW4	-85	453

Observation Wells

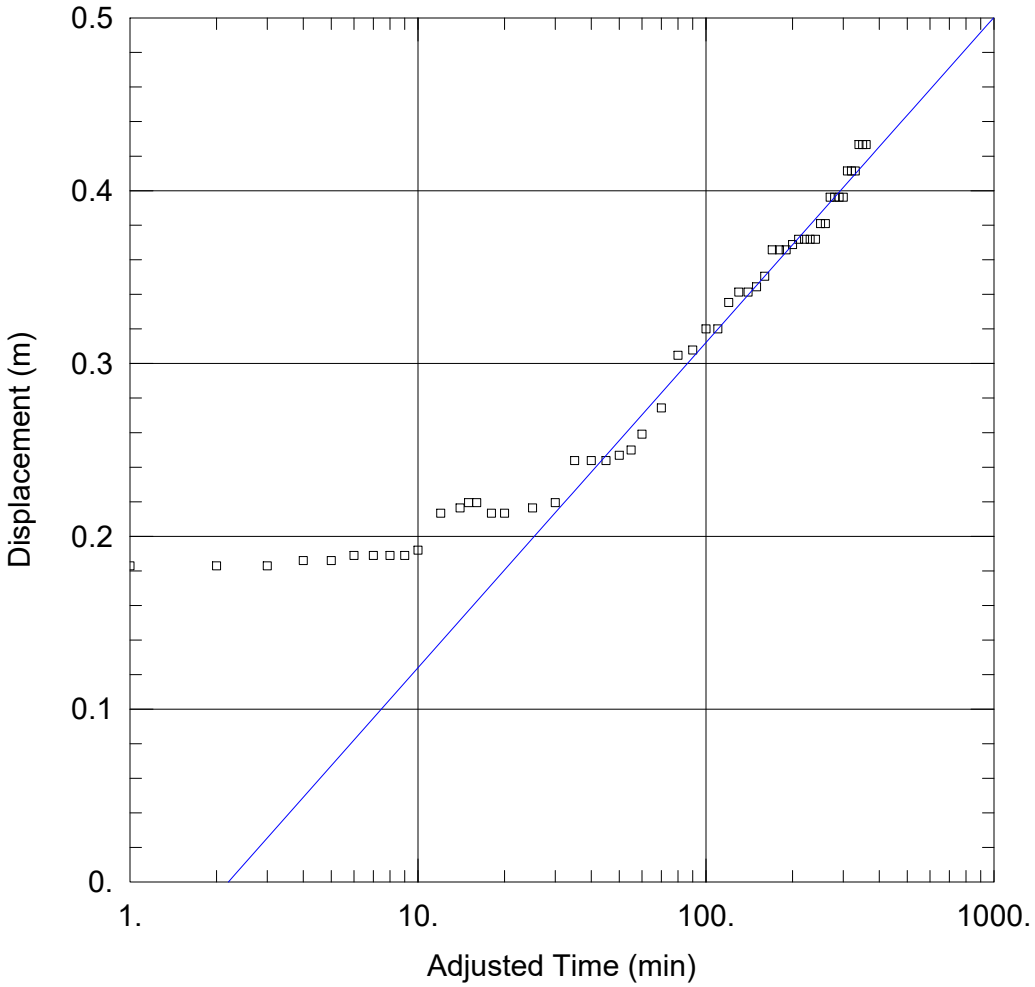
Well Name	X (m)	Y (m)
TW4	-85	453

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 2.097E-5 m^2/sec
r/B = 10.
b = 30. m

S = 0.0002228
Kz/Kr = 0.1



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW5

AQUIFER DATA

Saturated Thickness: 30. m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW5	0	0

Observation Wells

Well Name	X (m)	Y (m)
TW5	0	0

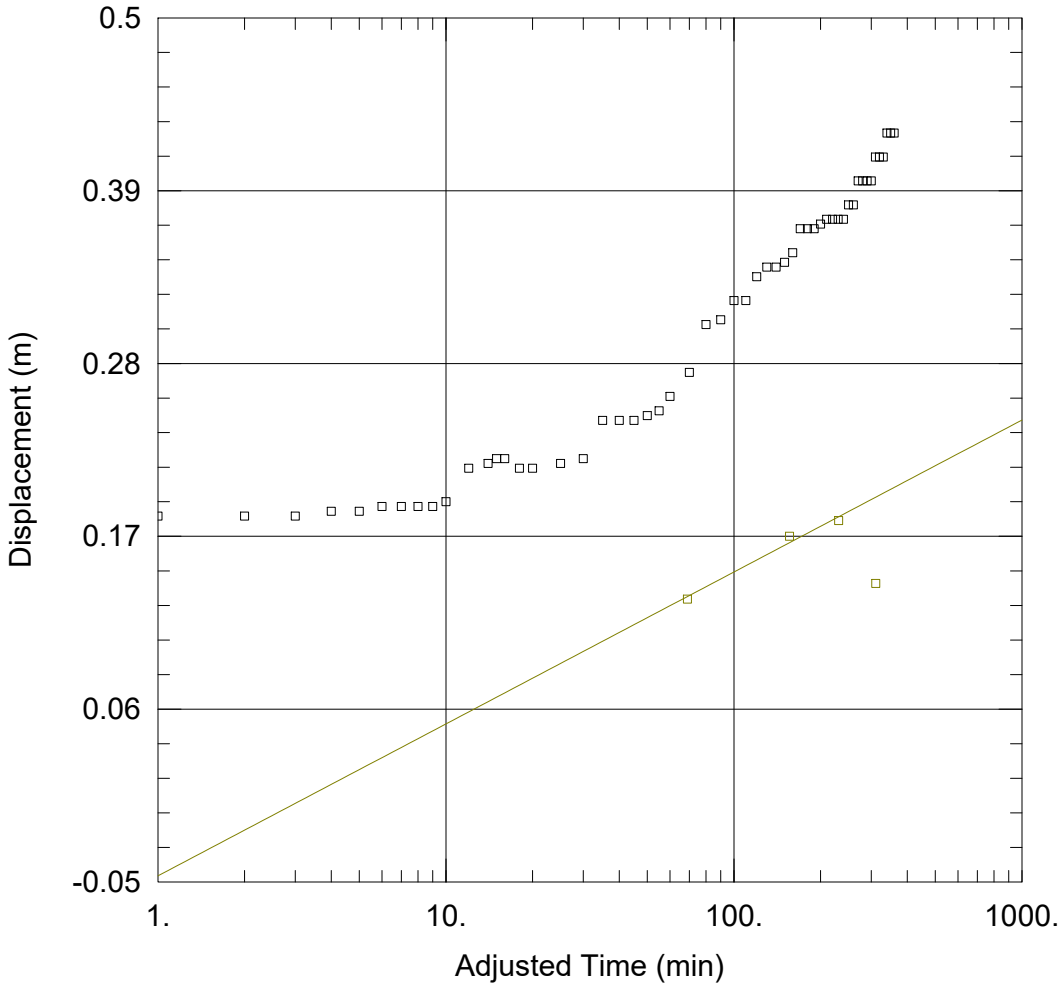
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.0005533 m^2/sec

