Hydrogeological Assessment
Petersburg Sand and Gravel

Pit Above the Water Table

Township of Wilmot

Regional Municipality of Waterloo

Prepared For: Petersburg Sand and Gravel

April 5, 2022

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Executive Summary

Petersburg Sand and Gravel is applying to the Ministry of Natural Resources and Forestry for a Class A, Above Water Table Pit.

The proposed extraction area is 27.54 hectares and is located on the Waterloo Moraine in an area with similar extractive operations already active on adjacent properties. These operations all mine to greater depths than proposed by Petersburg Sand and Gravel. The proposed minimum elevation of the proposed mining is 354.9 m AMSL.

No permit to take water is being considered, therefore there are no potential cumulative water taking issues on a regional scale or local scale.

The extraction area has been purposely curtailed to be outside of the surface water catchment areas of adjacent vernal pools and wetlands. There will be no change to surface water or groundwater contributions to any natural heritage feature.

The water table is found between 15 and 38 metres below ground surface, resulting in a considerable thickness of unsaturated sand and gravel. The depth of extraction has been limited to a minimum of 1.5 metres above the high-water table. There is a layer of clay that will be mined for cover material or other purposes to allow for access to additional sand and gravel deposits. This would only occur in the northeastern portion of the site.

The extraction area is found within the Well Head Protection Area of Regional of Waterloo municipal wells. The extraction area is found within the WHPA-C of the W07/W08 Erb Street Well Field (1.3 kilometres distant) and the WHPA-D of the Mannheim Peaking Well Field (4.5 kilometers distant). The immediately adjacent extractive area and two other extractive areas are also in these Well Head Protection Areas. Source Water Protection implications include an increase in the vulnerability score of the underlying aquifers and this site will be identified as a potential transport pathway. Aggregate extraction is not a prohibited activity in the Well Head Protection Areas and appropriate precautions will be taken to minimize the potential for spills.

There will be no mining into the water table, therefore there cannot be an impact to either quantity or quality of water available to private water wells.

It is the opinion of Harden Environmental Services Ltd. that the proposed mining operation should be approved by the Ministry of Natural Resources and Forestry, the Region of Waterloo and the Township of Wilmot.

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1.0 Introduction

Harden Environmental Services Ltd. was retained by Petersburg Sand and Gravel in November of 2020 to conduct a hydrogeological evaluation for the development of the Petersburg Sand and Gravel pit located in Lot 5, German Block North of Snyder's Road, Wilmot Township, Regional Municipality of Waterloo (Figure 1). The site is accessed from 1856 Snyder's Road East. No aggregate extraction will occur below the water table. A minimum pit elevation of 354.9 m Above Mean Sea Level (AMSL) is being requested. This maintains the pit floor at least 1.5 metres above the high-water table.

1.1 Study Scope

The 28-hectare (69 acre) site ("the Site") is situated northwest of the London to Toronto CNR Rail Line (Figure 2) which bisects lands owned by Petersburg Sand and Gravel. The entire property is 36 hectares. The Site is located in the Alder Creek Subwatershed, part of the Grand River Watershed (Figure 3). Potential impacts to these waterways have been considered in this report. Local well water supply is obtained from the sand and gravel aquifer. Potential impacts to private water wells have been considered in Section 7.1. A non-Provincially Significant Wetland (Waldau West Wetland Complex) is located adjacent to the Site in the northwest corner of the larger parcel owned by the applicant and off-site to the north. Potential impacts to these wetlands are considered in Section 2.7, 4.3 and 7.3 of this report. The site is located in the Well Head Protection Area C (WHPA-C) of the Erb Street and the Peaking Well fields WHPA-D. Implications of mining have been considered in regard to Source Water Protection.

The objectives of this study are to:

i. define the local hydrogeological setting,
ii. determine the local water table elevation,
iii. assess the extent of local groundwater / surface water interaction,
iv. determine the potential for adverse effects to water wells, springs, wetlands, ponds,
v. evaluate any potential impact to municipal water supply and
vi. recommend measures to minimize any significant impacts identified.

This study meets the requirements of the Level I and Level II Hydrogeological Assessments as required under the *Aggregate Resources Act* and reporting required by the Regional Municipality of Waterloo Official Plan.

A preconsultation study plan was presented to the ROW and the GRCA in April of 2021. The comments from the Region resulted in an additional well (BH5) being installed at the site.

2.0 Physical Setting

2.1 Site Description

The Site is located north of Snyder's Road East approximately 900 metres east of Notre Dame Drive in the Regional Municipality of Waterloo. The lot fabric is oriented southeast to northwest. The Site has a width (northeast to southwest) of 250 metres and has a maximum length (southeast to northwest) of 1050 meters.

The site is presently zoned agriculture (Figure 4).

There are seventeen civic addresses with potential residences within 500 metres of the Site. The nearest residential dwelling to the Site (1826 Snyder's Road East) is approximately 120 metres away accessed from Snyder's Road East (Figure 5).

A railway corridor is located along the southern edge of the site (Figure 2). Additional lands owned by the applicant are found between the railway corridor and Snyder's Road.

The lands immediately north of the site are a forty-metre-wide hydro corridor. Forests and wetlands are located north of the hydro corridor. The lands immediately to the west are cash crop fields and to the east is a licensed aggregate extraction area (Arriscraft).

A number of aggregate sites are found in the general area of the Site as shown on Figure 6. Arriscraft is licensed to an elevation of 352 m AMSL and Tri City Materials is licensed to an elevation of 348.5 m AMSL.

Wetlands and water bodies in the area are shown on Figure 7. The nearest environmental feature considered in this study is part of the Waldau West Wetland Complex found along the western border of the Site. The wetland is in the headwater area for Alder Creek although a direct surface water connection between the wetland and Alder Creek does not exist.

There are lands within the proposed aggregate license boundaries that are also within 120 metres of the wetland. These lands are regulated by the Grand River Conservation Authority (GRCA). There are no ponds, wetlands, streams or vernal pools within the proposed aggregate extraction boundaries. The proposed extraction area was modified to maintain catchment areas for the wetlands and vernal pools.

2.2 Climate

According to the climate data obtained by Environment Canada between 1973 and 2015, the normal annual precipitation in nearby Kitchener/Waterloo is 889 mm. Of this, a significant quantity is returned to the atmosphere by evaporative and evapotranspiration processes. The evapotranspiration is estimated to be 55% of precipitation. The remaining 'surplus water' available for runoff or infiltration is approximately 400 mm/year.

2.3 Physiography

According to Chapman and Putnam (1986) the Site is located within the Waterloo Moraine physiographic region (Figure 8). The Site is in a regionally upland area forming the headwater area of Alder Creek.

2.4 Bedrock Geology

The site is underlain by the Upper Silurian aged Salina Formation (Figure 9). The Salina Formation comprises shale and dolostone rock types. Water well record 6507461 (Figure 25) drilled to 102 metres logs the shale and limestone beginning at 93 metres below ground surface. The ground surface at this well is approximately 370 m AMSL; therefore the top of bedrock in this area is at approximately 281 m AMSL. Given the Site elevation range of 367 to 396 m AMSL and the above-water-table designation of the pit, the bedrock does not influence the hydrogeological regime affected by the proposed pit expansion.

2.5 Quaternary Geology

Ice contact stratified sand is identified as the main surficial geological unit beneath this site (Figure 10). However, the moraine is a complex sequence of various glacial deposits resulting from the advance and retreat of the Lake Huron, Georgian Bay, Lake Erie and Lake Ontario ice lobes (Blackport, 2009). The more than 100 metres of glacial material includes both relatively permeable (aquifers) and relatively impermeable (aquitards) stratigraphic layers. The youngest deposits occur near to the ground surface and although glacial tills have been identified elsewhere at the surface on the Waterloo Moraine, this does not occur at this site.

2.6 Topography and Drainage

The elevation of the Site ranges from 367 m AMSL to 397 m AMSL (Figure 11). The minimum elevation within the proposed licensed area of 367 m AMSL occurs in the south central portion of the site adjacent to the railway line. The highest topographical point of 397 m AMSL is found in the northeast corner of the extraction area.

The topography is undulating with two northwest to southeast trending valleys between two topographically elevated areas. There is seasonal water held in a depression located in the northern valley. It has been observed to hold water in the spring and fall but has also been tilled and planted with crops indicating the seasonality of the wet periods. No seasonal water has been observed in the southern valley.

The soil beneath the Site is a silty sand. Regional Soil types include Lisbon sandy loam and Waterloo fine sandy loam as shown on Figure 12.

2.7 Natural Heritage Features

We have reviewed the draft Natural Heritage Report prepared by Dance Environmental and note the following natural heritage features near to the site.

Streams

There are no permanent streams near to the site (Figure 7).

Ponds

There are no natural ponds or otherwise within the proposed extraction area.

Wetlands

The Waldau West Wetland Complex is located north and west of the proposed extraction area. These features were identified early in the planning process and the proposed extraction areas have been designed to remain outside of the surface water catchment of these features. Details of these wetlands can be found in the Dance Environmental natural heritage report.

The Dance Report identifies an Open Water Aquatic community on an adjacent property north of the hydro corridor. The elevation of this pond is approximately 382 m AMSL. There are no streams flowing into this pond and there are no streams flowing out of the pond. The surface water catchment area of this pond extends onto lands owned by the applicant; however, the proposed extraction area will remain outside of the surface water catchment area (Figure 13). In this way, the surface water catchment area is preserved and no change in support surface water hydrology for the wetland is expected to occur.

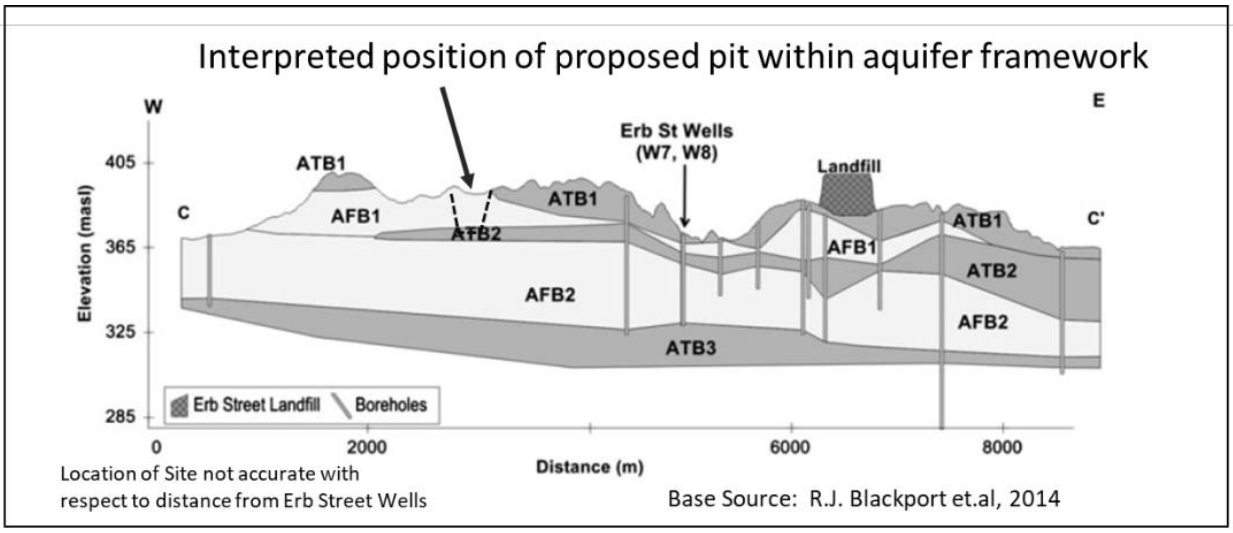
Dance Environmental also identified a wetland feature in the Sugar Maple Deciduous Forest located on adjacent lands owned by the applicant. Harden observed seasonal ponded water in two locations in this forest. Staff gauges were installed in these ponded areas to determine their hydroperiod. SG1 is installed in a small depression (vernal pool) and SG2 is installed in the wetland. The elevation of the ground surface of the vernal pool is approximately 380.4 mAMSL

and the elevation of the wetland is 381.4 m AMSL. The catchment areas for the vernal pool and the wetland will be maintained at all times during and following cessation of aggregate extractive activities. In this way the support surface water contributions will not be altered.

2.8 Regional Hydrogeology

The site is located on the Waterloo Moraine and R.J. Blackport et.al (2014) provide a regional perspective of hydrogeology of the Waterloo Moraine. Given the framework provided by Blackport (Figure 14), it is our interpretation that this site falls within Aquifer 1 (AFB1) also known as Upper Waterloo Moraine Sediments. These sediments are described by Blackport et. al. as being mainly fine sand, some gravel. These are also the geological conditions found during the on-site drilling. We have superimposed the site location on the cross section prepared by Blackport et. al. and see that it falls within AFB1 and the clay layer is likely part of ATB2.

Figure 14: Regional Hydrostratigraphy



Based on the interpretation by Blackport et.al., AFB1 and AFB2 are connected west of the site but separated by ATB2 beneath the site and east of the site. We note that the adjacent Arriscraft aggregate site and the Germet aggregate site are licensed to a lower elevation than the proposed licensed elevation of this site.

The Erb Street Wells are shown to be completed in aquifer AFB2. These wells are 1.3 kilometers from the site.

2.9 Source Water Protection

The site is found within the 5 to 25-year time of travel (WHPA-D) for the Peaking Well Field well K93/K94 and the 2-5 year time of travel (WHPA-C) for the Erb Street Wells W07/W08 (Figures 15 and 16).

The intrinsic vulnerability score for the site (Peaking Well Field) is Moderate (Figure 17). However, as noted in the adjacent extraction areas, the intrinsic vulnerability score has been modified to High Vulnerability after extraction occurs. The same will occur for this site.

The vulnerability score (Figure 18) of the proposed extraction area is 4 (Score of 2 being lowest vulnerability and Score of 10 being highest vulnerability). Upon extraction, the vulnerability score will likely increase to 6, based on scoring at adjacent sites.

The vulnerability score for this site for the Erb Street Well Field ranges from 2 to 6 (Figure 19).

The Intrinsic Vulnerability Score (Figure 20) for the site is Moderate (Erb Street Well Field). However, the adjacent above water table pits have been designated High risk.

The adjacent aggregate sites have been designated Transport Pathways for the Erb Street Well Field (Figure 21). It is likely this site will be treated in the same manner.

The site is found in a Significant Groundwater Recharge Area (Figure 15).

The site is not found in a highly vulnerable aquifer zone (Figure 15).

The site is not found in an Issue Contributing Area (Figure 22).

The site is not found in a Groundwater Under the Influence of Surface Water (GUDI) protection zone (Figure 23).

The site is not found in a Significant Drinking Water Threat Policy area (Figure 24).

Aggregate extraction is already occurring under the same source water protection situation adjacent to the proposed Petersburg Sand and Gravel pit. The source water protection policies allow for the mining of aggregate in WHPA-C and WHPA-D.

2.10 Local Water Supply

Local water supply is mainly from the overburden aquifers. Local wells found on the Ministry of the Environment, Conservation and Parks database are found on Figure 25 and pertinent water well records are found in Appendix A. The locations of the water well records have not been

ground truthed. The position of the water table will not be affected by the proposed above-water-table mining, therefore there can be no impact on the well yield in private wells.

3.0 Study Methodology

3.1 Monitor Installation Program

Five boreholes were drilled at the site between April 2019 and November 2021 by Altech Drilling and Investigative Services Inc. The boreholes were advanced to below the water table and completed with 50 mm diameter monitoring wells in BH1, BH3, BH4 and BH5. The drilling of BH1 through BH3 were supervised by MTE Consultants Inc. and drilling and installation of BH5 was supervised by Harden Environmental Services Ltd. Borehole logs are found in Appendix A. The monitors installed in the boreholes are designated BH1 to BH5 and are shown on Figure 26. Completion details are summarized in Table 1.

Table 1: Summary of Monitor Installation Details

Monitor	Easting	Northing	Installation Date	Well Pipe Inside Diameter	Type	Ground Elevation (m AMSL)	Top of Well Pipe Elevation (m AMSL)	Stick-up (m)	Monitor Depth (mbct)	Monitor Depth (mbgs)	Screen Length (m)
BH1	532060	4808043	29/Mar/2019	2"/51mm	Drilled Monitor	382.62	383.32	0.70	39.93	39.23	1.52
BH3	532902	4807382	30/Apr/2019	2"/51mm	Drilled Monitor	371.42	372.40	0.98	25.16	24.18	1.52
BH4	532594	4807377	05/Jan/2021	2"/51mm	Drilled Monitor	368.11	369.21	1.10	26.23	25.13	3.05
BH5	532276	4808165	12/Nov/2021	2"/51mm	Drilled Monitor	389.29	390.17	0.88	40.99	40.11	3.05
SG1	532034	4808135	12/Jan/2021	1.25"/32mm	Standpipe	380.37	381.95	1.58	2.98	1.40	2.98
SG2	532011	4808112	18/May/2021	1.25"/32mm	Standpipe	381.20	382.56	1.36	2.01	0.65	1.52

SG1 and SG2 are wetland monitors installed in vernal pools in the forested area northwest of the site.

3.2 Geodetic Level Survey

The geodetic top-of-pipe elevations were determined by total station and rod and level.

3.3 Water Level Monitoring

Groundwater level and wetland water level observations have been obtained on a regular basis since the monitors were installed. Manual water levels are obtained periodically with an electric water level meter. Data loggers have been installed in each of the monitoring wells, SG1 and SG2. The dataloggers are recording at one-hour intervals. A barologger installed nearby is used to compensate the water level data for changes in barometric pressure.

Manually obtained water level measurements are provided in Appendix B, Table B1 and data logger data is shown graphically in the hydrographs also located in Appendix B.

3.4 Private Well Survey

A private well survey will be conducted in the Spring of 2022.

3.5 Hydraulic Testing

Hydraulic testing was conducted in monitors BH1, BH3, BH4 and BH5 on January 11, 2022. This testing was conducted using the Falling Head and Rising Head methods. These tests involve adding or removing a known volume (a solid slug was used) into the monitoring well and measuring the water level as it returns to pre-test or static level. The observed change in the water level with time was used to estimate the hydraulic conductivity of the hydrostratigraphic unit using the Hvorslev method as described by Freeze and Cherry (1979). An estimate of the hydraulic conductivity is determined using the following method (Hvorslev, 1951);

$k = r^2 \ln(L/R) / 2LT_o$

Where

k = hydraulic conductivity (m/s)

r = radius of the well (m)

L – length of screen (m)

R – radius of borehole (m)

T_o – lag time obtained from graph (s)

The data from these tests was analyzed using the Aqtesolv™ program. The results of which are included in Appendix C and summarized in Table 2.

Table 2: Summary of Hydraulic Testing

Monitor	Slug Removal	Slug Added
BH1	9.6×10^{-5}	1.1×10^{-4}
BH3	8×10^{-6}	1.2×10^{-5}
BH4	1.2×10^{-5}	1.4×10^{-5}
BH5		4.1×10^{-5}

3.6 Water Quality

Groundwater samples were obtained from on-site groundwater monitors to characterize the existing groundwater quality beneath the Site. The sampling locations are BH1, BH3, and BH4. The samples were obtained on May 11, 2021 and on September 2, 2021. The samples were

obtained after the removal of three well volumes. The samples were analyzed for general chemistry, nutrients, anions, DOC and dissolved metals. The results of the testing are found in Appendix D.

All analyses were conducted by AGAT Laboratories in Mississauga.

4.0 Results

4.1 Geology

On-site geological conditions have been determined by logging the drilling of boreholes BH1 through BH5. The drilling confirmed that the site is underlain by glacially derived sediments, both ice contact sand and gravel and lacustrine sand and silt. Our observations from drilling BH5 are provided in Table 3 as follows with the ground elevation being 389.49 m AMSL.

Table 3: Geological Observations BH5

From (m)	To (m)	From (m AMSL))	To (m AMSL)	Material Description
0.0	0.3	389.29	388.99	Dark, organic rich topsoil
0.3	0.6	388.99	388.68	Dark brown, sand, medium grained
0.6	2.0	388.68	387.33	Brown, sand and gravel, angular stones, fine-medium grained sand matrix
2.0	2.0	387.33	387.26	Dark brown silty till
2.0	3.0	387.26	386.24	Dark brown, sand, layered, fine sand and medium grained sand
3.0	3.2	386.24	386.09	Fine Sand
3.2	3.4	386.09	385.94	Sand and Gravel
3.4	3.6	385.94	385.66	Fine Sand
3.6	5.1	385.66	384.21	Light coloured fine sand layered with dark coloured very fine sand
5.1	5.2	384.21	384.06	Dark Brown fine sand/silt
5.2	6.1	384.06	383.19	Layered fine sand and medium grained sand with 50 mm silt layer
6.1	7.6	383.19	381.67	Light coloured fine sand
7.6	10.3	381.67	379.00	Light coloured fine sand, layered
10.3	10.4	379.00	378.93	Brown silt
10.4	13.7	378.93	375.57	Light coloured fine sand, layered
13.7	15.6	375.57	373.64	Fine sand grading to very fine sand
15.6	15.7	373.64	373.57	Dark Brown Silt
15.7	19.3	373.57	369.99	Brown Sand
19.3	23.3	369.99	365.97	Grey clay, dense
23.3	24.4	365.97	364.91	Very fine sand
24.4	25.9	364.91	363.38	Fine Sand
25.9	35.1	363.38	354.24	Medium grained sand some stones
35.1	41.1	354.24	348.14	Fine Sand

The geological materials from ground surface to 19.3 metres (370 m AMSL) are predominantly glacial deltaic deposits. There is evidence of layering within the sand deposit as wells intermittent

layers of silt. The lacustrine deposits are mainly sand indicating deltaic deposits within a glacial lake. A significant thickness of clay/silt occurs at the base of the upper sand unit. At BH5 the clay deposit was four metres thick. At BH2 more than 16 metres of continuous silt and clay are recorded and at BH3 the clay/silt deposit was more than six metres thick.

The observed layering is also confirmed in the open face of the adjacent active gravel pit. The elevation of the base of the adjacent pit is estimated to be 365 m AMSL and is thus below the clay layer. The adjacent pit is licenced to a depth of 352 m AMSL.

The geological conditions based on on-site wells and water well records are interpreted in cross sections presented in Figures 27, 28 and 29. In general, there is a sandy unit near the ground surface. This is interpreted to be aquifer AFB1. There is a silt/clay unit beneath the sand and this is interpreted to be ATB1. A sand unit identified in BH5 underlies the silt/clay unit and is interpreted to be AFB2. Although we have attempted to extend these units off-site, the water well records are generally not detailed enough to make definite "picks" of the regional aquifer units.

4.2 Hydrogeology

The water table is found in each of the groundwater monitors to occur below or within the observed clay layer. Extraction will remain above the water table and thus, no disturbance of the position of the water table can occur. During the extractive period, vegetation will be removed, and evapotranspiration will thus decrease. This will result in a greater volume of water being available for infiltration within the pit.

4.2.1 Groundwater Elevations

The water table has been confirmed in the four boreholes, BH1 through BH5. The elevation of the high-water table measured at the site ranges from 352.9 m AMSL in BH1 to 352.2 m AMSL in BH3. The data logger data shows that there was a steady decline in groundwater levels in 2021 with a levelling out and small increase in water levels beginning in January 2022. It is unlikely that the early 2021 data represents the highest groundwater levels. We have reviewed the water level data for the nearby Germet Pit (Monitor BH101-15A) and as shown in Appendix B the groundwater levels in early 2021 do not represent the highest in the past 10 years. In order to maintain a 1.5 m from the highest groundwater level, we recommend maintaining a two-metre separation from the observed early 2021 high groundwater levels. Table 4 summarizes the observed high groundwater elevations and the recommended minimum pit floor elevation.

Table 4: Summary of High Groundwater Elevations and Recommended Pit Floor Elevation

Station	Highest Recorded Water Level (m AMSL)	Recommended Minimum Pit Floor Elevation (m AMSL).
BH1	352.9	354.9
BH3	352.2	354.2
BH4	352.8	354.8

The water level in BH5 confirms that unsaturated conditions occur beneath the clay layer in the northeast area of the site. There are no artesian conditions at the site and limiting extraction to above the water table eliminates the potential for alteration of groundwater flow paths within the aquifer.

The elevation of the position of the water table decreases from west to east resulting in an easterly groundwater flow direction. The direction of groundwater flow is shown on Figure 30.

MTE (2019) reports water levels obtained from groundwater monitor MW3A/3B located on the adjacent Arriscraft property. The multi-level monitor is completed at depths of 88 and 56 metres. The water level in the deeper monitor (MW3A) is reported to be 47.66 metres below casing top and the shallow monitor (MW3B) is reported to be 38.6 metres below casing top. Both monitors are completed in the overburden. The vertical hydraulic gradient is thus downward. The well record for BH3A/B is provided in Appendix A (TAG A063942).

4.2.2 Water Table Elevation With Respect To Wetlands

The wetland feature in the Maple Sugar Deciduous Forest and the wetland located north of the hydro corridor have elevations greater than 381 m AMSL. This is approximately thirty metres above the established water table. The wetland features are not supported by groundwater below the established water table.

We have also considered whether or not the wetland feature in the Maple Sugar Deciduous Forest is supported by a perched water table. Our observations are that the lower-elevation vernal pool was dry at the time there was standing water in the wetland. The SG1 hydrograph shows that when the water level beneath the vernal pool was less than 379 m AMSL, the wetland (Station SG2) immediately adjacent had a water level of greater than 380.5 m AMSL. This one and a half metre water level difference makes it clear that a shallow groundwater system does not support the wetland feature (otherwise the vernal pool would also have ponded water).

4.2.3 Water Quality

The water samples obtained in May and September 2021 have similar concentrations of major anions and cations. Nitrate concentrations are found to range from 1.5 to 5.5 mg/L. Agricultural fertilizers are the main source of nitrate. Table 5 summarizes several chemical parameters from the water samples.

Table 5: Water Quality Parameters

Parameter	BH1		BH3		BH4	
Date	May 11, 2021	Sept 2, 2021	May 11, 2021	Sept 2, 2021	May 11, 2021	Sept 2, 2021
Electrical Conductivity (mhos/cm)	658	697	586	602	547	491
Hardness (mg/L)	324	341	295	284	244	219
Chloride (mg/L)	18.6	19.4	7.45	6.64	23.2	8.66
Nitrate (mg/L)	1.53	1.48	4.56	5.52	<0.05	<0.05
Sulphate (mg/L)	23.9	29.1	85.3	73.9	35.6	53.2
Calcium (mg/L)	95.1	101	75.6	72.7	38.9	51.3
Magnesium (mg/L)	21.0	21.5	25.8	25.0	23.0	22.1

5.0 Proposed Extraction

It is proposed to extract aggregate from above the water table at this Site. The proposed limit of extraction is shown on Figure 26. Details of the phasing and operations of the Site can be found on the Site plans prepared by IBI Group (2021). The Site will be extracted in four phases as shown on the operation plan prepared by IBI Group. The maximum depth of extraction will remain at least 1.5 metres above the water table and the minimum allowable pit floor elevation ranges from 354.2 to 354.9 across the site.

5.1 Level 2 Evaluation

Given the local presence of wetlands a Level 2 evaluation as described by the Ministry of Natural Resources and Forestry standards for aggregate license applications, is warranted. Table 6 summarizes the need for a Level 2 assessment.

Table 6: Evaluation of Need for Level 2 Hydrogeological Assessment

Category	Level 1 Assessment	Level 2 Assessment Needed?
Water Wells	Water wells are within 120 metres.	Level 2 Assessment for water wells required.
Springs	No springs identified.	No Level 2 assessment needed to assess potential impact on springs.
Groundwater Aquifers	Above water table extraction.	Level 2 assessment required to evaluate the potential water quality impact of loss of unsaturated zone and removal of clay layer.
Discharge to Surface Water	There is presently no hydrological from the site to surface water features	Level 2 assessment is not required to evaluate the impact of changes to ponds or streams.
Water Diversion, Storage and Drainage Facilities On-Site	No water diversion, storage or drainage facilities associated with proposed extraction.	A Level 2 assessment is not required to address alterations to water diversion, storage and drainage facilities.
Water Balance	There will be a temporary increase in groundwater recharge during extraction phases.	Level 2 assessment is needed to evaluate changes in the water balance.

6.0 Level 2 Assessment

The following areas will be assessed as part of the Level 2 assessment.

1) Impact to off site vernal pool and offsite wetlands
2) Water quality impact to sand and gravel aquifer
3) Water quantity impact to sand and gravel aquifer

6.1 Effect of Aggregate Extraction on Water levels

The removal of aggregate at this site will result in the alteration of the topography and thus potentially change groundwater recharge. A water balance approach has been used to evaluate and is described as follows;

6.1.1 Water Balance

The water balance for the site prior to the proposed development has been determined using the basic formula of

P = E + R + I

Where;

P – precipitation (mm/year)

E - evapotranspiration (mm/year)

R – runoff (mm/year)

I – infiltration (mm/year)

There are two drainage areas on the site as shown on Figure 31. Table 7 summarizes the hydrology of each of the drainage areas. The volume of infiltration within each drainage area was estimated using the MECP guideline for infiltration found in the document titled "*Hydrogeological Technical Information Requirements for Land Development Applications"*. The partition of surplus water into infiltration and runoff is estimated using an infiltration factor. The infiltration factor is based on topography, soil type and vegetation and for the drainage areas at this site is 0.6. Where surplus water remains on-site as within closed depressions, the infiltration factor is 1 as ultimately all of this water will infiltrate. An infiltration factor of 1 was also used where it is known that all off-site runoff will also infiltrate (e.g. runs off into adjacent pit).

Table 7: Description of Drainage Areas

Micro Drainage Area	Size (ha)	Hydrology
D1	9.16	Southern drainage area with no obvious drainage pathway off-site along railway and no drainage along western property line. All surplus water infiltrates.
D2	15.12	Northern drainage area converging on central swale that directs runoff offsite into the adjacent pit. In this way, all runoff is considered to be captured and infiltrate.

Table 8 summarizes the pre-development water balance for the site. The infiltration value is determined by multiplying surplus water (Precipitation – Evapotranspiration) by the infiltration factor. Runoff is determined by subtracting infiltration values from the surplus water value.

Table 8: Pre-Extraction Water Balance for Entire Site

		Pre Extraction Water Balance			
	Area	Precipitation	Evapotranspiratio	Runoff	Infiltration
	(hectare)	(m^3/year)	(m^3/year)	(m^3/year)	(m^3/year)
Pre Development					
Drainage Area D1	9.16	81,444	44,794	-	36,650
Drainage Area D2	15.12	134,448	73,946	-	60,502
Pre Development Summary	24.28	215,892	118,741	-	97,151

The water balance shows that a main hydrological function of this site is groundwater recharge (infiltration). Full summary of water balances are found in Appendix E.

The proposed aggregate extraction will alter the topography of the site including the catchment areas. Much of the licensed area will be at a lower elevation than the surrounding lands and therefore will be internally draining. There will be a significant decrease in evapotranspiration due to the removal of vegetation during active extraction. We have assumed that there will be ten hectares of disturbed land and the evapotranspiration will decrease by 50% in that disturbed area.

Figure 32 depicts the two drainage areas on the site during active extraction and post-extraction. Drainage area 1 (PE1) is the resulting pit area. All surplus water will infiltrate. Drainage area PE2 is the setback area that is presumed to have all runoff flowing into the pit and infiltrate therein.

The Active Phase of pit development water balance for the site is summarized in Table 9.

Table 9: Active Extraction Water Balance for Entire Site

	Area	Precipitation	Evapotranspiratio n or Evaporation	Runoff	Infiltration
Active Development	(hectare)	(m^3/year)	(m^3/year)	(m^3/year)	(m^3/year)
PE1	22.52	200,172	110,094	-	90,077
PE2	1.77	15,720	8,646	-	7,074
Disturbed Land Benefit	10.00		- 24,448		24,448
Active Development Summary	**24.28480**	**215,892**	**94,293**	**-**	**121,599**

Note: The Disturbed Land Benefit arises from the removal of vegetation and subsequent decrease in evapotranspiration.

The differences between pre and active development in water balance is summarized in Table 10.

Table 10: Water Balance Change between Pre and Active Development for Entire Site

	Area	Precipitation	Evapotranspiratio	Runoff	Infiltration
	(hectare)	(m^3/year)	(m^3/year)	(m^3/year)	(m^3/year)
Pre Development Summary	24.28	215,892	118,741	-	97,151
Active Development Summary	24.28	215,892	94,293	-	121,599
Difference	-	-	- 24,447.50	-	24,448

This table shows that 24,448 more cubic metres of water will infiltrate on the site during active site development because the site will be completely internally draining, no water will be lost to runoff and there is less evapotranspiration.

The difference between pre and post pit development is shown in Table 11. This table shows that because all runoff is captured before and after pit development, there is no change in the water balance.

Table 11: Water Balance Change Between Pre Development and Post Development Site

	Area	Precipitation	Evapotranspiration	Runoff	Infiltration
	(hectare)	(m^3/year)	(m^3/year)	(m^3/year)	(m^3/year)
Pre Development Summary	24.28	215,892	118,741	-	97,151
Post Development Summary	24.28	215,892	118,741	-	97,151
Difference	-	-	-	-	-

6.2 Aggregate Extraction and Water Quality

Aggregate production does not require the use of any chemicals for either the extraction (digging) or processing (conveyors, crushers, sorters etc.). Chemicals are used for;

- machinery, mainly for lubrication, cooling and fuel,
- suppressing dust at the site

6.2.1 Lubricants, Fuels and Coolants

Although the possibility exists of a gas tank rupture, hydraulic hose failure or coolant leak, these are rare events involving relatively small quantities of chemicals and are easily and quickly mitigated through a Spill Response Protocol. In over twenty-five years of monitoring aggregate pits and quarries, Harden Environmental has never encountered a water quality impact. Nonetheless, a Spill Response Protocol has been designed for this Site and will be used to mitigate any potential spill (see Section 6.2.3).

Any fuel stored on-site will be done in accordance with Technical Standards and Safety Association regulations.

6.2.2 Dust Control

Dust will only be controlled with water on the internal road system.

6.2.3 Spill Response

A spill response protocol has been established for the Site. In the unlikely event of a contaminant spill, the procedures outlined in the Spill Response Protocol (Appendix F) will be followed.

6.2.4 Change in Thickness of Unsaturated Zone

The travel time for water passing through the unsaturated zone will decrease. Investigations for the proposed Hallman Pit (elsewhere in Wilmot Township) found that nitrogen applied for agricultural purposes did not adhere to or be held within the underlying aggregate material. Elevated nitrate concentration measured in the underlying groundwater led to the conclusion that nitrogen readily passes through the aggregate to the water table (Harden, 2020). The aerobic conditions and absence of carbon sources in the unsaturated sand deposits are not favourable for denitrification. The elevated nitrate concentrations found in BH3 at this site are evidence that nitrogen also passes through the unsaturated zone at this site. Therefore, decreasing the thickness of the unsaturated zone will not result in greater nitrate contamination of groundwater post aggregate extraction and resumption of agricultural practices.

7.0 Conclusions and Recommendations

The following sections will discuss the conclusions and recommendations arising from this hydrogeological study.

7.1 Private Water Wells

No groundwater quality changes are likely to occur from the proposed aggregate extraction. Chemicals are not used in the extractive process and any potential spill can be readily addressed with on-site equipment. As determined from groundwater flow directions in the unconfined aquifer, there are no private wells for at least 1.5 kilometers downgradient of the site. However, there are three operational pits downgradient of the site that have been operational for decades. To our knowledge, there have been no water quality impacts from the existing sites and thus none expected from this site.

The site will remain above the water table, therefore, there will be no change in water quantity available to any private well.

7.2 Source Water Protection

There will be no direct impact to water quality or quantity in any of the municipal wells. The site activity does not require the use of chemicals for the extraction of the aggregate and is a permitted use in a well head protection area. Any fuel stored on-site (if any) will be done in accordance with Technical Standards and Safety Association regulations.

The development of this site will not result in the alteration of groundwater flow in the Well Head Protection Areas. There will be no long-term alteration of groundwater recharge within the source water protection area. There will be a temporary increase in groundwater recharge

during the active extraction. There will be a change in the thickness of overburden overlying the aquifer resulting in an increase to the vulnerability score. Also, as shown to be the case with adjacent aggregate sites, this site will be identified as a Transport Pathway.

7.3 Wetlands

The Site has been deliberately located outside of the catchment of the small wetland and vernal pool located in the Maple Sugar Deciduous Forest. There will be no change in surface water support hydrology for the wetland or vernal pool.

The Site has been deliberately located outside of the catchment of the open water feature located north of the hydro corridor. There will be no change in surface water support hydrology for the wetland.

The wetlands and vernal pool are not supported by the water table nor are they supported by perched groundwater beneath the extraction area. There is no groundwater component of hydrological support for the wetland.

The established hydroperiod of the vernal pool and wetlands will not be altered because of aggregate mining at this site.

7.4 Alder Creek

There is no direct surface water connection between the Site and Alder Creek. There are no surface water pathways over or under the railway corridor to allow southerly passage of water from the site.

7.5 Proposed Water Diversion/Storage/Drainage Areas

There is no proposed water diversion associated with this site. There is no proposed water storage associated with this site.

7.6 Water Balance Changes

The site is located in the Alder Creek Subwatershed. Only above water table extraction will occur at this site. There is no change in runoff or infiltration at this site. In this way there will be no cumulative impact from the proposed development.

8.0 Monitoring Program

We propose that water level monitoring be continued with data loggers in monitors BH1, BH3, BH4 and BH5 on a continuous basis (every four hours) with data downloads every six months. An

annual report will be prepared and provided to the Region of Waterloo and the Township of Wilmot.

9.0 Mitigation Measures

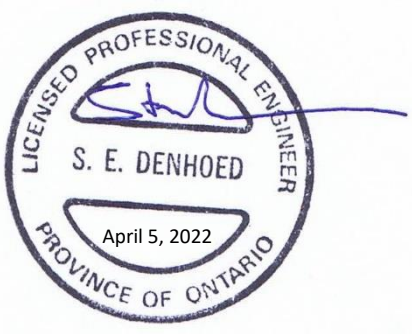
No mitigation measures are recommended.

10.0 Closure

Please do not hesitate to contact us if you have any questions regarding this submission.

All of Which is Respectfully Submitted,
Harden Environmental Services Ltd.

Stan Denhoed, M.Sc., P. Eng.
Senior Hydrogeologist



11.0 References And Other Supporting Documents

Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 228. Copyright © Queen's Printer for Ontario

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Ontario Ministry of Agriculture, Food and Rural Affairs, Agriculture and Agri-Food Canada, Ministry of Natural Resources, 2011, Soil Survey Complex.

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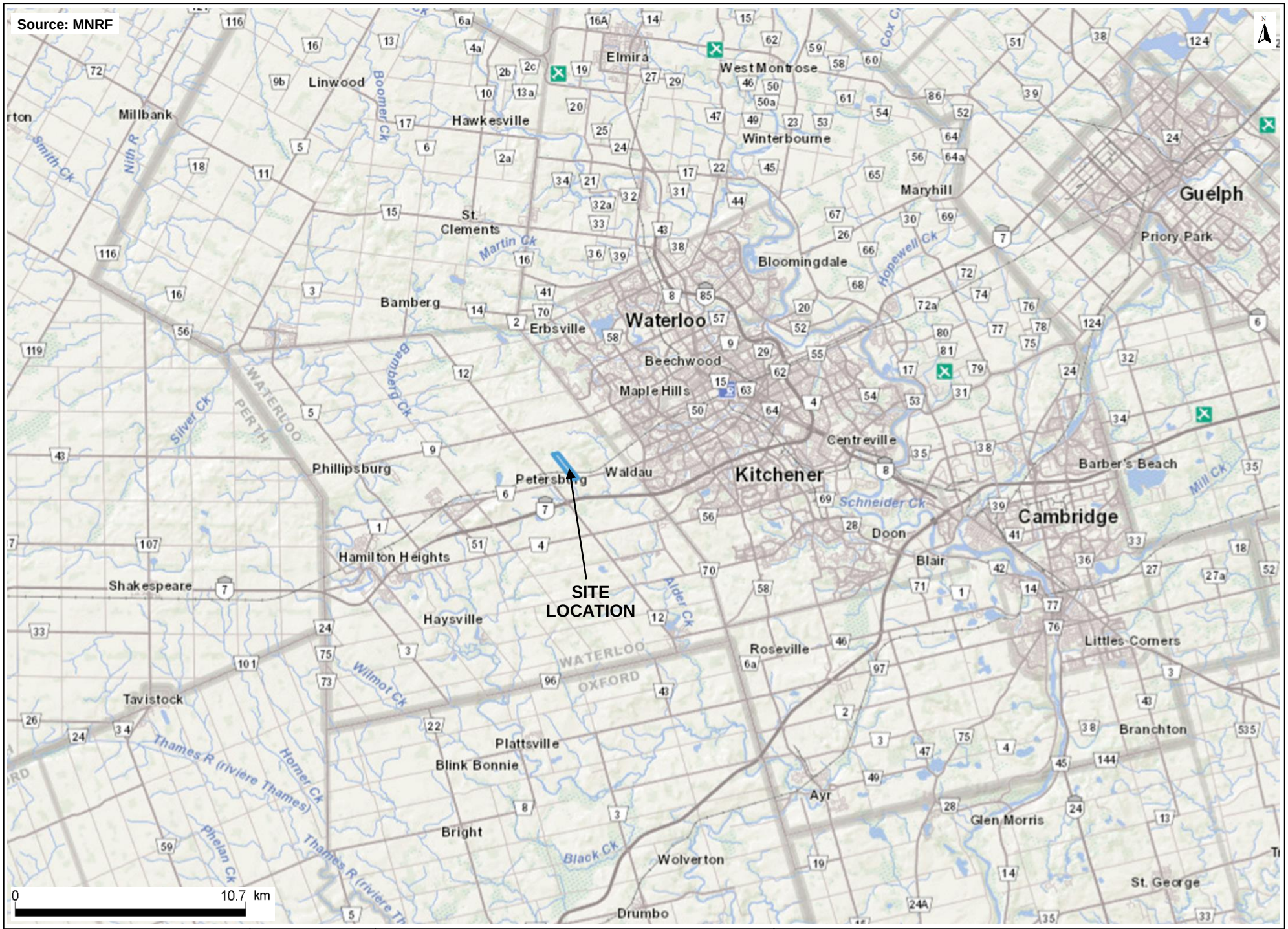
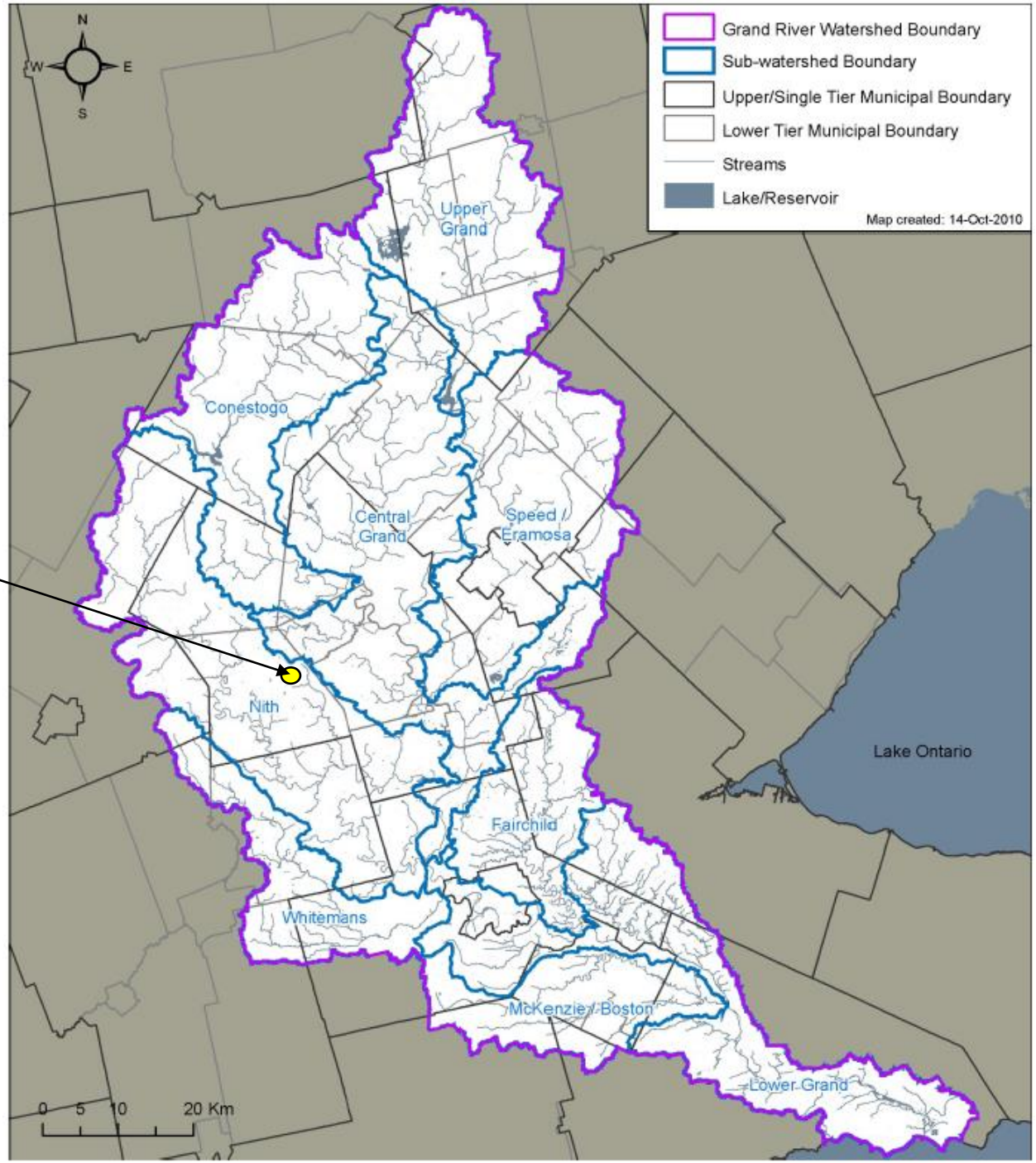
MTE, 2019, 1856 Snyder's Road East, Aggregate Assessment, MTE File No. 45533-100



Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 1: Site Location**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		

