BURNSIDE

Addendum to Long Term Water Supply to Clearview, Schedule B Class EA

Community of Stayner
Township of Clearview

APPENDIX C

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Technical Documents

[The Difference is our People]

Appendix C1

Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Water Supply Exploration Addendum (Golder Associates, December 2018)

GOLDER

REPORT

Township of Clearview
Stayner Long Term Water Supply
Schedule B Municipal Class EA

Water Supply Exploration Addendum

Submitted to:

Mr. Mike Rawn, C.E.T.

Township of Clearview
217 Gideon Street
Stayner, ON
L0M 1S0

Submitted by:

Golder

121 Commerce Park Drive, Unit L
Barrie, Ontario, L4N 8X1 Canada
705 722 4492

1415404

December 21, 2018

Distribution List

E-copy - Township of Stayner.

E-copy - Golder Associates Ltd.

Table of Contents

TABLES (IN TEXT)

TABLES (APPENDED)

FIGURES

APPENDICES

Appendix B: Klondike Park Road Site

Appendix C: Water Quality Analyses

Appendix D: Water Well Records

Appendix E: Phase 1 Environmental Site Assessment

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the Township of Clearview (Clearview) to carry out a water supply exploration program to find additional future groundwater sources for the community of Stayner. The primary focus of this study is the water well drilling and aquifer testing completed at 1585 Klondike Park Road, Wasaga Beach, approximately 9 kilometres from Stayner (the Site – Figure 1). This current work follows a similar previous investigation that was focussed on lands closer to Stayner (Golder, 2006).

A Class EA was prepared for Clearview by Burnside Associates (2008) that concluded, amongst several alternatives, that the future water supply for the ultimate build-out of Stayner should come the Collingwood New Tecumseth pipeline. The EA conclusion that adequate local groundwater supplies were not available was based on a drilling program relatively close to Stayner (Golder, 2006). There were other sites considered to have water supply potential, including the general area of Klondike Park Road, however site access and other issues resulted in the exploratory drilling of these areas being postponed until 2014, upon which the current work was initiated. The current water supply investigation program began in 2014 and General Manager of Environmental Services, Mike Rawn, persevered to gain access to the properties for used for exploratory drilling.

1.1 Background

Currently, the population of Stayner is approximately 4,029 (Statistics Canada, 2016) within an area of 214 hectares (ha). Burnside estimated the population increase of 24,800 beyond the year 2034 based on an additional settlement area of 496 ha with a population density of 20 persons per hectare (Burnside, 2008). The ultimate build-out of Stayner is estimated by Burnside (2008) to be approximately 11,000 dwellings and a population of approximately 28,200.

The current water supply exploration program coincided with, and benefitted from, the Simcoe County Stratigraphic investigation being conducted by Dr. Riley Mulligan of the Ontario Geological Survey (OGS) (Mulligan, 2016; 2017). The OGS investigation was focussed on collecting samples of the full stratigraphic sequence, from the surface to the bedrock and three of their boreholes are germane to this investigation (see Section 4.2). This information was particularly valuable as most well records in the Stayner and Wasaga Beach areas terminate at the first or second aquifer whereas the most productive aquifers in Simcoe County are typically the deeply buried sand and gravel units.

The normal tools that hydrogeologists must assess the geology and hydrogeology are Ministry of Environment, Conservation, and Parks (MECP) water well records and as indicated above these records most often stop at the first or second aquifer. Hydrogeologists and drillers typically know the most productive aquifers in Simcoe County are the deeply buried sand and gravel aquifers, however these aquifers are the least represented in the water well database and the deep drilling of the OGS proved valuable in this investigation.

The MECP water well database includes the drilling contractor’s descriptions of materials intersected when drilling rural, domestic wells. Private wells are generally much shallower than municipal wells and are drilled into the first aquifer that will provide an adequate supply for the intended purpose. An adequate water supply for domestic use is quite small and is most often met from Aquifer A1 or Aquifer A2, while most municipal water supplies come from Aquifers A3 and A4. Golder (2004) is the first reported assessment of all aquifers in Simcoe County and provides a description and nomenclature for regional aquifers.

1.2 Water Demand

Burnside estimated a future average day water demand (ADD) of 14,136 m^3/day (or 164 L/sec) and future maximum day water demand (MDD) of 27,057 m^3/day (or 313 L/sec) for the ultimate build-out of Stayner. To meet the ultimate MDD for Stayner wells with a total Firm Capacity, or total well yield with the largest well off-line, 313 L/sec would be required. There is currently a water supply in Stayner of 76 L/sec and the resultant shortfall in MDD is approximately 237 L/sec.

2.0 INVESTIGATION PROCEDURES

2.1 Background Data Analysis

The initial assessment of the area was prepared using available information in previously published reports (see References) and in the MECP water well database (Table 1). The background data and information derived from these data such as hydrogeological cross sections, geological maps, and groundwater flow maps are presented in the Figures section at the end of this report.

2.2 Klondike Park Road Site

2.2.1 Drilling

Appendix B contains information relating to the construction of the construction and testing of a test well at 1585 Klondike Park Road. The property located at 1585 Klondike Park Road was put up for sale in 2018 and Clearview entered into an Authorization and Agreement with the owner to conduct test drilling on the site. Test drilling commenced in June 2018 with the drilling of two boreholes, sampling of aquifer materials, and installation of standpipe piezometers in the boreholes. The logs for these boreholes, OW1-18 and OW2-18, hereafter referred to as OW1, OW2, are shown in Figures B-1 and B-2. In July drilling of the pilot hole for TW3-18, hereafter referred to as TW3, was completed and aquifer samples were collected (Figure B-3). Drilling of a shallow monitoring well OW4-18, hereafter referred to as OW4, was also completed in July (Figure B-4).

2.2.2 Laboratory Testing

Grain size analyses were conducted on aquifer samples from OW1 and OW2 (Figures B-5 and B-6) with the aquifer being the coarsest at OW1. To take advantage of the coarse aquifer identified during previous observation well drilling the pilot hole for TW3 was drilled adjacent to OW1 and gradations were completed on aquifer materials (Figure B-7).

2.2.1 Well Construction

Based on the soil gradations Golder prepared a design for a 203 mm diameter well that included 7.9 m of 50-slot telescoping screen. The nominal 203 mm diameter screen, 203 mm diameter well casing with a wall thickness of 0.635 mm, #2 well gravel, and grout were assembled, and the well was constructed in late September.

2.2.2 PTTW Approval

A Category 2 permit to take water (PTTW) was obtained from the Ministry of the Environment, Conservation, and Parks. The PTTW was required by the MECP to be in place prior to construction and development of the well. PTTW No: 0123-B3NHDB is reprinted in Appendix B.

2.2.3 Aquifer Testing

Stepped rate and constant rate pumping tests were completed during the third week of October 2018. Monitoring of TW3 and three other monitoring wells constructed specifically for testing was conduced using pressure transducer data loggers and barometric correction (Figures B-8 to B-12). Sixteen additional monitoring locations that included both private water wells and dedicated monitoring wells were also monitored. Some of these data was made available through the courtesy of Peace Naturals who operate a groundwater monitoring network around their facility at 4491 Concession 12 (Sunnidale). All monitoring locations that experienced drawdown during the test have been analysed and hydrographs of these data are contained in Figures B-13 to B-19.

Semi-log plots and drawdown vs distance hydrographs were prepared from the groundwater monitoring data. These hydrographs are shown in Figures B-20 and B-21.

2.2.4 Water Quality Testing

Water quality samples were collected from the wells at 1585 Klondike Park Road and submitted for analysis to Caduceon Environmental Laboratories in Barrie. OW2 was sampled in June as a check on the water quality before drilling a full scale well (Table C-1). During the pumping test of TW3 additional water samples were collected after pumping for 24 hours, 44 hours, and 70 hours and analysed (Tables C-2, C-3, and C-4).

2.3 Other Sites

Boreholes drilled by the OGS at two sites near Stayner, they were: Lot 13 Concession 12 (Sunnidale) (Figure 1) and Lot 15, Concession 2 (Nottawasaga) (Figure A-1) (Mulligan, 2016). These boreholes assisted Golder in the preliminary selection of sites for further exploratory drilling. The presence of a closed Simcoe County landfill at Lot 13, Concession 12 precluded further work in this area.

Appendix A contains the exploratory boreholes drilled by the OGS and follow up boreholes drilled by Clearview that were not followed up with test well construction. An OGS borehole (CS-16-01) was drilled adjacent to Concession 12 Sunnidale at the location shown on Figure 1 and a second borehole (CS-16-06) was drilled on SR 15/16 Sunnidale at the location shown on Figure A-1.

Appendix A contains borehole information from the two sites noted above:

- OGS borehole CS-16-01 was drilled on Lot 13 Concession 12 (former Sunnidale) (Figure A-2);
- OGS borehole CS-16-6 was drilled on Lot 15, Concession 2 (Sunnidale) (Figure A-3);
- Borehole 17-1 was drilled on Lot 15, Concession 3 (Sunnidale) (Figure A-4), and
- Borehole 18-1 was drilled on Lot 16, Concession 2 (Sunnidale) (Figure A-5).

3.0 PHYSICAL CONDITIONS

The primary test well development site, 1585 Klondike Park Road, is located at the corner of Concession 12 and Klondike Park Road (Figure 1). The property has an area of approximately 38 ha and the relationship of the property to neighbours and drainage features such as the Nottawasaga River and Georgian Bay is shown on Figures 1 and 2.

3.1 Physiography, Topography and Drainage

The Site is in the Simcoe Lowlands physiographic region as defined by Chapman and Putnam (1984). The major drainage feature in the area is the Nottawasaga River Valley and the River itself is located 1.45 km north of test well TW3 (Figures 1 and 2). The Nottawasaga River drains an area from the Niagara Escarpment to the Oak Ridges Moraine to the Oro uplands and discharges to the Georgian Bay approximately 4.5 km north of the Site. There is a small drainage feature crossing the northeastern corner of the site that has been constructed to enhance drainage of farmland and has a catchment of approximately 600 ha.

The ground surface at the Site ranges from a high of approximately 196 metres above sea level (masl) adjacent to Concession 12 to a low of 180 masl at the northern side of the Site. Georgian Bay has an elevation of approximately 176 masl.

The Site relief slopes from the south toward the north and has a glacial Lake Nipissing shoreline bluff crossing the land from the east to the west. TW3 is located just south of a bluff and the slope above the bluff is 0.035 m/m while the lands north of the bluff (or formerly below the level of Lake Nipissing) have a slope of 0.006 m/m.

3.2 Hydrogeological Conditions

The surficial materials at the site are silty to sandy Newmarket till overlain by older alluvium of the Nottawasaga River and nearshore lacustrine deposits of glacial Lake Nippising (Figures 3 and 4). The lands surrounding the site to the south are predominantly a drumlinized till plane with remnants of lake Algonquin deep water lacustrine silt and clay in places. To the north of the site the surficial materials are younger than to the south and consist of eolian dunes and nearshore lacustrine sand with minor amounts of silt and clay (Figure 3 and 4).

The Ministry of Environment and Climate Change (MOECC) digital water well database (Table 1) and digital topographic maps have been used to prepare a location maps, groundwater flow map (Figure 5). The potentiometric surface in the confined aquifer systems at the Site indicates groundwater flow toward Wasaga Beach and Nottawasaga Bay (Figure 5). The hydraulic gradient ranges from 0.0037 to 0.0039 in the central part of the Figure. Gradients are steeper on the west side of Wasaga Beach where aquifer thinning may influence the behaviour of the potentiometric surface.

Hydrogeological cross-sections have been prepared to assist in understanding the subsurface stratigraphy (Figures 6 through 8). The aquifers have been classified into four regional aquifers referred to as Aquifers A1 through A4 (Golder, 2004). The aquifer systems in Clearview, Wasaga Beach, and Springwater shown on these cross sections include regional units A1 through A3. Most of the data on these cross sections is from the water well records of shallow water supply wells. The stratigraphy of Aquifers A3/A4 is defined by wells at 5 locations and are considered to be high quality data because of the geoscientist oversight.

The upper unconfined aquifer, Aquifer A1, is present throughout the area and attains a thickness of approximately 25 m southeast of the Klondike Park Road site (Figures 6 and 7), whereas to the west of Freethy Road Aquifer A1 is largely missing. The Quaternary geology map (Figure 3) provides insight into the absence of Aquifer A1 with the absence of glaciolacustrine (Unit 10) and lacustrine (Unit 12) deposits south and west of Freethy road. Aquifer A1 in this area can be inferred to be present within the aforementioned lacustrine and glaciolacustrine sand deposits.

Aquifer A2 is present throughout the area and according to Mulligan (2017) likely represents sand and gravel that was deposited prior or during the advance of the Wisconsinan Glaciers and were subsequently preserved or eroded partially or wholly during the most recent glaciation that ended approximately 15,00 years ago in this area. Between Aquifer A1 and A2 there is a confining layer composed of silt and clay that may represent deep water lacustrine deposits. This confining layer provides protection from direct recharge of surface water. The confining layer above Aquifer A2 is interpreted to be continuous along Concession 12, Sunnidale (Figure 6). This confining layer is also present in the north to south cross section (Figure 7).

As a result of drilling programs by the Town of Wasaga Beach, the Clearview, the Ontario Geological Survey, and commercial water support an interpretation of Aquifer A3 as an expansive, regional aquifer within the lower Nottawasaga River Valley. Throughout much of the Nottawasaga River watershed large thicknesses of highly productive aquifer have been identified which evidently have significant groundwater flow from the margins of the Nottawasaga River Valley toward the lower elevations in the centre of the valley. The aquifers of Hillsdale, Midhurst, Barrie, Essa, New Tecumseth, Base Borden, and Creemore all flow into the Nottawasaga River valley and discharge of this groundwater to the surface is constrained by significant thicknesses of Lake Algonquin silt and clay, as well as Thorncliffe fine grained sediments.

The research conducted by the OGS has indicated the age of the aquifer materials as being the Thorncliffe Formation equivalents from the early Wisconsinan. These sand and gravel deposits are interpreted to be a subaquatic fan deposited in a lacustrine environment prior to the last glaciation that covered this area (Mulligan, 2017). Using this geological interpretation, the hydrostratigraphic units, Aquifers A3/A4, would be the lower Thorncliffe, while Aquifer A2 would represent the upper Thorncliffe Formation equivalents.

Aquifer A3 has been recognized in Wasaga Beach as having very high transmissivities (T) (1,400 m^2/day) and testing at TW3 indicates a similarly high transmissivity (1,900 m^2/day). The high T zone is expected to extend to the east, where the aquifer thickens, however a rising bedrock surface to the west will limit the westward expression of Aquifer A3 (Figure 6).

3.3 Existing Water Supplies

There are currently 32 private water supply wells within 1,000 m of TW3. All the wells drilled in this area yield greater than 13 L/min, which is considered to be a minimally adequate water supply for single family homes or livestock use. One well is a 914 mm diameter bored well that is constructed in Aquifer A1 (WWR 5722846) and the rest are steel cased drilled wells with casing diameters from 100 to 152 mm in diameter mostly constructed in Aquifer A2.

The yield of the wells ranges from 9 to 245 L/min. All wells except one are recorded to have an adequate to greater than adequate water supply for single family homes. One well (WWR 5715737) was drilled in 1978 and plots 485 m from TW3 and had with a recorded pumping rate of 9 L/min. This well is located on the same property as WWR A098224, which was drilled in 2012 and is used as the main source of domestic water supply for this property.

The depth of wells ranges from 13.4 to 40.2 m deep, with 32% of the wells shallower than 30 m deep and 68% of wells greater than 30 m deep. All the wells deeper than 20 m deep (93%) are interpreted to be in Aquifer A2, while the shallow wells are interpreted to be constructed in Aquifer A1. While Aquifer A3 and Aquifer A2 are hydraulically connected, none of the private water supply wells are constructed in Aquifer A3. Two wells that service the Peace Naturals green houses are constructed in Aquifer A3.

3.3.1 Pre-Test Private Well Survey

Prior to conducting well development and test pumping a review of private wells was completed and determined that there were no wells constructed in the Aquifer A3, however given the gradational nature of Aquifer A3 and A2 at the drilling site it was determined that it was likely that there would be drawdown in Aquifer A2 wells. The water well records positively identified and linked with actual wells are shown in Table 1. The individual records of the conversations with homeowners are not presented thereby respecting their privacy.

Following development of TW3 a logger in one of the private wells was downloaded and it was determined that the connection between Aquifer A2 and A3 was possible and only a small amount of drawdown, if any, was likely. It was determined based on these test data that there was adequate available drawdown in the private wells and no contingency measures, other than notification and contact numbers, was required to safeguard the private water supplies.

The only municipal water supply wells in the area supply Wasaga Beach. These wells are constructed in Aquifer A3 approximately 4 and 7 km to the north of the Site. The South Georgian Bay-Lake Simcoe Source Protection Committee, (2011) mapping shows the capture zones for these wells not extending into Clearview Township.

4.0 ASSESSMENT ALTERNATIVES

4.1 Aquifer Selection

Municipal wells in Simcoe County are typically constructed in Aquifers A3 or A4 on account of their high-yield and protective confining layers. In Wasaga Beach two well fields each with a capacity of 180 L/sec are constructed in the Aquifer A3/A4 at a depth of approximately 60 m. Shallower aquifers generally are not thick enough nor coarse enough to yield municipal grade wells. The test drilling conducted during this investigation has confirmed this.

4.2 Site Selection

Three locations were subjected to investigative drilling as part of the evaluation of Aquifer A3 during this project. One of the sites was drilled by the Ontario Geological Survey and three were drilled by Clearview.

4.2.1 1443 12/13 SR North Sunnidale - OGS Site 16-01

In the Fall of 2015 CS-15-03 was drilled at a location 12 km east of Klondike Park Road and just west of Phelpston. This cored borehole identified a deep expression of Aquifer A3/A4 that was formerly unknown in this area. Riley Mulligan of the Ontario Geological Survey met with Golder and presented his interpretation of the geological history of the site in relation to the materials in the core of borehole CS-15-03. During a discussion of the geology of the area, the Clearview long term water supply project was discussed. Riley noted his interest in drilling another borehole west of the Nottawasaga River and Golder noted a location on the 12th Concession south of Wasaga Beach in Clearview would be of benefit to the project.

The test drilling conducted by the OGS (OGS, 2016) Concession 12, Lot 12 indicated the presence of approximately 40 m of Aquifer A3 in borehole CS-16-01 (Figure 6). The core retrieved from CS-16-01 had gravel at the base of the aquifer at approximately 75 m depth. Above the gravel rested a fining upward sequence of coarse to fine sand that yielded two important observations: Aquifer A3 extends south of Wasaga Beach in a bedrock valley and Aquifer A3 was coarse enough to have the potential to host a municipal grade well. The presence of the former Sunnidale Landfill potentially up gradient of the site resulted in the site not further being considered. Numerical modelling of the area was conducted to determine an acceptable offset from the landfill site.

4.2.2 Airport Road and 15/16 SR Nottawasaga

Two test holes were drilled in this area (Figure A-1) was of interest because the Mad River Golf Course well is currently operating at approximately 22 L/sec and is constructed in the target aquifer. The site would also provide a short pipeline to the standpipes located on Airport Road approximately one kilometer north of 15/16 SR (Nottawasaga). OGS borehole CS-16-06 was drilled in the road allowance of the 15/16 SR approximately 600 m east of Airport Road. The borehole intersected zones of gravel and coarse sand which indicated a potential for a municipal water supply in the 15 to 23 L/sec range. Seismic profiling was conducted along the 15/16 SR by the Geological Survey of Canada that further indicated potential water supply aquifer targets.

