MIRAMICHI SHORES PHASE 4
HYDROGEOLOGICAL REPORT
PERMIT TO TAKE WATER
TOWN OF SAUGEEN SHORES

Prepared for:
Miramichi Shores Land Development Limited

January 2021

File 20007.00

Distribution:
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January 31, 2021

Miramichi Shores Land Development Limited
c/o Brad Pryde
10 Collard Way, Box 1725
Port Elgin, Ontario
N0H-2C0

Attention: Mr. Brad Pryde

Dear sirs:

Re: Miramichi Shores Phase 4 Residential Development
Hydrogeological Report for a Permit To Take Water
Town of Saugeen Shores
File 20007.00

GAMAN Consultants Inc. is pleased to submit this hydrogeological report to support a Category 3 Permit To Take Water for the purpose of dewatering the shallow groundwater table at the subject site.

The work was initiated to assess the need for groundwater control measures to facilitate the installation of a perforated storm sewer. A Category 3 Permit To Take Water should be acquired from the Ministry of Environment, Climate and Parks (MECP). This hydrogeologic report should be submitted with the MECP Permit Application. We trust that this report satisfies your requirements.

Yours truly,
GAMAN Consultants Inc.

Gary R. Hendy, P.Eng.
Consulting Engineer

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1.0 INTRODUCTION

1.1 BACKGROUND

This report provides the results of a hydrogeological assessment carried out by GAMAN Consultants Inc. (GAMAN) in support of an application by Miramichi Shores Land Development Inc. for a Category 3 Permit to Take Water (PTTW). The Permit application is required for temporary dewatering during construction and installation of underground services at Miramichi Shores Phase 4 residential development.

Miramichi Shores Phase 4 is a proposed estate residential development located on Part of Lots 55 and 56, Lake Range in the former Township of Saugeen, Town of Saugeen Shores, County of Bruce. The site is located north of the 10th Concession between Port Elgin and Southampton near the shores of Lake Huron. The regional location of the subject property is shown in Figure 1. The residential portion of the development is approximately 16.25 hectares in area. The proposed Plan of Subdivision comprises 14 residential lots shown in Figure 2.

Miramichi Shores Phase 4 will consist of partial services using municipal water and on-site subsurface sewage disposal (septic) systems. A perforated storm sewer system (PSS) will be installed along the road to control groundwater. The groundwater table is close to grade and there is an expectation that groundwater control measures will be needed to temporarily lower the water table to allow for the installation of the PSS beneath the road.

There have been other approved applications for temporary water taking permits near this site as described below:

Port Elgin Lakeside Woods Residential Development
Lakeside Woods was serviced in 2018 and home occupancy and construction continue. The development is located about 700 metres south of this site on the north side of Concession 10 and east of Miramichi Bay Road as shown in Figure 1. Groundwater control measures were needed to install underground services at the site under Permit To

Take Water 7843-AZEL2T, dated July 18, 2018. The Permit allowed for dewatering at discharge rates up to 2,600,000 L/day. Dewatering reported no problems with calculated daily volumes ranging from 200,000 to 520,000 L/day.

Trunk Sanitary Sewer System and Sewage Pumping Station – 10th Concession
Positive groundwater control was required to lower the groundwater level for the construction of the trunk sanitary sewer and the sewage pumping station (located approximately 500 m from the proposed Lakeside Woods development). A hydrogeological assessment in support of an application for a PTTW for the construction dewatering associated with the trunk sanitary sewer and sewage pumping station was carried out by Henderson Paddon & Associates Limited (HPA), now part of WSP Canada Inc., on behalf of the Town of Saugeen Shores in 2008. The results of that assessment were provided to the Town in a report dated April 2008. The construction dewatering was subsequently carried out under PTTW 1077-7Q7P2X, issued to the Town of Saugeen Shores in March 2009. During the dewatering process, no reported problems were noted.

Summerside – Phases 1 to 4
Positive groundwater control was also required to lower the groundwater level for the construction of municipal services related to major residential development at the north end of Port Elgin south of the 10th Concession. A hydrogeological assessment in support of an application for a PTTW for construction dewatering associated with the installation of water mains, sanitary sewers and storm sewers was carried out by GENIVAR on behalf of the developer (Lord Elgin Estates Developments Limited) in 2012. PTTW 2511-8TNL3C was issued on April 26, 2012. A renewal of the water taking permit was required in 2016. WSP Canada on behalf of the developer made a subsequent application and PTTW 7758-AEFQAV was issued. There were no reported problems related to dewatering at the Summerside site.

Based on the results of geotechnical investigations for this proposed residential development and the previous hydrogeological assessments for construction projects in the study area, it is anticipated that positive groundwater control will be required to temporarily lower the water table to facilitate the installation of the underground services.

1.2 STUDY OBJECTIVES

The Province, under the Ontario Water Resources Act, regulates the use of groundwater. In 2016, the MECP introduced the Environmental Activity and Sector Registry (EASR) to

streamline the requirements for an Environmental Compliance Approval (ECA) or a PTTW. For construction site dewatering, water takings must be less than 400,000 L/day under normal circumstances which exclude heavy rainfall to qualify for the streamlined EASR. If the water taking is expected to exceed 400,000 L/day, the applicant is required to follow the PTTW process.

The installation of the PSS is scheduled to commence later this year or during the summer of 2022. This hydrogeological assessment was prepared to evaluate the need for an EASR application or a PTTW application and then prepare the appropriate documentation to support this water taking.

1.3 STUDY METHODOLOGY

The study methodology for this work program was comprised of reviewing background information about the site and relying on soil and groundwater data provided by other project team members to understand and interpret subsurface conditions at the site. GAMAN completed in-situ hydraulic conductivity tests on groundwater monitors at the site and the data was interpreted as input to an assessment of dewatering volumes that ultimately determines the need for a PTTW or the streamlined EASR. Given that the result of this work showed the need to follow the PTTW process, additional documentation was prepared on surrounding groundwater users and potential effects from dewatering.

The tasks required to complete the work program included:

- Background review of the physical setting of the site including physiography, surficial geology and groundwater.
- Review of soil and groundwater data completed by others during the installation of 4 groundwater monitors and a drive point.
- A site inspection of the site and surrounding area.

- A review of local water well records and existing services around the site.
- Analysis of in-situ hydraulic conductivity tests to assess groundwater control measures.
- Assessment of effects to nearby receptors.
- Preparation of a hydrogeological report to support a Category 3 Permit To Take Water Application.

This report documents the study findings of these investigations.

2.0 PHYSICAL SETTING

2.1 PHYSIOGRAPHY, SURFICIAL GEOLOGY AND DRAINAGE

Bruce County is covered by seven (7) physiographic regions. The study area and site are located within the Huron Fringe physiographic region as described by Chapman and Putnam (1984). This physiographic region is a narrow ridge of land extending along Lake Huron from Sarnia to Tobermory and consists of wave-cut terraces formed from glacial Lake Algonquin and glacial Lake Nipissing. Across the mouth of the Saugeen River and valley at Southampton, north of this development, glacial Lake Algonquin built a massive beach deposit.

The sand plains within this physiographic region are comprised of coarse textured glaciolacustrine sediments. Figure 3 illustrates the surficial geology within the Saugeen Valley Watershed with the approximate site location shown in the northwest area. The surficial geology illustrates the sand plain that extends over and beyond the study area.

The elevation of the tablelands east of the former Nipissing Bluff is above 194 masl. The ground surface at the toe of the bluff, east of the Site, is at an approximate elevation of 191 masl. Numerous groundwater seeps are present at the base of the embankment that support

baseflow within unnamed tributaries in the study area. The seeps arise east of this development.

Within the proposed residential area, local topographic elevations range from 181 masl to 187 masl at the easterly property boundary. Ground surface contours at the Site are shown on the Draft Plan, Figure 2. Drainage at the site is comprised of a water course that conveys runoff to the west and discharges into Miramichi Bay.

The area is located within the Lake Fringe Sub-watershed of the Saugeen Valley Conservation Authority. Our review of the source water protection assessment report and maps for this area show that both groundwater and surface waters are located within areas classified as low stress potential.

2.2 HYDROGEOLOGY

The water well record database and observation wells drilled at the site were reviewed and interpreted to present the following understanding of hydrostratigraphic units beneath the site. Figure 4 illustrates the locations of local water wells. Water well records are presented in Table A-1.

There are three (3) main hydrostratigraphic units within the immediate area of the site as follows:

- The Upper Aquifer
- Aquitard
- Bedrock Aquifer

The Upper Aquifer is comprised of saturated sands and gravels that form the sand plains described in Section 2.1. There are few water wells documented in the MECP water well record database near the site and most show this thin aquifer. The upper aquifer south of

Concession 10 may be about 4.5 metres thick at MECP Well #1406082 and about 3.3 metres thick at MECP Well #1407481 near the site (see Figure 4 and Table A-1). These saturated sands were observed to be at least 4 metres thick at the site based on BH20-01. Flowing sands prevented the augers from advancing the boreholes deeper. Water wells terminating in the upper aquifer were usually completed as shallow dug wells.

The Aquitard appears to be comprised of heterogeneous mixtures of sandy-silt, silty-sand or clayey-silty soils as described in water well records. The aquitard is at least 30 metres thick based on MECP well record #1403490. Other water well records show the presence of these fine-grained sediments that comprise the aquitard and it appears that water well contractors extended wells down to bedrock near the site. The four boreholes drilled at the site were not deep enough to confirm the depth to the aquitard.

The Bedrock Aquifer was encountered at depths of or greater than 30 metres. Domestic wells extract groundwater from this aquifer which is overlain by the thick aquitard described above.

There is evidence of one or more deeper overburden aquifers at other well records reported in Table A-1. Water well MECP 1402111 at Miramichi Bay adjacent to the site report productive zones of groundwater supply.

2.3 GROUNDWATER MOVEMENT

The movement of groundwater is influenced by regional and local topographic feature, and drainage. The site is located adjacent to the shoreline of Lake Huron and it follows that shallow groundwater movement should be from east to west towards the lake at the regional scale.

Local groundwater movement is influenced by local topographic and drainage features. Groundwater levels monitored at four observation wells drilled at the site confirms the movement of shallow groundwater from west to east towards Lake Huron as expected. The average horizontal groundwater gradient from BH20-01 to BH20-04 was 0.0126 m/m and is the essentially the same as the horizontal gradient calculated at Lakeside Woods (Figure 1) to the south.

2.4 LOCAL WATER SUPPLIES

Within the area bounded by County Road 21 to the east, Concession 10 to the south, Lake Huron to the west and South Street in Southampton to the north, there are few reported water wells. Much of the area surrounding this site is serviced with municipal water including this proposed development.

Local water well records are appended to the report in Appendix A and illustrated in Figure 4. There are about 23 wells reported in the database as summarized in Table A-1. Six water wells appear in Figure 4 within about 500 metres of the site; however, the area is now serviced with municipal water. Most wells are drilled and extract groundwater from depths greater than the 2-metre excavation required for the perforated storm sewer. Test rates from productive wells range from 2 to 100 Igpm (9 to 454 L/min) with an average test rate of 16.6 Igpm (74 L/min). If we ignore the 100 Igpm test rate, the average test rate is still high for domestic use at 12 Igpm (54 L/min).

The water wells located between the lake and the site are situated within the municipally serviced area as confirmed with the water hydrants during our site inspection. Water wells may still exist but are likely to be used for non-drinking water purposes such as lawn watering.

The cluster of wells east of the site on Lot 54 includes well abandonment records for two wells (1407272 and 1407273). The two productive wells include a dug well and a shallow drilled well. These wells are located more than 500 metres from this development.

The wells in the area extract groundwater from thicker portions of the water table aquifer, deeper overburden aquifers or the bedrock aquifer. Groundwater is commonly reported as fresh in the water well record database. An exception is MECP well #1407421 north of the site that was drilled deep into bedrock (~100 metres) and encountered sulfurous water.

2.5 WATER BUDGET

As precipitation falls to the ground in the form of rainfall or snow, it is subject to components of the hydrological cycle. Water will generally runoff, infiltrate, evaporate or be subject to transpiration from plant uptake. Evaporation and transpiration are commonly grouped together as evapotranspiration while runoff and infiltration are grouped together as water surplus. The water budget is represented in a simple form as follows:

Water In = water Out

P + EI = ET + IR + RO + EO

Where:

P = Precipitation

EI = External Inputs (Run-on, irrigation and vertical/lateral transfers)

ET = Evapotranspiration from plant uptake and evaporation.

IR = Infiltration Recharge

RO = Run-off

EO = External Outputs (water taking and vertical/lateral transfers)

Precipitation data is available from the Environment Canada website for climatic stations across the country. The Hanover Climatic Station provides climatic data temperature and precipitation for the period 1981 to 2010.

Thornthwaite (1948) developed a mathematical method for analyzing precipitation data and calculating evapotranspiration and water surplus. Average monthly temperature and precipitation data were analyzed using the method provided by Thornthwaite. The results are presented in Table 3 show the 30-year normal annual precipitation at 1,087 mm/yr. with a resultant water surplus of 505 mm/yr.

The MOECC Hydrogeological Technical Information Requirements For Land Development Applications (1995) included Table 2 derived from hydrologic analysis for assessing peak runoff for storm water management. The method considers topography, soil type and vegetation cover on the site as summarized in the table below.

Infiltration Factors	Range of Values	Assessment of Site	Selected Factor
Topography	0.1-0.3	Hilly	0.1
Soil Type	0.1-0.4	Open sandy loam	0.4
Cover	0.1-0.2	Woodland	0.2
Total Infiltration Factor			0.7

The rationale for selecting infiltration factors from this table is as follows:

- The infiltration factor for topography was estimated at 0.1 to reflects hilly topography.
- The soil infiltration factor was estimated at 0.4 to reflect the sandy texture.
- The cover factor of 0.2 reflects the woodlands.

The infiltration factor for this site is estimated at 0.70. The infiltration rate associated for the site is the product of the infiltration factor (0.70) and the water surplus (505 mm/yr.) and results in 354 mm/yr./ha.

3.0 SITE INVESTIGATIONS

CMT Engineering Inc. was retained by the developer to carry out geotechnical investigations. The firm completed a geotechnical investigation and documented the findings in a report titled "Geotechnical Investigations, Miramichi Shores Phase 4 Subdivision – Saugeen Shores dated January 2021. Four groundwater monitors were installed as part of the program and the borehole logs are included in Appendix B.

Soils beneath the site are comprised of sand fill overlying sand. Groundwater monitor details and water levels are detailed in Tables B-1(a) and B-1(b), Appendix B. The presence of these sands is consistent with other development sites in the area and with the physical setting of the broader area.

A drive point designated DP20-01 was installed below the creek bed near BH20-04. The purpose of the drive point was to provide an understanding of groundwater and surface water interaction to determine the potential effects of dewatering on surface water. Water levels in the drive point and the surface water level beside it are documented in Table B-1(b).

4.0 DEWATERING ASSESSMENT

4.1 DEWATERING CALCULATIONS

The dewatering requirements for the site were reviewed and assessed using the proposed depth of the perforated storm sewers (PSS), soil and groundwater conditions presented in the borehole logs completed by CMT Engineering Inc.

We understand that it is proposed to extend the PSS to a depth of 1.5 metres below proposed grade. There is about 250 metres of underground services to install from Carter Drive to the cul-de-sac.

Soil and groundwater conditions were evaluated below the site at four locations. Borehole logs for BH20-01, BH20-02, BH20-03 and BH20-04 (Appendix B) show that the upper aquifer is at least 4 metres thick. This is similar to the Lakeside Woods site along Concession 10 where the upper aquifer was documented at 4.1 metres thick.

Groundwater levels were monitored the boreholes on several occasions. The borehole construction details and water level elevations are documented in Table B-1, Appendix B. If the maximum depth of servicing is 1.5 metres below proposed grade, the water table may need to be lowered from about 0.8 to 1.2 metres based on water levels at boreholes BH20-01 and BH20-02, respectively. The water table may not need to be lowered at BH20-03.

In-situ rising head hydraulic conductivity (slug) tests were completed at the four boreholes. The data was analyzed using Aquifer Test Pro (Version 9.0) software and the results are presented in Figures C-1 to C-12, Appendix C. The test results for boreholes BH20-01 to BH20-04 reflect estimates of hydraulic conductivity ranging from $3.46x10^{-5}$ to $1.08x10^{-4}$ m/s with a geometric mean value of about $5.6x10^{-5}$ m/sec. Borehole BH20-01 provided the highest hydraulic conductivity at $1.08x10^{-4}$ m/sec.

Dewatering calculations at the site were evaluated based on the following assumptions:

1. The upper aquifer is up to 4 metres thick at the site.
2. The water table would be lowered by a maximum of 1.3 metres to facilitate the installation of perforated storm sewers up to 1.2 metres below the water table across the site.
3. Linear trenches 100 metres long by 2 metres wide would be dewatered at a time.

Powers presented a method for analyzing a long narrow system of dewatering that incorporates the flow from the sides (line source) and from radial flow from the ends of the dewatering system. Dewatering calculations presented in Tables D-1 and D-2, Appendix D reveal that daily volumes could range from an average of about 391,000 to a maximum of 558,000 L/day for hydraulic conductivities ranging from the average to the maximum values noted above, respectively. The zone of influence (Ro) ranges from about 30 to 40 metres. Dewatering rates at 391,000 L/day create the 30-metre zone of influence for underground services between BH20-02 and BH2-03. The higher volume of 558,000 L/day creating the 40-metre zone of influence reflects conditions between BH20-01 and BH20-02. The widths of dewatering (L) from the sides of the trench are about half the distance reported above. Figure 5 illustrates the 30-metre zone of influence that reflects the average hydraulic conductivity for the site.

We anticipate that the dewatering volumes would be lower in the northwest area of the site by BH20-03. As the excavation proceeds along Mary Rose Court, the aquifer becomes less transmissive based on the insitu hydraulic conductivity tests at BH20-02 to BH20-04. The length of dewatering may need to be adapted (shortened or lengthened) based on the volumes of water encountered and potential effects to nearby receptors.

4.2 ALLOWANCES FOR DEWATERING UNCERTAINTY

We have examined the results from dewatering at a nearby site that was serviced in 2018 to compare theoretical volumes from actual rates of dewatering to determine the need to adjust the volumes for uncertainty.

Lakeside Woods is a residential development comprised of 29 lots on a 6.1 ha parcel of land. The site is located about 700 metres south of this property in the same physical setting as this site. A Permit To Take Water #7843-AZEL2T, dated July 18, 2018 allowed for dewatering at discharge rates up to 2,600,000 L/day.

Soil and groundwater conditions at the Lakeside Woods site are similar to this site. The dewatering assessment at Lakeside Woods concluded that dewatering volumes could range from 245,000 to 405,000 L/day for soils with hydraulic conductivities up to $6.7x10^{-5}$ m/sec. Table D-4 summarized daily water takings from the dewatering system. Daily volumes of dewatering ranged from about 200,000 to 520,000 L/day. The observed volumes were within the estimated range from the theoretical evaluation except for the first four days of pumping where volumes were around 517,000 L/day and declined to 445,000 L/day. By day 5, volumes were below 400,000 L/day. From August 8 to August 30, 2018, the average daily water taking was calculated at 365,000 L/day and this is within the expected range calculated from the theoretical evaluation.

The uncertainty around these higher initial volumes may be due to one or a combination of the following:

1) The initial response and release of water from storage within an unconfined aquifer.
2) The linear trench may have exceeded the 100 metres assumed in the evaluation.
3) Locally higher hydraulic conductivities than observed from testing.
4) A thickening of the aquifer between boreholes.
5) Precipitation

The estimates of dewatering volumes in Tables D-1 and D-2 are based on hydraulic conductivity tests at each borehole and may not reflect variability in hydraulic conductivity. Table D-3 provides a sensitivity analysis for a scenario where the hydraulic conductivity increases by three times the maximum K value at BH20-01 to $3.24x10^{-4}$ m/sec. This scenario reveals that the water volumes could increase to about 1,047,000 L/day.

The zone of influence increases to 70 metres for this higher rate of dewatering. Dewatering at these high rates is not expected to be sustained by the aquifer based on the observed results at Lakeside Woods and lower hydraulic conductivities at other boreholes.

The water budget for this site was presented in Section 2.5 and documented recharge at 70% of the water surplus or about 35% of the total precipitation. If a 50mm precipitation event occurred during dewatering, the additional volume of water that could be captured from this event includes the following:

1) The zone of influence comprises the recharge area.
2) All the recharge captured within the ZOI is removed by dewatering in one day.
3) The recharge area for the zone of influence extends 40 metres away from a 100 metre long dewatering system.
4) A 50-mm rainfall event is assumed to produce 17.5 mm of infiltration.

The volume of water captured by the dewatering system is the product of the zone of influence (180m x 80m) and 17.5 mm of recharge or 252 m^3/day (252,000 L/day).

While we would not expect to see high volumes of pumping across the site, this scenario provides reason to increase the amount of water taking due to uncertainty. It is appropriate to undertake a Category 3 Permit To Take Water Application for dewatering up to 1,300,000 L/day to accommodate uncertainty in the hydraulic conductivity and rainfall.

There is about 250 metres of perforated storm sewers to install along the subdivision road and it should be possible to reduce the trench lengths to lower the volumes if needed. Servicing at this site is expected to last less than one month based on the results at Lakeside Woods.

4.3 DISCHARGE PLAN

Groundwater at this site flows towards and discharges to Lake Huron which is a short distance from the west property boundary. There is an unnamed water course that drains through a culvert beneath Miramichi Bay Road. It is proposed to discharge shallow

groundwater to the tributary near BH20-4 (Figure 2) where it will flow directly into Lake Huron.

The discharge water will pass through appropriate siltation controls (e.g.: sedimentation tanks, rock check dams, silt bags, hay bales, splash pads, etc.) before it is conveyed to the roadside culvert.

4.4 GROUNDWATER QUALITY

Once the discharged water passes through the appropriate filtration system(s), it is expected that the level of total suspended solids (TSS) in the water will be low. Typically, discharge water from construction sites should contain no more than 25 mg/L of TSS. Periodic sampling will be needed to confirm TSS levels and ensure compliance with this criterion.

Tests for TSS are done by certified laboratories; however, the results are not available immediately. It is proposed to use field turbidity as a surrogate for TSS. Turbidity will be measured in the field and a corresponding sample of water will be sent to a certified laboratory for analysis of TSS. The field turbidity results will then be used to establish a relationship between TSS and turbidity so that remedial action, if needed, can occur sooner in the field. During the intervening time when the ratio of turbidity to TSS is established, the site should adopt a turbidity criterion up to 8 NTU as acceptable for TSS.

5.0 RECEPTORS

Several receptors were identified during the site inspection and from our review of other reports for this project noted in the references (Section 8) as follows:

1. Wells
2. Aquatic ecosystems.
3. Wetlands

Wells

Private water wells were discussed in this report. The area is serviced with municipal water and we are not aware of shallow dug wells in the area. It is assumed that other dwellings in the area are connected to the water works system. There may be some wells that have been retained perhaps for sprinklers or other uses by some residents. Water wells appear to extract groundwater from aquifers and depths below the shallow excavation levels proposed during this short period of dewatering.