S = 25.59



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW5

AQUIFER DATA

Saturated Thickness: 30. m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW5	0	0

Observation Wells

Well Name	X (m)	Y (m)
TW5	0	0
4 N Brdwy	370	23

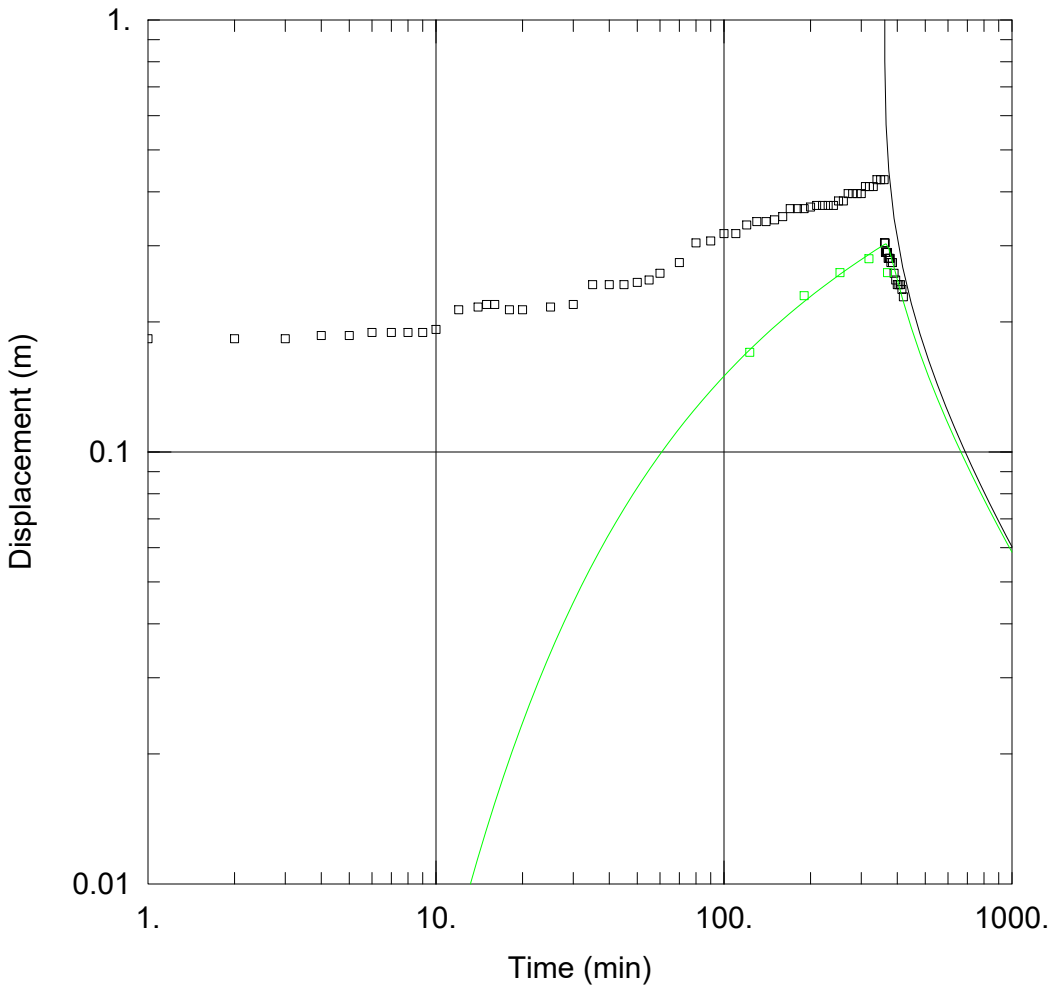
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.001077 m^2/sec