Boreholes were drilled on available properties at the unopened road allowance of the SR 15/16 Nottawasaga on the west side of Airport Road and on the farm of Andy Van Niekerk approximately 1,200 m east Airport Road in July 2017 and October 2018, respectively. Cross Section C-C’ (Appendix A) shows a hydrogeological profile along SR 15/16 that indicates a deep confined aquifer with a thickness of approximately 15 m. The target aquifer was intersected at both drilling locations; however, the aquifer was not coarse enough for the construction of a municipal grade well. The boreholes were abandoned, and the drillers records are shown in Figures A-3 and A-4 (Appendix A).

4.2.3 Klondike Park Road Site

The property at 1585 Klondike Park Road was put up for sale during the summer of 2018 and an option to purchase the property was made to the owner by the Township. Two boreholes were drilled on the central part of the site (Figure 2) to evaluate the stratigraphy and potential for municipal well construction.

The borehole drilling indicated the presence of Aquifer A3 at similar depth and aquifer material as the Powerline Road municipal water supply wells in Wasaga Beach that have rated capacities of 60 L/sec (WWRs 5716860, 5729667). The drilling also confirmed the continuity of Aquifer A3 between OGS BH6-13, OGS BH8-12 to the east and WWR A185915 to the west (Figure 7).

The boreholes were equipped with 50 mm diameter standpipes to facilitate future water level monitoring and water quality analyses, hence are referred to as Observation Wells (OW). OW1 and OW2 were constructed at the locations shown in Figure 2, grain size analyses were performed on aquifer samples and a water quality sample was conducted in July 2018 on water from OW1 (Appendix C). The water quality at OW1 was sampled on July 17, 2018 for general water chemistry and VOCs. The test results indicated an absence of VOCs and nitrate, low concentrations of chloride and sodium, but with slightly elevated iron concentrations.

OW 4 was conducted in the upper aquifer to a depth of 12 mbgl to aid in aquifer and confining layer characterization during pumping tests. The log of OW4 is shown in Figure B-4. The location for a pilot hole for a production well was chosen near OW1 because of coarser aquifer materials at OW1, compared to OW2 (Figures B-5 and B-6). TW3-18 was drilled obtaining aquifer samples for well design, hereafter TW3-18 will be referred to as TW3 (Figure B-3).

5.0 CONSTRUCTION AND TESTING OF TW3

As mentioned above, the 1585 Klondike Park Road site was selected for further investigation. Test well TW3 was constructed approximately 8 m east of OW1 and drilled to the base of Aquifer A3. The gradation analyses for TW3 are presented in Appendix B and a well design was prepared using 7.93 m of 200 mm diameter, 50 slot, telescoping screen with an appropriately sized gravel pack (Appendix B). The transmitting capacity of the Johnson High Flo well screen is 53 L/sec. TW3 was constructed during September 2018 and tested and developed under PTTW # 0123-B3NHDB.

Water quality samples were obtained at 24-h, 44-h, and 71-h during the pumping test and submitted to Caduceon Environmental Laboratories in Barrie. Samples at 24-h and 44-h were analysed for general water quality parameters, bacteria, and VOCs. The 71-h sample was analysed for Tables 1-4 of the ODWS. The analytical results are contained in Tables C-2, C-3, and C-4 (Appendix C).

5.1 Stepped Rate Testing

TW3 was subjected to a stepped rate pumping test on October 22, 2018 while monitoring water levels in TW3, OW1, OW2, and OW4. The pumping test rates were 12.6, 25.3, and 37.8 L/sec and the duration of the steps were 60 minutes each, except for step 3 that was shortened because of an issue with the generator.

Table 5.1: Summary of Stepped Rate Pumping Test, Static Water Level 7.97 m below top of casing (mbtoc)

Step #	Pumping Rate (L/sec)	Pumping Level at end of step (mbtoc)	Drawdown (m)	Well Losses (m)
1	8.83	8.83	0.86	--
2	25.3	9.97	1.79	0.08
3	37.9	10.64 (10.9)	2.67 (2.90)	0.34

5.2 Constant Rate Testing

The electrical generator was replaced during the morning of October 23, 2018 following which the pumping test started at 12:40 PM at a rate of 37.9 L/sec. During the 72-h pumping test a total of 9,811,783 litres of water was pumped from the well. TW3 had a final drawdown of 2.98 m that translates into a specific capacity of 12.6 L/sec/m of drawdown or 51 IGM/ft of drawdown, which is very good. As a point of reference, the 60 L/sec wells at Power Line Road in Wasaga Beach specific capacities of 4 to 6 L/sec/m or 16 to 25 IGM/ft.

Loggers were placed in wells at 8, 11, 90, and 290 m distances and in different aquifers to determine the drawdown in each of the aquifers because of pumping TW3. The barometer corrected water levels are plotted on linear time scale graphs and shown on Figures B-9 to B-12 (Appendix B). These hydrographs illustrate natural variation in the water level plus water level change due to the stepped rate test on October 22 and drawdown during the constant rate pumping test between October 23 and 26, 2018. All the graphs show post-testing water levels had returned to the pretesting water levels shortly after the pumping test was completed. Another salient observation is the water levels stopped declining after approximately 1 day of pumping and there was no further drawdown during the pumping test.

Sixteen additional monitoring locations that included both private water wells and dedicated monitoring wells were also monitored. Some of these data was made available through the courtesy of Peace Naturals who operate a groundwater monitoring network around their facility at 4491 Concession 12 (Sunnidale). The monitoring locations are between 360 m and 2.7 km from TW3 and are constructed in both Aquifer A2 and A3. Monitoring wells that experienced drawdown during the test have been analysed and hydrographs of these data are contained in Figures B-13 to B-19. These wells showed a clear response to the pumping of TW3 and experienced between 1.4 and 6 cm of drawdown during the 72-h test. Semi-log hydrographs illustrate the drawdown and recovery for each of the observation wells and TW3 during the test. There is a steady drawdown trend of 0.31 m per log cycle and a transmissivity of 1,930 m^2/day is calculated from early time data using the Jacob-Theis straight line method. The Drawdown vs Distance graph has two good data points in Aquifer A3 (OW1 and OW2) and a straight line between these points yields a drawdown of 0.5 m/log cycle and a transmissivity of 2,180 m^2/day using the Theim method. These two transmissivities are in good agreement and are deemed reliable measures of this aquifer parameter. The storativity is calculated to be 5.5×10^{-4}.

The adequacy of the aquifer is further illustrated by the following observations:

- The pumping test indicated that the groundwater taking was met by flow through the aquifer and the drawdown cone was established within 24 hours of the start of pumping.
- The width of the aquifer required to provide groundwater to TW3 is estimated to be approximately 440 m using the Darcy equation, given a measured hydraulic gradient of 0.0039 (Figure 5), a transmissivity of 1,900 m^2/day (Section 4.1.2), and a water abstraction of 3,273 m^3/day.

Extrapolation of pumping test data to 20-years indicates that no further drawdown is expected at a pumping rate of 37.9 L/sec. It is expected that further water supply development could be contemplated on this Site similar to the well fields developed at Wasaga Beach.

5.3 Water Quality

The water from TW3 meets the Ontario Drinking Water Standards for all parameters tested except for turbidity and the aesthetic parameters iron and hardness (Tables C-1 through C-4; Appendix C). The turbidity was elevated at approximately 4 to 5 NTU, however, this is typically related to elevated iron concentrations. The iron concentration is 0.375 and 0.465 mg/L. Nitrate and organic nitrogen concentrations are below detection limits, while chloride is very low, and sodium is less than 10 mg/L. Nitrate is below detection limits. The water samples were free of volatile organic compounds and pesticides.

5.4 Drawdown at Private Wells

An evaluation of 12 of the well records that could be positively located and that have either monitored data or adequate pumping test data indicates that there is sufficient available drawdown at nearby private wells. The wells in the area draw water from Aquifer A2, which is a good aquifer for domestic water supply development Table 2.3.4 indicates that there are between 11.2 m and 38 m of available drawdown once normal drawdown and an accommodation for pumping equipment is subtracted.

Table 5.4: Water level and susceptibility to drawdown at nearby private wells

Well Tag#	Top of Screen	Static WL	Drawdown from Normal Use	Remaining Available Drawdown
	mbgl	(mbgl)	(m)	Includes 3 m for pump
A210653*	54.9	8.0	3.0	34.5
5727234	26.5	10.9	1.4	11.2
5711523	31.0	7.8	0.0	20.2
5710435	20.4	0.0	6.0	11.4
A098224	24.4	7.7	1.6	12.1

Well Tag#	Top of Screen	Static WL	Drawdown from Normal Use	Remaining Available Drawdown
	mbgl	(mbgl)	(m)	Includes 3 m for pump
5725137	35.4	13.4	3.2	15.7
5737227	35.4	13.1	3.8	15.5
A233065	35.4	13.4	3.2	15.7
5732471	38.8	16.8	5.9	13.1
5710998	39.3	6.1	6.0	24.2
A185915*	57.4	14.5	1.9	38.0
A185917*	58.0	16.9	0.9	37.2

*Note: *-denotes Aquifer A3 well, the rest are Aquifer A2 wells*

5.5 Further Water Supply Development

Of all of the sites tested 1585 Klondike Park Road has the potential site for the development of a high yielding municipal water supply. This site should be brought forward as an option for a long term water supply for Clearview and specifically for Stayner based on the good aquifer yield, acceptable water quality, large property to accommodate WHPA A, and manageable offsite impacts.

Clearview intends to develop a 120 L/sec water supply on this Site and we envision that this could be accomplished with two additional wells. There is very little drawdown (1.42 m) at eight metres from TW3 and with an allowance of 9.4 m for the well pump and adequate submergence there is a standing water column of 30.5 m in the well.

If three municipal water supply wells are placed at the points of an equilateral triangle with sides 8 m long, then each well operating at 40 L/sec would have a drawdown of 6.1 m (1.5 m of drawdown from other wells and 3.1 m of drawdown from its operation). The well field could operate at 120 L/sec and use 6.1 m of the 30.5 m of available drawdown or 20% of the standing water above the safe pumping level.

Wells should be constructed 100 m from the property boundaries such that Clearview can be in control of the land use activities in WHPA A. As noted above the property has an area of approximately 38 ha, therefore wells could be located in a variety of locations and offsets from each other. Ultimately the thickness of the aquifer and the aquifer coarseness should be a prime factor in the locating of future wells.

Additional wells will be required to satisfy the 120 L/sec water supply demand for Clearview. It is anticipated that a pumphouse and reservoir will be constructed on the site and the well pumps will be used to fill the reservoir. High lift pumps in the reservoir will be used to push the water to Stayner, therefore individual wells with a diameter of 200 mm or 250 mm should be adequate supply approximately 40 L/sec.

5.6 Numerical Modelling

Numerical groundwater modelling is currently being conducted in support of the Class EA. This modelling will be used to quantify long term drawdown in the area as a result of water taking, assess impacts to surrounding wells and surface water receptors, and develop capture zones / vulnerable areas to address future source water protection planning needs.

6.0 CONCLUSIONS

1) Aquifer A3 is continuous from Wasaga Beach to Phelpston and the Klondike Park Road site.

2) The Klondike Park Road site and associated test well TW3 has proven the ability to yield 37.9 L/sec for a period of 72-hours. The water level in TW3 declined by 3 m and reached equilibrium in 24 hours. For the remaining 48 hours of the pumping test there was no further drawdown.

3) The transmissivity measured at observation wells is calculated to be 1,900 m^2/day and the storativity is calculated to be $4x10^{-4}$. These aquifer parameters are characteristic of highly productive aquifers.

4) The water quality sampling of TW3 met the Ontario Drinking Water Standards for all parameters except turbidity and the aesthetic parameters iron and hardness.

5) Surrounding private water supply wells are serviced by shallower Aquifers A1 and A2. Monitoring during the pumping test indicated a minor amount of drawdown at nearby wells and, compared with the height of standing water in the wells, which is more than 10 m in most cases, adverse impacts on private water supply wells is not expected.

6) The A3 aquifer is capable of providing more water and, like the 180 L/sec well field at Powerline Road in Wasaga Beach, extrapolation of testing data indicate that three wells at the Klondike Park Road site could produce 120 L/sec and potentially more.

7) Modelling is underway to demonstrate the adequacy of the future water supply.

8) Before the future water supply of 120 L/sec can be used further production well drilling and testing with an expanded private well monitoring program will be completed.

7.0 LIMITATIONS

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client (Township of Clearview). The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder cannot be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent identifying the other party as an Approved User and stipulating the specific purpose and limits of the report use for the Approved User. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder cannot be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and **Ground water Conditions:** Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

8.0 CLOSURE

We trust that this preliminary hydrogeological evaluation is sufficient for your immediate requirements. Prior to submission for development approval, the recommendations given in this report should be reviewed and additional fieldwork carried out as required.

Signature Page

Golder Associates Ltd.

John Easton, M.Sc., P.Geo.
Associate, Senior Hydrogeologist

JAE/DH/cdr

References:

Burnside, 2008. Township of Clearview, Long Term Water Supply for Clearview, Schedule B, Municipal Class EA.

exp, 2018. Hydrogeological Investigation, 4491 Concession 12 Sunnidale Road, Stayner, ON.

Golder, 2004. South Simcoe Municipal Groundwater Study. Golder Associates Ltd, Barrie. File # S41W04.

Golder, 2006. Township of Clearview, Long Term Water Supply, Environment Assessment Groundwater Source Evaluation. Golder Associates, Barrie.

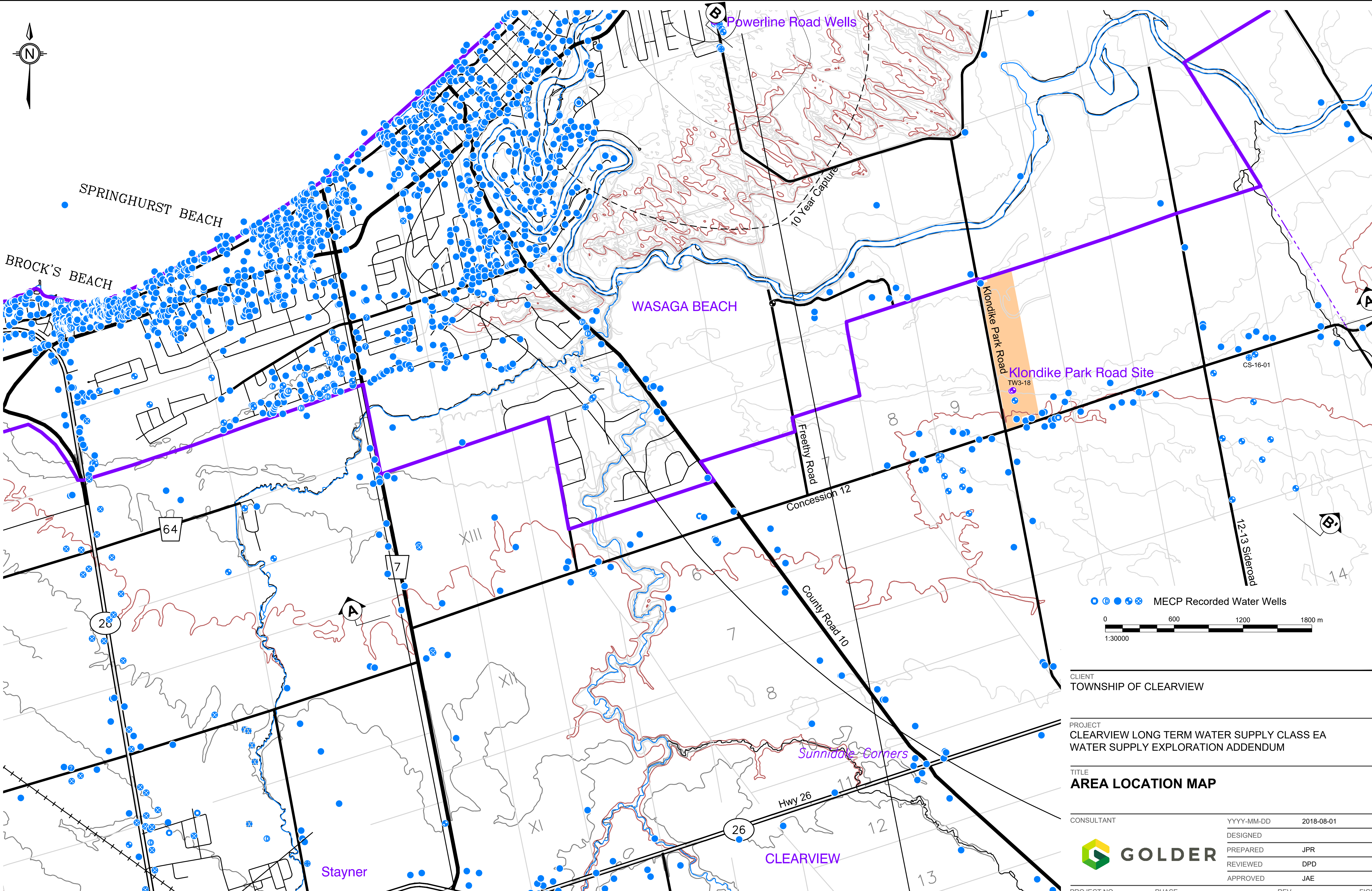
Mulligan, R.P.M., 2016. Summary of Field Work and Other Activities 2017, Ontario Geological Survey, Open File Report 6323, pages 31-1 to 31-10.

Mulligan, R.P.M., 2017. Summary of Field Work and Other Activities 2017, Ontario Geological Survey, Open File Report 6333, pages 25-1 to 25-10.

South Georgian Bay-Lake Simcoe Source Protection Committee, (2011). Approved Assessment Report: Nottawasaga Valley Source Protection Area.