Estimates of the predicted zones of influence (ZOI) presented in Section 4.1 ranges from about 30 to 40 metres from the ends of the dewatering system. The larger ZOI is expected in the vicinity of BH20-01 and BH20-02 where the soil conditions appear more transmissive. The lower ZOI is expected to result from dewatering between BH20-02 and BH20-03. The ZOI is expected to be closer to the lower range of this estimate if aquifer conditions do not change from the observed site conditions as described in Section 4.1. We infer that adverse effects to residents reliant on wells for drinking water are not anticipated. There appears to be a low risk of adverse effects to wells in the area from this temporary lowering of the water table.

Aquatic Ecosystems

WSP Canada Inc. completed an EIS for the subject lands. There is one water course at the site. The nearest distance from the storm sewer to the permanent water course is about 90 metres from the bulb at BH20-03 and is near BH20-04. Groundwater levels at BH20-04

and drive point DP20-01 beneath the water course show surface water levels are higher than groundwater levels at DP20-01 and BH20-04. The hydraulic head is downwards from surface water to groundwater and shows the water course loses water to the water table at that location.

The water course is about 1.4 metres wide and about 0.24 metres deep. The permanent water course could be influenced by temporary dewatering if aquifer conditions change beyond those observed at the four boreholes. It would be prudent to inspect and document conditions in this area during dewatering though the risk of an adverse effect seems low.

The zone of influence from dewatering in this area of the site was estimated at about 40 metres which should prevent the ZOI from extending to the water course, 90 metres away.

In summary, the proposal is to initiate dewatering at the site is not expected to affect the permanent water course. Groundwater and surface water levels should be monitored at BH20-04, DP20-01 and the water course to verify these observations.

Terrestrial Ecosystems

The WSP report noted documented sensitive areas across the site. Unmapped wetlands are designated Units 1 to 4 on Figure 4. Part of Unit 4 extends across lots 12-14. Dewatering at these high rates is temporary. Recharge from upland area should replenish the water table at the site. WSP considered the temporary affects from dewatering to not have an adverse impact on Unit 4.

6.0 ENVIRONMENTAL MANAGEMENT PLAN

Section 5 described the various potential receptors that could be affected by dewatering and concluded that the risk of adverse effects was low. Despite the low level of risk, it is proposed to initiate a groundwater monitoring program for the site.

Water levels at shallow observation wells designated BH20-01 to BH20-04, drive point DP20-01 and the water course should be monitored to document the effects of dewatering on the water table before, during and after dewatering. Water levels should be monitored at least three times before dewatering begins and then three times weekly during dewatering. Post construction monitoring would continue until groundwater levels rebound by 80% based on the baseline water levels.

If a water well supplying drinking water to a dwelling exists, a sample of groundwater will be collected for chemical analysis, provided the resident agrees to testing. Water quantity volumes should be documented daily and be retained on site for MECP inspections. The results will be submitted to the MECP as required under the PTTW.

Environmental inspections should occur during the dewatering period. The inspection should be completed to address the Conditions of the PTTW. The rates and taking of groundwater should be reviewed by the inspector and the discharge location examined for erosion related features caused by dewatering.

During the first 5-days of dewatering, TSS and Turbidity should be monitored daily to establish a ratio for turbidity and TSS going forward. Beyond the first 5-days, discharge water should be tested at least 3 times a week for field turbidity and one sample of water should be collected and tested by a certified laboratory for TSS weekly to continue correlating turbidity with TSS. If a turbidity value is observed to be higher than a concentration observed during the initial 5-days, a sample of this water should be tested for TSS to update the ratio of TSS to turbidity.

In the unlikely event that a resident who owns a water well experiences a water shortage, the complaint must be registered with the MECP within 24-hours of receiving the complaint. A temporary source of water should be provided to the dwelling within 24-hours if the well is a source of drinking water if the cause of water shortage is unclear or dewatering is known to be the cause. An investigation and report should be initiated into the cause of water shortages.

Water supply companies should be on standby in the event of a water shortage issue. The solution may be to provide bottled water for drinking and a water tank hookup until dewatering ceases and groundwater levels rebound by 80% at the site observation wells.
A sample of groundwater should be collected and tested from a groundwater monitor at the site to establish baseline water quality. A grab sample of discharge water should be collected and tested every two weeks during dewatering to ensure ongoing compliance with surface water quality.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations presented below are premised on the data collected and reviewed at the site and existing information reviewed for this study:

- The study area and site are located within the Huron Fringe physiographic region. The sand plains within the region are comprised of coarse textured glaciolacustrine sediments.
- The Upper Aquifer (water table) is comprised of saturated sands and gravels that form the sand plains. The upper aquifer is about 4 metres thick based on local well record information.
- The aquitard that underlies the water table is thick and comprised of low permeability till.

- Groundwater levels at the site range from about 0.7 to 1.3 metres below grade. Underground services to depths up to 1.5 metres below proposed grade necessitates the need to lower the water table up to 1.3 metres.
- Insitu hydraulic conductivity tests completed at four monitors shows the saturated sands to have an average value of $5.6x10^{-5}$ m/sec and a maximum value of $1.08x10^{-4}$ m/sec. These hydraulic conductivities are consistent with values determined at other sites in the study area.
- Dewatering volumes ranging from 391,000 to 558,000 L/day may be observed.
- A sensitivity analysis to consider higher hydraulic conductivity and precipitation shows dewatering volumes could rise to 1,300,000 L/day.
- The interpreted zone of influence caused by dewatering ranges from 30 to 40 metres away from the well points.
- There are no reported adverse impacts on local domestic wells. Based on these observed and predicted effects, there continues to be a low risk of adverse effects to wells in the area from this temporary lowering of the water table.
- The developer should submit this report along with an Application for a Category 3 Permit To Take Water Application.

Respectfully Submitted,
GAMAN CONSULTANTS INC.

Gary R. Hendy, P.Eng.
Consulting Engineer

8.0 LIMITATIONS AND USE

This report has been prepared for the exclusive use of Miramichi Shores Land Development Limited for their exclusive use in the evaluation of the area for the proposed development. GAMAN Consultants Inc. accepts no responsibility for any damages incurred by any third party resulting from decisions made, or actions taken based upon the information contained within this report.

All background information used in the preparation of this report has been relied upon in good faith, and GAMAN does not accept any responsibility for any misstatements, inaccuracies, or deficiencies contained in those documents or records. The information contained in this report should be evaluated, interpreted and implemented only in the context of the assignment.

The findings and conclusions included in this report reflect our best judgement in light of the information available at the time of report preparation and site inspection and are valid only at the date of issuance. If additional information is provided in the future, such as the results of additional site-specific assessments or monitoring, GAMAN will be pleased to re-evaluate our conclusions contained within this report, and issue amendments, as required.

9.0 REFERENCES

CMT Engineering, 2021

Geotechnical Investigations, Miramichi Shores Subdivision Phase 4

GAMAN Consultants Inc., 2018

Hydrogeological Assessment For Permit To Take Lakeside Woods Residential Development, Part Lot 51, Lake Range, Town of Saugeen Shores,

Chapman L.J. and Putnam, D.F., 1984

The Physiography of Southern Ontario, 3rd edition;

Ontario Geological Survey Special Volume 2; Ministry of Natural Resources.

Ministry of Environment Climatic & Parks

Water Well Records

WSP, 2021

Environmental Impact Study, Mary Rose Subdivision, Saugeen Shores, Ontario

FIGURES

NOTES

Site Location

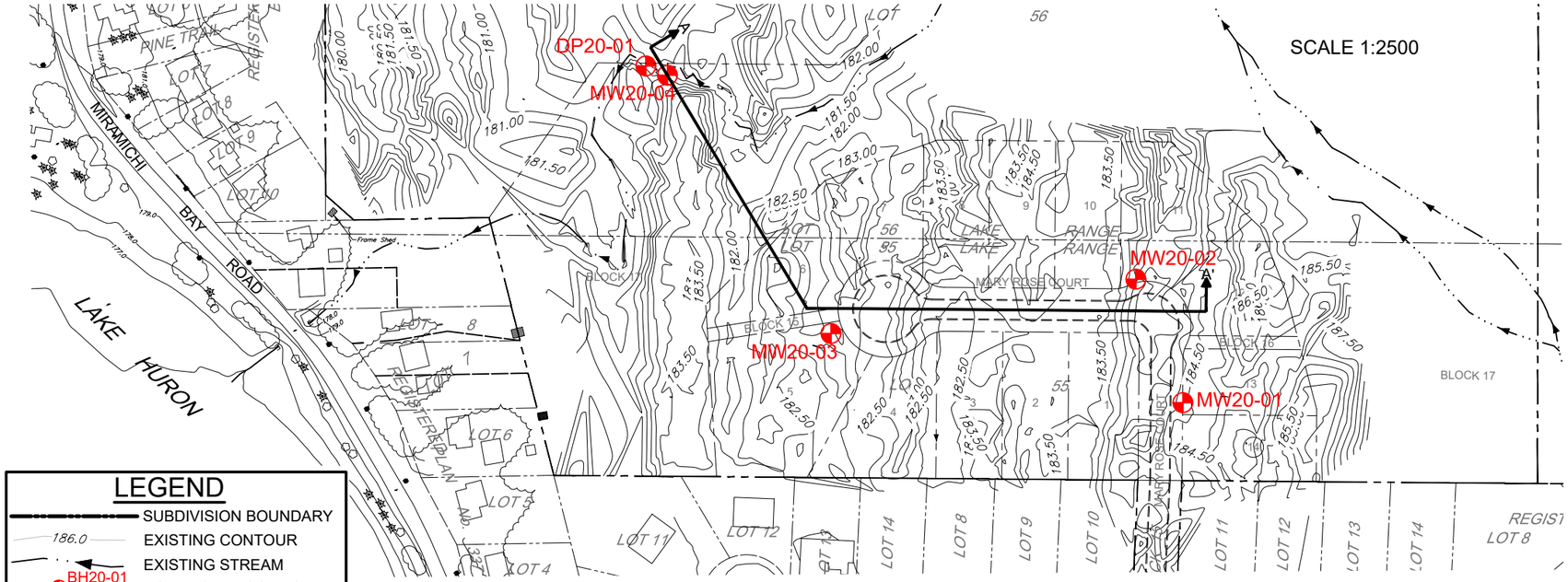
Miramichi Shores Phase 4 Hydrogeological Evaluation Permit To Take Water

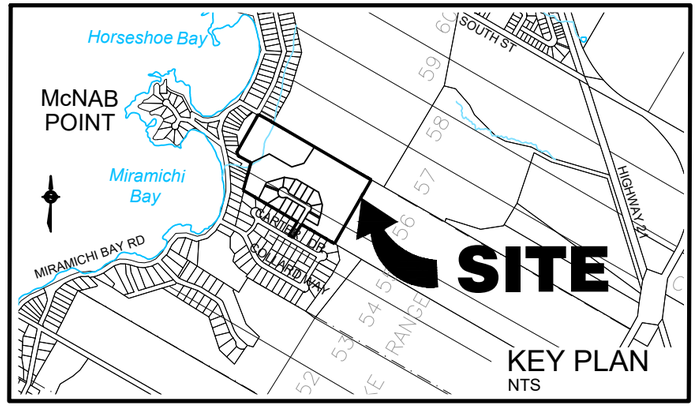
For Miramichi Shores Land Development Limited

Date:	Jan-21	Scale:	~1:43000
Project:	20007.00	Ref No:	

GAMAN Consultants Inc.

Figure 1





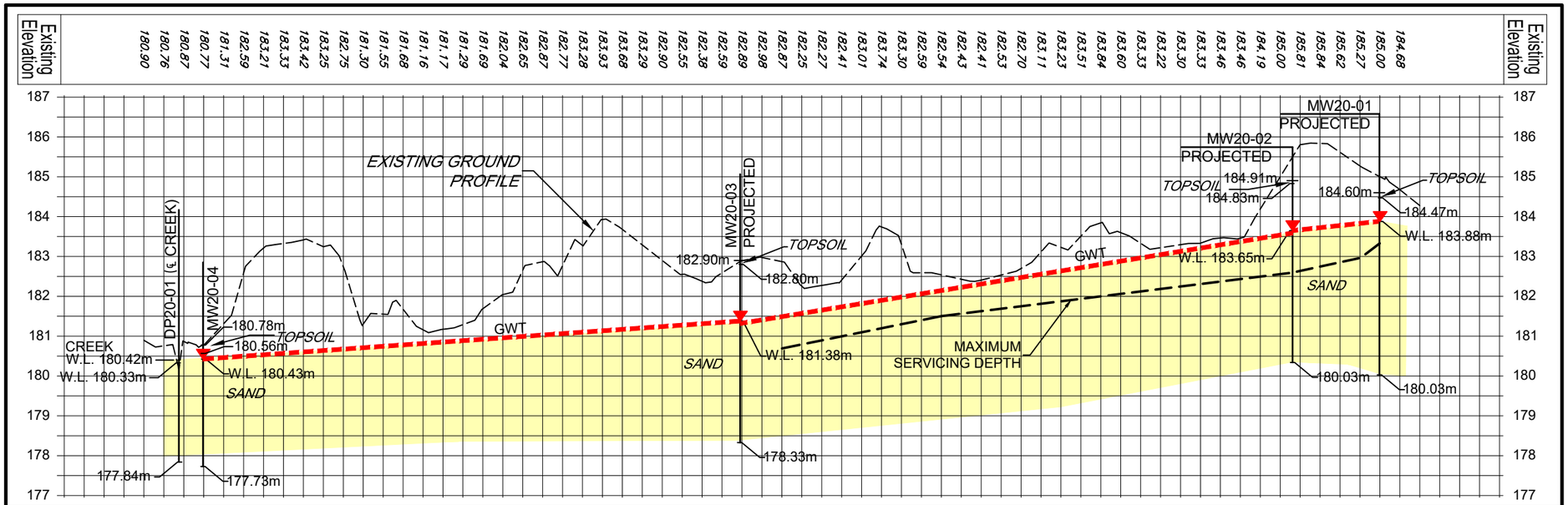
SCALE 1:2500 (11 x 17)

50 0 25 50 100 METRES

100 0 50 150 250 500 FEET

LEGEND

- SUBDIVISION BOUNDARY
- 186.0 EXISTING CONTOUR
- EXISTING STREAM
- BH20-01 BOREHOLE LOCATION
- GWT GROUNDWATER TABLE
- W.L.275.9m WATER LEVEL ELEVATION



SECTION A - A'

SCALE

HORZ 1:1250

VERT 1:125

No.	DATE	DESCRIPTION	BY	APPD
1	JAN 11/21	PRELIMINARY SUBMISSION	TLB	SJC

REVISION / ISSUE

Title:
INTERPRETED HYDROSTRATIGRAPHY
SECTION A-A'
MIRAMICHI SHORES PHASE 4
PROPOSED SUBDIVISION
Town of Saugeen Shores, Ontario
HYDROGEOLOGICAL EVALUATION
PERFORATED DRAIN

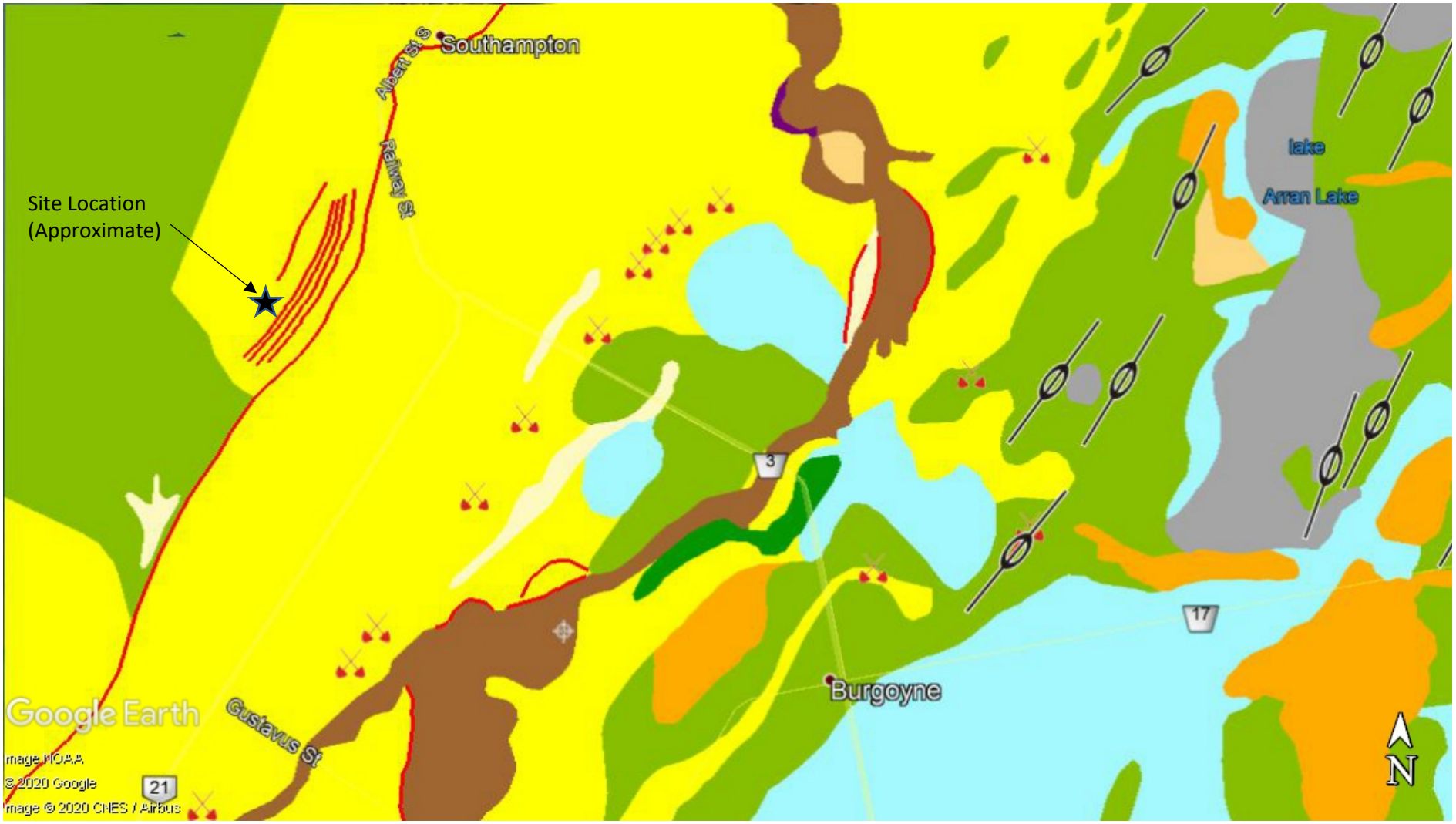
Client:
MIRAMICHI SHORES LAND DEVELOPMENT LTD.

COBIDE ENGINEERING INC
517 10th St, Hanover, ON N4N 1R4
Telephone: (519) 506-5959
www.cobideeng.com

Design:	TLB	Scale:	AS SHOWN
Drawn:	JAF	Approved:	
Checked:	SJC		
Date:	DEC 2020		Design Engineer

DRAWING No. 00104-FIG2

H:\Pryde\00104 Miramichi Shores – Phase 4 Subdivision\Drawings\Submissions\2020-12-15 Hydrostratigraphy\00104 Hydrostratigraphy Plan Dec 15-20.dwg



NOTES

2	Bedrock Drift Complex
5a	silty sand - sand till
6	Ice-contact stratified deposits (sand & gravel)
7a	Glacialfluvial deposits (sandy)
8a	Fine Textured Glaciolacustrine Deposits (silt & clay)
9	Coarse Textured Glaciolacustrine Deposits
19	Modern Alluvial Deposits (gravel sand, silt, clay)
20	Organic Deposits (peat, muck marl)

Surficial Geology

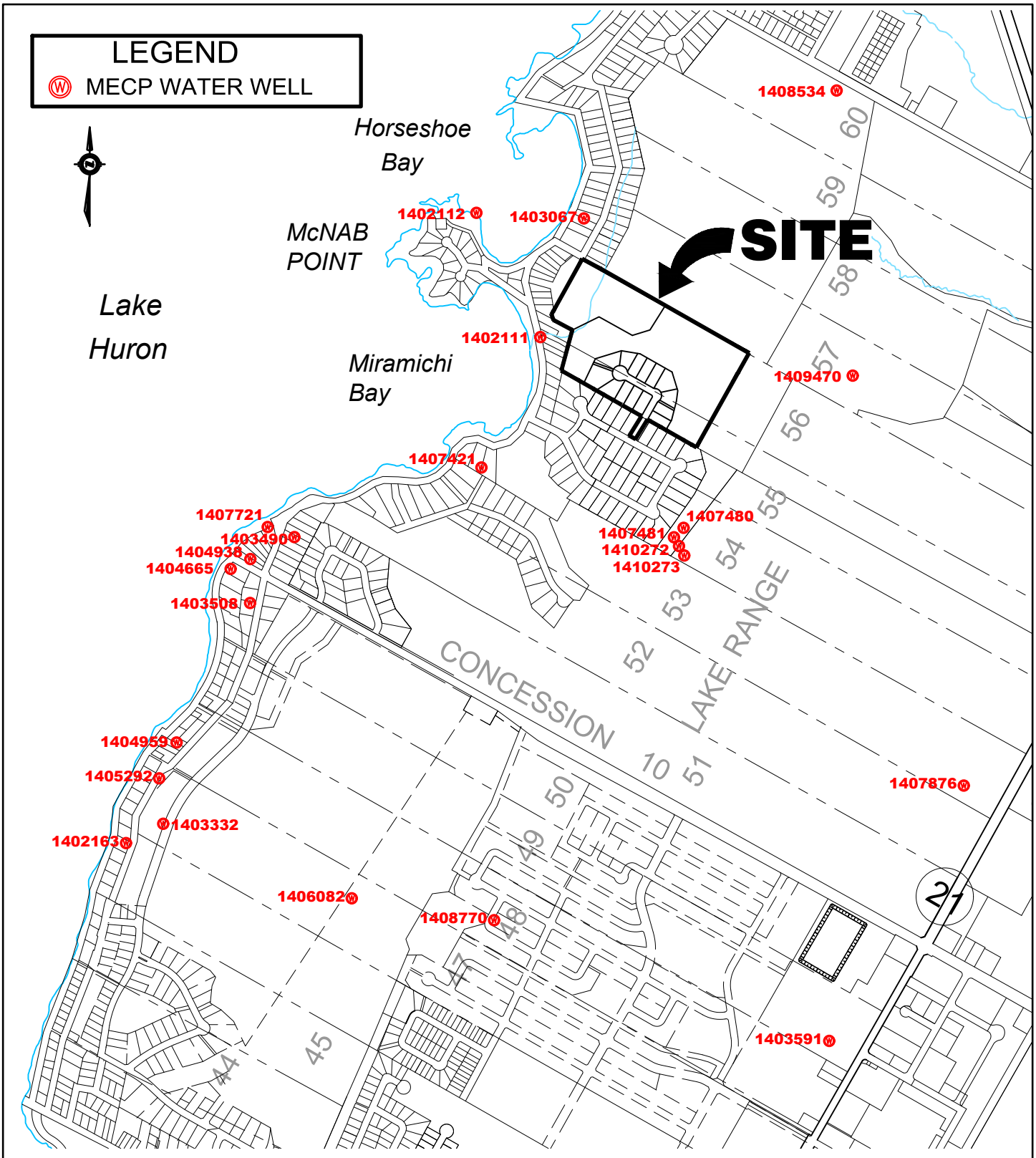
Miramichi Shores Phase 4 Hydrogeological Evaluation Permit To Take Water

For Miramichi Shores Land Development Limited

Date:	Jan-21	Scale:	NTS
Project:	20007.00	Ref No:	

GAMAN Consultants Inc.