S = 3.168E-6



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW5

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW5	0	0

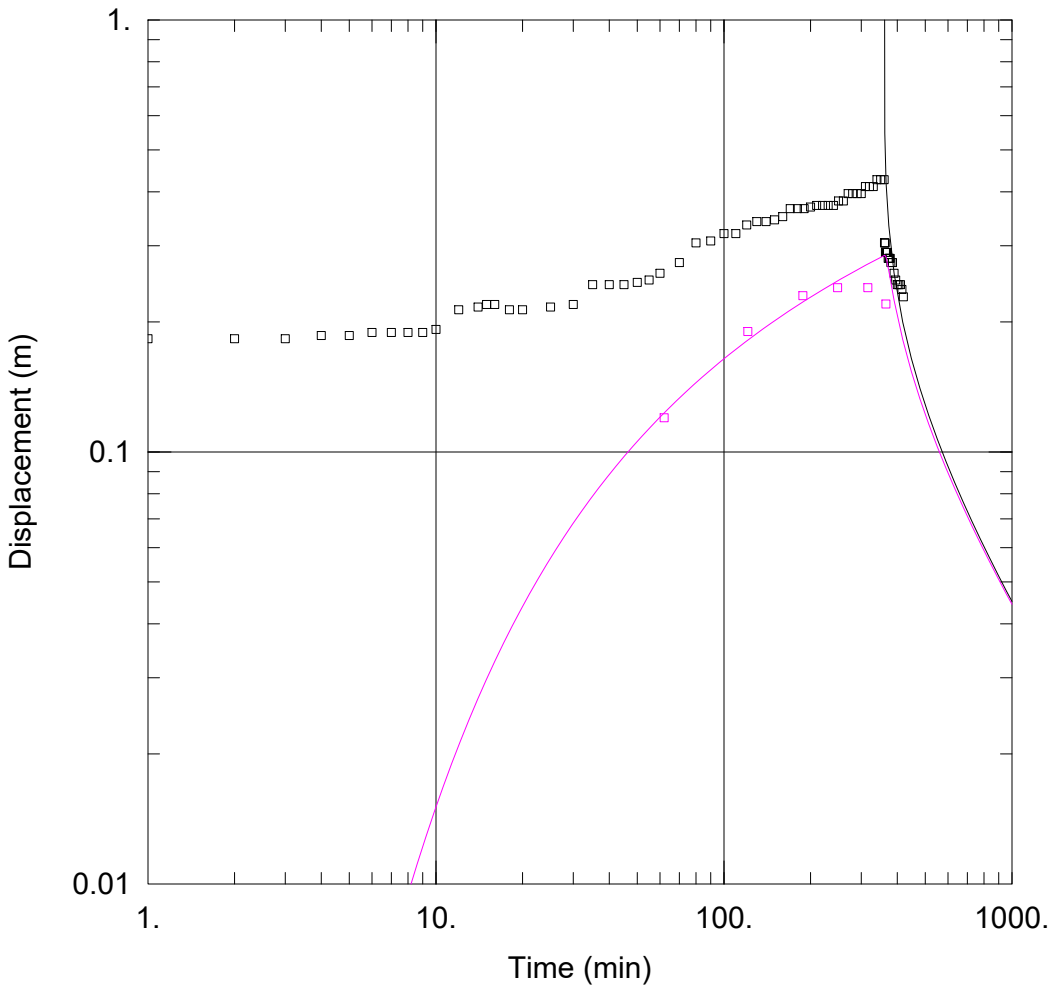
Observation Wells

Well Name	X (m)	Y (m)
TW5	0	0
49 Well Rd 19	153	-65

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.0003345 m^2/sec
S = 6.761E-5
Kz/Kr = 0.1
b = 30. m



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW5

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW5	0	0

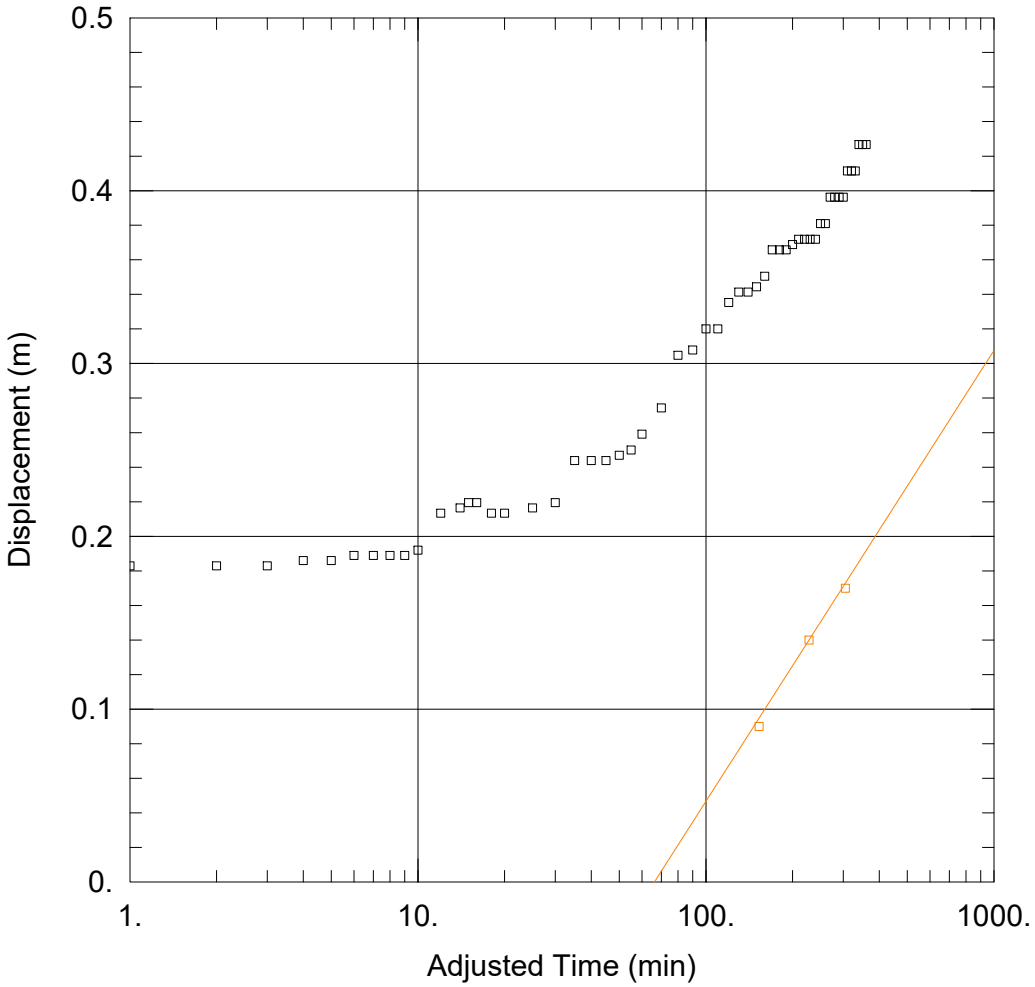
Observation Wells

Well Name	X (m)	Y (m)
TW5	0	0
57 Well Rd 19	175	-59

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.0004477 m^2/sec
S = 3.942E-5
Kz/Kr = 0.1
b = 30. m