Statistics Canada, 2016. Census Profile, 2016 Census, Stayner, Ontario

FIGURES



CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION ADDENDUM

TITLE
AREA LOCATION MAP

CONSULTANT

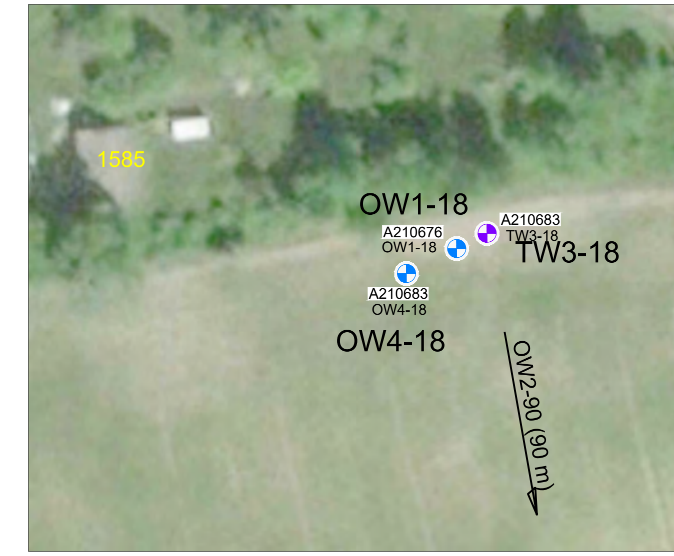
GOLDER

YYYY-MM-DD	2018-08-01
DESIGNED	
PREPARED	JPR
REVIEWED	DPD
APPROVED	JAE

PROJECT NO.	PHASE	REV.	FIGURE
1311860360		EA	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm

KEY PLAN



SITE PLAN

LEGEND

TEST OR OBSERVATION WELL

SITE INVESTIGATIONS PROPERTY BOUNDARY

WELL	EAST	NORTH
OW1-18	579360	4923724
OW2-18	579380	4923637
TW3-18	579364	4923726
OW4-18	579353	4923721

0 125 250

1:7,500 METRES

DATUM: UTM NAD 83 ZONE 17

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE
2. TO BE READ IN CONJUNCTION AND ACCORDANCE WITH THE REPORT

REFERENCE(S)

BASE DATA - MNR LIO, OBTAINED 2018
BASE IMAGERY - © 2018 DIGITALGLOBE IMAGE COURTESY OF USGS EARTHSTAR GEOGRAPHICS SIO © 2018 MICROSOFT CORPORATION
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENSE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2018
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION ADDENDUM

TITLE
SITE LOCATION MAP

CONSULTANT

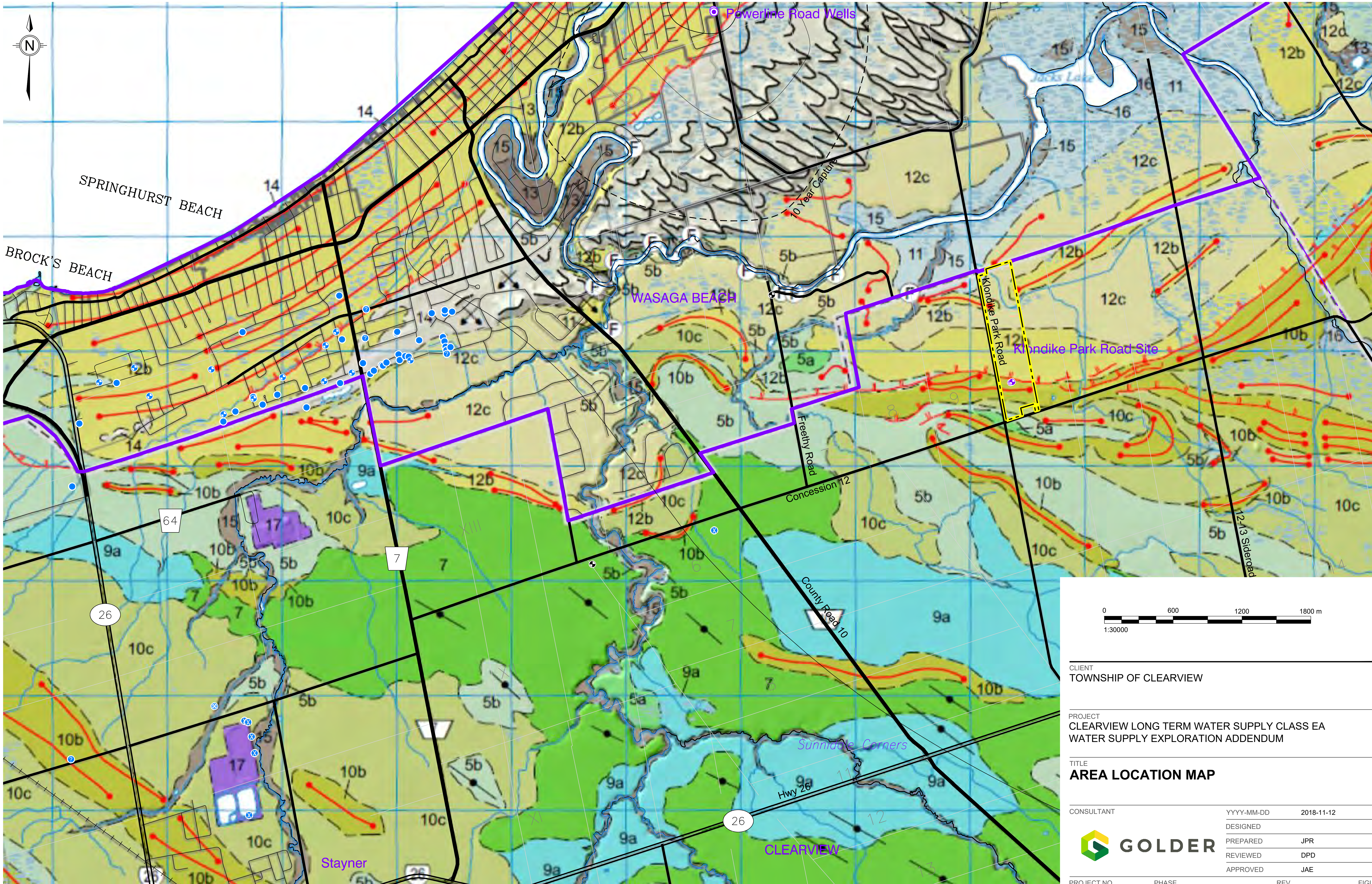
GOLDER

YYYY-MM-DD	2018-08-01
DESIGNED	
PREPARED	STB / JPR
REVIEWED	
APPROVED	JAE

PROJECT NO.	CONTROL	REV.	FIGURE
1415404			2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm



CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION ADDENDUM

TITLE
AREA LOCATION MAP

CONSULTANT

GOLDER

YYYY-MM-DD	2018-11-12
DESIGNED	
PREPARED	JPR
REVIEWED	DPD
APPROVED	JAE

PROJECT NO.	PHASE	REV.	FIGURE
141-5404		EB	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

QUATERNARY

RECENT

- **17 — Anthropogenic Deposits:** Man-made features composed of fill or aggregate material, sewage lagoons or wastewater treatment ponds
- **16 — Swamp and Organic Deposits:** Peat and muck
- **15 — Modern Alluvial Deposits:** Very fine- to coarse-grained sand, minor gravel, silt and clay
- **14 — Eolian Deposits:** Very fine- to medium-grained sand
- **13 — Older Alluvial Deposits:** Very fine- to coarse-grained sand, minor gravel, silt and clay
- **12 — Coarse-Grained Lacustrine Deposits:** Sand and gravel, minor silt
  - **12a — Fluviodeltaic Deposits:** Sand, minor gravel, silt and clay
  - **12b — Littoral Deposits:** Sand, minor gravel, silt and clay
  - **12c — Foreshore Deposits:** Very fine- to medium-grained sand, minor silt and clay
- **11 — Fine-Grained Lacustrine Deposits:** Silt, clay, marl and minor very fine-grained sand

PLEISTOCENE

- **10 — Coarse-Grained Glaciolacustrine Deposits:** Sand, gravel, minor silt
  - **10a — Fluviodeltaic Deposits:** Sand, minor gravel, silt and clay
  - **10b — Littoral Deposits:** Sand, minor gravel, silt and clay
  - **10c — Foreshore Deposits:** Very fine- to medium-grained sand, minor silt and clay
- **9 — Fine-Grained Glaciolacustrine Deposits:** Silt, clay, minor sand and diamicton
  - **9a — Basinal Glaciolacustrine Deposits:** Massive to well-laminated silt, clay and minor sand
  - **9b — Basinal Glaciolacustrine Deposits:** Interbedded ice-proximal rain-out deposits and laminated silt and clay, minor fine-grained till and subaquatic debris flows
- **8 — Glaciofluvial Outwash Deposits:** Sand and gravel
  - **8a —** Mainly sand
  - **8b —** Mainly gravel
- **7 — Allenwood Till:** Moderately to highly consolidated silt- and clay-rich till and deformed glaciolacustrine deposits
- **6 — Ice-Contact Stratified Deposits:** Fine- to coarse-grained sand, minor gravel, silt and clay and diamicton
- **5 — Newmarket–Catfish Creek–Elma Till:** Moderately to highly consolidated silt- to sand-rich till, may contain beds, lenses, and stringers of sand, gravel, and silt
  - **5a —** Silt-rich facies
  - **5b —** Sand-rich facies
- **4 — Thorncliffe Formation:** Glaciolacustrine sand, silt and clay
  - **4a —** Massive to laminated fine- to coarse-grained sand with lesser gravel and silt; includes subaquatic fan deposits
  - **4b —** Massive to rhythmically laminated silt and clay, minor fine-grained sand
- **3 — Older Silt Till:** Highly consolidated silt-rich till
- **2 — Bedrock-Drift Complex:** Extensive, but discontinuous bedrock outcrop, mainly till cover, generally less than 1 m thick
  - **2a —** Stratified veneer
  - **2b —** Till veneer

PALEOZOIC

SILURIAN

ORDOVICIAN

- **1 — Bedrock:** Undifferentiated bedrock, with a very thin, discontinuous cover of Quaternary sediment

SYMBOLS[a]

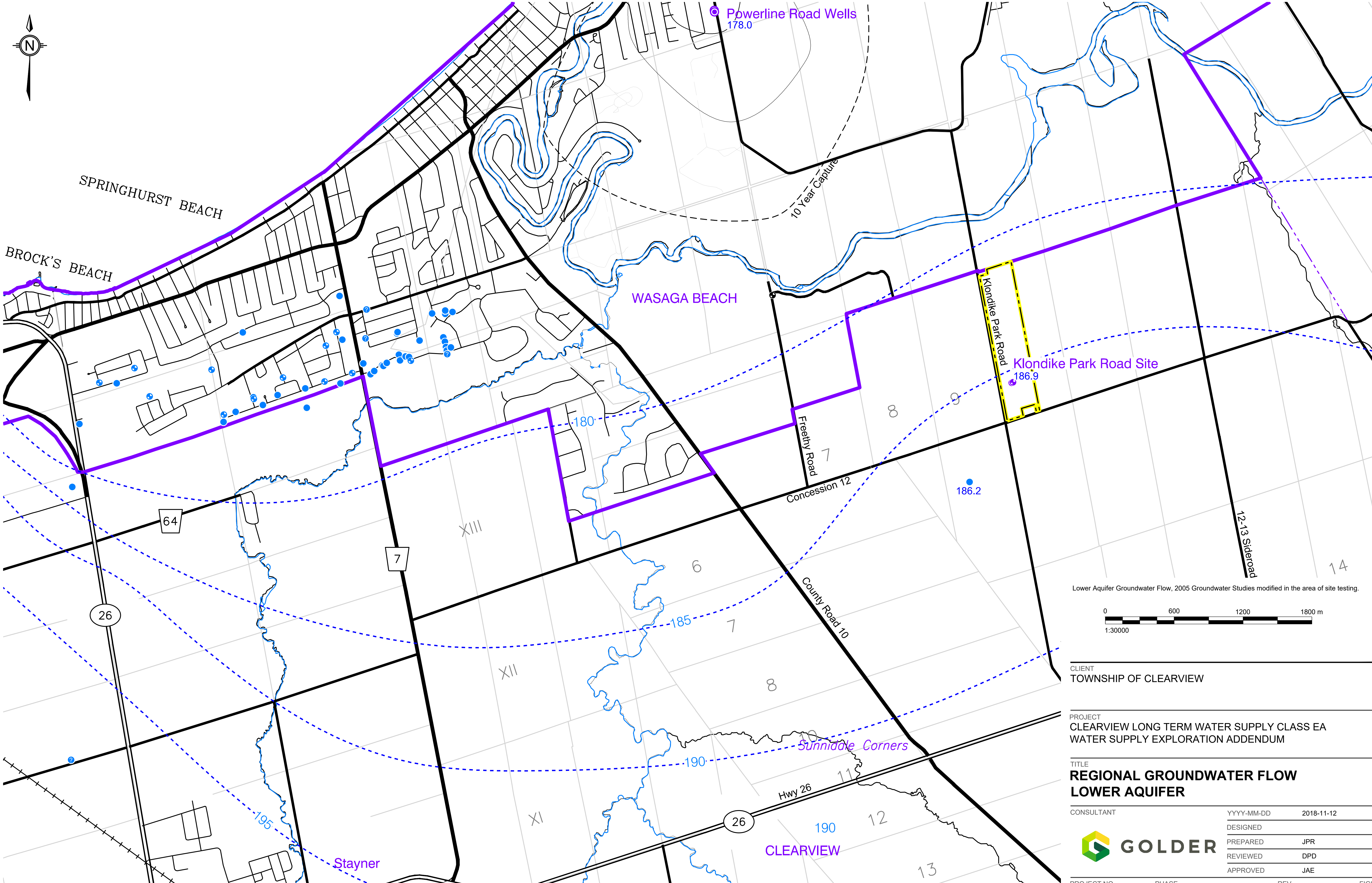
- Geological contact, approximate
- Beach ridge or bar
- Wave-cut terrace
- Fluvial terrace
- Head of groundwater piping feature
- Minor moraine
- End moraine
- Crevasse fill ridge
- Esker, direction of flow known
- Fluvial meltwater channel, direction of flow indicated by arrow (channel buried by younger sediments)
- Glaciofluvial meltwater channel, direction of flow indicated by arrow
- Flute
- Drumlin
- Eolian dune crest
- Glacial striae, direction of ice movement known or assumed; numbers indicate relative ages, 1=oldest
- Kettle
- Sand and gravel pit
- Quarry or pit
- Fossil locality, primarily aquatic molluscs
- Roads (primary, secondary)
- Railroads
- Utilities (pipeline, transmission line)
- Administrative boundary (provincial park, township)

[a] Maps P.3815 and P.3816 share a common legend; however, not all symbols may be present on this map.

CLIENT	TOWNSHIP OF CLEARVIEW
PROJECT	CLEARVIEW LONG TERM WATER SUPPLY CLASS EA WATER SUPPLY EXPLORATION ADDENDUMROAD
TITLE	**QUATERNARY GEOLOGY MAP LEGEND**
CONSULTANT	GOLDER

YYYY-MM-DD	2018-11-12
DESIGNED	
PREPARED	JPR
REVIEWED	
APPROVED	

PROJECT NO.	Phase	REV.	Figure
141-5404	-		4



CLIENT
TOWNSHIP OF CLEARVIEW

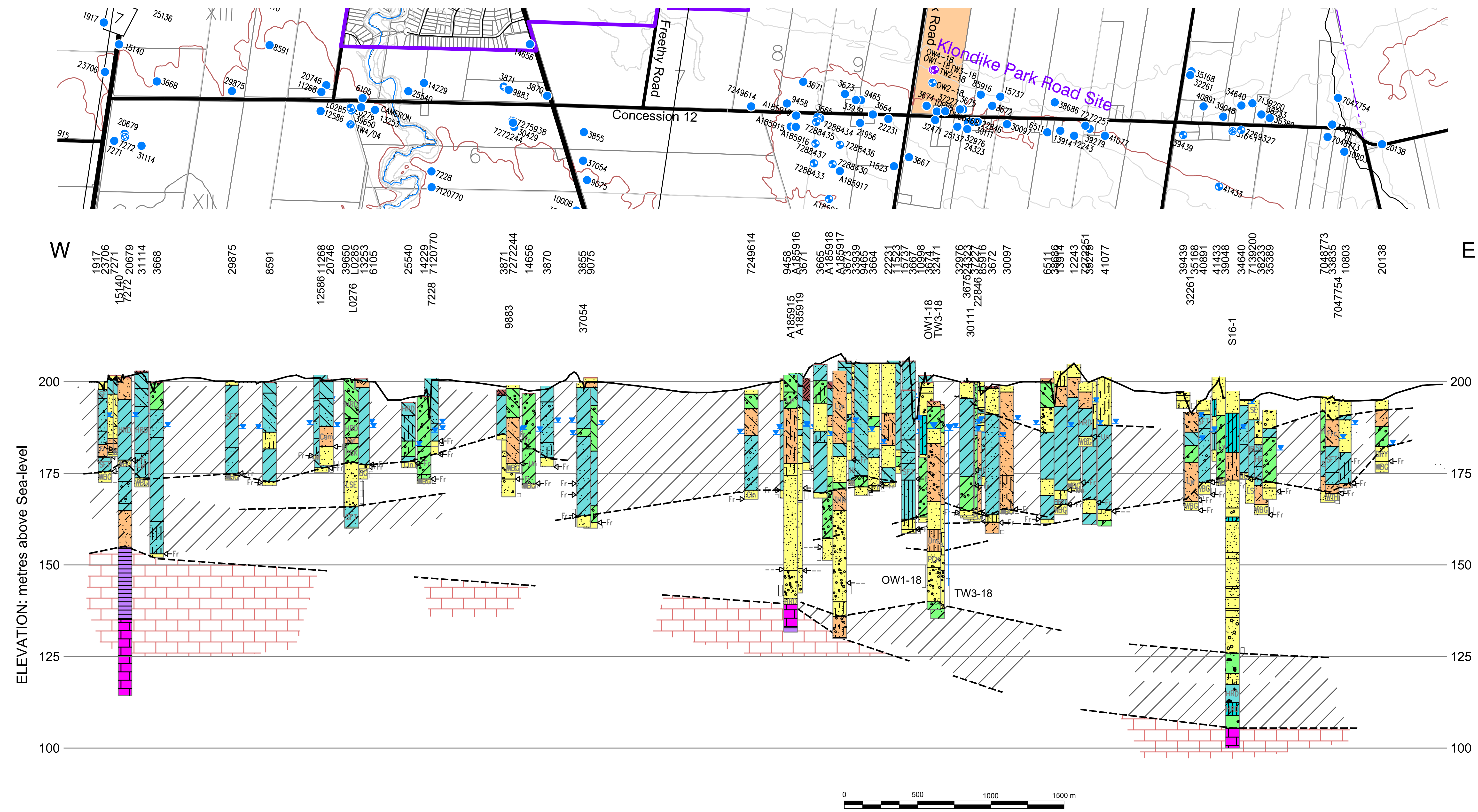
PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION ADDENDUM

TITLE
REGIONAL GROUNDWATER FLOW
LOWER AQUIFER

CONSULTANT
GOLDER

YYYY-MM-DD	2018-11-12
DESIGNED	
PREPARED	JPR
REVIEWED	DPD
APPROVED	JAE

PROJECT NO.	PHASE	REV.	FIGURE
141-5404		EB	5



Unoxidized Clay Blue, Grey White, or Undefined	Stones, Pebbles
Oxidized Clay Brown, Red, Yellow	Boulder
Silt	Till
Sand	Shale
Gravel	Limestone

Silt Clayey	Unknown
Clay	Peat/loam
Till	Sands & Gravels
Limestones	Granular Till
Shales	Silt

23453 MOE Recorded Private Well
Recorded Static Water Level
Water Producing Zone
Screen

CLIENT
TOWNSHIP OF CLEARVIEW

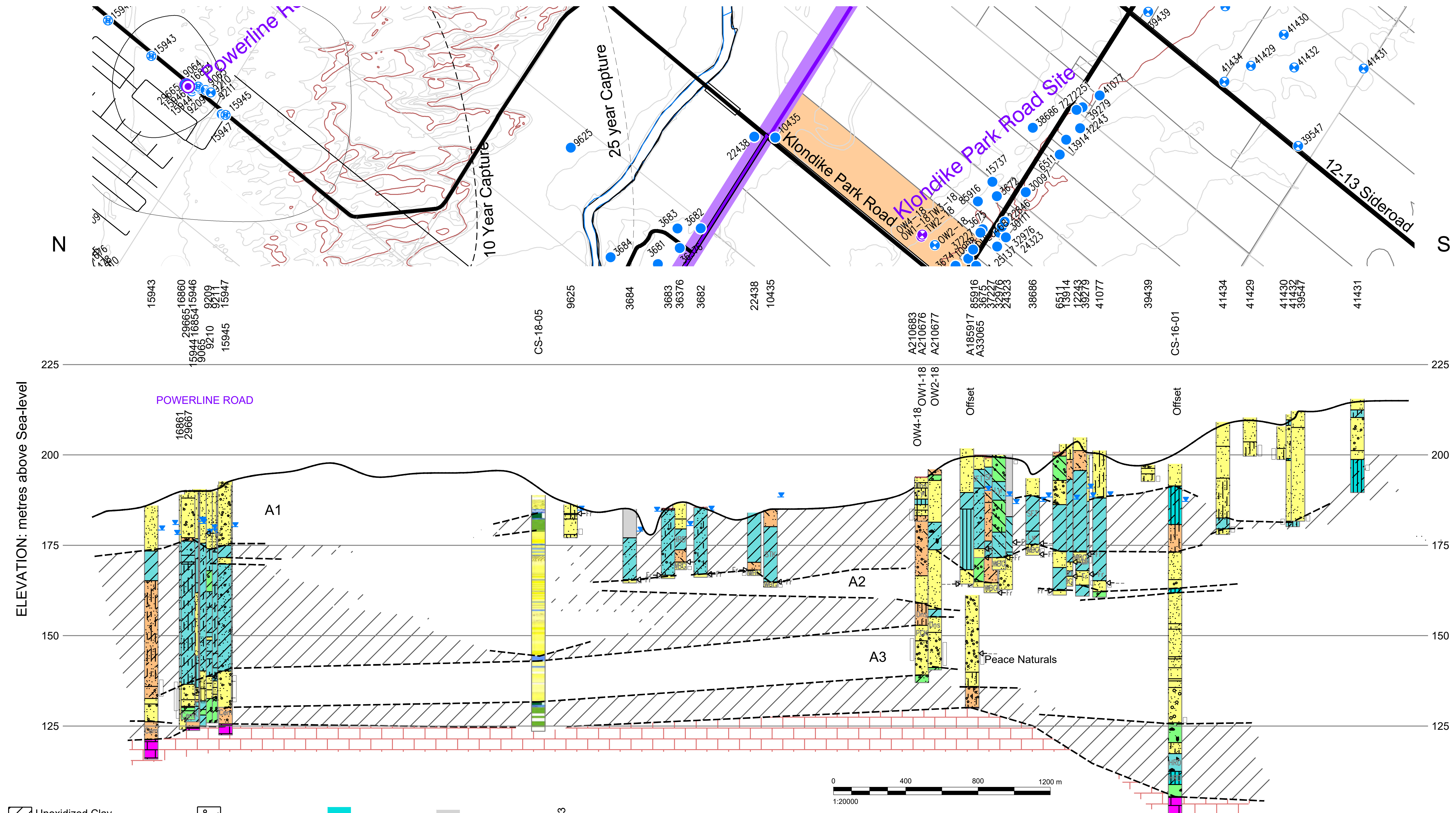
PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION ADDENDUM