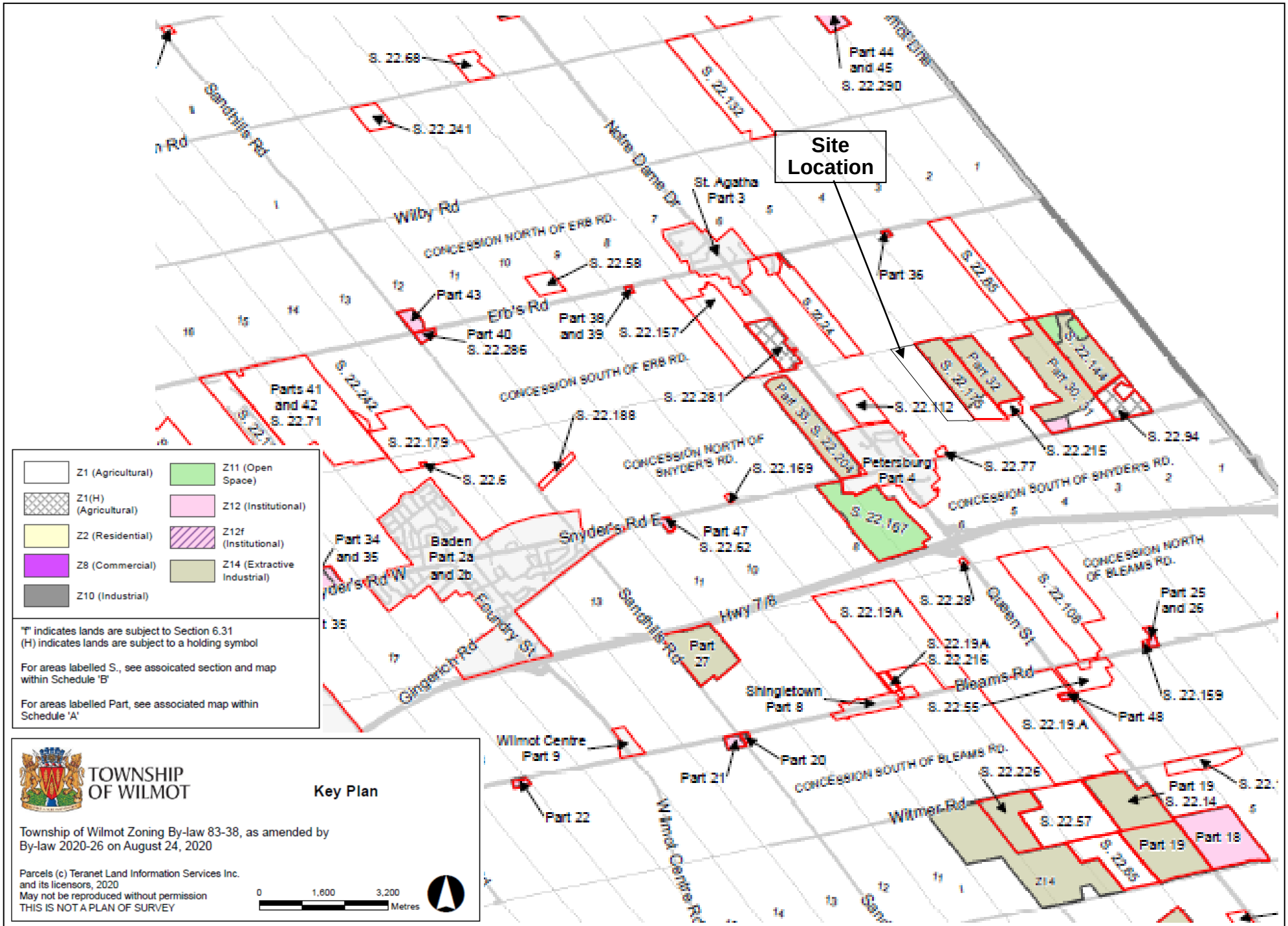
Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Jun 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	**Figure 2: Aerial Imagery**



Site Location

Source:
Grand River Source Protection Area
APPROVED SOURCE PROTECTION PLAN
VOLUME I
Prepared on behalf of:
Lake Erie Region Source Protection Committee
Under the Clean Water Act, 2006
(Ontario Regulation 287/07)
February 2, 2021
Section 4-1 Map B: Grand River Source Protection Area
https://www.sourcewater.ca/en/source-protection-areas/Grand-River-Source-Protection-Plan.aspx

Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 3: Subwatersheds**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		



Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 4: Zoning By-law 83-38**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		

500 metres from Subject Lands

6502377

1441 ERB'S RD

1617 ERB'S RD

7103572

7103574

7149907
7149908
7149909

Subject Lands

7103573

6502409
1974

NOTRE DAME DR

12

6502410

6508257

SNYDER'S RD E

Owned by Applicant

1910
6502903

1738

1826

1856

1844
6502412
6505154
1922
7246610

1836

1876
6505382
6507134

1786
6502411
7315242
6504507
1921
1929

7129683

6507644

1941

6507674

1855-B C

1837

1787

1805

1855-A

6506683

6502472
6502474

7268273

6502471

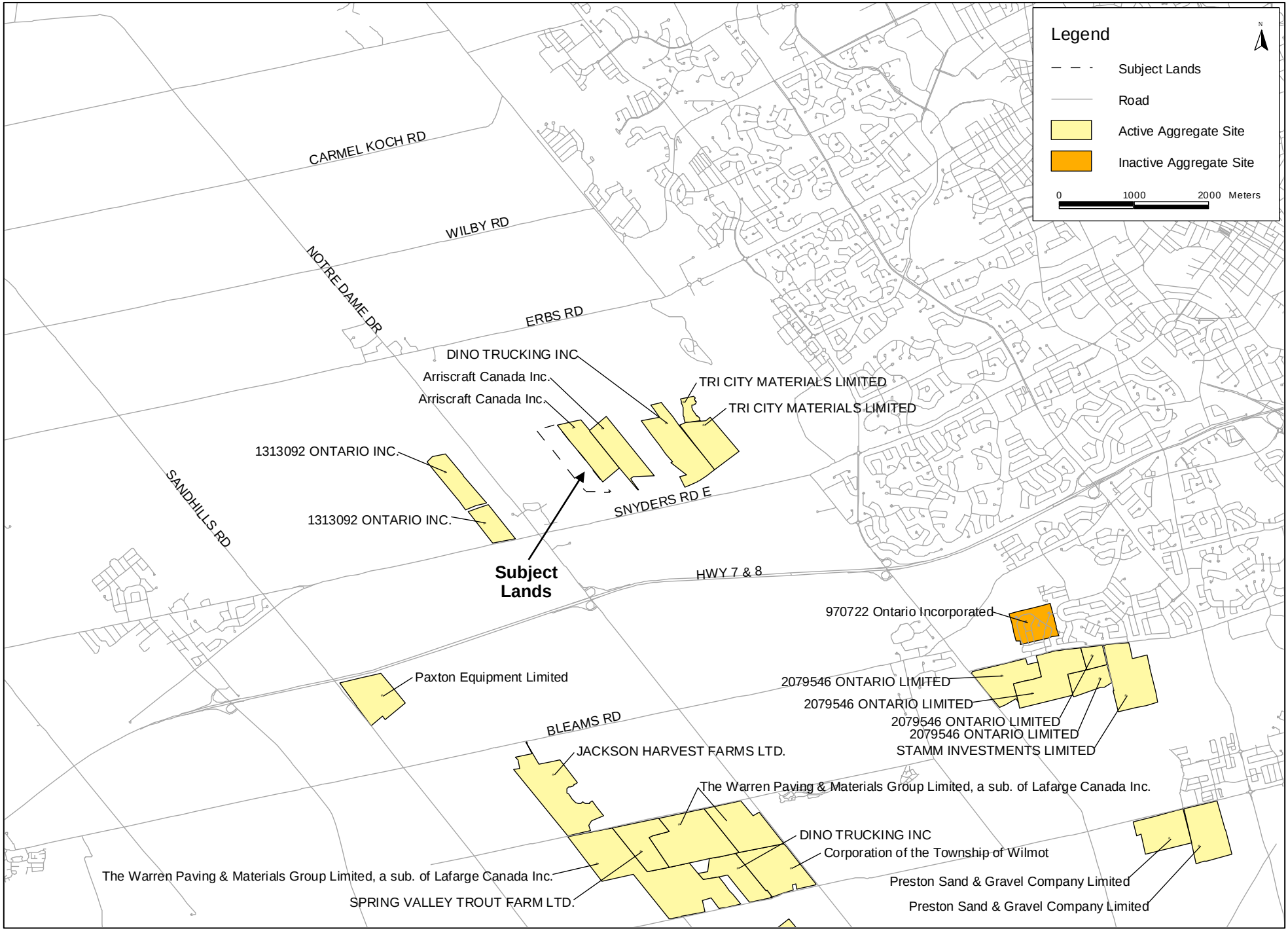
1745

6

0 0.7 km

Well Record

Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	Figure 5: **Civic Addresses within 500m**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		



Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 6: Aggregate Sites**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		

Waldau West Wetland Complex
Significance: Evaluated - Other

SG1
SG2
BH1
BH5
BH4
BH3

NOTRE DAME DR

SNYDERS RD E

500 m Buffer

Legend

- Road
- Contour 1m (mAMSL)
- Watercourse
- Waterbody
- Railway Line
- ANSI
- Constructed Drain
- Subject Lands
- Monitor Location
- Wetland
- Lot Fabric
- Active Aggregate Site
- Inactive Aggregate Site

0 250 Meters

Harden Environmental Services Ltd.

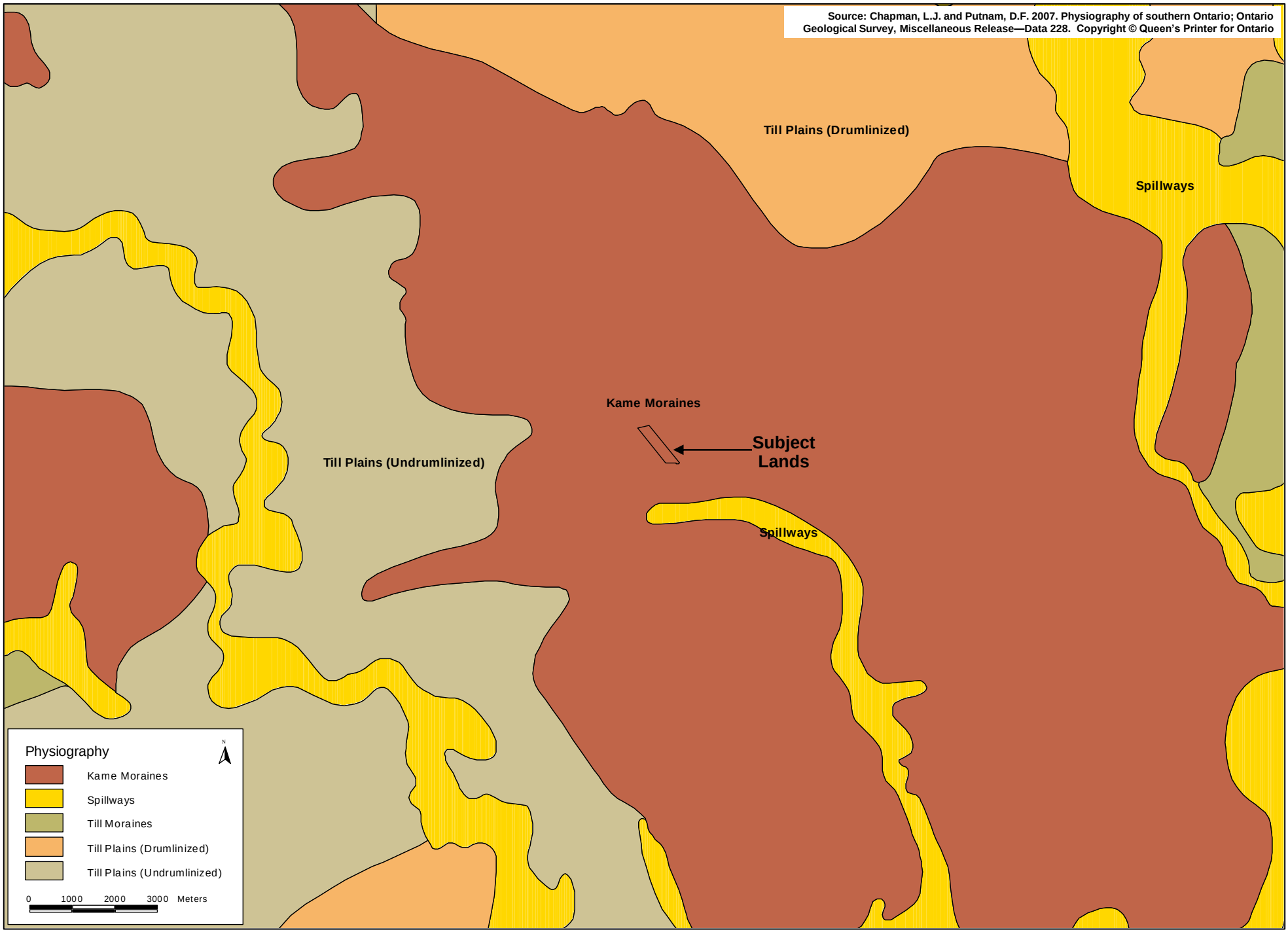
Project No: 2027
Date: Jun 2021
Drawn By: AR

Hydrogeological Assessment

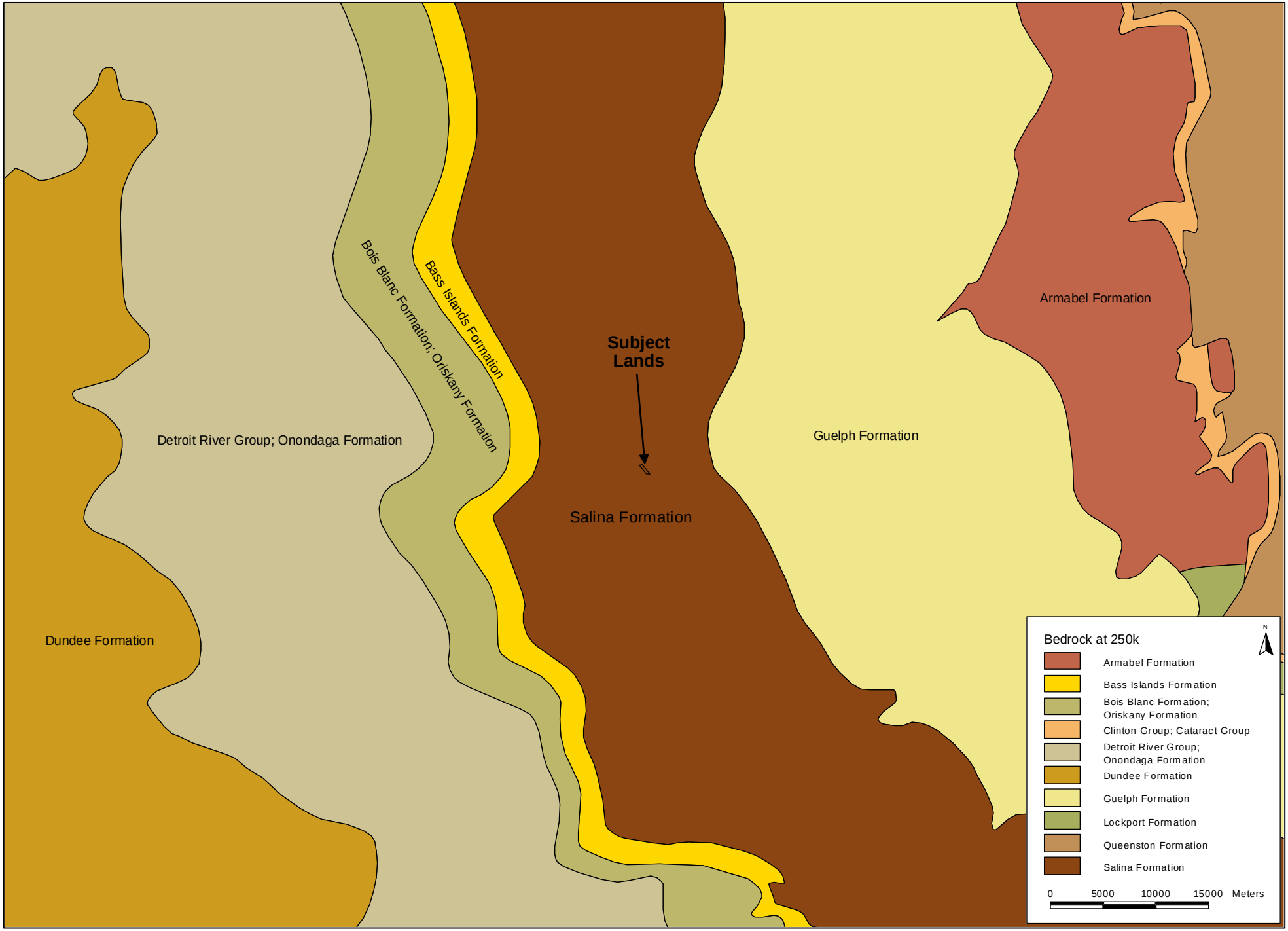
Township of Wilmot, Regional Municipality of Waterloo
Wilmot German Block North of Snyders Road, Lot 5

Figure 7:

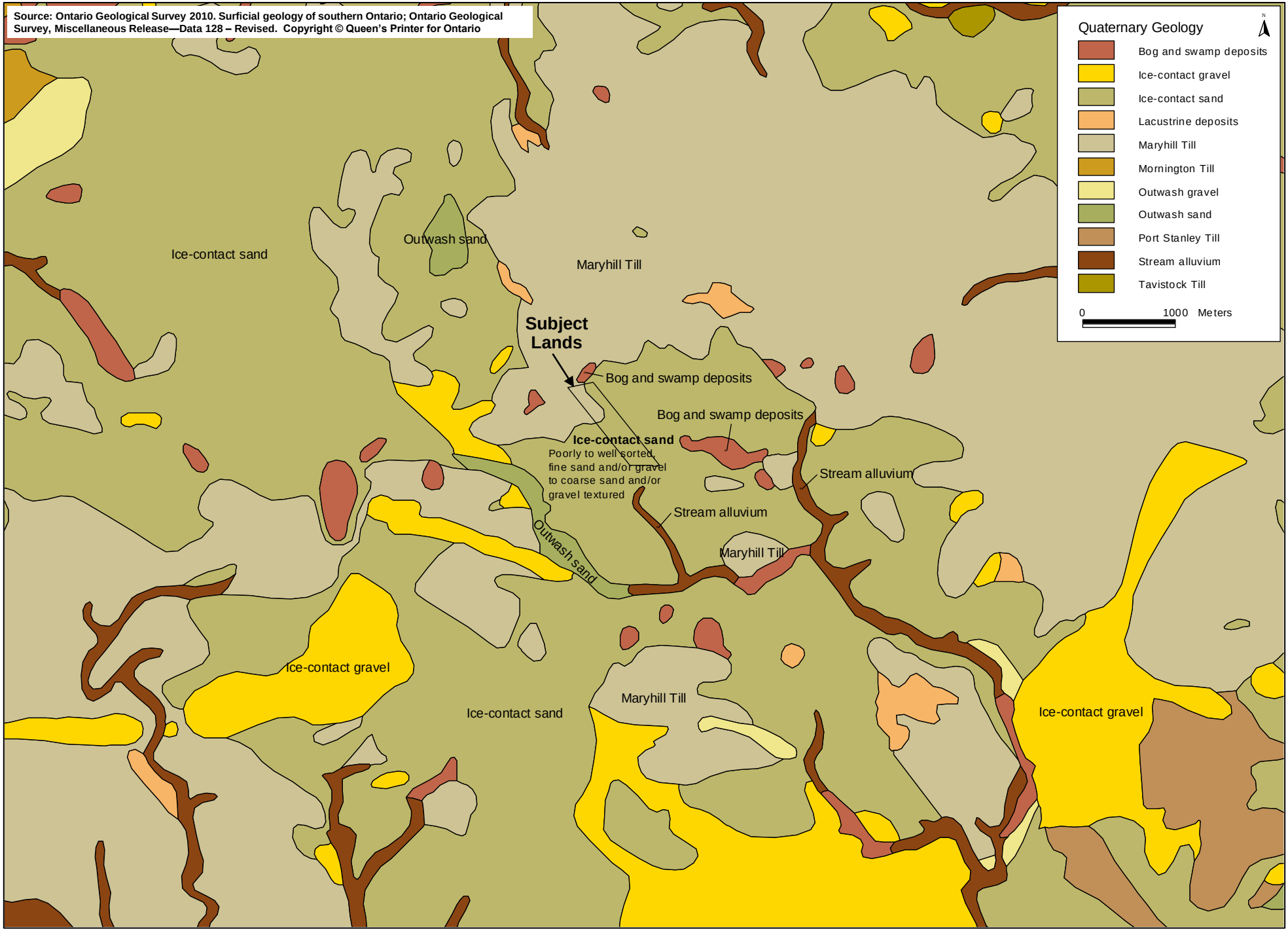
Environmental Features



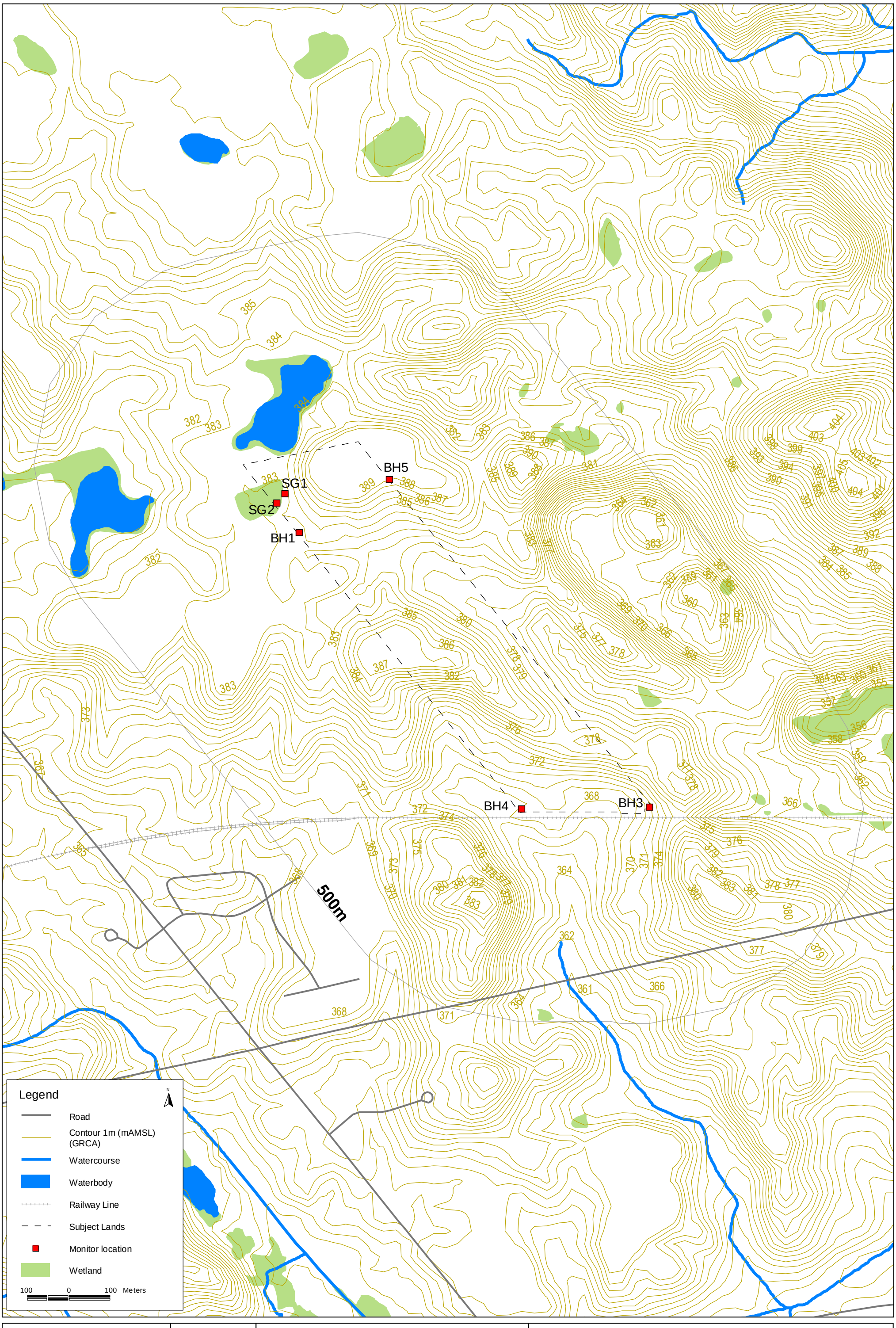
Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 8: Physiography**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		



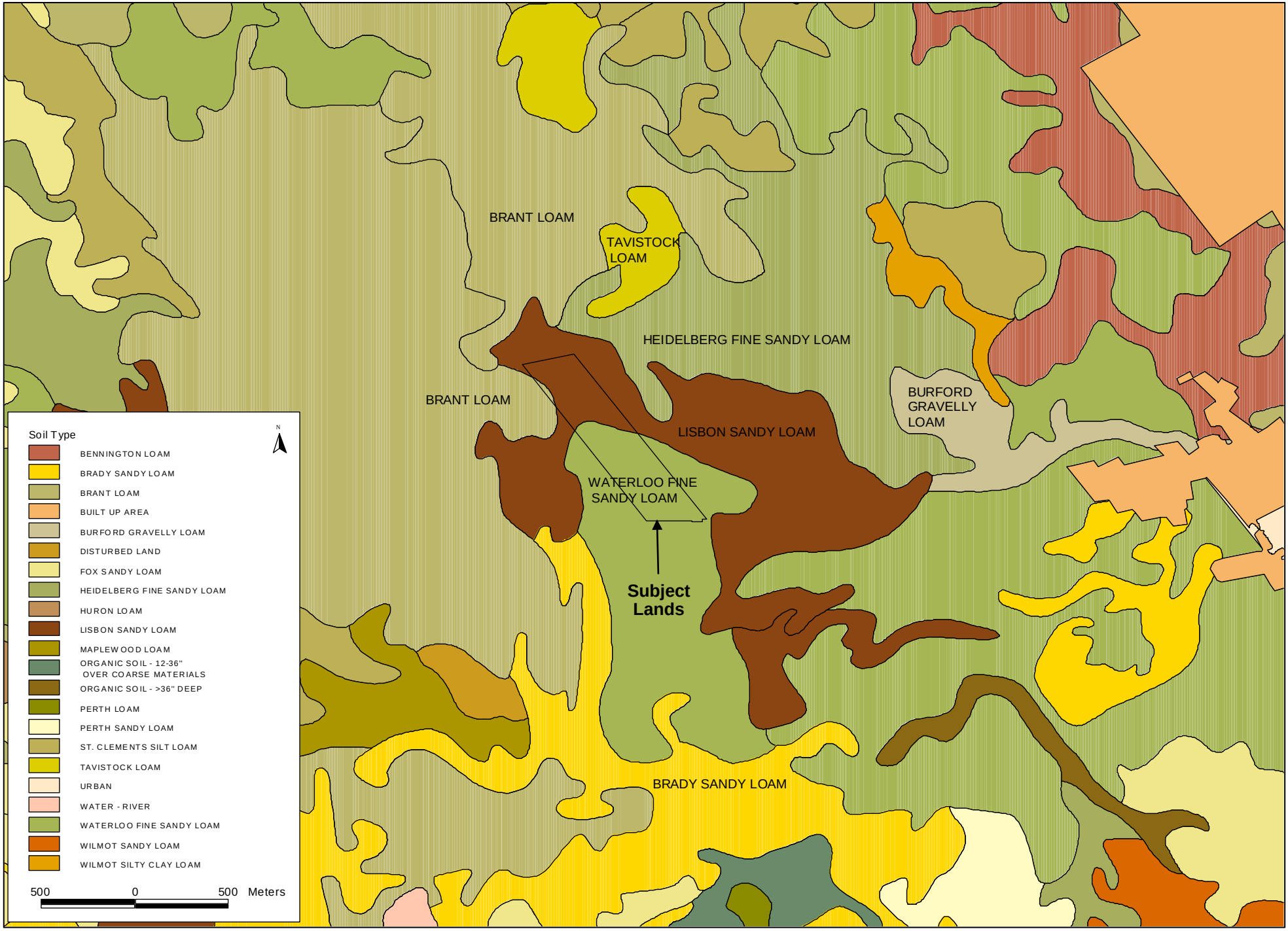
Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Jun 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	**Figure 9: Bedrock Geology**



Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 10: Quaternary Geology**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		

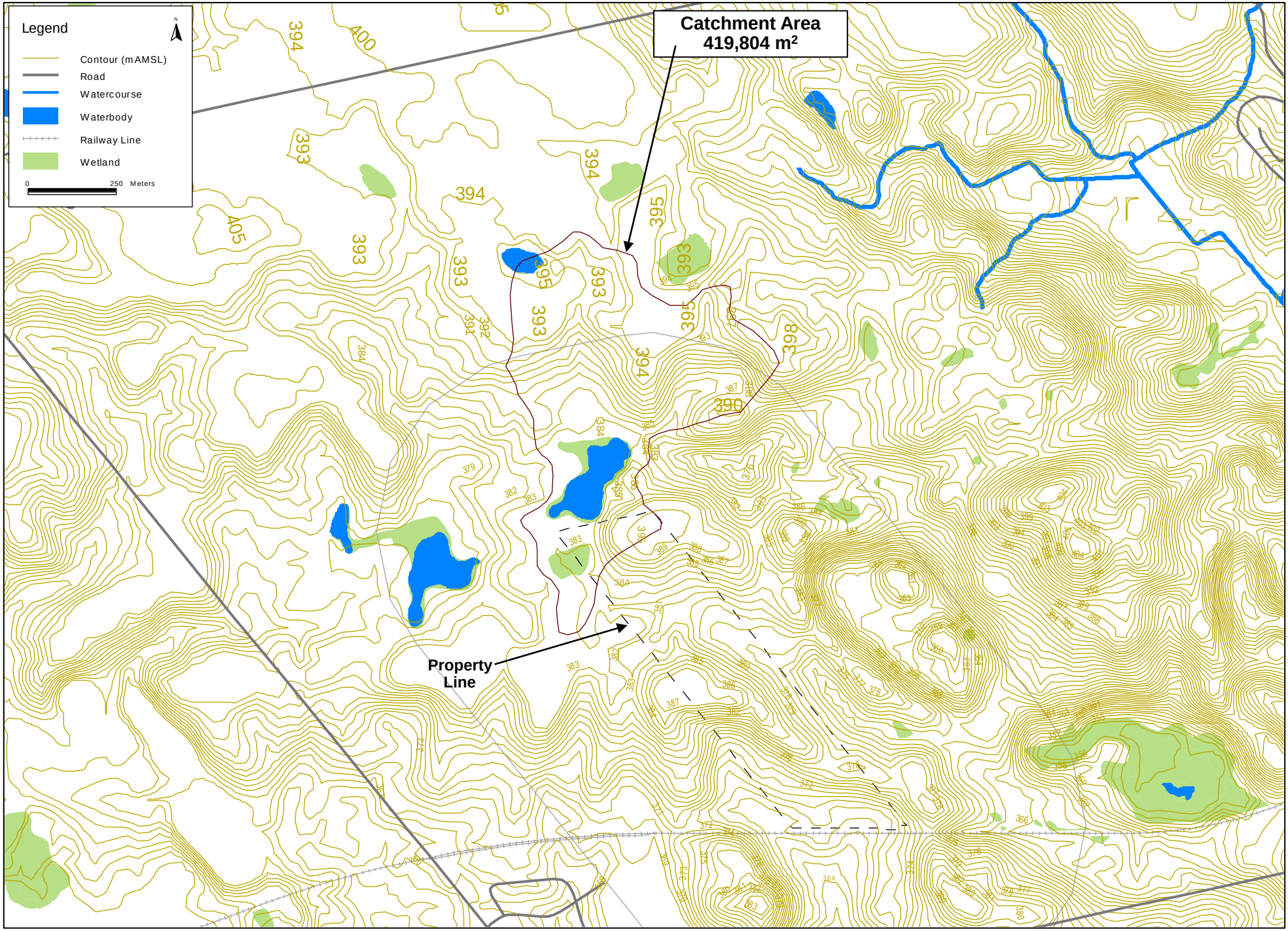


Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 11: Topography**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		



Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Jun 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5

Figure 12: Soils



Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 13: Wetland Catchment Area**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		

Ontario **Source Protection Information Atlas**
Ministry of the Environment, Conservation and Parks

Location Information

Zoom in to confirm your location and results.

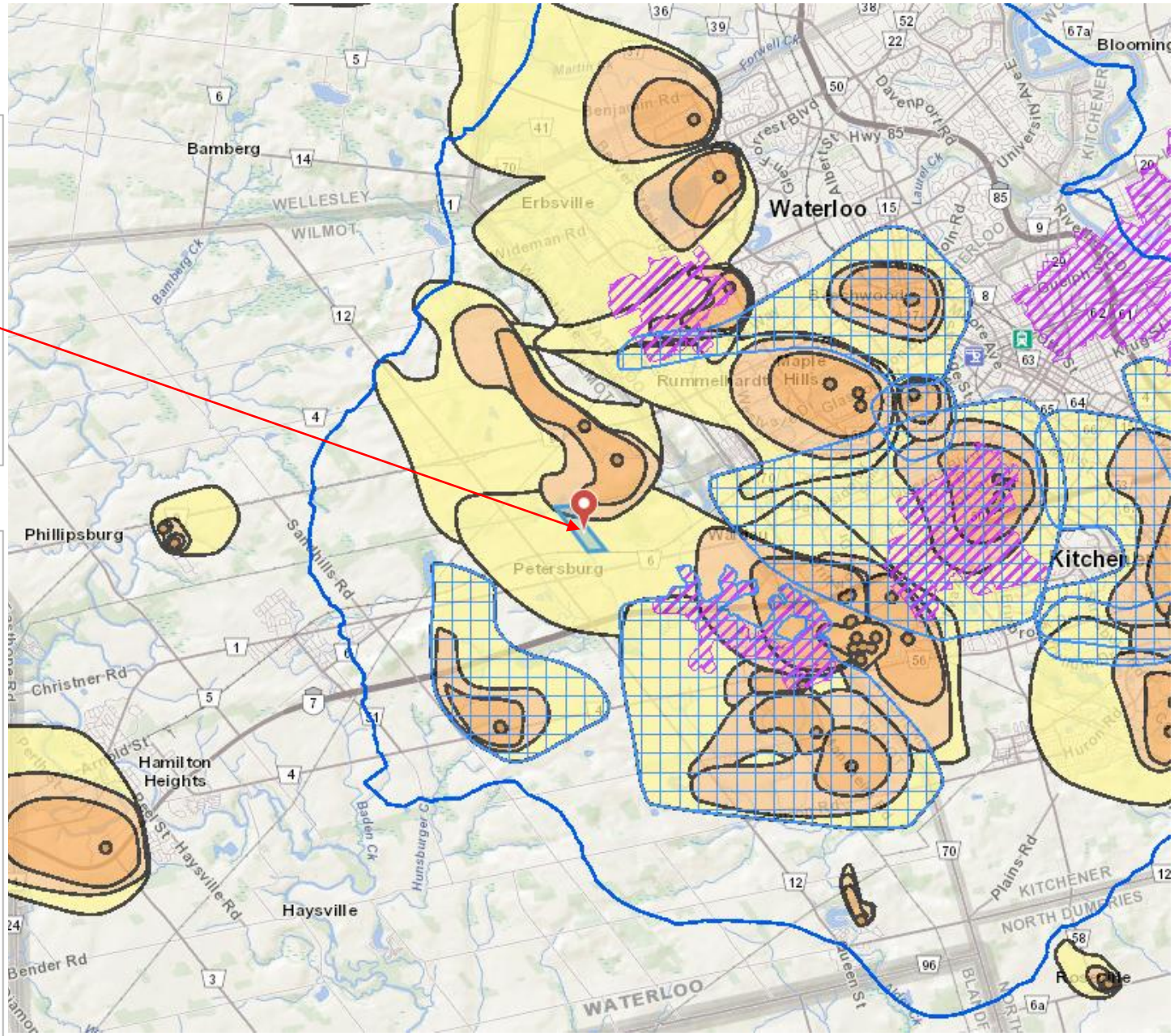
Latitude: **43.42148** Longitude: **-80.59868**
UTM Zone: **17** Easting: **532486.85** Northing: **4807699.49**
Upper Tier Municipality: **REGIONAL MUNICIPALITY OF WATERLOO**
Lower/Single Tier Municipality: **TOWNSHIP OF WILMOT**
Township Concession and Lot: **WILMOT GERMAN BLOCK NORTH OF SNYDERS ROAD, LOT 5**
Assessment Parcel Address: **N/A**
Assessment Roll #: **30180300042170000000**
MECP District: **Guelph**
MECP Region: **West Central**

Source Protection Details for Location

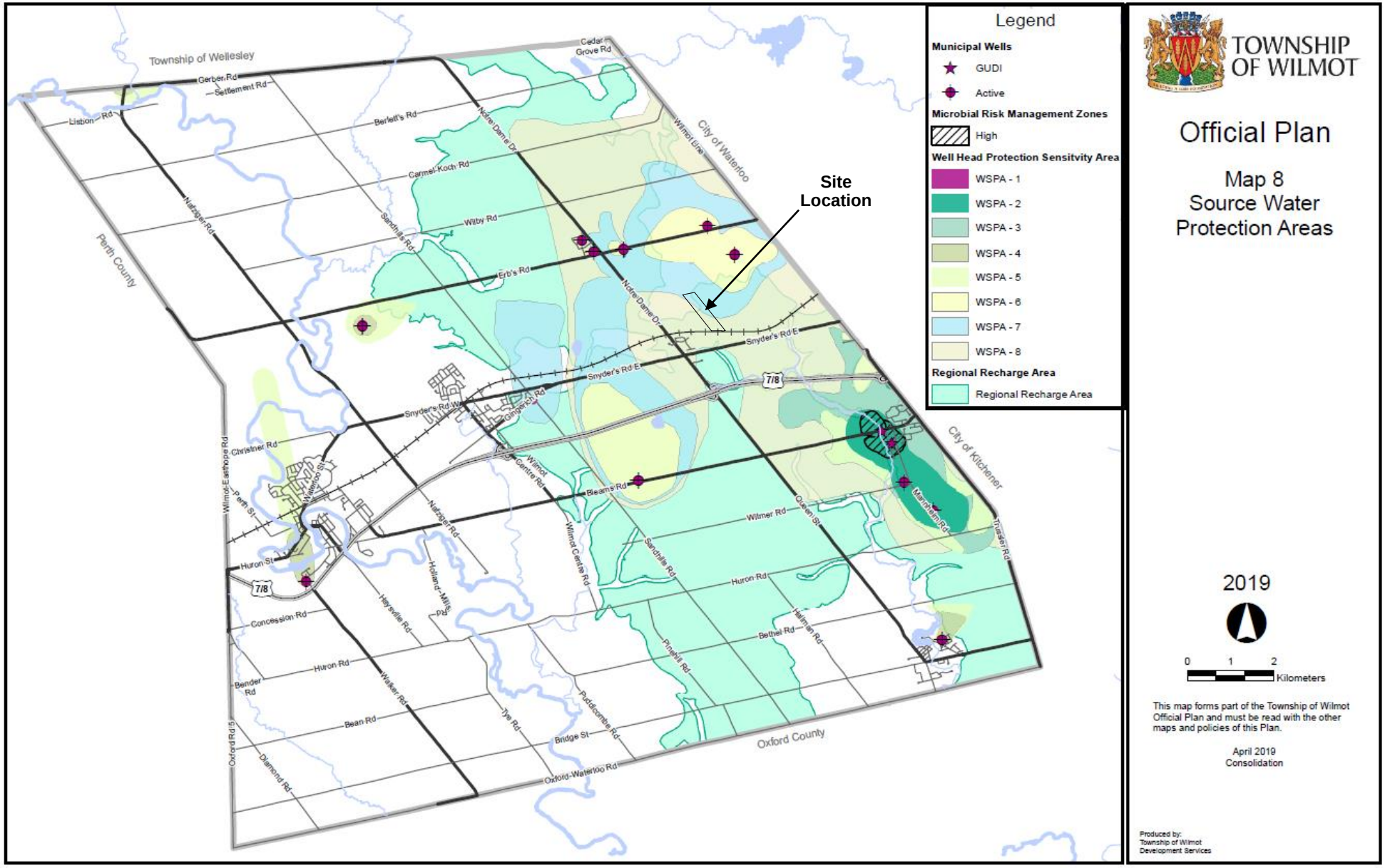
Source Protection Area. **Grand River**
Wellhead Protection Area: **D** ; score is **4**
Wellhead Protection Area E (GUDI): **No**
Intake Protection Zone: **No**
Issue Contributing Area: **No**
Significant Groundwater Recharge Area: **Yes** ; score is **0**
Highly Vulnerable Aquifer: **No**
Event Based Area: **No**
Wellhead Protection Area Q1: **Yes** ; Stress: **Low**
Wellhead Protection Area Q2: **Yes** ; Stress: **Low**
Intake Protection Zone Q: **No**

Significant Drinking Water Threats at this location:
Threats list by zone can be found at this link.

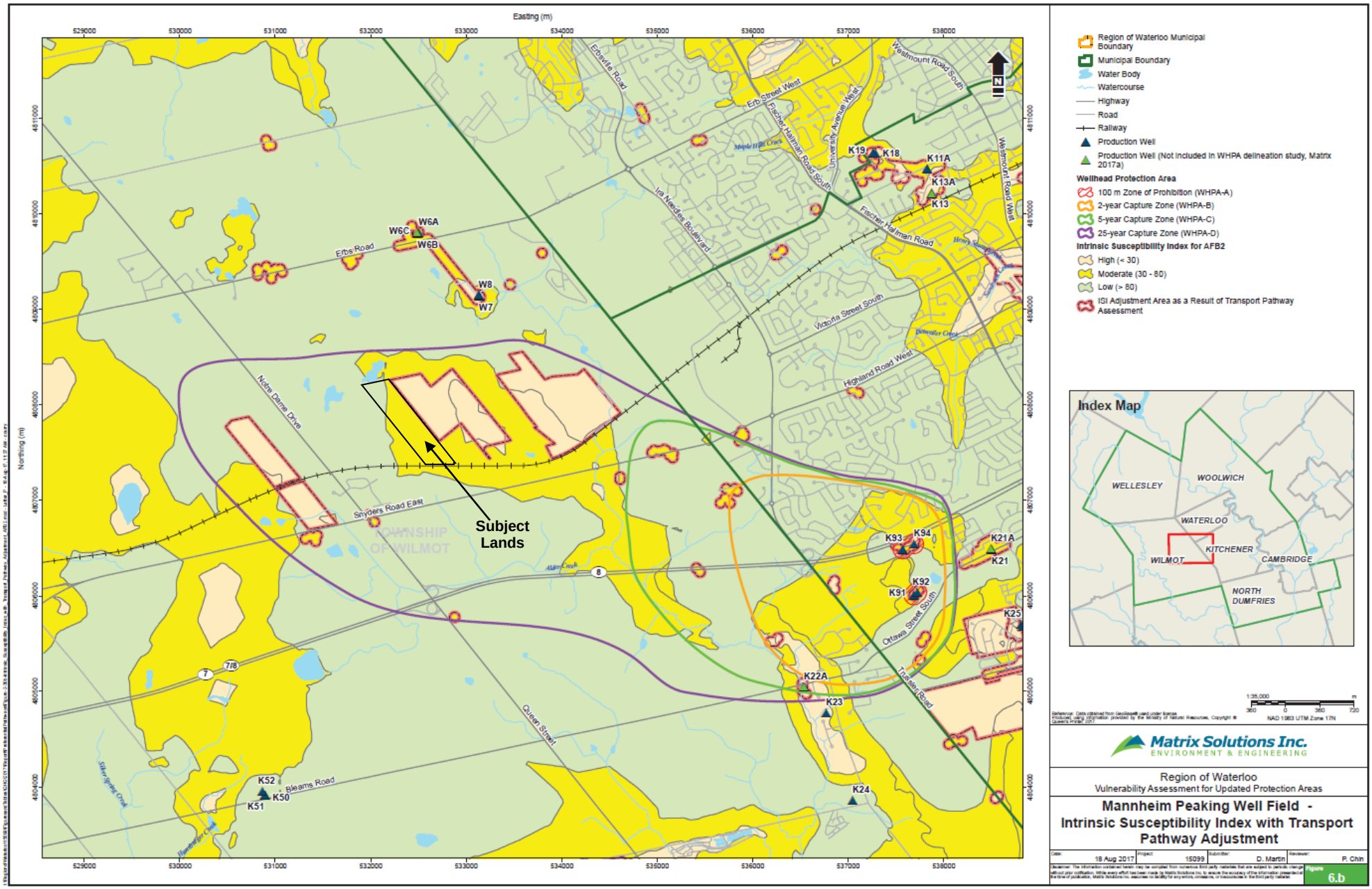
Information is current as of: **April 7, 2021**



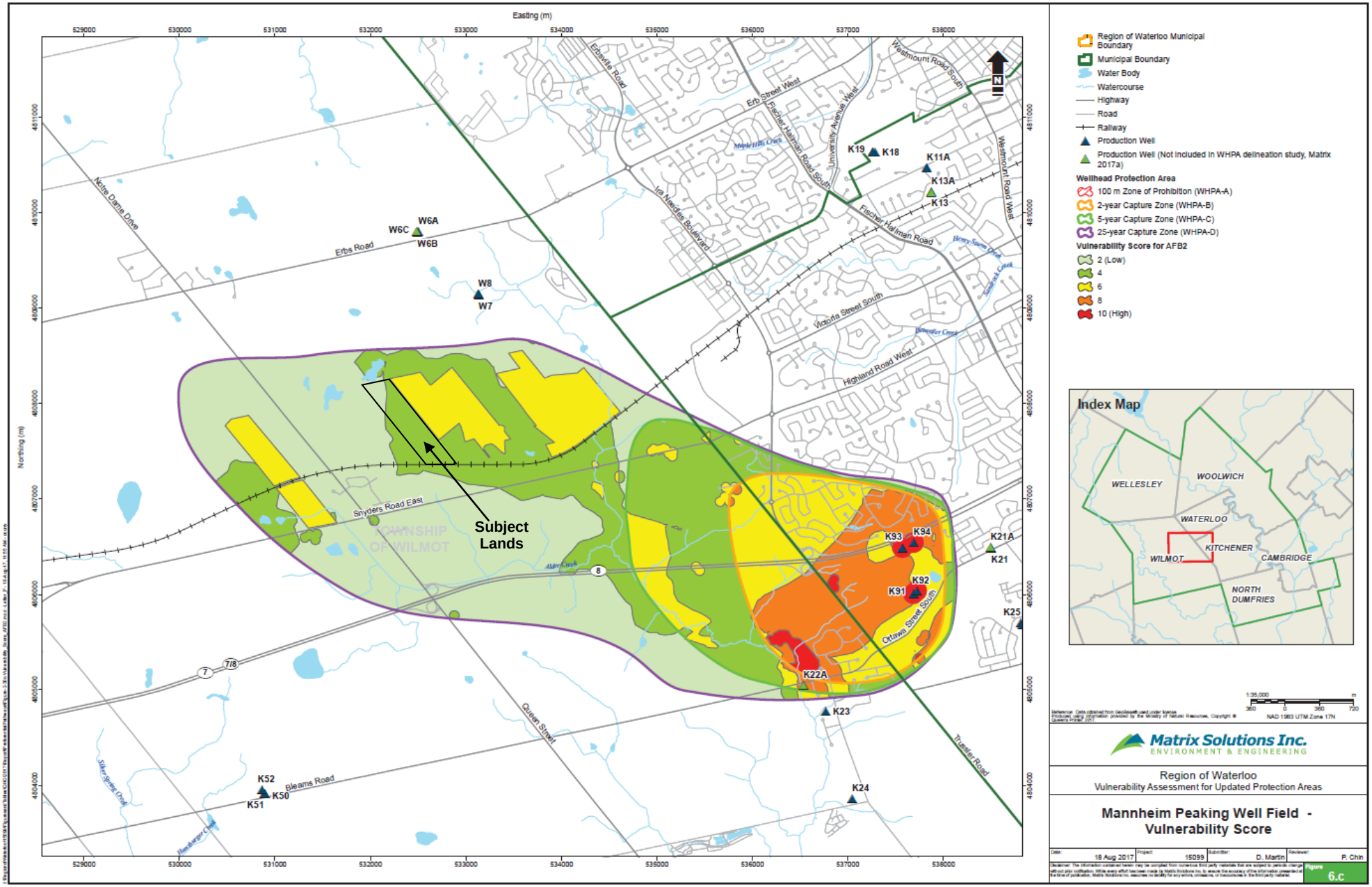
Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 15: Source Water Protection**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		



Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 16: Source Water Protection - Official Plan**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		