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW5

AQUIFER DATA

Saturated Thickness: 30. m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW5	0	0

Observation Wells

Well Name	X (m)	Y (m)
TW5	0	0
8714 Well Rd 19	398	221

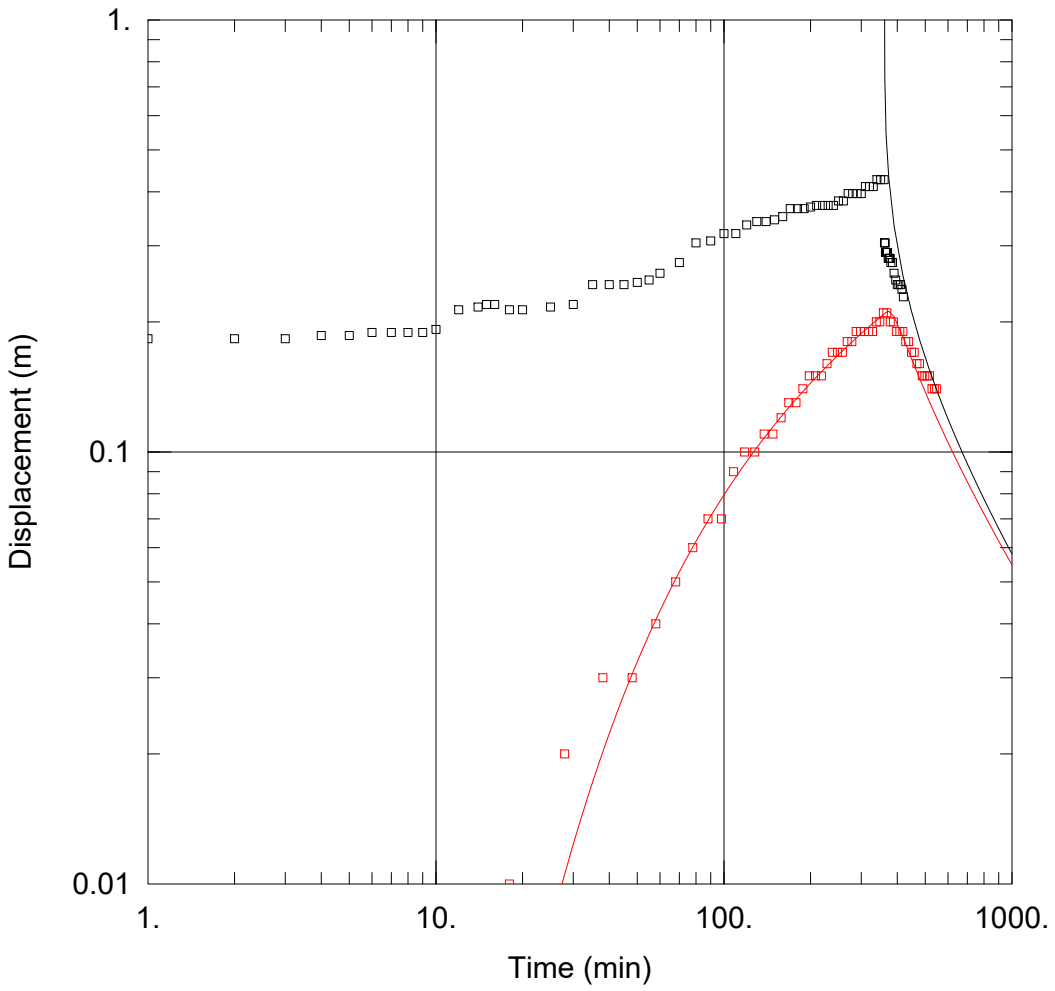
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.0003992 m^2/sec

S = 1.72E-5



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: Groundwater Science Corp.
Client: BelCal Inc
Location: Belwood Development
Test Well: TW5

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW5	0	0

Observation Wells

Well Name	X (m)	Y (m)
TW5	0	0
TW3	246	124

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.0003477 m^2/sec
S = 5.061E-5
Kz/Kr = 0.1
b = 30. m