CONSULTANT
GOLDER

YYYY-MM-DD	2018-11-09
DESIGNED	
PREPARED	JPR
REVIEWED	DPD
APPROVED	JAE

TITLE
CROSS-SECTION A - A'
CONCESSION ROAD 12

PROJECT NO.	Control	REV.	Figure
1415404	EB		6



Unoxidized Clay Blue, Grey White, or Undefined
Oxidized Clay Brown, Red, Yellow
Silt
Sand
Gravel
Stones, Pebbles
Boulder
Till
Shale
Limestone
Silt Clayey
Clay
Till
Limestones
Shales
Unknown
Peat/loam
Sands & Gravels
Granular Till
Silt
23453 MOE Recorded Private Well
Recorded Static Water Level
Water Producing Zone
Screen

CLIENT
TOWNSHIP OF CLEARVIEW

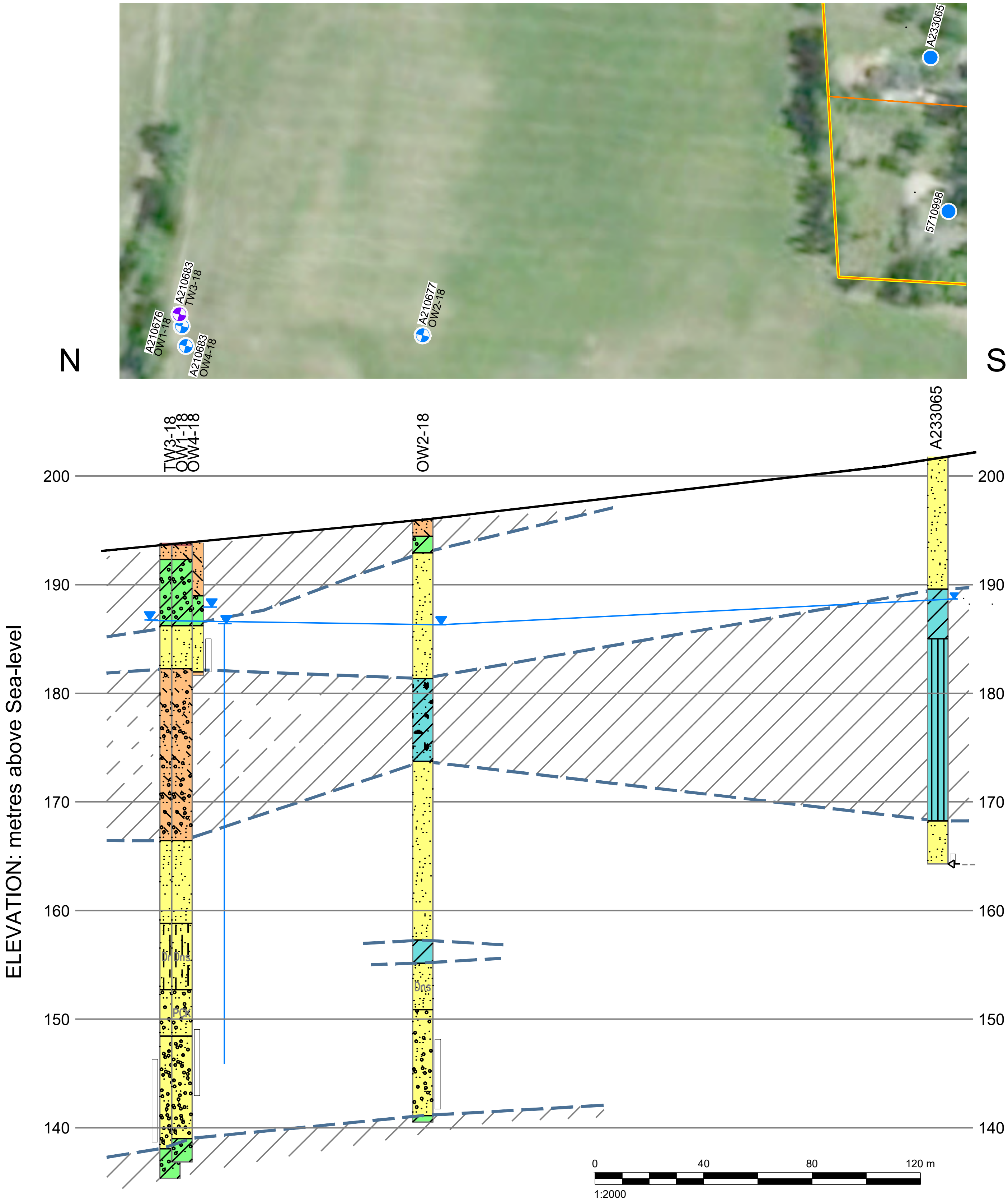
PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION ADDENDUM

CONSULTANT
GOLDER

YYYY-MM-DD	2018-11-09
DESIGNED	
PREPARED	JPR
REVIEWED	DPD
APPROVED	JAE

TITLE
CROSS-SECTION B - B'
POWERLINE ROAD TO KLONDIKE WELL SITE

PROJECT NO.	Control	REV.	Figure
1415404	EB		7



REFER TO FIGURE 6 FOR LEGEND AND NOTES

CLIENT TOWNSHIP OF CLEARVIEW	PROJECT CLEARVIEW LONG TERM WATER SUPPLY CLASS EA WATER SUPPLY EXPLORATION ADDENDUM
CONSULTANT GOLDER	TITLE **SITE SECTION C - C'**

YYYY-MM-DD	2018-11-13
DESIGNED	
PREPARED	JPR
REVIEWED	
APPROVED	

PROJECT NO.	Phase	REV.	Figure
141-5404	-		8

TABLES

TABLE 1 - WATER WELL RECORDS

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	Dist TW3	ELEV masl	WTR FND mbgl Qu	SCR TOP LEN mbgl m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6E+06	12 9	Jul-62	579069 4923297	521	204.8	33.2 Fr	32.9 -1.8	21.6	45	120	27.4	1614 CT	WS DO	**MOE# 5703664** 0.0 MSND 14.3 CLAY STNS 17.1 MSND 23.2 CLAY MSND 25.6 FSND 33.2 MSND 34.4 GRVL 34.7
6E+06	12 9	May-65	578739 4923152	849	204.8	35.1 Fr	35.7 -0.9	19.5	18	360	20.1	3602 CT	WS ST	**MOE# 5703665** 0.0 TPSL 0.3 CLAY MSND 4.6 HPAN STNS 10.7 MSND 18.3 HPAN 21.3 CLAY 35.1 CSND 36.6
6E+06	12 10	Dec-67	579399 4923104	623	205.7	32.3 Fr	34.1 -0.9	19.8	23	120	30.5	3602 CT	WS ST	**MOE# 5703667** 0.0 TPSL 0.3 CLAY MSND 9.1 MSND 24.4 CLAY MSND HPAN 32.0 MSND FSND 35.1
6E+06	13 8	Jan-62	578546 4923347	902	200.9	25.0 Fr	23.8 -1.2	13.7	45	120	16.8	1510 CT	WS ST	**MOE# 5703671** 0.0 TPSL MSND 6.1 BRWN CLAY 22.9 CSND 25.0
6E+06	13 8	Nov-65	579816 4923626	463	198.7	37.2 Fr	39.3 -0.9	13.7	36	120	33.5	3602 CT	WS ST	**MOE# 5703672** 0.0 TPSL 0.6 FSND 7.6 CLAY MSND 35.1 MSND SILT 37.2 MSND CLAY 40.2
6E+06	13 9	Sep-59	578842 4923365	635	205.7	27.1 Fr	22.3 -4.0	16.8	18	120	17.4	5510 CT	WS DO	**MOE# 5703673** 0.0 TPSL 0.3 BRWN CLAY 1.8 BRWN CLAY MSND 8.8 MSND 14.6 HPAN 16.2 BLUE CLAY STNS 21.9 MSND 27.1
6E+06	13 10	Jun-63	579395 4923476	252	199.9	19.8 Fr	20.1 -0.6	12.8	32	120	15.8	2216 CT	WS DO	**MOE# 5703674** 0.0 TPSL 0.3 MSND GRVL 1.5 MSND 3.0 CSND GRVL 9.1 SILT CLAY 19.8 MSND CSND 20.7
6E+06	13 10	Oct-67	579639 4923536	334	199.9	35.7 Fr	35.7 -0.9	12.5	27	60	18.3	3602 CT	WS DO	**MOE# 5703675** 0.0 TPSL 0.3 MSND 4.6 GREY CLAY 25.9 CLAY GRVL 35.1 MSND 36.6
6E+06	12 11	Jun-69	580231 4923581	879	200.9	38.4 Fr	38.7 -0.9	12.5	27	60	17.1	3602 CT	WS DO	**MOE# 5706511** 0.0 TPSL 0.3 MSND CLAY 1.2 BRWN CLAY GRVL 7.9 GRVL MSND 14.6 CLAY 27.4 MSND 32.0 GREY CLAY 38.4 CSND 39.6
6E+06	13 8	Nov-72	578491 4923171	1034	200.9	30.5 Fr	31.7 -0.9	15.2	45	60	25.0	3602 RC	WS DO	**MOE# 5709458** 0.0 BRWN TPSL 0.3 BRWN FSND 6.1 GREY CLAY 30.5 BRWN MSND 32.6
6E+06	13 9	Dec-72	578961 4923361	544	204.8	33.5 Fr	35.1 -0.9	18.3	32	60	27.4	3602 CT	WS DO	**MOE# 5709465** 0.0 BRWN CLAY SAND 30.5 GREY CLAY GRVL HPAN 33.5 BRWN FSND 36.0
6E+06	13 10	Oct-73	579081 4924659	975	184.7	19.8 Fr	20.4 -0.9	-3.7	36	45	18.3	3602 RC	WS DO	**MOE# 5710435** 0.0 BRWN SAND CLAY SNDY 4.6 GREY CLAY STKY 19.8 BRWN FSND MSND WBRG 21.3
6E+06	13 10	May-74	579474 4923462	286	201.8	38.7 Fr	39.3 -0.9	6.1	18	90	30.5	3602 RC	WS DO	**MOE# 5710998** 0.0 BRWN TPSL 0.3 BRWN CLAY SAND 12.2 GREY CLAY STNS 38.7 BRWN SAND 40.2
6E+06	12 9	Oct-74	579323 4923012	715	205.7	29.0 Fr 24.4 Fr	29.9 -0.9 29.0 -0.9	18.3	45	90	24.4	3602 RC	WS DO	**MOE# 5711523** 0.0 BRWN CLAY SAND 6.1 GREY CLAY 24.4 GREY SAND 26.2 GREY CLAY SNDS 29.0 BRWN SAND 30.8
6E+06	12 11	Sep-76	580311 4923621	953	203.0	36.6 Fr 32.6 Mn		15.2	45	60	33.5	3602 RC	WS DO	**MOE# 5713914** 0.0 BRWN SAND DRTY 4.3 BRWN SAND CLAY 9.8 GREY CLAY 32.6 BRWN SAND SILT 35.1 GREY CLAY HARD 36.6 BRWN SAND WBRG 39.3

TABLE 1 - WATER WELL RECORDS

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	Dist TW3	ELEV masl	WTR FND mbgl Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6E+06	13 10	Nov-78	579848 4923703	485	197.8	38.1 Fr	38.4	-0.9	8.2	9	5520	37.8	4716 CT	WS DO	**MOE# 5715737** 0.0 BRWN TPSL 0.3 GREY CLAY SNDY 13.7 BRWN CLAY SNDY 17.1 GREY CLAY SNDY 20.1 GREY CLAY SOFT 24.7 BRWN SILT SAND 35.4 BRWN SAND SILT DRTY 38.1 BRWN SAND 39.3
6E+06	12 9	Jul-87	579007 4923213	625	205.1	33.8 Fr	34.4	-2.1	19.2	68	90	30.5	3602 RA	WS DO	**MOE# 5721956** 0.0 BRWN TPSL 0.3 BRWN SAND CLAY 4.6 GREY CLAY STNS SNDS 11.6 GREY CLAY SAND SNDY 18.6 GREY CLAY SNDS 21.3 GREY CLAY HARD 33.8 BRWN SAND CLN WBRG 36.6
6E+06	12 9	Apr-87	579179 4923305	460	204.8	32.3 Fr	32.6	-0.9	18.0	73	60	31.1	2514 CT	WS DO	**MOE# 5722231** 0.0 YLLW SAND 13.4 YLLW SAND SILT CLAY 22.3 YLLW SAND 28.3 YLLW CLAY SAND 32.3 YLLW SAND 33.5
6E+06	14 9	Sep-87	578995 4924737	1076	184.1	15.8 Fr	16.5	-0.9	NR	91	60	6.1	3602 CT	WS DO	**MOE# 5722438** 0.0 GREY CLAY 13.7 BRWN SAND CLAY 15.8 BRWN SAND CLN WBRG 17.4
6E+06	12 10	Nov-87	579759 4923490	460	199.9	11.0 Fr 7.0 Fr			11.0				3030 BR	WS DO	**MOE# 5722846** 0.0 BRWN SAND 1.2 GREY CLAY STNS 2.4 BRWN SAND 7.0 BRWN CSND 7.6 GREY CLAY 8.5 BRWN SAND 9.8 BRWN SAND DRY 11.0 BRWN SAND 11.9 BRWN SAND 13.4
6E+06	12 10	Nov-88	579709 4923419	462	200.3	24.4 Fr	1.8	-0.9	13.7	27	80	33.5	1920 CT	WS DO	**MOE# 5724323** 0.0 UNKN 17.4 BRWN CLAY 27.1 BRWN CLAY 28.0 BRWN SAND GRVL 37.5
6E+06	12 10	Jun-89	579640 4923411	419	209.4	34.1 Fr	35.1	-1.5	13.4	91	120	19.8	3602 RA	WS DO	**MOE# 5725137** 0.0 BRWN SAND GRVL CLAY 5.5 GREY CLAY HARD 33.5 BRWN SAND CLN WBRG 36.6
6E+06	12 10	Aug-90	579709 4922836	955	209.4	24.4 Fr	24.7	-1.8	10.4	36	1440	22.6	3602 CT	WS DO	**MOE# 5727234** 0.0 BRWN SAND 0.6 GREY CLAY MGRD CLAY 3.0 BRWN CLAY SAND SNDY 22.9 GREY CLAY HARD 24.4 BRWN SAND CLAY WBRG 26.5
6E+06	12 11	Aug-93	579953 4923541	617	198.7	33.5 Fr	33.5	-1.2	9.1	68	60	27.4	3602 RC	WS DO	**MOE# 5730097** 0.0 BRWN SAND 1.5 BRWN SAND CLAY 24.4 BRWN SAND SILT CLAY 33.5 BRWN SAND CLN WBRG 34.7
6E+06	12 10	Aug-93	579729 4923479	441	200.3	36.0 Fr	36.9	-0.9	11.0	91	60	21.3	3602 CT	WS DO	**MOE# 5730111** 0.0 BRWN SAND 0.9 BRWN CLAY STNS STNY 7.6 GREY CLAY GRVL 10.7 GREY CLAY SAND SNDY 14.9 GREY CLAY GRVL 29.0 GREY CLAY SNDS 35.1 BRWN SAND WBRG 37.8
6E+06	12 10	Sep-96	579483 4923403	344	201.8	30.8 Fr	31.4	-1.2	16.2	32	210	29.3	1467 CT	WS DO	**MOE# 5732471** 0.0 BLCK TPSL 0.3 BRWN CLAY SAND 7.3 GREY CLAY SAND 30.8 BRWN SAND 32.6 GREY CLAY 32.6
6E+06	12 10	Aug-97	579697 4923466	422	199.9	28.3 Fr	30.8	-0.9	11.3	27	80	19.2	3602 CT	WS DO	**MOE# 5732976** 0.0 BRWN SAND 0.3 BRWN CLAY STNS 7.3 BRWN CLAY SAND LYRD 12.5 BRWN CLAY STNS HPAN 21.3 BRWN CLAY SAND 28.3 BRWN SAND CLN WBRG 31.7

TABLE 1 - WATER WELL RECORDS

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	Dist TW3	ELEV masl	WTR FND mbgl Qu	SCR TOP LEN mbgl m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6E+06	12 9	Dec-98	578926 4923350	577	205.1	32.0 Fr	32.3 -1.2	15.2	45	180	22.9	1851 CT	WS DO	**MOE# 5733939** 0.0 BLCK TPSL 0.3 BRWN SAND GRVL 4.6 BRWN SAND CLAY 26.5 BRWN CLAY HARD 32.0 BRWN SAND WBRG 33.5
6E+06	13 10	Sep-02	579618 4923529	321	199.3	37.5 Fr 34.7 Fr	35.4 -2.1	13.1	68	90	24.4	3602 CT	WS DO	**MOE# 5737227** 0.0 BLCK TPSL 0.3 BRWN SAND 2.7 BRWN CLAY HARD SOFT 8.2 BRWN SAND CLAY SNDY 12.5 GREY SAND CLAY GRVL 23.2 GREY CLAY HARD 27.7 GREY SAND CLAY SNDY 34.7 BRWN SAND CLN WBRG 37.5
6E+06	13 11	Feb-04	580211 4923790	849	193.5	21.0 Fr 18.0 -	19.5 -2.4	6.4	245	80	7.3	3602 CT	WS DO	**MOE# 5738686 TAG#A003162** 0.0 BRWN SAND 4.9 GREY CLAY SOFT 14.6 GREY CLAY HARD LYRD 18.3 BRWN MSND FSND WBRG 21.3
7E+06	12 10	May-12	579717 4923671	357	197.8	26.2 Fr 23.8 Fr	24.4 -1.8	7.6	45	60	11.0	3602 CT	WS DO	**MOE# 7185916 TAG#A098224** 0.0 BRWN SAND 1.8 BRWN CLAY HARD SOFT 7.0 GREY CLAY SAND GRVL 23.8 BRWN SAND 26.2
7E+06	12 9	Apr-17	578923 4922885	950	203.0		3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288430 TAG#A223651** 0.0 BLCK TPSL LOOS 0.3 BRWN FILL LOOS 0.6 BRWN CLAY SILT DNSE 4.6
7E+06		Mar-17	578802 4922848	1042	202.1	3.0 Un	3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288433 TAG#A223650** 0.0 BLCK TPSL LOOS 0.3 BRWN FILL LOOS 0.9 BRWN CLAY SILT DNSE 3.0 BRWN SAND SILT LOOS 4.6
7E+06	12 9	Mar-17	578719 4923153	863	204.5		3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288434 TAG#A223647** 0.0 BLCK TPSL LOOS 0.3 BRWN CLAY SILT HARD 4.6
7E+06		Mar-17	578722 4923119	884	204.2	2.1 Un	3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288435 TAG#A223648** 0.0 BLCK TPSL LOOS 0.6 BRWN CLAY SILT LOOS 4.6
7E+06		Mar-17	578926 4923027	825	204.8	3.4 Un	3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288436 TAG#A223652** 0.0 BLCK TPSL LOOS 0.0 BRWN SAND SILT LOOS 0.6 BRWN CLAY GRVL SLTY 2.1 BRWN SILT CLYY SAND 4.6
7E+06	12 9	Mar-17	578767 4922979	956	203.6	4.0 Un	3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288437 TAG#A223649** 0.0 BLCK TPSL LOOS 0.3 BRWN FILL CLAY SILT 0.6 BRWN SAND SILT LOOS 4.6
A185915	12 9	Oct-17	578568 4923031	1057	201.8	53.0 -	57.3 -3.0	14.6	80	60	14.9	5528 RC	WS CO	**MOE# A185915 4491 CON 12 SUNNIDALE** 0.0 BRWN CLAY STNS 4.6 GREY CLAY STNS LYRD 9.1 BRWN SAND SILT CLAY 24.1 BRWN SAND SILT DRTY 27.4 BRWN MSND CSND 53.3 GREY GRVL SAND 61.0 GREY SAND HARD 62.5 GREY LMSN FCRD 68.6 BLCK SHLE HARD 70.1
A185916	12 9	Oct-17	578602 4923040	1025	202.4	53.9 -	53.9 -6.1	14.3				5528 RC	OW CO	**MOE# A185916 4491 CON 12 SUNNIDALE** 0.0 BRWN CLAY STNS 4.6 GREY CLAY STNS SAND 9.1 BRWN SAND SILT LYRD 24.1 BRWN SAND SILT DRTY 27.4 BRWN MSND CSND 53.3 GREY GRVL SAND 60.0