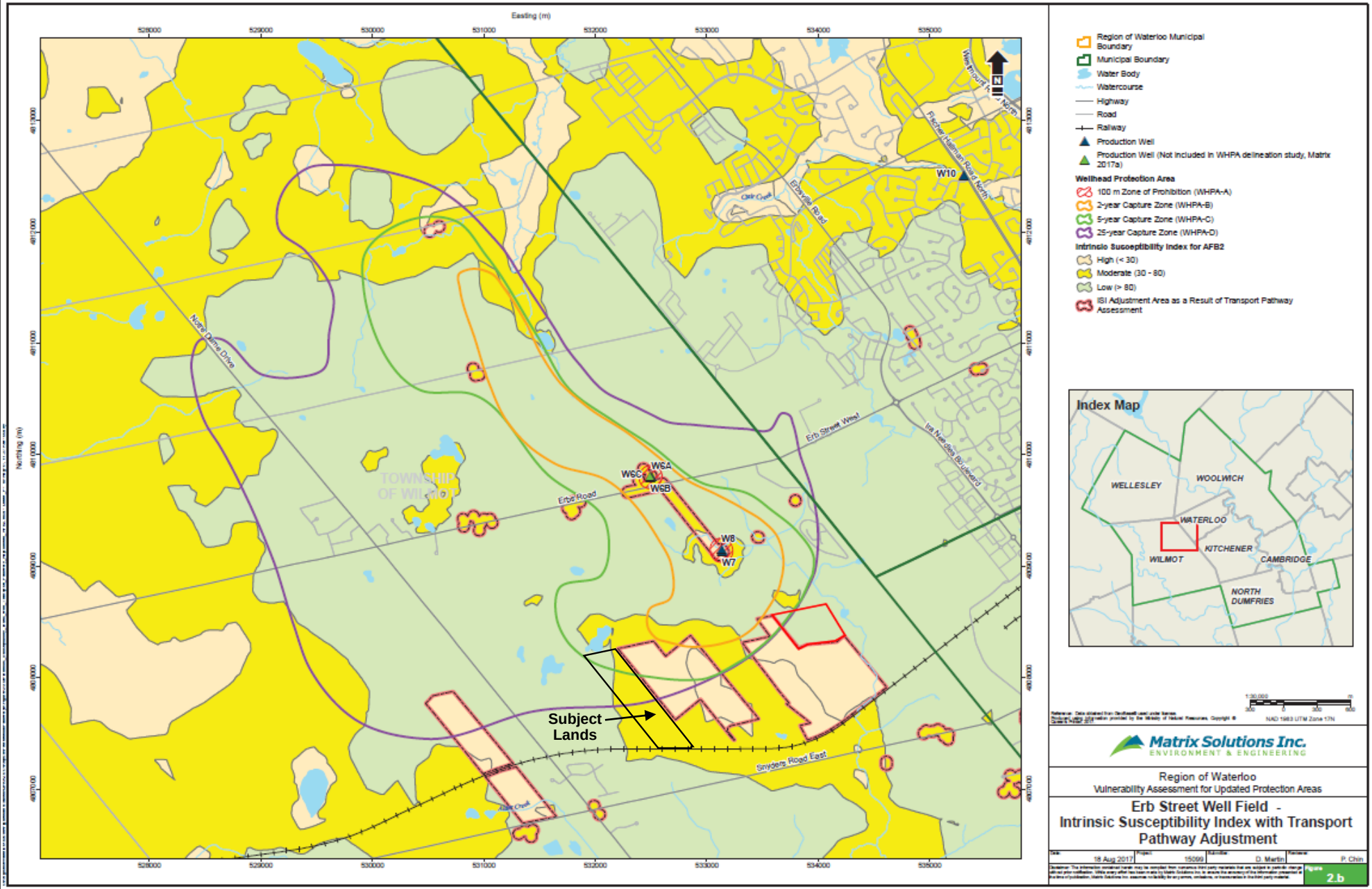


Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment
	Date: Dec 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5
	Drawn By: AR	**Figure 17: Mannheim Peaking Well Field - ISI**

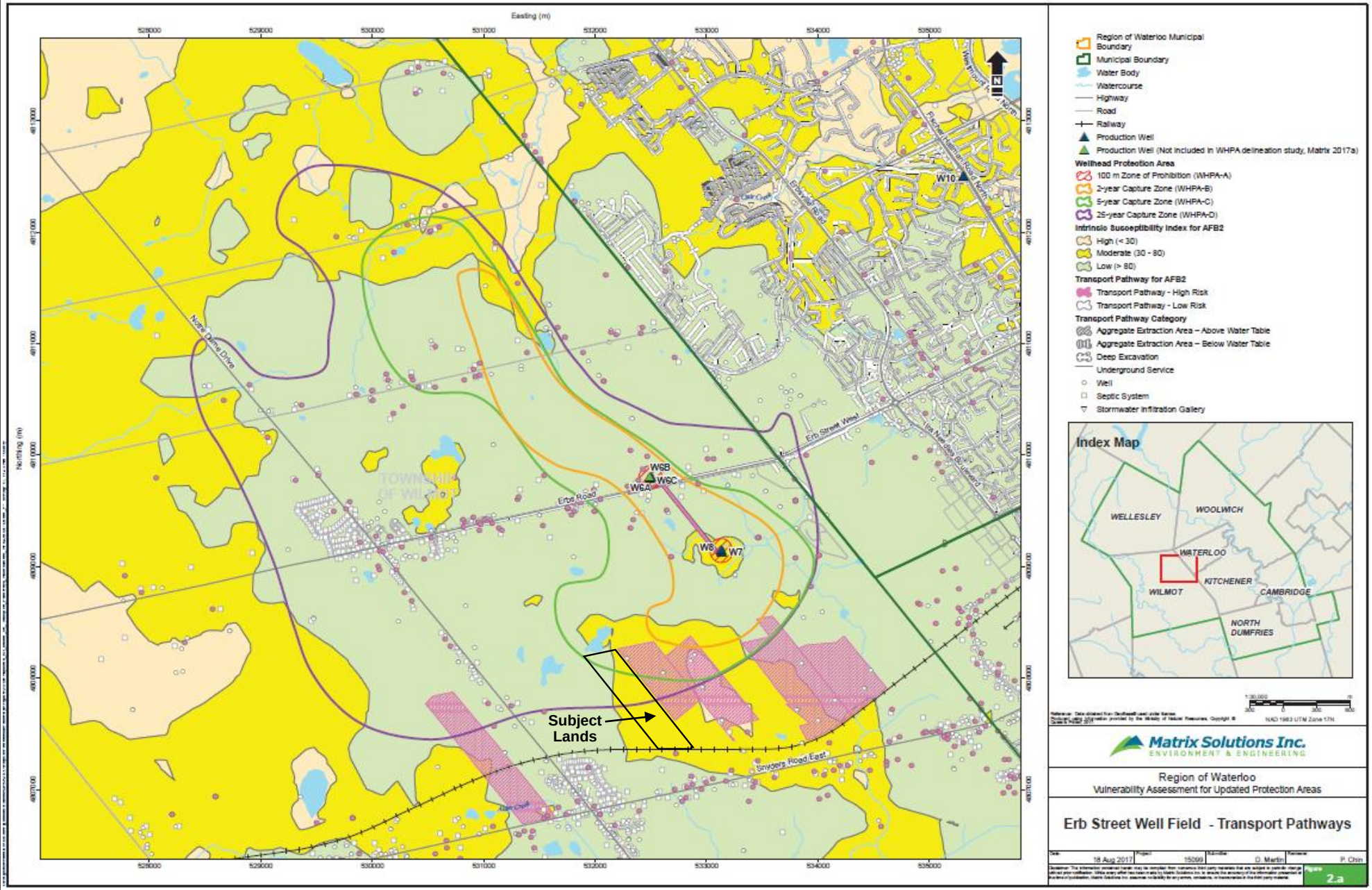


Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment
	Date: Dec 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5
	Drawn By: AR	**Figure 18: Mannheim Peaking Well Field - Vulnerability Score**

Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 19: Erb Street Well Field - Vulnerability Score**
	Date: Dec 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		

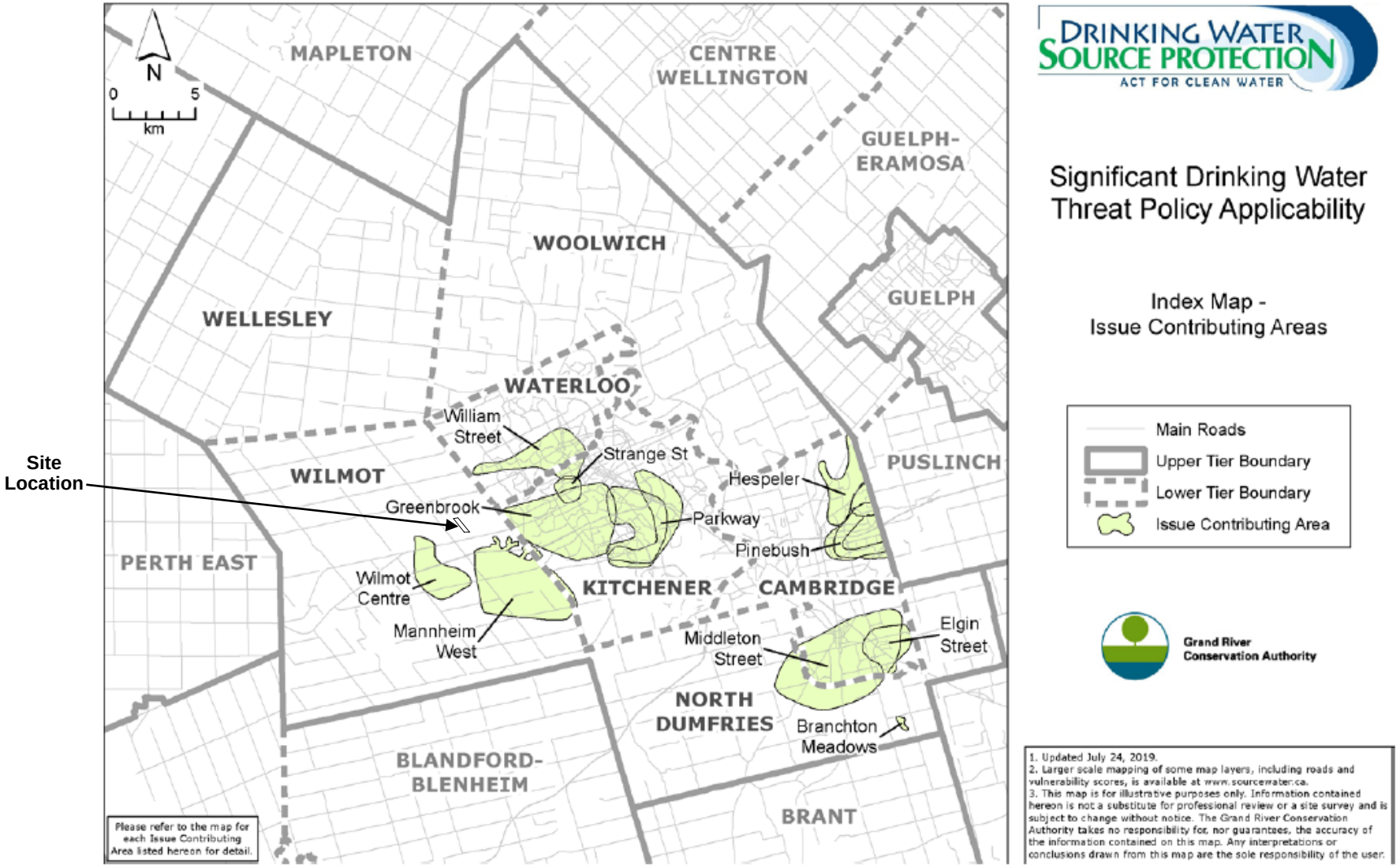


Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 20: Erb Street Well Field - ISI**
	Date: Dec 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		



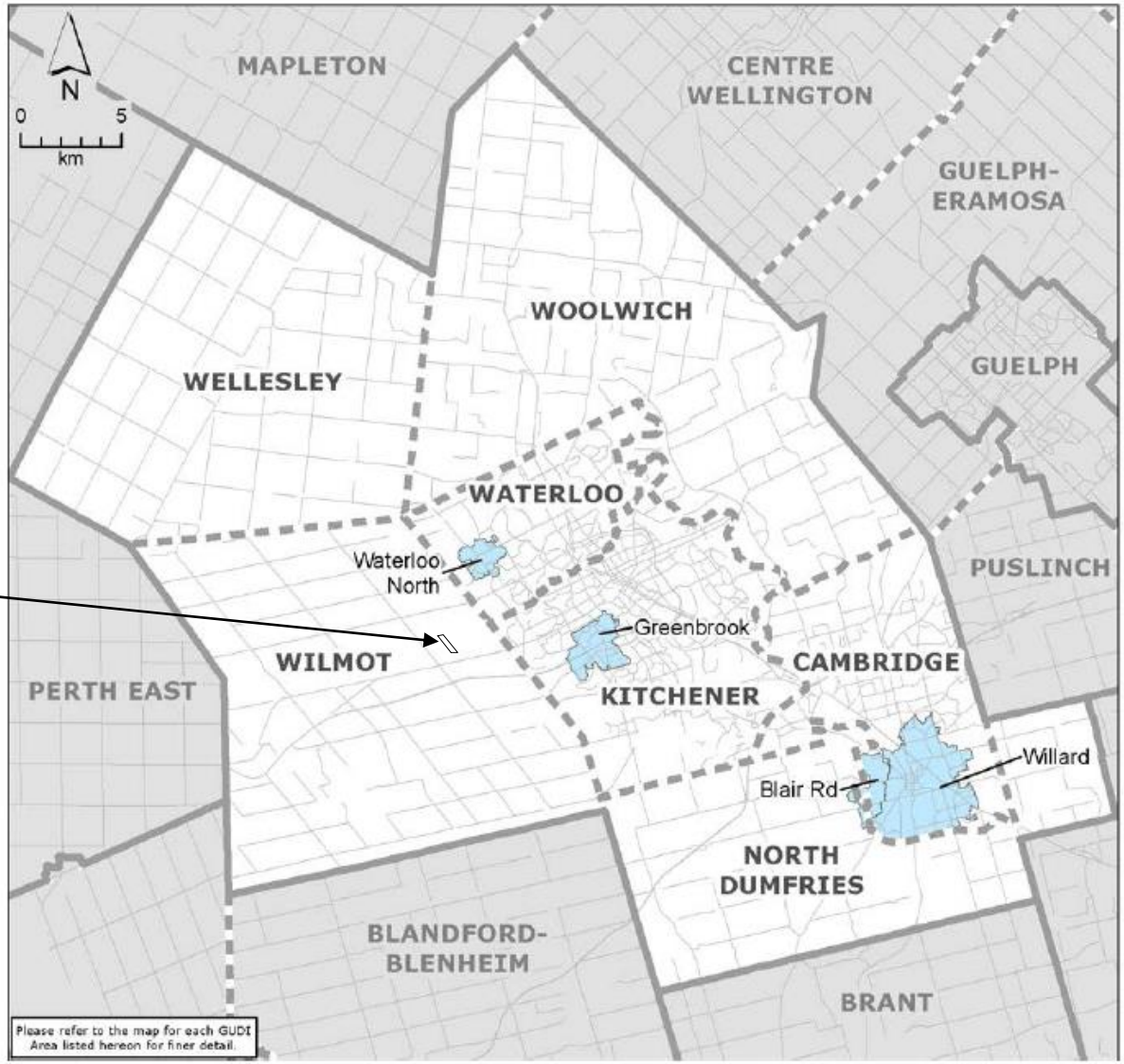
Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Dec 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	**Figure 21: Erb Street Well Field - Transport Pathways**

10.20 Schedule P: Region of Waterloo Issue Contributing Areas: Index Map



Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Jun 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	**Figure 22: Issue Contributing Areas**

10.15 Schedule K: Region of Waterloo GUDI Systems: Index Map



Site Location

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Significant Drinking Water Threat Policy Applicability

Index Map - Groundwater Under Direct Influence of Surface Water (GUDI) Protection Zones

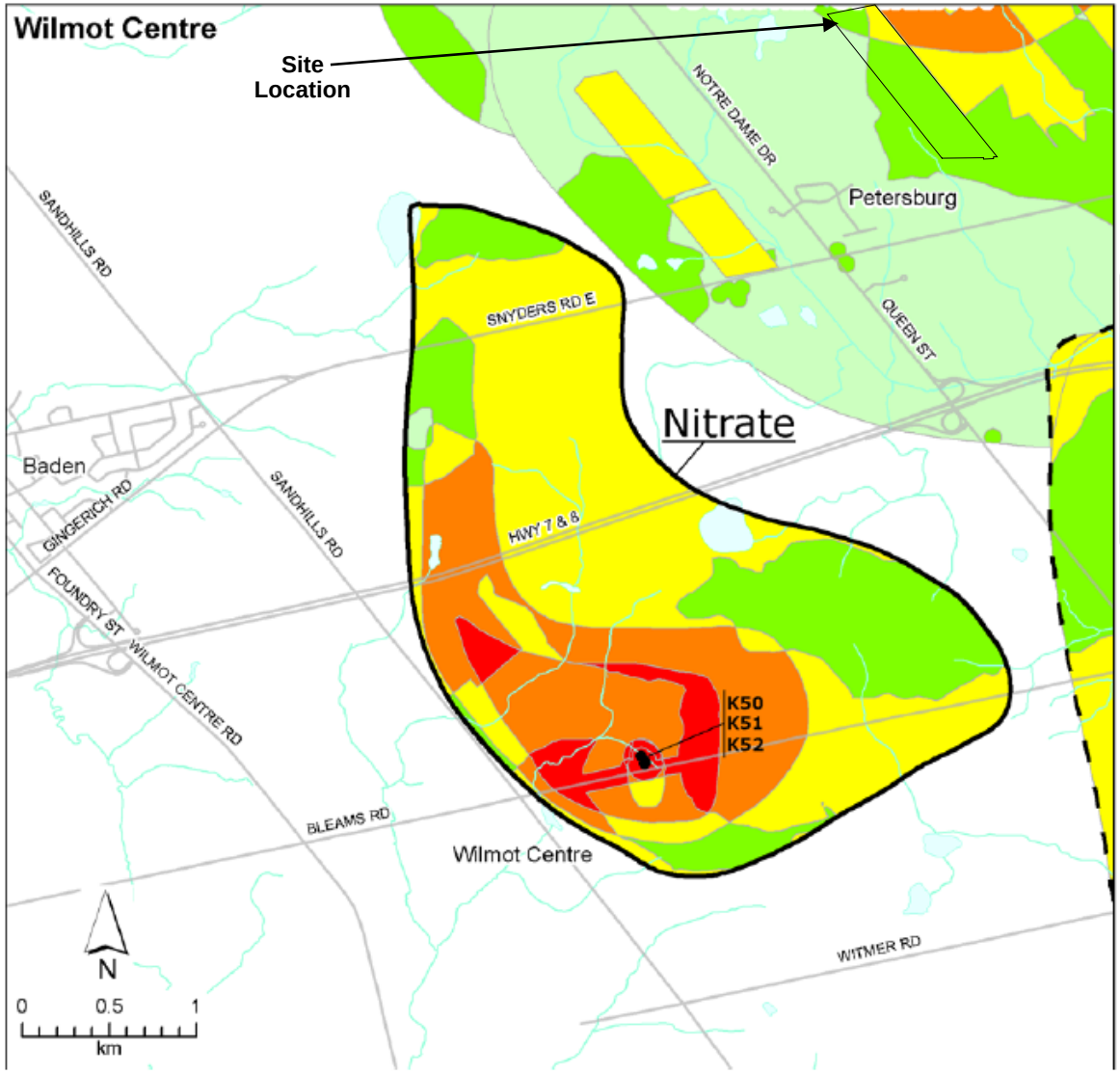
- Main Roads
- Upper Tier Boundary
- Lower Tier Boundary
- GUDI Protection Zone Where Policies Apply

Grand River Conservation Authority

1. Updated January 25, 2019.
2. Larger scale mapping of some map layers, including roads and vulnerability scores, is available at www.sourcewater.ca.
3. This map is for illustrative purposes only. Information contained hereon is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.

Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 23: GUDI Protection Zones**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		

10.28 Schedule X: Region of Waterloo Issue Contributing Areas: Wilmot Centre



DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Significant Drinking Water Threat Policy Applicability

Significant Drinking Water Threat Policy Categories		Identified Issue			
		Chloride	Nitrate	Sodium	TCE
1.	Waste Disposal		Y		Y
2.	Sewage Systems	Y	Y	Y	Y
3, 4.	Agricultural Source Material		Y		
6, 7.	Non-Agricultural Source Material		Y		
8, 9.	Commercial Fertilizer		Y		
12, 13.	Road Salt	Y		Y	
14.	Storage of Snow	Y	Y	Y	
16.	DNAPLs				Y
21.	Livestock Area		Y		

Note: This table provides a summary of the activities listed in the Clean Water Act (2006) that apply as Prescribed Drinking Water Threats (PDWT) in the Issue Contributing Area(s) shown on this map. For details refer to the Drinking Water Threats Tables from the Ministry of the Environment and Climate Change, and the text of this Source Protection Plan.

- Well with Identified Issue(s)
- Roads
- Minor Rivers
- Lakes / Main Rivers
- Baden & Wilmot Centre Issue Contributing Areas
- Other Issue Contributing Areas

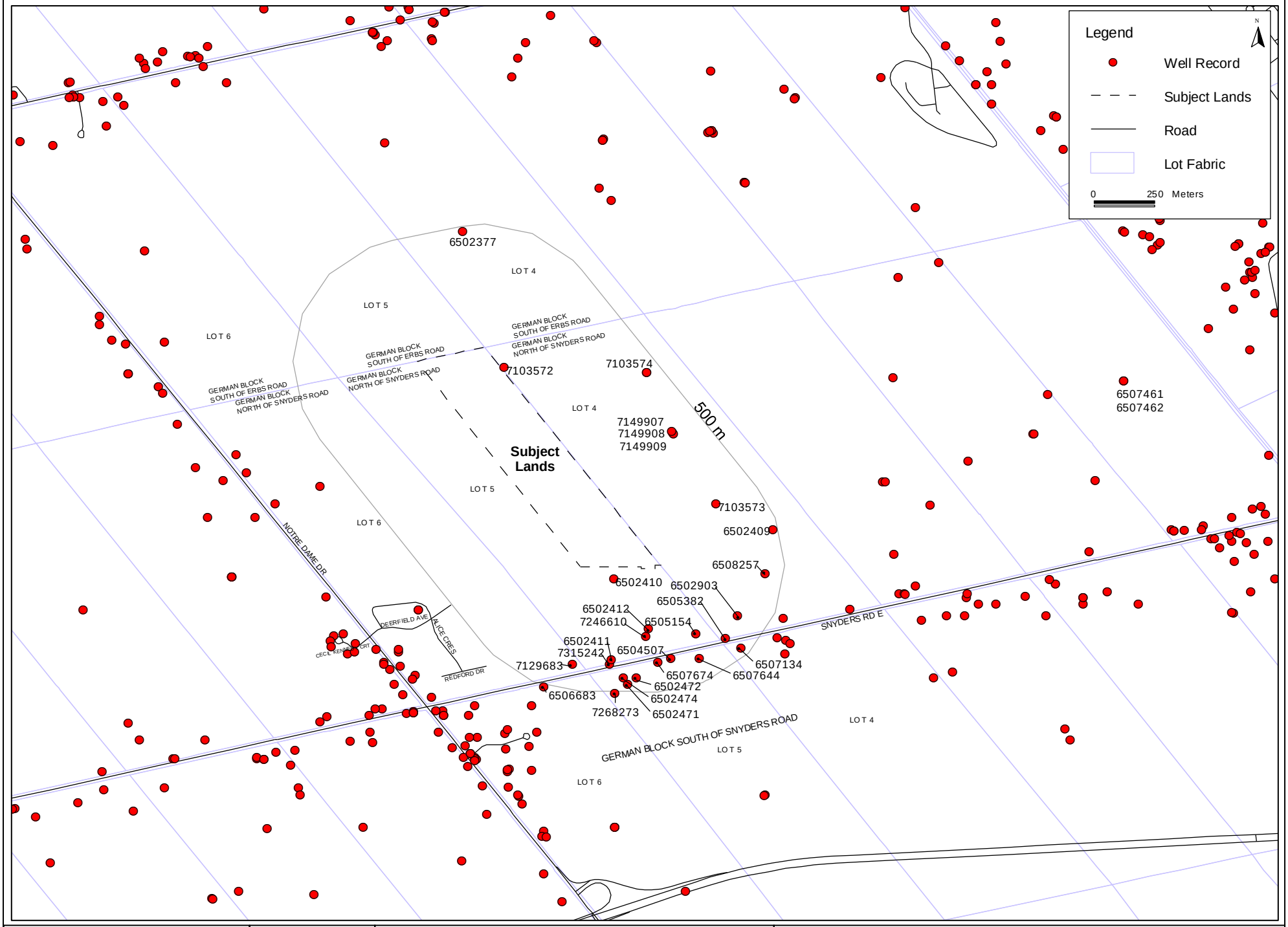
Vulnerability Score: 2 4 6 8 10

Issue — Associated Issue Parameter

Grand River Conservation Authority

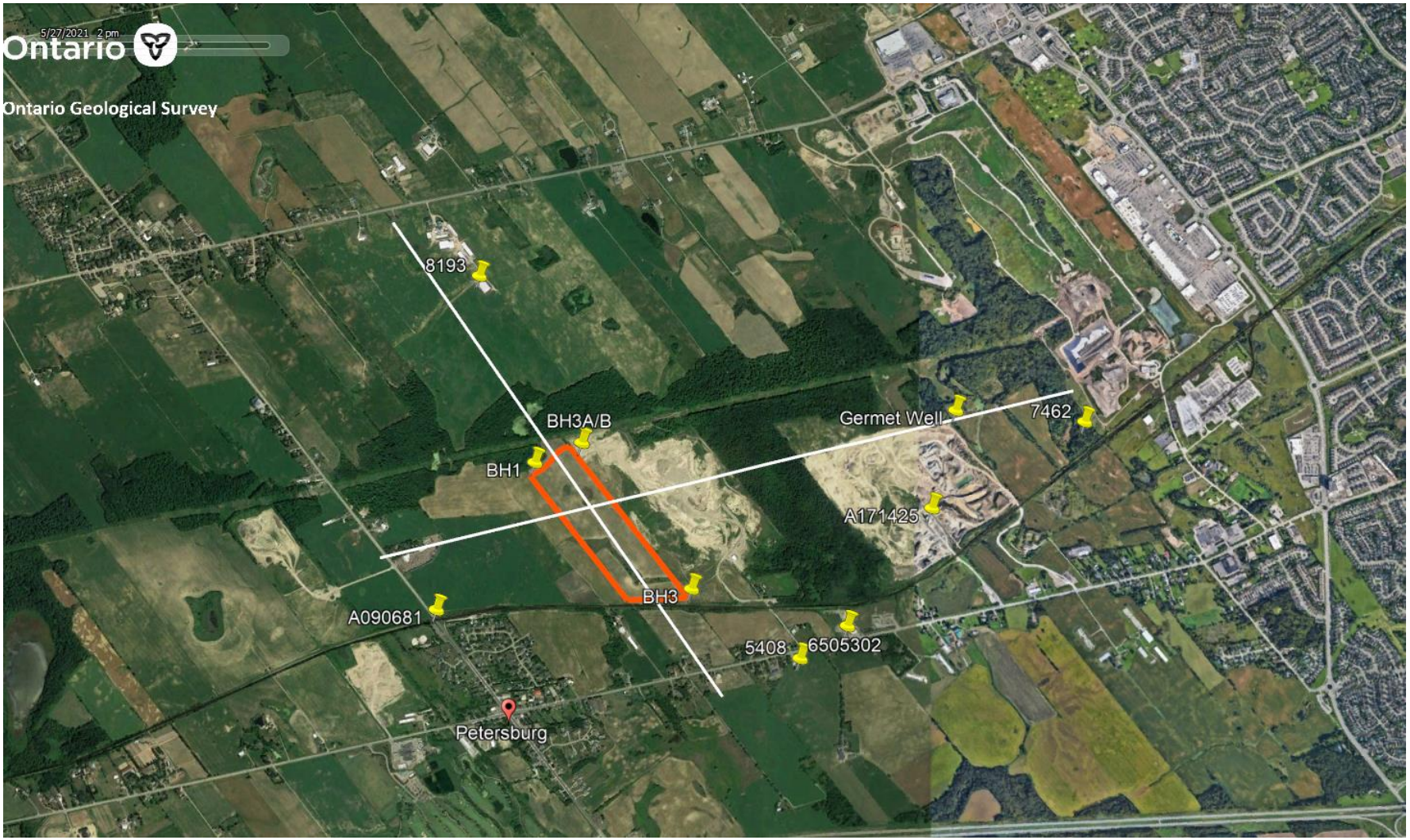
1. Updated July 31, 2019
2. Larger scale mapping of some map layers, including roads and vulnerability scores, is available at www.sourcewater.ca.
3. This map is for illustrative purposes only. Information contained hereon is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.

Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 24: Significant Drinking Water Threat Policy Applicability**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo	
	Drawn By: AR	Wilmot German Block North of Snyders Road, Lot 5	

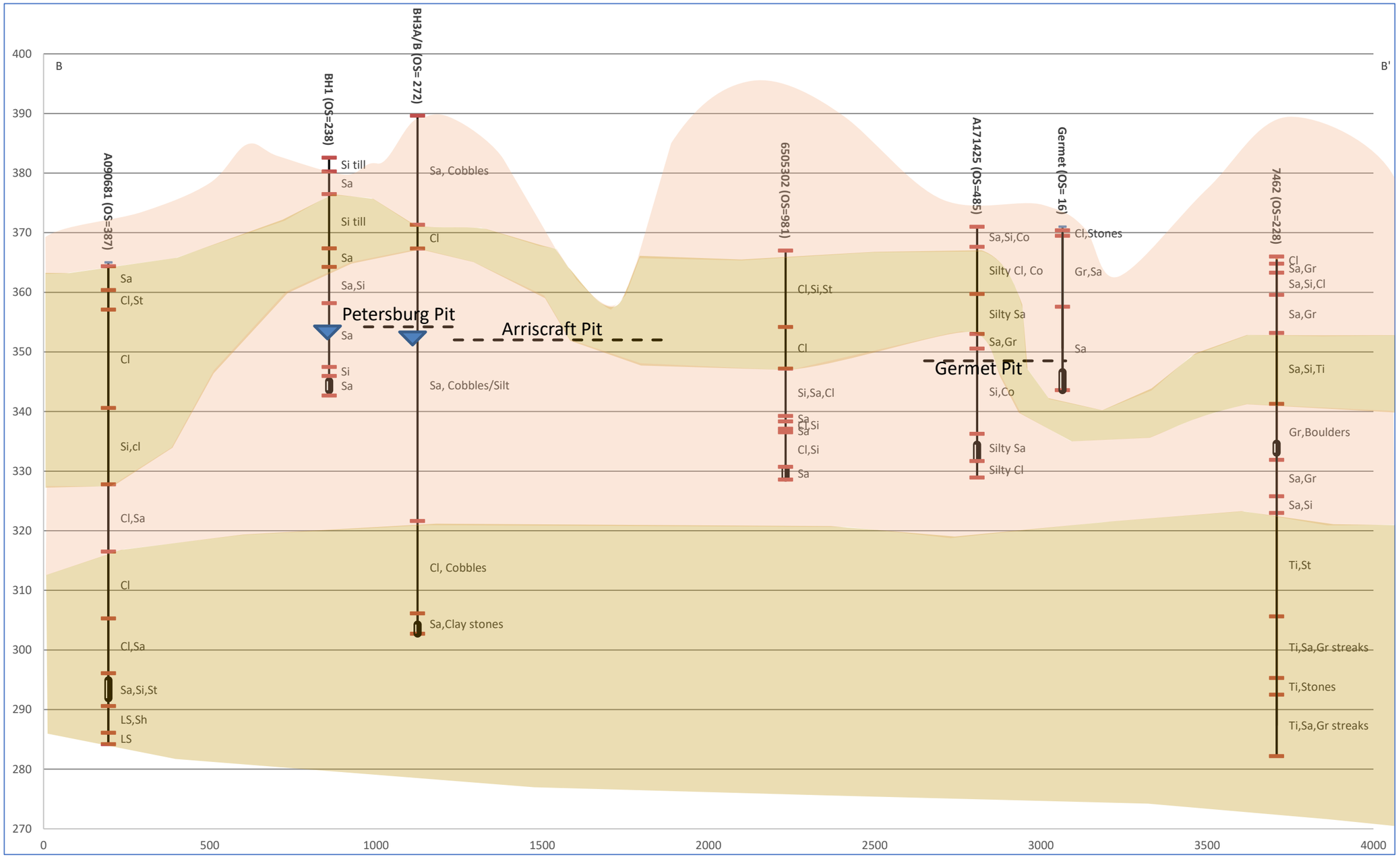


Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Jun 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	**Figure 25: Water Well Records**

Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 26: Monitor Locations**
	Date: Dec 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		



Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	**Figure 27: Key Map for Cross Sections**
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	
	Drawn By: AR		



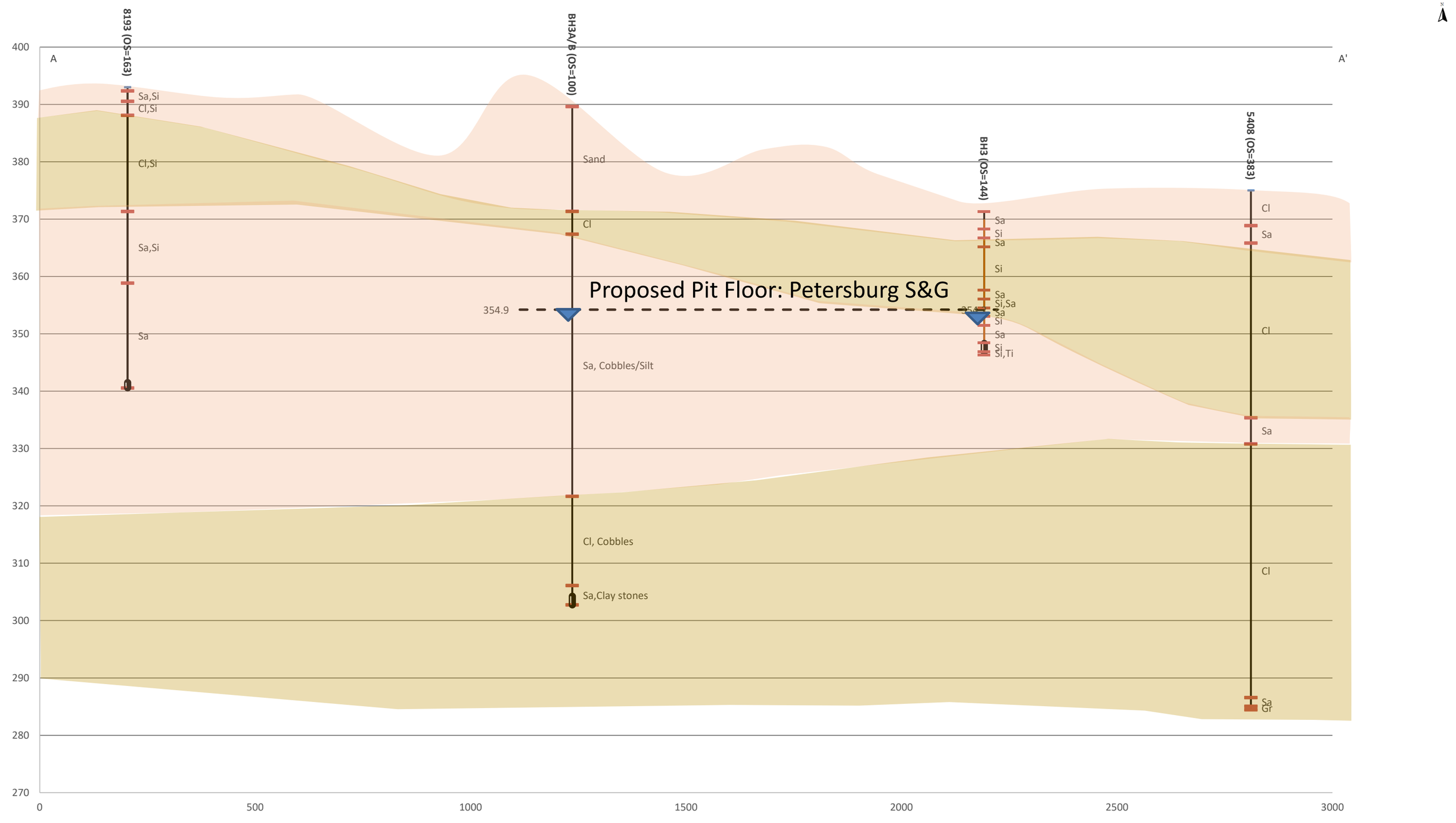
Water Table Elevation

Pit Floor Elevation

Aquifer

Aquitard

Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Jun 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	Figure 28: **East West Cross Section**



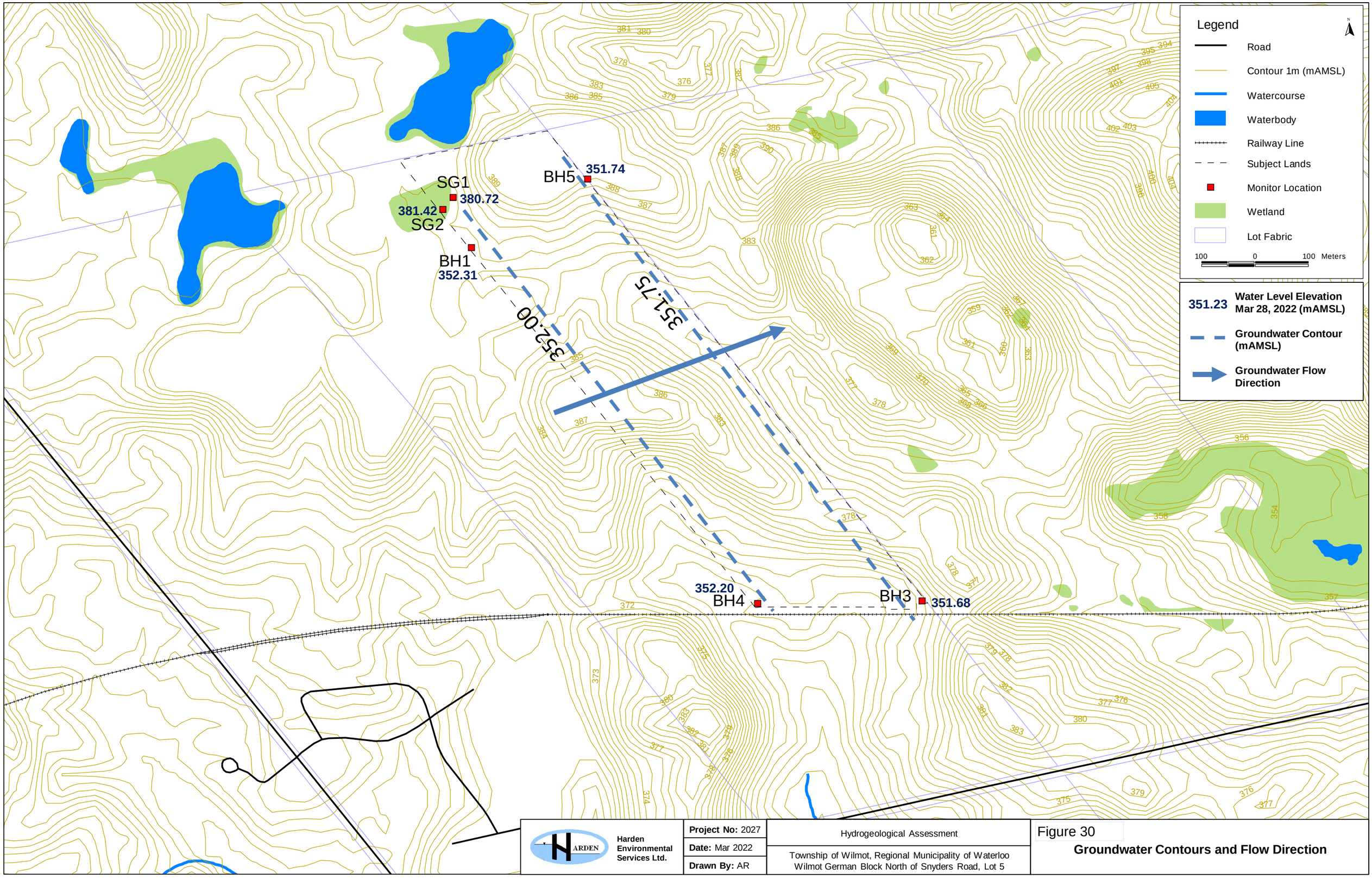
Water Table Elevation

Pit Floor Elevation

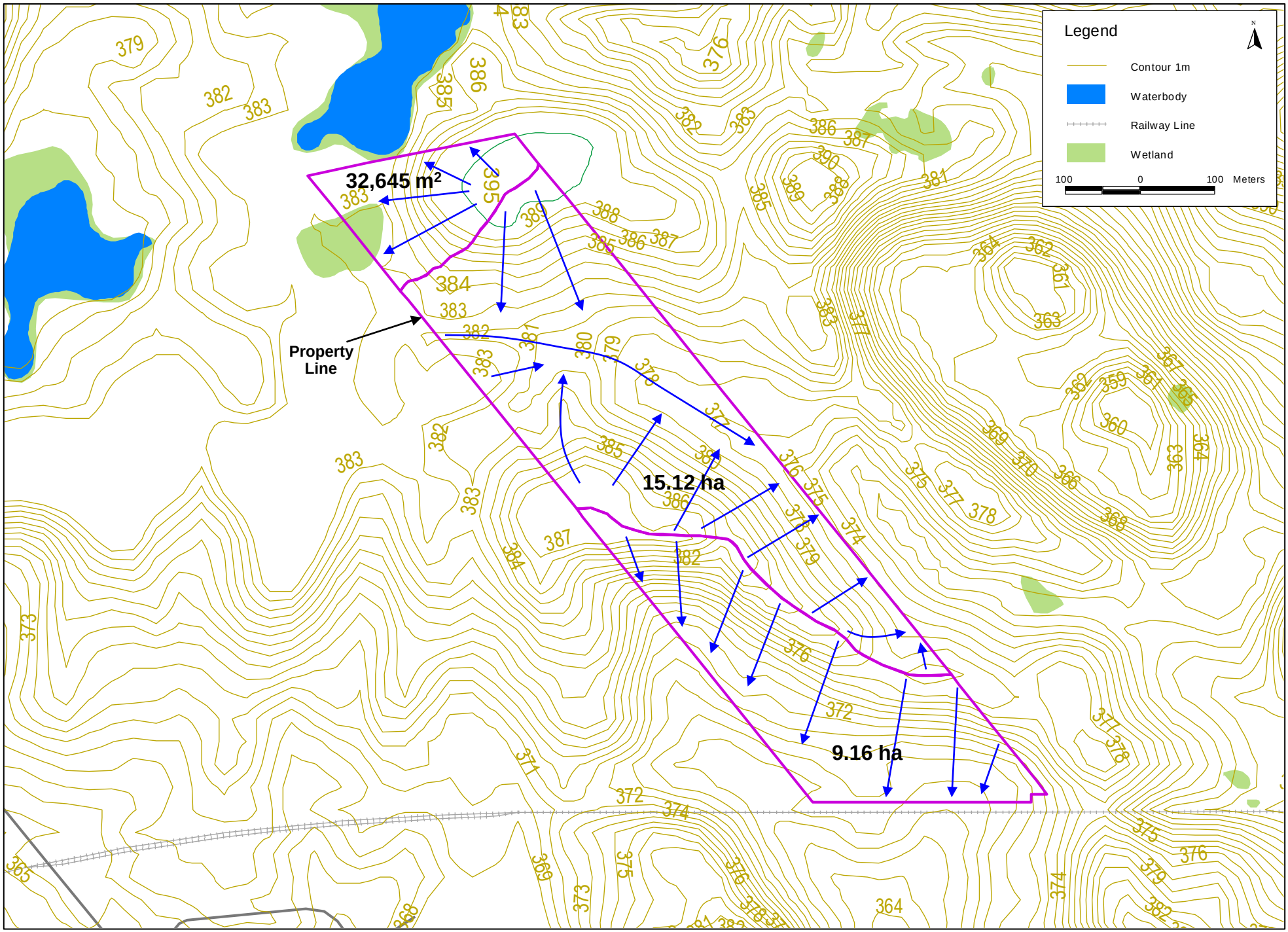
Aquifer

Aquitard

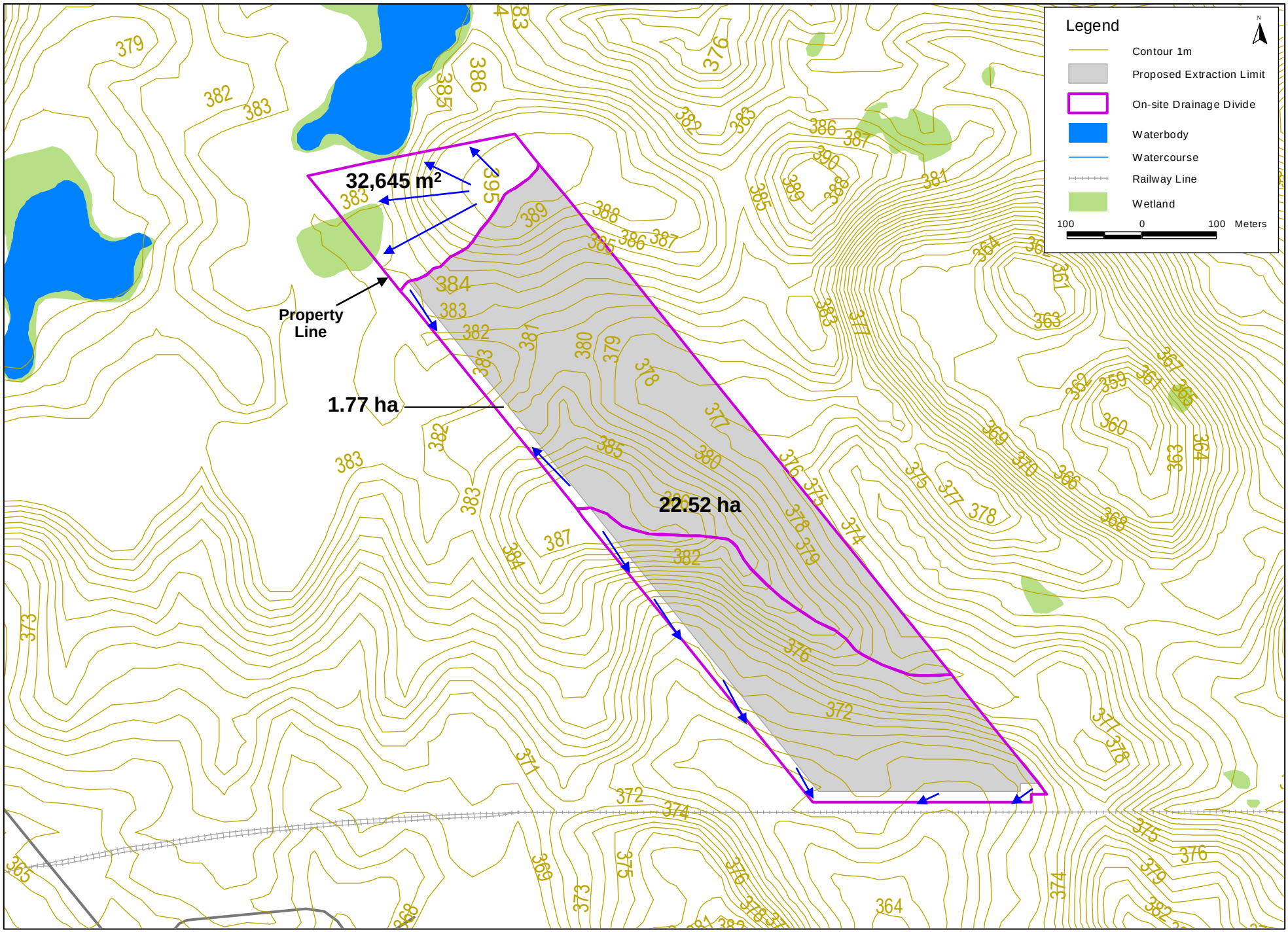
Harden Environmental Services Ltd.	**Project No:** 2027	Hydrogeological Assessment	Figure 29:
	Date: Jun 2021	Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	**North South Cross Section**
	Drawn By: AR		



Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Mar 2022 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	Figure 30 **Groundwater Contours and Flow Direction**



Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Jun 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	**Figure 31: On-site Drainage Pre Extraction**



Harden Environmental Services Ltd.	**Project No:** 2027 **Date:** Jun 2021 **Drawn By:** AR	Hydrogeological Assessment Township of Wilmot, Regional Municipality of Waterloo Wilmot German Block North of Snyders Road, Lot 5	**Figure 32: On-site Drainage Post Extraction**

Appendix A: Borehole Logs and Water Well Records

APPENDIX C

BOREHOLE LOGS

ID Number: BH1

Project Name: 1856 Snyders Road Aggregate Assessment

Project No: 45533-100

Client: Mike Hodgkinson

Site Location: 1856 Snyders Road East

Date Completed: 3/29/2019

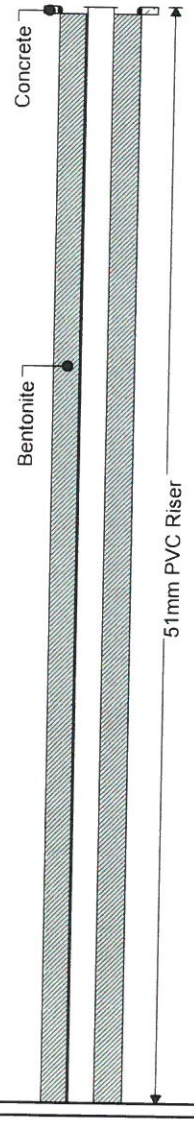
Drilling Contractor: Altech

Drill Rig:

Drill Method: Hollow Stem Auger

Protective Cover: Monument Casing

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value • Blows/305mm • 20 40 60 80	Moisture Content % 10 20 30	Well Completion Details
0 / 0		Ground Surface	382.6						
		SILT TILL trace sand, trace clay	0.0						
2				1	SS				
6 / 2			380.3						
		SAND brown, fine, some silt	2.3	2	SS				
			379.5						
		SAND AND SILT fine, some clay	3.0	3	SS				
12 / 4									
			378.0						
		SAND brown, med	4.6	4	SS				
18									
20 / 6			376.5						
		SILT TILL grey/brown, some clay, trace sand	6.1	5	SS				
24									
			375.0						
26 / 8		**CLAYEY SILT TILL** grey/ brown, trace sand	7.6	6	SS				
28									
30			373.4						
		SILT TILL grey/brown, trace clay, trace sand	9.1	7	SS				
34 / 10									
			371.9						
36		**CLAYEY SILT TILL** grey/brown, trace sand	10.7	8	SS				
38									
40 / 12				9	SS				
42									
44			368.9						
46 / 14		**SILT TILL** some sand, trace clay	13.7	10	SS				
48									
50			367.3						
52 / 16		**SAND** brown, fine/med, some silt	15.2	11	SS				
54									
56									
58									
60 / 18			364.3						
			18.3						



Field Technician: JFB/TFC

Drafted by: SAR

Reviewed by: JFB/ TFC

MTE

ID Number: BH1

Project Name: 1856 Snyders Road Aggregate Assessment

Project No: 45533-100

Client: Mike Hodgkinson

Site Location: 1856 Snyders Road East

Date Completed: 3/29/2019

Drilling Contractor: Altech

Drill Rig:

Drill Method: Hollow Stem Auger

Protective Cover: Monument Casing

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value • Blows/305mm • 20 40 60 80	Moisture Content % 10 20 30	Well Completion Details
62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100 102 104 106 108 110 112 114 116 118 120	20 22 24 26 28 30 32 34 36	**SANDY SILT** brown	361.2	12	SS				05/07/2019: 29.71 mbgs; 51mm PVC Riser
		SAND AND SILT fine, brown	21.3 / 358.2	13	SS				
		SAND fine, brown, some silt	24.4	14	SS				
		SILT TILL brown, some clay, some sand	356.7	15	SS				
		SAND fine, brown, some silt	25.9	16	SS				
				17	SS				
		med	353.6 / 29.0	18	SS				
				19	SS				
				20	SS				
		fine	350.6 / 32.0	21	SS				
		some silt	349.1 / 33.5	22	SS				
		SILT brown, trace fine sand,	347.5 / 35.1	23	SS				
			346.0 / 36.6						

Field Technician: JFB/TFC

Drafted by: SAR

Reviewed by: JFB/ TFC

MTE

ID Number: BH1

Project Name: 1856 Snyders Road Aggregate Assessment

Project No: 45533-100

Client: Mike Hodgkinson

Site Location: 1856 Snyders Road East

Date Completed: 3/29/2019

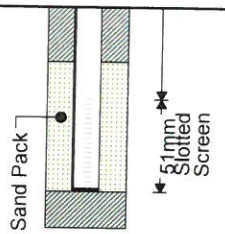
Drilling Contractor: Altech

Drill Rig:

Drill Method: Hollow Stem Auger

Protective Cover: Monument Casing

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value • Blows/305mm • 20 40 60 80	Moisture Content % 10 20 30	Well Completion Details
122		**SAND** med, brown		24	SS				
124									
126				25	SS				
128									
130			343.0						
132		coarse	39.6	26	SS				
134		Drilling Terminated							
136									
138									
140									
142									
144									
146									
148									
150									
152									
154									
156									
158									
160									
162									
164									
166									
168									
170									
172									
174									
176									
178									
180									
38									
40									
42									
44									
46									
48									
50									
52									
54									



Field Technician: JFB/TFC

Drafted by: SAR

Reviewed by: JFB/ TFC

MTE

ID Number: BH2

Project Name: 1856 Snyders Road Aggregate Assessment

Project No: 45533-100

Client: Mike Hodgkinson

Site Location: 1856 Snyders Road East

Date Completed: 4/17/2019

Drilling Contractor: Altech

Drill Rig:

Drill Method: Hollow Stem Auger

Protective Cover:

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value • Blows/305mm • (20 40 60 80)	Moisture Content % (10 20 30)	Well Completion Details
0 / 0		Ground Surface	390.6						
		SAND very soft, ligh brown, fine, few silt, trace organics	0.0						
				1	SS				
			389.1						
2		trace silt, trace gravel	1.5	2	SS				
			388.3						
		brown, few gravel, some silt	2.3	4	SS				
			387.5						
		SILT AND SAND brown, fine	3.0	5	SS				
4									
			386.0						
		SAND brown, fine, some silt	4.6	6	SS				
6				7	SS				
			383.0						
		grey/brown, fine/med, trace/few silt	7.6	8	SS				
			381.4						
		med	9.1	9	SS				
10									
			379.9						
		brown, fine, some silt	10.7	10	SS				
			378.4						
12		**SANDY SILT** brown, fine, some silty sand	12.2	11	SS				
			376.9						
14		**SAND** grey/ brown, fine/ med, few silt	13.7	12	SS				
			375.3						
		fine, trace silt	15.2	13	SS				
16									
				14	SS				
18			372.3						
			18.3						

Bentonite

Field Technician: JFB/TFC

Drafted by: SAR

Reviewed by: JFB/ TFC

MTE

ID Number: BH2

Project Name: 1856 Snyders Road Aggregate Assessment

Project No: 45533-100

Client: Mike Hodgkinson

Site Location: 1856 Snyders Road East

Date Completed: 4/17/2019

Drilling Contractor: Altech

Drill Rig:

Drill Method: Hollow Stem Auger

Protective Cover:

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value • Blows/305mm • 20 40 60 80	Moisture Content % 10 20 30	Well Completion Details
62		brown, ffew silt		15	SS				
64			370.8						
66 20		some silt	19.8	16	SS				
68									
70			369.2						
72 22		**CLAYEY SILT TILL** brown, some grey/brown,	21.3	17	SS				
74			367.7						
76		**SAND** brown, fine, some silt	22.9	18	SS				
78 24									
80				19	SS				
82									
84			364.7						
86 26		**CLAYEY SILT TILL** grey/brown, some sand	25.9	20	SS				
88									
90			363.1						
92 28		**SAND** brown, fine, some silt	27.4	21	SS				
94			361.6						
96		**CLAYEY SILT TILL** grey/brown, trace coarse sand	29.0	22	SS				
98 30									
100			360.1						
102			30.5	23	SS				
104									
106 32				24	SS				
108									
110									
112 34				25	SS				
114			355.5						
116		trace coarse sand	35.1	26	SS				
118 36									
120									

Field Technician: JFB/TFC

Drafted by: SAR

Reviewed by: JFB/ TFC

MTE

ID Number: BH2

Project Name: 1856 Snyders Road Aggregate Assessment

Project No: 45533-100

Client: Mike Hodgkinson

Site Location: 1856 Snyders Road East

Date Completed: 4/17/2019

Drilling Contractor: Altech

Drill Rig:

Drill Method: Hollow Stem Auger

Protective Cover:

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Recovery (%)	N-Value • Blows/305mm • 20 40 60 80	Moisture Content • % • 10 20 30	Well Completion Details
122				27	SS				
124 38			352.5						
126			38.1	28	SS				
128									
130 40				29	SS				
132									
134			349.4						
136		trace coarse sand	41.1	30	SS				
138 42		Drilling Terminated							
140									
142									
144 44									
146									
148									
150 46									
152									
154									
156									
158 48									
160									
162									
164 50									
166									
168									
170 52									
172									
174									
176									
178 54									
180									

Field Technician: JFB/TFC

Drafted by: SAR

Reviewed by: JFB/ TFC

MTE

ID Number: BH3

Project Name: 1856 Snyders Road Aggregate Assessment

Project No: 45533-100

Client: Mike Hodgkinson

Site Location: 1856 Snyders Road East

Date Completed: 4/30/2019

Drilling Contractor: Altech

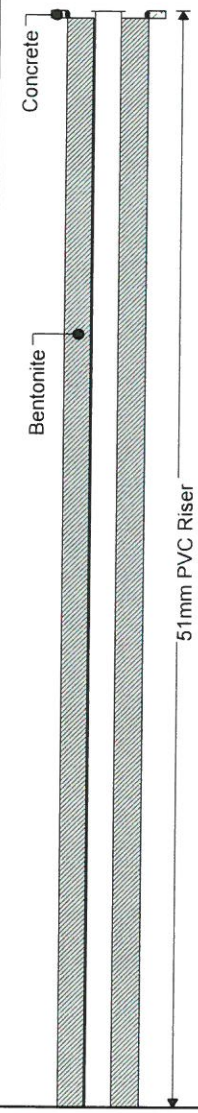
Drill Rig:

Drill Method: Hollow Stem Auger

Protective Cover: Monument Casing

Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	N-Value • Blows/305mm • (20 40 60 80)	Moisture Content % (10 20 30)
0 / 0		Ground Surface	371.3					
2		**TOPSOIL** orange/brown, silt, trace sand, trace clay, trace organics	0.0 / 369.8	1	SS			
4								
6 / 2		**SAND AND SILT** brown, fine, trace organics	1.5 / 369.0	2	SS			
8		**SAND** brown, fine, few silt	2.3 / 368.3	3	SS			
10								
12 / 4		**SILT** light brown, trace fine sand	3.0 / 366.7	4	SS			
14								
16		**SAND** brown, fine, few silt	4.6 / 365.2	5	SS			
18								
20 / 6		**SILT AND SAND** brown	6.1 / 363.7	6	SS			
22								
24								
26 / 8		**SILT** brown, trace fine sand	7.6	7	SS			
28								
30								
32				8	SS			
34 / 10								
36								
38				9	SS			
40 / 12			359.1					
42		**SILT** grey/brown	12.2 / 357.6	10	SS			
44								
46 / 14		**SAND** brown, fine, sone silt	13.7 / 356.1	11	SS			
48								
50								
52 / 16		**SILT AND SAND** brown	15.2 / 354.6	12	SS			
54								
56		**SAND** light brown, fine, some silt	16.8 / 353.0	13	SS			
58								
60 / 18			18.3					

Well Completion Details



Field Technician: JFB/TFC

Drafted by: SAR

Reviewed by: JFB/ TFC

MTE

Sheet: 1 of 2

NOTES:

1) Water Level measured at 19.32 mbgs on 05/07/2019

ID Number: BH3

Project Name: 1856 Snyders Road Aggregate Assessment

Project No: 45533-100

Client: Mike Hodgkinson

Site Location: 1856 Snyders Road East

Date Completed: 4/30/2019

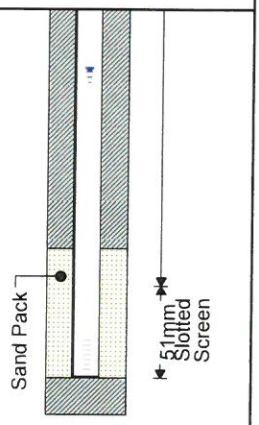
Drilling Contractor: Altech

Drill Rig:

Drill Method: Hollow Stem Auger

Protective Cover: Monument Casing

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value • Blows/305mm • 20 40 60 80	Moisture Content • % • 10 20 30	Well Completion Details
62		**SILT** brown, some fine sand		14	SS				
64			351.5						
66 20		**SAND** brown, med	19.8	15	SS				
68			350.0						
70		fine, trace silt	21.3	16	SS				
72 22									
74			348.5						
76		**SILT** grey/ brown, trace fine sand	22.9	17	SS				
78 24									
80			346.9						
82		**SILT TILL** grey/brown, trace fine sand, trace clay	24.4	18	SS				
84		Drilling Terminated							
86 26									
88									
90									
92 28									
94									
96									
98 30									
100									
102									
104 32									
106									
108									
110									
112 34									
114									
116									
118 36									
120									



Field Technician: JFB/TFC

Drafted by: SAR

Reviewed by: JFB/ TFC

MTE

Sheet: 2 of 2

NOTES:

1) Water Level measured at 19.32 mbgs on 05/07/2019

BOREHOLE LOG BH4

PROJECT NUMBER 2027
PROJECT NAME Petersburg Sand and Gravel
DRILLING DATE January 5, 2021

TOTAL DEPTH 25.6 m
DIAMETER .206 m
CASING PVC 50 mm
SCREEN PVC 50 mm 10 Slot
SCREEN LENGTH 3.05 m

COORDINATES 532594E 4807377N
COORD SYS NAD83 Zone17
COMPLETION Sand and Gravel
SURFACE ELEVATION 368.11 m AMSL
WELL TOC 369.21 m AMSL

COMMENTS Log details copied from MECP Well Record

LOGGED BY Altech Drilling
CHECKED BY Stan Denhoed

Depth (m)	Drilling Method	Graphic Log	Material Description	Samples	Sample Type	% Recovery	Blow Counts	N Value	Additional Observations	Water Level	Well Diagram	Elevation (mAMSL)
0	Rotary		Topsoil									368
			Sand									
2												366
4												364
6												362
8												360
10			Clay								Bentonite	358
12			Sand									356
14												354
16												352
18												350
20												348
22												346
24											Sand	344
26												342
28												340

produced by ESlog.ESdat.net on 01 Apr 2022

BOREHOLE LOG BH5

PROJECT NUMBER 2027
PROJECT NAME Petersburg Sand and Gravel
DRILLING DATE November 12, 2021

TOTAL DEPTH 41.15 m
DIAMETER .206 m
CASING PVC 50 mm
SCREEN PVC 50 mm 10 Slot
SCREEN LENGTH 3.05 m

COORDINATES 532276E 4808165N
COORD SYS NAD83 Zone17
COMPLETION Sand and Gravel
SURFACE ELEVATION 389.29 m AMSL
WELL TOC 390.17 m AMSL

COMMENTS

LOGGED BY Stan Denhoed
CHECKED BY Allan Rodie

Depth (m)	Drilling Method	Graphic Log	Material Description	Samples	Sample Type	% Recovery	Blow Counts	N Value	Additional Observations	Water Level	Well Diagram	Elevation (mAMSL)
0	Drive		Dark, organic rich topsoil	S1	Contin							389
			Dark brown, sand, medium grained									
1			Brown, sand and gravel, angular stones, fine-medium grained sand matrix									388
				S2	Contin							
2			Dark brown silty till									387
			Dark brown, sand, layered, fine sand and medium grained sand									
3			Fine Sand	S3	Contin							386
			Sand and Gravel									
			Fine Sand									
4			Light coloured fine sand layered with dark coloured very fine sand									385
			Dark Brown fine sand/silt	S4	Contin							
5			Layered fine sand and medium grained sand with 50 mm silt layer									384
6			Light coloured fine sand	S5	Contin							383
7											Bentonite	382
			Light coloured fine sand, layered	S6	Contin							
8												381
9				S7	Contin							380
10			Brown silt									379
			Light coloured fine sand, layered									
11				S8	Contin							378
12												
				S9	Contin							377
13												376
14			Fine sand grading to very fine sand	S10	Contin							375
15												

produced by ESlog.ESdat.net on 01 Apr 2022

BOREHOLE LOG BH5

Depth (m)	Drilling Method	Graphic Log	Material Description	Samples	Sample Type	% Recovery	Blow Counts	N Value	Additional Observations	Water Level	Well Diagram	Elevation (mAMSL)
16			Dark Brown Silt	S11	Contin						Bentonite	374
			Brown Sand									373
17				S12	Contin							372
18				S13	Contin							371
19												370
			Grey clay, dense									
20				S14	Contin							369
21												368
22				S15	Contin							367
23				S16	Contin							366
	Rotary		very fine sand									
24												365
25			Fine Sand	S17	SS						Cave	364
26			Medium grained sand some stones	S18	SS							363
27												362
28				S19	SS							361
29				S20	SS							360
30												359
31												358
32				S21	SS							357

produced by ESlog.ESdat.net on 01 Apr 2022

BOREHOLE LOG BH5

Depth (m)	Drilling Method	Graphic Log	Material Description	Samples	Sample Type	% Recovery	Blow Counts	N Value	Additional Observations	Water Level	Well Diagram	Elevation (mAMSL)
33												356
34											Cave	355
35			Fine Sand	S22	SS						Bentonite Gravel	354
36												353
37										1		352
38				S23	SS						Sand	351
39												350
40												349
41												348
42												347
43												346
44												345
45												344
46												343
47												342
48												341
49												340
50												339

Ontario Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)* A063942

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name	E-mail Address	
TOP OF THE HILL	AGGREGATES	—	☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name, RR)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
1974 Snyders Rd.	WATERLOO	ONT.		5199655845

Part A Construction and/or Major Alteration of a Well

Address of Well Location (Street Number/Name, RR)	Township	Lot	Concession
1974 Snyders Rd.	WILMOT	PT 1-2	NSR.

County/District/Municipality	City/Town/Village	Province	Postal Code
WATERLOO	Petersburg	Ontario	

UTM Coordinates	Zone	Easting	Northing	GPS Unit Make	Model	Mode of Operation:
NAD 83	17	532283	4808176	Magellan	Meridian	☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

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

Feet

General Colour	Most Common Material	Other Materials	General Description	Depth (Metres) From	To
Brown	Sand	Cobbles		0	60
Grey	Clay			60	61
Brown	Clay			61	73
Brown	Sand	Cobbles / Silt		73	223
Grey	Clay	Cobbles		223	274
Grey	Sand	Clay Stones		274	285
	2"-180' TD + 2.5"-285' TD IN SAME BOREHOLE				

Annular Space/Abandonment Sealing Record

Depth Set at (Metres) From	To	Type of Sealant Used (Material and Type)	Volume Placed (Cubic Metres)
0	165	Bentonite Slurry	
165	185	Silica Sand	
185	270	Bentonite chips	
270	285	Silica Sand.	Approx

Method of Construction

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

Water Use

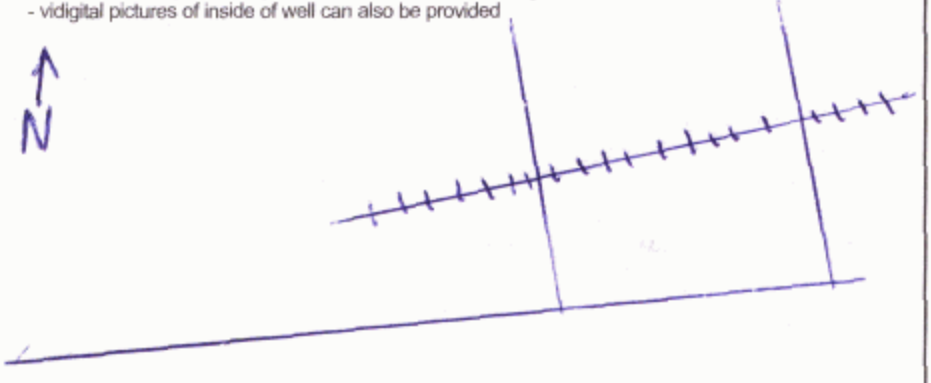
☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☑ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Status of Well

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

Location of Well

Please provide a map below showing:
- all property boundaries, and measurements sufficient to locate the well in relation to fixed points,
- an arrow indicating the North direction
- detailed drawings can be provided as attachments no larger than legal size (8.5" by 14")
- vidigital pictures of inside of well can also be provided



Date Well Completed (yyyy/mm/dd)	Was the well owner's information package delivered?	Date the Well Record and Package Delivered to Well Owner (yyyy/mm/dd)
2007/08/24	☐ Yes ☑ No	

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
DURL HOPPER LTD	2644

Business Address (Street No./Name, number, RR)	Municipality
RR#7 STMARYS ONT	PERTH.

Province	Postal Code	Business E-mail Address
ONT	N4X1C9	hopperc@cyg.net.

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

Well Technician's Licence No.	Signature of Technician	Date Submitted (yyyy/mm/dd)
2323		2007/11/14

Results of Well Yield Testing

Check box if after test of well yield, water was:
☑ Clear and sand free ☐ Cannot develop to sand-free state

If pumping discontinued, give reason:

Pumping test method

Pump intake set at *(Metres)*

Pumping rate *(Litres/min)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(Metres)*

Recommended pump type ☐ Shallow ☐ Deep

Recommended pump depth ____ Metres

Recommended pump rate *(Litres/min)*

If flowing give rate *(Litres/min)*

Draw Down Time (Min)	Draw Down Water Level (Metres)	Recovery Time (Min)	Recovery Water Level (Metres)
Static Level	NA.	Static Level	
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Water Details

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

Casing Used

☐ Galvanized ☐ Steel ☐ Fibreglass ☑ Plastic ☐ Concrete

Screen Used

☐ Galvanized ☐ Steel ☐ Fibreglass ☑ Plastic ☐ Concrete

No Casing and Screen Used

☐ Open Hole

Disinfected? ☐ Yes ☑ No

Casing and Well Details

Diameter of the Hole *(Centimetres)* 8 3/4"

Depth of the Hole *(Metres)* 285

Wall Thickness *(Metres)* sch 40/sch 40

Inside Diameter of the Casing *(Metres)* 2"-180' 2.5"-285

Depth of the Casing *(Metres)* 285, 180'

Ministry Use Only

Audit No.	Well Contractor No.
z62913	
Date Received (yyyy/mm/dd) APR 03 2008	Date of Inspection (yyyy/mm/dd)
Remarks	

0506E (11/2006)

Ministry's Copy

40P7E

UTM 17 532100 E

5 R 4808500 N

Elev. 5 R 1300

Basin 23

The Ontario Water Resources Commission Act

WATER WELL RECORD

65 No 2377

County or District WATERLOO Township, Village, Town or City WILMOT

Con. SER Lot 3 Date completed 2 (day) MARCH (month) 1966 (year)

Owner WATERLOO P.U.C. (print in block letters) Address WATERLOO.

Casing and Screen Record

Inside diameter of casing 16"

Total length of casing 108'6"

Type of screen LAYNE S.S.

Length of screen 30'

Depth to top of screen 108'6"

Diameter of finished hole 16"

Pumping Test

Static level 62.92

Test-pumping rate 786 G.P.M.

Pumping level 70-3

Duration of test pumping 18 HRS.

Water clear or cloudy at end of test CLEAR

Recommended pumping rate 700 G.P.M.

with pump setting of 100' feet below ground surface

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
TOP SOIL	0	1		
BROWN CLAY	1	15		
CLAY & GRAVEL	15	47		
GRAVEL & SAND (TIGHT)	47	65	47	F
COARSE GRAVEL & SAND	65	83-6		
CLAY & GRAVEL	83'6"	84		
SAND & GRAVEL	84	138		
CLAY & SAND	138	140		

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

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

Drilling or Boring Firm INTERNATIONAL WATER SUPPLY LTD.

Address LONDON

Licence Number

Name of Driller or Borer F. BARNHARDT

Address KITCHENER

Date MAR 31/66

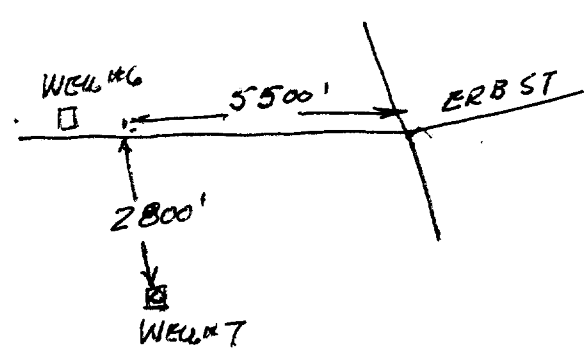
F. Barnhardt
(Signature of Licensed Drilling or Boring Contractor)

Form 7 10M-62-1152

OWRC COPY

Location of Well

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



WATERLOO PUC WELL #7

CSS.S8

40P7E

UTM 17 Z 533350 E
S R 5 R 4807300 N
Elev. 5 R 1175
Basin 23

The Ontario Water Resources Commission Act

WATER WELL RECORD

65 № 2409

County or District ~~WILMOT~~ WATERLOO Township, ~~Village, Town or City~~ WILMOT

Con. SNIDER ROAD N. Lot 4 Date completed 8 (day) JAN. (month) 1966 (year)

[redacted]ess RR 2 PETERSBURG.

Casing and Screen Record	
Inside diameter of casing	6¼"
Total length of casing	85 Ft.
Type of screen	—
Length of screen	—
Depth to top of screen	—
Diameter of finished hole	6¼"

Pumping Test	
Static level	55 FT.
Test-pumping rate	10 G.P.M.
Pumping level	60 FT.
Duration of test pumping	7 HRS.
Water clear or cloudy at end of test	CLEAR.
Recommended pumping rate	10 OR LESS G.P.M.
with pump setting of	60 feet below ground surface

Well Log: Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
PIT	0	5		
CLAY + STONES	5	77		
SAND + CLAY	77	85		
MEDIUM GRAVEL	85	86	85 to 86	FRESH

For what purpose(s) is the water to be used? HOUSEHOLD.

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

Drilling or Boring Firm McLAUGHLIN WATER WELLS + SUPPLY LTD.

Address BRESLAU, ONTARIO

Licence Number 1968

Name of Driller or Borer BRYAN CAREY

Address RR # 3 WATERLOO

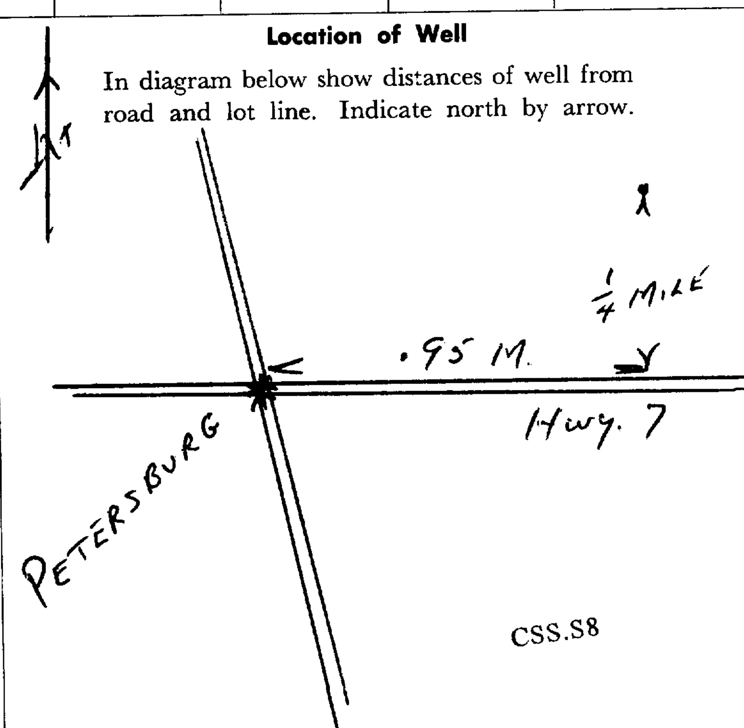
Date MAY 5 1966

R. McLaughlin

(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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



CSS.S8

Form 7 15M-60-4138

OWRC COPY

40P7E

UTM 17 Z 532710 E
5 R 4807100 N

Elev. 5 R 1200

Basin 23 ~~Smith~~ R.H.N.

Lot 5

ONTARIO

RECEIVED JUN 7 1965 GEOLOGICAL BRANCH DEPARTMENT OF MINES

The Water-well Drillers Act, 1954

Department of Mines

No 2410

Water-Well Record

County or Territorial District Waterloo Township, ~~Village, Town or City~~ Wilmont

[redacted] Village, Town or City)

[redacted] Address R.R.2. Petersburg Ont.

[redacted]
(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 5½" O.D.
Length(s) 276 ft.
Type of screen GRAVEL BATTAM
Length of screen

Pumping Test

Static level 115 ft
Pumping rate 25 G.P.M.
Pumping level 135 ft
Duration of test 25 hrs.

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Top Soil	0	1			
Dry Sand	1	6			
Quick Sand	6	28			
Clay	28	125			
Clay & Sand	125	160			
Quick Sand	160	170			
Clay & Sand	170	244			
Hardpan	244	267			
Sand & Gravel	267	275			
Gravel (water pres)	275	276	275 ft.	160 ft	FRESH

For what purpose(s) is the water to be used? FARMING & HOUSEHOLD

Is water clear or cloudy? CLEAR

Is well on upland, in valley, or on hillside? HILLSIDE
MED. LOWLAND IN HILL COUNTRY

Drilling firm C. McLaughlin & Sons
Address 244 Erb St. W.
Waterloo Ont.

Name of Driller Russell McLaughlin
Address 236 Erb St. W.
Waterloo, Ont.

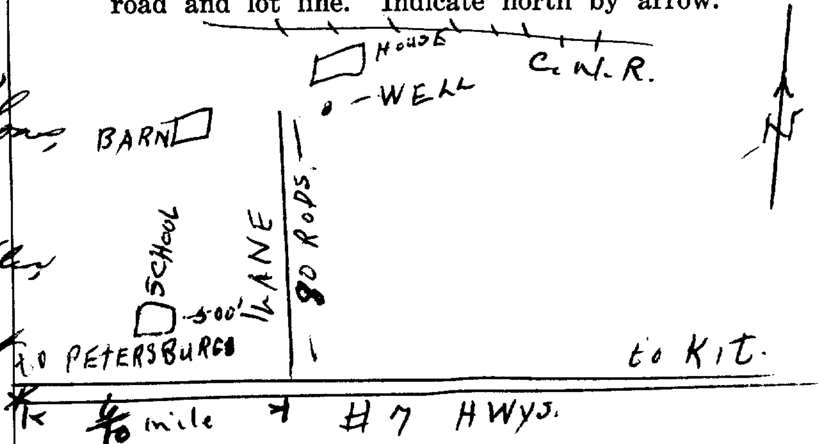
Licence Number 21

I certify that the foregoing statements of fact are true.

Date May 29 R. McLaughlin
Signature of Licensee

Location of Well

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



CSS.S8

15

40PTE

UTM 17 Z 532700 E
5 R 4806775 N
Elev. 5 R 1187
Basin 23 Rd North Snider

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

Water-Well Record

County or Territorial District Waterloo Township, Village, Town or City Wilmot

[redacted] Village, Town or City)

Address RR. # 2, Petersburg, Ontario

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 5½"
Length(s) 284'
Type of screen screwed
Length of screen screwed

Pumping Test

Static level 110'
Pumping rate 20 G.P.M.
Pumping level 125'
Duration of test 24 hrs.

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
dry sand	0	18			
quick sand with clay streaks	18	75'			
clay	75'	142			
quick sand	142	155'			
clay & quick sand	155'	188			
clay	188	235'			
hard pan	235'	275'			
sand	275'	282			
gravel	282	284	275-284	174	fresh

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

Is water clear or cloudy? clear

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

Drilling firm E. McLaughlin & Sons

Address Waterloo

Name of Driller Russel McLaughlin

Address 236 King St. Waterloo

Licence Number 21

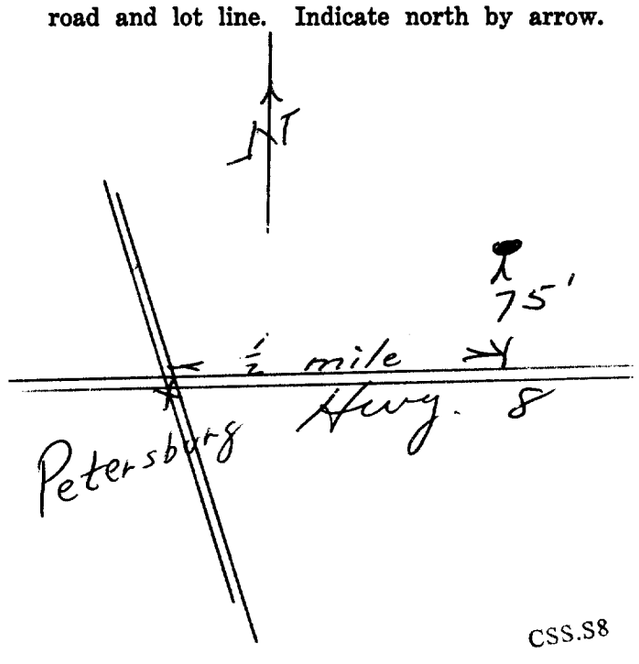
I certify that the foregoing statements of fact are true.

Date June 2/58 Russel McLaughlin

Signature of Licensee

Location of Well

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



Form 5

CSS.S8

40P7E

UTM 17 Z 532850 E
5 R 4806900 N

Elev. 5 R 1225

Basin 23

The Ontario Water Resources Commission Act

WATER RESOURCES DIVISION
JUL 1964
ONTARIO WATER RESOURCES COMMISSION

65 No 2412

WATER WELL RECORD

County or District WATERLOO Township, Village, Town or City WILMOT

Con. SNIDER Rd. N. Lot 5 Date completed 7 (day) FEB (month) 1964 (year)

[redacted] ress RR 2 PETERSBURG ONT N0B 2H0

Casing and Screen Record

Inside diameter of casing 5" + 4"

Total length of casing 267' of 5" + 65' of 4"

Type of screen —

Length of screen —

Depth to top of screen 4" casing is 232' from top

Diameter of finished hole 4" at bottom

Pumping Test

Static level 132 ft.

Test-pumping rate 7 G.P.M.

Pumping level 201 ft.

Duration of test pumping 15 hrs

Water clear or cloudy at end of test Clear

Recommended pumping rate 12 or 6 G.P.M.

with pump setting of 205 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
top soil	0	1		
DRY SAND	1	120		
Clay & sand	120	195		
Hardpan & clay	195	267		
Hardpan & boulders	267	297	300 ft	Fresh
Limestone Rock	297	303		

For what purpose(s) is the water to be used? ~~FARMING~~ D.W.S.

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

Drilling or Boring Firm R.I. McLaughlin ~~Water Well Drilling~~

Address 236 Erb St West Waterloo Ont

Licence Number 1265

Name of Driller or Borer Paul Hergott

Address RR#1, Bamberg, Ont

Date June 29 1964

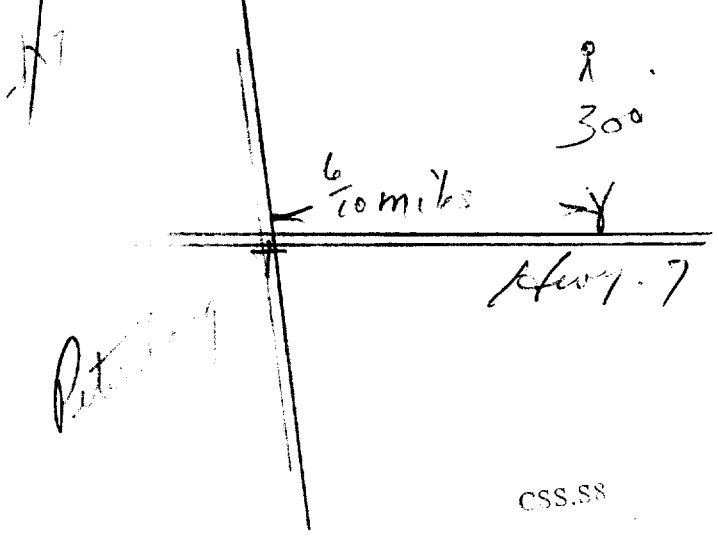
R. McLaughlin
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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



CSS.S8

40 P 7E

UTM 17 Z 532765 E
5 R 4806675 N
Elev. 5 R 1195
Basin 23

Original received Feb 4/52 65 No 52-2471
Revised Record received Apr 8/52

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

[redacted] ~~Village, Town or City~~ Wilmot

~~wn or City~~) Petersburg

Date Completed 29 (day) June (month) 1950 Cost of Well (excluding pump)

Pipe and Casing Record

Casing diameter(s) 5"
Length(s) of casing(s) 165'
Type of screen 90 mesh
Length of screen 6 ft Long
Distance from top of screen to ground level 159
Is well a gravel-wall type?

Pumping Test

Date
Static level 90 ft
Pumping level
Pumping rate 800 Gal Per hr
Duration of test
Distance from cylinder or bowls to ground level

Water Record

Kind (fresh or mineral) Fresh
Quality (hard, soft, contains iron, sulphur, etc.) Soft
Appearance (clear, cloudy, coloured) Clear
For what purpose(s) is the water to be used? House

How far is well from possible source of contamination?
What is the source of contamination?
Enclose a copy of any mineral analysis that has been made of water

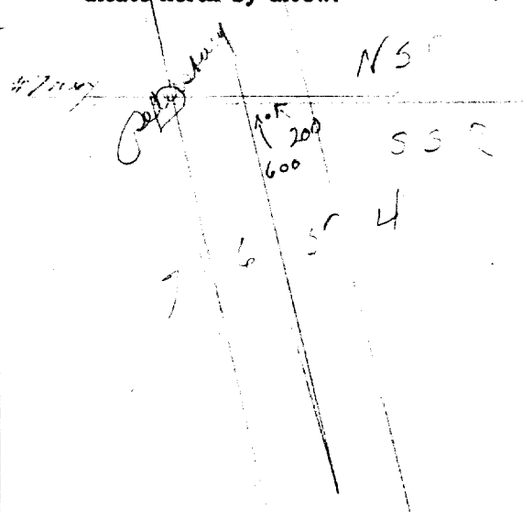
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
165'	fresh	75'

Well Log

Overburden and Bedrock Record	From	To
	0 ft.	....ft.
Dry Sand	0	60
Clay	60	159
Sand	159	165'

Location of Well

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



Situation: Is well on upland, in valley, or on hillside?
Drilling Firm Twin City Water Supply Co
Address 278 Lawrence Ave
Name of Driller Florian Phillips Address Kitchener
Date Apr 2 - 52 Licence Number

Florian Phillips
Signature of Licensee

FORM 5

CSS.S8

40P7E

* UTM 17 Z 532800 E

5 R 4806700 N

Elev. 5 R 1200

Basin 23

ONTARIO

RECEIVED 65 JUN 7 1955 GEOLOGICAL BRANCH DEPARTMENT OF MINES

№ 2472

The Water-well Drillers Act, 1954

Department of Mines

Snider Rd. South

Lot - 5? 4 RW

Water-Well Record

County or Territorial District Waterloo Township, ~~Village, Town or City~~ Wilmont

[redacted] Village, Town or City)

[redacted]ddress R.R.#2 PETERSBURG

(day) (month) (year)

Pipe and Casing Record

J.W.

Casing diameter(s) 4½" O.D.

Length(s) 324

Type of screen Gravel Bottom

Length of screen

Pumping Test

Static level 165'

Pumping rate 15 GPM

Pumping level 175'

Duration of test 26 hrs.

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Dry sand	0	95			
Clay	95	108			
Quick sand	108	210			
Clay	210	260			
Bolders & Hardpan	260	305			
Hardpan	305	322			
Gravel (water press)	322	324	322	157	FRESH

For what purpose(s) is the water to be used?
HOUSEHOLD & DOMESTIC

Is water clear or cloudy? Clear

Is well on upland, in valley, or on hillside?
TOP OF BIG HILL

Drilling firm ~~Ellis McLaughlin & Sons~~

Address 244 Erb St W
Waterloo Ont

Name of Driller Russel McLaughlin

Address 236 Erb St W.
Waterloo Ont.

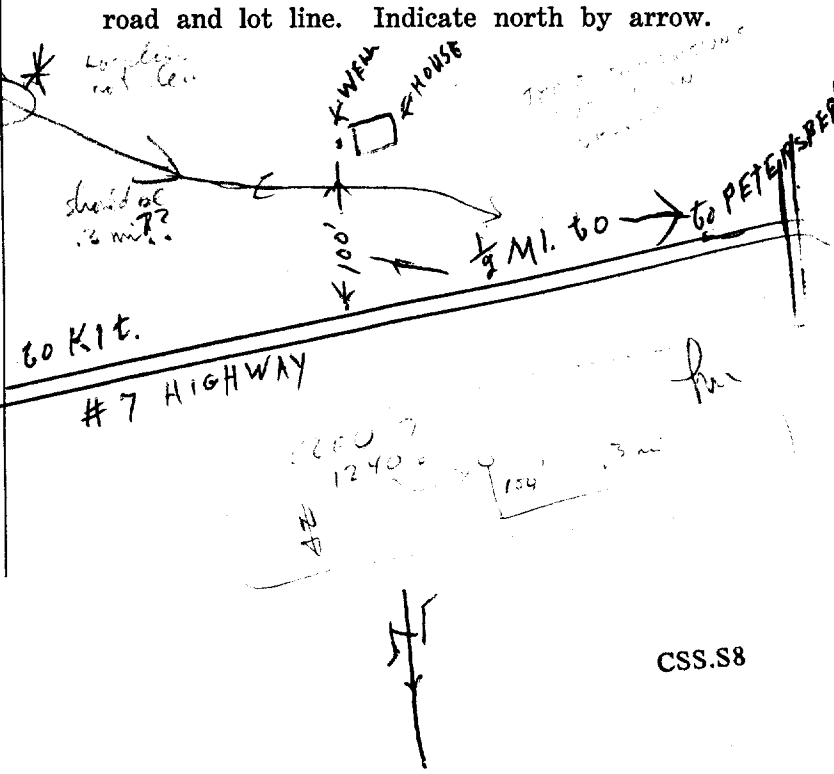
Licence Number 21

I certify that the foregoing statements of fact are true.

Date May 28th R. McLaughlin
Signature of Licensee

Location of Well

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



CSS.S8

Form 5

Stay at home except for essential travel and follow the **restrictions and public health measures (https://covid-19.ontario.ca/zones-and-restrictions)**.

Ontario

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records).

Go Back to Map ()

Well ID

Well ID Number: 6502474
Well Audit Number:
Well Tag Number:
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	
Township	WILMOT TOWNSHIP
Lot	005

Concession	SR S
County/District/Municipality	WATERLOO
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 17 Easting: 532764.00 Northing: 4806923.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
	LOAM			0 ft	1 ft
BRWN	CLAY	MSND		1 ft	5 ft
	MSND			5 ft	14 ft

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed

Method of Construction & Well Use

Method of Construction	Well Use

Boring	
	Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
30 inch	CONCRETE		14 ft

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 2519

Results of Well Yield Testing

After test of well yield, water was	CLEAR
If pumping discontinued, give reason	

Pump intake set at	
Pumping Rate	6 GPM
Duration of Pumping	1 h:0 m
Final water level	13 ft
If flowing give rate	
Recommended pump depth	14 ft
Recommended pump rate	4 GPM
Well Production	PUMP
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL	8 ft		
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	

30	30
40	40
45	45
50	50
60	60

Water Details

Water Found at Depth	Kind
7 ft	Fresh

Hole Diameter

Depth From	Depth To	Diameter

Audit Number:

Date Well Completed: June 09, 1961

Date Well Record Received by MOE: June 21, 1961

Updated: April 30, 2021

SRN

17 5332110 Lot 4 CODED

15 4806950

16 11240

123 1

6502903

3 9

7

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District: Waterloo
Township, Village, Town or City: Wilmot

Con.: ~~33~~ Snider Rd. N Lot: 4
Date completed: 10 (day) July (month) 1968 (year)

[redacted]ss: Petersburg

Casing and Screen Record

Inside diameter of casing: 5

Total length of casing: 153

Type of screen: Slot 12 pipe

Length of screen: 7 ft top 9 ft with 6 ft Pocket

Depth to top of screen: 142

Diameter of finished hole: 5

Pumping Test

Static level: 100

Test-pumping rate: 15 G.P.M.

Pumping level: 125

Duration of test pumping: 8

Water clear or cloudy at end of test: Clear

Recommended pumping rate: 12 or less G.P.M.

with pump setting of 140 feet below ground surface

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Dry sand	0	63		
Clay	63	67		
Sand and Clay	67	119		
Clay	119	132	132	
Water Bearing Sand	132	152	to	Fresh
			152	

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

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

Drilling or Boring Firm: Fely Straus

Address: St Clements

Licence Number: 2826

Name of Driller or Borer: Fely Straus

Address: St Clements

Date: July 11

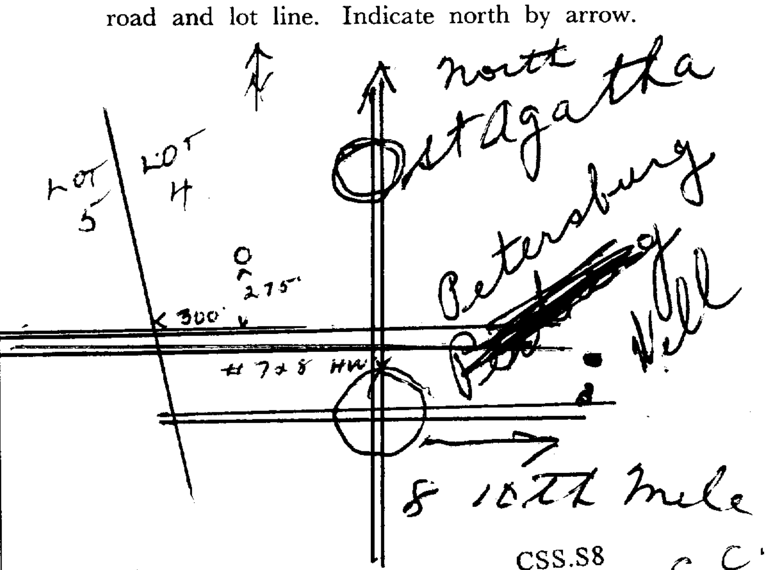
Fely Straus
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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



CSS.S8

S.C.