Appendix G
Test Well Water Quality Sampling Results

		Ontario Drinking Water Regulation (JAN, 2020)				Sample	
		Aesthetic Objective/Operational Guideline		Schedule 1 (Microbiological) and 2 (Chemical) Standards		TW1 Start	TW1-END
Anions and Nutrients		**Guidelines - Pass Limits**					
ammonia, total (as N)	mg/L	**Lower**	**Upper**	**Lower**	**Upper**	0.146	0.0360
bromide	mg/L						<0.10
chloride	mg/L		<=250			4.95	4.70
fluoride	mg/L			0	<=1.5	0.588	0.575
nitrate (as N)	mg/L			0	<=10	<0.020	<0.020
nitrite (as N)	mg/L			0	<=1	<0.010	<0.010
phosphate, ortho-, dissolved (as P)	mg/L					<0.0030	<0.0030
sulfate (as SO4)	mg/L					114	82.7
Microbiological Tests							
coliforms, Escherichia coli [E. coli]	CFU/100mL			0	<1		<1
coliforms, total	CFU/100mL			0	<1		<1
Physical Tests							
alkalinity, total (as CaCO3)	mg/L	>=30	<=500			172	172
colour, apparent	CU		<=5			12.4	<2.0
conductivity	µS/cm					557	502
hardness (as CaCO3), dissolved	mg/L	>=80	<=100			231	
hardness (as CaCO3), from total Ca/Mg	mg/L						204
pH	pH units	>=6.5	<=8.5			8.38	8.44
solids, total dissolved [TDS]	mg/L		<=500			334	304
turbidity	NTU		<=5			2.50	0.41
Metals						**Dissolved Metals**	**Total Metals**
aluminum	mg/L		<=0.1			<0.0010	0.0031
antimony	mg/L			0	<=0.006	<0.00010	<0.00010
arsenic	mg/L			0	<=0.01	0.00386	0.00417
barium	mg/L			0	<=1	0.114	0.102
beryllium	mg/L					<0.000020	<0.000020
bismuth	mg/L					<0.000050	<0.000050
boron	mg/L			0	<=5	0.087	0.081
cadmium	mg/L			0	<=0.005	0.0000056	<0.0000050
calcium	mg/L					52.8	44.9
cesium	mg/L					<0.000010	<0.000010
chromium	mg/L			0	<=0.05	0.00150	0.00091
cobalt	mg/L					<0.00010	<0.00010
copper	mg/L		<=1			0.00301	0.00440
iron	mg/L		<=0.3			0.097	0.124
lead	mg/L			0	<=0.01	0.000403	0.000434
lithium	mg/L					0.0040	0.0034
magnesium	mg/L					24.0	22.2
manganese	mg/L		<=0.05			0.00628	0.00300
molybdenum	mg/L					0.00578	0.00590
nickel	mg/L					0.00079	0.00054
phosphorus	mg/L					<0.050	<0.050
potassium	mg/L					1.02	0.963
rubidium	mg/L					0.00040	0.00036
selenium	mg/L			0	<=0.05	0.000058	<0.000050
silicon	mg/L					5.37	5.50
silver	mg/L					<0.000010	<0.000010
sodium	mg/L		<=200	0	<=20	29.0	27.7
strontium	mg/L					0.954	0.819
sulfur	mg/L					37.6	28.3
tellurium	mg/L					<0.00020	<0.00020
thallium	mg/L					0.000042	0.000041
thorium	mg/L					<0.00010	<0.00010
tin	mg/L					<0.00010	<0.00010
titanium	mg/L					<0.00030	<0.00030
tungsten	mg/L					<0.00010	<0.00010
uranium	mg/L			0	<=0.02	0.000662	0.000594
vanadium	mg/L					<0.00050	<0.00050
zinc	mg/L		<=5			0.0160	0.0125
zirconium	mg/L					<0.00020	<0.00020

No Spec
Within Limit
Exceeds Limit

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		Ontario Drinking Water Regulation (JAN, 2020)				Sample	
		Aesthetic Objective/Operational Guideline		Schedule 1 (Microbiological) and 2 (Chemical) Standards		TW2 Start	TW2-END
Anions and Nutrients		**Guidelines - Pass Limits**					
ammonia, total (as N)	mg/L	**Lower**	**Upper**	**Lower**	**Upper**	0.182	0.153
bromide	mg/L						<0.10
chloride	mg/L		<=250			0.68	0.52
fluoride	mg/L			0	<=1.5	0.321	0.337
nitrate (as N)	mg/L			0	<=10	<0.020	<0.020
nitrite (as N)	mg/L			0	<=1	<0.010	<0.010
phosphate, ortho-, dissolved (as P)	mg/L					0.0032	0.0088
sulfate (as SO4)	mg/L					5.65	5.23
Microbiological Tests							
coliforms, Escherichia coli [E. coli]	CFU/100mL			0	<1		<1
coliforms, total	CFU/100mL			0	<1		<1
Physical Tests							
alkalinity, total (as CaCO3)	mg/L	>=30	<=500			175	162
colour, apparent	CU		<=5			24.6	22.6
conductivity	µS/cm					332	308
hardness (as CaCO3), dissolved	mg/L	>=80	<=100			113	
hardness (as CaCO3), from total Ca/Mg	mg/L						113
pH	pH units	>=6.5	<=8.5			8.12	8.49
solids, total dissolved [TDS]	mg/L		<=500			233	186
turbidity	NTU		<=5			4.24	3.94
Metals						**Dissolved Metals**	**Total Metals**
aluminum	mg/L		<=0.1			<0.0010	0.0031
antimony	mg/L			0	<=0.006	<0.00010	<0.00010
arsenic	mg/L			0	<=0.01	0.00406	0.00395
barium	mg/L			0	<=1	0.0300	0.0285
beryllium	mg/L					<0.000020	<0.000020
bismuth	mg/L					<0.000050	<0.000050
boron	mg/L			0	<=5	0.081	0.088
cadmium	mg/L			0	<=0.005	<0.0000050	<0.0000050
calcium	mg/L					24.0	22.8
cesium	mg/L					<0.000010	<0.000010
chromium	mg/L			0	<=0.05	<0.00050	<0.00050
cobalt	mg/L					<0.00010	<0.00010
copper	mg/L		<=1			0.00042	<0.00050
iron	mg/L		<=0.3			0.239	0.241
lead	mg/L			0	<=0.01	0.000082	0.000078
lithium	mg/L					0.0026	0.0025
magnesium	mg/L					12.8	13.7
manganese	mg/L		<=0.05			0.0158	0.0147
molybdenum	mg/L					0.00555	0.00636
nickel	mg/L					<0.00050	<0.00050
phosphorus	mg/L					<0.050	<0.050
potassium	mg/L					0.732	0.680
rubidium	mg/L					0.00036	0.00033
selenium	mg/L			0	<=0.05	<0.000050	<0.000050
silicon	mg/L					5.30	5.71
silver	mg/L					<0.000010	<0.000010
sodium	mg/L		<=200	0	<=20	25.8	28.7
strontium	mg/L					0.225	0.224
sulfur	mg/L					1.75	2.10
tellurium	mg/L					<0.00020	<0.00020
thallium	mg/L					<0.000010	<0.000010
thorium	mg/L					<0.00010	<0.00010
tin	mg/L					<0.00010	<0.00010
titanium	mg/L					<0.00030	<0.00030
tungsten	mg/L					<0.00010	<0.00010
uranium	mg/L			0	<=0.02	0.000235	0.000216
vanadium	mg/L					<0.00050	<0.00050
zinc	mg/L		<=5			<0.0010	<0.0030
zirconium	mg/L					<0.00020	<0.00020