TABLE 1 - WATER WELL RECORDS

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	Dist TW3	ELEV masl	WTR FND mbgl	Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
A185917	12 9	Oct-17	578986 4922857	948	203.0	57.9	-	57.9	-3.0	16.8	80	60	17.1	5528 RC	WS CO	**TAG#A185917 4491 CON 12 SUNNIDALE** 0.0 BRWN SAND CLAY LYRD 19.8 BRWN CLAY 23.5 BRWN FSND 30.5 BRWN CLAY STNS 32.3 BRWN SAND CLAY THIN 38.1 BRWN SAND GRVL CSND 63.1 GREY SAND DRTY 67.1 GREY SAND GRVL SILT 72.8 BLCK SHLE 73.2
A185918	12 9	Oct-17	578981 4922653	1139	199.9	45.1	-	45.7	-3.0	15.5				5528 RC	OW CO	**TAG#A185918 4491 CON 12 SUNNIDALE** 0.0 BRWN FILL 1.8 BRWN CLAY 6.1 GREY CLAY 9.1 GREY SAND CLAY 12.2 BRWN CSND 25.9 GREY CLAY STNS 42.7 BRWN MSND CSND 48.8
A185919	12 9	Oct-17	578578 4923114	996	202.1	31.1	-	31.1	-3.0	14.3				5528 RC	OW CO	**TAG#A185919 4491 CON 12 SUNNIDALE** 0.0 BRWN CLAY 3.4 BRWN CLAY STNS 3.0 BRWN CLAY 9.1 BRWN FSND 15.2 GREY CLAY 16.8 BRWN FSND 24.4 BRWN MSND 34.4 UNKN 35.1
A233065	13 10	Nov-17	579527 4923483	293	201.8	37.5	-	36.6	-0.9	13.1	36	60	22.9	7556 RC	WS DO	**TAG#A233065 4328 CON 12 SUNNIDALE** 0.0 BRWN SAND 12.2 GREY CLAY 16.8 GREY SILT 33.5 BRWN SAND 37.5
A210676	13 10	Jun-18	579360 4923724	4.5	193.9			44.8	-6.1	NR				9999 RC	TH MU	**OW1-18 TAG#A210676** 0.0 TPSL 0.3 BRWN SAND CLAY STNS 1.5 GREY CLAY STNS 7.6 BRWN SAND 11.6 BRWN SAND GRVL CLAY 27.4 BRWN SAND 35.1 GREY SAND SILT DNSE 41.1 BRWN SAND GRVL PCKD 45.4 BRWN GRVL SAND 54.9 GREY CLAY GRVL SAND 57.0
A210677	13 10	Aug-18	579380 4923637	90	196.0			47.9	-6.4	NR				9999 RC	OW PU	**OW2-18 TAG#A210677** 0.0 BRWN SAND CLAY STNS 1.5 GREY CLAY STNS 3.0 BRWN SAND 14.6 GREY CLAY SAND TILL 22.3 BRWN SAND 38.7 GREY CLAY 40.8 BRWN FSND DNSE 45.1 BRWN SAND GRVL 54.9 GREY CLAY GRVL SAND 55.5
A210683	13 10	Jun-18	579364 4923726	0	193.9			47.5	-7.6	NR				9999 RC	TW MU	**TW3-18 TAG#A210683** 0.0 TPSL 0.3 BRWN SAND CLAY STNS 1.5 GREY CLAY STNS 7.6 BRWN SAND 11.6 BRWN SAND GRVL CLAY 27.4 BRWN SAND 35.1 GREY SAND SILT DNSE 41.1 BRWN SAND GRVL 45.4 BRWN GRVL SAND 55.8 GREY CLAY GRVL SAND 58.5
A210683	13 10	Jun-18	579353 4923721	12	193.9			8.8	-3.0	NR				9999 RC	TH MU	**OW4-18 TAG#A210683** 0.0 BRWN SAND CLAY CBLE 4.9 GREY CLAY STNS 7.6 BRWN SAND 11.9 BRWN SAND GRVL CLAY 12.2

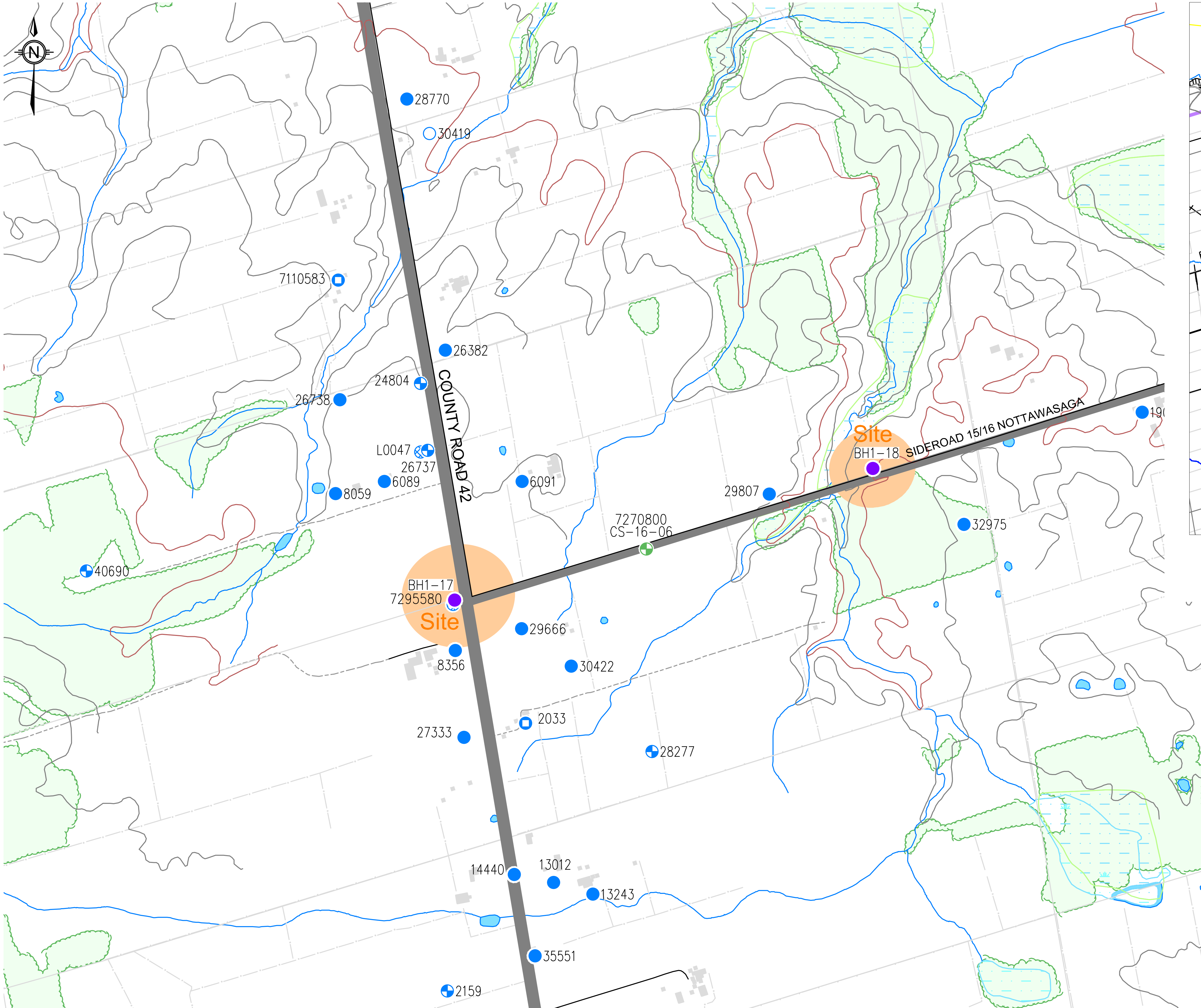
QUALITY:		TYPE:		USE:				METHOD :	
Fr	Fresh	WS	Water Supply	CO	Comercial	NU	Not Used	CT	Cable Tool
Mn	Mineral	AQ	Abandoned Quality	DO	Domestic	IR	Irrigation	JT	Jetting
Sa	Salty	AS	Abandoned Supply	MU	Municipal	AL	Alteration	RC	Rotary Conventional
Su	Sulphur	AB	Abandonment Record	PU	Public	MO	Monitoring	RA	Rotary Air
--	Unrecorded	TH	Test Hole or Observation	ST	Stock	-	Not Recorded	BR	Boring
		TW	Test Well						

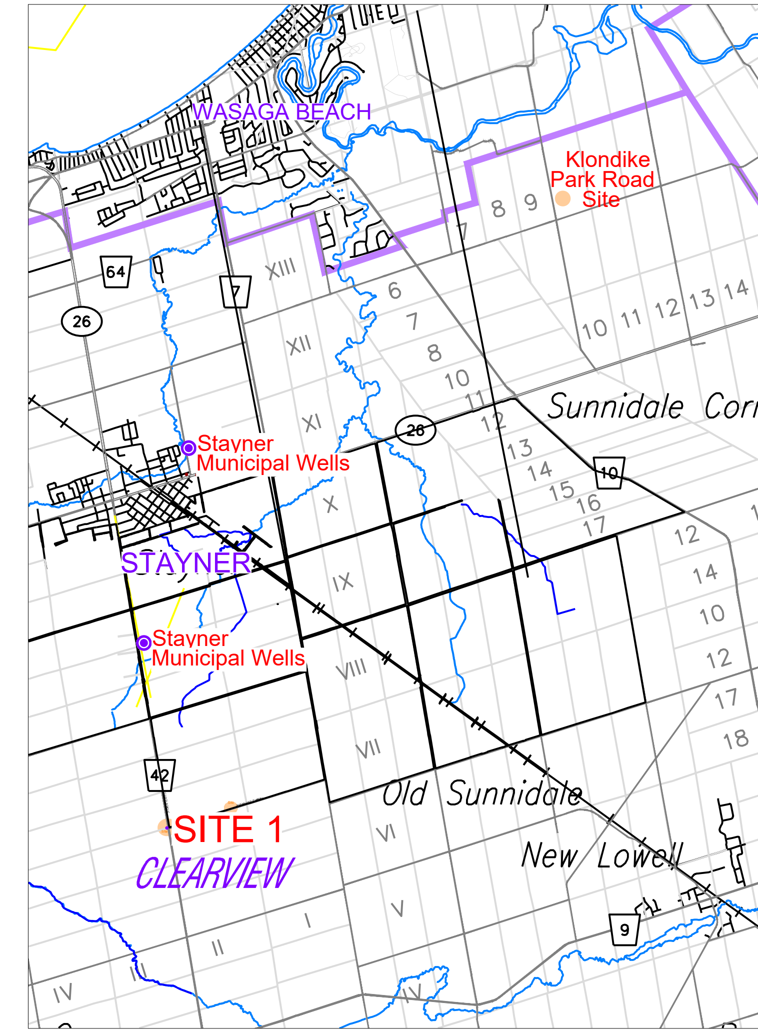
Easting and Northings UTM NAD 83 Zone 17, Translated from Recorded UTM NAD, subject to Field Verified Location or Improved Location Accuracy.

 Selected information tabulated to metric with changes and corrections subject to Driller's Records.

Appendix A

Test Hole Drilling Sites





Drill Site Locations

- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well
- Drilled Bedrock Well
- Municipal Test Well

0 200 400 600 m

1:10000

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION ADDENDUM

TITLE
LOCATION MAP SIDE ROAD 15/16 WELL SITE

CONSULTANT

GOLDER

YYYY-MM-DD	2018-11-13
DESIGNED	
PREPARED	JPR
REVIEWED	
APPROVED	

PROJECT NO.	Phase	REV.	
141-5404	-		A-1

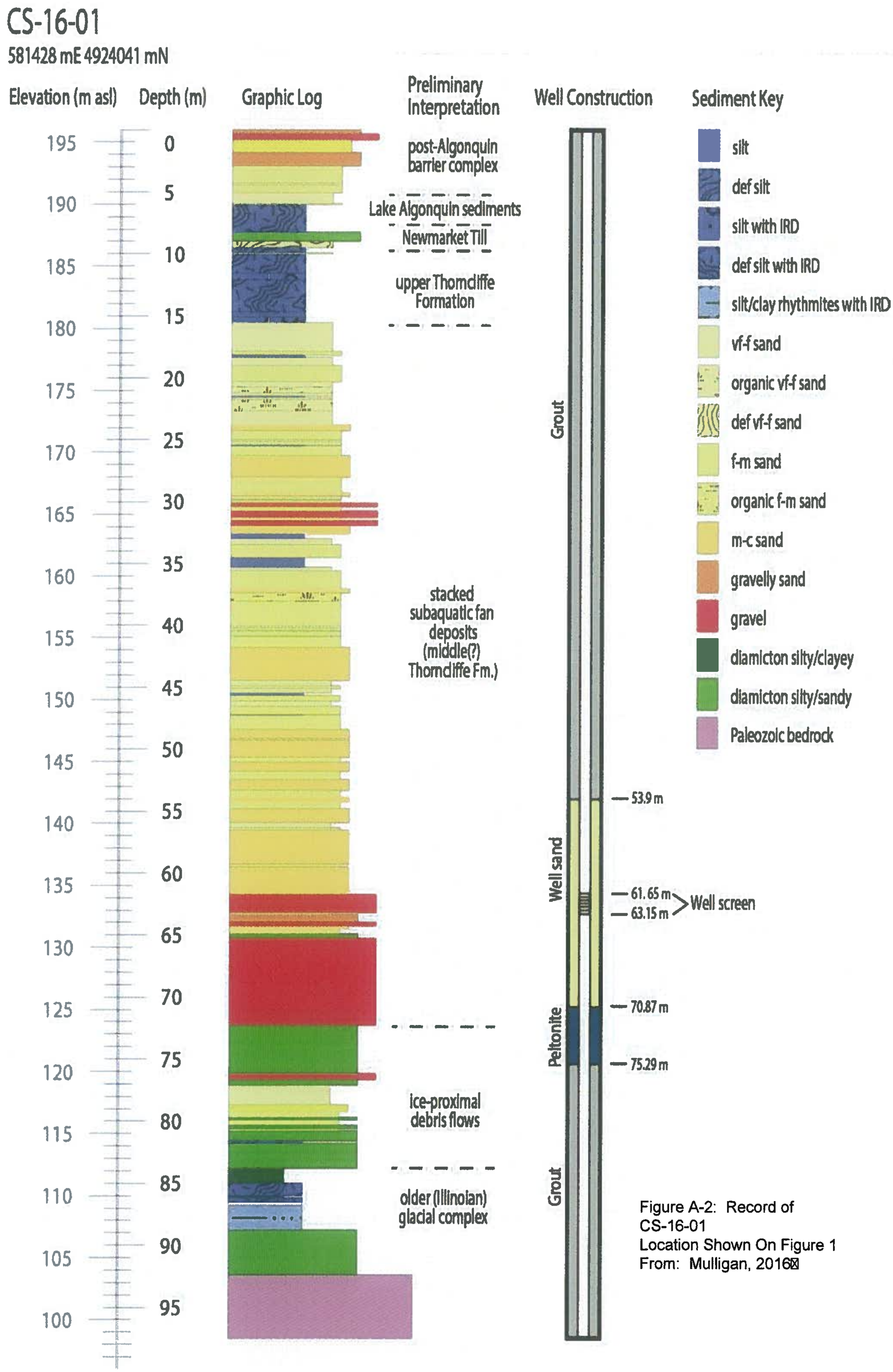


Figure A-2: Record of CS-16-01
Location Shown On Figure 1
From: Mulligan, 2016

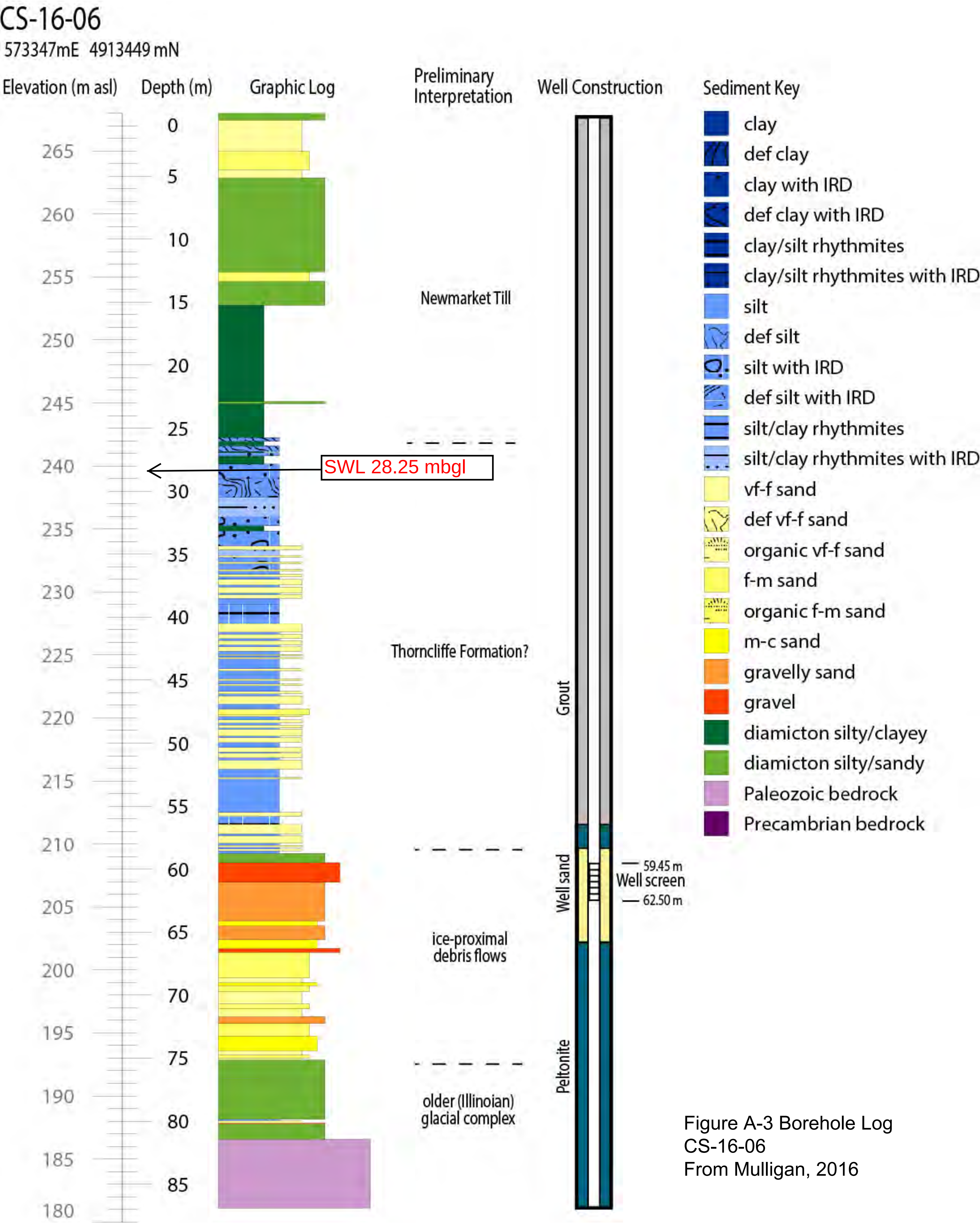


Figure A-3 Borehole Log
CS-16-06
From Mulligan, 2016

Ontario Ministry of the Environment and Climate Change

Measurements recorded in: ☒ Metric ☐ Imperial

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

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	TOWNSHIP OF CLEARVIEW.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. BOX 200	STAYNER	ON	L0M1S0	7054286230