Figure 3



MAP SOURCE: COUNTY OF BRUCE ASSESSMENT MAPPING (NOT TO SCALE)

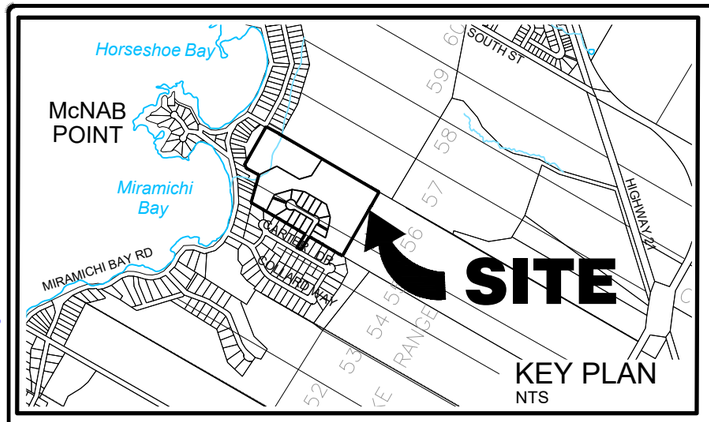
COBIDE ENGINEERING INC
517 10th STREET, Hanover, Ontario N4N 1R4
Telephone: (519) 506-5959
www.cobideeng.com

Client/Project
MIRAMICHI SHORES PHASE 4
PROPOSED SUBDIVISION
TOWN OF SAUGEEN SHORES

Figure No.
4

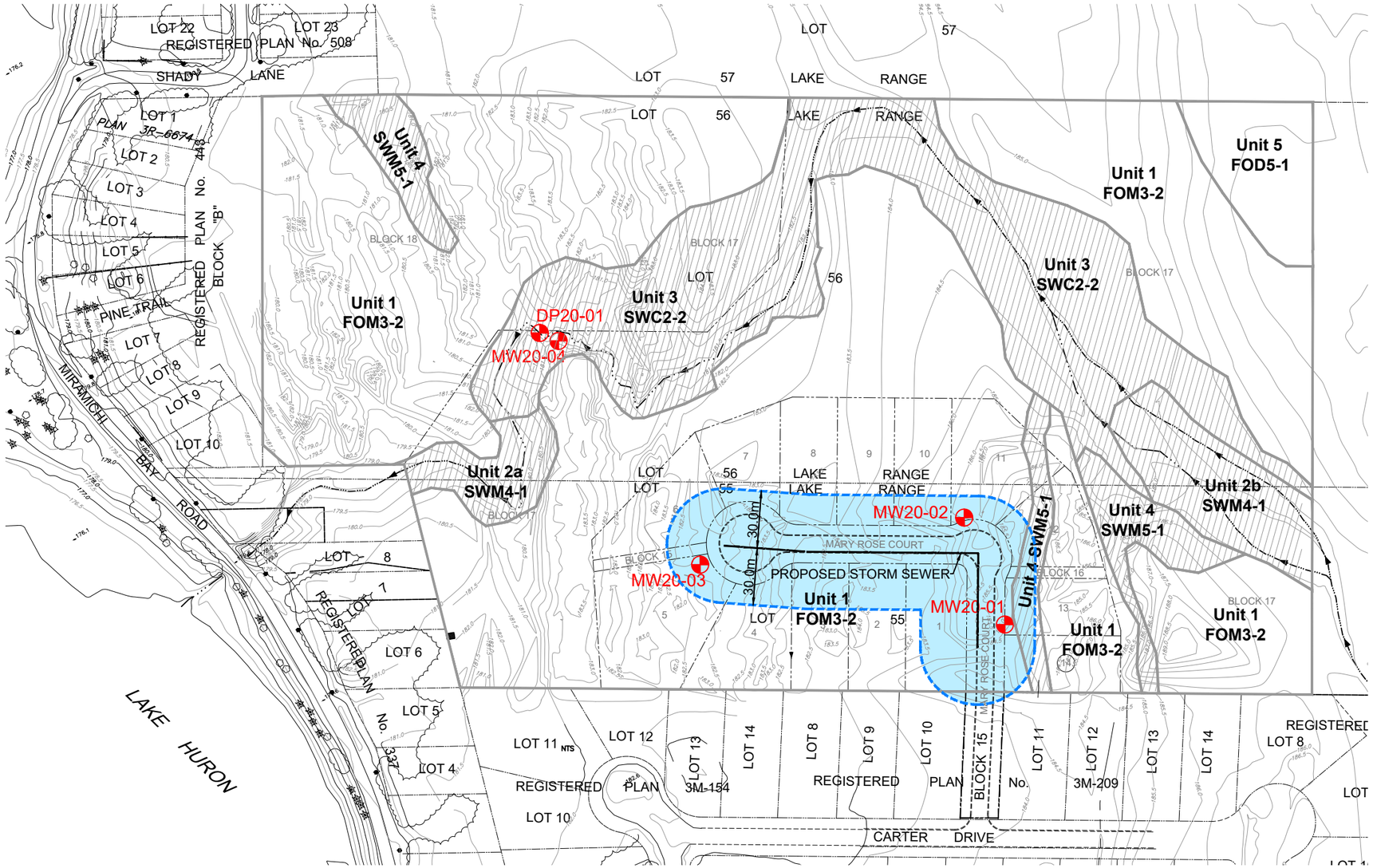
Title
WATER WELL LOCATION MAP

ORIGINAL SHEET – 8 x 11
H:\Pryde\00104 Miramichi Shores – Phase 4 Subdivision\Drawings\Submissions\2020-12-15 Hydrostratigraphy\00101 Well Map Fig 4 Dec 22-20.dwg Dec 23, 2020 – 9:55am



Legend

- PROPOSED SUBDIVISION BOUNDARY
- PROPOSED LOT LINE
- EXISTING PROPERTY/STREET LINE
- 182 — EXISTING CONTOUR
- EXISTING STREAM
- MW20-02 — BOREHOLE LOCATION
- ZONE OF INFLUENCE
- UN-MAPPED WETLAND (REF. 2021 EIS PREPARED BY WSP)



SCALE 1:2500 (11 x 17)

50 0 25 50 100 METRES

100 0 50 150 250 500 FEET

No.	DATE	DESCRIPTION	BY	APPD
1	JAN 11/21	PRELIMINARY SUBMISSION	TLB	SJC

REVISION / ISSUE

Title: PROPOSED SUBDIVISION
MIRAMICHI SHORES PHASE 4
GEOGRAPHIC TOWNSHIP OF SAUGEEN
TOWN OF SAUGEEN SHORES
ZONE OF INFLUENCE

Client: MIRAMICHI SHORES LAND DEVELOPMENT LTD.

COBIDE ENGINEERING INC
517 10th St, Hanover, ON N4N 1R4
Telephone: (519) 506-5959
www.cobideeng.com

Design:	TLB	Scale:	1:2500
Drawn:	JAF	Approved:	
Checked:	SJC		
Date:	JAN 2021		Design Engineer

DRAWING No. 00104-FIG5

APPENDICES

APPENDIX A

WATER WELL RECORDS

TABLE A-1 SUMMARY OF WATER WELL RECORDS
Miramichi Bay Phase 4 Permit To Take Water Evaluation (Project 20007.00)

TOWNSHIP CON LOT	UTM (metres)	DATE & Driller	CASING DIA (in)	WATER FOUND (ft)	Static Level (Ft.bgl)	Pumping Level (ft. bgl)	Test Rate (Igpm)	WELL USE	SCREEN top / Length	WELL ID	FORMATION (feet)
SAUGEEN TOWNSHIP LR 055	17 468974 4924189	1954/05 1705	4	FR 0141	2	6	10	PS		1402111 ()	MSND 0016 MSND GRVL 0035 HPAN STNS 0054 CLAY 0063 HPAN STNS 0136 MSND GRVL 0140 GRVL 0141
SAUGEEN TOWNSHIP LR 056	17 468874 4924449	1961/07 1804	4	FR 0142		80	2	DO		1402112 ()	GRVL STNS 0005 BLUE CLAY 0015 HPAN GRVL 0032 BRWN CLAY STNS 0090 MSND GRVL 0102 QSND 0129 FSND 0136 MSND GRVL 0140 GRVL 0142
SAUGEEN TOWNSHIP LR 046	17 467864 4922634	1968/04 1804	4	FR 0092 FR 0096	8	60	10	DO		1402163 ()	LOAM 0002 CLAY MSND BLDR 0030 CLAY MSND 0075 MSND GRVL 0092 GRVL 0096
SAUGEEN TOWNSHIP LR 057	17 469184 4924434	1972/05 5507	5	FR 0111	8	50	10	DO		1403067 ()	SAND 0020 BRWN CLAY 0108 GRVL 0113
SAUGEEN TOWNSHIP LR 047	17 467974 4922694	1973/10 2644	4	FR 0068	19		5	DO	0068 4	1403332 ()	CLAY 0002 BLDR CLAY 0020 CLAY SAND 0068 GRVL 0075 CLAY STNS 0093
SAUGEEN TOWNSHIP LR 051	17 468342 4923517	1974/02 5507	5 5	FR 0143	10	60	14	DO		1403490 ()	GRVL STNS 0010 CLAY GRVL STNS 0124 BLUE SHLE ROCK 0150
SAUGEEN TOWNSHIP LR 050	17 468220 4923328	1974/05 1804	5	FR 0141	18	40	15	DO		1403508 ()	BRWN STNS GRVL 0010 BRWN BLDR CLAY 0082 GREY SAND BLDR 0110 GREY GRVL SAND 0141
SAUGEEN TOWNSHIP LR 049	17 469890 4922064	1974/07 3408	7	FR 0040	10	17	10	DO	0038 4	1403591 ()	SAND CLAY 0026 SAND GRVL 0048
SAUGEEN TOWNSHIP LR 050	17 468164 4923424	1977/11 3030	36 30	FR 0005 FR 0015	15			DO		1404665 () A	BRWN LOAM 0001 BRWN GRVL 0005 BLUE CLAY STNS 0030

TABLE A-1 SUMMARY OF WATER WELL RECORDS
Miramichi Bay Phase 4 Permit To Take Water Evaluation (Project 20007.00)

TOWNSHIP CON LOT	UTM (metres)	DATE & Driller	CASING DIA (in)	WATER FOUND (ft)	Static Level (Ft.bgl)	Pumping Level (ft. bgl)	Test Rate (Igpm)	WELL USE	SCREEN top / Length	WELL ID	FORMATION (feet)
SAUGEEN TOWNSHIP LR 050	17 468214 4923424	1978/08 1737	5 5	FR 0141 FR 0156	50	82	3	DO		1404938 ()	SAND GRVL STNS 0006 BLUE CLAY GRVL STNS 0013 BLUE CLAY STNS SNDY 0045 SAND GRVL BLDR 0094 GREY HPAN STNS 0112 BRWN CLAY 0124 GREY HPAN STNS 0133 BRWN LMSN HARD DKCL 0135 BLUE LMSN 0137 BRWN LMSN SHLE LYRD 0141 GREY LMSN HARD DKCL 0156
SAUGEEN TOWNSHIP LR 048	17 468014 4922924	1978/10 1737	5 5	FR 0148 UK 0159	18	20	10	DO		1404959 ()	SAND FILL 0001 SAND 0003 GREY SAND 0006 SAND GRVL 0012 BLUE CLAY STNS 0038 BRWN CLAY 0055 GRVL CLAY 0074 QSND 0096 GREY HPAN STNS 0138 BLUE SHLE LMSN SOFT 0144 BRWN LMSN HARD 0160
SAUGEEN TOWNSHIP LR 047	17 467964 4922824	1979/12 1737	5	FR 0086	14	42	6	DO	0088 3	1405292 ()	CSND 0004 GREY SAND MARL CLAY 0007 BLUE CLAY STNS 0015 BLUE SAND GRVL CLAY 0042 GREY HPAN SNDY 0064 GREY HPAN STNS 0082 GRVL 0084 SAND GRVL 0090 FGVL 0091
SAUGEEN TOWNSHIP LR 046	17 468514 4922474	1981/07 4302	2	FR 0008	9	12	23	MN	0019 5	1406082 ()	BRWN CSND 0008 GREY MSND 0019 GREY SAND GRVL 0024 GREY CLAY SILT 0025
SAUGEEN TOWNSHIP LR 053	17 468880 4923717	1989/09 5507	5	SU 0425		425	25	DO		1407421 (25232)	CLAY SNDY 0016 CLAY BLDR 0141 BLUE SHLE ROCK LYRD 0425
SAUGEEN TOWNSHIP LR 054	17 469448 4923525	1990/01 1129	8	FR 0008	8	16	23	PS	0016 3	1407480 (54115)	BLCK LOAM 0001 BRWN SAND GRVL 0019 GREY CLAY SILT STNS 0020

TABLE A-1 SUMMARY OF WATER WELL RECORDS
Miramichi Bay Phase 4 Permit To Take Water Evaluation (Project 20007.00)

TOWNSHIP CON LOT	UTM (metres)	DATE & Driller	CASING DIA (in)	WATER FOUND (ft)	Static Level (Ft.bgl)	Pumping Level (ft. bgl)	Test Rate (Igpm)	WELL USE	SCREEN top / Length	WELL ID	FORMATION (feet)
SAUGEEN TOWNSHIP LR 055	17 469432 4923515	1990/01 1129	8	FR 0008	8	16	23	PS	0016 3	1407481 (54116)	BLCK LOAM 0001 BRWN SAND GRVL 0019 GREY CLAY SILT STNS 0020
SAUGEEN TOWNSHIP LR 051	17 468266 4923560	1990/10 1737	6 6	FR 0384		101	4	DO		1407721 (85519)	LOAM 0001 BRWN SAND STNS SOFT 0007 BRWN SAND CLAY STNS 0021 GREY CLAY STNS SOFT 0049 BRWN CLAY HARD 0091 GREY HPAN STNS HARD 0131 BLUE LMSN MGRD HARD 0197 BLUE LMSN DKCL HARD 0269 BRWN LMSN DKCL HARD 0305 BRWN LMSN MGRD HARD 0384
SAUGEEN TOWNSHIP LR 052	17 470278 4922798	1991/05 1737	6	FR 0032	8	11	20	DO	0029 3	1407876 (099603)	LOAM 0001 BRWN SAND GRVL SOFT 0006 GREY CLAY SILT SOFT 0017 GREY SAND SOFT 0032 GREY CLAY SILT SOFT 0044
SAUGEEN TOWNSHIP LR 052		1992/05 1737	6	FR 0016	4	8	15	CO	0014 3	1408151 (114852)	BRWN SAND SOFT 0016 GREY SAND SOFT 0025 GREY SAND SILT SOFT 0027
SAUGEEN TOWNSHIP LR 048	17 468925 4922412	1995/05 6634	6	FR 0165 UK 0172	16	70	5	DO		1408770 (146801)	LOAM 0002 CLAY STNS 0018 CLAY SNDY 0086 CLAY SNDY STNS 0143 LMSN 0172
SAUGEEN TOWNSHIP LR 057	17 469959 4923980	1999/06 5507	6	FR 0320 FR 0490	49	495	100	DO		1409470 (202548)	SAND 0012 CLAY SOFT 0105 HPAN STNS 0182 SHLE STNS 0234 LMSN 0495
SAUGEEN TOWNSHIP 054	17 469439 4923487	2002/11 1129								1410272 (54229) A	
SAUGEEN TOWNSHIP 055	17 469439 4923487	2002/11 1129								1410273 (54227) A	

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

4A/6W

Ontario

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

11

1403490

MUNICIP. 14015 CON. L.R

COUNTY OR DISTRICT [redacted]

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Sargeen

CON. BLOCK, TRACT, SURVEY, ETC. Plan 468 Work In East

LOT 051

DATE COMPLETED DAY 15 MO. 02 YR. 24

RC 4 ELEVATION 0605 RC 5 BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Gravel & Stones				0	10
Clay	Gravel & Stones			10	124
Blues	Shale Rock			124	150

OWRC V-5

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0143	1 ☒ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

OUTSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
[redacted] 05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE	188	0	0126
05	4 ☒ OPEN HOLE			0150

SCREEN

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

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD 1 ☐ PUMP 2 ☒ BAILER

PUMPING RATE 0014 GPM

DURATION OF PUMPING 02 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
010 FEET	060 FEET	1 ☒ PUMPING 2 ☐ RECOVERY	040 FEET	060 FEET	060 FEET	060 FEET

IF FLOWING, GIVE RATE [redacted] GPM

PUMP INTAKE SET AT 150 FEET

WATER AT END OF TEST 1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE ☐ SHALLOW ☒ DEEP

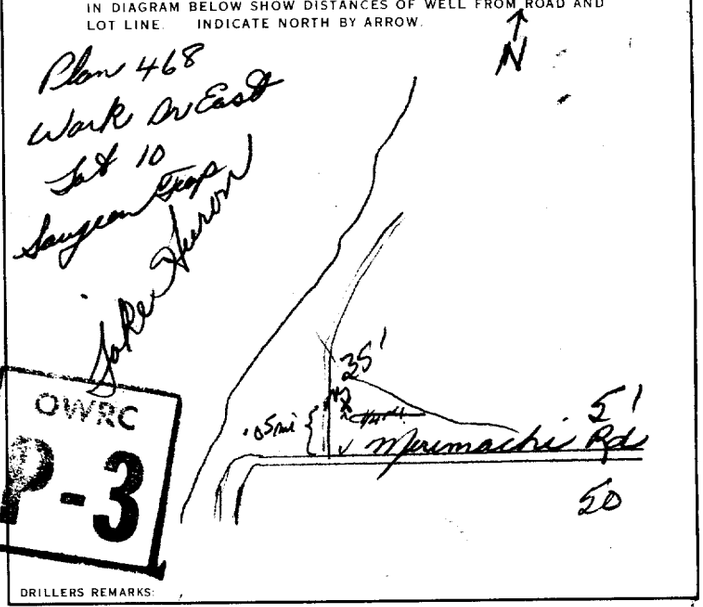
RECOMMENDED PUMP SETTING 090 FEET

RECOMMENDED PUMPING RATE 0005 GPM

50-53 0003

LOCATION OF WELL 6823

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



OWRC P-3

DRILLERS REMARKS:

FINAL STATUS OF WELL 54: 1

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

WATER USE 55-56: 01

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 57: 2

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 Wm Wright Well Drillers Ltd — LICENCE NUMBER 5507

ADDRESS Box 167 Hanmouth Ont

NAME OF DRILLER OR BORER — LICENCE NUMBER —

SIGNATURE OF CONTRACTOR William Wright — SUBMISSION DATE DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 5507 | DATE RECEIVED 280574

DATE OF INSPECTION July 30/75 | INSPECTOR

REMARKS: CSS.S8

P L W1

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 07-091

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

Ontario 140

41 A/6 W

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

(11) 1404665

MUNICIP 14015 CON. LR

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
BRUCE	SAUGEEN	L. RANGE	050

OWNER (SURNAME FIRST) [redacted] ADDRESS RR#2 PT ELGIN

DATE COMPLETED DAY 10 MO 11 YR 77

(21) UTM ZONE 17 EASTING 468150 NORTHING 4923200 RC 5 ELEVATION 0600 RC 5 BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	TOPSOIL			0	6"
BROWN	GRAVEL			6"	5'
BLUE	CLAY	STONES		5	30
		LARGE STONE IN BOTTOM			

(31) 0001602 0005611 0030305 12

32

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0005 (10-13)	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (14)
0015 (15-18)	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (19)
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (24)
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☒ SULPHUR 4 ☒ MINERAL (29)
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (34-40)

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
36 (10-11)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☒ CONCRETE 4 ☐ OPEN HOLE (12)	3	0	0030 (13-16)
30 (17-18)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE (19)	16	20	0030 (20-23)
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE (26)			27-30

SCREEN

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

MATERIAL AND TYPE: GRAVEL PACK

DEPTH TO TOP OF SCREEN (41-44) FEET (80)

(61) PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33 (80)	

(71) PUMPING TEST

PUMPING TEST METHOD (10)	PUMPING RATE (11-14) GPM	DURATION OF PUMPING (15-16) HOURS (17-18) MINS
1 ☐ PUMP 2 ☐ BAILER		

STATIC LEVEL	WATER LEVEL END OF PUMPING	(25) WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY			
		15 MINUTES (26-28) FEET	30 MINUTES (29-31) FEET	45 MINUTES (32-34) FEET	60 MINUTES (35-37) FEET
015 (19-21) FEET	(22-24) FEET				

IF FLOWING, GIVE RATE (38-41) GPM	PUMP INTAKE SET AT FEET	WATER AT END OF TEST (42) 1 ☐ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE ☐ SHALLOW ☐ DEEP	RECOMMENDED PUMP SETTING 028 (43-45) FEET	RECOMMENDED PUMPING RATE ~~4000~~ (46-49) GPM

(50-53) ——— GPM./FT. SPECIFIC CAPACITY

(54) FINAL STATUS OF WELL: 5

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

(55-56) WATER USE: 01

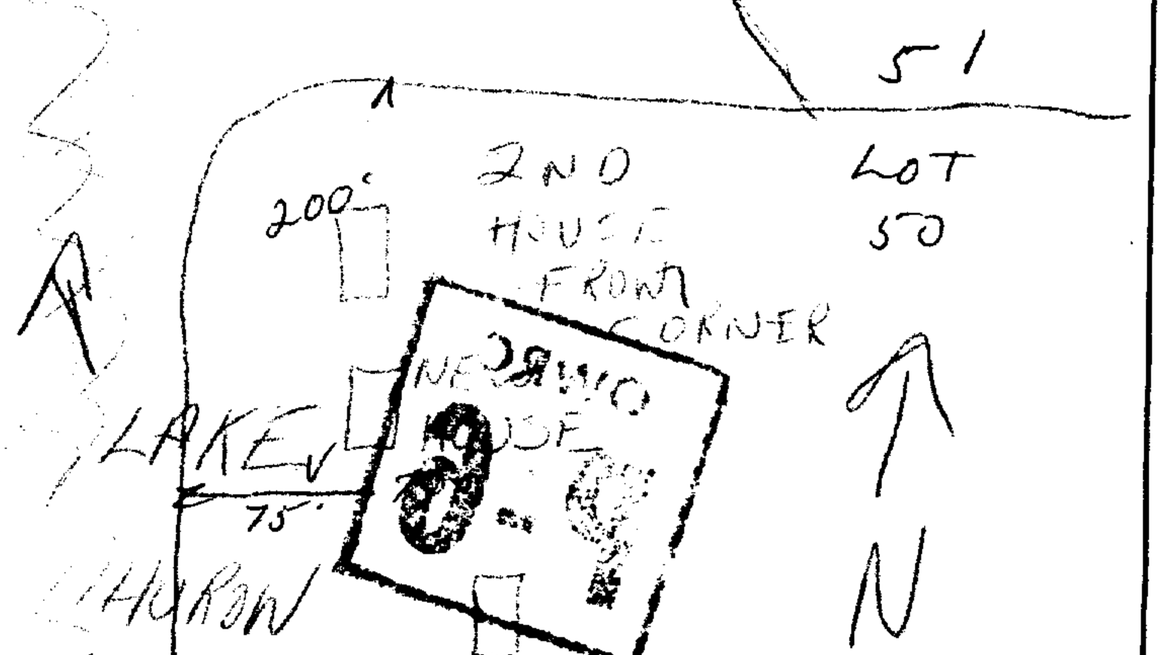
1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

(57) METHOD OF DRILLING: 6

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

LOCATION OF WELL

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



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: Johnson Water Well Boring — LICENCE NUMBER: 3030

ADDRESS: RR#1 Mt Pleasant

NAME OF DRILLER OR BORER: [illegible] — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: [signature] — SUBMISSION DATE: DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE (58): 1 — CONTRACTOR (59-62): 3030 — DATE RECEIVED (63-68): 240178 (80)

DATE OF INSPECTION: 19,11,78 — INSPECTOR:

REMARKS: N.H. CSS.S8 — P 2 — WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

41 A/6 W

Ministry of the Environment

Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 1404938 MUNICIP 14015 CON. LR

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Bruce	Saugeen Twp.	Con.L.R. (Plan 518-PT 2)	PT 50

[redacted]. # 2, Port Elgin, Ontario.