No Spec
Within Limit
Exceeds Limit

		Ontario Drinking Water Regulation (JAN, 2020)				Sample	
		Aesthetic Objective/Operational Guideline		Schedule 1 (Microbiological) and 2 (Chemical) Standards		TW3 Start	TW3-END
Anions and Nutrients		**Guidelines - Pass Limits**					
ammonia, total (as N)	mg/L	**Lower**	**Upper**	**Lower**	**Upper**	0.156	0.0323
bromide	mg/L						<0.10
chloride	mg/L		<=250			1.36	2.52
fluoride	mg/L			0	<=1.5	0.516	0.474
nitrate (as N)	mg/L			0	<=10	<0.020	<0.020
nitrite (as N)	mg/L			0	<=1	<0.010	<0.010
phosphate, ortho-, dissolved (as P)	mg/L					<0.0030	0.0032
sulfate (as SO4)	mg/L					13.4	11.2
Microbiological Tests							
coliforms, Escherichia coli [E. coli]	CFU/100mL			0	<1		<1
coliforms, total	CFU/100mL			0	<1		<1
Physical Tests							
alkalinity, total (as CaCO3)	mg/L	>=30	<=500			174	158
colour, apparent	CU		<=5			6.0	3.4
conductivity	µS/cm					321	324
hardness (as CaCO3), dissolved	mg/L	>=80	<=100			113	
hardness (as CaCO3), from total Ca/Mg	mg/L						116
pH	pH units	>=6.5	<=8.5			8.61	8.55
solids, total dissolved [TDS]	mg/L		<=500			166	176
turbidity	NTU		<=5			150	1.43
Metals						**Dissolved Metals**	**Total Metals**
aluminum	mg/L		<=0.1			0.0063	0.0079
antimony	mg/L			0	<=0.006	<0.00010	<0.00010
arsenic	mg/L			0	<=0.01	0.00943	0.0103
barium	mg/L			0	<=1	0.0392	0.0391
beryllium	mg/L					<0.000020	<0.000020
bismuth	mg/L					<0.000050	<0.000050
boron	mg/L			0	<=5	0.085	0.090
cadmium	mg/L			0	<=0.005	<0.0000050	0.0000056
calcium	mg/L					22.6	22.5
cesium	mg/L					<0.000010	<0.000010
chromium	mg/L			0	<=0.05	<0.00050	<0.00050
cobalt	mg/L					<0.00010	<0.00010
copper	mg/L		<=1			<0.00020	0.00346
iron	mg/L		<=0.3			0.340	0.192
lead	mg/L			0	<=0.01	0.000052	0.000313
lithium	mg/L					0.0019	0.0027
magnesium	mg/L					13.8	14.6
manganese	mg/L		<=0.05			0.0220	0.0133
molybdenum	mg/L					0.00722	0.00725
nickel	mg/L					<0.00050	0.00060
phosphorus	mg/L					<0.050	<0.050
potassium	mg/L					0.691	0.704
rubidium	mg/L					0.00031	0.00030
selenium	mg/L			0	<=0.05	<0.000050	<0.000050
silicon	mg/L					4.92	5.18
silver	mg/L					<0.000010	<0.000010
sodium	mg/L		<=200	0	<=20	26.7	28.1
strontium	mg/L					0.296	0.303
sulfur	mg/L					4.71	4.10
tellurium	mg/L					<0.00020	<0.00020
thallium	mg/L					0.000028	0.000029
thorium	mg/L					<0.00010	<0.00010
tin	mg/L					<0.00010	<0.00010
titanium	mg/L					<0.00030	<0.00030
tungsten	mg/L					<0.00010	<0.00010
uranium	mg/L			0	<=0.02	0.000392	0.000353
vanadium	mg/L					<0.00050	<0.00050
zinc	mg/L		<=5			0.0052	0.0063
zirconium	mg/L					<0.00020	<0.00020