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
15/16 SR AIRPORT ROAD.	CLEARVIEW	16	3

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

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	572856	4913308		

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
	LIMESTONE FILL			0	.3
BROWN	SAND	CLAY TILL		.3	3.6
BROWN	SAND	STONES		3.6	11.0
GREY	CLAY	TILL		11.0	23.8
GREY	CLAY		SOFT	23.8	29.9
GREY	CLAY		DENSE	29.9	36.6
BROWN	SAND			36.6	37.5
BROWN	SAND	LAYERS CLAY		37.5	43.6
GREY	CLAY		DENSE	43.6	46.6

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	91.5	BENTONITE GROUT	1800 Ltr

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	

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

Status of Well

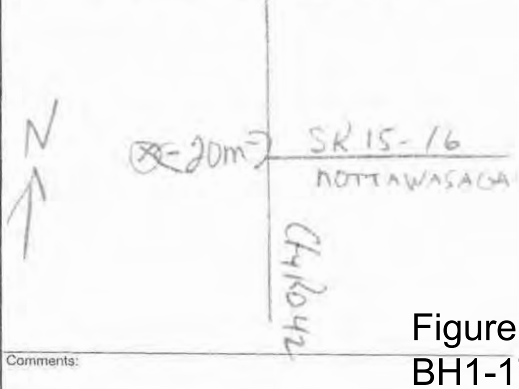
☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, *specify* ☐ Other, *specify*

Construction Record - Screen

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

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)
0	46.6	15

Well Contractor and Well Technician Information

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

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

Province	Postal Code	Business E-mail Address
ON	L0K1V0	awww@bellnet.ca.

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
7058355640	WRIGHT DAVID

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

Well owner's information package delivered ☐ Yes ☒ No

Date Package Delivered

Date Work Completed 20170209

Ministry Use Only

Audit No. Z240013

Received

0506E (2014/11)

Contractor's Copy

Figure A-4 Record of BH1-17

Ontario Ministry of the Environment and Climate Change

Measurements recorded in: [X] Metric [ ] Imperial

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

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name / Last Name / Organization	E-mail Address		
TOWNSHIP OF CLEARVIEW		[ ] Well Constructed by Well Owner	
Mailing Address (Street Number/Name): P.O. BOX 200	Municipality: STAYNER	Province: ON	Postal Code: L0M1S0 — Telephone No. (inc. area code): 7054286230

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
15/16 S.R.	CLEARVIEW	15	2
County/District/Municipality: SIMCOE	City/Town/Village: STAYNER	Province: Ontario	Postal Code:
UTM Coordinates — Zone: 17, Easting: 573923, Northing: 4913654 (NAD 83)	Municipal Plan and Sublot Number	Other	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	SAND	CLAY GRAVEL		0	5.2
GREY	CLAY			5.2	25.9
BROWN	SAND	SILT CLAY	LAYERS.	25.9	35.7
GREY	CLAY		SOFT	35.7	39.3
BROWN	SAND	SILT	DIRTY	39.3	48.8
BROWN	SAND		DIRTY TOWARD BOTTOM	48.8	57.9
GREY	SAND	GRAVEL	CEMENTED TO END.	57.9	61.0
GREY	SAND	CLAY STONE TILL		61.0	64.9
GREY	LIMESTONE			64.9	65.6

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	32m	BENTONITE GROUT	800 Ltr
32	65.6	BENTONITE + SAND	750 Ltr

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ___ hrs + ___ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	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	

Method of Construction

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

Well Use

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

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

Status of Well

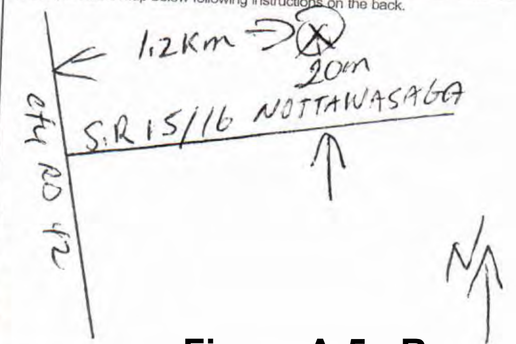
[ ] Water Supply [ ] Replacement Well [X] Test Hole [ ] Recharge Well [ ] Dewatering Well [ ] Observation and/or Monitoring Hole [ ] Alteration (Construction) [ ] Abandoned, Insufficient Supply [ ] Abandoned, Poor Water Quality [ ] Abandoned, other, specify [ ] Other, specify

Construction Record - Screen

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

Map of Well Location

Please provide a map below following instructions on the back.



Water Details

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

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

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	65.6	15

Well Contractor and Well Technician Information

Business Name of Well Contractor: ALLAN WRIGHT WATER WELLS

Well Contractor's Licence No.: 5528

Business Address (Street Number/Name): 4121 Hwy 93

Municipality: HILLSDALE

Province: ON Postal Code: L0L1V0

Business E-mail Address: acwwwl@bellnet.ca

Bus. Telephone No. (inc. area code): 7058355646

Name of Well Technician (Last Name, First Name): WRIGHT GAVIN.

Well Technician's Licence No.: 2976

Signature of Technician and/or Contractor

Date Submitted: Y Y Y Y M M D D

Comments:

Well owner's information package delivered [ ] Yes [X] No

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

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

Ministry Use Only

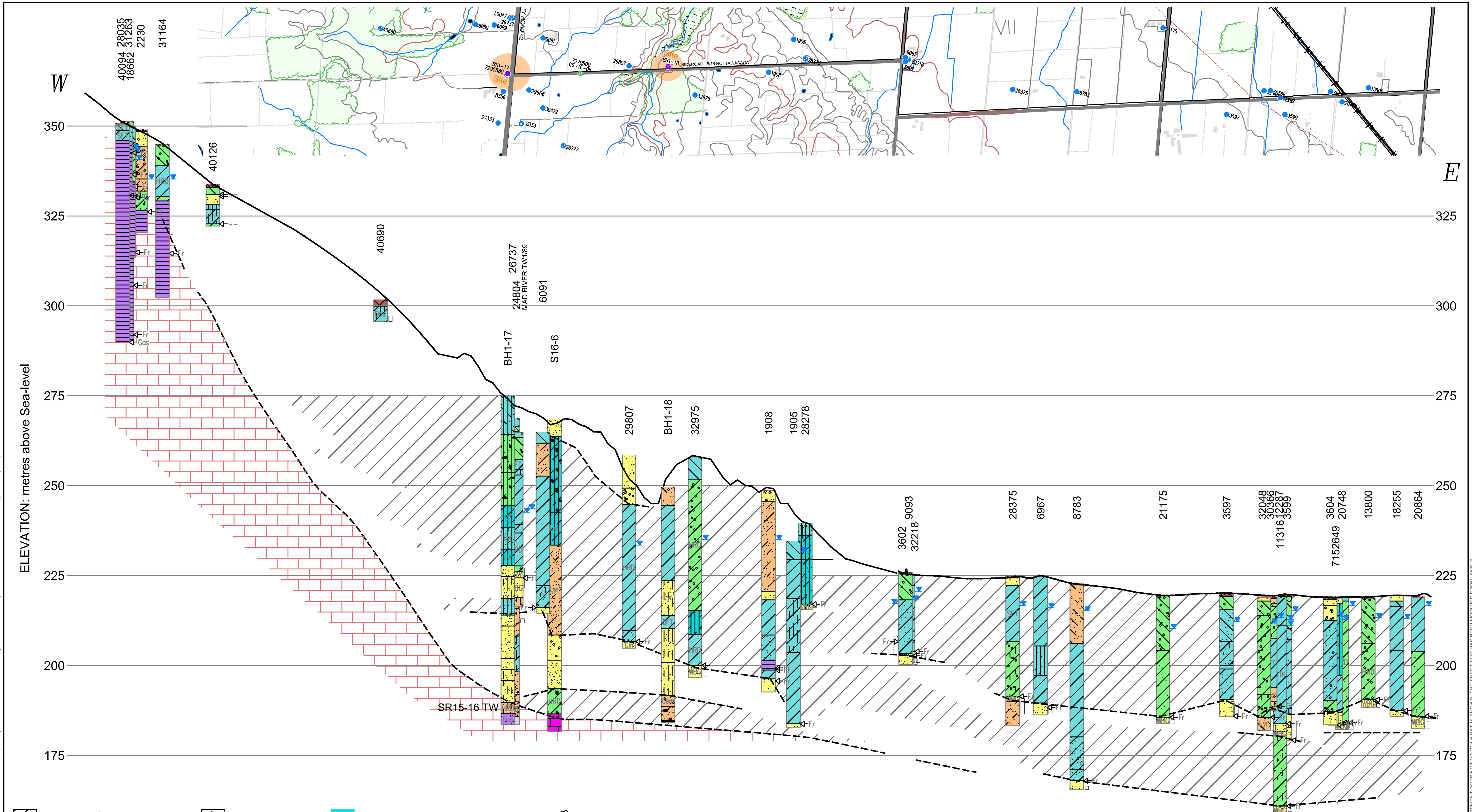
Audit No. Z240105

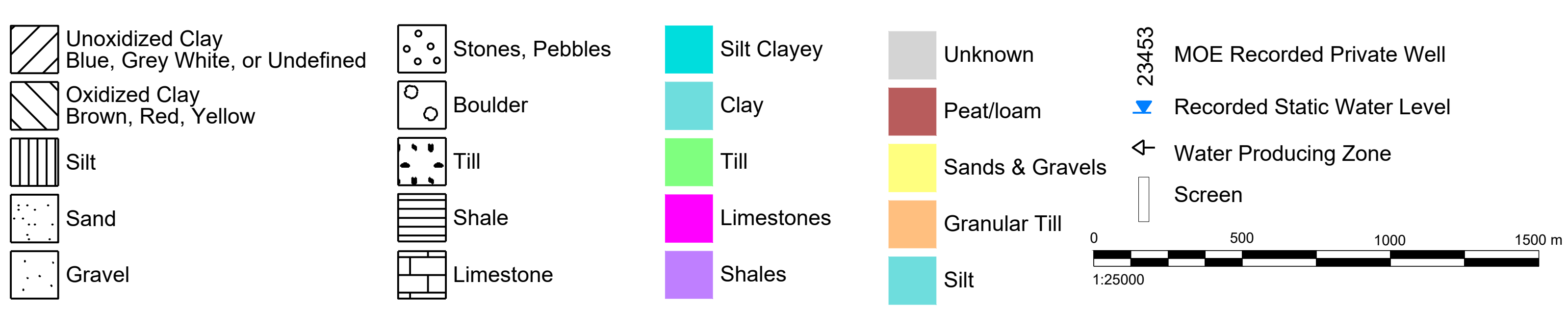
Received

0506E (2014/11)

Ministry's Copy

Figure A-5: Record of BH1-18





CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION ADDENDUM

CONSULTANT

GOLDER

YYYY-MM-DD	2018-11-09
DESIGNED	
PREPARED	JPR
REVIEWED	DPD
APPROVED	JAE

TITLE
CROSS-SECTION C - C'
15/16 SIDEROAD WELL SITE

PROJECT NO.	Control	REV.	Figure
1415404	EB		A-6

APPENDIX B

Klondike Park Road Site

Ontario | Ministry of the Environment and Climate Change

Measurements recorded in: ☒ Metric ☐ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*
Tag#: A 210676

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
TOWNSHIP OF CLEARVIEW			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. BOX 200	STAYNER	ON	L0M 1S0	7054286230

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1585 KLONDIKE PARK RD.	CLEARVIEW	10	13

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

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	579388	4923729	SITE #1	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	SAND	CLAY STONES		0	1.5
GREY	CLAY	STONES.		1.5	7.6
BROWN	SAND.			7.6	11.6
BROWN	SAND	GRAVEL CLAY		11.6	27.4
BROWN	SAND			27.4	35.0
GREY	SAND.	SILT	DENSE	35.0	41.1
BROWN	SAND	GRAVEL	PACKED	41.1	45.4
BROWN	GRAVEL	SAND.	BEST TO END.	45.4	54.8
GREY	CLAY	GRAVEL SAND.		54.8	55.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	42.6	BENTONITE GROUT	530 Ltr

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) 40 L/m

Duration of pumping 1 hrs + 0 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	7.41		
1		1	
2		2	
3		3	
4		4	
5		5	
10	30.0	10	
15		15	
20	30.0	20	
25		25	
30		30	
40		40	
50		50	
60	30.0	60	

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
5cm	PVC	Sch 40	+5	44.9

Status of Well

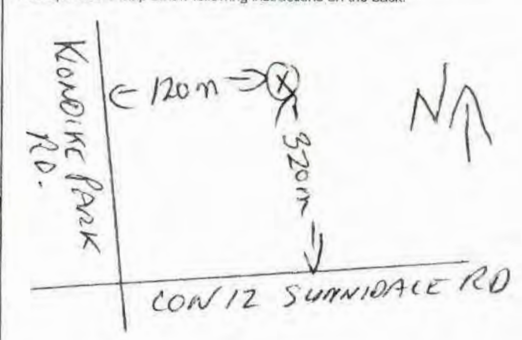
☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☒ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
5cm	PVC	010	44.9	50.9

Map of Well Location

Please provide a map below following instructions on the back.



Water Details

Water found at Depth 44m 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)
0	55.5	16cm

Well Contractor and Well Technician Information

Business Name of Well Contractor: ACCANWRIGHT WATER WELLS — Well Contractor's Licence No. 5528

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

Province: ON — Postal Code: L0L 1V0 — Business E-mail Address: awwwc@bellnet.ca

Bus. Telephone No. *(inc. area code)*: 7058355646 — Name of Well Technician (Last Name, First Name): WRIGHT DAVIN

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

Comments:

Well owner's information package delivered ☐ Yes ☒ No — Date Package Delivered — Date Work Completed 20180628

Ministry Use Only Audit No. Z240087 Received

0506E (2014/11) Ministry's Copy

Figure B-1: Record of OW1

Ontario | Ministry of the Environment and Climate Change

Well Tag No. *(Place Sticker and/or Print Below)*
Tag#:A 210677

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: ☒ Metric ☐ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
TOWNSHIP OF CLEARVIEW			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
P.O. BOX 200	STAYNER	ON	L0M1S0	7054286230

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1585 KLONDIKE PARK RD	CLEARVIEW	10	13

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

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	579397	4923634	SITE #2	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	SAND	CLAY STONES		0	1.5
GREY	CLAY	STONES		1.5	3.1
BROWN	SAND			3.1	14.6
GREY	CLAY	SAND SILT STONE TILL		14.6	27.4
BROWN	SAND.			27.4	38.7
GREY	CLAY			38.7	40.8
BROWN	SAND		FINE DENSE	40.8	45.1
BROWN	SAND	GRAVEL	BEST TO END.	45.1	54.9
				54.9	55.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	42.1	BENTONITE GROUT	525 Ltr

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): 40 L/m

Duration of pumping: 1 hrs + 0 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	9.66		
1		1	
2		2	
3		3	
4		4	
5		5	
10	30.0	10	
15		15	
20	30.0	20	
25		25	
30		30	
40		40	
50		50	
60	30.0	60	

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
5cm	PVC	Sch40	+.5	48.3

Status of Well

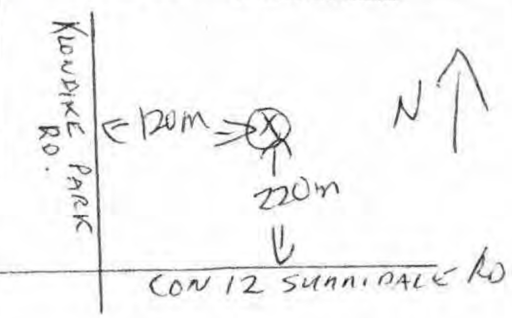
☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☒ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
5cm	PVC	010	48.3	54.3

Map of Well Location

Please provide a map below following instructions on the back.



Water Details

Water found at Depth 48 (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)
0	55.5	16cm

Well Contractor and Well Technician Information

Business Name of Well Contractor: ALLAN WRIGHT WATER WELLS

Well Contractor's Licence No.: 5528

Business Address (Street Number/Name): 4121 Hwy 93

Municipality: HILLSDALE

Province: ON

Postal Code: L0L1V0

Business E-mail Address: awww@bellnet.ca

Bus. Telephone No. (inc. area code): 7058355646

Name of Well Technician (Last Name, First Name): WRIGHT GAVIN

Well Technician's Licence No.: 2976

Signature of Technician and/or Contractor

Date Submitted: Y Y Y Y M M D D

Comments:

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

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

Date Work Completed: 20180628

Ministry Use Only

Audit No. Z240088

Received

0506E (2014/11)

Ministry's Copy

Figure B-2: Record of OW2

Ontario Ministry of the Environment and Climate Change

Measurements recorded in: ☒ Metric ☐ Imperial

Well Tag#: A210653 (Tag Number Sticker and/or Print Below)

A210683

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
TOWNSHIP	OF CLEARVIEW		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
P.O. BOX 200	STAYNER	ON	L0M 1S0	705 428 6230

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1585 KLONDIKE PARK RD	CLEARVIEW	10	13

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

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	579430	4923732		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	SAND CLAY	STONES		0	1.5
BROWN/GREY	CLAY	STONES		1.5	7.6
BROWN	SAND			7.6	11.6
BROWN	SAND	GRAVEL CLAY		11.6	27.4
BROWN	SAND			27.4	35.0
GREY	SAND	SILT CLAY	DENSE	35.0	41.1
BROWN	SAND	GRAVEL		41.1	45.4
BROWN	GRAVEL	SAND		45.4	55.8
GREY	CLAY	GRAVEL SAND		55.8	58.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	38.1	BENTONITE GROUT	

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): 42.7 m

Pumping rate (l/min / GPM): 2270 L/m

Duration of pumping: 72 hrs + 0 min

Final water level end of pumping (m/ft): 10.965 m

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	7.96		
1	10.07	1	8.78
2	10.13	2	8.65
3	10.19	3	8.63
4	10.25	4	8.59
5	10.26	5	8.55
10	10.39	10	8.44
15	10.46	15	8.37
20	10.51	20	8.325
25	10.54	25	8.29
30	10.56	30	8.26
40	10.61	40	8.215
50	10.64	50	8.185
60	10.66	60	8.16

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
20.5	STEEL	250	+.7	47.5
20	S.STEEL	0slot	46.5	47.5

Status of Well

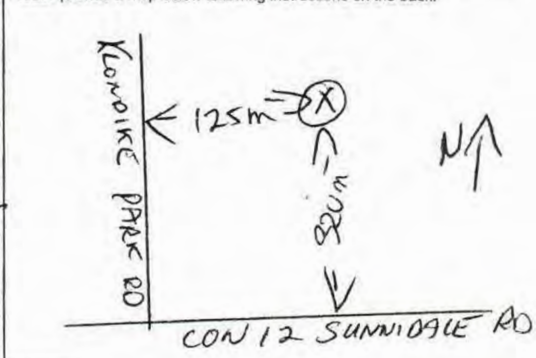
☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
20cm	S STEEL	050	47.5	55.1

Map of Well Location

Please provide a map below following instructions on the back.