DATE COMPLETED: DAY 22 MO 08 YR 78

23200 RC 5 ELEVATION 0600 RC 5 BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Sand	Gravel, stones		0	6
Blue	Clay	Gravel, stones		6	13
Blue	Clay	Stones	Sandy	13	45
	Sand	Gravel, boulders	Coarse	45	94
Grey	Hardpan	Stones		94	112
Brown	Clay			112	124
Grey	Hardpan	Stones		124	133
Dk.Br..	Limestone		Hard	133	135
Blue	Limestone		Medium	135	137
Brown	Limestone	Blue shale streaks	Soft	137	141
Dk.Grey	Limestone		Hard	141	156

31 0006 281112 0013305 1112 0045305 1281 0094 28 1113 0112 21 412 0124605

32 0133 21412 0135615 7365 0137315 0141615 1774 0156215 7365

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0141 ~~156~~	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
0156	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
05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0134 ~~133-10~~
05	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		133-10	0156
	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

METHOD	PUMPING RATE GPM	DURATION OF PUMPING HOURS	MINS
1 ☒ PUMP 2 ☐ BAILER	0003	02	00

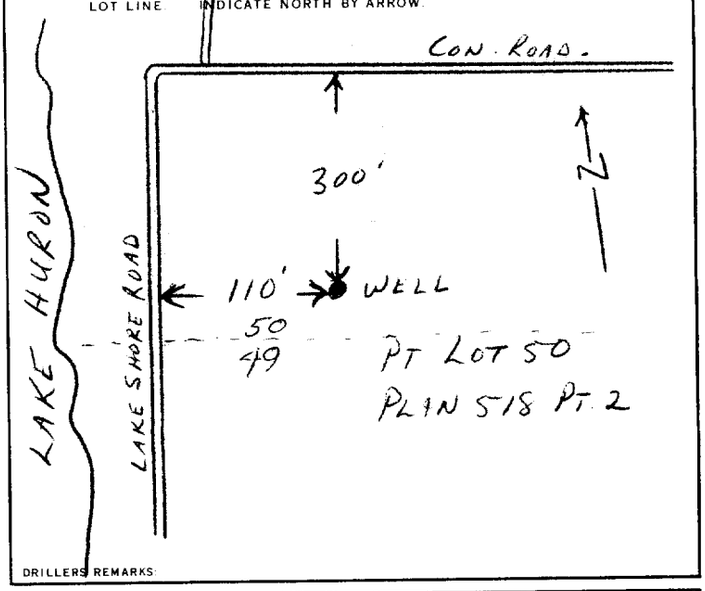
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
050 FEET	082 FEET	1 ☒ PUMPING 2 ☐ RECOVERY	075 FEET	078 FEET	080 FEET	081 FEET

IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	156 FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	100 FEET	0003 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 54: 1

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

WATER USE 55-56: 01

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 57: 2

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: Davidson Well Drilling Limited — LICENCE NUMBER: 1737

ADDRESS: Box 486, Wingham, Ontario.

NAME OF DRILLER OR BORER: E. Thompson — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: [signature] — SUBMISSION DATE: DAY 25 MO Aug. YR 78

OFFICE USE ONLY

DATA SOURCE 58: 1 — CONTRACTOR 59-62: 1737 — DATE RECEIVED 63-68: 08 11 78

DATE OF INSPECTION: 29,8,79 — INSPECTOR:

REMARKS: CSS.S8

P L

WI L

FORM NO. 0506-4-77

MINISTRY OF THE ENVIRONMENT COPY

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

4/A/6

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

(11) 1406082 MUNICIP 14015 CON. LR

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC	LOT
Bruce County	Township of Saugeen	Lake Range	046 46

OWNER (SURNAME FIRST): Biener Enterprises ~~Ltd.~~
ADDRESS: P.O. Box 399, Port Elgin, Ontario
DATE COMPLETED: DAY 02 MO 07 YR 81

(21) UTM ZONE 17 EASTING 468500 NORTHING 4922250 RC 5 ELEVATION 0625 RC 5 BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Sand		Medium to Coarse	0	8
Grey	Sand		Medium	8	19
Grey/Brn.	Sand & Gravel			19	24
Grey	Clay	Silt		24	25
	NOTE:	There were a total of four	(4) wells drilled at		
		a spacing of approximately	30 feet. This Water		
		Well Record shall apply to	all 4 wells.		

(31) 000860 0019209 0024228 0025205 96
(32)

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0008	1 ☒ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
02	1 ☒ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE		0	0019
	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE			
	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.): 018
DIAMETER: 02000 INCHES
LENGTH: 05 FEET
MATERIAL AND TYPE: #18 Slot Stainless Steel
DEPTH TO TOP OF SCREEN: 0019 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

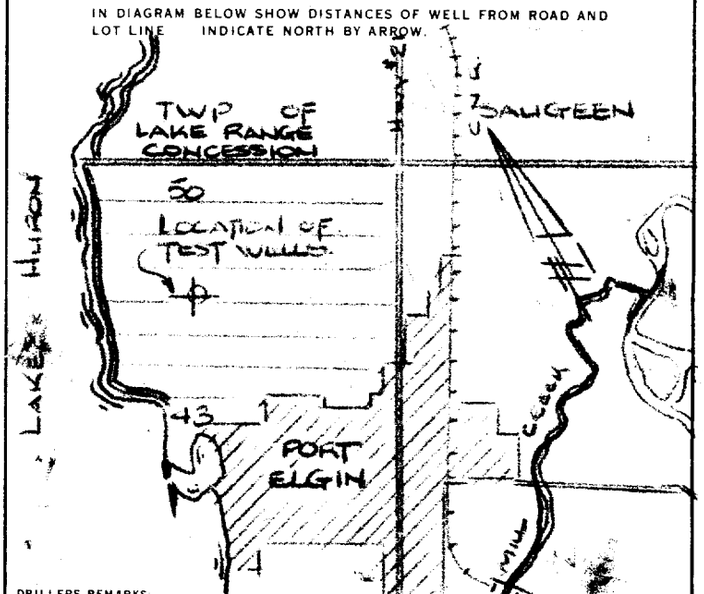
PUMPING TEST METHOD: ☒ 1 PUMP ☐ 2 BAILER
PUMPING RATE: 0023 GPM
DURATION OF PUMPING: 72 HOURS 00 MINS
STATIC LEVEL: 009 FEET
WATER LEVEL END OF PUMPING: 012 FEET
WATER LEVELS DURING: ☐ 1 PUMPING ☐ 2 RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
FEET	FEET	FEET	FEET

IF FLOWING GIVE RATE: N/A GPM
PUMP INTAKE SET AT: N/A FEET
WATER AT END OF TEST: ☒ 1 CLEAR ☐ 2 CLOUDY
RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: DIRECT N/A FEET
RECOMMENDED PUMPING RATE: 0023 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 (54): 1

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

WATER USE (55-56): 06

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

METHOD OF DRILLING (57): 6

1 ☐ CABLE TOOL; 2 ☐ ROTARY (CONVENTIONAL); 5 ☐ ROTARY (REVERSE); 4 ☐ ROTARY (AIR); 5 ☐ AIR PERCUSSION; ☒ BORING Hollow Stem; 7 ☐ DIAMOND; 8 ☐ JETTING; 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: PVK AND SONS DRILLING — LICENCE NUMBER: 4302.
ADDRESS: R.R.4 BRANTFORD
NAME OF DRILLER OR BORER: PETER VAN KRUISTUM — LICENCE NUMBER: 4302
SIGNATURE OF CONTRACTOR: P. Van Kruistum
SUBMISSION DATE: DAY ____ MO ____ YR ____

OFFICE USE ONLY

DATA SOURCE (58): 1
CONTRACTOR (59-62): 4302
DATE RECEIVED (63-68): 020484
DATE OF INSPECTION: 10/3/84
INSPECTOR
REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 1407421 — MUNICIP 14015 — CON. LR

COUNTY OR DISTRICT: [redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Sayeen
CON., BLOCK, TRACT, SURVEY, ETC.: Lake Range
LOT: 53
DATE COMPLETED: DAY — MO 9 YR 89
[redacted] Muramichi Bay
BASIN COND. NOH 200

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Sandy Clay			0	16
	Clay & Boulders			16	141
Blue	Shale Rock w/ Layers			141	425

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
390	1 ☐ FRESH 2 ☐ SALTY 3 ☑ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
425	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
5 7/16	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	0	145
			145	425
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

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

MATERIAL AND TYPE: — DEPTH TO TOP OF SCREEN FEET: —

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

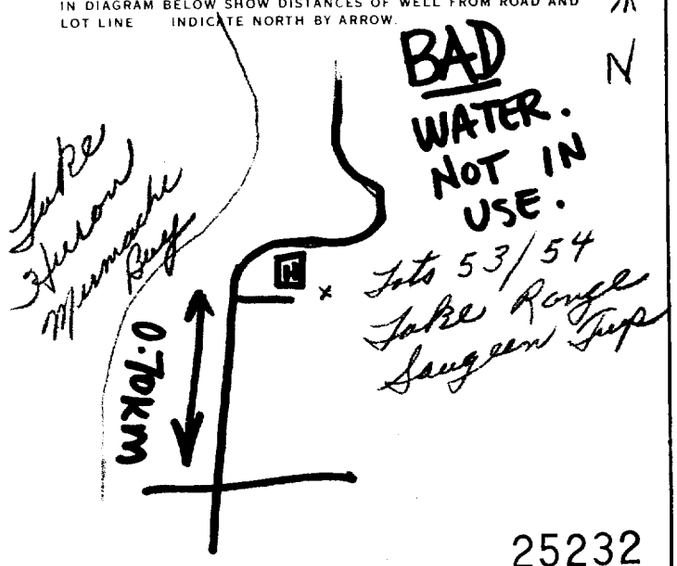
PUMPING TEST METHOD: 1 ☑ PUMP 2 ☐ BAILER
PUMPING RATE: 25 + GPM
DURATION OF PUMPING: 2 HOURS — MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☑ RECOVERY			
Flows FEET	425 FEET	15 MINUTES: Flowing FEET	30 MINUTES: FEET	45 MINUTES: FEET	60 MINUTES: FEET

IF FLOWING, GIVE RATE: 8 GPM
PUMP INTAKE SET AT: Rods 425 FEET
WATER AT END OF TEST: 1 ☑ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP
RECOMMENDED PUMP SETTING: 150 FEET
RECOMMENDED PUMPING RATE: 5 + GPM

LOCATION OF WELL

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



25232

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 9 ☐ DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Wm Wright Well Drillers Ltd — WELL CONTRACTOR'S LICENCE NUMBER: 5507
ADDRESS: Box 167 Hepworth Ont
NAME OF WELL TECHNICIAN: Wm Wright — WELL TECHNICIAN'S LICENCE NUMBER: T-0221
SIGNATURE OF TECHNICIAN/CONTRACTOR: William Wright — SUBMISSION DATE: DAY — MO — YR —

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR 5507 — DATE RECEIVED FEB 21 1990
DATE OF INSPECTION — INSPECTOR
REMARKS

CSS.S8

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 1407480 — MUNICIP. 14015 — CON. LR

COUNTY OR DISTRICT: BRUCE
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: SAUGEEN
CON. BLOCK, TRACT, SURVEY, ETC.:
LOT: 54

[redacted]
BOX 1840 PORT ELGIN ONT. N0H 2C0

DATE COMPLETED: DAY [redacted]15 MO [redacted]8 YR. 90

[redacted]23301 — RC — ELEVATION: 625 — RC — BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BLACK	TOPSOIL			0	1.5
BROWN	SAND	GRAVEL		1.5	19
GREY	CLAY	CLAY SILT W/STONES.		19	

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
8	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
8 11	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☒ PLASTIC	.188	+1	16
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
.18	8 INCHES	3 FEET

MATERIAL AND TYPE: STAINLESS STEEL
DEPTH TO TOP OF SCREEN: 16 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
0	3	CEMENT GROUT

71 PUMPING TEST

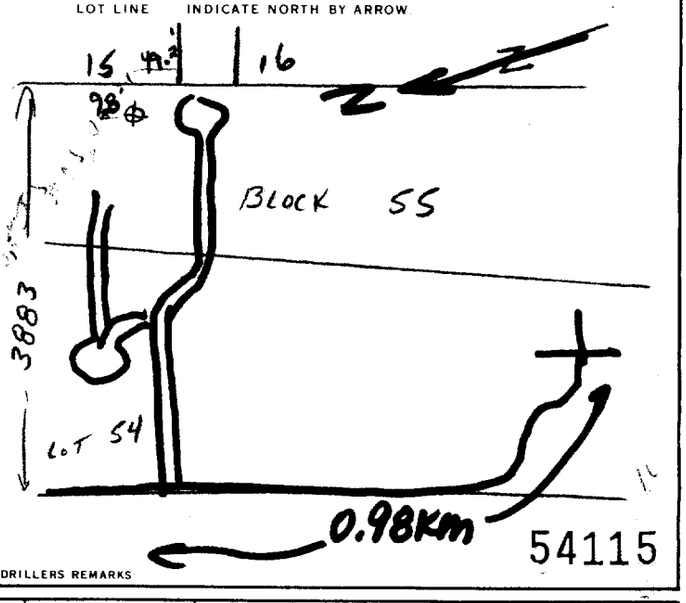
PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 23 GPM
DURATION OF PUMPING: 2 HOURS ___ MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
8 FEET	16 FEET		FEET	FEET	FEET	16 FEET

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

LOCATION OF WELL

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



DRILLERS REMARKS:

FINAL STATUS OF WELL

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

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: ALL-TERRAIN DRILLING LIMITED
WELL CONTRACTOR'S LICENCE NUMBER: 1129
ADDRESS: 3-661 COLBY DR. WATERLOO ONT. N2V1C2
NAME OF WELL TECHNICIAN: MIKE POLLICE
WELL TECHNICIAN'S LICENCE NUMBER: T-0268
SIGNATURE OF TECHNICIAN/CONTRACTOR:
SUBMISSION DATE: DAY 30 MO. 04 YR. 90

OFFICE USE ONLY

DATA SOURCE:
CONTRACTOR: 1129
DATE RECEIVED: MAY 18 1990
DATE OF INSPECTION:
INSPECTOR:
REMARKS: A-P-L

CSS.S8

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 | 1407481 | MUNICIP 14015 | CON. LR | LOT 55

COUNTY OR DISTRICT | TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE | CON | BLOCK, TRACT, SURVEY, ETC | LOT

[redacted] BOX 1840 PORT ELGIN ONT.

DATE COMPLETED: DAY 15 MO 01 YR 90

RC. 2329.1 | ELEVATION 625 | RC. | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BLACK	TOPSOIL			0	1.5
BROWN	SAND	GRAVEL		1.5	19
GREY	CLAY	CLAY SILT W/STONES		19	

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
8	1 ☑ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
8"	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+1	16
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
.18	8 INCHES	3 FEET

MATERIAL AND TYPE: STAINLESS STEEL | DEPTH TO TOP OF SCREEN: 16 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
0	5	CEMENT GROUT
5	6.5	BENTONITE CLAY

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☑ PUMP 2 ☐ BAILER | PUMPING RATE: 23 GPM | DURATION OF PUMPING: 2 HOURS ___ MINS

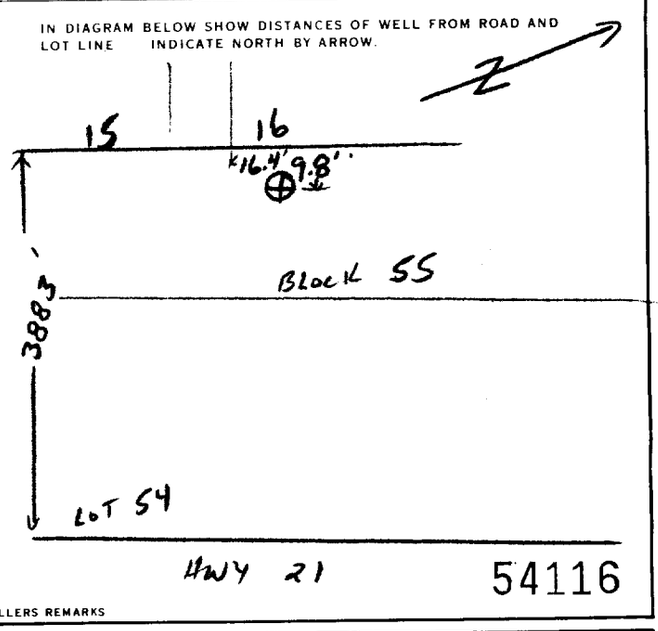
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☑ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
8 FEET	16 FEET		FEET	FEET	FEET	16 FEET

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

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

LOCATION OF WELL

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



54116

DRILLERS REMARKS

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

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

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

CONTRACTOR

NAME OF WELL CONTRACTOR: ALL-TERRAIN DRILLING LIMITED | WELL CONTRACTOR'S LICENCE NUMBER: 1129

ADDRESS: 3-661 COLBY DR WATERLOO

NAME OF WELL TECHNICIAN: MIKE POLLICE | WELL TECHNICIAN'S LICENCE NUMBER: T0268

SIGNATURE OF TECHNICIAN/CONTRACTOR | SUBMISSION DATE: DAY 30 MO 04 YR 90

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 1129 | DATE RECEIVED MAY 18 1990

DATE OF INSPECTION | INSPECTOR

REMARKS: APL

CSS.88

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 1407721 — MUNICIP 14015 — CON. LR

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC	LOT 25-27
[redacted]	[illegible] Twp.	Con. L.R.	Pt.51

[redacted] R. 1, Port Elgin, Ontario. N0H 2C0

DATE COMPLETED 48-53: DAY 23 MO Oct. YR 90.

NG 23336 — RC — ELEVATION 605 — RC — BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Topsoil			0	1
Brown	Sand	Stones	Soft	1	7
Brown	Sand	Clay, stones	Hard	7	21
Grey	Clay	Stones	Soft	21	49
Brown	Clay		Hard	49	91
Grey	Hardpan	Stones	Hard	91	131
Blue	Limestone		Med. hard	131	197
Dk.Blue	Limestone		Hard	197	269
Dk.Brn.	Limestone		Hard	269	305
Lt.Brown	Limestone		Med. hard	305	384

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
384	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	132-6
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		132-6	384
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

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

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

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

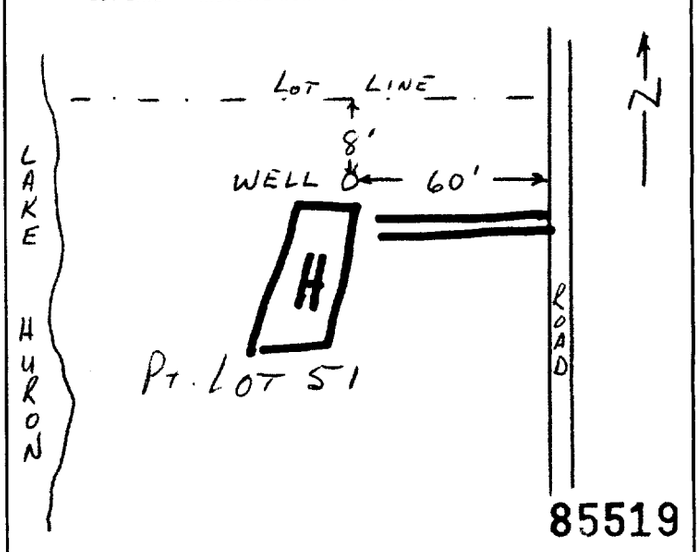
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
Flowing FEET	101 FEET	41 FEET	69 FEET	87 FEET	101 FEET

IF FLOWING, GIVE RATE: ___ GPM — PUMP INTAKE SET AT: 130 FEET — WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP — RECOMMENDED PUMP SETTING: 130 FEET — RECOMMENDED PUMPING RATE: 4 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

FINAL STATUS OF WELL

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

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Davidson Well Drilling Limited — WELL CONTRACTOR'S LICENCE NUMBER: 1737

ADDRESS: Box 486, Wingham, Ontario. N0G 2W0

NAME OF WELL TECHNICIAN: G. Wright — WELL TECHNICIAN'S LICENCE NUMBER: T0166

SIGNATURE OF TECHNICIAN/CONTRACTOR: [signature] — SUBMISSION DATE: DAY 9 MO Nov. YR 90.