No Spec
Within Limit
Exceeds Limit

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		Ontario Drinking Water Regulation (JAN, 2020)				Sample	
		Aesthetic Objective/Operational Guideline		Schedule 1 (Microbiological) and 2 (Chemical) Standards		TW4 Start	TW4-END
Anions and Nutrients		**Guidelines - Pass Limits**					
ammonia, total (as N)	mg/L	**Lower**	**Upper**	**Lower**	**Upper**	0.148	0.162
bromide	mg/L						<0.10
chloride	mg/L		<=250			1.45	1.19
fluoride	mg/L			0	<=1.5	0.507	0.507
nitrate (as N)	mg/L			0	<=10	<0.020	<0.020
nitrite (as N)	mg/L			0	<=1	<0.010	<0.010
phosphate, ortho-, dissolved (as P)	mg/L					<0.0030	0.0344
sulfate (as SO4)	mg/L					4.07	4.21
Microbiological Tests							
coliforms, Escherichia coli [E. coli]	CFU/100mL			0	<1		<1
coliforms, total	CFU/100mL			0	<1		<1
Physical Tests							
alkalinity, total (as CaCO3)	mg/L	>=30	<=500			148	148
colour, apparent	CU		<=5			9.2	6.0
conductivity	µS/cm					289	289
hardness (as CaCO3), dissolved	mg/L	>=80	<=100			66.3	
hardness (as CaCO3), from total Ca/Mg	mg/L						66.2
pH	pH units	>=6.5	<=8.5			8.50	8.37
solids, total dissolved [TDS]	mg/L		<=500			148	154
turbidity	NTU		<=5			16.5	1.16
Metals						**Dissolved Metals**	**Total Metals**
aluminum	mg/L		<=0.1			0.0011	0.0036
antimony	mg/L			0	<=0.006	<0.00010	<0.00010
arsenic	mg/L			0	<=0.01	0.00403	0.00444
barium	mg/L			0	<=1	0.0238	0.0248
beryllium	mg/L					<0.000020	<0.000020
bismuth	mg/L					<0.000050	<0.000050
boron	mg/L			0	<=5	0.126	0.132
cadmium	mg/L			0	<=0.005	<0.0000050	<0.0000050
calcium	mg/L					13.5	12.9
cesium	mg/L					<0.000010	<0.000010
chromium	mg/L			0	<=0.05	<0.00050	<0.00050
cobalt	mg/L					<0.00010	<0.00010
copper	mg/L		<=1			0.00021	<0.00050
iron	mg/L		<=0.3			0.607	0.151
lead	mg/L			0	<=0.01	0.000072	0.000152
lithium	mg/L					<0.0010	0.0011
magnesium	mg/L					7.91	8.25
manganese	mg/L		<=0.05			0.0248	0.00796
molybdenum	mg/L					0.0103	0.0105
nickel	mg/L					<0.00050	0.00055
phosphorus	mg/L					<0.050	0.067
potassium	mg/L					0.585	0.671
rubidium	mg/L					0.00022	0.00023
selenium	mg/L			0	<=0.05	<0.000050	<0.000050
silicon	mg/L					4.01	4.39
silver	mg/L					<0.000010	<0.000010
sodium	mg/L		<=200	0	<=20	38.1	40.3
strontium	mg/L					0.196	0.200
sulfur	mg/L					1.45	1.54
tellurium	mg/L					<0.00020	<0.00020
thallium	mg/L					<0.000010	<0.000010
thorium	mg/L					<0.00010	<0.00010
tin	mg/L					<0.00010	<0.00010
titanium	mg/L					<0.00030	<0.00030
tungsten	mg/L					<0.00010	<0.00010
uranium	mg/L			0	<=0.02	0.000067	0.000365
vanadium	mg/L					<0.00050	<0.00050
zinc	mg/L		<=5			0.0013	<0.0030
zirconium	mg/L					<0.00020	<0.00020

No Spec
Within Limit
Exceeds Limit

		Ontario Drinking Water Regulation (JAN, 2020)				Sample	
		Aesthetic Objective/Operational Guideline		Schedule 1 (Microbiological) and 2 (Chemical) Standards		TW5 Start	TW5-END
Anions and Nutrients		**Guidelines - Pass Limits**					
ammonia, total (as N)	mg/L	**Lower**	**Upper**	**Lower**	**Upper**	0.144	0.152
bromide	mg/L						<0.10
chloride	mg/L		<=250			5.39	5.18
fluoride	mg/L			0	<=1.5	0.798	0.816
nitrate (as N)	mg/L			0	<=10	<0.020	<0.020
nitrite (as N)	mg/L			0	<=1	<0.010	<0.010
phosphate, ortho-, dissolved (as P)	mg/L					<0.0030	<0.0030
sulfate (as SO4)	mg/L					90.5	84.3
Microbiological Tests							
coliforms, Escherichia coli [E. coli]	CFU/100mL			0	<1		<1
coliforms, total	CFU/100mL			0	<1		<1
Physical Tests							
alkalinity, total (as CaCO3)	mg/L	>=30	<=500			158	154
colour, apparent	CU		<=5			20.9	12.3
conductivity	µS/cm					503	487
hardness (as CaCO3), dissolved	mg/L	>=80	<=100			165	
hardness (as CaCO3), from total Ca/Mg	mg/L						166
pH	pH units	>=6.5	<=8.5			8.41	8.42
solids, total dissolved [TDS]	mg/L		<=500			327	316
turbidity	NTU		<=5			2.80	1.32
Metals						**Dissolved Metals**	**Total Metals**
aluminum	mg/L		<=0.1			<0.0010	<0.0030
antimony	mg/L			0	<=0.006	<0.00010	<0.00010
arsenic	mg/L			0	<=0.01	0.00579	0.00554
barium	mg/L			0	<=1	0.0348	0.0329
beryllium	mg/L					<0.000020	<0.000020
bismuth	mg/L					<0.000050	<0.000050
boron	mg/L			0	<=5	0.110	0.123
cadmium	mg/L			0	<=0.005	<0.0000050	<0.0000050
calcium	mg/L					39.1	39.3
cesium	mg/L					<0.000010	<0.000010
chromium	mg/L			0	<=0.05	<0.00050	<0.00050
cobalt	mg/L					0.00015	0.00016
copper	mg/L		<=1			0.00076	<0.00050
iron	mg/L		<=0.3			0.159	0.206
lead	mg/L			0	<=0.01	0.000140	0.000148
lithium	mg/L					0.0028	0.0033
magnesium	mg/L					16.4	16.6
manganese	mg/L		<=0.05			0.00888	0.00880
molybdenum	mg/L					0.0104	0.0105
nickel	mg/L					<0.00050	0.00056
phosphorus	mg/L					<0.050	<0.050
potassium	mg/L					0.908	0.903
rubidium	mg/L					0.00056	0.00058
selenium	mg/L			0	<=0.05	<0.000050	<0.000050
silicon	mg/L					4.29	4.45
silver	mg/L					<0.000010	<0.000010
sodium	mg/L		<=200	0	<=20	36.1	37.6
strontium	mg/L					1.06	0.980
sulfur	mg/L					31.6	30.0
tellurium	mg/L					<0.00020	<0.00020
thallium	mg/L					0.000028	0.000025
thorium	mg/L					<0.00010	<0.00010
tin	mg/L					<0.00010	<0.00010
titanium	mg/L					<0.00030	<0.00030
tungsten	mg/L					<0.00010	<0.00010
uranium	mg/L			0	<=0.02	0.000271	0.000300
vanadium	mg/L					<0.00050	<0.00050
zinc	mg/L		<=5			0.0165	0.0157
zirconium	mg/L					<0.00020	<0.00020