Water Details

Water found at Depth 47 m 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)
0	56	38cm

Well Contractor and Well Technician Information

Business Name of Well Contractor: ALLAN WRIGHT WATER WELLS

Well Contractor's Licence No.: 5528

Business Address (Street Number/Name): 4121 Hwy 93

Municipality: HILLSDALE

Province: ON Postal Code: L0L 1V0 Business E-mail Address: awww@bellnet.ca

Bus. Telephone No. (inc. area code): 7058355646

Name of Well Technician (Last Name, First Name): WRIGHT ALVIN

Well Technician's Licence No.: 2976

Signature of Technician and/or Contractor:

Date Submitted: Y Y Y Y M M D D

Comments:

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered: 2018 11 09

Date Work Completed: 2018 10 28

Ministry Use Only

Audit No. Z287341

Received

0506E (2014/11)

Ministry's Copy

Figure B-3: Record of TW3

Ontario — Ministry of the Environment and Climate Change

Measurements recorded in: ☒ Metric ☐ Imperial

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

Tag#: A210683

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	TOWNSHIP OF CLEARVIEW		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
P.O BOX 200	STAYNER	ON	L0M1S0	705 428 6230

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1585 KLONDIKE PARK RD	CLEARVIEW	10	13

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

UTM Coordinates Zone, Easting, Northing	Municipal Plan and Sublot Number	Other
NAD 83 17 579359 4923723		PW4-18

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	SAND	CLAY COBBLES		0	4.9
GREY	CLAY	STONES		4.9	7.6
BROWN	SAND			7.6	12.0
BROWN	SAND	GRAVEL CLAY		12.0	12.3

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	6m	BENTONITE GROUT	200Ltr

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): 9.0m

Pumping rate (l/min / GPM): 30L/m

Duration of pumping: 1 hrs + 30 min

Final water level end of pumping (m/ft): 9.0m

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	6.42		
1	9.0	1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60	9.0	60	

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
5cm	PVC	Sch 40	+.5	8.9

Status of Well

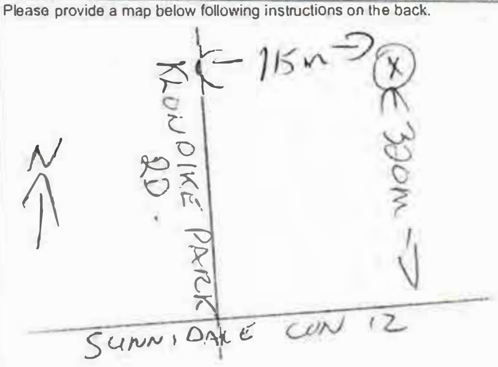
☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☒ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
5cm	PVC	.010	8.9	12.0m

Map of Well Location

Please provide a map below following instructions on the back.



Water Details

Water found at Depth 8.9m (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)
0	12.3	15

Well Contractor and Well Technician Information

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

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

Province	Postal Code	Business E-mail Address
ON	L0L1V0	awwwc@ko[illegible]

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

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2976	[signature]	

Comments:

Well owner's information package delivered ☐ Yes ☒ No

Date Package Delivered:

Date Work Completed: 2018 10 23

Ministry Use Only

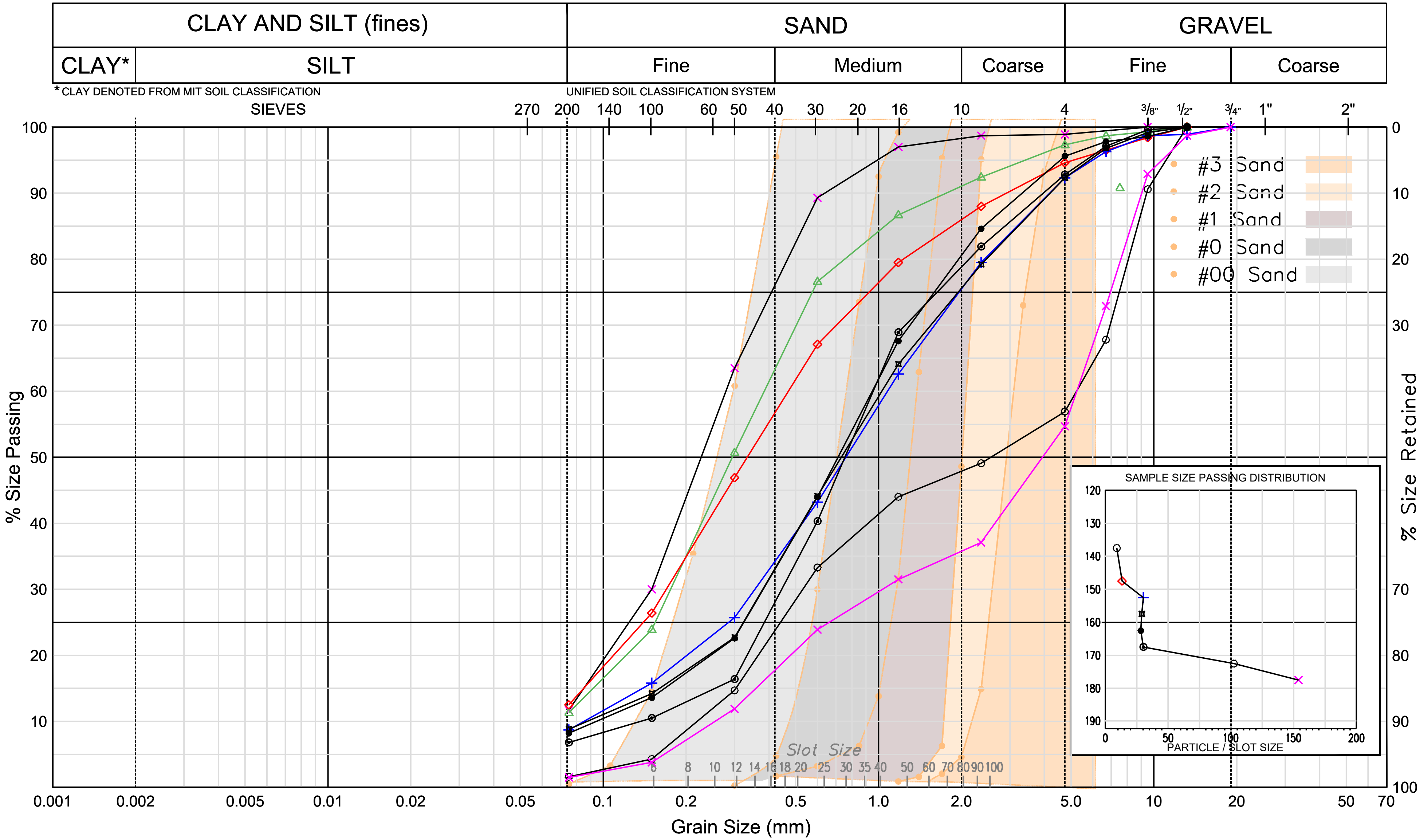
Audit No. Z287335

Received

0506E (2014/11) Ministry's Copy © Queen's Printer for Ontario, 2014

Figure B-4: Record of OW4

Path: \\golder.gds\gal\barrie\CAD\Projects\2014\141-5404 (Clearview, HydroG Stayner)\-DA-Memo\ | File Name: 1415404EBSVE1.dwg



LEGEND

× TW1-18 135-140'
△ TW1-18 140-145'
◇ TW1-18 145-150'
+ TW1-18 150-155'
¤ TW1-18 155-160'
• TW1-18 160-165'
⊙ TW1-18 165-170'
○ TW1-18 170-175'
× TW1-18 175-180'

CLIENT
TOWNSHIP OF CLEARVIEW
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA

PROJECT
WELL CONSTRUCTION AND TESTING
1585 KLONDIKE PARK ROAD

CONSULTANT

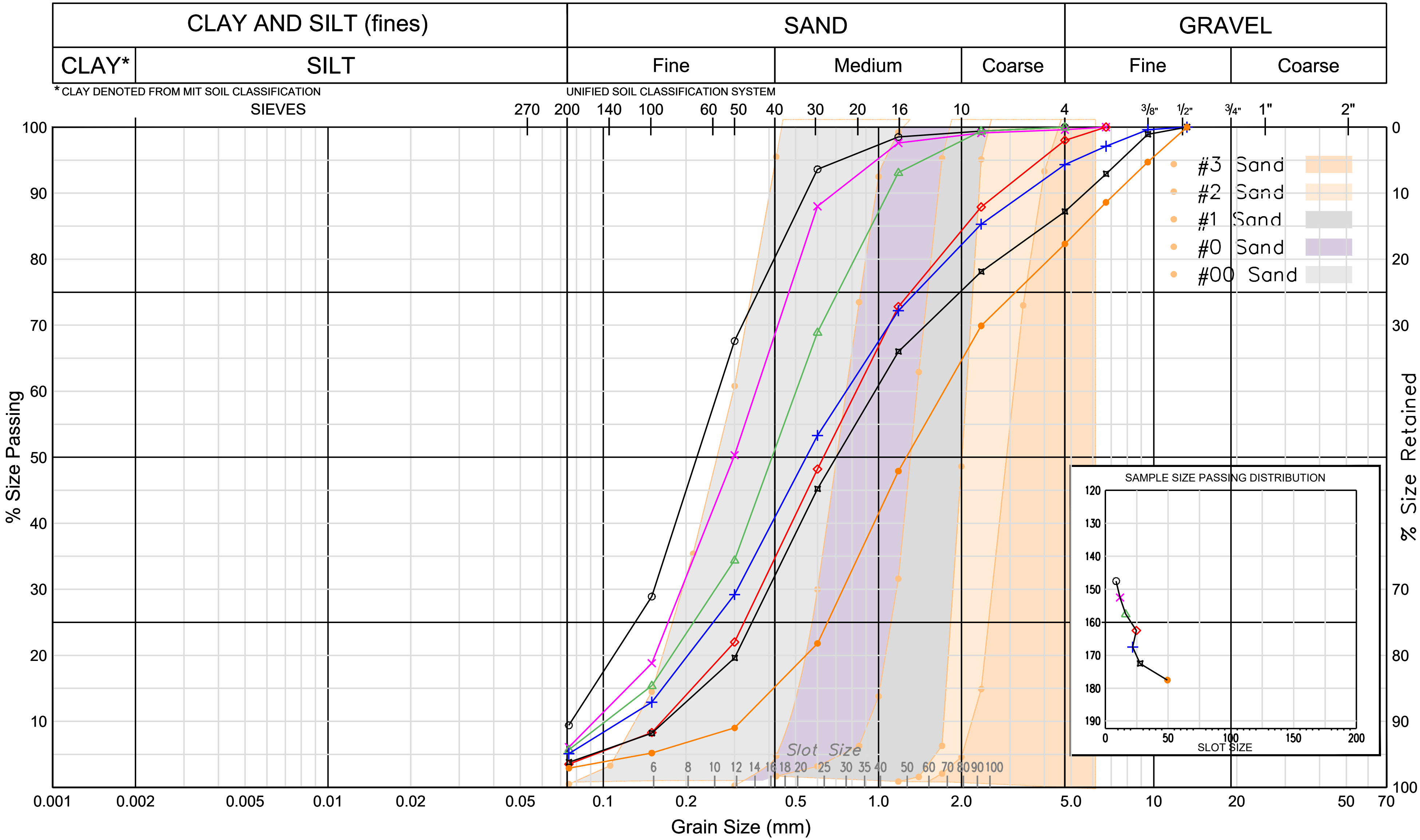
GOLDER

YYYY-MM-DD	2018-11-13
PREPARED	JPR
DESIGN	
REVIEW	
APPROVED	

TITLE
OW1-18 GRAIN-SIZE SIEVE RESULTS

PROJECT No.	Phase	Rev.	Figure
141-5404	-		B-5

Path: \\golder.gds\gal\barrie\CAD\Projects\2014\141-5404 (Clearview, HydroG Stayner)\-DA-Memo\ | File Name: 1415404EBSVE2.dwg



LEGEND
- ○ TW2–18 145–150'
- × TW2–18 150–155'
- △ TW2–18 155–160'
- ◇ TW2–18 160–165'
- + TW2–18 165–170'
- ⌑ TW2–18 170–175'
- ● TW2–18 175–180'

CLIENT
TOWNSHIP OF CLEARVIEW
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA

CONSULTANT

GOLDER

YYYY-MM-DD	2018-11-13
PREPARED	JPR
DESIGN	
REVIEW	
APPROVED	

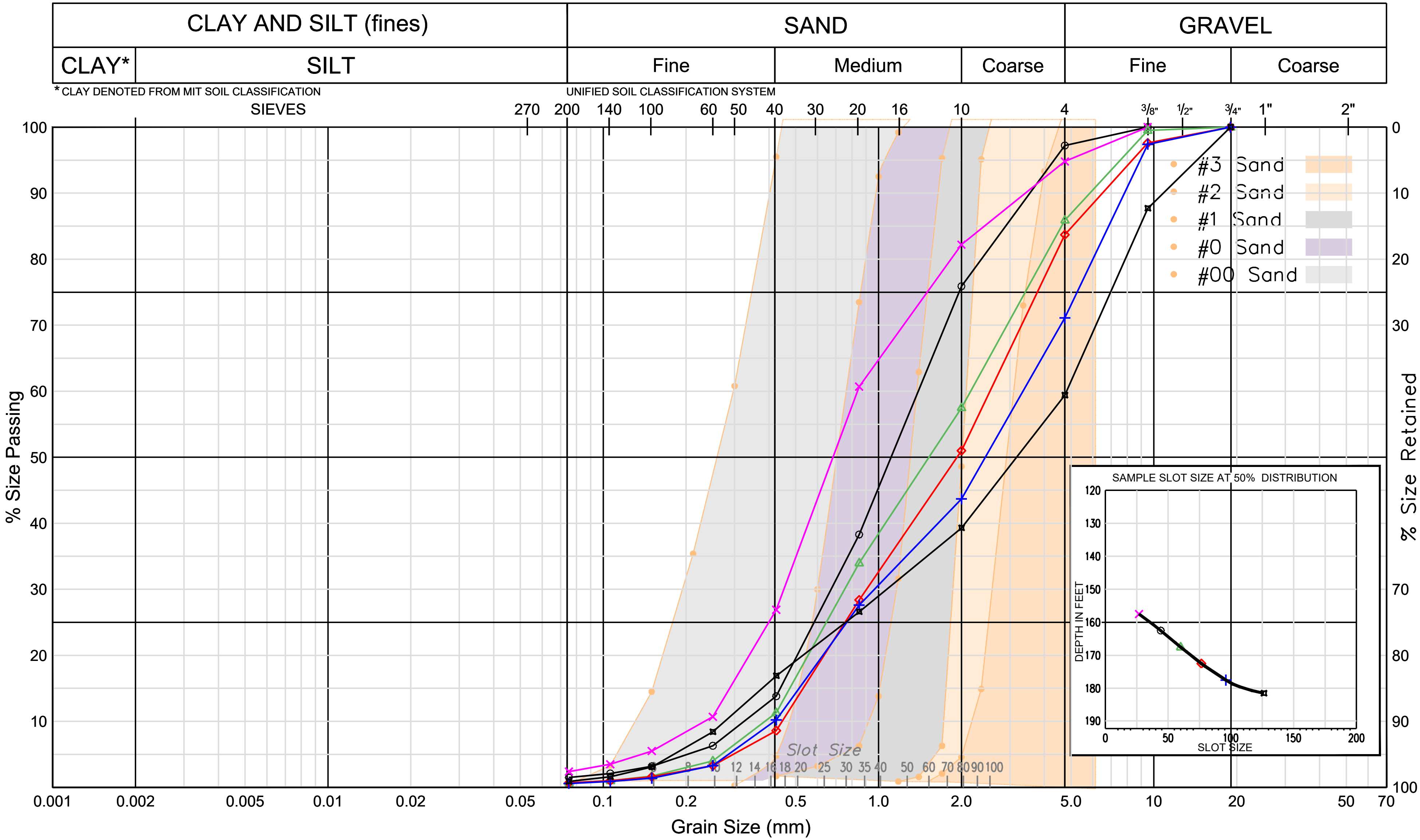
PROJECT
WELL CONSTRUCTION AND TESTING
1585 KLONDIKE PARK ROAD

TITLE
OW2-18 GRAIN-SIZE SIEVE RESULTS

PROJECT No.	Phase	Rev.	Figure
141-5404	-		B-6

25 mm

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A



LEGEND

- × TW3−18 155−160'
- ○ TW3−18 160−165'
- △ TW3−18 165−170'
- ◇ TW3−18 170−175'
- \+ TW3−18 175−180'
- ¤ TW3−18 180−183'

CLIENT
TOWNSHIP OF CLEARVIEW
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA

PROJECT
WELL CONSTRUCTION AND TESTING
1585 KLONDIKE PARK ROAD

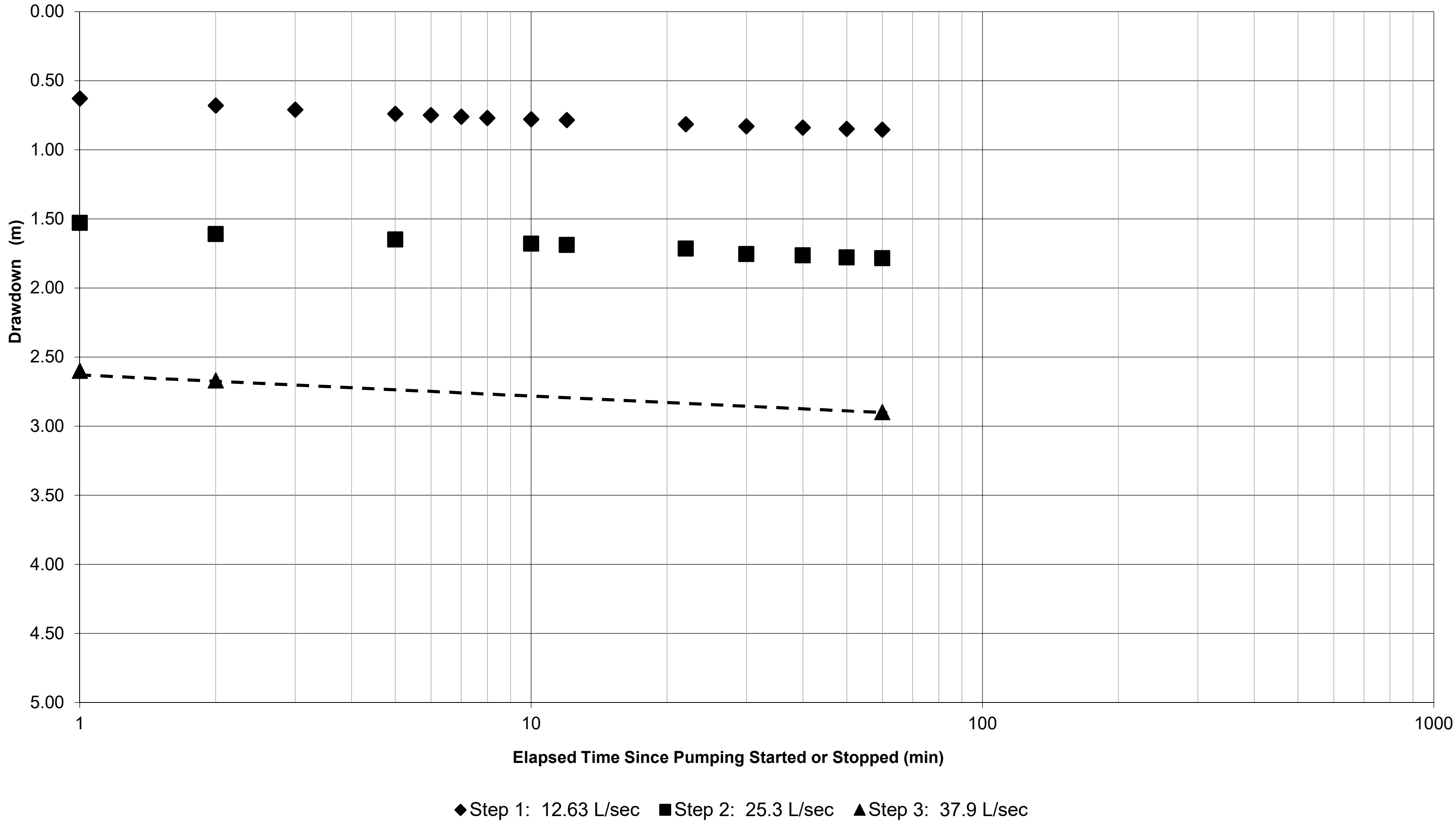
CONSULTANT

GOLDER

YYYY-MM-DD	2018-11-13
PREPARED	JPR
DESIGN	
REVIEW	
APPROVED	

TITLE
TW3-18 GRAIN-SIZE SIEVE RESULTS

PROJECT No.	Phase	Rev.	Figure
141-5404	-		B-7



Record of	TW3
Static Water Level (mbmp)	7.97 mbmp
Pumping Level End (mbmp)	10.64 mbmp