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Ontario

40P/7h

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

6504507 | MUNICIP. 65004 | CON. SR 5

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Waterloo	Wilmont Twsp	Conn. South Snyder Rd.	Part 005

[redacted] Krug St Kitchener

DATE COMPLETED: DAY 09 MO 08 YR. 76

[redacted] 566780 | RC 4 | ELEVATION 1210 | RC 4 | BASIN CODE 23

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BLK	Topsoil			0	1
Brown	Clay			1	94
Brown	Sand			114	130
	Clay	Stones		130	158
Brown	Clay	Sand		158	172
	Boulders			172	185
Blue	Clay	Stones		188	214
	Clay	Boulders		214	225
Blue	Clay	Stones		225	238
Blue	Clay	Boulders		238	244
		gravel		245	250
Brown	Sand			250	255

31: 0001B04 | 0094605 | 0130028 | 0158605112 | 0172605128 | 01851[illegible]
32: 0214306112 | 0225305113 | 0238305114 | 0244305113 | 0250611 | 02551[illegible]

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0255	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	TO
05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	1	0251
	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.): 016 | DIAMETER: 04000 INCHES | LENGTH: 04 FEET
MATERIAL AND TYPE: Stainless Steel | DEPTH TO TOP OF SCREEN: 0247 FEET

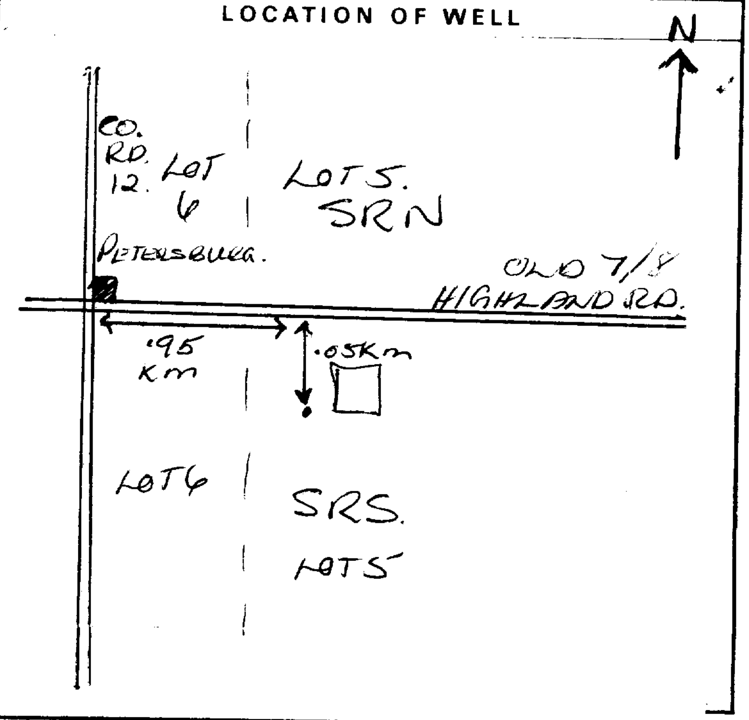
61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP Air 2 ☐ BAILER
PUMPING RATE: 0010 GPM
DURATION OF PUMPING: 02 HOURS 00 MINS
STATIC LEVEL: 093 FEET
WATER LEVEL END OF PUMPING: FEET
WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY — 15 MINUTES: FEET; 30 MINUTES: FEET; 45 MINUTES: FEET; 60 MINUTES: FEET
IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: 160 FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 160 FEET
RECOMMENDED PUMPING RATE: 0010 GPM
GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL



FINAL STATUS OF WELL 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 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 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: Paul Weber Well Drilling | LICENCE NUMBER: 5469
ADDRESS: RR 2 Breslau
NAME OF DRILLER OR BORER: Paul Weber | LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: Paul Weber | SUBMISSION DATE: DAY 25 MO. 8 YR. 76

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 5469 | DATE RECEIVED: 220976
DATE OF INSPECTION: | INSPECTOR: May 25/81
REMARKS: CSS.S8
P
WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

Ministry of the Environment
Ontario

The Ontario Water Resources Act

40P/7h

WATER WELL RECORD

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

11 | 6505154 | MUNICIP 65004 | CON SR N

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC	LOT 25-27
[redacted]	[redacted]LWICH	NORTH OF SNIDER RD.	005

[redacted] R.R #2 PETERSBURG ONT.

DATE COMPLETED: DAY 21 MO 04 YR. 80

21 [redacted]6680 | RC 4 | ELEVATION 1250 | RC 4 | BASIN CODE 23

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BLACK	TOP SOIL			0	1
BROWN	SAND	~~FINE~~, SILT	FINE, PACKED, SOFT	1	58
GREY	CLAY	SAND	SOFT	58	175
"	SAND,	SILT, CLAY		175	293
"	GRAVEL,	BOULDERS, SILT	HARD	293	308
"	ROCK,		HARD	308	327

31 | 0001802 | 0058608067 9 | 0175205288 5 | 0293228066 5 | 0308211139 6 | 0327212 73

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0308	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	TO
05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.244	0	0308
05	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		308	0327
	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	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 [redacted] 2 ☒ BAILER
PUMPING RATE: 0020 GPM
DURATION OF PUMPING: 24 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 [redacted] 2 ☒ RECOVERY 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
170 FEET	200 FEET	185 FEET	175 FEET	170 FEET	FEET

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: 250 FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 250 FEET
RECOMMENDED PUMPING RATE: 0010 GPM

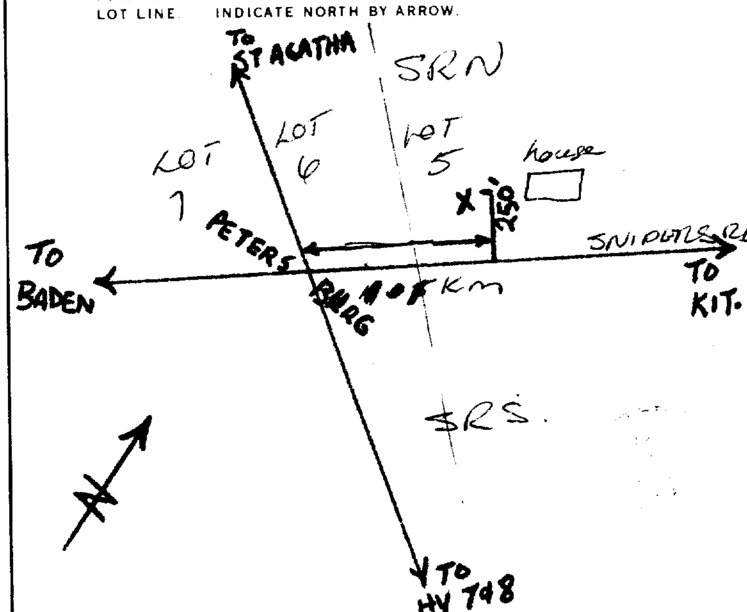
FINAL STATUS OF WELL 1
1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE 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 1
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: McLAUGHLIN WATERWELLS — LICENCE NUMBER 3518
ADDRESS: 38 DOLMAN St. BRESLAU
NAME OF DRILLER OR BORER: DON McLAUGHLIN — LICENCE NUMBER
SIGNATURE OF CONTRACTOR: R. McLaughlin — SUBMISSION DATE DAY 20 MO. 5 YR. 80

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 3518 | DATE RECEIVED 160381
DATE OF INSPECTION | INSPECTOR May 19/81
REMARKS: CSS.S8 Locate

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506–4–77 FORM 7

Ministry of the Environment

Ontario

The Ontario Water Resources Act

40P/7h

WATER WELL RECORD

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

11 | 6505382 | MUNICIP 65004 | CON. SR N

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON, BLOCK, TRACT, SURVEY, ETC.	LOT 004
[redacted] ot		Snider Rd. North	4

[redacted] .R.2 Petersburg

DATE COMPLETED: DAY 02 MO Nov YR 82 (11)

21 | [redacted] 06860 | RC 4 | ELEVATION 1200 | RC 4 | BASIN CODE 23

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Clay	Sand	Loose	I	32
" "	Sand		" "	32	35
" "	Clay	Sand	" "	35	I03
Blue	Clay		Hard	I03	I26
Brown	" "	Sand	Loose	I26	I52
" "	Sand		" "	I52	I6I

31 | 0032605287711 | 00356287711 | 01036052877 | 0126305173 | 01526052877 | 0161628771

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0I56 / I6I	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06 (6½)	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE	234	I	0I56
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.): 006 | DIAMETER: 06000 INCHES | LENGTH: 05 FEET

MATERIAL AND TYPE: Stainless Steel | DEPTH TO TOP OF SCREEN: 0I56 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
I52	I6I	With 4' of 5½" pipe on top of screen Type K packer

71 PUMPING TEST

PUMPING TEST METHOD: ☒ PUMP ☐ BAILER | PUMPING RATE: 0008 (7½) GPM | DURATION OF PUMPING: 05 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
I04 FEET	I50 FEET	I35 FEET	I4I FEET	I46 FEET	I49 FEET

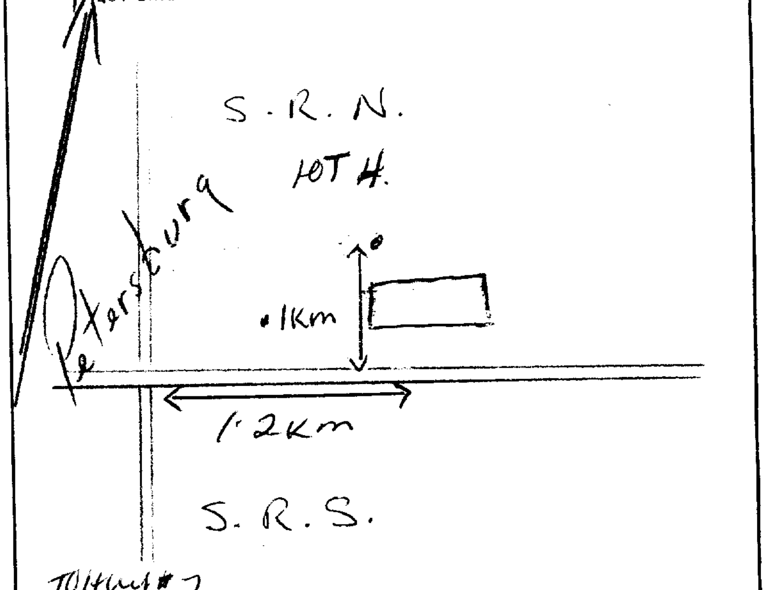
WATER LEVELS DURING: ☒ PUMPING ☐ RECOVERY

IF FLOWING, GIVE RATE: GPM | PUMP INTAKE SET AT: I55 FEET | WATER AT END OF TEST: ☒ CLEAR ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP | RECOMMENDED PUMP SETTING: I55 FEET | RECOMMENDED PUMPING RATE: 0006 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 ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED

WATER USE: 01

☒ DOMESTIC ☒ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED

METHOD OF DRILLING: 1

☒ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☐ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: C. A. Kerr Well Drilling | LICENCE NUMBER: 3I34

ADDRESS: 66 Christian St Baden

NAME OF DRILLER OR BORER: Charles A. Kerr | LICENCE NUMBER: 3I34

SIGNATURE OF CONTRACTOR: [signature] | SUBMISSION DATE: DAY 2 MO. Nov YR 82

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 3134 | DATE RECEIVED: 29 11 82

DATE OF INSPECTION | INSPECTOR

REMARKS: CSS.S8 July 5/83

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77 FORM 7

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 | 6506683 | MUNICIP. 650.04 | CON.

COUNTY OR DISTRICT: [redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Wilmot
CON. BLOCK, TRACT, SURVEY, ETC: Regional RD 6
LOT: Part S-6
[redacted] Snyders Rd.
DATE COMPLETED: DAY 10 MO 10 YR 89
MINING | RC. | ELEVATION | RC | BASIN CODE | II | III | IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Sand			0	100
Brown	Sand	some clay		100	121
Brown	Sand			121	172

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
121 / 172	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
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	2	169
	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
80	4" INCHES	3 FEET
MATERIAL AND TYPE: SS	DEPTH TO TOP OF SCREEN: 169 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

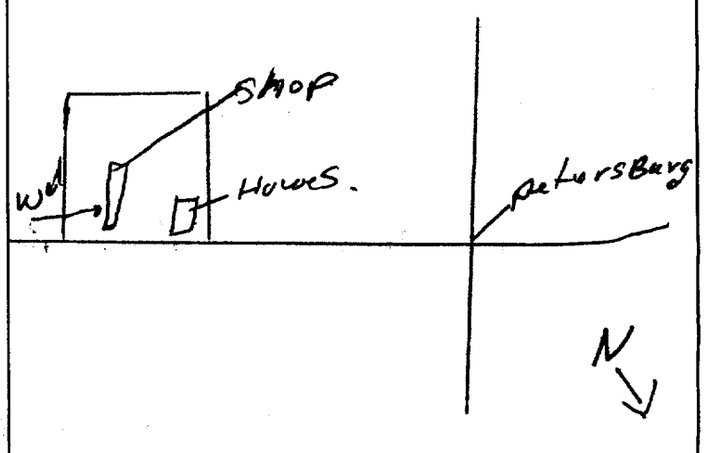
PUMPING TEST METHOD: 1 ☐ PUMP 2 ☐ BAILER
PUMPING RATE: No Test GPM
DURATION OF PUMPING: HOURS MINS

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

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

LOCATION OF WELL

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



DRILLERS REMARKS: gravel pack. 57477

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: Ryors well Drilling
WELL CONTRACTOR'S LICENCE NUMBER: 4643
ADDRESS: R3 Arthur
NAME OF WELL TECHNICIAN: B. Baily
WELL TECHNICIAN'S LICENCE NUMBER: 1116
SIGNATURE OF TECHNICIAN/CONTRACTOR
SUBMISSION DATE: DAY ____ MO ____ YR ____

OFFICE USE ONLY

DATA SOURCE
CONTRACTOR: 4643
DATE RECEIVED: OCT 26 1989
DATE OF INSPECTION
INSPECTOR
REMARKS
CSS.ES

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

6507134

MUNICIP 65004 CON. S.R. S.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC	LOT
Waterloo	Wilmot Twp.	S.R.S.	4

[redacted] R. 2, Petersburg, Ontario. N0B 2H0

DATE COMPLETED: DAY 17 MO May YR 91

RC ELEVATION RC BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Topsoil			0	1
Brown	Sand	Gravel	Soft	1	47
Brown	Sand	Silt	Soft	47	86
Grey	Clay	Silt	Soft	86	121
Grey	Sand	Silt	Soft	121	155
Grey	Sand		Soft	155	160
Grey	Sand	Silt	Soft	160	165

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
155-160	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	156
	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
Slot # 16	5.75 INCHES	3 FEET

MATERIAL AND TYPE: Stainless Steel Telescope

DEPTH TO TOP OF SCREEN: 156 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)
159	165	Sand

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☐ BAILER

PUMPING RATE: 8 GPM

DURATION OF PUMPING: 3 HOURS ____ MINS

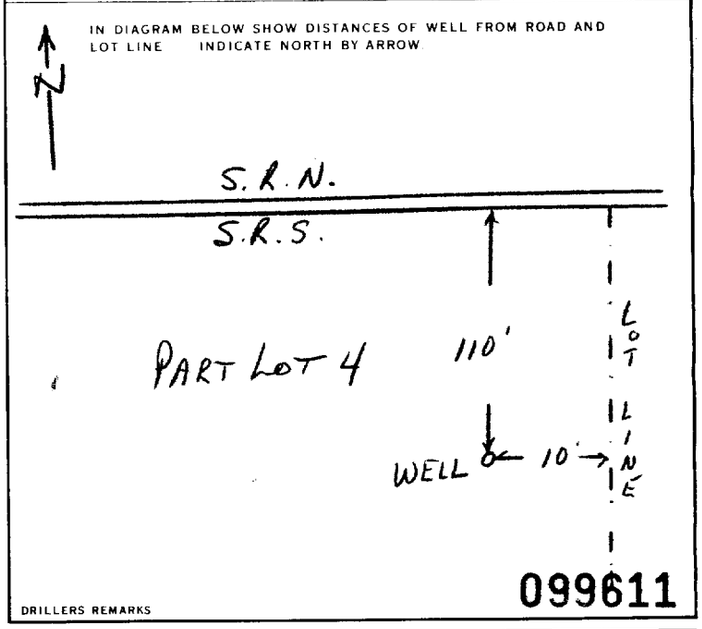
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
106 FEET	118 FEET	109 FEET	108 FEET	107 FEET	106 FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	150 FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	140 FEET	8 GPM

LOCATION OF WELL

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



DRILLERS REMARKS: 099611

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. Reavie
WELL TECHNICIAN'S LICENCE NUMBER: T0156
SIGNATURE OF TECHNICIAN/CONTRACTOR
SUBMISSION DATE: DAY 31 MO May YR 91

OFFICE USE ONLY

DATA SOURCE
CONTRACTOR: 1737
DATE RECEIVED: JUL 08 1991
DATE OF INSPECTION
INSPECTOR
REMARKS: CSS.ES

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

33/94

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

11 6507644 MUNICIP 65004 CON. SR. S

COUNTY OR DISTRICT [redacted] | TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Wilmont | CON. BLOCK, TRACT, SURVEY, ETC. S.R.S. | LOT 5

[redacted] PETERSBURG, ONT. | DATE COMPLETED DAY 012 MO 08 YR 94

ELEVATION | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	SAND			0	25
"	CLAY	SAND		25	27
"	SAND			27	38
"	CLAY	SAND		38	48
BROWN	CLAY			48	64
			TOTAL Depth 64'		
		DRY HOLE			
		well # 2			

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13 —	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (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 6" (12)	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+3	42 (13-16)
17-18 (19)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			(20-23)
24-25 (26)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			(27-30)

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	(80)

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD (10) 1 ☐ PUMP 2 ☐ BAILER

PUMPING RATE (11-14) — GPM

DURATION OF PUMPING (15-16) HOURS (17-18) MINS

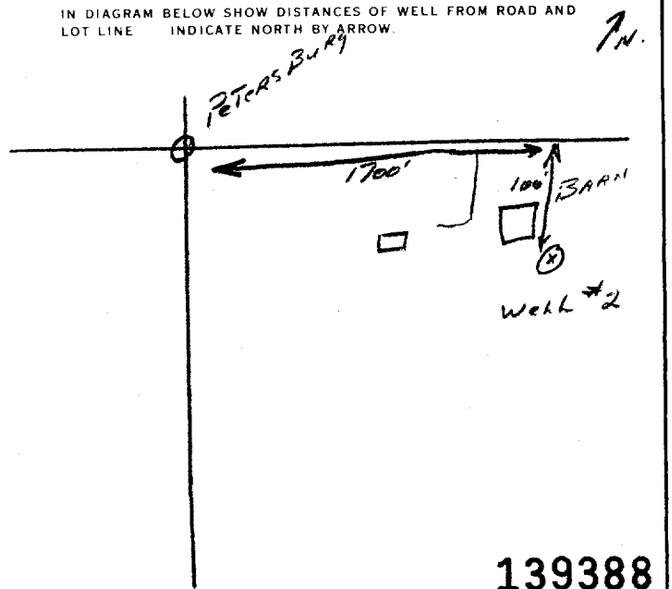
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING (25) 1 ☐ PUMPING 2 ☐ RECOVERY			
19-21 — FEET	22-24 FEET	15 MINUTES 26-28 FEET	30 MINUTES 29-31 FEET	45 MINUTES 32-34 FEET	60 MINUTES 35-37 FEET

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.



DRILLERS REMARKS

139388

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: GRAHAM WELL DRILLING LTD | WELL CONTRACTOR'S LICENCE NUMBER: 2336

ADDRESS: RR#5 Rockwood, ONT. N0B-2K0

NAME OF WELL TECHNICIAN: W. Howe | WELL TECHNICIAN'S LICENCE NUMBER: T-0518

SIGNATURE OF TECHNICIAN/CONTRACTOR: Robert Graham | SUBMISSION DATE: DAY 030 MO. 08 YR. 94

OFFICE USE ONLY

DATA SOURCE (58) | CONTRACTOR (59-62) 2336 | DATE RECEIVED (63-68) SEP 01 1994 (80)

DATE OF INSPECTION | INSPECTOR

REMARKS

CSS.ES

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

6507674

1. PRINT ONLY IN SPACES PROVIDED
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11

MUNICIP 65004 CON. SR. S.

COUNTY OR DISTRICT [redacted] | TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Wilmot | CON. BLOCK, TRACT, SURVEY, ETC SRS | LOT 5

[redacted] tchener Ontario N2B 1C7 | DATE COMPLETED DAY 26 MO Aug YR 94

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Grey	sand fine			0	38
Grey	sand silt clay			38	135
Grey	fine sand			135	147

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
147	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
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	0	133
5	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	Screen & Fittings	130	147
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
6	6	8

MATERIAL AND TYPE: Stainless Steel

DEPTH TO TOP OF SCREEN: 138 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 (Air) 2 ☐ BAILER

PUMPING RATE: 7 GPM

DURATION OF PUMPING: 1 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
79 FEET	147 FEET		85 FEET	79 FEET	79 FEET	79 FEET

IF FLOWING, GIVE RATE: GPM

PUMP INTAKE SET AT: FEET

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

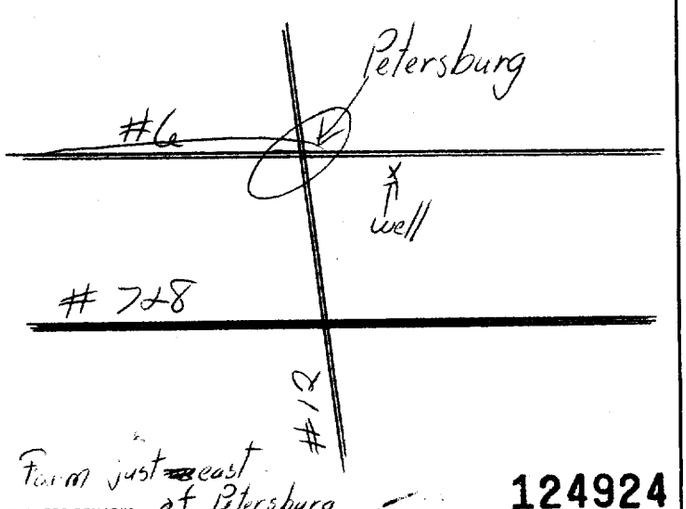
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING: 140 FEET

RECOMMENDED PUMPING RATE: 7 GPM

LOCATION OF WELL

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



DRILLERS REMARKS: From just east of Petersburg.

124924

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: Packham Well Drilling Inc. | WELL CONTRACTOR'S LICENCE NUMBER: 4207

ADDRESS: RR # 2 Lancaster Ont.

NAME OF WELL TECHNICIAN: Mervyn Packham | WELL TECHNICIAN'S LICENCE NUMBER: 10058

SIGNATURE OF TECHNICIAN/CONTRACTOR: Mervyn Packham | SUBMISSION DATE: DAY 26 MO Aug YR 94

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 4207 | DATE RECEIVED NOV 04 1994

DATE OF INSPECTION | INSPECTOR

REMARKS

MINISTRY OF THE ENVIRONMENT COPY

CSS.ES

FORM NO. 0506 (11/86) FORM 9

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 (1 2) 6508257 Municipality (10–14) 65004 Con. (15–22 23 24) SR N

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot (25-27)
Waterloo	Wilmot Twp.	Con. N.S.R.	4

Owner's surname (28-47)	First name	Address	Date completed (48-53)
GERMET FARMING LIMITED		R.R. 4, Bright, Ontario N0J 1B0	12 day May month 98 year

21 (1 2) U T M Zone (10) Easting (12–17) Northing (18–24) RC (25) Elevation (26–30) RC Basin Code (31–47) ii iii iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
	Topsoil			0	2
Brown	Clay	Stones		2	5
Brown	Gravel	Sand	Coarse	5	44
Brown	Sand			44	90

31 (10 14 15 21 32 43 54 65 75 80)
32

41 WATER RECORD

Water found at – feet (10-13)	Kind of water (14)	(60)
80	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas	
(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)	

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
(10-11) 2	1 ☐ Steel (12) 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☒ Plastic	Sch.40	+2.5	(13-16) 80
(17-18)	1 ☐ Steel (19) 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			(20-23)
(24-25)	1 ☐ Steel (26) 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			(27-30)

SCREEN

Sizes of opening (Slot No.) (31-33)	Diameter (34-38)	Length (39-40)
10	2 inches	10 feet
Material and type	**Depth at top of screen (41-44)**	(30)
PVC	80 feet	

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at – feet From (10-13)	Depth set at – feet To (14-17)	Material and type (Cement grout, bentonite, etc.)
0	70	Bentonite Grout
(18-21)	(22-25)	
(26-29)	(30-33) (80)	

71 PUMPING TEST

Pumping test method (10) 1 ☐ Pump 2 ☐ Bailer	Pumping rate (11-14) GPM	Duration of pumping (15-16) ..... Hours (17-18) ..... Mins

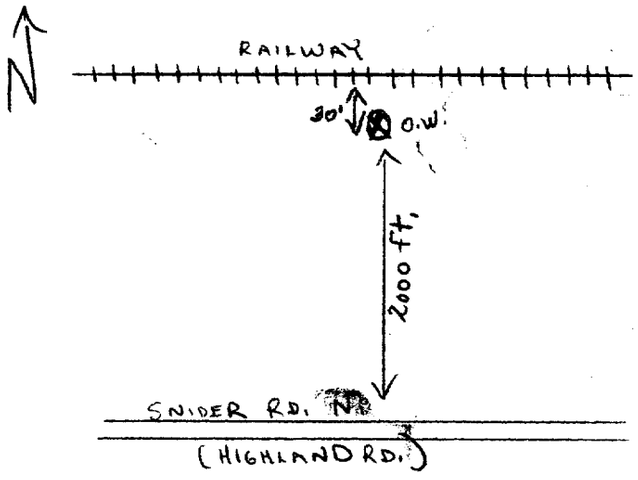
Static level (19-21) feet	Water level end of pumping (22-24) feet	Water levels during (25) 1 ☐ Pumping 2 ☐ Recovery	15 minutes (26-28) feet	30 minutes (29-31) feet	45 minutes (32-34) feet	60 minutes (35-37) feet

If flowing give rate (38-41) GPM	Pump intake set at feet	Water at end of test (42) ☐ Clear ☐ Cloudy
Recommended pump type ☐ Shallow ☐ Deep	Recommended pump setting (43-45) feet	Recommended pump 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.



188413

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 ☐ Abandoned (Other) 8 ☐ Dewatering 9 ☐ Unfinished 10 ☐ Replacement well

WATER USE (55-56)

1 ☐ Domestic 2 ☐ Stock 3 ☐ Irrigation 4 ☐ Industrial 5 ☐ Commercial 6 ☐ Municipal 7 ☐ Public supply 8 ☐ Cooling & air conditioning 9 ☒ Not used 10 ☐ Other .....

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 10 ☐ Digging 11 ☐ Other .....

Name of Well Contractor	Well Contractor's Licence No.
Davidson Well Drilling Limited	1737
Address	
Box 486, Wingham, Ontario N0G 2W0	
Name of Well Technician	**Well Technician's Licence No.**
D. Fenton	T2003
Signature of Technician/Contractor	**Submission date**
D.F. DAVIDSON per: J.C. Davidson	day 29 May mo yr 98

MINISTRY USE ONLY

Data source (58)	Contractor (59-62)	Date received (63-68) (80)
	1737	SEP 17 1998
Date of inspection	**Inspector**	
Remarks		
	CSS. S9	

2 - MINISTER OF ENVIRONMENT & ENERGY COPY

Ontario Ministry of the Environment

7103572

Well Tag No. *(Place Sticker and/or Print Below)* A063942

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name	E-mail Address	Well Constructed by Well Owner
TOP OF THE HILL	AGGREGATES	—	☐

Mailing Address (Street Number/Name, RR)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
1974 Snyders Rd.	WATERLOO	ONT.		5199655845

Part A Construction and/or Major Alteration of a Well

Address of Well Location (Street Number/Name, RR)	Township	Lot	Concession
1974 Snyders Rd.	WILMOT	PT 1-2	NSR.

County/District/Municipality	City/Town/Village	Province	Postal Code
WATERLOO	Petersburg	Ontario	

UTM Coordinates	Zone	Easting	Northing	GPS Unit Make	Model	Mode of Operation:	
NAD 83	17	532283	4808176	Magellan	Meridian	☐ Differentiated, specify	☐ Undifferentiated ☑ Averaged

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

Feet

General Colour	Most Common Material	Other Materials	General Description	Depth (Metres) From	To
Brown	Sand	Cobbles		0	60
Grey	Clay			60	61
Brown	Clay			61	73
Brown	Sand	Cobbles / Silt		73	223
Grey	Clay	Cobbles		223	274
Grey	Sand	Clay Stones		274	285
	2"–180' TD. + 2.5"–285' TD IN SAME BOREHOLE				

Annular Space/Abandonment Sealing Record

Depth Set at (Metres) From	To	Type of Sealant Used (Material and Type)	Volume Placed (Cubic Metres)
0	165	Bentonite Slurry	
165	185	Silica Sand	
185	270	Bentonite chips	
270	285	Silica Sand.	Approx

Method of Construction

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

Water Use

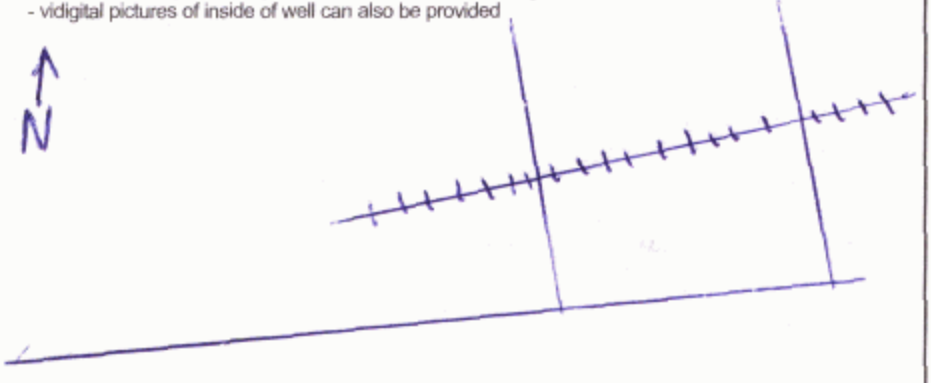
☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☑ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Status of Well

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

Location of Well

Please provide a map below showing:
- all property boundaries, and measurements sufficient to locate the well in relation to fixed points,
- an arrow indicating the North direction
- detailed drawings can be provided as attachments no larger than legal size (8.5" by 14")
- vidigital pictures of inside of well can also be provided



Date Well Completed (yyyy/mm/dd)	Was the well owner's information package delivered?	Date the Well Record and Package Delivered to Well Owner (yyyy/mm/dd)
2007/08/24	☐ Yes ☑ No	

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
DURL HOPPER LTD	2644

Business Address (Street No./Name, number, RR)	Municipality
RR#7 STMARYS ONT	PERTH.

Province	Postal Code	Business E-mail Address
ONT	N4X1C9	hopperc@cyg.net.

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

Well Technician's Licence No.	Signature of Technician	Date Submitted (yyyy/mm/dd)
2323		2007/11/14

Results of Well Yield Testing

Check box if after test of well yield, water was:
☑ Clear and sand free
☐ Cannot develop to sand-free state

If pumping discontinued, give reason:

Pumping test method

Pump intake set at *(Metres)*

Pumping rate *(Litres/min)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(Metres)*

Recommended pump type ☐ Shallow ☐ Deep

Recommended pump depth ____ Metres

Recommended pump rate *(Litres/min)*

If flowing give rate *(Litres/min)*

	Draw Down Time (Min)	Draw Down Water Level (Metres)	Recovery Time (Min)	Recovery Water Level (Metres)
Static Level		NA.	Static Level	
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Water Details

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

Casing Used

☐ Galvanized ☐ Steel ☐ Fibreglass ☑ Plastic ☐ Concrete

Screen Used

☐ Galvanized ☐ Steel ☐ Fibreglass ☑ Plastic ☐ Concrete

No Casing and Screen Used

☐ Open Hole

Disinfected? ☐ Yes ☑ No

Casing and Well Details

Diameter of the Hole *(Centimetres)* 8 3/4"

Depth of the Hole *(Metres)* 285

Wall Thickness *(Metres)* sch 40/sch 40

Inside Diameter of the Casing *(Metres)* 2"-180' 2.5"-285'

Depth of the Casing *(Metres)* 285, 180'

Ministry Use Only

Audit No.	Well Contractor No.
z62913	
Date Received (yyyy/mm/dd)	**Date of Inspection (yyyy/mm/dd)**
APR 03 2008	

Remarks

0506E (11/2006)

Ministry's Copy

Ontario Ministry of the Environment

7103573

FEET'

Well Tag No. *(Place Sticker and/or Print Below)* A037704.

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name	E-mail Address	Well Constructed by Well Owner
	TOP OF THE HILL AGGREGATES.	—	☐

Mailing Address (Street Number/Name, RR)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
1974 SNYDERS ROAD.	WATERLOO	ONT		5194655545

Part A Construction and/or Major Alteration of a Well

Address of Well Location (Street Number/Name, RR)	Township	Lot	Concession
1974 SNYDERS. RD.	WILMOT.	PT 1-2,	NSR.

County/District/Municipality	City/Town/Village	Province	Postal Code
WATERLOO	PETERSBURG.	Ontario	

UTM Coordinates	Zone	Easting	Northing	GPS Unit Make	Model	Mode of Operation:
NAD 83	17	533137	4807627	MAGELLAN	MERIDIAN	☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

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

Feet.

General Colour	Most Common Material	Other Materials	General Description	Depth (Metres) From	To
PIT RUN.				0	5
RED	SILTY SAND.			5	18
BROWN	SILTY SAND.			18	34.
	SAND.			34	52.
	SAND	COBBLES.		52	77.
	COBBLES	LOOSE GRAVEL		77	89
GREY	GRAVEL	SILTY.		89	96.
			BH1		

Annular Space/Abandonment Sealing Record

Depth Set at (Metres) From	To	Type of Sealant Used (Material and Type)	Volume Placed (Cubic Metres)
0	75	BENTONITE SLURRY	
75	96.	SILICA SAND.	

Method of Construction

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

Water Use

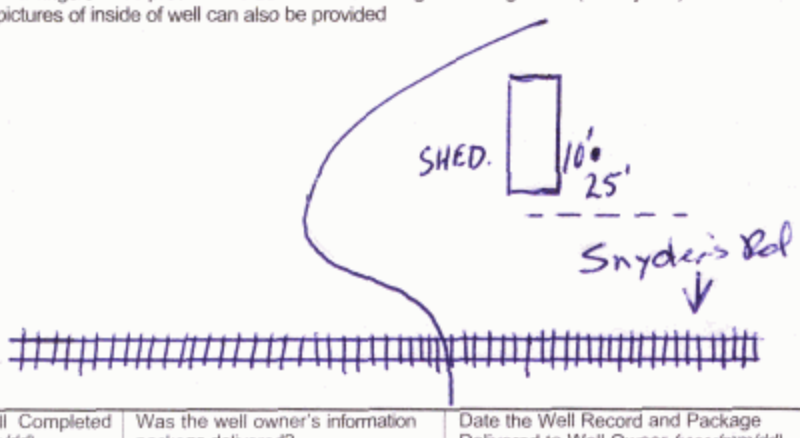
☐ Public ☑ Commercial ☐ Not used
☑ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Status of Well

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

Location of Well

Please provide a map below showing:
- all property boundaries, and measurements sufficient to locate the well in relation to fixed points,
- an arrow indicating the North direction
- detailed drawings can be provided as attachments no larger than legal size (8.5" by 14")
- vidigital pictures of inside of well can also be provided



Date Well Completed (yyyy/mm/dd)	Was the well owner's information package delivered?	Date the Well Record and Package Delivered to Well Owner (yyyy/mm/dd)
2007/08/13.	☑ Yes ☐ No	2007/08/13.

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
DURL HOPPER LTD.	2644A.

Business Address (Street No./Name, number, RR)	Municipality
RR#7	ST. MARYS

Province	Postal Code	Business E-mail Address
ON	N4X1C9	HOPPER@CYG.NET.

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

Well Technician's Licence No.	Signature of Technician	Date Submitted (yyyy/mm/dd)
2323		2007/11/14.

Results of Well Yield Testing

Check box if after test of well yield, water was:
☑ Clear and sand free
☐ Cannot develop to sand-free state

If pumping discontinued, give reason:

Pumping test method: AIR / BAIL.

Pump intake set at (Metres): 84'.

Pumping rate (Litres/min): 10 gpm.

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (Metres): 84'

Recommended pump type: ☐ Shallow ☑ Deep

Recommended pump depth: 85' Metres

Recommended pump rate (Litres/min): 10 gpm.

If flowing give rate (Litres/min):

	Draw Down Time (Min)	Draw Down Water Level (Metres)	Recovery Time (Min)	Recovery Water Level (Metres)
Static Level		74	Static Level	
1		84	1	78
2			2	75
3			3	75
4			4	74
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60		84	60	74.

Water Details

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

Casing Used

☐ Galvanized
☑ Steel
☐ Fibreglass
☐ Plastic
☐ Concrete

Screen Used

☐ Galvanized
☑ Steel S.S.
☐ Fibreglass 20
☐ Plastic slot
☐ Concrete

No Casing and Screen Used

☐ Open Hole Screen 85-89

Disinfected? ☑ Yes ☐ No

Casing and Well Details

Diameter of the Hole (Centimetres): 8 3/4.

Depth of the Hole (Metres): 96'

Wall Thickness (Metres): .188"

Inside Diameter of the Casing (Metres): 6 1/4"

Depth of the Casing (Metres): 96'

Ministry Use Only

Audit No.	Well Contractor No.
z62905	
Date Received (yyyy/mm/dd) APR 03 2008	Date of Inspection (yyyy/mm/dd)
Remarks	

0506E (11/2006)

Ministry's Copy

Ontario Ministry of the Environment

7103574

Well Tag No. *(Place Sticker and/or Print Below)* A037705

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name	E-mail Address	☐ Well Constructed by Well Owner
TOP OF THE HILL	AGGREGATES	—	

Mailing Address (Street Number/Name, RR)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
1974 Snyders Road	WATERLOO	ONT		5194655545

Part A Construction and/or Major Alteration of a Well

Address of Well Location (Street Number/Name, RR)	Township	Lot	Concession
1974 Snyders Road.	WILMOT	PT 1-2	N Snyders Rd.

County/District/Municipality	City/Town/Village	Province	Postal Code
WATERLOO	Petersburg	Ontario	

UTM Coordinates NAD 83 — Zone 17 — Easting 528564 — Northing 4808157 — GPS Unit Make Magellan — Model Meridian — Mode of Operation: ☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify

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

General Colour	Most Common Material	Other Materials	General Description	Depth (Metres) From	To
Brown	Sand	Cobbles	loose	0	40
Brown	Sand	Coarse Gravel.		40	43
Brown	Sand	Cobbles	Silt layers	43	100

BH2

Annular Space/Abandonment Sealing Record

Depth Set at (Metres) From	To	Type of Sealant Used (Material and Type)	Volume Placed (Cubic Metres)
0	85	Bentonite Pulsone Slurry	
85	100	Silica Sand.	

Method of Construction

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

Water Use

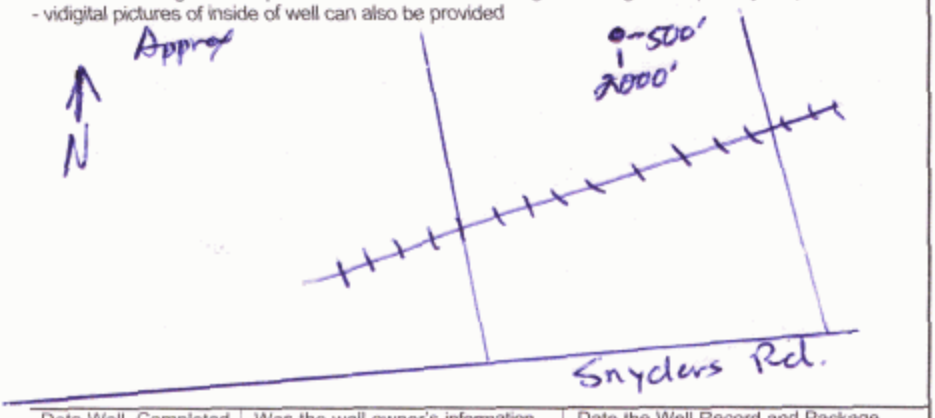
☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☑ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, *specify*

Status of Well

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

Location of Well

Please provide a map below showing:
- all property boundaries, and measurements sufficient to locate the well in relation to fixed points,
- an arrow indicating the North direction
- detailed drawings can be provided as attachments no larger than legal size (8.5" by 14")
- vidigital pictures of inside of well can also be provided



Date Well Completed (yyyy/mm/dd)	Was the well owner's information package delivered?	Date the Well Record and Package Delivered to Well Owner (yyyy/mm/dd)
2007/08/14	☐ Yes ☑ No	

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
DURL HOPPER LTD	2644

Business Address (Street No./Name, number, RR)	Municipality
RR#7 STMARYS ONT	PERTH

Province	Postal Code	Business E-mail Address
ONT	N4X-1C9	hopper@cyg.net

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

Well Technician's Licence No.	Signature of Technician	Date Submitted (yyyy/mm/dd)
2323		2007/11/14

Results of Well Yield Testing

Check box if after test of well yield, water was:
☑ Clear and sand free
☐ Cannot develop to sand-free state

If pumping discontinued, give reason:

Pumping test method

Pump intake set at *(Metres)*

Pumping rate *(Litres/min)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(Metres)*

Recommended pump type ☐ Shallow ☐ Deep

Recommended pump depth ____ Metres

Recommended pump rate *(Litres/min)*

If flowing give rate *(Litres/min)*

	Draw Down Time (Min)	Draw Down Water Level (Metres)	Recovery Time (Min)	Recovery Water Level (Metres)
Static Level		58	Static Level	
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Water Details

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

Casing Used	Screen Used
☐ Galvanized	☐ Galvanized
☐ Steel	☐ Steel
☐ Fibreglass	☐ Fibreglass
☑ Plastic	☑ Plastic
☐ Concrete	☐ Concrete

No Casing and Screen Used

☐ Open Hole

Disinfected? ☐ Yes ☑ No

Casing and Well Details

Diameter of the Hole *(Centimetres)* 6¼

Depth of the Hole *(Metres)* 100'

Wall Thickness *(Metres)* Sch 40

Inside Diameter of the Casing *(Metres)* 2"

Depth of the Casing *(Metres)* 100

Ministry Use Only

Audit No.	Well Contractor No.
z62901	
Date Received (yyyy/mm/dd) APR 03 2008	Date of Inspection (yyyy/mm/dd)
Remarks	

0506E (11/2006)

Ministry's Copy

7129683

Ontario — Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)* A086327

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☐ Imperial

[redacted]

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	WILMOT	PT6	SRN

County/District/Municipality	City/Town/Village	Province	Postal Code
WATERLOO	PETERSBURG	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	17	502257	4806979		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	TOPSOIL			0	3
BROWN	SANDY CLAY			3	43
BROWN	CLAY			43	61
BROWN	SAND			61	70

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	60	BENTONITE SLURRY	
60	70	SAND PACK	

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6	STEEL	.188	+2	66

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
6	STAINLESS STEEL	10	66	70

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	
67	☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	70	8 3/4

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 65

Pumping rate (l/min / GPM): 15

Duration of pumping: 1 hrs + 30 min

Final water level end of pumping (m/ft): 60

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

Recommended pump depth (m/ft): 65

Recommended pump rate (l/min / GPM): 12

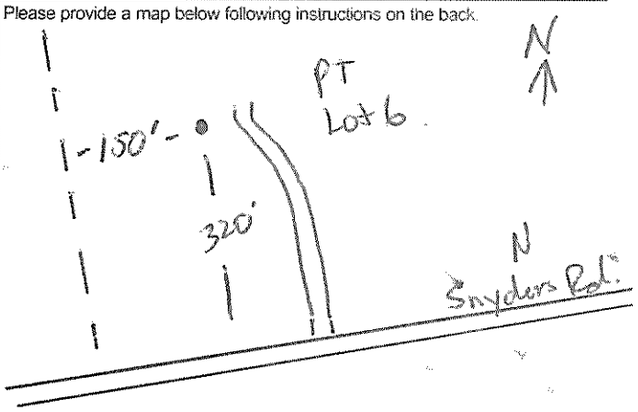
Well production (l/min / GPM): 18

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	15		
1	65	1	52
2		2	43
3		3	35
4		4	30
5		5	27
10		10	26
15		15	24
20		20	22
25		25	20
30		30	18
40		40	17
50		50	16
60	65	60	15

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

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

Business Address (Street Number/Name)	Municipality
RR#7	St. Marys

Province	Postal Code	Business E-mail Address
Ont.	N4X1C9	hopper@cyg.net

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

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2315		7/14/2009

Well owner's information package delivered ☑ Yes ☐ No

Date Package Delivered: 7/2/2009

Date Work Completed: 7/2/2009

Ministry Use Only

Audit No. Z 099019

Received SEP 15 2009

Ontario — Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*: No Tag 7149907

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Region of Waterloo		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
150 Frederick St. 7th Floor	Waterloo	Ont	L9W3R4	5195754400

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1974 Snyders Rd. E.	Wilmot	4	North of Snyders

County/District/Municipality	City/Town/Village	Province	Postal Code
Region of Waterloo	Petersburg	Ontario	N0B2H0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	532961	4807914		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Abandonment of 2" PVC Well x 79' Deep WMOW9-93-C				0	79

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Well Thickness (cm/in)	Depth (m/ft) From	To
2	plastic			

Construction Record - Screen

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

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☑ Abandoned, other, *specify* not needed ☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	Kind of Water	
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

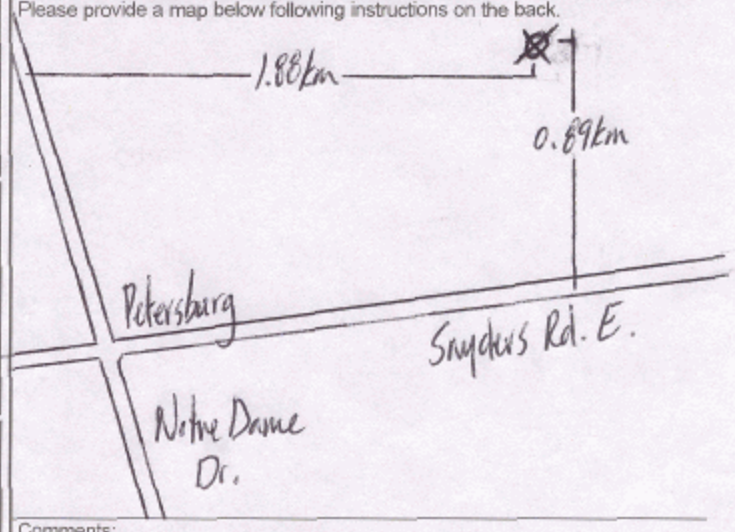
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Well Initiatives Ltd.	7221

Business Address (Street Number/Name)	Municipality
15 Townline Rd. Orangeville	

Province	Postal Code	Business E-mail Address
Ont	L9W3R4	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
5197630666	Losch Kim