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR 1737 — DATE RECEIVED NOV 21 1990

DATE OF INSPECTION — INSPECTOR

REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 1407876 MUNICIP 14015 CON. LR

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT
Bruce	Saugeen Twp.	L.R.	52

[redacted] Archibald Place, Southampton, ON

DATE COMPLETED: DAY 9 MO May YR 91

22574 RC EI 665 RC BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

470263 4922574 665

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Topsoil			0	1
Brown	Sand	Gravel	Soft	1	6
Grey	Clay	Silt	Soft	6	17
Grey	Sand		Soft	17	32
Grey	Clay	Silt	Soft	32	44

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
17-32	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☒ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+2	28
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
#18 slot	5.75 INCHES	3 FEET

MATERIAL AND TYPE: Stainless Steel Telescope

DEPTH TO TOP OF SCREEN: 29 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
32	44	Sand

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER

PUMPING RATE: 20 GPM

DURATION OF PUMPING: 2 HOURS ___ MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING
8 FEET	11 FEET

WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
9 FEET	8 FEET	8 FEET	8 FEET

IF FLOWING, GIVE RATE: ___ GPM

PUMP INTAKE SET AT: 26 FEET

WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

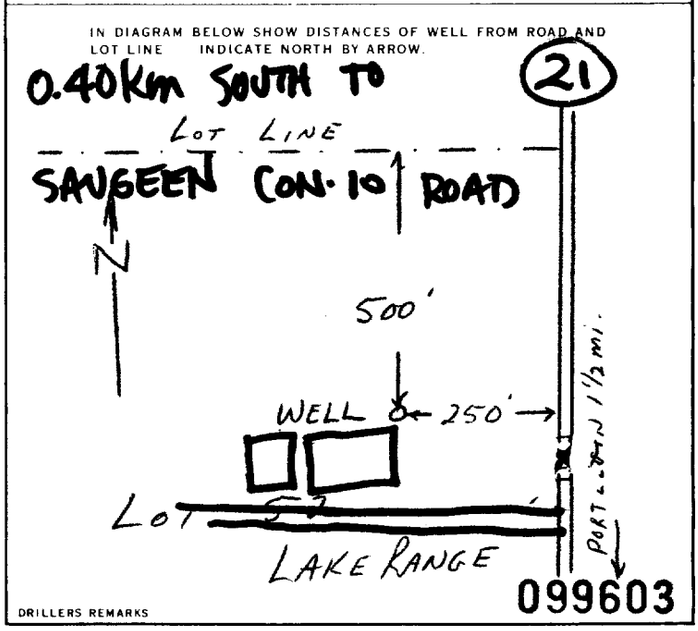
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP

RECOMMENDED PUMP SETTING: 20 FEET

RECOMMENDED PUMPING RATE: 10 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

099603

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Davidson Well Drilling Limited

WELL CONTRACTOR'S LICENCE NUMBER: 1737

ADDRESS: Box 486, Wingham, Ontario. N0G 2W0

NAME OF WELL TECHNICIAN: G. Reavie

WELL TECHNICIAN'S LICENCE NUMBER: T0156

SIGNATURE OF TECHNICIAN/CONTRACTOR

SUBMISSION DATE: DAY 23 MO. May YR. 91.

OFFICE USE ONLY

DATA SOURCE

CONTRACTOR 1737

DATE RECEIVED JUL 08 1991

DATE OF INSPECTION

INSPECTOR

REMARKS

CSS 88

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

~~WATER WELL~~ RECORD

ABANDONMENT

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

11 | 1410272 | MUNICIP. 14015 | ORIGINAL RECORD # 54115 | CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
BRUCE	SAUGEEN		54

[redacted] . Box 1840 Port Elgin Ont N0H2C0 — DATE COMPLETED 48-53: DAY 13 MO 11 YR 02

21 | M 10 | 12 | 17 | 18 | 24 | RC. 25 | ELEVATION 26 | RC. 30 | BASIN CODE 31 | II | III | IV | 47

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
	WELL WAS PULLED OUT WITH BACKHOE				
	HOLE WAS BACKFILLED WITH NATIVE SAND				
	& BENSEAL MIX TO SURFACE				

31
32
10 | 14 15 | 21 | 32 | 43 | 54 | 65 | 75 | 80

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (14)
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (19)
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (24)
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (29)
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (34) (80)

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
10-11	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (12)			13-16
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (19)			20-23
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (26)			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	10

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13: 19	14-17: 0	BACKFILLED W/NATIVE
18-21	22-25	SAND & BENSEAL
26-29	30-33	80

71 PUMPING TEST

PUMPING TEST METHOD 10	PUMPING RATE 11-14	DURATION OF PUMPING
1 ☐ PUMP 2 ☐ BAILER	GPM	15-16 HOURS 17-18 MINS

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

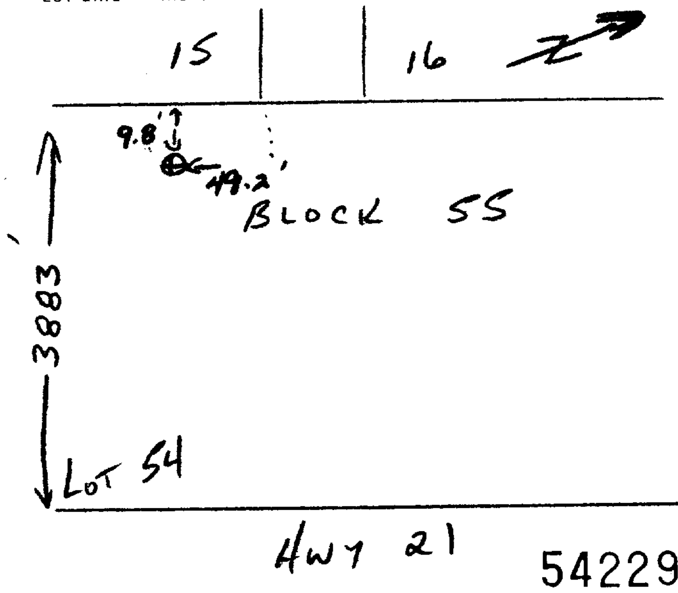
IF FLOWING, GIVE RATE 38-41	PUMP INTAKE SET AT	WATER AT END OF TEST 42
GPM	FEET	1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING 43-45	RECOMMENDED PUMPING RATE 46-49
☐ SHALLOW ☐ DEEP	FEET	GPM

50-53

LOCATION OF WELL

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



54229

DRILLERS REMARKS

FINAL STATUS OF WELL (54)

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

WATER USE (55-56)

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

METHOD OF CONSTRUCTION (57)

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

CONTRACTOR

NAME OF WELL CONTRACTOR: ALL-TERRAIN DRILLING LIMITED
WELL CONTRACTOR'S LICENCE NUMBER: 1129
ADDRESS: 3-661 COLBY DR WATERLOO ONT N2V 1C2
NAME OF WELL TECHNICIAN: MIKE POLLICE
WELL TECHNICIAN'S LICENCE NUMBER: 268
SIGNATURE OF TECHNICIAN/CONTRACTOR
SUBMISSION DATE: DAY 07 MO 12 YR 02

OFFICE USE ONLY

DATA SOURCE 58 | CONTRACTOR 59-62: 1129 | DATE RECEIVED 63-68: JAN 16 2003 | 80
DATE OF INSPECTION | INSPECTOR
REMARKS

CSS.ES3

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

~~WATER WELL~~ RECORD

ABANDONMENT 14015 ORIGINAL # 54NK

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

1 2 7 410273

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
BRUCE	SAUGEEN			55

[redacted] BOX 1840 PORT ELGIN ONT.

DATE COMPLETED 48-53: DAY 13 MO 11 YR 02

21 | M 10 | 12 | 17 | 18 | 24 | RC 25 | ELEVATION 26 | RC 30 | BASIN CODE 31 | II | III | IV | 47

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
			WELL WAS PULLED OUT WITH BACKHOE		
			HOLE WAS BACKFILLED WITH NATIVE SAND &		
			BENSEAL MIX TO SURFACE.		

31
32 | 10 | 14 15 | 21 | 32 | 43 | 54 | 65 | 75 | 80

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER	
10-13	1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (14)
15-18	1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (19)
20-23	1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (24)
25-28	1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (29)
30-33	1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (34) 80

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
10-11	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (12)			13-16
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (19)			20-23
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (26)			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	50

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
19 (10-13)	0 (14-17)	BACKFILLED W/NATIVE
(18-21)	(22-25)	SAND & BENSEAL
(26-29)	(30-33) 80	

71 PUMPING TEST

PUMPING TEST METHOD (10)	PUMPING RATE (11-14)	DURATION OF PUMPING (15-16 HOURS, 17-18 MINS)
1 ☐ PUMP 2 ☐ BAILER	GPM	

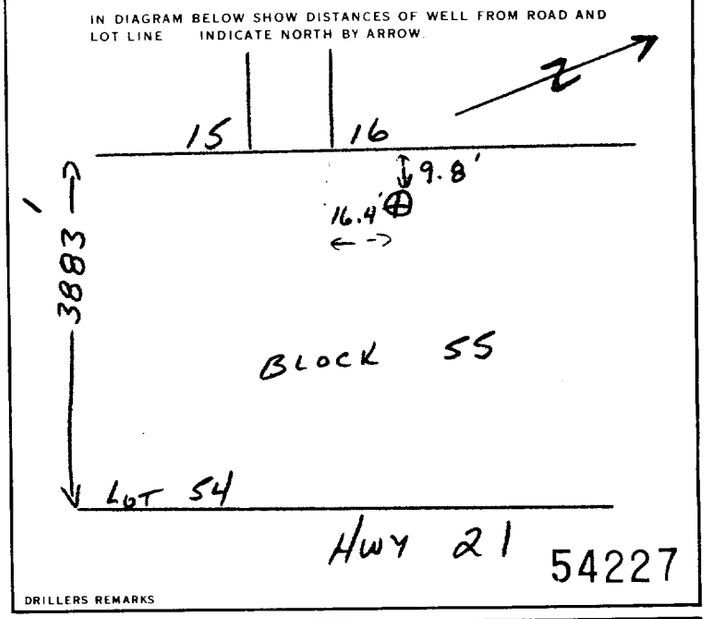
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING (25) 1 ☐ PUMPING 2 ☐ RECOVERY			
19-21 FEET	22-24 FEET	15 MINUTES 26-28 FEET	30 MINUTES 29-31 FEET	45 MINUTES 32-34 FEET	60 MINUTES 35-37 FEET

IF FLOWING GIVE RATE (38-41) GPM	PUMP INTAKE SET AT FEET	WATER AT END OF TEST (42) 1 ☐ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE ☐ SHALLOW ☐ DEEP	RECOMMENDED PUMP SETTING (43-45) FEET	RECOMMENDED PUMPING RATE (46-49) GPM

50-53

LOCATION OF WELL

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



54227

DRILLERS REMARKS

FINAL STATUS OF WELL (54)

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

WATER USE (55-56)

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

METHOD OF CONSTRUCTION (57)

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

CONTRACTOR

NAME OF WELL CONTRACTOR: ALL-TERRAIN DRILLING LIMITED
WELL CONTRACTOR'S LICENCE NUMBER: 1129
ADDRESS: 3-661 COLBY DR. WATERLOO ONT. N2V 1C2
NAME OF WELL TECHNICIAN: MIKE POLLICE
WELL TECHNICIAN'S LICENCE NUMBER: 268
SIGNATURE OF TECHNICIAN/CONTRACTOR
SUBMISSION DATE: DAY 07 MO 12 YR 02

OFFICE USE ONLY

DATA SOURCE (58) | CONTRACTOR (59-62): 1129 | DATE RECEIVED (63-68): JAN 16 2003 | 80
DATE OF INSPECTION | INSPECTOR
REMARKS

CSS.ES3

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario Ministry of the Environment

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

A 054677 A 054677

Master Well Record for Cluster Well Construction

[redacted] *rio Water Resources Act*

Master Well Owner's and Land Owner's Information

First Name	Last Name	E-mail Address
REID'S HERITAGE GROUP		

Mailing Address (Street Number/Name, RR)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
6783 WELLINGTON Rd. 34	CAMBRIDGE	ONT.	N3C2V4	5196566666

Location and Construction of the Master Well in the Cluster

Address of Well Location (Street Number/Name, RR)	Township	Lot	Concession
	SAUGEEN	46,47 49,49,50	LAKE RANGE

County/District/Municipality	City/Town/Village	Province	Postal Code
BRUCE	TOWN of SAUGEEN SHORES	Ontario	

UTM Coordinates	Zone	Easting	Northing	GPS Unit Make	Model	Mode of Operation
NAD 83	17	467788	4920025			☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify

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

General Colour	Most Common Material	Other Materials	General Description	Depth (*Metres*) From	To
Brown	SILT			0	0.5
Brown	SAND	gravel		0.5	1.9
Brown	SAND	SILT		1.9	4.6

Hole Details

Depth (*Metres*) From	To	Diameter (*Centimetres*)
0	4.6	15

Water Use

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

Method of Construction

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

Status of Well

☑ Test Hole ☐ Abandoned, Insufficient Supply
☐ Replacement Well ☐ Abandoned, Poor Water Quality
☐ Dewatering Well ☐ Other, *specify*
☐ Alteration (Construction) ☐ Abandoned, other, *specify*

No Casing and Screen Used

Open Hole ☐ Yes ☐ No

Static Water Level Test

Metres

Screen

☐ Galvanized ☐ Steel ☐ Fibreglass ☐ Concrete ☑ Plastic

Outside Diameter (*Centimetres*)	Slot No.
2.7	

Construction Details

Inside Diameter (*Centimetres*)	Material (*steel, plastic, fibreglass, concrete, galvanized*)	Wall Thickness	Depth (*Metres*) From	To
1.9	PLASTIC	0.4	0	4.6

Water Details

Water found at Depth	Kind of Water
1.2 Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals
Water found at Depth	Kind of Water
Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals
Water found at Depth	Kind of Water
Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals

Annular Space/Abandonment Sealing Record

Depth Set at (*Metres*) From	To	Type of Sealant Used (*Material and Type*)	Volume Used (*Cubic Metres*)
0	1.6	Bentonite	
1.6	4.6	SAND	

Disinfected ☐ Yes ☐ No If no, provide reason:

Date Master Well Completed *(yyyy/mm/dd)*

Cluster Information *(Please also fill out the additional Cluster Well Information for Well Construction for each parcel of land and cluster.)*

Total Wells in Cluster	Please indicate Number of Cluster Well Information Log Sheets Submitted
14	2
Total Wells on this Property: 14	

Location of Well Cluster

Detailed Map must be provided as an attachment no larger than legal size (8.5" x 14"). Sketches are not allowed.

☑ Check box to confirm detailed map is provided as per Section 11.1 (3)

Consent to release additional information concerning the cluster to the Director upon request

Signature of Technician/Contractor

Date *(yyyy/mm/dd)* 2007/10/03

Master Well Owner's/Land Owner's consent to use Cluster Form

[redacted]

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
GEO-ENVIRONMENTAL Drilling	6107

Business Address (Street No./Name, number, RR)	Municipality
340 MARKET Dr.	HALTON

Province	Postal Code	Business E-mail Address
ONT.	L9T5A4	

Bus.Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
9058763382	GAMMIE Doug

Well Technician's Licence No.	Signature of Technician	Date Submitted *(yyyy/mm/dd)*
3104		2007/10/03

Ministry Use Only

Audit No.	Well Contractor No.
M 00611	
Date Received *(yyyy/mm/dd)* DEC 10 2007	Date of Inspection *(yyyy/mm/dd)*
Remarks C00713/C00712	

*11/2006)

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Ontario

Ministry of the Environment

Well Tag No. for Master Well *(Print Well Tag No.)* A054677

Cluster Well Information for Cluster Well Construction

Regulation 903 Ontario Water Resources Act

Property Owner's Information

First Name	Last Name	Mailing Address (Street No./Name, RR)	Municipality
REID'S HERITAGE GROUP		6783 WELLINGTON Rd 34	CAMBRIDGE

Province	Postal Code	E-mail Address	Telephone No. (inc. area code)
ONT.	N3C2V4		5196586656

[redacted]

upon request

Signature of Technician/Contractor

Date (yyyy/mm/dd) 2007/10/03

Cluster Well Information

Address of Well Location (Street Number/Name, RR)	Lot	Concession	Township	County/District/Municipality
	46,47 48,49,50	LAKE ROAD	SAUGEEN	BRUCE

City/Town/Village	Province	Postal Code	GPS Unit Make	Model	Unit Mode of Operation
TOWN OF SAUGEEN SHORES	Ontario				☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify:

Well # on Sketch	UTM Coordinates Zone	Easting	Northing	Full Depth of Hole (metres)	Hole Diameter (cm)	Method of Construction	Casing Material	Casing Length (metres)	Screen Interval (metres) From	To	Annular Space Sealant Used	Static Water Level (metres)	Abandonment Sealant Used	Comments	Date of Completion (yyyy/mm/dd)
201	17	468349	4923339	4.6	15	Boring	Plastic	2.2	4.6	1.6	Bentonite	2.0			
203	17	468117	4922964	1.6	15	Boring	Plastic	1.2	1.6	0.6	Bentonite	0.10			DEC 10 2007
204	17	467992	4922860	4.6	15	BORING	Plastic	2.2	4.6	1.6	Bentonite	0.6			
205	17	467877	4922636	2.1	15	Boring	Plastic	1.5	2.1	0.9	Bentonite	0.3			
206	17	467833	4922470	5.0	15	Boring	Plastic	3.8	5.0	3.2	Bentonite	0.4			
207	17	467711	4922273	5.0	15	Boring	Plastic	3.8	5.0	3.2	Bentonite	1.3			
208	17	467892	4921990	4.6	15	Boring	Plastic	3.4	4.6	2.8	Bentonite	0.6			
210	17	467989	4922061	4.6	15	Boring	Plastic	3.4	4.6	2.8	Bentonite	0.6			
211	17	468093	4922092	4.6	15	Boring	Plastic	3.4	4.6	2.8	Bentonite	0.6			
212	17	467865	4922241	4.6	15	Boring	Plastic	2.1	3.0	1.5	Bentonite	0.8			

Well Contractor and Well Technician Information

Business Name of Well Contractor	Business Address (Street Number/Name, RR)	Municipality	Province
GEO-ENVIRONMENTAL DRILLING	340 MORROW Dr.	HALTON	ONT

Postal Code	Business Telephone No. (inc. area code)	Well Contractor's Licence No.	Business E-mail Address
L9T5A4	9058763328	6607	

Name of Well Technician (First Name, Last Name)	Well Technician's Licence No.	Date Submitted (yyyy/mm/dd)	Signature of Technician
Tony GAMMIE	3109	2007/10/08	

Date 1st Well in Cluster Constructed (yyyy/mm/dd)	Date Last Well in Cluster Constructed (yyyy/mm/dd)
2007/10/02	2007/10/03

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Date Received (yyyy/mm/dd)	Date Inspected (yyyy/mm/dd)
DEC 10 2007	C00712
Audit No. C 00713	**Remarks** M00611

1991 (11/2006)

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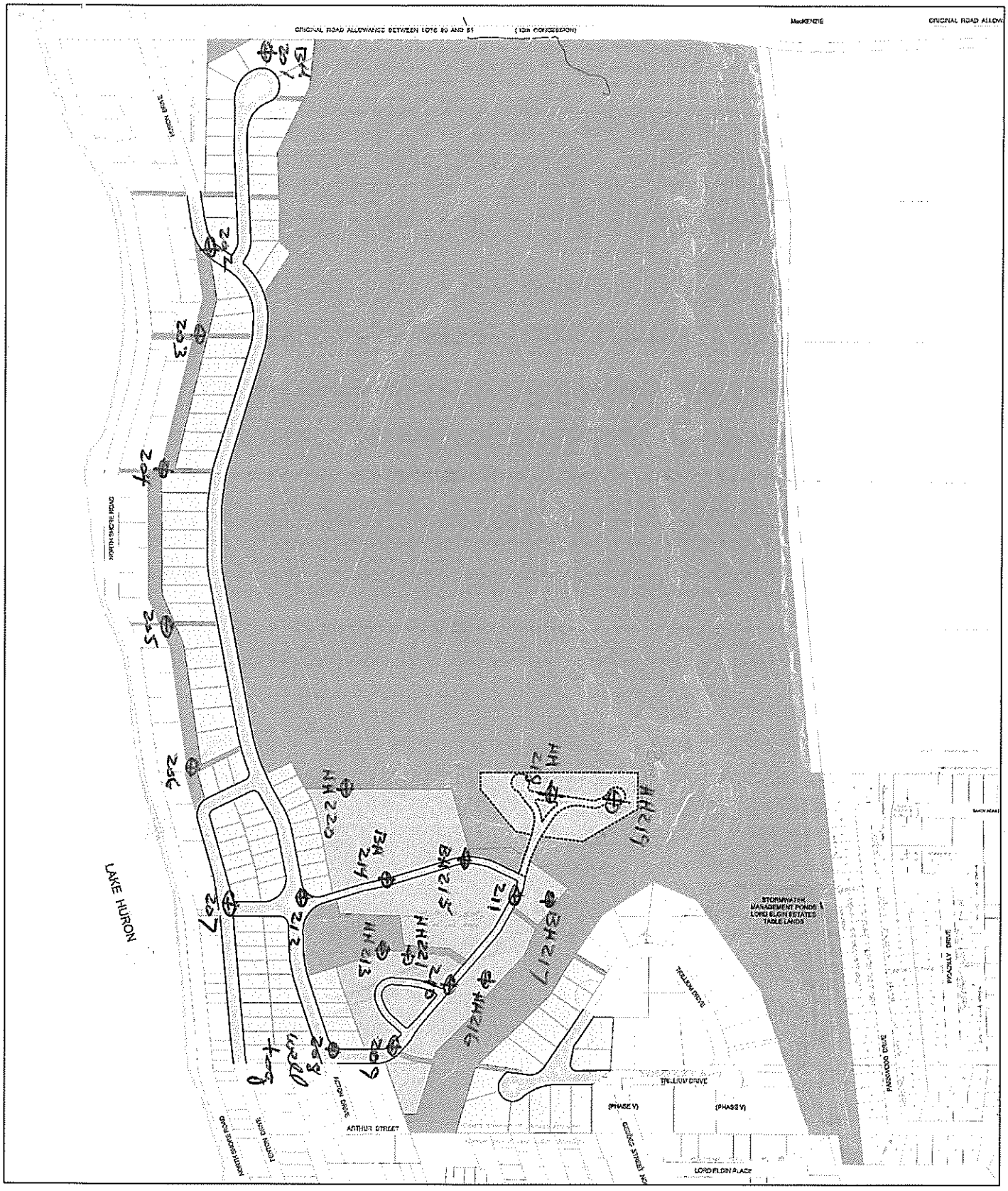

M00611
C00713
C00712
C-6607

DEC 10 2007

0 75 150 225 300
SCALE 1:7500 (m)

JOB # 5605G3
Scale 1:7500

Ontario — Ministry of the Environment

Well Tag No. for Master Well *(Print Well Tag No.)*: A054677

Cluster Well Information for Cluster Well Construction

Regulation 903 Ontario Water Resources Act

Property Owner's Information

First Name	Last Name	Mailing Address (Street No./Name, RR)	Municipality
REID'S HERITAGE	GROUP	6783 WELLINGTON Rd 34	COMBERMERE