No Spec
Within Limit
Exceeds Limit

Disclaimer: Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Appendix H
Water Balance Calculations

SMR = Soil Moisture Retention (mm)					
Soil Type	Vegetation Type				
	Shallow Rooted Crops (e.g. beans)	Moderately Deep Rooted Crops (e.g. corn)	Deep Rooted Crops (e.g. pasture)	Orchards	Closed Mature Forest
Fine Sand	50	**75**	100	150	250
Fine Sandy Loam	75	150	150	250	300
Silt Loam	125	**200**	250	300	400
Clay Loam	100	200	250	250	400
Clay	75	50	200	200	350

Source: *Instructions and Tables For Computing Potential Evapotranspiration And The Water Balance,* C.W. Thornthwaite and J.R. Mather, 1957

Estimated Evapotranspiration Values (mm) using Environment Canada FERGUS SHAND DAM Weater Station 1981 to 2010 Climate Normals

Month	Daily Average Temperature (C.)	Average Monthly Precipitaiton (mm)	PET (mm)*	Gravel AET (mm)* (75 mm SMR)	Till AET (mm)* (200 mm SMR)
January	-7.4	67.9	0.00	0.00	0.00
February	-6.3	55.9	0.00	0.00	0.00
March	-1.9	59.6	0.00	0.00	0.00
April	5.7	74.1	30.24	30.24	30.24
May	12.2	86.9	76.20	76.20	76.20
June	17.5	83.8	112.23	107.80	110.80
July	20.0	89.2	132.60	112.20	122.20
August	19.0	96.6	115.20	102.60	109.60
September	14.9	93.1	78.00	78.00	78.00
October	8.3	77.2	37.05	37.05	37.05
November	2.1	93.0	7.20	7.20	7.20
December	-3.9	68.6	0.00	0.00	0.00
Annual Total (mm):		945.90	588.72	551.29	571.29

* Source: *Computer Program for Estimating Evapotranspiration Using the Thornthwaite Method* , United States Department of Commerce, National Oceanic and Atmosphere Administration (NOAA) Technical Memorandum ERL GLERL-101 (November 1996)

MECP Infiltration Factors

Topography Factor							
Classification	Criteria					Slope (%)	Value of Infiltration Factor
Flat land	Average Slope Not Exceeding:	0.6	m per	1	km	0.06	0.3
Rolling land	Average slope of:	2.8	m per	1	km	0.28	0.2
	to:	3.8	m per	1	km	0.38	
Hilly land	Average slope of:	28	m per	1	km	2.8	**0.1**
	to:	47	m per	1	km	4.7	

Soil Factor	
Soil Type	Value of Infiltration Factor
Tight impervious clay	0.1
Medium combinations of clay and loam	**0.2**
Open sandy loam	**0.4**

Cover Factor	
Classification	Value of Infiltration Factor
Cultivated lands	**0.1**
Woodland	0.2

Source:
MOEE Hydrogeological Technical Information Requirements for Land Development Applications,
Ontario Ministry of the Environment and Energy, April 1995

Belwood Water Balance

Purpose:
To assess pre-existing recharge and runoff conditions at the site

Assumptions:
- climate conditions at the site represented by Environment Canada reported 1981 - 2010 Climate Normals for the FERGUS SHAND DAM weather station
- evapotranspiration rates estimated using the Thornthwaite and Mather method
- runoff rates estimated using MECP Infiltration Factors (*MOEE Hydrogeological Technical Information Requirements For Land Development Applications* , April 1995).

1) Water Balance Components

surplus = precipitation - evapostranspiration
recharge = IF x surplus IF = MECP infiltration factor
runoff = surplus - recharge

Precipitation Rate =	0.94590	m/yr

2) Estimate of Till Recharge/Runoff

Infiltration Factor			
Hilly land	0.1		
Medium clay + loam	0.2		
Cultivated lands	0.1		
Factor:	0.4	40	% of surplus becomes infiltration recharge
	0.6	60	% of surplus becomes runoff

Evapotrans. Rate =	0.57129	m/yr
Water Surplus =	0.37461	m/yr
Recharge =	0.14984	m/yr
Runoff =	0.22477	m/yr

3) Estimate of Sand/Gravel Recharge/Runoff

Infiltration Factor			
Hilly land	0.1		
Open sandy load	0.4		
Cultivated lands	0.1		
Factor:	0.6	60	% of surplus becomes infiltration recharge
	0.4	40	% of surplus becomes runoff

Evapotrans. Rate =	0.55129	m/yr
Water Surplus =	0.39461	m/yr
Recharge =	0.23677	m/yr
Runoff =	0.15784	m/yr

4) Calculated Site Recharge Rate

Site Size =	38.7	ha
Sand/Gravel Area =	19.9	ha
=	51%	of site
Till Area =	18.8	ha
=	49%	of site

average recharge	0.1945	m/yr