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T9217	Kim Losch	2010/07/27

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☐ No	YYYY MM DD	2010/07/22

Ministry Use Only

Audit No. z118767

Rec'd AUG 16 2010

Ministry's Copy

Ontario — Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. (Place Sticker and/or Print Below): No Tag 7149908

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	
	Region of Waterloo		☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
150 Fredrick St. 7th Floor	Waterloo	Ont	N2J3Z1	5197544000

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1974 Snyders Rd. E.	Wilmot	4	North of Snyders

County/District/Municipality	City/Town/Village	Province	Postal Code
Region of Waterloo	Petersburg	Ontario	N0B2H0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	532966	4807911		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Abandonment of 2" PVC Well x 104' Deep WMOW9-93-B			Portland Cement	0	104

Annular Space

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

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
2	plastic			

Construction Record - Screen

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

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☑ Abandoned, other, specify: not needed ☐ Other, specify

Water Details

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

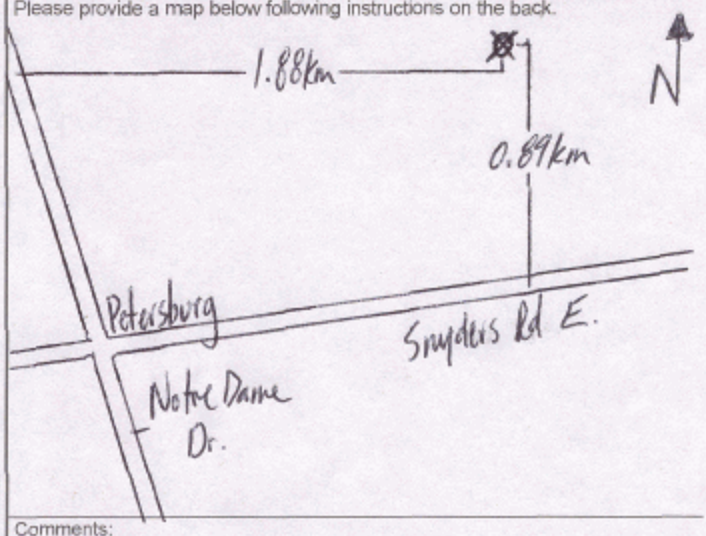
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Well Initiatives Ltd.	7221

Business Address (Street Number/Name)	Municipality
15 Townline Rd. Orangeville	

Province	Postal Code	Business E-mail Address
Ont.	L9W3R4	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5197630666	Losch Kim

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T927	Kim Losch	2010 07 27

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

Date Package Delivered: ____

Date Work Completed: 2010 07 22

Ministry Use Only

Audit No. Z118766

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Ontario — Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*: No Tag 7149909

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Region of Waterloo		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
150 Fredrick St. 7th Floor	Waterloo	Ont	N2G4J3	5197544000

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1974 Snyders Rd. E.	Wilmot	4	North of Snyders

County/District/Municipality	City/Town/Village	Province	Postal Code
Region of Waterloo	Petersburg	Ontario	N0B2H0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	532959	4807921		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Abandonment of 2" PVC Well x 243' Deep WMOW9-93-A			Portland Cement	0	243

Annular Space

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

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
2	plastic			

Construction Record - Screen

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

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☑ Abandoned, other, *specify* not needed
☐ Other, *specify*

Water Details

Water found at Depth (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*
Water found at Depth (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*
Water found at Depth (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

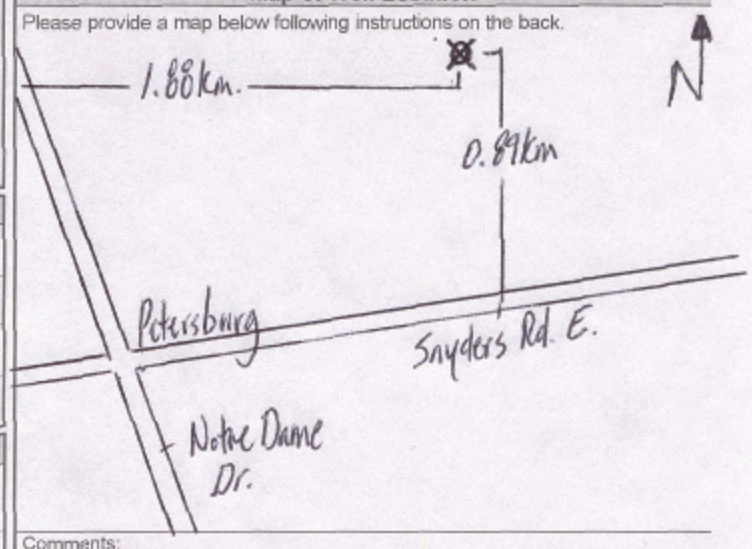
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Well Initiatives Ltd.	7221

Business Address (Street Number/Name)	Municipality
15 Townline Rd. Orangeville	

Province	Postal Code	Business E-mail Address
Ont.	L9W3R4	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
5197630666	Losch Kim

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T927	Kim Losch	20100727

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered: YYYY MM DD

Date Work Completed: 20100722

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Audit No. z118765

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Ministry of the Environment

Measurements recorded in: ☐ Metric ☐ Imperial

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

NO TAG 7246610

Well Record

Regulation 903 Ontario Water Resources Act

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
AS ABOVE	WILMOT		

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

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	532852	4807092		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (*m/ft*) From	Depth (*m/ft*) To
BRN	SAND		POROUS.	20'	15'
GRY	4MM CONCRETE		PACKED	15'	0'

Annular Space

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

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (*cm/in*)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (*cm/in*)	Depth (*m/ft*) From	To
48"	CONCRETE	3"	0'	20'

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (*m/ft*)	Kind of Water: ☐ Fresh ☐ Untested	☐ Gas ☐ Other, *specify*
Water found at Depth (*m/ft*)	Kind of Water: ☐ Fresh ☐ Untested	☐ Gas ☐ Other, *specify*
Water found at Depth (*m/ft*)	Kind of Water: ☐ Fresh ☐ Untested	☐ Gas ☐ Other, *specify*

Hole Diameter

Depth (*m/ft*) From	To	Diameter (*cm/in*)

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping _____ hrs + _____ min

Final water level end of pumping *(m/ft)*

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

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

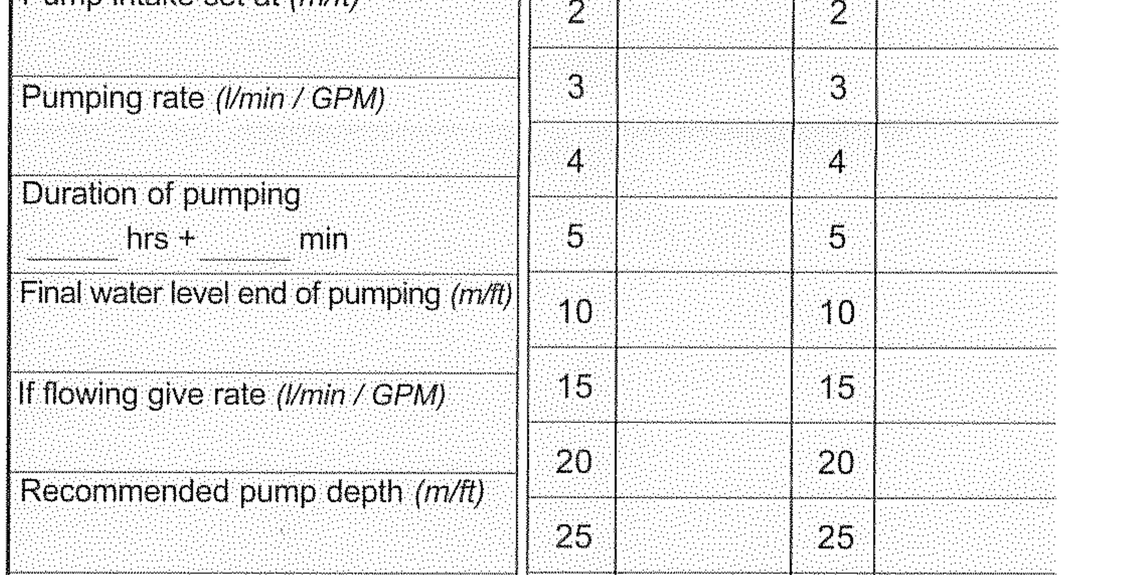
Well production *(l/min / GPM)*

Disinfected?
☒ Yes ☐ No

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
BJD WATER SYSTEMS	7554

Business Address (Street Number/Name)	Municipality
1061 INDUSTRIAL CRES.	WATERLOO

Province	Postal Code	Business E-mail Address
ONT	N0B2M0	bjdietrich@bellnet.ca

Bus. Telephone No. (*inc. area code*)	Name of Well Technician (Last Name, First Name)
5196994605	DIETRICH BRAD

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3378		20150812

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☑ No		20150722

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Audit No. Z 183421

AUG 17 2015

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Stay at home except for essential travel and follow the **restrictions and public health measures (https://covid-19.ontario.ca/zones-and-restrictions)**.

Ontario

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records).

Go Back to Map ()

Well ID

Well ID Number: 7268273
Well Audit Number: *Z226962*
Well Tag Number: *A171421*
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	1805 SNYDER'S ROAD
Township	WILMOT TOWNSHIP
Lot	005

Concession	SR S
County/District/Municipality	WATERLOO
City/Town/Village	PETERSBURG
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 17 Easting: 532727.00 Northing: 4806862.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BRWN	FSND			0 ft	25 ft
GREY	SILT	CLAY	STNS	25 ft	241 ft
GREY	SILT	SILT		241 ft	274 ft
GREY	LMSN	LYRD		274 ft	287 ft

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 ft	277.5 ft	BENTONITE SLURRY	
277.5 ft	287 ft	OPEN HOLE	

Method of Construction & Well Use

Method of Construction	Well Use
Rotary (Convent.)	
	Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
6 inch	STEEL	-2.5 ft	277.5 ft

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 2644

Results of Well Yield Testing

After test of well yield, water was	CLEAR
If pumping discontinued, give reason	
Pump intake set at	150 ft
Pumping Rate	20 GPM
Duration of Pumping	1 h:30 m
Final water level	120 ft
If flowing give rate	
Recommended pump depth	125 ft
Recommended pump rate	20 GPM
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL	102 ft		
1	114 ft	1	104 ft
2	15 ft	2	104 ft
3	115 ft	3	103 ft
4	116 ft	4	103 ft
5	116 ft	5	102 ft
10		10	102 ft
15		15	102 ft

20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60	116 ft	60	102 ft

Water Details

Water Found at Depth	Kind
280 ft	Fresh
284 ft	Fresh
286 ft	Fresh

Hole Diameter

Depth From	Depth To	Diameter
0 ft	277.5 ft	8.75 inch
277.5 ft	287 ft	6.25 inch

Audit Number: Z226962

Date Well Completed: June 26, 2016

Date Well Record Received by MOE: August 08, 2016

Ontario

Ministry of the Environment and Climate Change

Well Tag No. *(Place Sticker and/or Print Below)* A037705 7281426

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☐ Imperial

Page 1 of 1

Well Owner's Information

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

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
875 SPEEDSVILLE ROAD	CAMBRIDGE	ON	N3H4S8	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1974 SNYDERS ROAD	WILMOT	PT 4	NSR.

County/District/Municipality	City/Town/Village	Province	Postal Code
WATERLOO	PETERSBURG	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	17	532856	4808157		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
			~~SURFACE ELEVATION ADJUSTED 45'~~		
			~~OF WELL CASING REMOVED~~	0	55'
			~~BH2~~		

Annular Space

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

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
2"	Sch 40 PVC			

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

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

If pumping discontinued, give reason: NOT TESTED

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

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

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

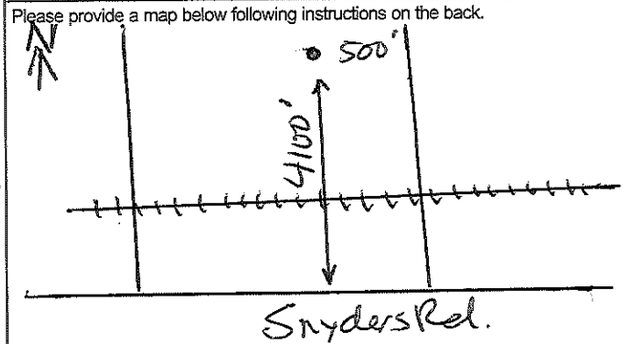
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☑ No

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Dan Hopper Ltd.	2044

Business Address (Street Number/Name)	Municipality
RR#7	St. Marys

Province	Postal Code	Business E-mail Address
Ont.	N4X1C9	hopper@cyg.net

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

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2315		12/16/2016 (Y Y Y Y M M D D)

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☐ No		12/16/2016 (Y Y Y Y M M D D)

Ministry Use Only

Audit No. 2247089

FEB 21 2017

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Ontario

Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☐ Imperial

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

Tag#: A 230892 7315242

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1844 Snyders Rd. E.	Wilmot	Pt. Lot 5	N. OF SNYDERS 5808811

County/District/Municipality	City/Town/Village	Province	Postal Code
Region of Waterloo	Petersburg	Ontario	N0B2H0

UTM Coordinates	Zone	~~Easting~~ West	~~Northing~~	Municipal Plan and Sublot Number	Other
NAD 8 3		80.596	43.415		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
			well extension		

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	
☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify* _____
☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify* _____
☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify* _____

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping _____ hrs + _____ min

Final water level end of pumping *(m/ft)*

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

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

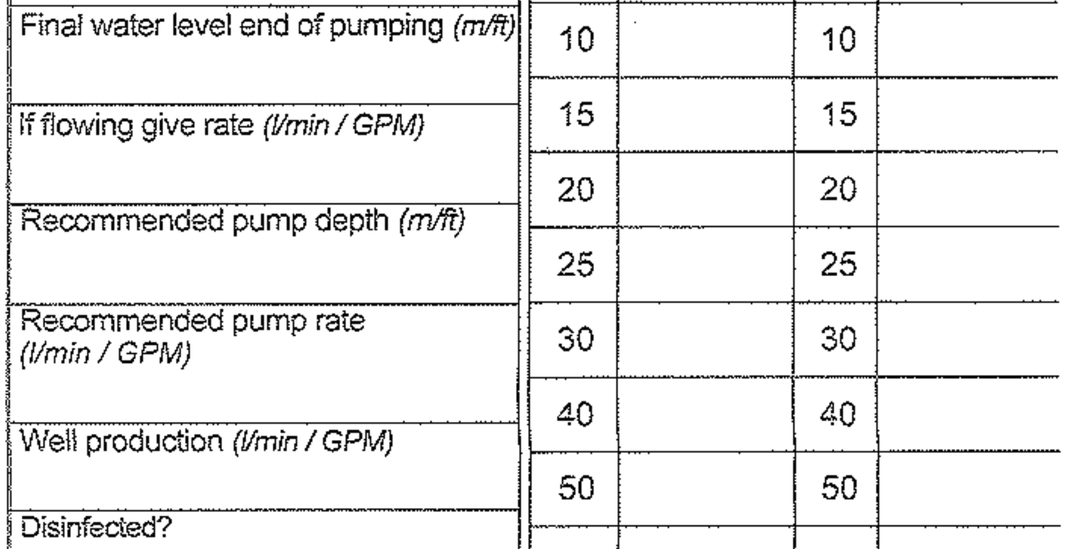
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Jantzi Plumbing Inc	7168

Business Address (Street Number/Name)	Municipality
1426 Hutchison Rd Wellesley	Waterloo

Province	Postal Code	Business E-mail Address
Ont	N0B2T0	Brad@Jantziplumbing.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
519 656 3030	Erb Ken

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2301		2018 07 18

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: Y Y Y Y M M D D

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Appendix B: Water Level Data and Hydrographs

Table B1: Water Level Measurements

Water Level (mbct)

Monitor	Top of Well Pipe Elevation (m AMSL)	Water Level (mbct)	Water Level (mbct)	Water Level (mbct)	Water Level (mbct)	Water Level (mbct)	Water Level (mbct)	Water Level (mbct)	Water Level (mbct)	Water Level (mbct)
		07-May-19	12-Jan-21	11-May-21	18-May-21	02-Sep-21	16-Nov-21	30-Nov-21	14-Dec-21	28-Mar-22
BH1	383.32	30.45	30.52	30.76	30.76	30.91			31.06	31.01
BH3	372.40	20.39	20.41	20.58	20.55	20.66			20.82	20.73
BH4	369.21		16.63	16.83	16.81	16.92			17.12	17.01
BH5	390.17						36.74	38.34	38.51	38.43
SG1	381.95		Dry	Dry	Dry	Dry			1.08	1.23
SG2	382.56				1.23	1.46			1.17	1.14

mbct - metres below casing top

Water Level Elevation (m AMSL)

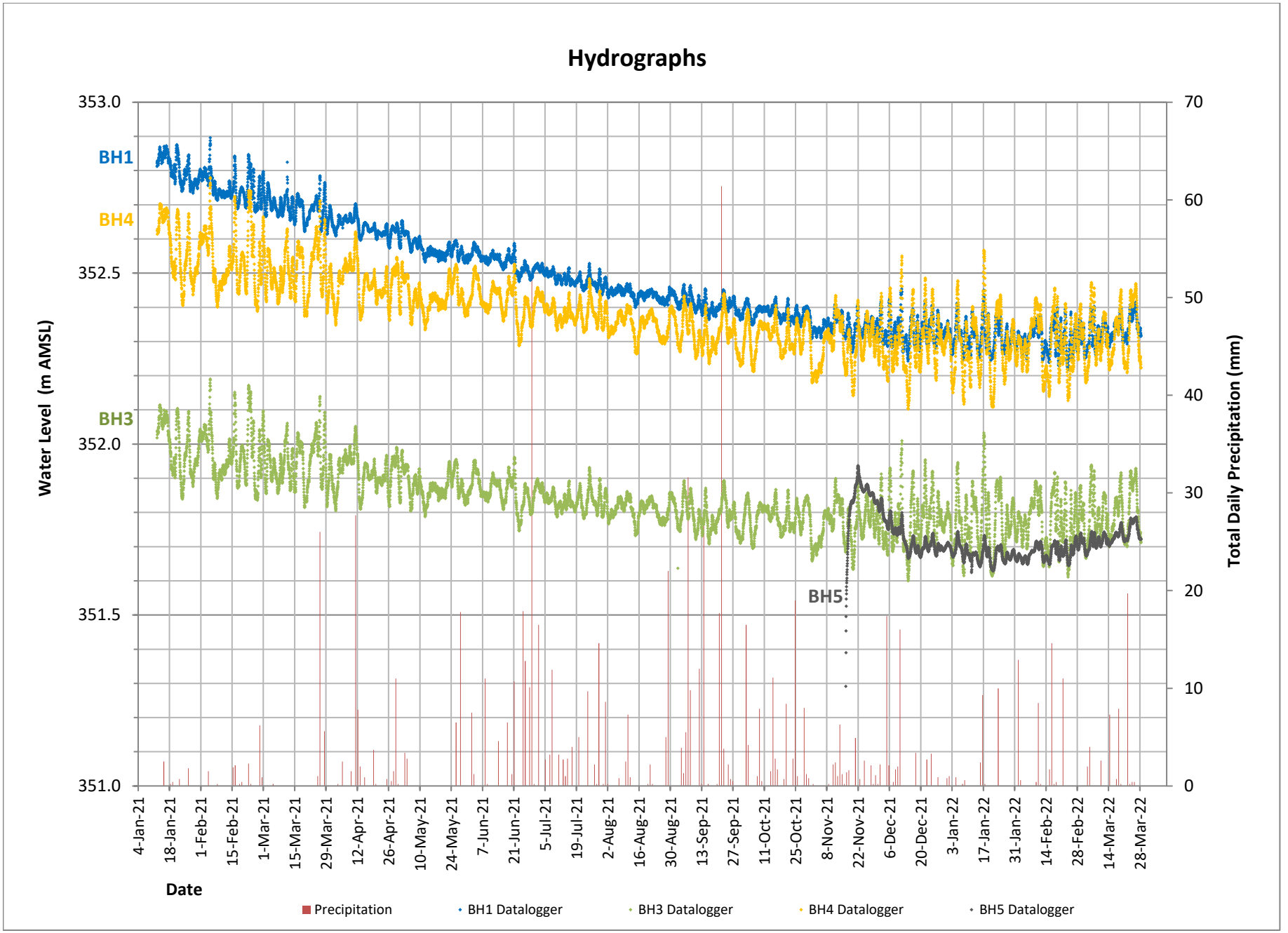
Monitor	Top of Well Pipe Elevation (m AMSL)	Water Level (mAMSL)	Water Level (mAMSL)	Water Level (mAMSL)	Water Level (mAMSL)	Water Level (mAMSL)	Water Level (mAMSL)	Water Level (mAMSL)	Water Level (mAMSL)	Water Level (mAMSL)
		07-May-19	12-Jan-21	11-May-21	18-May-21	02-Sep-21	16-Nov-21	30-Nov-21	14-Dec-21	28-Mar-22
BH1	383.32	352.87	352.80	352.56	352.56	352.41			352.26	352.31
BH3	372.40	352.01	351.99	351.83	351.85	351.74			351.58	351.68
BH4	369.21		352.58	352.38	352.41	352.29			352.10	352.20
BH5	390.17						353.44	351.84	351.67	351.74
SG1	381.95								380.87	380.72
SG2	382.56				381.33	381.10			381.39	381.42

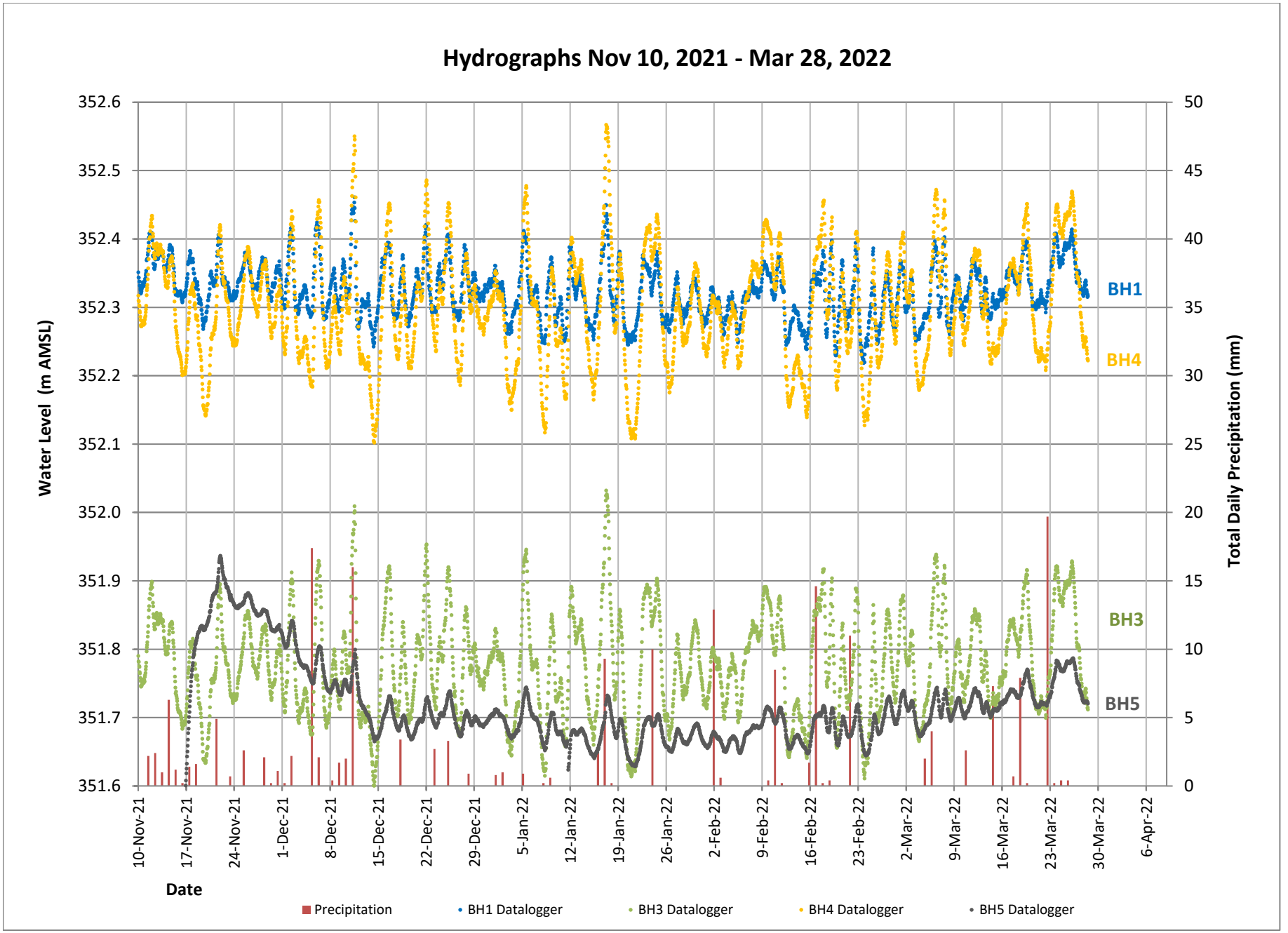
mAMSL - metres above mean sea level

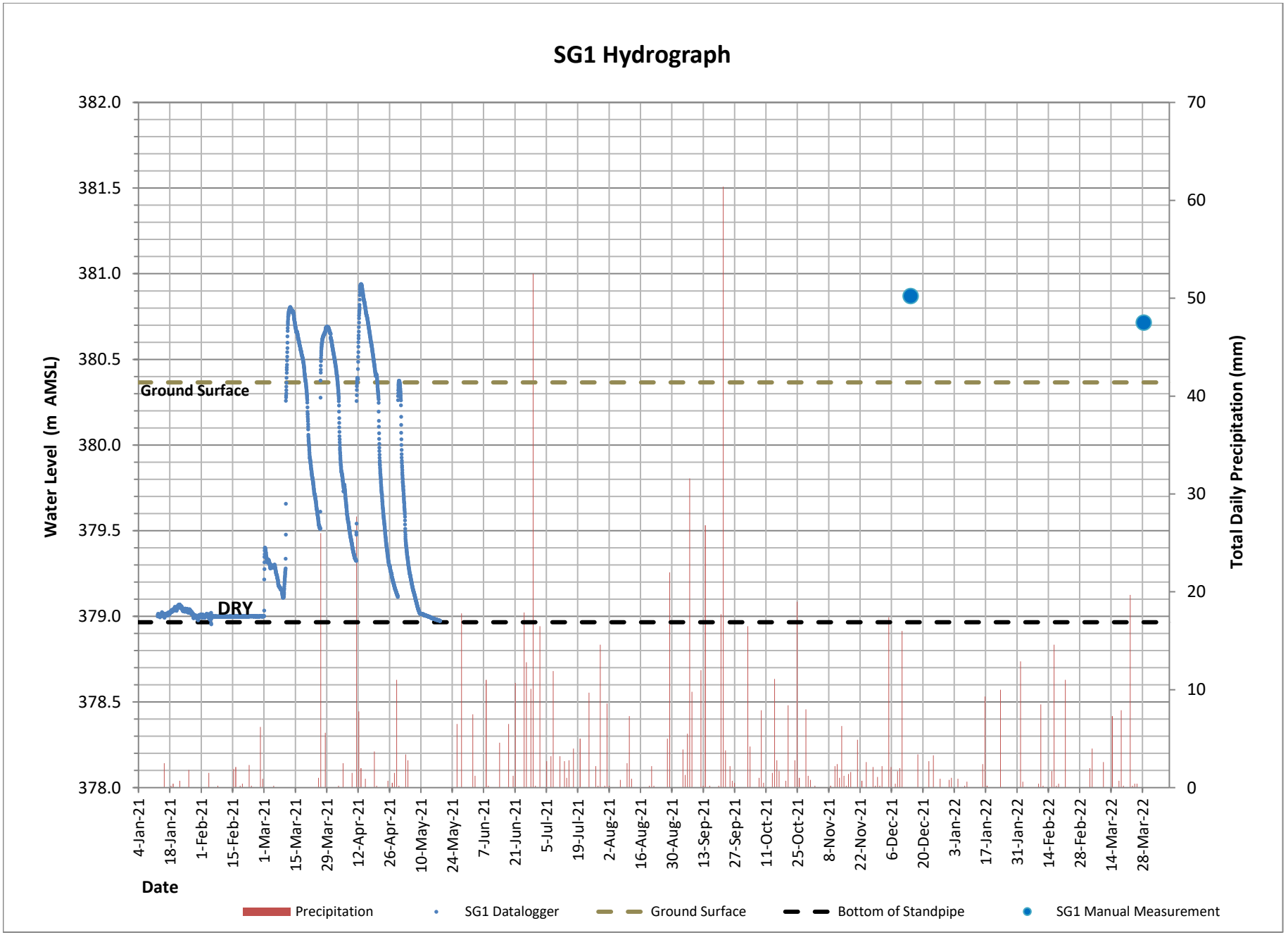
Water Level (mbgs)

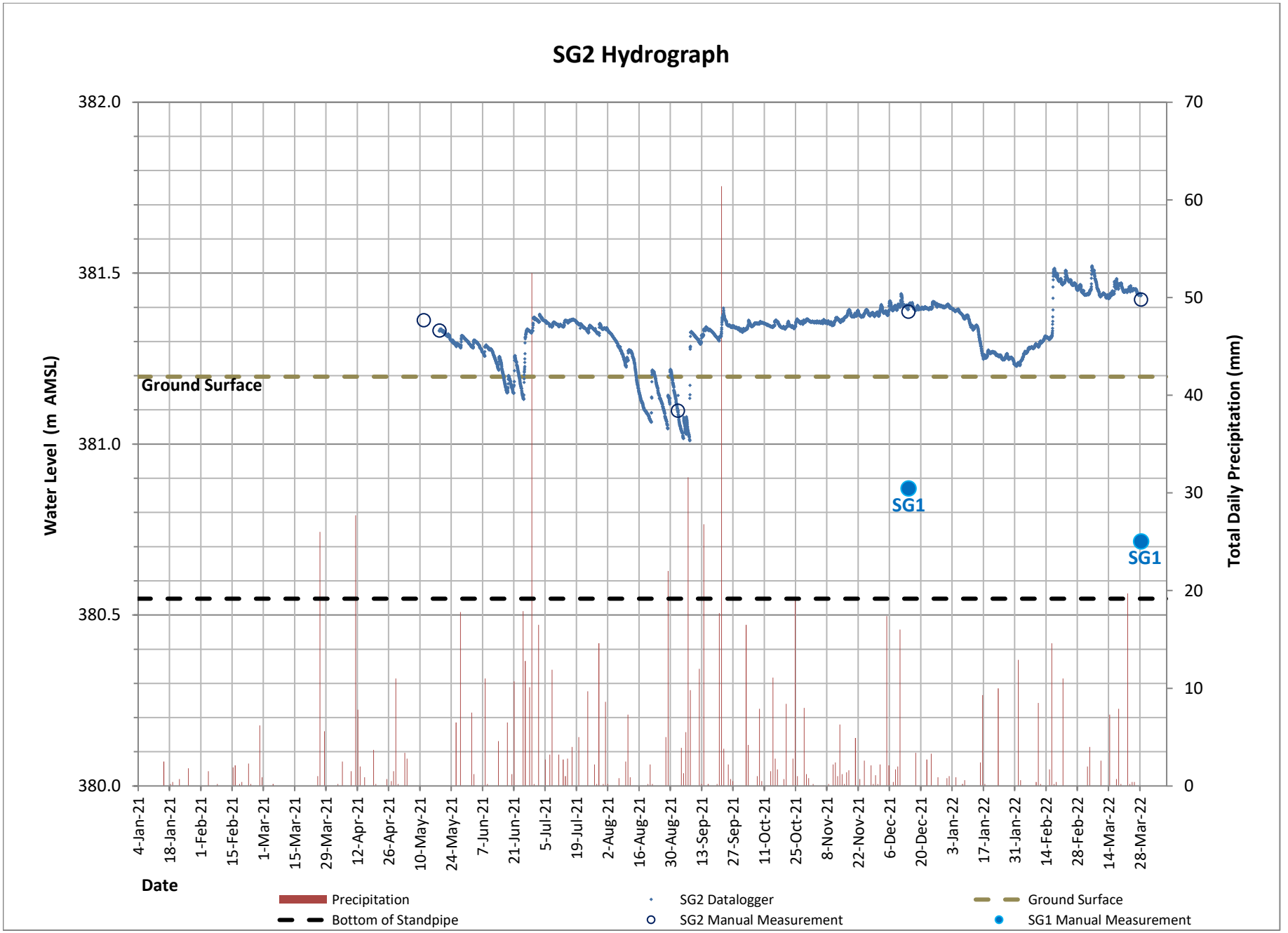
Monitor	Top of Well Pipe Elevation (m AMSL)	Water Level (mbgs)	Water Level (mbgs)	Water Level (mbgs)	Water Level (mbgs)	Water Level (mbgs)	Water Level (mbgs)	Water Level (mbgs)	Water Level (mbgs)	Water Level (mbgs)
		07-May-19	12-Jan-21	11-May-21	18-May-21	02-Sep-21	16-Nov-21	30-Nov-21	14-Dec-21	28-Mar-22
BH1	383.32	29.75	29.82	30.06	30.06	30.21			30.36	30.31
BH3	372.40	19.41	19.43	19.60	19.57	19.68			19.84	19.75
BH4	369.21		15.53	15.73	15.71	15.82			16.02	15.91
BH5	390.17						35.86	37.46	37.63	37.55
SG1	381.95								-0.51	-0.35
SG2	382.56				-0.14	0.10			-0.19	-0.23

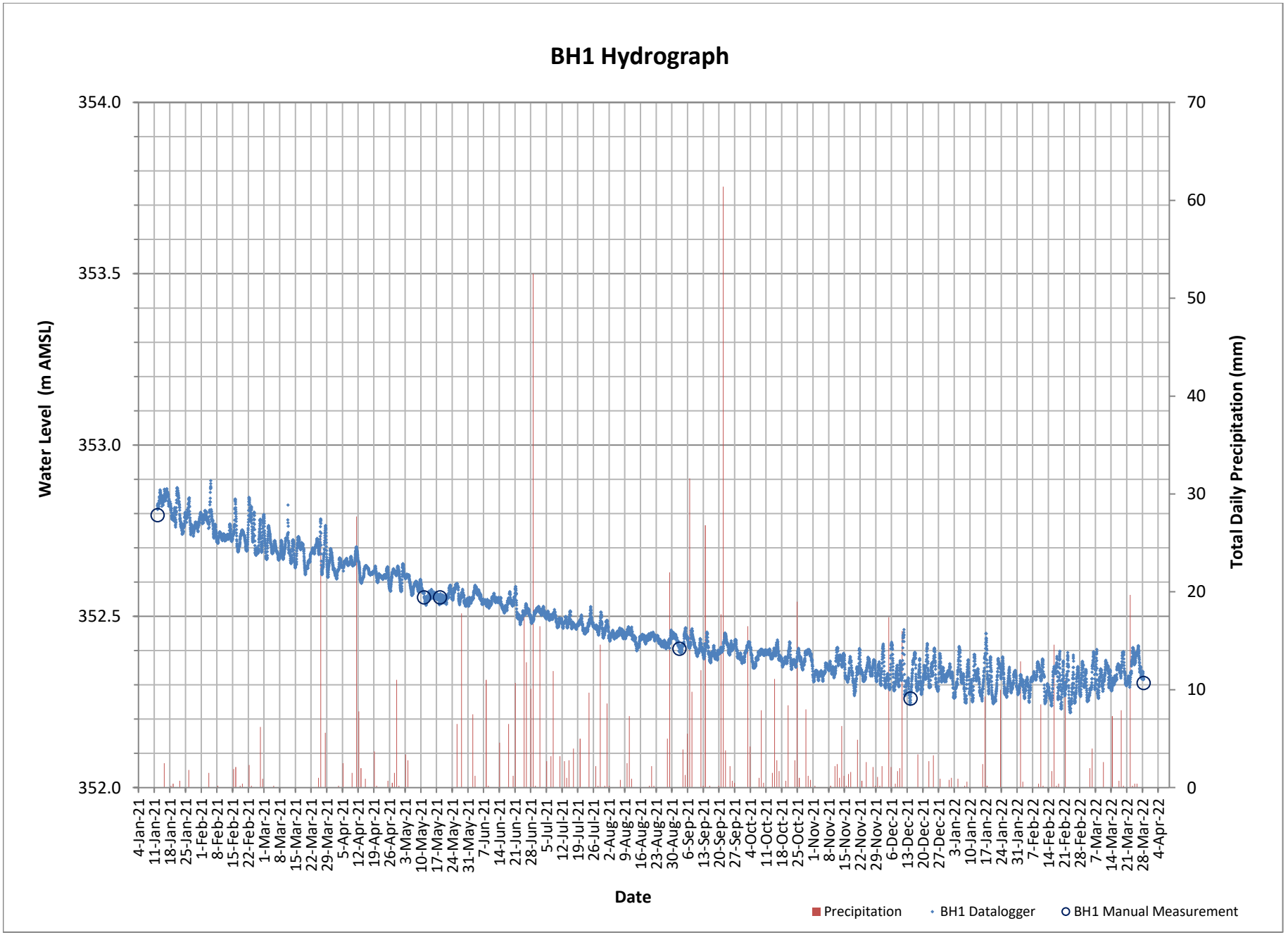
mbgs - metres below ground surface

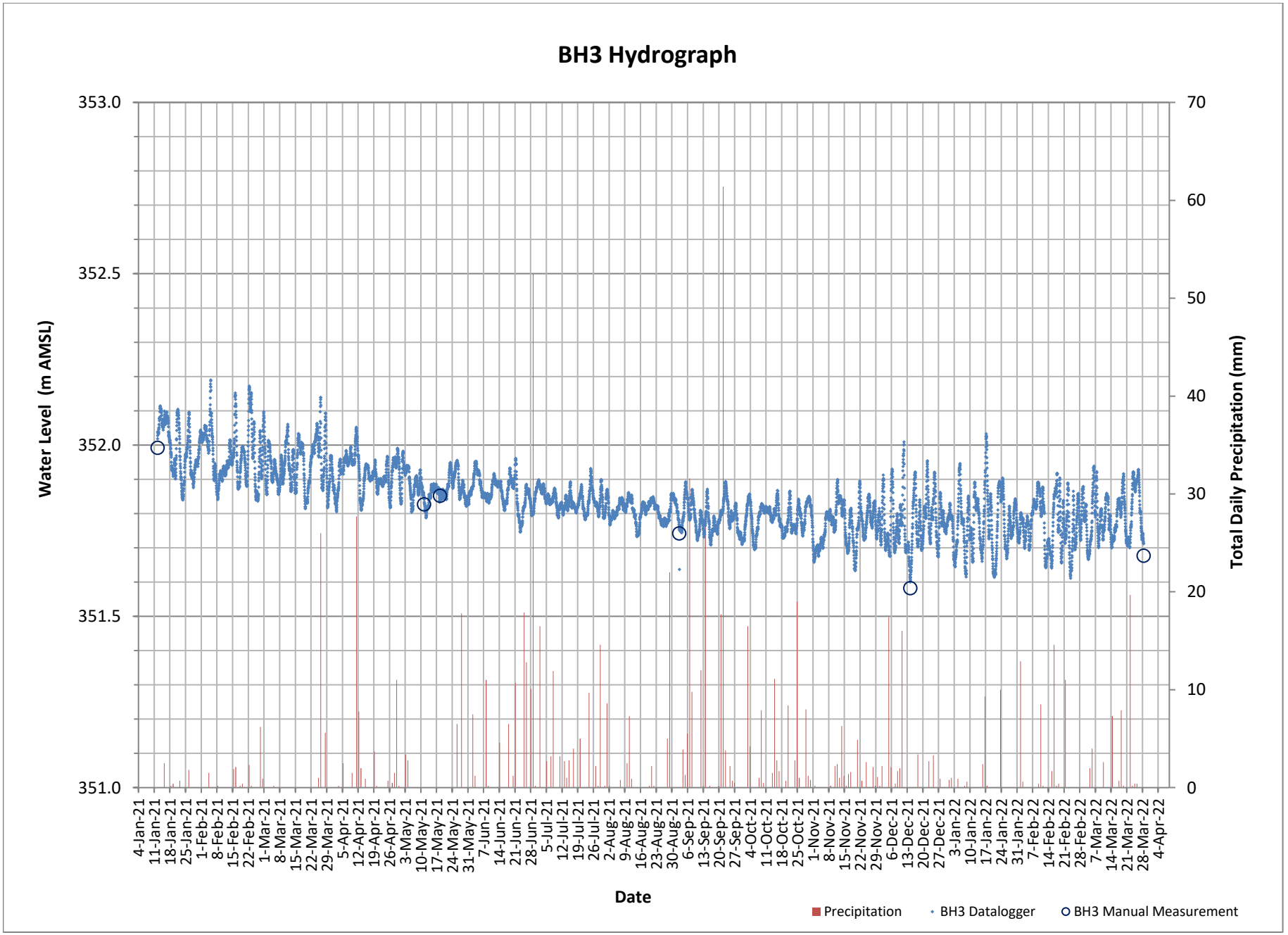

Hydrographs
Water Level (m AMSL)
Total Daily Precipitation (mm)
353.0
352.5
352.0
351.5
351.0
70
60
50
40
30
20
10
0
BH1
BH4
BH3
BH5
4-Jan-21
18-Jan-21
1-Feb-21
15-Feb-21
1-Mar-21
15-Mar-21
29-Mar-21
12-Apr-21
26-Apr-21
10-May-21
24-May-21
7-Jun-21
21-Jun-21
5-Jul-21
19-Jul-21
2-Aug-21
16-Aug-21
30-Aug-21
13-Sep-21
27-Sep-21
11-Oct-21
25-Oct-21
8-Nov-21
22-Nov-21
6-Dec-21
20-Dec-21
3-Jan-22
17-Jan-22
31-Jan-22
14-Feb-22
28-Feb-22
14-Mar-22
28-Mar-22
Date
Precipitation
BH1 Datalogger
BH3 Datalogger
BH4 Datalogger
BH5 Datalogger

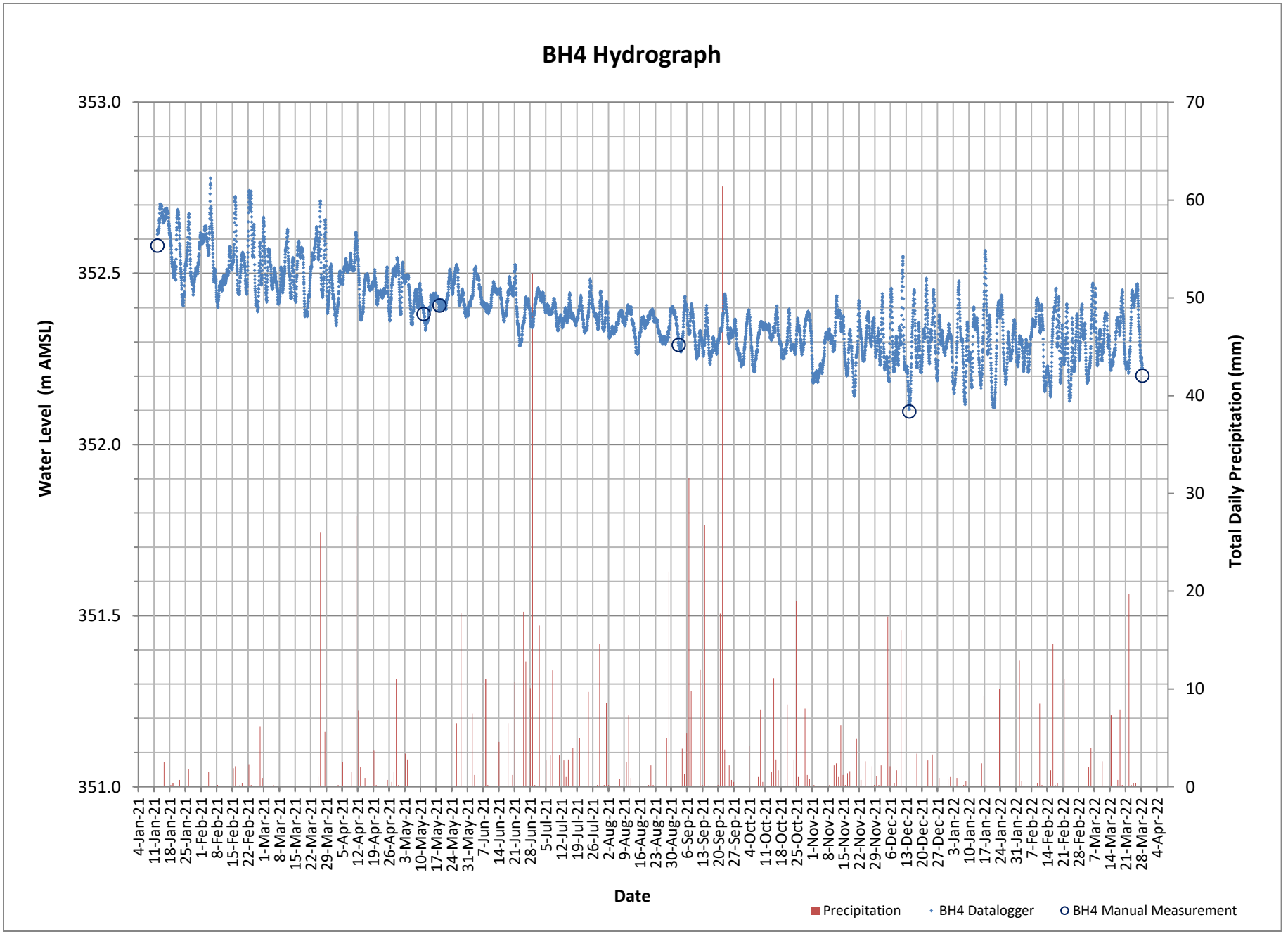

Hydrographs Nov 10, 2021 - Mar 28, 2022
Water Level (m AMSL)
Total Daily Precipitation (mm)
352.6
352.5
352.4
352.3
352.2
352.1
352.0
351.9
351.8
351.7
351.6
50
45
40
35
30
25
20
15
10
5
0
BH1
BH4
BH3
BH5
10-Nov-21
17-Nov-21
24-Nov-21
1-Dec-21
8-Dec-21
15-Dec-21
22-Dec-21
29-Dec-21
5-Jan-22
12-Jan-22
19-Jan-22
26-Jan-22
2-Feb-22
9-Feb-22
16-Feb-22
23-Feb-22
2-Mar-22
9-Mar-22
16-Mar-22
23-Mar-22
30-Mar-22
6-Apr-22
Date
Precipitation
BH1 Datalogger
BH3 Datalogger
BH4 Datalogger
BH5 Datalogger