Province	Postal Code	E-mail Address	Telephone No. (inc. area code)
ONT.	K 0 J 2 V 4		5 1 9 6 5 8 6 6 5 6

Consent

Property Owner's Consent to use cluster form

[redacted]

Consent to release additional information to the Director upon request

Signature of Technician/Contractor

Date *(yyyy/mm/dd)*: 2007/10/03

Cluster Well Information

Address of Well Location (Street Number/Name, RR)	Lot	Concession	Township	County/District/Municipality
	46, 47 48, 49 & 50	LAKE RANGE	SOUGEEN	Bruce

City/Town/Village	Province	Postal Code	GPS Unit Make	Model	Unit Mode of Operation
Town of SOUGEEN SHORES	Ontario				☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify:

Well # on Sketch	UTM Coordinates Zone	Easting	Northing	Full Depth of Hole (metres)	Hole Diameter (cm)	Method of Construction	Casing Material	Casing Length (metres)	Screen Interval (metres) From	Screen Interval (metres) To	Annular Space Sealant Used	Static Water Level (metres)	Abandonment Sealant Used	Comments	Date of Completion (yyyy/mm/dd)
214	17	467991	4922227	4.6	15	Boring	Plastic	3.4	4.6	2.8	Bentonite	0.5			
215	17	467811	4922173	4.6	15	Boring	Plastic	3.4	4.6	2.8	Bentonite	0.5			
217	17	468141	4922026	4.6	15	Boring	Plastic	2.1	3.0	1.5	Bentonite	0.8			DEC 10 2007

Well Contractor and Well Technician Information

Business Name of Well Contractor	Business Address (Street Number/Name, RR)	Municipality	Province
GEO-ENVIRONMENTAL Drilling	340 MARKET DRIVE	HALTON	ONT

Postal Code	Business Telephone No. (inc. area code)	Well Contractor's Licence No.	Business E-mail Address
L 9 T 5 A 1	9 0 5 8 7 6 3 3 8 8	6 6 0 7	

Name of Well Technician (First Name, Last Name)	Well Technician's Licence No.	Date Submitted (yyyy/mm/dd)	Signature of Technician
Ray Gamble	3 1 0 5		

Date 1st Well in Cluster Constructed (yyyy/mm/dd)	Date Last Well in Cluster Constructed (yyyy/mm/dd)
2007/10/02	2007/10/03

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Date Received (yyyy/mm/dd)	Date Inspected (yyyy/mm/dd)
	C 00712
Audit No. C 00712	**Remarks** M00611

1991 (11/2006)

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APPENDIX B

BOREHOLE LOGS

CMT Engineering Inc.
1011 Industrial Crescent,
St. Clements, ON, N0B 2M0
Telephone: 519-699-5775

BOREHOLE NUMBER BH20-01

PROJECT: Miramichi Shores - Phase 4 Subdivision
PROJECT ADDRESS:
PROJECT NUMBER: 20-626
PROJECT LOCATION: Saugeen Shores, Ontario
DRILLING DATE: 20-11-16
GROUND ELEVATION: 184.60 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: SW
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
	TOPSOIL Very loose, black, sandy topsoil, moist (130 mm)	0.00, 184.60			
	DISTURBED SAND Very loose, dark brown reworked/disturbed sand, trace silt and clay, some organics, moist	0.13, 184.47	SPT 1	20	0-1-1-1 (2)
1	**SAND** Loose, brown sand, trace silt and clay, saturated	0.76, 183.84	SPT 2	44	1-2-2-2 (4)
	Becoming grey, compact	1.52, 183.08	SPT 3	100	4-6-5-5 (11)
2			SPT 4	100	4-7-9 (16)
3	Compact, saturated sand, trace clay and silt (Based on visual inspection. Not confirmed by SPT sampling)	3.05, 181.55			
4					

SPT N VALUE: 10 20 30 40
POCKET PEN. (kPa): 90 180 270 360
MOISTURE CONTENT (%): 12 24 36 48

SPT N VALUE: 2, 4, 11, 16
MOISTURE CONTENT (%): 19.9, 27, 24.8, 22.8

WELL DIAGRAM: Bentonite Seal; Water Level: 183.877 m on Dec 8/2020; 38 mm Riser; #3 Sand Pack; 38 mm Screen

Bottom of borehole at 4.57 m, Elevation 180.03 m.

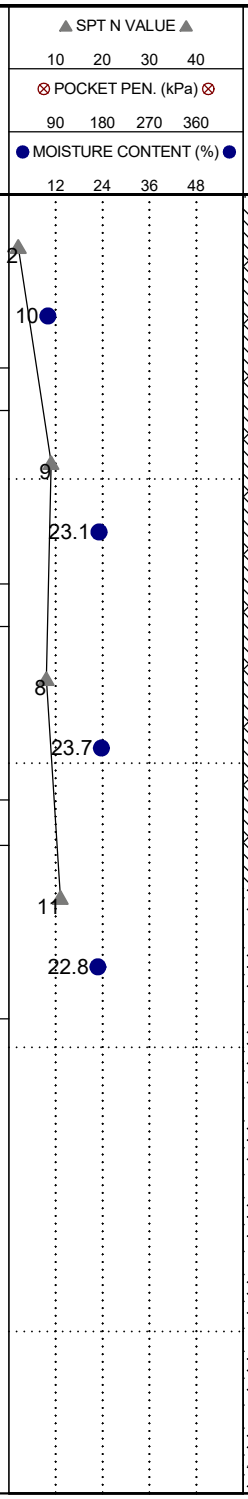
CMT Engineering Inc.
1011 Industrial Crescent,
St. Clements, ON, N0B 2M0
Telephone: 519-699-5775

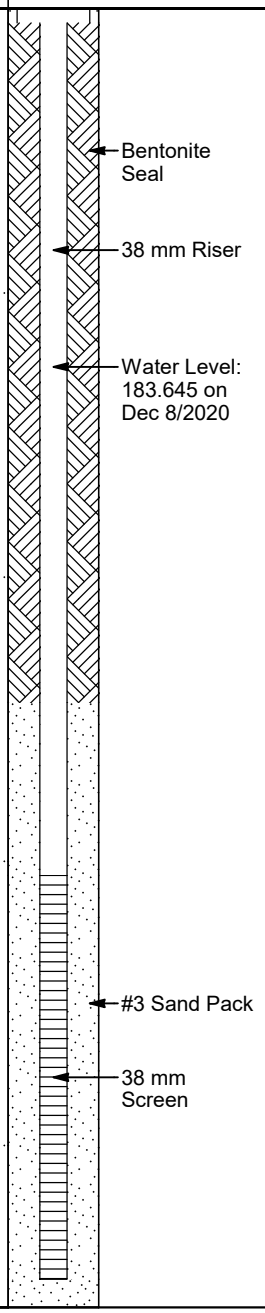
BOREHOLE NUMBER BH20-02

PROJECT: Miramichi Shores - Phase 4 Subdivision
PROJECT ADDRESS:
PROJECT NUMBER: 20-626
PROJECT LOCATION: Saugeen Shores, Ontario
DRILLING DATE: 20-11-16
GROUND ELEVATION: 184.91 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: SW
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0	**TOPSOIL** Very loose, black, sandy topsoil, moist (80 mm)	0.00, 184.91			
		0.08, 184.83			
	DISTURBED SAND Very loose, grey reworked/disturbed sand, trace silt and clay, trace organics and roots, moist (200 mm)	0.28, 184.63	SPT 1	66	0-1-1-1 (2)
	Becoming red				
1	**SAND** Loose, grey sand, trace silt and clay, wet	1.04, 183.87	SPT 2	70	3-4-5-4 (9)
	Becoming saturated	1.52, 183.39	SPT 3	61	4-4-4-4 (8)
2	Becoming compact	2.29, 182.62	SPT 4	100	5-5-6 (11)
3	Compact, saturated sand, trace clay and silt (Based on visual inspection. Not confirmed by SPT sampling)	3.05, 181.86			
4					

Bottom of borehole at 4.57 m, Elevation 180.34 m.





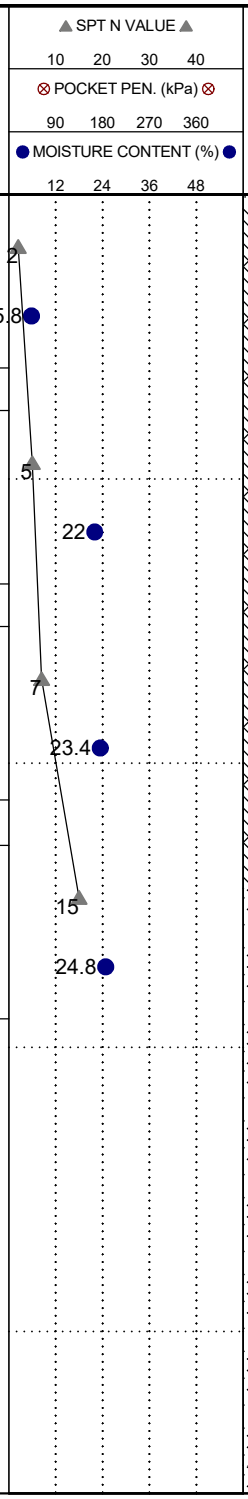
CMT Engineering Inc.
1011 Industrial Crescent,
St. Clements, ON, N0B 2M0
Telephone: 519-699-5775

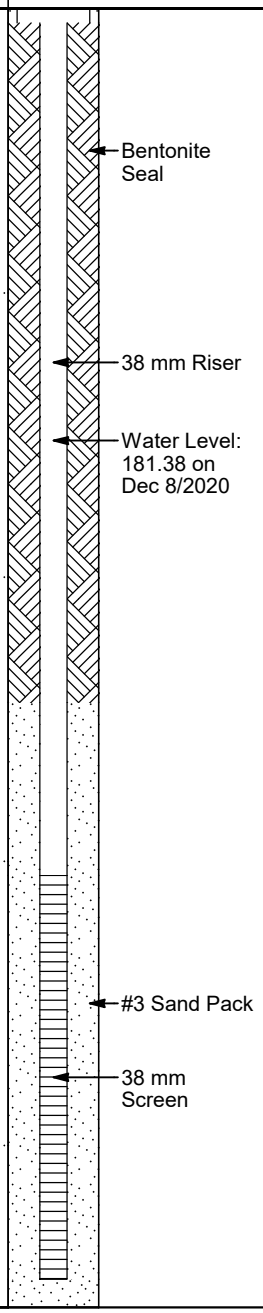
BOREHOLE NUMBER BH20-03

PROJECT: Miramichi Shores - Phase 4 Subdivision
PROJECT ADDRESS:
PROJECT NUMBER: 20-626
PROJECT LOCATION: Saugeen Shores, Ontario
DRILLING DATE: 20-11-16
GROUND ELEVATION: 182.90 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: SW
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
	TOPSOIL Very loose, black, sandy topsoil, moist (100 mm)	0.00, 182.90			
		0.10, 182.80			
	DISTURBED SAND Very loose, brown reworked/disturbed sand, trace silt and clay, some organics, moist (100 mm)	0.20, 182.70	SPT 1	61	0-1-1-1 (2)
	SAND Very loose, light brown sand, trace silt and clay, moist				
	Becoming loose, grey, wet	0.76, 182.14	SPT 2	20	3-2-3-3 (5)
1					
			SPT 3	61	2-2-5-5 (7)
2					
	Becoming compact, saturated	2.29, 180.61	SPT 4	100	2-6-9-9 (15)
3					
	Compact, saturated sand, trace clay and silt (Based on visual inspection. Not confirmed by SPT sampling)	3.05, 179.85			
4					

Bottom of borehole at 4.57 m, Elevation 178.33 m.





CMT Engineering Inc.
1011 Industrial Crescent,
St. Clements, ON, N0B 2M0
Telephone: 519-699-5775

BOREHOLE NUMBER BH20-04

PROJECT: Miramichi Shores - Phase 4 Subdivision
PROJECT ADDRESS:
PROJECT NUMBER: 20-626
PROJECT LOCATION: Saugeen Shores, Ontario
DRILLING DATE: 20-11-16
GROUND ELEVATION: 180.78 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: SW
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
		TOPSOIL Very loose, black, sandy topsoil, wet (220 mm)	0.00, 180.78					
		DISTURBED SAND Very loose, grey reworked/disturbed sand, trace gravel, silt and clay, some organics, trace wood, saturated	0.22, 180.56	SPT 1	0	0-0-1-1 (1)	>>	Water Level: 180.425 m on Dec 8/2020
1		**BURIED TOPSOIL** Very loose, black, silty organic burried topsoil layer, saturated (100mm)	0.86, 179.92 0.96, 179.82	SPT 2	100	0-1-0-1 (1)	55.4	38 mm Riser Bentonite Seal
2		**DISTURBED SAND** Very loose, grey reworked/disturbed sand, trace gravel, silt and clay, trace organics, trace wood, saturated		SPT 3	80	0-0-2-2 (2)	2 39.3	#3 Sand Pack
3		**SAND** Compact to dense, grey sand, trace silt, clay and gravel, saturated	2.29, 178.49	SPT 4	100	4-9-17-20 (26)	26 21.8	38 mm Screen

Bottom of borehole at 3.05 m, Elevation 177.73 m.

TABLE B-1(A): MONITOR CONSTRUCTION DETAILS

Miramichi Shores Phase 4 PTTW Report (Project 20007.00)

MONITOR CONSTRUCTION DETAILS										
Monitor	Depth (mbgl)	BH Dia. (mm)	Monitor Dia. (mm)	Screen Length (m)	Sand Pack	Casing Elev. (masl)	casing stickup (magl)	ground Elev. (masl)	Creek Bed Elev (masl)	
BH20-01	4.57	200	38	1.52	#3	185.62	1.03	184.59		
BH20-02	4.57	200	38	1.52	#3	185.95	0.97	184.98		
BH20-03	4.57	200	38	1.52	#3	183.97	1.03	182.94		
BH20-04	3.05	200	38	1.52	#3	181.82	0.98	180.84		
DP20-01	2.36*	38	38	0.9	na	181.44	1.24*		180.20	

Note: monitor depth and casing stickup for DP20-01 are relative to creek bed

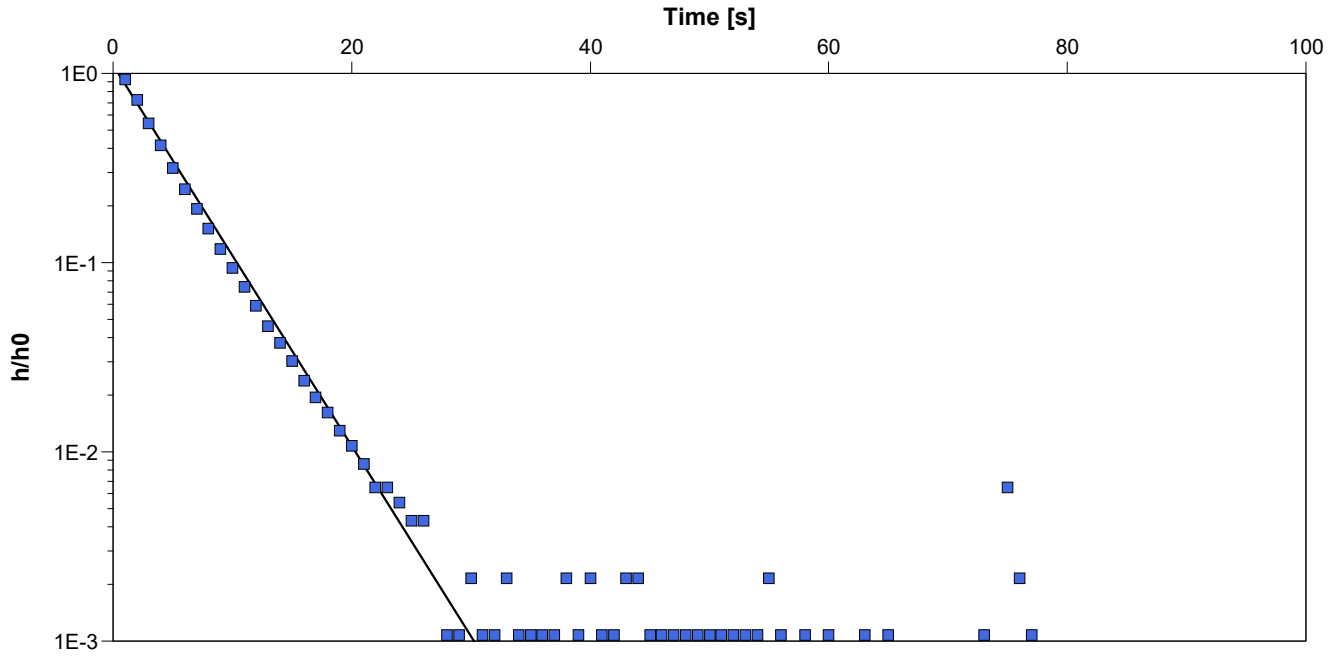
TABLE B-1(B): WATER LEVELS

Groundwater and Surface Water Levels										
Date	BH20-01		BH20-02		BH20-03		BH20-04		DP20-01	Creek
	Water Level		Water Level		Water Level		Water Level		Water Level	
	(mbtoc)	(masl)	(mbtoc)	(masl)	(mbtoc)	(masl)	(mbtoc)	(masl)	(masl)	(masl)
16-Nov-20	1.780	183.840	2.260	183.690	2.580	181.390	1.390	184.230	na	na
27-Nov-20	1.750	183.870	2.305	183.645	2.596	181.374	1.388	180.432	na	na
8-Dec-20	1.743	183.877	2.305	183.645	2.585	181.385	1.395	180.425	na	na
23-Dec-20	1.740	183.880	2.300	183.65	2.590	181.380	1.390	180.430	180.33	180.44

APPENDIX C

HYDRAULIC CONDUCTIVITY TESTS

	Slug Test Analysis Report	
	Project: Miramachi Shores Phase 4	
	Number: 20007.00	
	Client: Cobide Engineering	
Location: Port Elgin	Slug Test: BH20-01 Test 1	Test Well: BH20-01
Test Conducted by: GRH		Test Date: 2020-11-27
Analysis Performed by: grh	BH20-01 Test 1	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



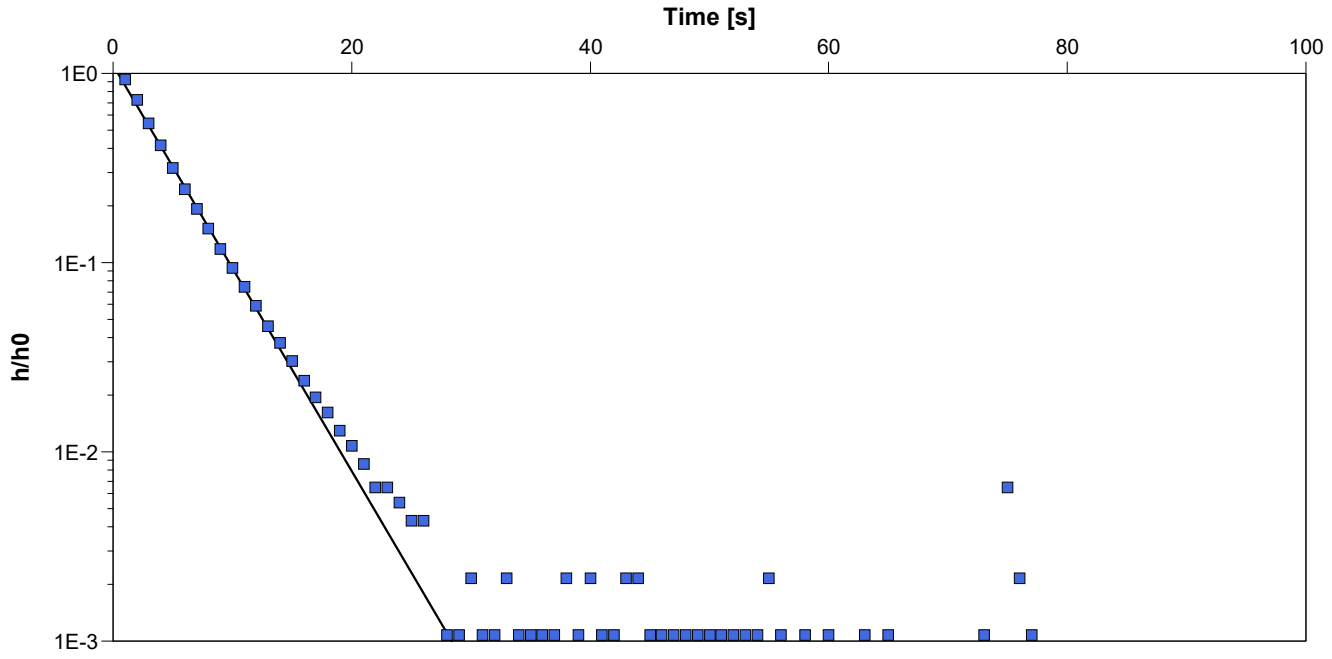
Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-01	1.01×10^{-4}	

Figure C-1: BH20-01 Test #1 Slug Test Analsis

	Slug Test Analysis Report
	Project: Miramachi Shores Phase 4
	Number: 20007.00
	Client: Cobide Engineering

Location: Port Elgin	Slug Test: BH20-01 Test 1	Test Well: BH20-01
Test Conducted by: GRH		Test Date: 2020-11-27
Analysis Performed by: grh	BH20-01 Test 2	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		