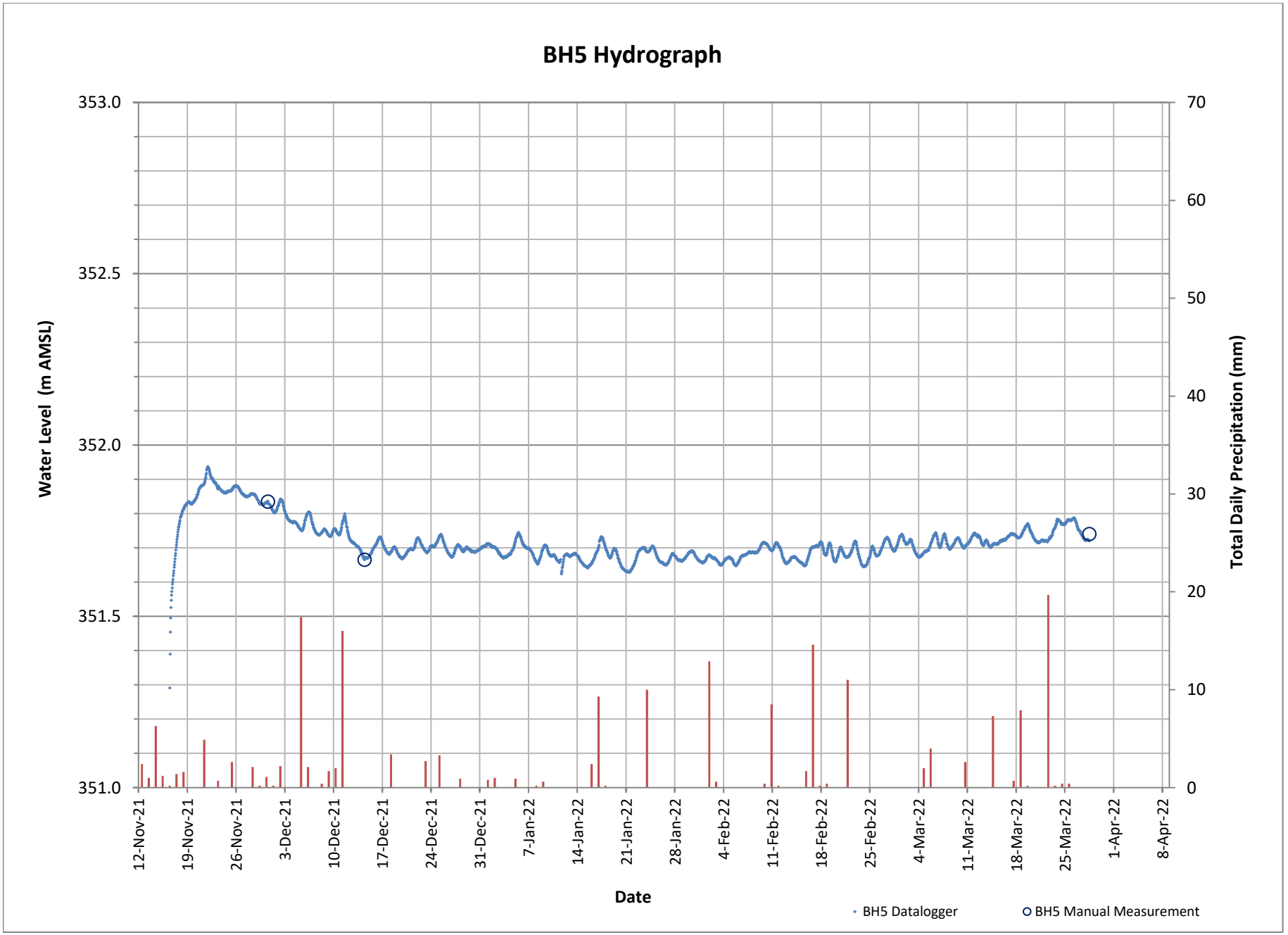

SG1 Hydrograph
Water Level (m AMSL)
Total Daily Precipitation (mm)
382.0
381.5
381.0
380.5
380.0
379.5
379.0
378.5
378.0
70
60
50
40
30
20
10
0
Ground Surface
DRY
4-Jan-21
18-Jan-21
1-Feb-21
15-Feb-21
1-Mar-21
15-Mar-21
29-Mar-21
12-Apr-21
26-Apr-21
10-May-21
24-May-21
7-Jun-21
21-Jun-21
5-Jul-21
19-Jul-21
2-Aug-21
16-Aug-21
30-Aug-21
13-Sep-21
27-Sep-21
11-Oct-21
25-Oct-21
8-Nov-21
22-Nov-21
6-Dec-21
20-Dec-21
3-Jan-22
17-Jan-22
31-Jan-22
14-Feb-22
28-Feb-22
14-Mar-22
28-Mar-22
Date
Precipitation
SG1 Datalogger
Ground Surface
Bottom of Standpipe
SG1 Manual Measurement

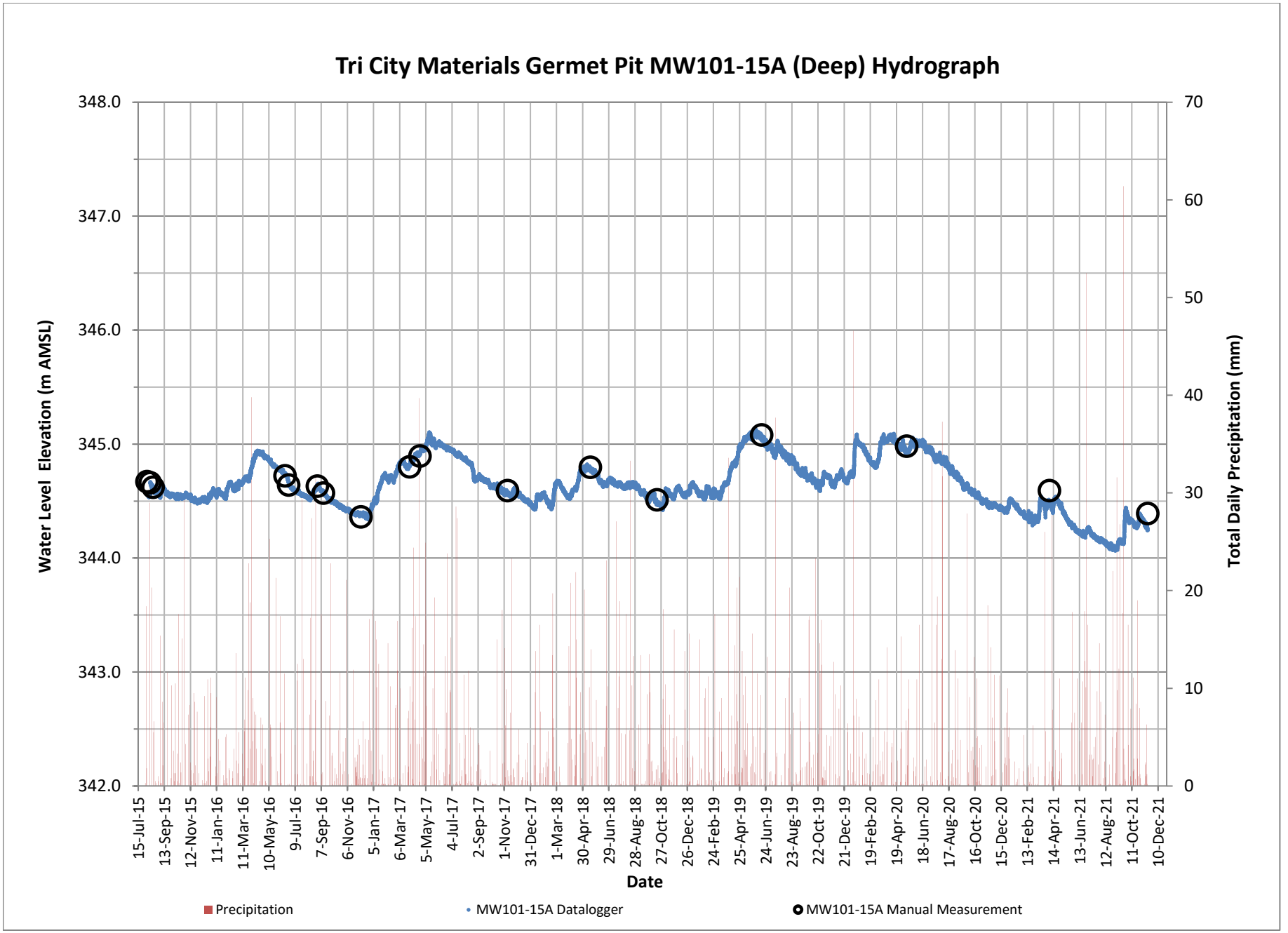

SG2 Hydrograph
382.0
381.5
381.0
380.5
380.0
70
60
50
40
30
20
10
0
Water Level (m AMSL)
Total Daily Precipitation (mm)
Ground Surface
SG1
SG1
4-Jan-21
18-Jan-21
1-Feb-21
15-Feb-21
1-Mar-21
15-Mar-21
29-Mar-21
12-Apr-21
26-Apr-21
10-May-21
24-May-21
7-Jun-21
21-Jun-21
5-Jul-21
19-Jul-21
2-Aug-21
16-Aug-21
30-Aug-21
13-Sep-21
27-Sep-21
11-Oct-21
25-Oct-21
8-Nov-21
22-Nov-21
6-Dec-21
20-Dec-21
3-Jan-22
17-Jan-22
31-Jan-22
14-Feb-22
28-Feb-22
14-Mar-22
28-Mar-22
Date
Precipitation
SG2 Datalogger
Ground Surface
Bottom of Standpipe
SG2 Manual Measurement
SG1 Manual Measurement


BH1 Hydrograph
Water Level (m AMSL)
354.0
353.5
353.0
352.5
352.0
Total Daily Precipitation (mm)
70
60
50
40
30
20
10
0
4-Jan-21
11-Jan-21
18-Jan-21
25-Jan-21
1-Feb-21
8-Feb-21
15-Feb-21
22-Feb-21
1-Mar-21
8-Mar-21
15-Mar-21
22-Mar-21
29-Mar-21
5-Apr-21
12-Apr-21
19-Apr-21
26-Apr-21
3-May-21
10-May-21
17-May-21
24-May-21
31-May-21
7-Jun-21
14-Jun-21
21-Jun-21
28-Jun-21
5-Jul-21
12-Jul-21
19-Jul-21
26-Jul-21
2-Aug-21
9-Aug-21
16-Aug-21
23-Aug-21
30-Aug-21
6-Sep-21
13-Sep-21
20-Sep-21
27-Sep-21
4-Oct-21
11-Oct-21
18-Oct-21
25-Oct-21
1-Nov-21
8-Nov-21
15-Nov-21
22-Nov-21
29-Nov-21
6-Dec-21
13-Dec-21
20-Dec-21
27-Dec-21
3-Jan-22
10-Jan-22
17-Jan-22
24-Jan-22
31-Jan-22
7-Feb-22
14-Feb-22
21-Feb-22
28-Feb-22
7-Mar-22
14-Mar-22
21-Mar-22
28-Mar-22
4-Apr-22
Date
Precipitation
BH1 Datalogger
BH1 Manual Measurement

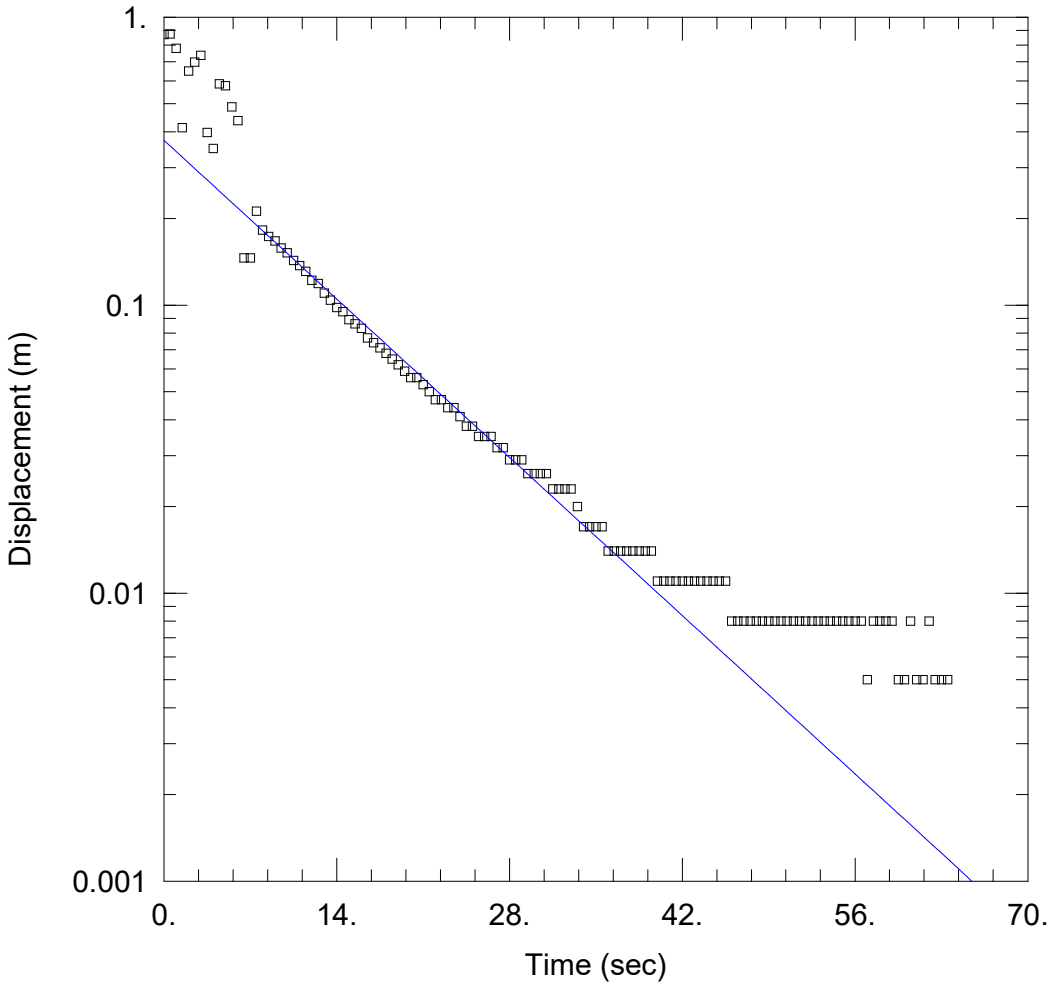

BH3 Hydrograph
Water Level (m AMSL)
Total Daily Precipitation (mm)
Date
353.0
352.5
352.0
351.5
351.0
70
60
50
40
30
20
10
0
4-Jan-21
11-Jan-21
18-Jan-21
25-Jan-21
1-Feb-21
8-Feb-21
15-Feb-21
22-Feb-21
1-Mar-21
8-Mar-21
15-Mar-21
22-Mar-21
29-Mar-21
5-Apr-21
12-Apr-21
19-Apr-21
26-Apr-21
3-May-21
10-May-21
17-May-21
24-May-21
31-May-21
7-Jun-21
14-Jun-21
21-Jun-21
28-Jun-21
5-Jul-21
12-Jul-21
19-Jul-21
26-Jul-21
2-Aug-21
9-Aug-21
16-Aug-21
23-Aug-21
30-Aug-21
6-Sep-21
13-Sep-21
20-Sep-21
27-Sep-21
4-Oct-21
11-Oct-21
18-Oct-21
25-Oct-21
1-Nov-21
8-Nov-21
15-Nov-21
22-Nov-21
29-Nov-21
6-Dec-21
13-Dec-21
20-Dec-21
27-Dec-21
3-Jan-22
10-Jan-22
17-Jan-22
24-Jan-22
31-Jan-22
7-Feb-22
14-Feb-22
21-Feb-22
28-Feb-22
7-Mar-22
14-Mar-22
21-Mar-22
28-Mar-22
4-Apr-22
Precipitation
BH3 Datalogger
BH3 Manual Measurement


BH4 Hydrograph
Water Level (m AMSL)
353.0
352.5
352.0
351.5
351.0
Total Daily Precipitation (mm)
70
60
50
40
30
20
10
0
4-Jan-21
11-Jan-21
18-Jan-21
25-Jan-21
1-Feb-21
8-Feb-21
15-Feb-21
22-Feb-21
1-Mar-21
8-Mar-21
15-Mar-21
22-Mar-21
29-Mar-21
5-Apr-21
12-Apr-21
19-Apr-21
26-Apr-21
3-May-21
10-May-21
17-May-21
24-May-21
31-May-21
7-Jun-21
14-Jun-21
21-Jun-21
28-Jun-21
5-Jul-21
12-Jul-21
19-Jul-21
26-Jul-21
2-Aug-21
9-Aug-21
16-Aug-21
23-Aug-21
30-Aug-21
6-Sep-21
13-Sep-21
20-Sep-21
27-Sep-21
4-Oct-21
11-Oct-21
18-Oct-21
25-Oct-21
1-Nov-21
8-Nov-21
15-Nov-21
22-Nov-21
29-Nov-21
6-Dec-21
13-Dec-21
20-Dec-21
27-Dec-21
3-Jan-22
10-Jan-22
17-Jan-22
24-Jan-22
31-Jan-22
7-Feb-22
14-Feb-22
21-Feb-22
28-Feb-22
7-Mar-22
14-Mar-22
21-Mar-22
28-Mar-22
4-Apr-22
Date
Precipitation
BH4 Datalogger
BH4 Manual Measurement


BH5 Hydrograph
Water Level (m AMSL)
353.0
352.5
352.0
351.5
351.0
Total Daily Precipitation (mm)
70
60
50
40
30
20
10
0
12-Nov-21
19-Nov-21
26-Nov-21
3-Dec-21
10-Dec-21
17-Dec-21
24-Dec-21
31-Dec-21
7-Jan-22
14-Jan-22
21-Jan-22
28-Jan-22
4-Feb-22
11-Feb-22
18-Feb-22
25-Feb-22
4-Mar-22
11-Mar-22
18-Mar-22
25-Mar-22
1-Apr-22
8-Apr-22
Date
BH5 Datalogger
BH5 Manual Measurement


Tri City Materials Germet Pit MW101-15A (Deep) Hydrograph
Water Level Elevation (m AMSL)
Total Daily Precipitation (mm)
348.0
347.0
346.0
345.0
344.0
343.0
342.0
70
60
50
40
30
20
10
0
15-Jul-15
13-Sep-15
12-Nov-15
11-Jan-16
11-Mar-16
10-May-16
9-Jul-16
7-Sep-16
6-Nov-16
5-Jan-17
6-Mar-17
5-May-17
4-Jul-17
2-Sep-17
1-Nov-17
31-Dec-17
1-Mar-18
30-Apr-18
29-Jun-18
28-Aug-18
27-Oct-18
26-Dec-18
24-Feb-19
25-Apr-19
24-Jun-19
23-Aug-19
22-Oct-19
21-Dec-19
19-Feb-20
19-Apr-20
18-Jun-20
17-Aug-20
16-Oct-20
15-Dec-20
13-Feb-21
14-Apr-21
13-Jun-21
12-Aug-21
11-Oct-21
10-Dec-21
Date
Precipitation
MW101-15A Datalogger
MW101-15A Manual Measurement

Appendix C: Results of Hydraulic Testing



SNYDERS PIT

Data Set: C:\Harden 2\Slug Test Results\bh1In_Snyders.aqt
Date: 03/31/22 Time: 12:32:01

PROJECT INFORMATION

Company: Harden Environmental
Client: Petersburg Sand and Gravel
Project: 2027
Location: 1856 Snyders Road East
Test Well: BH1
Test Date: 01/11/22

AQUIFER DATA

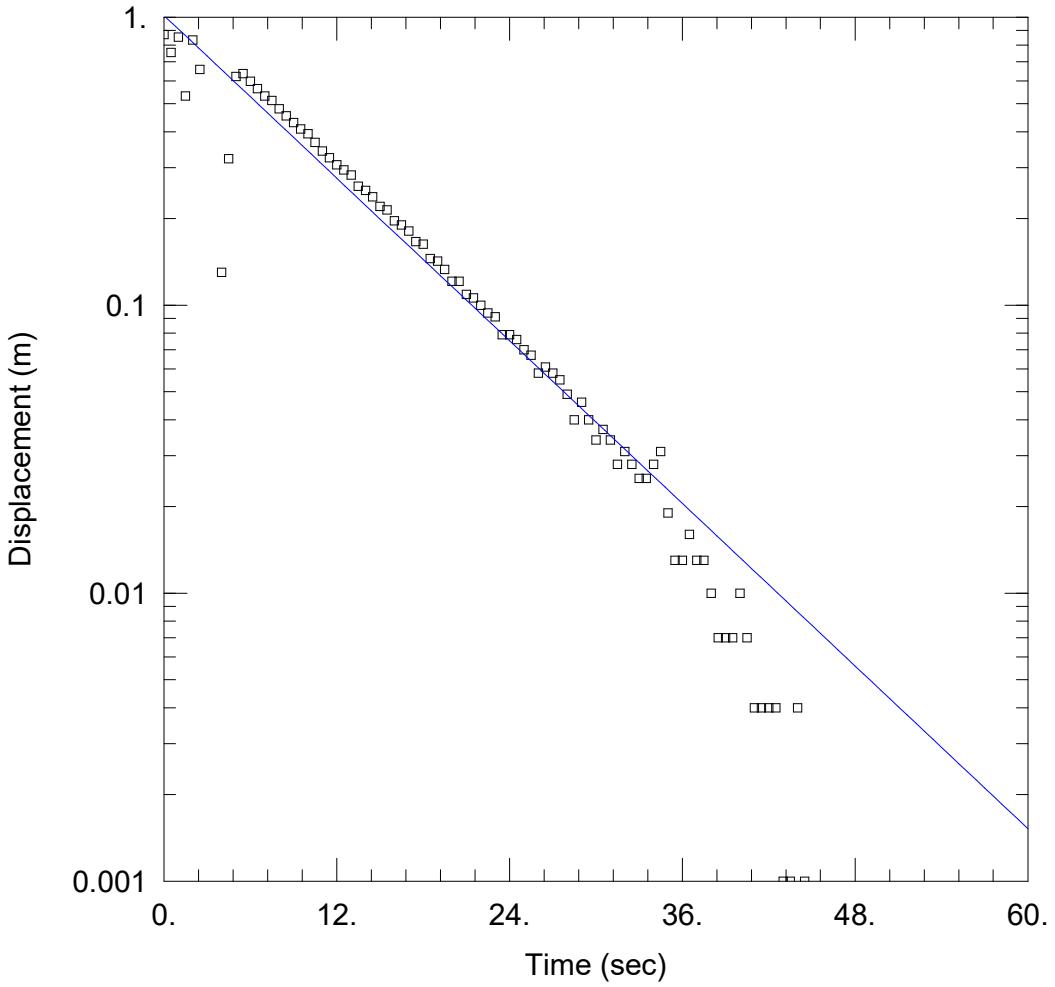
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH1 (In))

Initial Displacement: 0.87 m Static Water Column Height: 8.87 m
Total Well Penetration Depth: 39.02 m Screen Length: 1.52 m
Casing Radius: 0.0254 m Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 9.639E-5 m/sec y0 = 0.3734 m



SNYDERS PIT

Data Set: C:\Harden 2\Slug Test Results\bh1Out_Snyders.aqt
Date: 03/31/22 Time: 12:34:25

PROJECT INFORMATION

Company: Harden Environmental
Client: Petersburg Sand and Gravel
Project: 2027
Location: 1856 Snyders Road East
Test Well: BH1
Test Date: 01/11/22

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.1

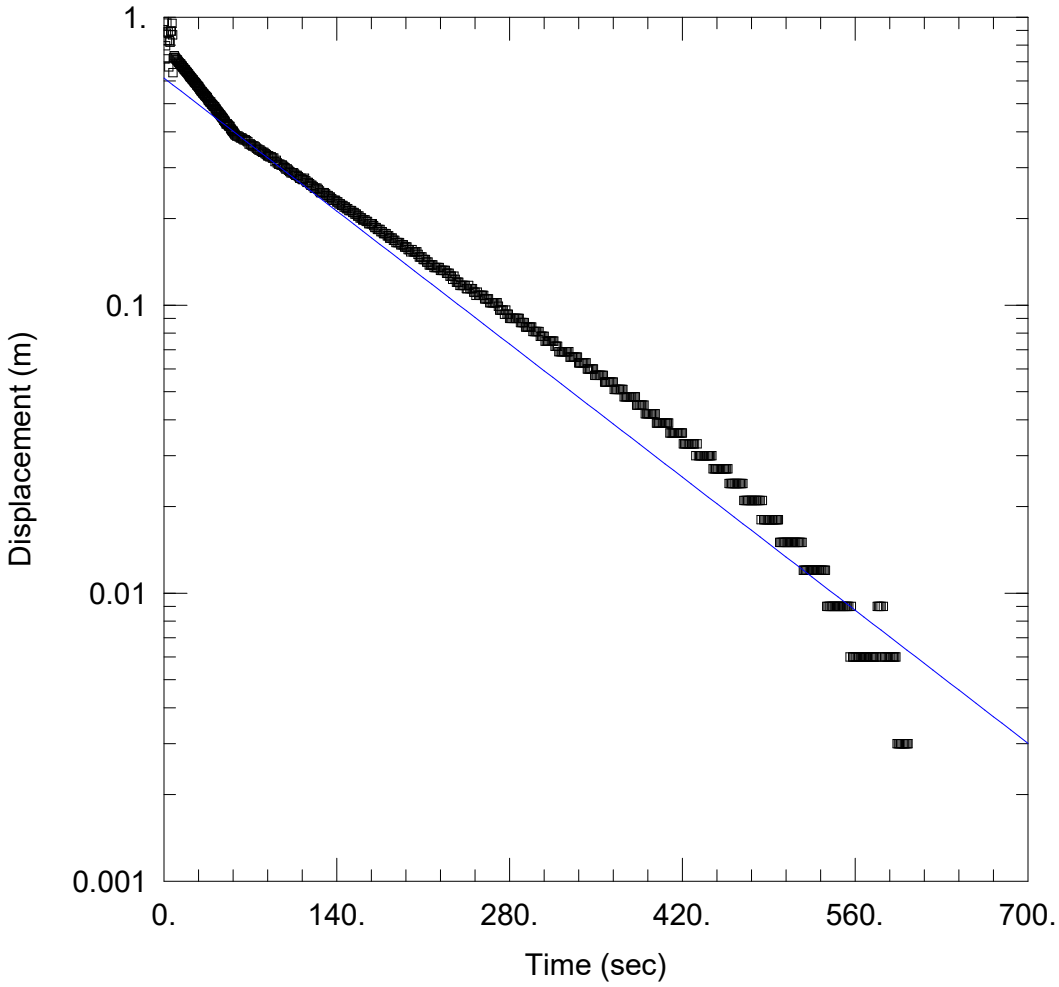
WELL DATA (BH1 (Out))

Initial Displacement: 0.87 m Static Water Column Height: 8.87 m
Total Well Penetration Depth: 39.02 m Screen Length: 1.52 m
Casing Radius: 0.0254 m Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.0001155 m/sec y0 = 1.014 m



SNYDERS PIT

Data Set: C:\Harden 2\Slug Test Results\bh3ln_Snyders.aqt
Date: 03/31/22 Time: 12:35:11

PROJECT INFORMATION

Company: Harden Environmental
Client: Petersburg Sand and Gravel
Project: 2027
Location: 1856 Snyders Road East
Test Well: BH3
Test Date: 01/11/22

AQUIFER DATA

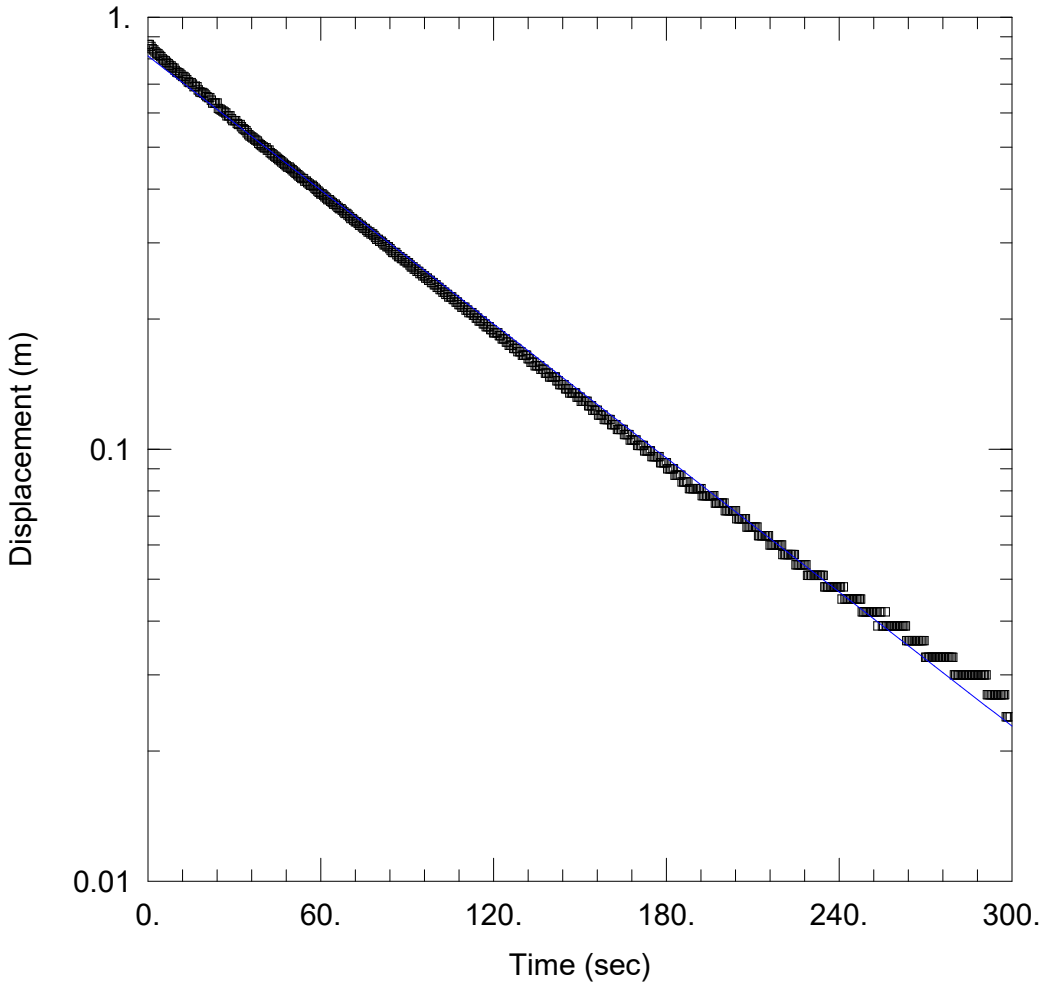
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH3 (In))

Initial Displacement: 0.966 m Static Water Column Height: 4.137 m
Total Well Penetration Depth: 24.52 m Screen Length: 1.52 m
Casing Radius: 0.0254 m Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 8.095E-6 m/sec y0 = 0.6145 m



SNYDERS PIT

Data Set: C:\Harden 2\Slug Test Results\bh3Out_Snyders.aqt
Date: 03/31/22 Time: 12:35:40

PROJECT INFORMATION

Company: Harden Environmental
Client: Petersburg Sand and Gravel
Project: 2027
Location: 1856 Snyders Road East
Test Well: BH3
Test Date: 01/11/22

AQUIFER DATA

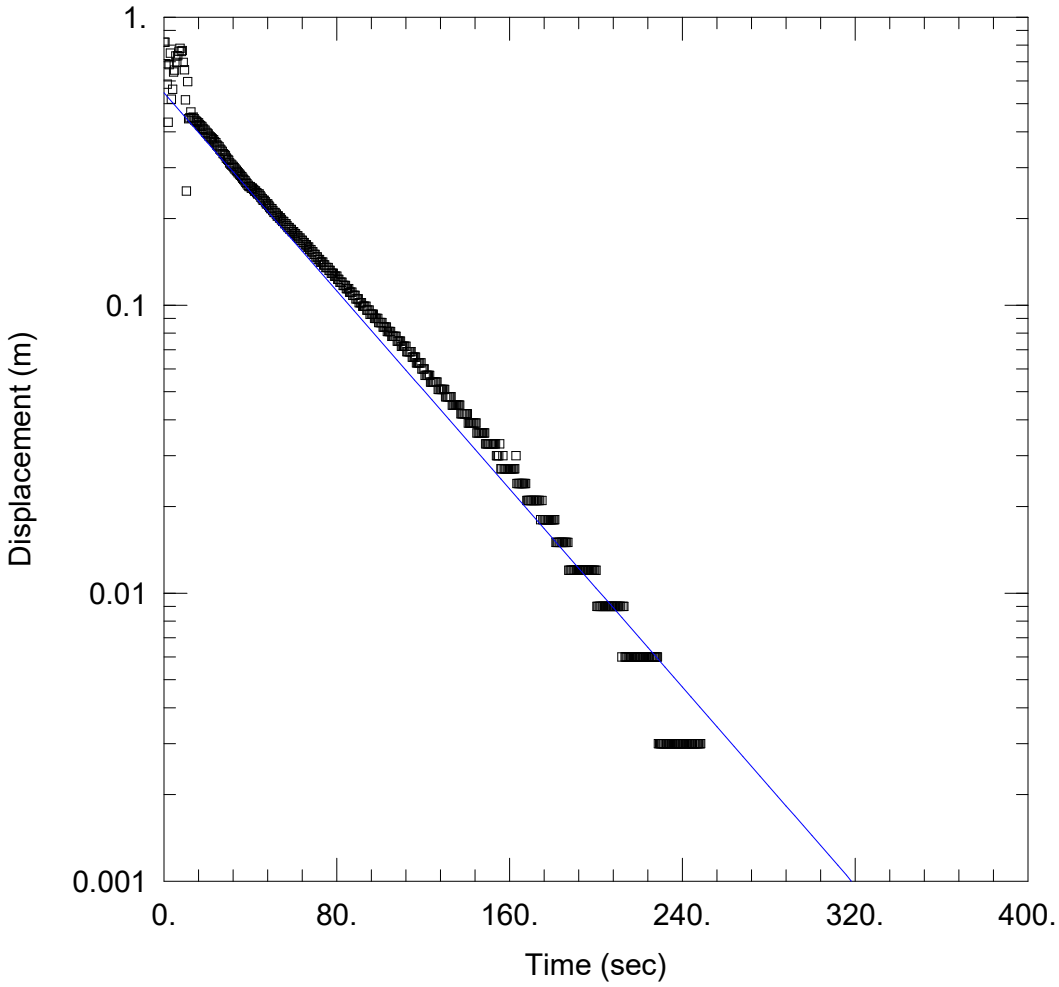
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH3 (Out))

Initial Displacement: 0.864 m Static Water Column Height: 4.137 m
Total Well Penetration Depth: 24.52 m Screen Length: 1.52 m
Casing Radius: 0.0254 m Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 1.269E-5 m/sec y0 = 0.8134 m



SNYDERS PIT

Data Set: C:\Harden 2\Slug Test Results\bh4ln_Snyders.aqt
Date: 03/31/22 Time: 12:36:23

PROJECT INFORMATION

Company: Harden Environmental
Client: Petersburg Sand and Gravel
Project: 2027
Location: 1856 Snyders Road East
Test Well: BH4
Test Date: 01/11/22

AQUIFER DATA

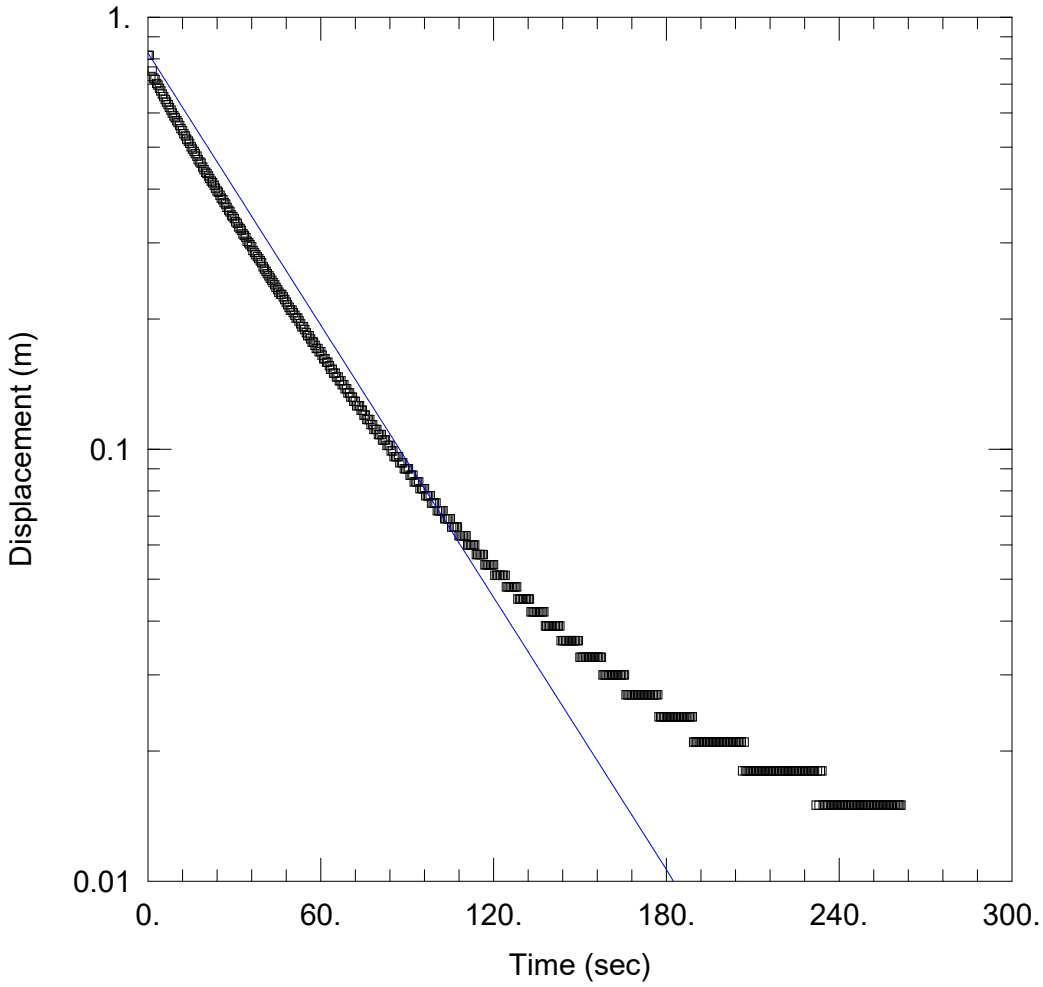
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH4 (In))

Initial Displacement: 0.819 m
Static Water Column Height: 9.23 m
Total Well Penetration Depth: 25.05 m
Screen Length: 3.05 m
Casing Radius: 0.0254 m
Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.197E-5 m/sec
y0 = 0.5463 m



SNYDERS PIT

Data Set: C:\Harden 2\Slug Test Results\bh4Out_Snyders.aqt
Date: 03/31/22 Time: 12:37:29

PROJECT INFORMATION

Company: Harden Environmental
Client: Petersburg Sand and Gravel
Project: 2027
Location: 1856 Snyders Road East
Test Well: BH4
Test Date: 01/11/22

AQUIFER DATA

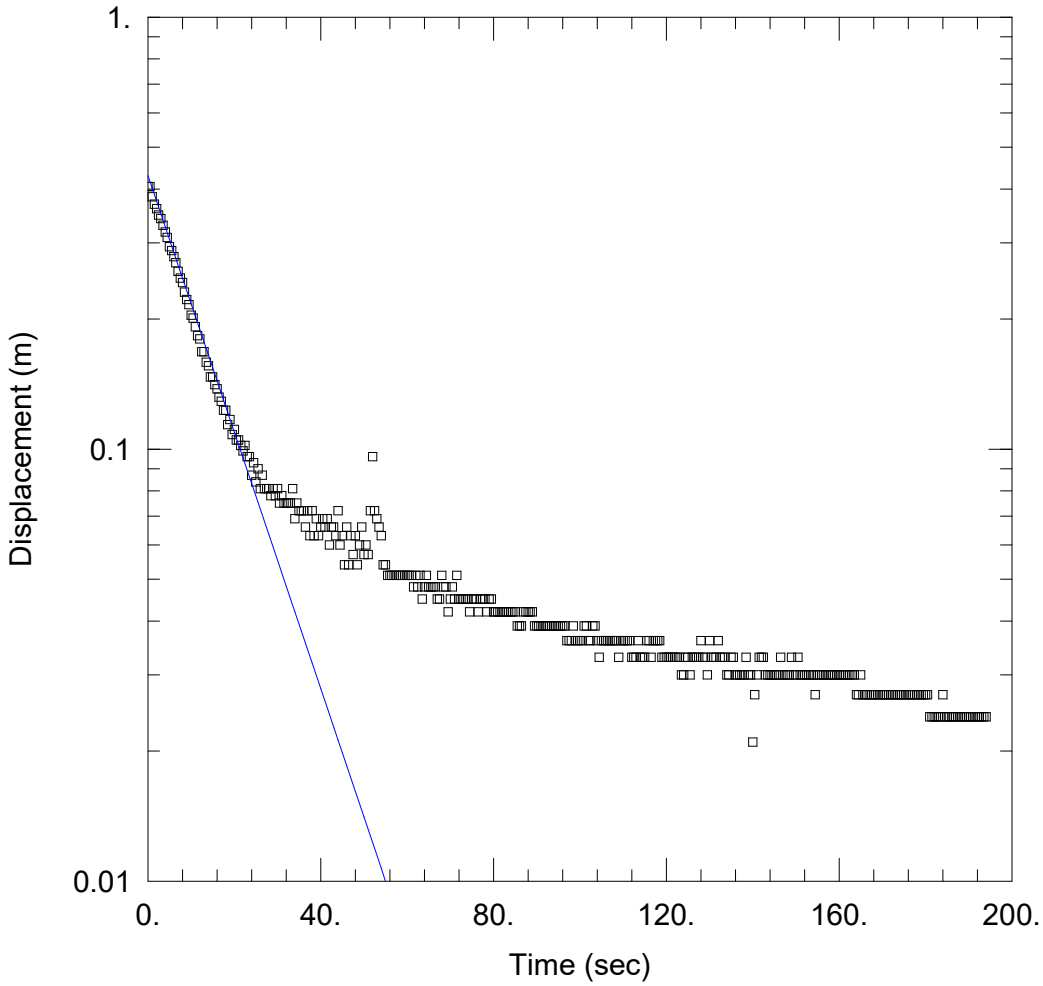
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH4 (Out))

Initial Displacement: 0.816 m
Static Water Column Height: 9.23 m
Total Well Penetration Depth: 25.05 m
Screen Length: 3.05 m
Casing Radius: 0.0254 m
Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.462E-5 m/sec
y0 = 0.8259 m



SNYDERS PIT

Data Set: C:\Harden 2\Slug Test Results\bh5Out_Snyders.aqt
Date: 03/31/22 Time: 12:38:33

PROJECT INFORMATION

Company: Harden Environmental
Client: Petersburg Sand and Gravel
Project: 2027
Location: 1856 Snyders Road East
Test Well: BH5
Test Date: 01/11/22

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH5 (Out))

Initial Displacement: 0.405 m Static Water Column Height: 2.5 m
Total Well Penetration Depth: 40.11 m Screen Length: 3.05 m
Casing Radius: 0.0254 m Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 4.133E-5 m/sec y0 = 0.4294 m

Appendix D: Water Quality Results

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.
4622 NASSAGAWEYA PUSLINCH TOWNLINE
MOFFAT, ON L0P 1J0
519-826-0099

ATTENTION TO: Allan Rodie

PROJECT: Job No.2027 - Petersburg Sand

AGAT WORK ORDER: 21T797201

WATER ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician

DATE REPORTED: Sep 14, 2021

PAGES (INCLUDING COVER): 9

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

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Certificate of Analysis

AGAT WORK ORDER: 21T797201

PROJECT: Job No.2027 - Petersburg Sand

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

(Water) TKN

DATE RECEIVED: 2021-09-03

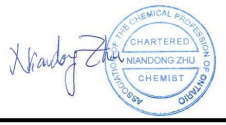
DATE REPORTED: 2021-09-14

				SAMPLE DESCRIPTION:	BH1	BH3	BH4
				SAMPLE TYPE:	Water	Water	Water
				DATE SAMPLED:	2021-09-02 17:30	2021-09-02 10:40	2021-09-02 11:25
Parameter	**Unit**	**G / S**	**RDL**		**2926160**	**2926248**	**2926249**
Total Kjeldahl Nitrogen	mg/L		0.10		0.13	0.19	0.43

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



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Certificate of Analysis

AGAT WORK ORDER: 21T797201

PROJECT: Job No.2027 - Petersburg Sand

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

Water Quality Assessment (mg/L) Groundwater

DATE RECEIVED: 2021-09-03

DATE REPORTED: 2021-09-14

		SAMPLE DESCRIPTION:		BH1	BH3	BH4
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2021-09-02 17:30	2021-09-02 10:40	2021-09-02 11:25
Parameter	Unit	G / S	RDL	2926160	2926248	2926249
Electrical Conductivity	µS/cm		2	697	602	491
pH	pH Units		NA	7.95	7.86	7.84
Saturation pH (Calculated)				6.85	7.08	7.21
Langelier Index (Calculated)				1.10	0.782	0.634
Hardness (as CaCO3) (Calculated)	mg/L		0.5	341	284	219
Total Dissolved Solids	mg/L		10	362	346	250
Alkalinity (as CaCO3)	mg/L		5	299	213	192
Bicarbonate (as CaCO3)	mg/L		5	299	213	192
Carbonate (as CaCO3)	mg/L		5	<5	<5	<5
Hydroxide (as CaCO3)	mg/L		5	<5	<5	<5
Fluoride	mg/L	1.5	0.05	<0.05	<0.05	<0.05
Chloride	mg/L		0.10	19.4	6.64	8.66
Nitrate as N	mg/L	10.0	0.05	1.48	5.52	<0.05
Nitrite as N	mg/L	1.0	0.05	<0.05	<0.05	<0.05
Bromide	mg/L		0.05	<0.05	<0.05	<0.05
Sulphate	mg/L		0.10	29.1	73.9	53.2
Ortho Phosphate as P	mg/L		0.10	<0.10	<0.10	<0.10
Ammonia as N	mg/L		0.02	0.03	<0.02	0.32
Total Phosphorus	mg/L		0.02	0.11	0.17	0.05
Total Organic Carbon	mg/L		0.5	2.8	1.3	1.1
True Colour	TCU		5	<5	<5	6
Turbidity	NTU		0.5	183	4670	124
Dissolved Calcium	mg/L		0.05	101	72.7	51.3
Dissolved Magnesium	mg/L		0.05	21.5	25.0	22.1
Dissolved Potassium	mg/L		0.50	1.93	1.31	0.93
Dissolved Sodium	mg/L	20	0.05	6.96	5.43	8.33
Dissolved Aluminum	mg/L		0.004	0.025	0.022	0.013
Dissolved Antimony	mg/L	0.006	0.001	<0.001	<0.001	<0.001
Dissolved Arsenic	mg/L	0.01	0.001	0.002	<0.001	0.010

Certified By:

NIANDONG ZHU
CHARTERED CHEMIST
ASSOCIATE OF THE CHEMICAL PROFESSION OF ONTARIO

AGAT Laboratories

5835 COOPERS AVENUE
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CANADA L4Z 1Y2
TEL (905)712-5100
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T797201