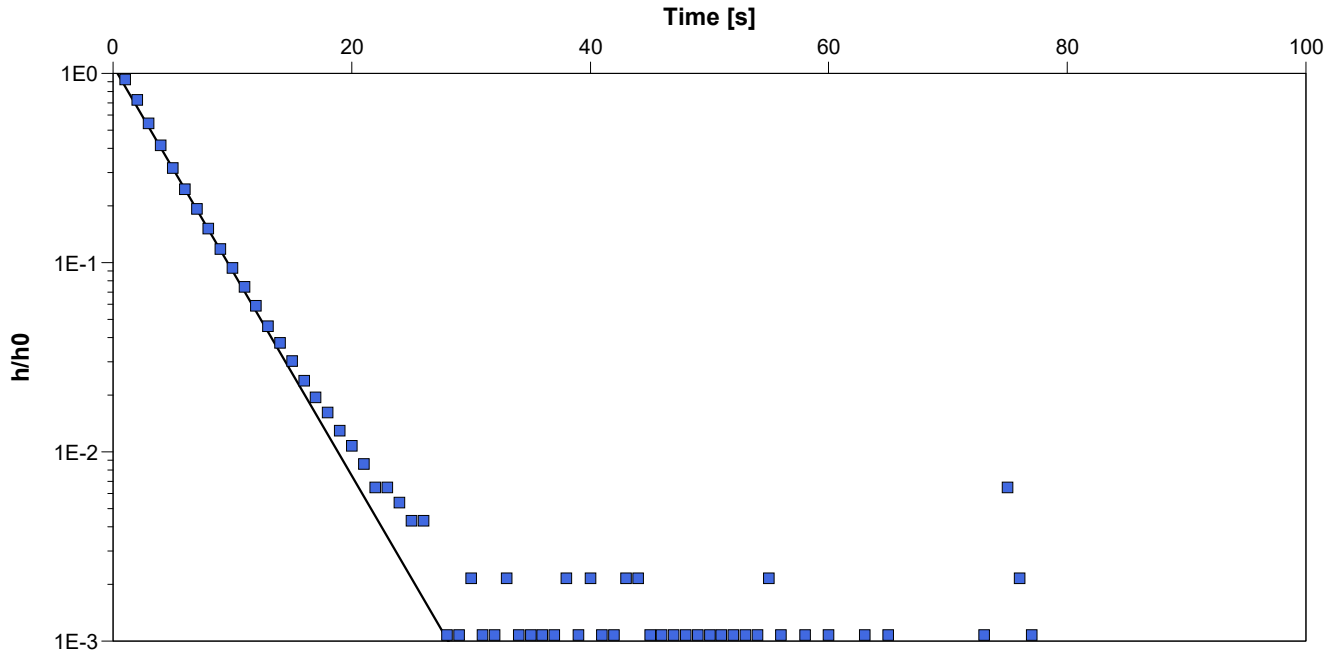


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-01	1.07×10^{-4}	

Figure C-2: BH20-01 Test #2 Slug Test Analysis

	Slug Test Analysis Report	
	Project: Miramachi Shores Phase 4	
	Number: 20007.00	
	Client: Cobide Engineering	
Location: Port Elgin	Slug Test: BH20-01 Test 1	Test Well: BH20-01
Test Conducted by: GRH		Test Date: 2020-11-27
Analysis Performed by: grh	BH20-01 Test 3	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



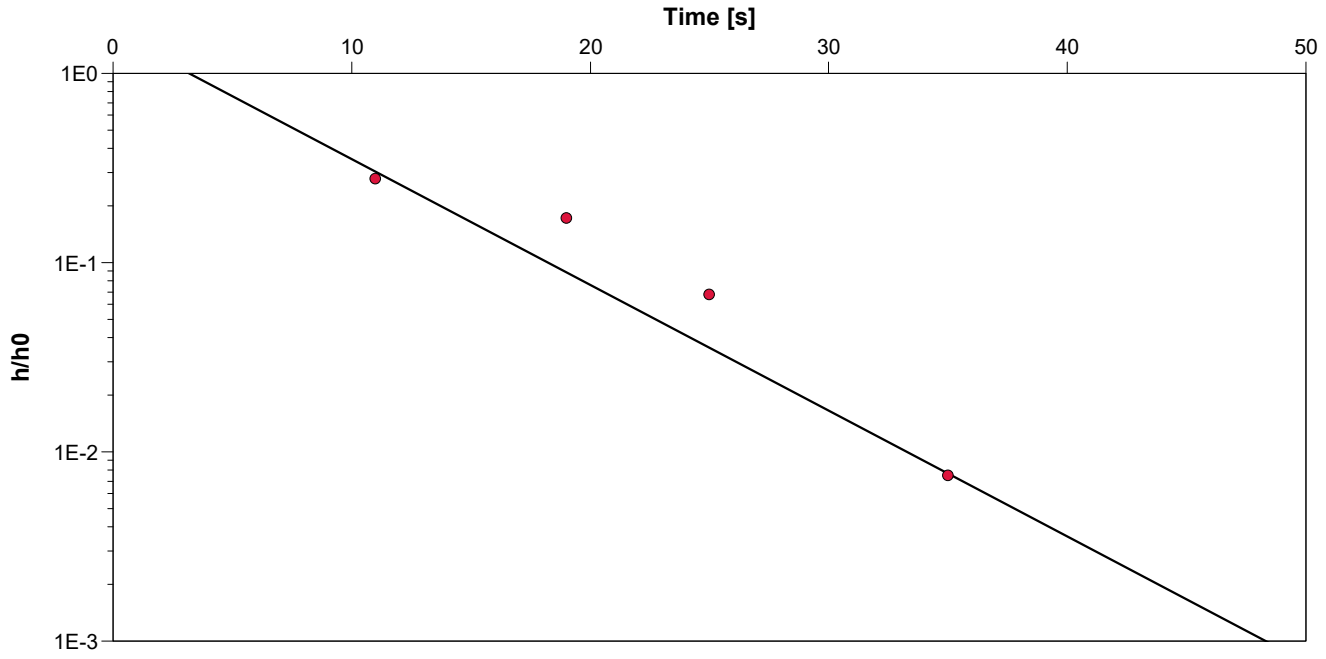
Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-01	1.08×10^{-4}	

Figure C-3: BH20-1 Test #3 Slug Test Analysis

	Slug Test Analysis Report
	Project: Miramachi Shores Phase 4
	Number: 20007.00
	Client: Cobide Engineering

Location: Port Elgin	Slug Test: BH20-02 Test 1	Test Well: BH20-02
Test Conducted by: grh		Test Date: 2020-11-27
Analysis Performed by: grh	BH20-02 Test 1	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



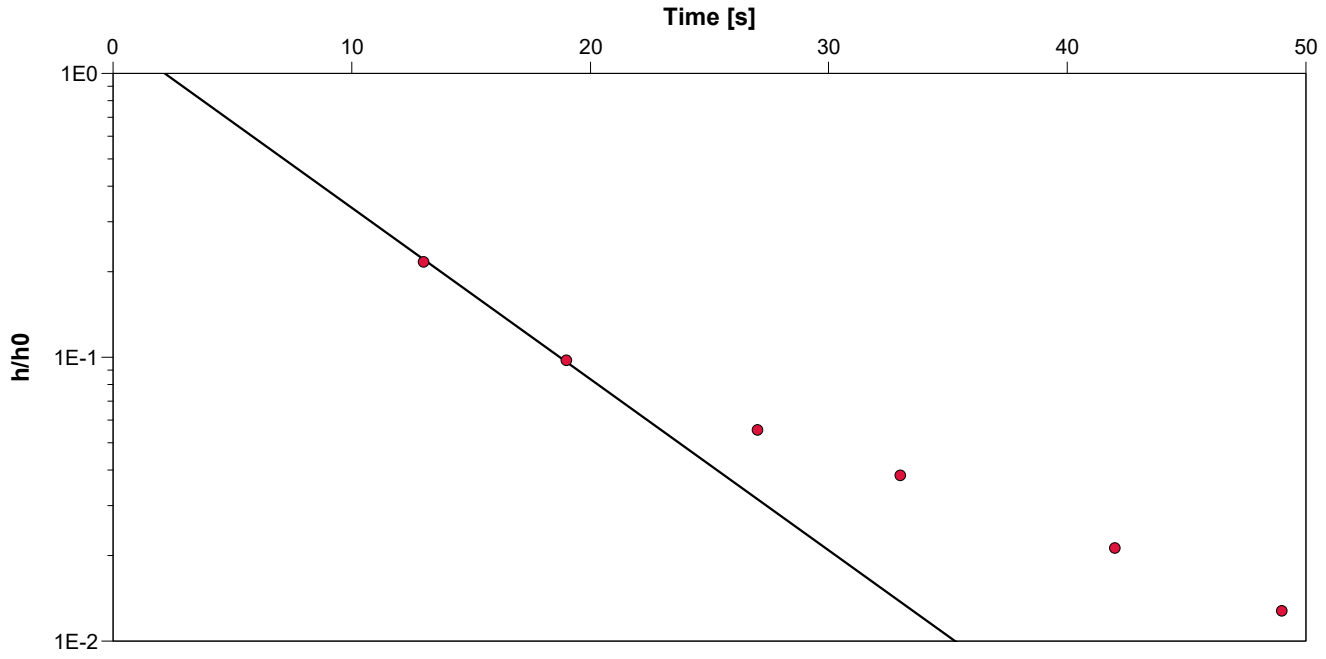
Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-02	6.22×10^{-5}	

Figure C-4: BH20-2 Test #1 Slug Test Analysis

	Slug Test Analysis Report
	Project: Miramachi Shores Phase 4
	Number: 20007.00
	Client: Cobide Engineering

Location: Port Elgin	Slug Test: BH20-02 Test 2	Test Well: BH20-02
Test Conducted by: grh		Test Date: 2020-11-27
Analysis Performed by: grh	BH20-02 Test 2	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		

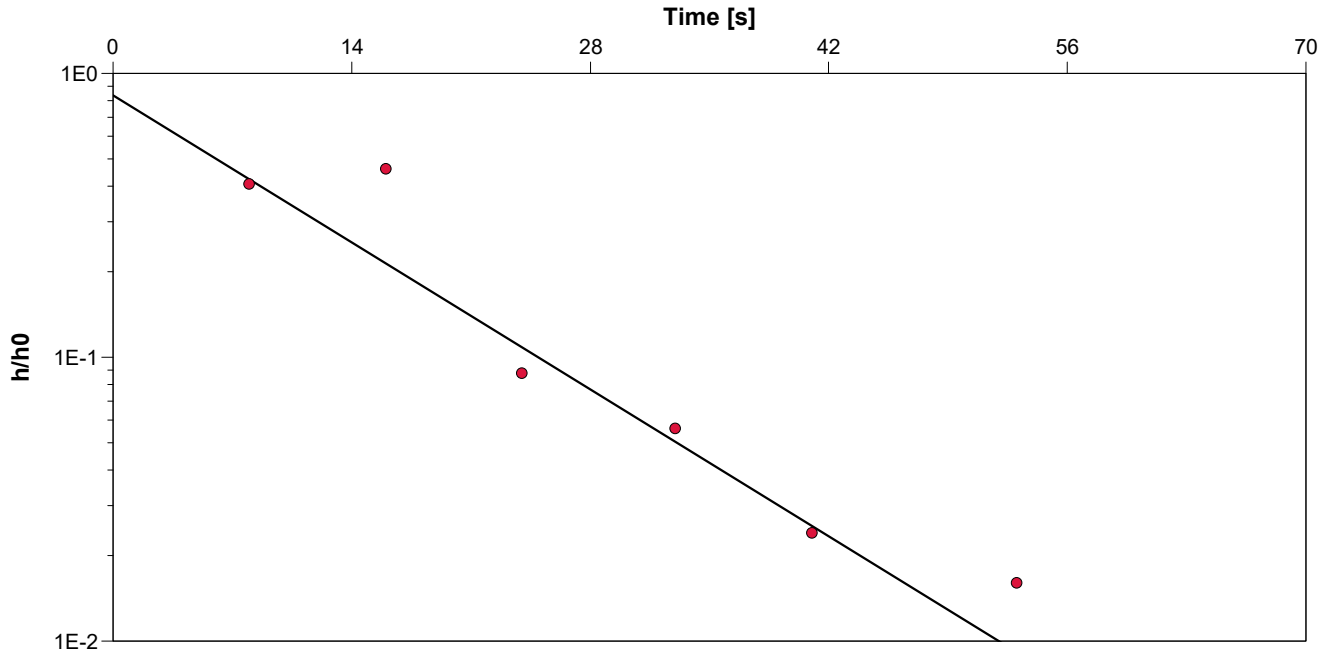


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-02	5.65×10^{-5}	

Figure C-5: BH20-2 Test #2 Slug Test Analysis

	Slug Test Analysis Report	
	Project: Miramachi Shores Phase 4	
	Number: 20007.00	
	Client: Cobide Engineering	
Location: Port Elgin	Slug Test: BH20-02 Test 3	Test Well: BH20-02
Test Conducted by: grh		Test Date: 2020-11-28
Analysis Performed by: grh	BH20-02 Test 3	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



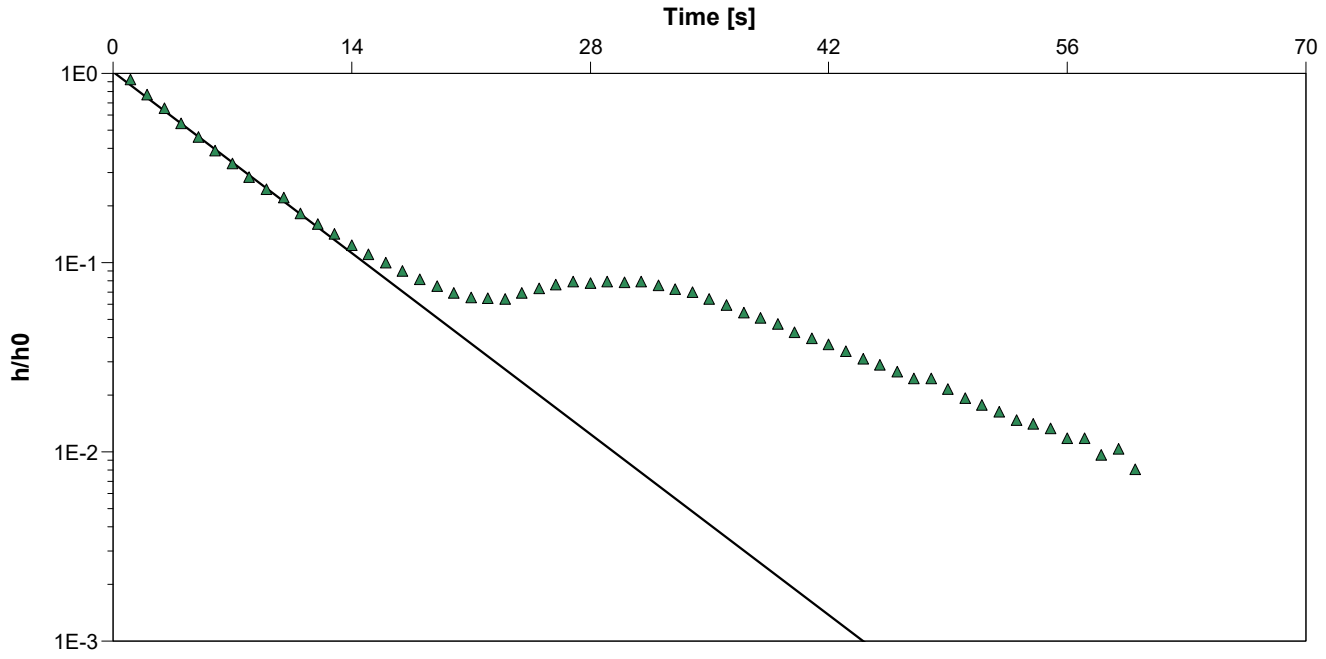
Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-02	3.46×10^{-5}	

Figure C-6: BH20-2 Test #3 Slug Test Analysis

	Slug Test Analysis Report
	Project: Miramachi Shores Phase 4
	Number: 20007.00
	Client: Cobide Engineering

Location: Port Elgin	Slug Test: BH20-03 Test 1	Test Well: BH20-03
Test Conducted by: grh		Test Date: 2020-11-28
Analysis Performed by: grh	BH20-03 Test 1	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



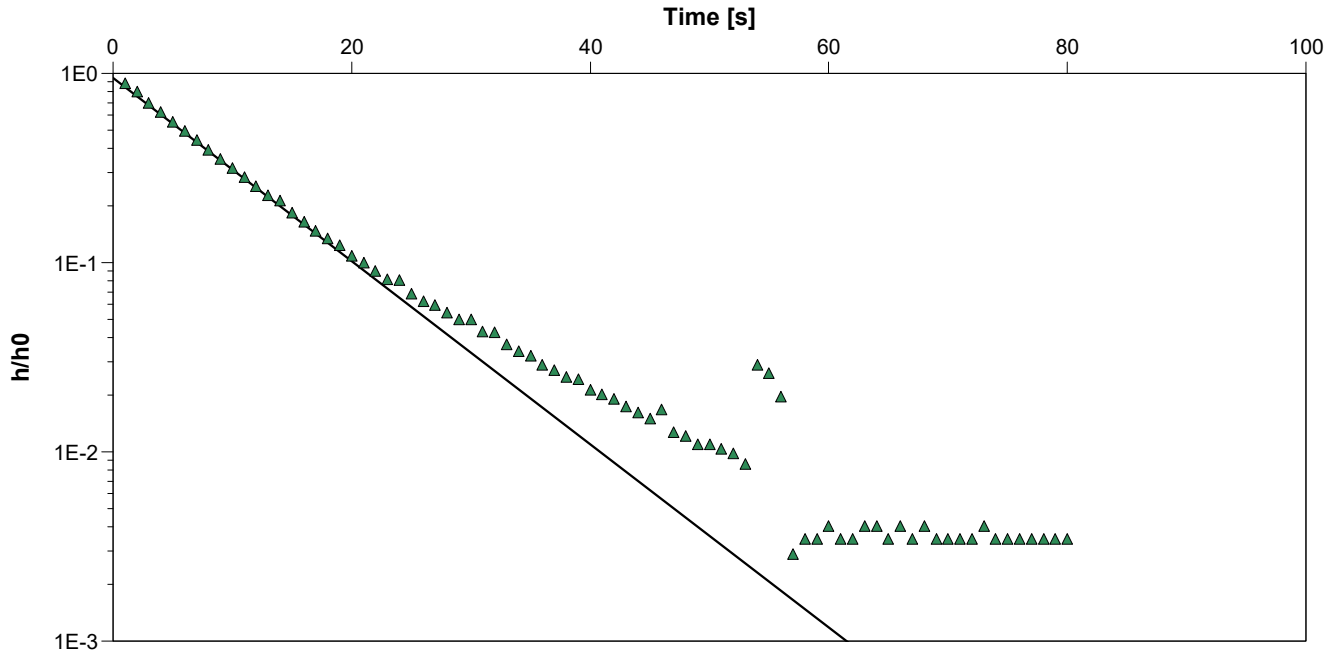
Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-03	6.28×10^{-5}	

Figure C-7: BH20-3 Test #1 Slug Test Analysis

	Slug Test Analysis Report
	Project: Miramachi Shores Phase 4
	Number: 20007.00
	Client: Cobide Engineering

Location: Port Elgin	Slug Test: BH20-03 Test 2	Test Well: BH20-03
Test Conducted by: grh		Test Date: 2020-11-27
Analysis Performed by: grh	BH20-03 Test 2	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



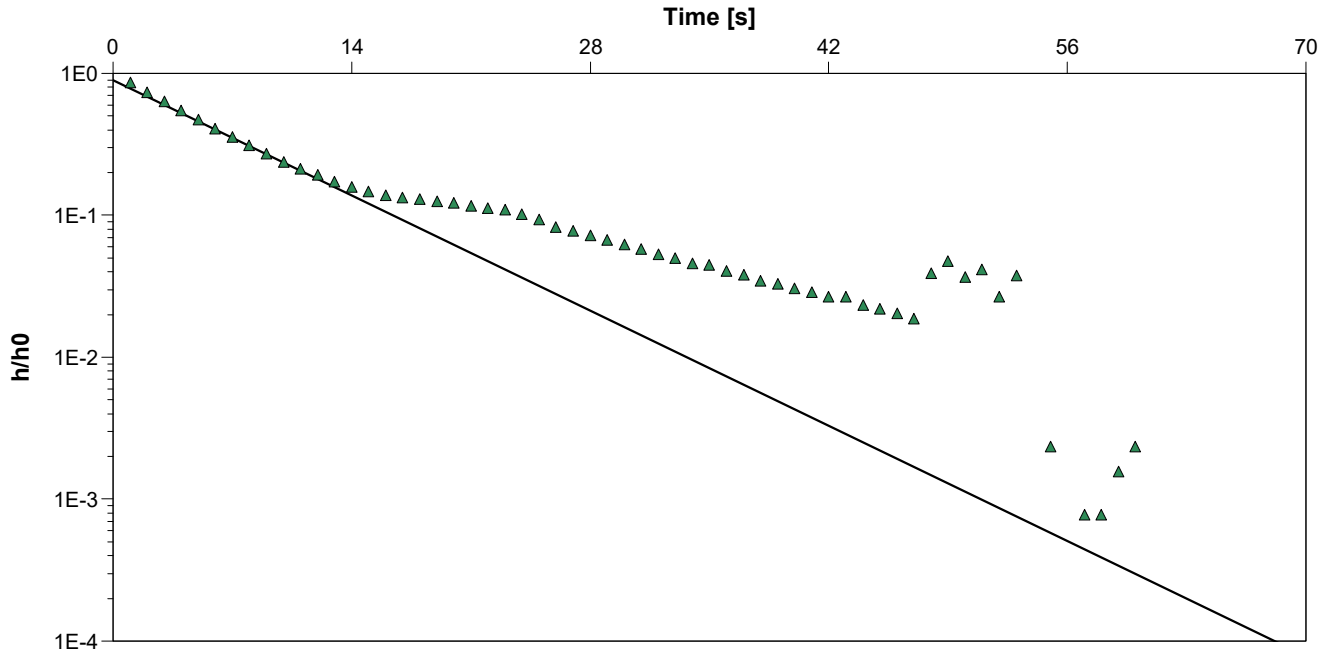
Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-03	4.45×10^{-5}	

Figure C-8: BH20-3 Test #2 Slug Test Analysis

	Slug Test Analysis Report
	Project: Miramachi Shores Phase 4
	Number: 20007.00
	Client: Cobide Engineering

Location: Port Elgin	Slug Test: BH20-03 Test 3	Test Well: BH20-03
Test Conducted by: grh		Test Date: 2020-11-27
Analysis Performed by: grh	BH20-03 Test 3	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



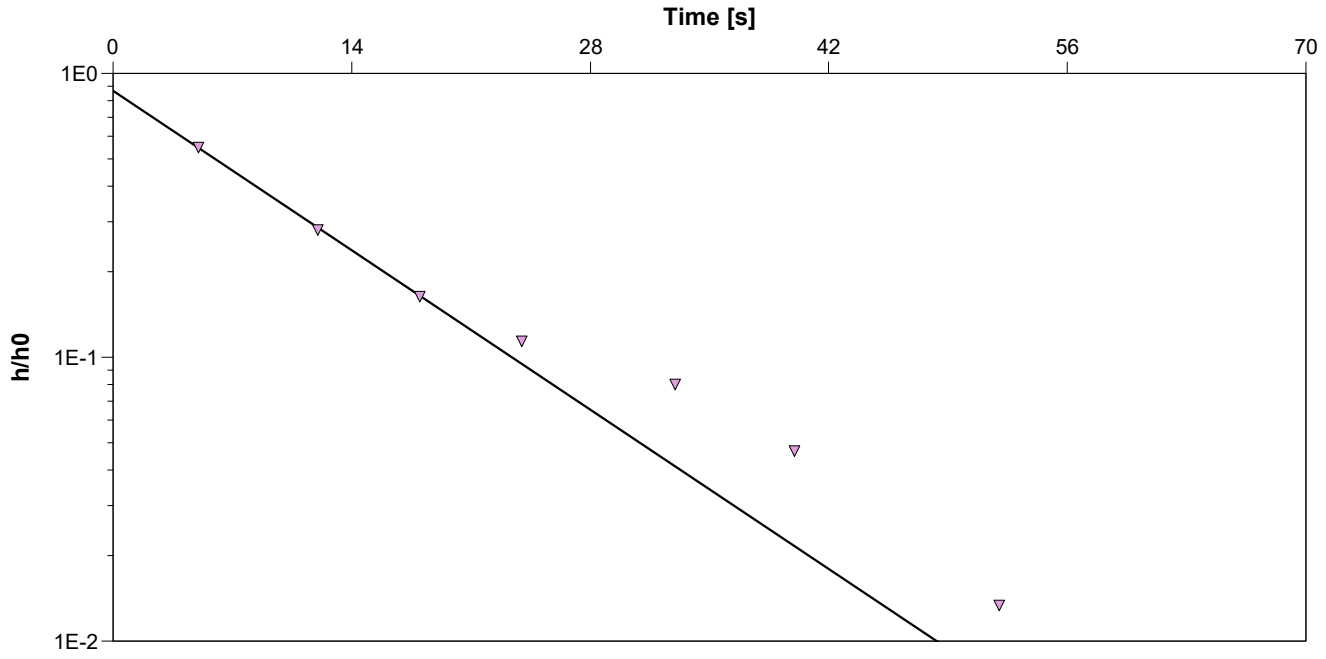
Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-03	5.33×10^{-5}	