PROJECT: Job No.2027 - Petersburg Sand

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

Water Quality Assessment (mg/L) Groundwater

DATE RECEIVED: 2021-09-03

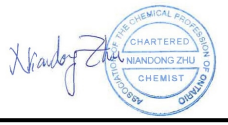
DATE REPORTED: 2021-09-14

SAMPLE DESCRIPTION:				BH1	BH3	BH4
SAMPLE TYPE:				Water	Water	Water
DATE SAMPLED:				2021-09-02 17:30	2021-09-02 10:40	2021-09-02 11:25
Parameter	Unit	G / S	RDL	2926160	2926248	2926249
Dissolved Barium	mg/L	1.0	0.002	0.140	0.095	0.063
Dissolved Beryllium	mg/L		0.0005	<0.0005	<0.0005	<0.0005
Dissolved Boron	mg/L	5.0	0.010	0.037	0.022	0.030
Dissolved Cadmium	mg/L	0.005	0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.05	0.002	<0.002	<0.002	<0.002
Dissolved Cobalt	mg/L		0.0005	<0.0005	<0.0005	<0.0005
Dissolved Copper	mg/L		0.001	<0.001	0.001	<0.001
Dissolved Iron	mg/L		0.010	0.180	0.012	0.200
Dissolved Lead	mg/L	0.010	0.0005	0.0023	<0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	0.132	0.083	0.043
Dissolved Mercury	mg/L	0.001	0.0001	<0.0001	<0.0001	<0.0001
Dissolved Molybdenum	mg/L		0.002	0.002	<0.002	<0.002
Dissolved Nickel	mg/L		0.003	0.005	<0.003	<0.003
Dissolved Selenium	mg/L	0.05	0.001	<0.001	<0.001	<0.001
Dissolved Silver	mg/L		0.0001	<0.0001	<0.0001	<0.0001
Dissolved Strontium	mg/L		0.005	0.268	0.184	0.379
Dissolved Thallium	mg/L		0.0003	<0.0003	<0.0003	<0.0003
Dissolved Tin	mg/L		0.002	<0.002	<0.002	<0.002
Dissolved Titanium	mg/L		0.002	<0.002	<0.002	<0.002
Dissolved Tungsten	mg/L		0.010	<0.010	<0.010	<0.010
Dissolved Uranium	mg/L	0.02	0.0005	0.0007	<0.0005	<0.0005
Dissolved Vanadium	mg/L		0.002	<0.002	<0.002	<0.002
Dissolved Zinc	mg/L		0.005	<0.005	0.008	<0.005
Dissolved Zirconium	mg/L		0.004	<0.004	<0.004	<0.004

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards. Na value derived from O. Reg 248
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



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Quality Assurance

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 21T797201

PROJECT: Job No.2027 - Petersburg Sand

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Sep 14, 2021

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Water Quality Assessment (mg/L) Groundwater															
Electrical Conductivity	2925669		3590	3580	0.3%	< 2	99%	90%	110%						
pH	2925669		7.73	7.78	0.6%	NA	102%	90%	110%						
Total Dissolved Solids	2925737		166	162	2.4%	< 10	102%	80%	120%						
Alkalinity (as CaCO3)	2925669		460	474	3.0%	< 5	96%	80%	120%						
Bicarbonate (as CaCO3)	2925669		460	474	3.0%	< 5									
Carbonate (as CaCO3)	2925669		<5	<5	NA	< 5									
Hydroxide (as CaCO3)	2925669		<5	<5	NA	< 5									
Fluoride	2931141		<0.05	<0.05	NA	< 0.05	108%	70%	130%	112%	80%	120%	112%	70%	130%
Chloride	2931141		25.3	26.6	5.0%	< 0.10	96%	70%	130%	103%	80%	120%	107%	70%	130%
Nitrate as N	2931141		<0.05	<0.05	NA	< 0.05	99%	70%	130%	106%	80%	120%	109%	70%	130%
Nitrite as N	2931141		<0.05	<0.05	NA	< 0.05	97%	70%	130%	99%	80%	120%	106%	70%	130%
Bromide	2931141		<0.05	<0.05	NA	< 0.05	105%	70%	130%	107%	80%	120%	107%	70%	130%
Sulphate	2931141		267	268	0.4%	< 0.10	101%	70%	130%	103%	80%	120%	NA	70%	130%
Ortho Phosphate as P	2931141		<0.10	<0.10	NA	< 0.10	100%	70%	130%	108%	80%	120%	97%	70%	130%
Ammonia as N	2925331		4.59	4.56	0.7%	< 0.02	100%	70%	130%	100%	80%	120%	98%	70%	130%
Total Phosphorus	2925653		0.48	0.48	0.0%	< 0.02	100%	70%	130%	103%	80%	120%	96%	70%	130%
Total Organic Carbon	2926160	2926160	2.8	2.9	3.5%	< 0.5	97%	90%	110%	106%	90%	110%	104%	80%	120%
True Colour	2926160		NA	NA	0.0%	< 5	102%	90%	110%						
Turbidity	2926160	2926160	183	188	2.7%	< 0.5	100%	80%	120%						
Dissolved Calcium	2925584		76.7	79.2	3.2%	< 0.05	100%	70%	130%	98%	80%	120%	96%	70%	130%
Dissolved Magnesium	2925584		13.2	14.0	5.9%	< 0.05	102%	70%	130%	100%	80%	120%	99%	70%	130%
Dissolved Potassium	2925584		8.93	9.51	6.3%	< 0.50	102%	70%	130%	101%	80%	120%	101%	70%	130%
Dissolved Sodium	2925584		13.8	14.6	5.6%	< 0.05	100%	70%	130%	98%	80%	120%	97%	70%	130%
Dissolved Aluminum	2923442		0.020	0.021	4.9%	< 0.004	106%	70%	130%	109%	80%	120%	96%	70%	130%
Dissolved Antimony	2923442		<0.001	<0.001	NA	< 0.001	103%	70%	130%	104%	80%	120%	102%	70%	130%
Dissolved Arsenic	2923442		0.003	0.002	NA	< 0.001	93%	70%	130%	102%	80%	120%	108%	70%	130%
Dissolved Barium	2923442		0.544	0.569	4.5%	< 0.002	96%	70%	130%	101%	80%	120%	102%	70%	130%
Dissolved Beryllium	2923442		<0.0005	<0.0005	NA	< 0.0005	100%	70%	130%	98%	80%	120%	113%	70%	130%
Dissolved Boron	2923442		0.114	0.127	10.8%	< 0.010	100%	70%	130%	102%	80%	120%	109%	70%	130%
Dissolved Cadmium	2923442		<0.0001	<0.0001	NA	< 0.0001	102%	70%	130%	103%	80%	120%	104%	70%	130%
Dissolved Chromium	2923442		<0.002	<0.002	NA	< 0.002	99%	70%	130%	102%	80%	120%	101%	70%	130%
Dissolved Cobalt	2923442		<0.0005	<0.0005	NA	< 0.0005	105%	70%	130%	105%	80%	120%	100%	70%	130%
Dissolved Copper	2923442		<0.001	<0.001	NA	< 0.001	100%	70%	130%	103%	80%	120%	96%	70%	130%
Dissolved Iron	2923442		5.99	6.17	3.0%	< 0.010	107%	70%	130%	106%	80%	120%	99%	70%	130%
Dissolved Lead	2923442		<0.0005	<0.0005	NA	< 0.0005	99%	70%	130%	106%	80%	120%	89%	70%	130%
Dissolved Manganese	2923442		0.553	0.562	1.6%	< 0.002	108%	70%	130%	107%	80%	120%	101%	70%	130%
Dissolved Mercury	2925584		<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	101%	80%	120%	99%	70%	130%
Dissolved Molybdenum	2923442		<0.002	<0.002	NA	< 0.002	102%	70%	130%	106%	80%	120%	108%	70%	130%
Dissolved Nickel	2923442		<0.003	<0.003	NA	< 0.003	106%	70%	130%	104%	80%	120%	95%	70%	130%

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Quality Assurance

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 21T797201

PROJECT: Job No.2027 - Petersburg Sand

ATTENTION TO: Allan Rodie

SAMPLING SITE:

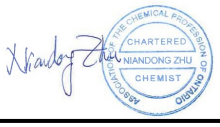
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Sep 14, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Selenium	2923442		0.003	0.004	NA	< 0.001	104%	70%	130%	99%	80%	120%	106%	70%	130%
Dissolved Silver	2923442		<0.0001	<0.0001	NA	< 0.0001	104%	70%	130%	105%	80%	120%	88%	70%	130%
Dissolved Strontium	2923442		0.771	0.804	4.2%	< 0.005	99%	70%	130%	102%	80%	120%	99%	70%	130%
Dissolved Thallium	2923442		<0.0003	<0.0003	NA	< 0.0003	101%	70%	130%	108%	80%	120%	95%	70%	130%
Dissolved Tin	2923442		<0.002	<0.002	NA	< 0.002	98%	70%	130%	95%	80%	120%	93%	70%	130%
Dissolved Titanium	2923442		0.012	0.014	15.4%	< 0.002	101%	70%	130%	105%	80%	120%	102%	70%	130%
Dissolved Tungsten	2923442		<0.010	<0.010	NA	< 0.010	86%	70%	130%	91%	80%	120%	94%	70%	130%
Dissolved Uranium	2923442		<0.0005	<0.0005	NA	< 0.0005	103%	70%	130%	110%	80%	120%	103%	70%	130%
Dissolved Vanadium	2923442		<0.002	<0.002	NA	< 0.002	110%	70%	130%	107%	80%	120%	109%	70%	130%
Dissolved Zinc	2923442		<0.005	<0.005	NA	< 0.005	102%	70%	130%	96%	80%	120%	91%	70%	130%
Dissolved Zirconium	2923442		<0.004	<0.004	NA	< 0.004	99%	70%	130%	101%	80%	120%	102%	70%	130%
(Water) TKN															
Total Kjeldahl Nitrogen	2920882		0.16	0.20	NA	< 0.10	101%	70%	130%	100%	80%	120%	98%	70%	130%

Comments: NA Signifies Not Applicable.
Duplicate NA: results are less than 5X the RDL and RPD will not be calculated.
Matrix spike: Spike level < native concentration. Matrix spike acceptance limits do not apply.

Certified By:



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Method Summary

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 21T797201

PROJECT: Job No.2027 - Petersburg Sand

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Saturation pH (Calculated)		SM 2320 B	CALCULATION
Langelier Index (Calculated)		SM 2330B	CALCULATION
Hardness (as CaCO3) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Bicarbonate (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Hydroxide (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Bromide	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH3 H	LACHAT FIA
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
Total Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
True Colour	INOR-93-6074	modified from SM 2120 B	LACHAT FIA
Turbidity	INOR-93-6044	modified from SM 2130 B	NEPHELOMETER
Dissolved Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Aluminum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Antimony	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Beryllium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cobalt	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 21T797201

PROJECT: Job No.2027 - Petersburg Sand

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Manganese	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Dissolved Molybdenum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Nickel	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Selenium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Silver	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Strontium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Thallium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tin	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Titanium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tungsten	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Uranium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Vanadium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zirconium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS

AGAT Laboratories

Turb

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Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 21T797201

Cooler Quantity: 1 med

Arrival Temperatures: 7.2 | 6.8 | 6.9

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: Free ICE

Report Information:

Company: HARDEN ENVIRONMENTAL SERVICES LTD.
Contact: Allan Rodie
Address: 4622 NASSAGAWEYA-PUSLINCH TOWNLINE
MOFFAT, ON L0P 1J0
Phone: (519) 826-0099 Fax: (519) 826-9099
Reports to be sent to:
1. Email: arodie@hardenv.com
2. Email: sdenhoed@hardenv.com

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☐ Regulation 153/04
Table ____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region ____ *Indicate One*
☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☑ Other
ODWS *Indicate One*

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply): ____

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: Job No. 2027 - Petersburg Sand
Site Location: Petersburg
Sampled By: Allan Rodie
AGAT Quote #: ____ PO: ____
Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☑ No

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company: HARDEN ENVIRONMENTAL SERVICES LTD.
Contact: Marianne Embro / Allan Rodie
Address:
Email: admin@hardenv.com | arodie@hardenv.com

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered Y/N	Metals; Hg; CrVI	O. Reg 153 Metals and Inorganics	O. Reg 153 153 Metals (excl. Hydrides)	O. Reg 153 Hydride Metals	O. Reg 153 153 Metals (incl. Hydrides)	O. Reg 153 ORPs: B-HWS, Cr, CN	O. Reg 153 Cr6+, EC, ROC, Hg	O. Reg 153 pH, SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: TP, NH4, TKN, NO3, NO2, NO3+NO2	Volatiles: VOC, BTEX, THM	PHCs F1 - F4	ABNs	PAHs	PCBs: Total, Aroclors	Organochlorine Pesticides	TCLP: M&I, VOCs, ABNs, B(a)P, PCBs	Sewer Use	WOA	TKN
BH1	9.2.21	1730	8	GW		Y																				✓	✓
BH3	9.2.21	1040	8	GW		Y																				✓	✓
BH4	9.2.21	1125	8	GW		Y																				✓	✓

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Allan Rodie	9.3.21	1225	NEAL G		
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

21 SEP 3 12:25pm

Page 1 of 1

N°:

AGAT Laboratories

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http://www.agatlabs.com

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.
4622 NASSAGAWEYA PUSLINCH TOWNLINE
MOFFAT, ON L0P 1J0
519-826-0099

ATTENTION TO: Allan Rodie

PROJECT: Snyders

AGAT WORK ORDER: 21T745271

WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer

DATE REPORTED: May 19, 2021

PAGES (INCLUDING COVER): 11

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

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Certificate of Analysis

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

(Water) TKN

DATE RECEIVED: 2021-05-11

DATE REPORTED: 2021-05-19

				SAMPLE DESCRIPTION:	BH1	BH4	BH3
				SAMPLE TYPE:	Water	Water	Water
				DATE SAMPLED:	2021-05-11 10:30	2021-05-11 10:30	2021-05-11 10:30
Parameter	Unit	G / S	RDL		2454574	2454587	2454588
Total Kjeldahl Nitrogen	mg/L		0.10		0.28	2.31	<0.10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis perfomed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

Water Quality Assessment (mg/L) Groundwater

DATE RECEIVED: 2021-05-11

DATE REPORTED: 2021-05-19

		SAMPLE DESCRIPTION:		BH1		BH4	BH3
		SAMPLE TYPE:		Water		Water	Water
		DATE SAMPLED:		2021-05-11 10:30		2021-05-11 10:30	2021-05-11 10:30
Parameter	Unit	G / S	RDL	2454574	RDL	2454587	2454588
Electrical Conductivity	µS/cm		2	658	2	547	586
pH	pH Units	6.5-8.5	NA	7.79	NA	7.83	7.85
Saturation pH (Calculated)				6.86		7.11	7.05
Langelier Index (Calculated)				0.935		0.716	0.796
Hardness (as CaCO3) (Calculated)	mg/L	80-100	0.5	**324**	0.5	**244**	**295**
Total Dissolved Solids	mg/L	500	20	380	20	352	376
Alkalinity (as CaCO3)	mg/L	30-500	5	312	5	228	217
Bicarbonate (as CaCO3)	mg/L		5	312	5	228	217
Carbonate (as CaCO3)	mg/L		5	<5	5	<5	<5
Hydroxide (as CaCO3)	mg/L		5	<5	5	<5	<5
Fluoride	mg/L		0.05	<0.05	0.05	<0.05	<0.05
Chloride	mg/L	250	0.20	18.6	0.10	22.2	7.45
Nitrate as N	mg/L		0.10	1.53	0.05	<0.05	4.16
Nitrite as N	mg/L		0.10	<0.10	0.05	<0.05	0.15
Bromide	mg/L		0.10	<0.10	0.05	<0.05	<0.05
Sulphate	mg/L	500	0.20	23.9	0.10	35.6	83.3
Ortho Phosphate as P	mg/L		0.20	<0.20	0.10	<0.10	<0.10
Ammonia as N	mg/L		0.02	0.13	0.02	1.13	<0.02
Total Phosphorus	mg/L		0.02	0.09	0.02	0.11	0.05
Total Organic Carbon	mg/L		0.5	4.1	0.5	16.7	7.4
True Colour	TCU	5	5	<5	5	**6**	<5
Turbidity	NTU	5	0.5	**140**	0.5	**107**	**7450**
Dissolved Calcium	mg/L		0.05	95.1	0.05	59.9	75.6
Dissolved Magnesium	mg/L		0.05	21.0	0.05	23.0	25.8
Dissolved Potassium	mg/L		0.50	1.78	0.50	1.58	1.24
Dissolved Sodium	mg/L		0.05	9.56	0.05	15.0	5.59
Dissolved Aluminum	mg/L		0.004	0.018	0.004	0.042	0.016
Dissolved Antimony	mg/L		0.001	<0.001	0.001	<0.001	<0.001
Dissolved Arsenic	mg/L		0.001	0.004	0.001	0.009	<0.001

Certified By: Iris Verástegui

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Certificate of Analysis

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

Water Quality Assessment (mg/L) Groundwater

DATE RECEIVED: 2021-05-11

DATE REPORTED: 2021-05-19

		SAMPLE DESCRIPTION:		BH1		BH4	BH3
		SAMPLE TYPE:		Water		Water	Water
		DATE SAMPLED:		2021-05-11 10:30		2021-05-11 10:30	2021-05-11 10:30
Parameter	Unit	G / S	RDL	2454574	RDL	2454587	2454588
Dissolved Barium	mg/L		0.002	0.155	0.002	0.087	0.109
Dissolved Beryllium	mg/L		0.0005	<0.0005	0.0005	<0.0005	<0.0005
Dissolved Boron	mg/L		0.010	0.032	0.010	0.024	0.014
Dissolved Cadmium	mg/L		0.0001	<0.0001	0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	0.003	0.002	<0.002	<0.002
Dissolved Cobalt	mg/L		0.0005	0.0015	0.0005	<0.0005	<0.0005
Dissolved Copper	mg/L		0.001	<0.001	0.001	<0.001	0.001
Dissolved Iron	mg/L		0.010	0.062	0.010	0.036	<0.010
Dissolved Lead	mg/L		0.0005	<0.0005	0.0005	<0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	0.165	0.002	0.116	0.084
Dissolved Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001	<0.0001
Dissolved Molybdenum	mg/L		0.002	0.003	0.002	0.002	<0.002
Dissolved Nickel	mg/L		0.003	0.005	0.003	0.006	<0.003
Dissolved Selenium	mg/L		0.001	<0.001	0.001	<0.001	<0.001
Dissolved Silver	mg/L		0.0001	<0.0001	0.0001	<0.0001	<0.0001
Dissolved Strontium	mg/L		0.005	0.677	0.005	0.537	0.198
Dissolved Thallium	mg/L		0.0003	<0.0003	0.0003	<0.0003	<0.0003
Dissolved Tin	mg/L		0.002	<0.002	0.002	<0.002	<0.002
Dissolved Titanium	mg/L		0.002	<0.002	0.002	0.003	<0.002
Dissolved Tungsten	mg/L		0.010	<0.010	0.010	<0.010	<0.010
Dissolved Uranium	mg/L		0.0005	0.0013	0.0005	<0.0005	0.0008
Dissolved Vanadium	mg/L		0.002	<0.002	0.002	<0.002	<0.002
Dissolved Zinc	mg/L		0.005	<0.005	0.005	<0.005	<0.005
Dissolved Zirconium	mg/L		0.004	<0.004	0.004	<0.004	<0.004
Lab Filtration mercury				Y		Y	Y
Lab Filtration Metals				Y		Y	Y

Certified By: Iris Verástegui

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Certificate of Analysis

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

Water Quality Assessment (mg/L) Groundwater

DATE RECEIVED: 2021-05-11 **DATE REPORTED: 2021-05-19**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards - Aesthetic Objectives and Operational Guidelines
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2454574-2454588 Dissolved Metals and Dissolved Mercury analysis completed on a lab filtered sample.
Dilution required, RDL has been increased accordingly.

Analysis perfomed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

AGAT Laboratories

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CANADA L4Z 1Y2
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Exceedance Summary

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
2454574	BH1	ON 169/03 AO&OG	Water Quality Assessment (mg/L) Groundwater	Hardness (as CaCO3) (Calculated)	mg/L	80-100	324
2454574	BH1	ON 169/03 AO&OG	Water Quality Assessment (mg/L) Groundwater	Turbidity	NTU	5	140
2454587	BH4	ON 169/03 AO&OG	Water Quality Assessment (mg/L) Groundwater	Hardness (as CaCO3) (Calculated)	mg/L	80-100	244
2454587	BH4	ON 169/03 AO&OG	Water Quality Assessment (mg/L) Groundwater	True Colour	TCU	5	6
2454587	BH4	ON 169/03 AO&OG	Water Quality Assessment (mg/L) Groundwater	Turbidity	NTU	5	107
2454588	BH3	ON 169/03 AO&OG	Water Quality Assessment (mg/L) Groundwater	Hardness (as CaCO3) (Calculated)	mg/L	80-100	295
2454588	BH3	ON 169/03 AO&OG	Water Quality Assessment (mg/L) Groundwater	Turbidity	NTU	5	7450

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Quality Assurance

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: May 19, 2021

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Water Quality Assessment (mg/L) Groundwater															
Electrical Conductivity	2451024		6790	6770	0.3%	< 2	105%	90%	110%						
pH	2451024		7.72	7.76	0.5%	NA	101%	90%	110%						
Total Dissolved Solids	2452580		20	24	NA	< 20	104%	80%	120%						
Alkalinity (as CaCO3)	2451024		268	273	1.8%	< 5	91%	80%	120%						
Bicarbonate (as CaCO3)	2451024		268	273	1.8%	< 5	NA								
Carbonate (as CaCO3)	2451024		<5	<5	NA	< 5	NA								
Hydroxide (as CaCO3)	2451024		<5	<5	NA	< 5	NA								
Fluoride	2456973		<0.05	<0.05	NA	< 0.05	103%	90%	110%	99%	90%	110%	99%	85%	115%
Chloride	2456973		58.9	58.6	0.5%	< 0.10	100%	70%	130%	106%	80%	120%	107%	70%	130%
Nitrate as N	2456973		<0.25	<0.25	NA	< 0.05	98%	70%	130%	101%	80%	120%	99%	70%	130%
Nitrite as N	2456973		<0.25	<0.25	NA	< 0.05	99%	70%	130%	95%	80%	120%	100%	70%	130%
Bromide	2456973		<0.25	<0.25	NA	< 0.05	107%	90%	110%	104%	90%	110%	98%	85%	115%
Sulphate	2456973		251	249	0.8%	< 0.10	100%	70%	130%	102%	80%	120%	NA	70%	130%
Ortho Phosphate as P	2456973		<0.50	<0.50	NA	< 0.10	107%	70%	130%	106%	80%	120%	110%	70%	130%
Ammonia as N	2453025		<0.02	<0.02	NA	< 0.02	106%	70%	130%	106%	80%	120%	102%	70%	130%
Total Phosphorus	2452992		<0.02	<0.02	NA	< 0.02	115%	70%	130%	100%	80%	120%	99%	70%	130%
Total Organic Carbon	2432668		5.4	5.4	0.0%	< 0.5	98%	90%	110%	97%	90%	110%	88%	80%	120%
True Colour	2466200		<5	<5	NA	< 5	99%	90%	110%						
Turbidity	2451382		0.8	0.8	NA	< 0.5	99%	80%	120%						
Dissolved Calcium	2445101		52.3	51.8	1.0%	< 0.05	96%	70%	130%	97%	80%	120%	95%	70%	130%
Dissolved Magnesium	2445101		19.5	19.2	1.6%	< 0.05	97%	70%	130%	98%	80%	120%	96%	70%	130%
Dissolved Potassium	2445101		2.79	2.74	1.8%	< 0.50	97%	70%	130%	97%	80%	120%	99%	70%	130%
Dissolved Sodium	2445101		6.40	6.37	0.5%	< 0.05	98%	70%	130%	98%	80%	120%	98%	70%	130%
Dissolved Aluminum	2453751		0.050	0.045	10.5%	< 0.004	98%	70%	130%	104%	80%	120%	107%	70%	130%
Dissolved Antimony	2453751		<0.001	<0.001	NA	< 0.001	106%	70%	130%	103%	80%	120%	99%	70%	130%
Dissolved Arsenic	2453751		<0.001	<0.001	NA	< 0.001	97%	70%	130%	106%	80%	120%	110%	70%	130%
Dissolved Barium	2453751		0.111	0.106	4.6%	< 0.002	98%	70%	130%	98%	80%	120%	102%	70%	130%
Dissolved Beryllium	2453751		<0.0005	<0.0005	NA	< 0.0005	103%	70%	130%	104%	80%	120%	107%	70%	130%
Dissolved Boron	2453751		0.011	0.011	NA	< 0.010	103%	70%	130%	104%	80%	120%	105%	70%	130%
Dissolved Cadmium	2453751		<0.0001	<0.0001	NA	< 0.0001	103%	70%	130%	104%	80%	120%	105%	70%	130%
Dissolved Chromium	2453751		<0.002	0.003	NA	< 0.002	95%	70%	130%	102%	80%	120%	98%	70%	130%
Dissolved Cobalt	2453751		<0.0005	<0.0005	NA	< 0.0005	97%	70%	130%	109%	80%	120%	101%	70%	130%
Dissolved Copper	2453751		0.002	0.002	NA	< 0.001	96%	70%	130%	103%	80%	120%	100%	70%	130%
Dissolved Iron	2453751		0.016	0.014	NA	< 0.010	100%	70%	130%	110%	80%	120%	102%	70%	130%
Dissolved Lead	2453751		<0.0005	<0.0005	NA	< 0.0005	101%	70%	130%	96%	80%	120%	96%	70%	130%
Dissolved Manganese	2453751		0.027	0.026	3.8%	< 0.002	97%	70%	130%	111%	80%	120%	101%	70%	130%
Dissolved Mercury	2451382		<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	100%	80%	120%	100%	70%	130%
Dissolved Molybdenum	2453751		<0.002	<0.002	NA	< 0.002	102%	70%	130%	107%	80%	120%	103%	70%	130%
Dissolved Nickel	2453751		<0.003	<0.003	NA	< 0.003	99%	70%	130%	110%	80%	120%	101%	70%	130%

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: May 19, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Selenium	2453751		<0.001	<0.001	NA	< 0.001	101%	70%	130%	105%	80%	120%	109%	70%	130%
Dissolved Silver	2453751		<0.0001	<0.0001	NA	< 0.0001	95%	70%	130%	106%	80%	120%	98%	70%	130%
Dissolved Strontium	2453751		0.149	0.142	4.8%	< 0.005	98%	70%	130%	107%	80%	120%	97%	70%	130%
Dissolved Thallium	2453751		<0.0003	<0.0003	NA	< 0.0003	102%	70%	130%	102%	80%	120%	101%	70%	130%
Dissolved Tin	2453751		<0.002	<0.002	NA	< 0.002	109%	70%	130%	100%	80%	120%	105%	70%	130%
Dissolved Titanium	2453751		0.003	0.006	NA	< 0.002	98%	70%	130%	106%	80%	120%	103%	70%	130%
Dissolved Tungsten	2453751		<0.010	<0.010	NA	< 0.010	95%	70%	130%	95%	80%	120%	96%	70%	130%
Dissolved Uranium	2453751		<0.0005	<0.0005	NA	< 0.0005	107%	70%	130%	105%	80%	120%	105%	70%	130%
Dissolved Vanadium	2453751		<0.002	<0.002	NA	< 0.002	96%	70%	130%	107%	80%	120%	101%	70%	130%
Dissolved Zinc	2453751		0.007	0.007	NA	< 0.005	97%	70%	130%	102%	80%	120%	99%	70%	130%
Dissolved Zirconium	2453751		<0.004	<0.004	NA	< 0.004	96%	70%	130%	98%	80%	120%	98%	70%	130%
(Water) TKN															
Total Kjeldahl Nitrogen	2458929		4.68	4.39	6.4%	< 0.10	100%	70%	130%	101%	80%	120%	96%	70%	130%

Comments: NA signifies Not Applicable.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By: Iris Verástegui

AGAT Laboratories

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FAX (905)712-5122
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Method Summary

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Saturation pH (Calculated)		SM 2320 B	CALCULATION
Langelier Index (Calculated)		SM 2330B	CALCULATION
Hardness (as CaCO3) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Bicarbonate (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Hydroxide (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Bromide	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH3 H	LACHAT FIA
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
Total Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
True Colour	INOR-93-6046	SM 2120 B	SPECTROPHOTOMETER
Turbidity	INOR-93-6044	modified from SM 2130 B	NEPHELOMETER
Dissolved Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Aluminum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Antimony	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Beryllium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cobalt	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS

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Method Summary

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 21T745271

PROJECT: Snyders

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Manganese	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Dissolved Molybdenum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Nickel	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Selenium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Silver	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Strontium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Thallium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tin	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Titanium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tungsten	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Uranium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Vanadium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zirconium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Lab Filtration mercury	SR-78-9001		FILTRATION
Lab Filtration Metals	SR-78-9001		FILTRATION

AGAT Laboratories

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Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Med Blue Turb

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 21T745271

Cooler Quantity:

Arrival Temperatures: 1 | 1 | 13.0
12.3 | 12.8 | 13.0

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: no ice

Report Information:

Company: Harden Environmental
Contact:
Address: Allan Rodie

Phone: Fax:

Reports to be sent to:
1. Email: arodie@hardenv.com
2. Email:

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table ___ *Indicate One*
☐Ind/Com
☐Res/Park
☐Agriculture

Soil Texture *(Check One)*
☐Coarse
☐Fine

☐ Excess Soils R406
Table ___ *Indicate One*

☐ Regulation 558

☐ CCME

☐ Sewer Use
☐Sanitary ☐Storm
___ *Region*

☐ Prov. Water Quality Objectives (PWQO)

☑ Other ODWS *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT (Most Analysis) ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: Snyders
Site Location:
Sampled By: AR
AGAT ID #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y/N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWS3	O. Reg 153: BTEX, F1-F4 PHCs Analyze F4G if required ☐ Yes ☐ No	O. Reg 153: PAHs	O. Reg 153: Total PCBs ☐ Aroclor	O. Reg 153: VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	WQ24	TKN						Potentially Hazardous or High Concentration (Y/N)
BH1	May 11/21	1030 AM PM		GW	Filter Metals in lab	N											✓	✓						
BH4	↓	1100 AM PM		↓	↓	N											✓	✓						
BH3	↓	1145 AM PM		↓	↓	N											✓	✓						
		AM PM																						
		AM PM																						
		AM PM																						
		AM PM																						
		AM PM																						
		AM PM																						
		AM PM																						
		AM PM																						

21 MAY 11 2:45 PM

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Allan Rodie AR	11 May 21		SIMRAN SG		
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page 1 of 1

N°: T 117979

Appendix E: Water Balance Calculations

Petersburg Sand and Gravel Water Balance Calculations

	Value	Units	
Precipitation	889	mm/year	
Evapotranspiration	489	mm/year	
Evapotranspiration Disturbed	244		
Total Extraction Area	24.2848	hectare	Infiltration Factor
Drainage Area D1	9.16	hectare	1
Drainage Area D2	15.12	hectare	1

		Pre Extraction Water Balance			
	Area	Precipitation	Evapotranspiration	Runoff	Infiltration
	(hectare)	(m^3/year)	(m^3/year)	(m^3/year)	(m^3/year)
Pre Development					
Drainage Area D1	9.16	81,444	44,794	-	36,650
Drainage Area D2	15.12	134,448	73,946	-	60,502
Pre Development Summary	24.28	215,892	118,741	-	97,151

Active Development

	Value	Units	
Evapotranspiration	489	mm/year	
Evapotranspiration Disturbed	244	mm/year	
Total Extraction Area	24.28	hectare	Infiltration Factor
Post PE1	22.52	hectare	1
Post PE2	1.77	hectare	1

	Area	Precipitation	Evapotranspiration or Evaporation	Runoff	Infiltration
Active Development	(hectare)	(m^3/year)	(m^3/year)	(m^3/year)	(m^3/year)
PE1	22.52	200,172	110,094	-	90,077
PE2	1.77	15,720	8,646	-	7,074
Disturbed Land Benefit	10.00		- 24,448		24,448
Active Development Summary	**24.28480**	**215,892**	**94,293**	**-**	**121,599**

Post Development

	Value	Units	
Evapotranspiration	488.95	mm/year	
Total Extraction Area	24.28	hectare	Infiltration Factor
Post PE1	22.52	hectare	1
Post PE2	1.77	hectare	1

	Area	Precipitation	Evapotranspiration or Evaporation	Runoff	Infiltration
Post Development	(hectare)	(m^3/year)	(m^3/year)	(m^3/year)	(m^3/year)
PE1	22.52	200,172	110,094	-	90,077
PE2	1.77	15,720	8,646	-	7,074
Post Development Summary	**24.28**	**215,892**	**118,741**	**-**	**97,151**

Summary Pre to Post Development

	Area	Precipitation	Evapotranspiration	Runoff	Infiltration
	(hectare)	(m^3/year)	(m^3/year)	(m^3/year)	(m^3/year)
Pre Development Summary	24.28	215,892	118,741	-	97,151
Post Development Summary	24.28	215,892	118,741	-	97,151
Difference	-	-	-	-	-

Appendix F: Spills Protocol and Well Complaint Protocol

RECOMMENDED PROCEDURES FOR THE PREVENTION AND MITIGATION OF CONTAMINANT SPILLS
2022

PETERSBURG SAND AND GRAVEL

Emergency Response Numbers:

Fire, Ambulance, Police	**911**
MECP Spills Action Centre	**1-800-268-6060**
Petersburg Sand and Gravel Office	**1-519-647-8000**
Region of Waterloo - Emergency	**911**
Region of Waterloo Service First Call Centre	**519-575-4400**
Township of Wilmot (General Contact)	**519-634-8444**

TABLE OF CONTENTS

ATTACHMENTS

1.0 Introduction

The majority of spills can be minimized through the adoption of good housekeeping policies. Cleanliness, readiness to respond to problems and correct waste management techniques will go a long way to creating a better working environment and prevention of spills. The following list identifies the more common contaminants which could be present on a regular basis on the site.

Vehicular Operating Fuels	Gasoline, diesel fuel
Lubricants	Motor oil, grease, lubricants, coolants, brake fluids, transmission fluids and other liquids used in the normal operation of a vehicle.
Miscellaneous Liquids	degreasing agents, solvents

The site foreman and all employees on site shall be familiar with procedures as set out in the attached document - “Plan of Action - Contaminant Spills".

2.0 Objective

The objective of this brief is to describe the procedures which will be undertaken to prevent and ameliorate spills of contaminant materials and to minimize the adverse effects if a spill does occur. A spill can be defined as a discharge of a pollutant:

a) into the natural environment,
b) from or out of a structure, vehicle or any other container and
c) which will have an adverse impact on the natural environment.

3.0 Prevention

The majority of products listed in the Introduction are used in the operation and maintenance of vehicles. One of the various methods, as outlined in this section will be used by the site operators to service vehicles and machinery, depending on the level of activity at the site or on the stage at which the pit is operating.

3.1 Vehicular Maintenance

3.1.1 Outdoor Maintenance

Mobile vehicles will be driven off-site for maintenance.

3.2 Immobile Equipment

Crushers, screens, conveyers, generators etc. require regular maintenance. This often entails lubrication, cleaning and/or replacement of oils. All fluids removed from this machinery will be collected and removed from the site. All spillage of fuels, liquids, lubricants etc. will be cleaned up immediately. The use of degreasers on immobile machinery will be kept to a minimum.

4.0 Mitigation

Due to unforeseeable circumstances and/or catastrophic events, spills of larger quantities of materials may occur. In the event of this occurring the following procedure will be followed:

4.1 The following information regarding the spill will be reported immediately to the site foreman:

- Type of substance spilled
- Quantity of substance spilled

- Location of spill
- Time that spill occurred

4.2 If the spill is over 80 litres of oils or 40 litres of fuel, degreasing agents, coolants or solvents, the MECP and the Region of Waterloo will be informed immediately. The current telephone number for the MECP Spills Action Centre is 1-800-268-6060 (24 hrs) and the Region of Waterloo is 911 or 519-575-4400. Attached is the Region of Waterloo Spills Response Fact Sheet.

4.3 Regardless of the quantity of the spill, mitigative measures will commence immediately in accordance with the attached plan of action. Initial measures will involve excavation of the contaminated soil. The soil removed from the spill area will be stored onsite in a manner acceptable to the MECP until the MECP has had an opportunity to assess the situation. If required by the MECP, the site operator will remove the contaminated material from the site by an approved waste hauler to an approved waste receiver.

4.4 If it is reasonable to suspect that the contamination will ultimately reach the groundwater the following procedures will be followed.

4.4.1 The excavation will be extended to the water table and a pump, suitable for the type of contamination, will be installed and operated to collect the contaminated groundwater. The collected groundwater will be stored, treated and discharged or removed from the site as recommended by the MECP.

4.4.2 Where the thickness of soil above the water table makes it impossible to excavate to the water table, a withdrawal well will be drilled and a pumping system installed and operated to collect the contaminated ground water. The collected ground water will be stored on site, treated and discharged or removed from the site.

4.5 If required, additional ground water monitors will be installed to verify that the

contamination has been mitigated.

4.6 If there is a potential for domestic wells being impacted by the spill, the users of those wells will be notified.

5.0 Employee Training

The site employees are required to have the following training.

5.1 All employees shall be familiar with "Recommended Procedures for the Prevention and Mitigation of Contaminant Spills" cleanup, the associated plan of action report form, any and all materials and equipment that would be used and their location in the event of a contaminant spill.

5.2 Employees shall receive training in respect to the use of materials and equipment required in a contaminant spill cleanup.

6.0 Reporting Requirements

A copy of each written contaminant spill report will be stored on-site for future reference and will be made available to the MECP and/or the Region of Waterloo upon request.

PETERSBURG SAND AND GRAVEL

PLAN OF ACTION
CONTAMINANT SPILLS

---

1. Contact the foreman.

2. Appraise the situation and take immediate action to stop further spillage.
   a) Stop the source.
   b) Confine or contain the spill.
   c) Appropriate service vehicles in the area to proceed immediately to the spill site when advised that a spill has occurred.
   d) Use kit materials to start removing spill product.
   Kit material to be located in scale house or maintenance building.

   Spill Kit contains: 1 - 27 litre (7 gallon) polyethylene pail
   1- Gasket seal lid,
   6- 'Eliminator ' E-2 socks and
   1 - Polyethylene disposal bag.

   e) Use 45 gallon containers to contain smaller spills. Put any absorbed oils into containers for disposal

3. The dispatcher/scale operator/foreman is to confirm that the Ministry of the Environment Conservation and Parks and the Region of Waterloo has been contacted, where necessary. The phone numbers are 1-800-268-6060 (MECP) and the Region of Waterloo is 911 or 519-575-4400.

4. The spill site supervisor is to contact the Fire and Police departments, where deemed necessary.

5. The site supervisor and person finding the spill will make out a full written report immediately after the spill is taken care of. The following shall be documented in the report:

a) location in pit (shown on reduced site plan photocopy)
b) time of spill
c) type of spill
d) estimated quantity
e) cause of spill
f) property damage
g) response time and number of people involved
h) clean up measures taken
i) assessment of area affected after clean up
j) an assessment of how spill could have been prevented
k) a diagram of the spill area
l) signature of site supervisor and personnel involved in cleanup

PETERSBURG SAND AND GRAVEL

CONTAMINANT SPILL

CLEAN UP REPORT FORM

Location: _____

_____

_____

Time of Spill: _____

_____

_____

Type of Spill: _____

_____

_____

Estimated Quantity of Spill: _____

_____

_____

Cause of Spill: _____

_____

_____

Property Damage:

Response Times and Names of People involved in Cleanup:

Clean up measures Taken:

Assessment of area affected after clean up:

How could this spill have been prevented?

Diagrams:

Signature of Site Supervisor and personnel involved in clean-up:

Petersburg Sand and Gravel
Water Well Complaint Protocol
Snyder's Road Pit

Petersburg Sand and Gravel has committed to addressing any water well issues arising as a result of aggregate extraction activities. If Petersburg Sand and Gravel receives of a complaint regarding any such issues, the following protocol will be followed.

Complaints about water well issues will be received any time at xxx xxx xxxx or by email messages sent to xxxxxxxxxxxxxx@xxxxxx. Updated contact information may be provided to local landowners prior to the start of construction.

In the event Petersburg Sand and Gravel receives a complaint regarding an adverse impact on water supply or quality which, in the opinion of Petersburg Sand and Gravel and its consultants, may reasonably be attributed to aggregate extractive activities, a supply of bottled water for drinking/cooking will be delivered to the complainant within 12 hours of the complaint and, as necessary, an alternative water supply will be delivered within 24 hours of the complaint being received. The same commitment is made for industrial and agricultural operations and includes, as necessary, sufficient water supply for relevant farm and industrial requirements.

Within 48 hours, Petersburg Sand and Gravel will initiate a hydrogeological investigation conducted by a qualified hydrogeologist or engineer to determine whether the water issue is attributable to aggregate extraction activities. The investigation may include but not be limited to the following actions;

- Confirmation of water levels in on-site groundwater monitoring wells
- Review of historical trends in groundwater levels and groundwater quality obtained in on-site groundwater monitoring wells, and surrounding domestic wells.
- Review of historical measured precipitation rates
- Scheduling an interview with resident regarding well complaint
- Investigation of subject well including flow testing, water level measurements and water quality testing if necessary
- Review of construction activities in the vicinity of the subject well
- Written report summarizing the findings.

In the event that activities related to the aggregate extractive activities are determined to be the cause of the complaint, Petersburg Sand and Gravel will undertake appropriate mitigation measures such as;

- Provision of the alternate water supply until water clarity/quality or water level issues abate
- Lowering the level of the pump within the resident's well
- Deepening the resident's well
- Replacing the resident's well
- Treating the resident's well water

Appendix G Qualifications

Stan Denhoed, P.Eng., M.Sc.

Senior Hydrogeologist

Education:

Institute for Hydraulic Engineering, Delft, The Netherlands, 1994
Master of Science in Hydrological Engineering Degree

University of Waterloo, Waterloo, Ontario, 1986
Bachelor of Applied Science Degree, Geological Engineering

Professional Experience

Aggregate Licensing, Letters of Opinion and Level I/II Hydrogeological Reports

Environmental investigations to ascertain potential impacts from dewatering or extractive activities in bedrock and sand and gravel. Compliance monitoring of active quarries and pits. Development of detailed water balances for extractive operation. Groundwater flow studies related to extraction and dewatering. I have worked in the following geological environments in regards to pits and quarries; Aberfoyle Outwash Deposit, Paris Moraine, Galt Moraine, Oro Hills, Caledon Outwash, Amabel Formation, Guelph Formation, Eramosa Formation, Gull River Formation, Bobcaygeon Formation, Verulum Formation, Oak Ridges Moraine, Precambrian Shield, Bois Blanc Formation, Simcoe Uplands.

Surface Water / Groundwater Interactions
Evaluation of changing groundwater levels on wetlands and fisheries. Working with both the Ministry of Natural Resources and the Federal Department of Fisheries and Oceans on projects related to man-induced groundwater level changes and their real and potential impacts on cold water fisheries. Investigation of groundwater inflow component to wetlands to evaluate potential impacts of urbanization in recharge areas.

Ontario Municipal Board Experience

Representation of clients' interest at six OMB/LPAT hearings (Oro Hills, Penetanguishene, Sturgeon Falls, Uxbridge, Aikensville, Hidden Quarry, Erin Pit) related to gravel pit and quarry applications. Three OMB mediated hearings in relation to septic system impacts (Goderich), quarry application (Owen Sound) and large water taking application (Artemesia).

Source Water Protection/Groundwater Management Studies

Senior hydrogeologist for five-Township groundwater protection study (Artemesia, Melancthon, Osprey, Euphrasia and Town of Blue Mountains) including preparation of recharge/discharge maps, aquifer susceptibility maps, groundwater flow maps and geological maps. Senior hydrogeologist/Project Manager for groundwater management studies for Marathon, Blind River, Burk's Falls, St. Joseph's Island and Gogama (2002-2005). GUDI Study for Val Rita Harty (2018).

Peer reviewer of Tier One and Tier Two Source Water Protection Studies for the Ausable-Bayfield Coalition and the Maitland Valley Conservation Area. Peer reviewer of the Vulnerability Assessment reports for the Trent Conservation Authority and Upper Thames Regional Conservation Authority.

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Email sdenhoed@hardenv.com

Stan Denhoed, P.Eng., M.Sc.

Senior Hydrogeologist

Supervision of Well Drilling and Water Sampling

Supervision of aquifer testing for water supply and for cone of influence of pumping wells or dewatering systems. Supervision of drilling contractors for the installation of pumping wells. Extensive experience with the evaluation of groundwater movement through fractured rock and the analysis of pumping test data related to confined and unconfined aquifers. Extensive experience in the sampling of well water and evaluation of water quality results.

Document Review/Peer Review

Review of mining applications, subdivisions, golf courses and septic system impacts on behalf of the Township of Puslinch, Grand River Conservation Authority and the County of Wellington. Evaluation of applications to gauge compliance with Ministry of the Environment policies and environmental guidelines developed by the Township and the County. Peer reviewer for the 2002 GUDI studies for nineteen communities in Ontario.

Groundwater and Surface Water Contaminant Experience

2011 Phase II Environmental Site Assessment for former wrecking yard in Hamilton, Ontario. Test pit soil samples obtained and tested for inorganic and organic contamination. Estimates of contaminated soils were prepared.

2009 Hydrocarbon contamination of former Township works yard in Puslinch, Ontario. Excavations were made and samples were obtained to determine potential for soil and groundwater contamination.

Evaluation of water quality results from the Marathon Landfill and preparation of annual monitoring reports from 2008 to 2010.

2007 Toluene contamination of municipal drinking water supply well in Marathon, Ontario. Responsible for identifying source and removal of source of toluene.

2007 Sampling of 120 private wells in Coleman Township investigating the presence of arsenic in drinking water. Results of sampling was compared to locations of mine tailings and historical mining activity.

Groundwater, surface water and soil sampling in and near Puslinch Lake as related to dredging operation.

Employment History

1993- Present	Harden Environmental Services Ltd., Moffat, Ontario *President/Senior Hydrogeologist*
1991- 1992	Keewatin-Aski Ltd., Concord, Ontario *Manager of Hydrogeological Projects*
1987- 1990	M.M. Dillon Ltd., Toronto, Ontario *Project Hydrogeologist*
1986- 1987	Environment Canada, Burlington, Ontario *Research Hydrogeologist*

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Stan Denhoed, P.Eng., M.Sc.
Senior Hydrogeologist

Associations, Licenses and Committee Participation

Professional Engineers of Ontario

Licensed Water Well Contractor/Technician in the Province of Ontario

Publications

Denhoed, S.E., 1994, *The Role of Sorption in the Accumulation of Arsenic by Peat in the Western Netherlands*, M.Sc. Thesis, Institute for Hydraulic Engineering, Delft, The Netherlands

Denhoed, S.E., Kell, R. and G. Parker.,1990, *Predictive Monitoring of Groundwater Quality at a Municipal Landfill Site*, Proceedings of Canadian Society for Civil Engineers, Annual Conference, Hamilton, Ontario, May 1990

Priddel, M., Jackson, R.E., Novakowski, K.S. and Denhoed, S.E., 1986, *Migration and Fate of Aldicarb in the sandstone Aquifer of Prince Edward Island*, Groundwater in Canada, Special Issue.

Harman, J., McLellan, J. Rudolph, D., Heagle, D, Piller, C. and S. Denhoed, 2001, *A proposed Framework for Managing the Impacts of Agriculture on Groundwater: A Report Prepared For the Sierra/Alert Coalition for Submission in Part 2 of the Walkerton Inquiry*.

Denhoed, S., Warkentin, A., Sarvas, P., 2007, Project Unit 06-031, *Investigation into the Relationship between Groundwater Quality and Geology in Coleman Township, North Eastern Ontario*, Summary of Field Work and Other Activities, Ontario Geological Survey, Open File Report 6213, p26-1 to 26-10.

Presentations

Source Water Protection Conference: Cornwall, Ontario, 2006: *Surface Water / Groundwater Interactions: Mill Creek Experience*

Source Water Protection Committee: Trent Coalition, July 2009: *Groundwater Modelling*

Ontario Research Fund April 2011: Sustainable Bedrock Water Supplies for Ontario Communities: *Compromised Aquitards – Unwelcome Transport Pathways*

Ontario Sand, Stone and Gravel Association, 2014, Impacts of Below-Water-Table Extraction in Unconsolidated Materials

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