Figure C-9: BH20-3 Test #3 Slug Test Analysis

	Slug Test Analysis Report
	Project: Miramachi Shores Phase 4
	Number: 20007.00
	Client: Cobide Engineering

Location: Port Elgin	Slug Test: BH20-04 Test 1	Test Well: BH20-04
Test Conducted by: grh		Test Date: 2020-11-27
Analysis Performed by: grh	BH20-04 Test 1	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



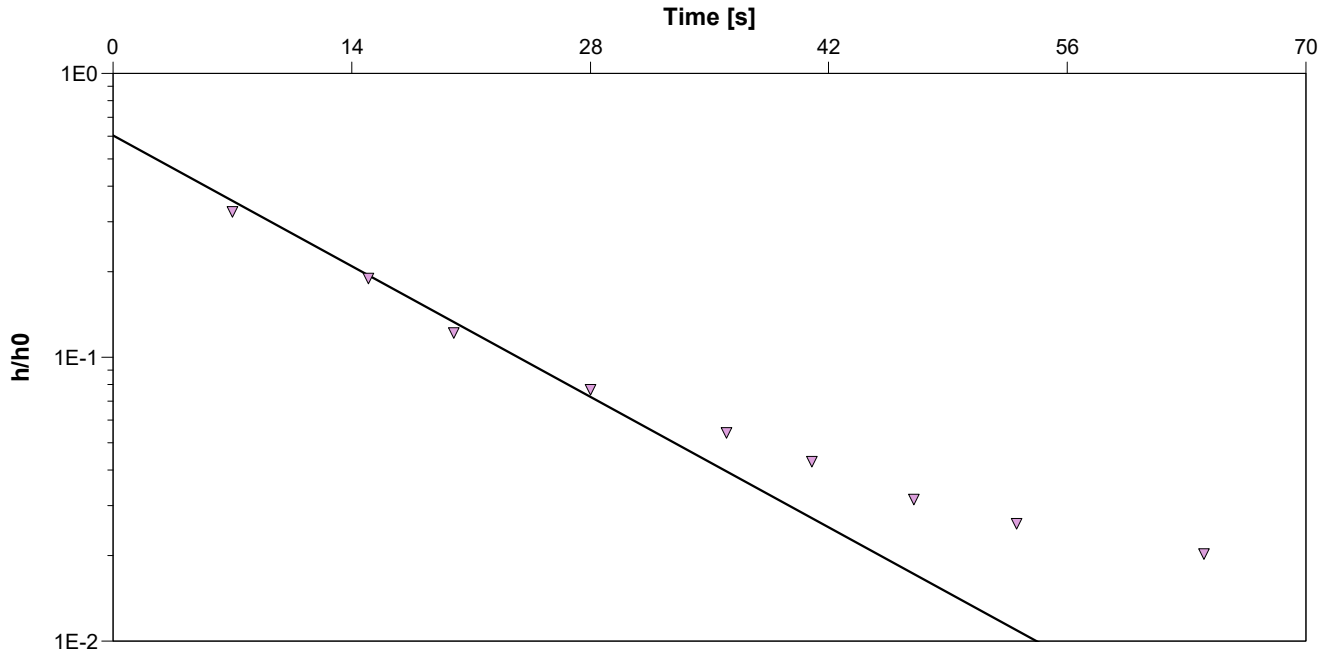
Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-04	3.59×10^{-5}	

Figure C-10: BH20-04 Test #1 Slug Test Analysis

	Slug Test Analysis Report
	Project: Miramachi Shores Phase 4
	Number: 20007.00
	Client: Cobide Engineering

Location: Port Elgin	Slug Test: BH20-04 Test 2	Test Well: BH20-04
Test Conducted by: grh		Test Date: 2020-11-28
Analysis Performed by: grh	BH20-04 Test 2	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		

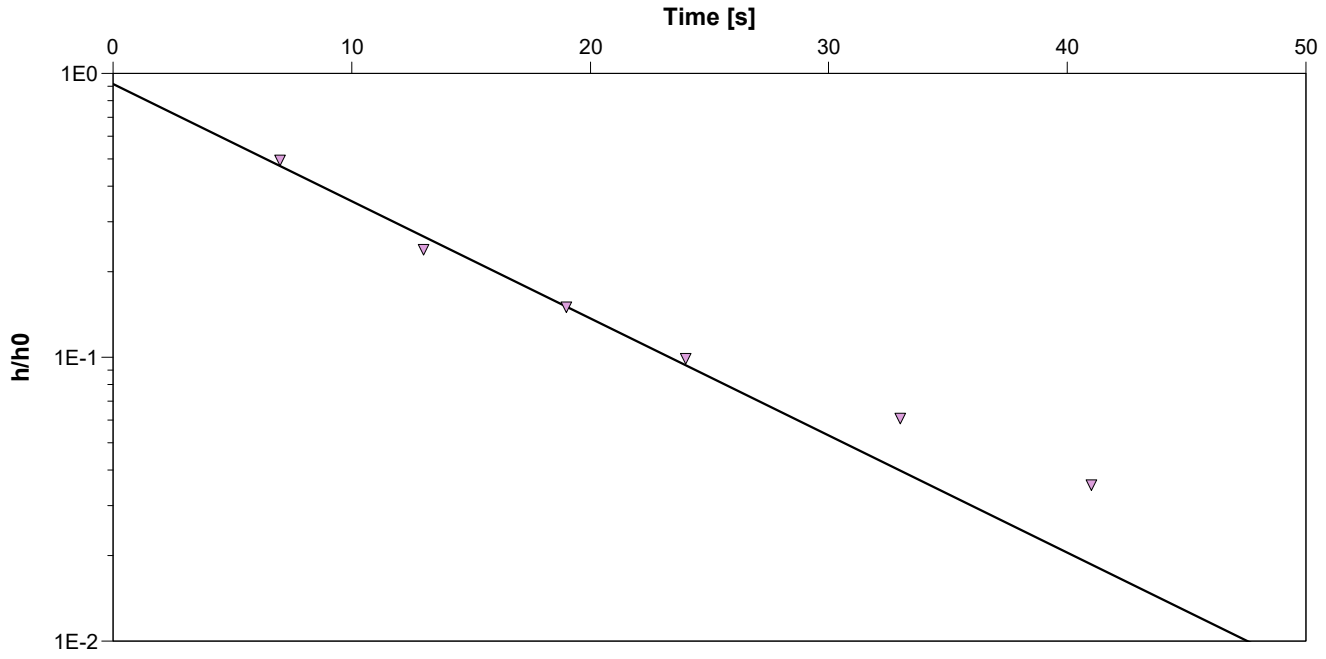


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-04	2.94×10^{-5}	

Figure C-11: BH20-04 Test #2 Slug Test Analysis

	Slug Test Analysis Report	
	Project: Miramachi Shores Phase 4	
	Number: 20007.00	
	Client: Cobide Engineering	
Location: Port Elgin	Slug Test: BH20-04 Test 3	Test Well: BH20-04
Test Conducted by: grh		Test Date: 2020-11-27
Analysis Performed by: GRH	BH20-04 Test 3	Analysis Date: 2020-11-28
Aquifer Thickness: 4.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH20-04	3.69×10^{-5}	

Figure C-12: BH20-04 Test #3 Slug Test Analysis

APPENDIX D

DEWATERING CALCUATIONS

Table D-1: Construction Dewatering Unconfined Conditions K(avg) & 100 m Trench

Miramichi Shores Phase 4 Hydrogeological Report PTTW (Project 20007.00)

(Method: Powers, 1992)

Open Cut - Sand Seams

Input Parameters

Initial Elevation of Water Table (m)	H	4	m
Final Elevation of Water Table (m)	h	2.7	m
Hydraulic Conductivity (m/s)	K	5.60E-05	m/s
Hydraulic Conductivity (m/d)	K	4.84E+00	m/d
Aquifer Thickness (m)	B	4.00	
Linear Trench Size (m)	a	100	m
Linear Trench Size (m)	b	2	m
Length of Dewatering - Trench Length (m)	X	100	m
Width of Dewatering (m)	L	14.59	m

L = Ro / 2

ZOI - Radius of Influence (m)

Ro	29	m

Ro = 3 (H - h) x sqrt (K)

Equivalent Radius of Well (m)

Rs	7.98	m

Rs = sqrt ((a x b)/ 3.14)

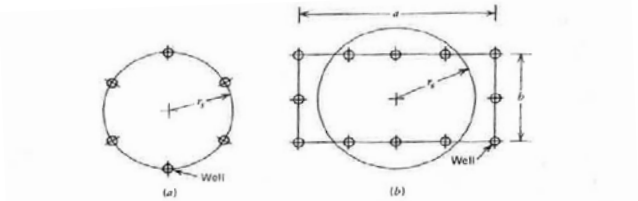


Figure 6.7 Approximation of equivalent radius r_s. (a) Circular systems. (b) Rectangular systems.

Flow Calculations - Q

Radial Flow to a Shaft (a/b < 1.5)

Shaft Calculation (m^3/day)

Q = (3.14 x K x (H^2 - h^2)) / ln (Ro / Rs)

Q	102	m^3/day
Q	102089	L/day

Long Narrow System - Trench (a/b > 1.5)

Drainage Trench from a Line Source - 2 Sides (m^3/day)

Q = 2 x (X x K x (H^2 - h^2)) / 2 x L

Q	289	m^3/day
Q	288796	L/day

Trench Calculation with Radial Flow (m^3/day)

Q = (3.14 x K x (H^2 - h^2)) / ln (Ro / Rs) + 2 x (X x K x (H^2 - h^2)) / 2 x L

Q	391	m^3/day
Q	390885	L/day

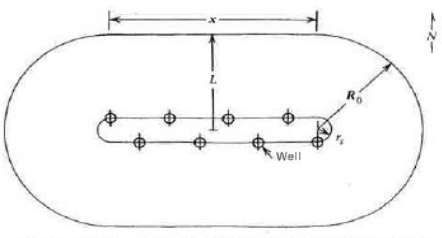
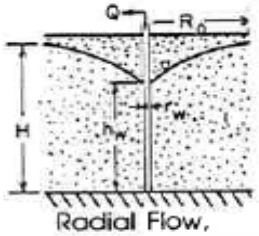
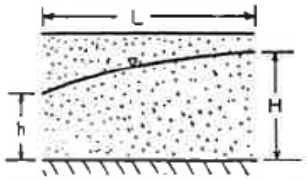


Figure 6.8 Approximate analysis of long narrow systems.



Radial Flow, Water Table Aquifer



Water Table Flow From a Line Source to a Drainage Trench

Table D-2: Construction Dewatering Unconfined Conditions K(max) & 100 m Trench

Miramichi Shores Phase 4 Hydrogeological Report PTTW (Project 20007.00)

(Method: Powers, 1992)

Open Cut - Sand Seams

Input Parameters

Initial Elevation of Water Table (m)	H	4	m
Final Elevation of Water Table (m)	h	2.7	m
Hydraulic Conductivity (m/s)	K	1.08E-04	m/s
Hydraulic Conductivity (m/d)	K	9.33E+00	m/d
Aquifer Thickness (m)	B	4.00	
Linear Trench Size (m)	a	100	m
Linear Trench Size (m)	b	2	m
Length of Dewatering - Trench Length (m)	X	100	m
Width of Dewatering (m)	L	20.26	m

L = Ro / 2

ZOI - Radius of Influence (m)

Ro	41	m

Ro = 3 (H - h) x sqrt (K)

Equivalent Radius of Well (m)

Rs	7.98	m

Rs = sqrt ((a x b)/ 3.14)

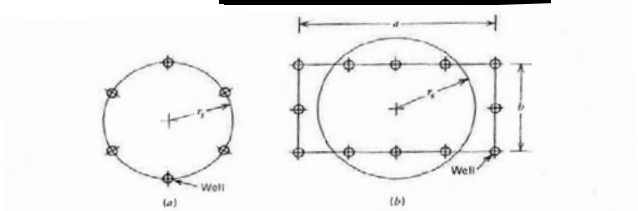


Figure 6.7 Approximation of equivalent radius r_s. (a) Circular systems. (b) Rectangular systems.

Flow Calculations - Q

Radial Flow to a Shaft (a/b < 1.5)

Shaft Calculation (m^3/day)

Q = (3.14 x K x (H^2 - h^2)) / ln (Ro / Rs)

Q	157	m^3/day
Q	157103	L/day

Long Narrow System - Trench (a/b > 1.5)

Drainage Trench from a Line Source - 2 Sides (m^3/day)

Q = 2 x (X x K x (H^2 - h^2)) / 2 x L

Q	401	m^3/day
Q	401060	L/day

Trench Calculation with Radial Flow (m^3/day)

Q = (3.14 x K x (H^2 - h^2)) / ln (Ro / Rs) + 2 x (X x K x (H^2 - h^2)) / 2 x L

Q	558	m^3/day
Q	558163	L/day

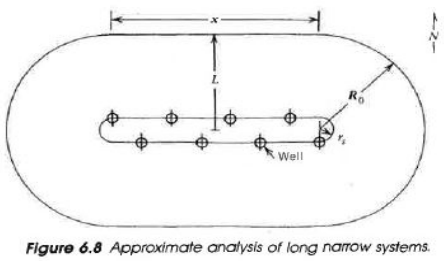
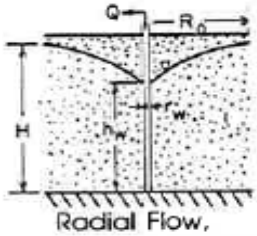
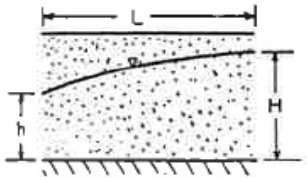


Figure 6.8 Approximate analysis of long narrow systems.



Radial Flow, Water Table Aquifer



Water Table Flow From a Line Source to a Drainage Trench

Table D-3: Construction Dewatering Unconfined Conditions- Sensitivity Anlysis

Miramichi Shores Phase 4 Hydrogeological Report PTTW (Project 20007.00)

(Method: Powers, 1992)

Open Cut - Sand Seams

Input Parameters

Initial Elevation of Water Table (m)	H	4	m
Final Elevation of Water Table (m)	h	2.7	m
Hydraulic Conductivity (m/s)	K	5.00E-04	m/s
Hydraulic Conductivity (m/d)	K	4.32E+01	m/d
Aquifer Thickness (m)	B	4.00	
Linear Trench Size (m)	a	100	m
Linear Trench Size (m)	b	2	m
Length of Dewatering - Trench Length (m)	X	100	m
Width of Dewatering (m)	L	43.60	m

L = Ro / 2

ZOI - Radius of Influence (m)

Ro	87	m

Ro = 3 (H - h) x sqrt (K)

Equivalent Radius of Well (m)

Rs	7.98	m

Rs = sqrt ((a x b)/ 3.14)

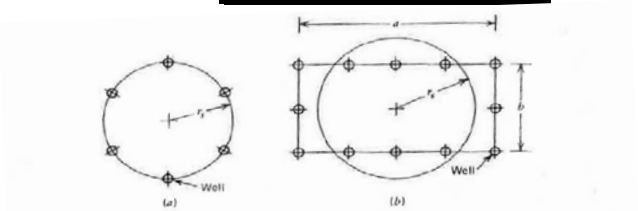


Figure 6.7 Approximation of equivalent radius r_s. (a) Circular systems. (b) Rectangular systems.

Flow Calculations - Q

Radial Flow to a Shaft (a/b < 1.5)

Shaft Calculation (m^3/day)

Q = (3.14 x K x (H^2 - h^2)) / ln (Ro / Rs)

Q	494	m^3/day
Q	494292	L/day

Long Narrow System - Trench (a/b > 1.5)

Drainage Trench from a Line Source - 2 Sides (m^3/day)

Q = 2 x (X x K x (H^2 - h^2)) / 2 x L

Q	863	m^3/day
Q	862943	L/day

Trench Calculation with Radial Flow (m^3/day)

Q = (3.14 x K x (H^2 - h^2)) / ln (Ro / Rs) + 2 x (X x K x (H^2 - h^2)) / 2 x L

Q	1357	m^3/day
Q	1357236	L/day

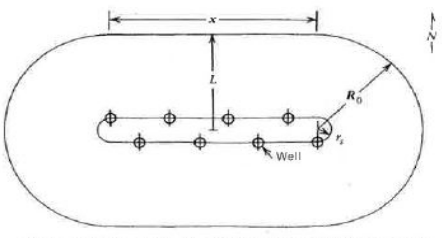
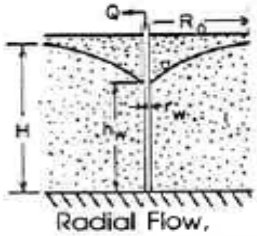
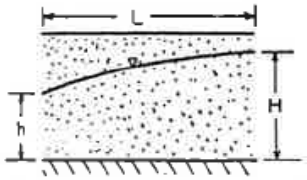


Figure 6.8 Approximate analysis of long narrow systems.



Radial Flow, Water Table Aquifer



Water Table Flow From a Line Source to a Drainage Trench

TABLE D-4 SUMMARY OF LAKESIDE WOODS DEWATERING (2018)

Project: Miramichi Bay Shores Phase 4 Hydrogeological Report Permit To Take Water (20007.00)

	PUMP 1						PUMP 2						TOTALS	
Date	Time	Meter Reading	Litres	hours	L/min	L/day	Time	Meter Reading	Litres	hours	L/min	L/day	L/min	Litres/day
Aug. 2	8:30 AM	22,313,100	0	0	0.0	0								
Aug. 3	8:30 AM	22,359,193	46,093	24	32.0	46,093								
Aug. 7	8:30 AM	22,368,469	9,276	96	1.6	2,319	3:00 PM	81,154,050	0	0	-	0		
Aug. 8	12 Noon	22,398,489	30,020	27.5	18.2	26,199	12:30 PM	81,604,050	450,000	22.50	333.3	480,000	352	506,199
Aug. 9	8:00 AM	22,424,024	25,535	20	21.3	30,642	2:00 PM	82,060,900	456,850	22.5	338.4	487,307	360	517,949
Aug. 10	8:30 AM	22,424,587	563	24.5	0.4	552	12:30 PM	82,475,700	414,800	22.5	307.3	442,453	308	443,005
Aug. 13	11:00 AM	22,426,950	2,363	26.5	1.5	2,140	8:00 AM	83,720,700	1,245,000	67.5	307.4	442,667	309	444,807
Aug. 14	12:30 PM	22,428,192	1,242	25.5	0.8	1,169	9:00 AM	84,117,800	397,100	25	264.7	381,216	266	382,385
Aug. 15							4:00 PM	84,555,000	437,200	31	235.1	338,477	235	338,477
Aug. 17	Pump Not Running													
Aug. 18							2:00 PM	85,145,000	590,000	70	140.5	202,286	140	202,286
Aug. 21							2:00 PM	86,323,887	1,178,887	72	272.9	392,962	273	392,962
Aug. 22	Pump Back Running													
Aug. 24	11:00 AM	22,454,200					11:00 AM	87,198,000	874,113	69	211.1	304,039	211	304,039
Aug. 27	11:30 AM	22,465,400	11,200	24.5	7.6	10,971	11:30 AM	88,042,500	844,500	72.5	194.1	279,559	202	290,530
Aug. 28	4:00 PM	22,466,000	600	28.5			4:30 PM	88,386,120	343,620	29	197.5	284,375	197	284,375
Aug. 29	Pump No. 1 Shut down for good at 8 AM													
Aug. 30							9:00 AM	**88,575,509**	189,389	16.5	191.3	275,475	191	275,475

Pump No. 2 Shut down for good at 9:00 AM Aug. 30

AVG	365,207

TABLE D-5
CLIMATIC WATER BUDGET: CLIMATE NORMAL 1981-2010 (Hanover)
Potential Evapotranspiration
Miramachi Shores Phase 4 Hydrogeological Evaluation Permit To Take Water (20007.00)

	Thornthwaite (1948)							
Month	**Mean Temperature (°C)**	**Heat Index**	**Potential Evapo-transpiration (mm)**	**Daylight Correction Value**	**Adjusted Potential Evapo-transpiration (mm)**	**Total Precipitation (mm)**	**Surplus (mm)**	**Deficit (mm)**
January	-6.8	0.0	0.0	0.81	0.0	109.6	109.6	0.0
February	-5.9	0.0	0.0	0.81	0.0	81.3	81.3	0.0
March	-1.7	0.0	0.0	1.02	0.0	72.0	72.0	0.0
April	5.8	1.3	27.9	1.12	31.3	73.1	41.8	0.0
May	11.9	3.7	58.8	1.27	74.7	84.6	9.9	0.0
June	17.2	6.5	86.2	1.29	111.2	78.3	0.0	32.9
July	19.6	7.9	98.7	1.30	128.4	83.1	0.0	45.3
August	18.6	7.3	93.5	1.20	112.2	95.0	0.0	17.2
September	14.6	5.1	72.7	1.04	75.7	109.1	33.4	0.0
October	8.4	2.2	41.0	0.95	39.0	89.7	50.7	0.0
November	2.6	0.4	12.2	0.80	9.7	103.0	93.3	0.0
December	-3.3	0.0	0.0	0.74	0.0	108.4	108.4	0.0
TOTALS	**6.8**	**34.3**			**582.2**	**1087.2**	**600.5**	**95.4**

TOTAL WATER SURPLUS **505.0** **mm**

NOTES:

1) Water budget adjusted for latitude and daylight.

2) (°C) - Represents calculated mean of daily temperatures for the month.

3) Precipitation and Temperature data from the Hanover Climatic Station latitude 44°06'59.058" N, longitude 80°00'21.042" W, elevation 270 masl

4) Total Water Surplus (Thornthwaite, 1948) is calculated as total precipitation minus adjusted potential evapotranspiration.