CLIENT
TOWNSHIP OF CLEARVIEW

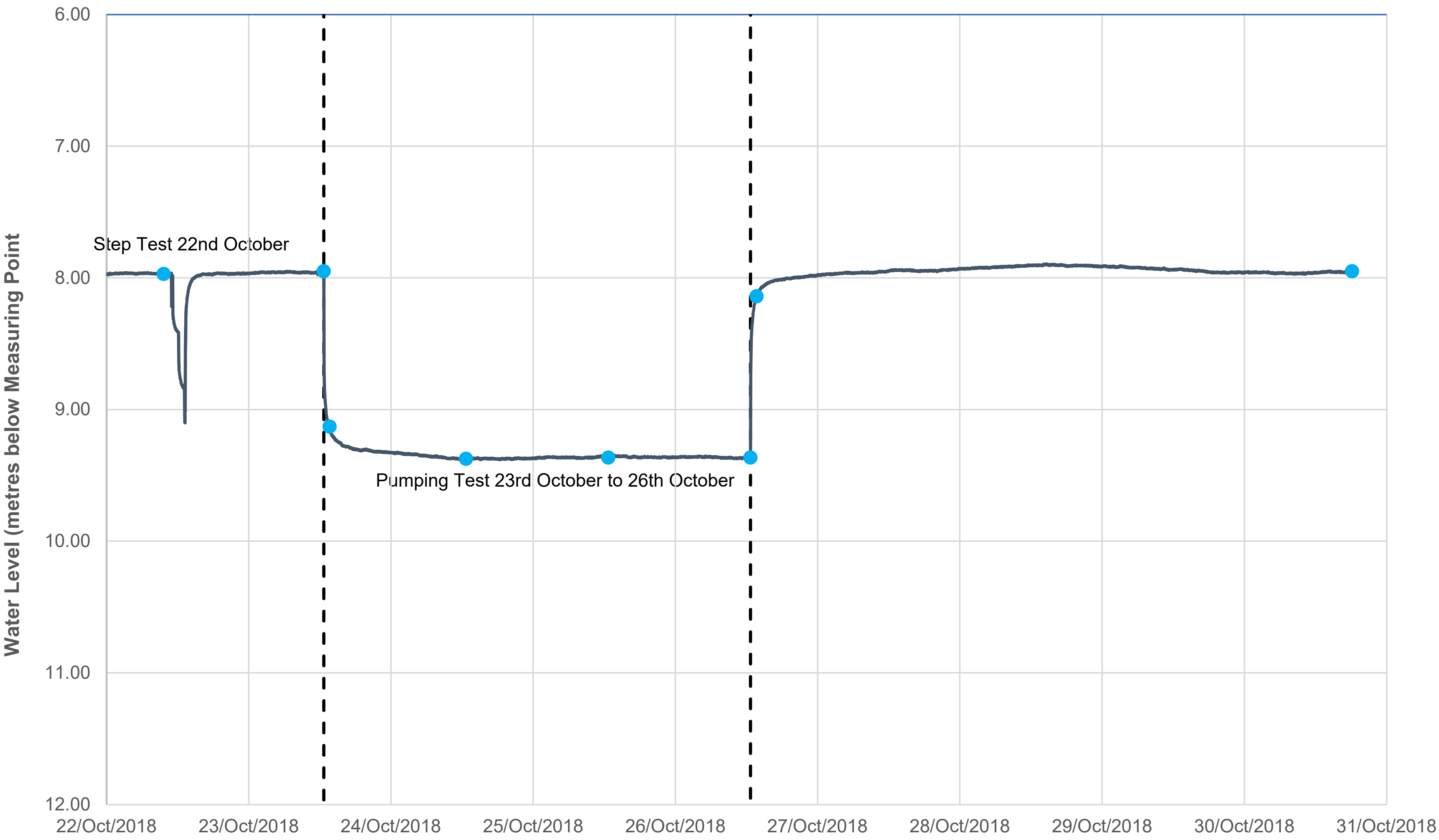
PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

GOLDER

Date of Test	22-10-2018
PREPARED	JAE
DESIGN	
REVIEW	
APPROVED	JAE

TITLE
STEPPED RATE PUMPING TEST TW3

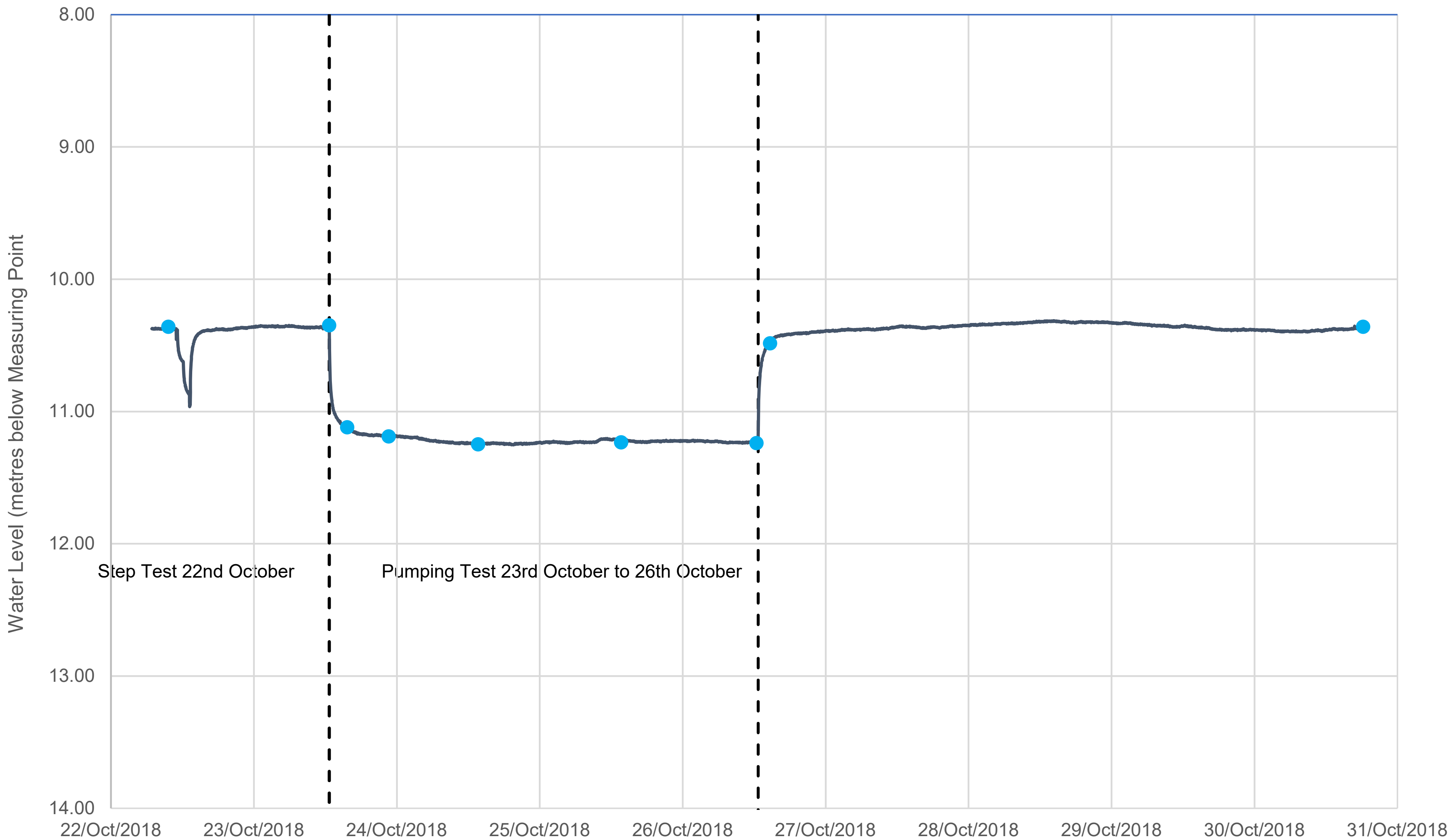
PROJECT No.	Phase	Rev	FIGURE
1415404			**B-8**



Pumping Well: TW3
Distance from Pumping Well:
Static Water Level: 7.95 mbmp
Pumping Level: 9.37 mbmp
*Levels start and Stop of Pumping Test

CLIENT	TOWNSHIP OF CLEARVIEW	PROJECT	CLEARVIEW LONG TERM WATER SUPPLY CLASS EA WATER SUPPLY EXPLORATION
CONSULTANT	GOLDER	TITLE	**CONSTANT RATE TEST OF TW3** **RECORD OF OBSERVATION WELL OW1**
YYYY-MM-DD	2018-12-03	PROJECT No.	1415404
PREPARED		Phase	
DESIGN	JPR	Rev	
REVIEW	JAE	FIGURE	**B-9**
APPROVED	JAE		

N:\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\Construction and Testing TW3 - Klondike\Working_Files\1415404-Combined-Data(JPR,20181105).xlsx



72 Hour Pump Test
Datalogger (Baro-Adjusted)
Hand Level

Pumping Well: TW3
Distance from Pumping Well: 57 m
Static Water Level: 10.37 mbmp
Pumping Level: 11.24 mbmp
*Levels start and Stop of Pumping Test

CLIENT
TOWNSHIP OF CLEARVIEW

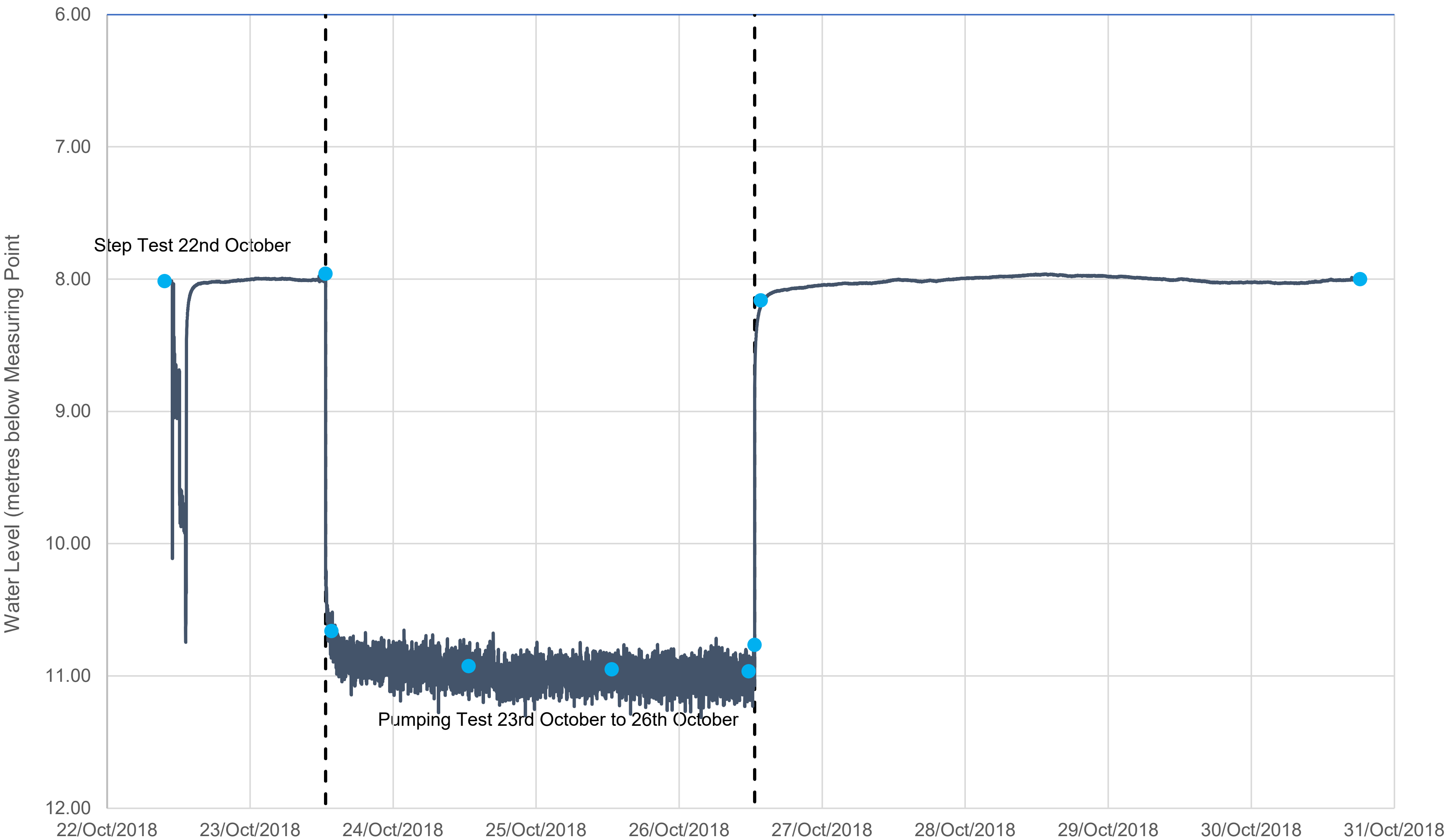
CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

TITLE
CONSTANT RATE TEST OF TW3
RECORD OF OBSERVATION WELL OW2

PROJECT No.	Phase	Rev	FIGURE
1415404			**B-10**



72 Hour Pump Test
Datalogger (Baro-Adjusted)
Hand Level

Pumping Well: TW3
Distance from Pumping Well: 0 m
Static Water Level: 8.02 mbmp
Pumping Level: 10.97 mbmp
*Levels start and Stop of Pumping Test

CLIENT
TOWNSHIP OF CLEARVIEW

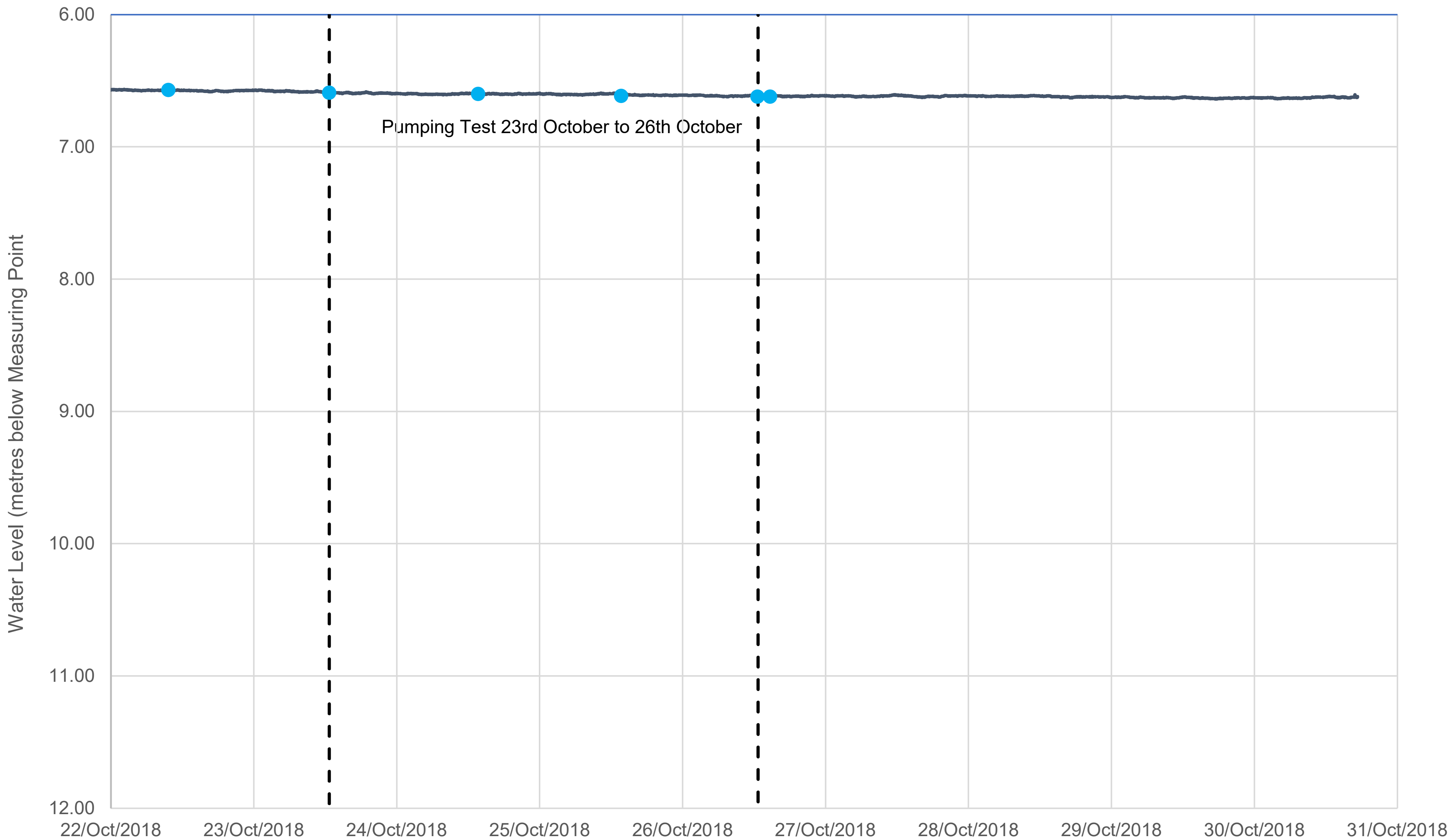
CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

TITLE
CONSTANT RATE TEST OF TW3
RECORD OF PUMPING WELL TW3

PROJECT No.	Phase	Rev	FIGURE
1415404			**B-11**



72 Hour Pump Test
Datalogger (Baro-Adjusted)
Hand Level

Pumping Well: TW3
Distance from Pumping Well: 6.0 m
Static Water Level: 6.59 mbmp
Pumping Level: 6.62 mbmp
*Levels start and Stop of Pumping Test

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

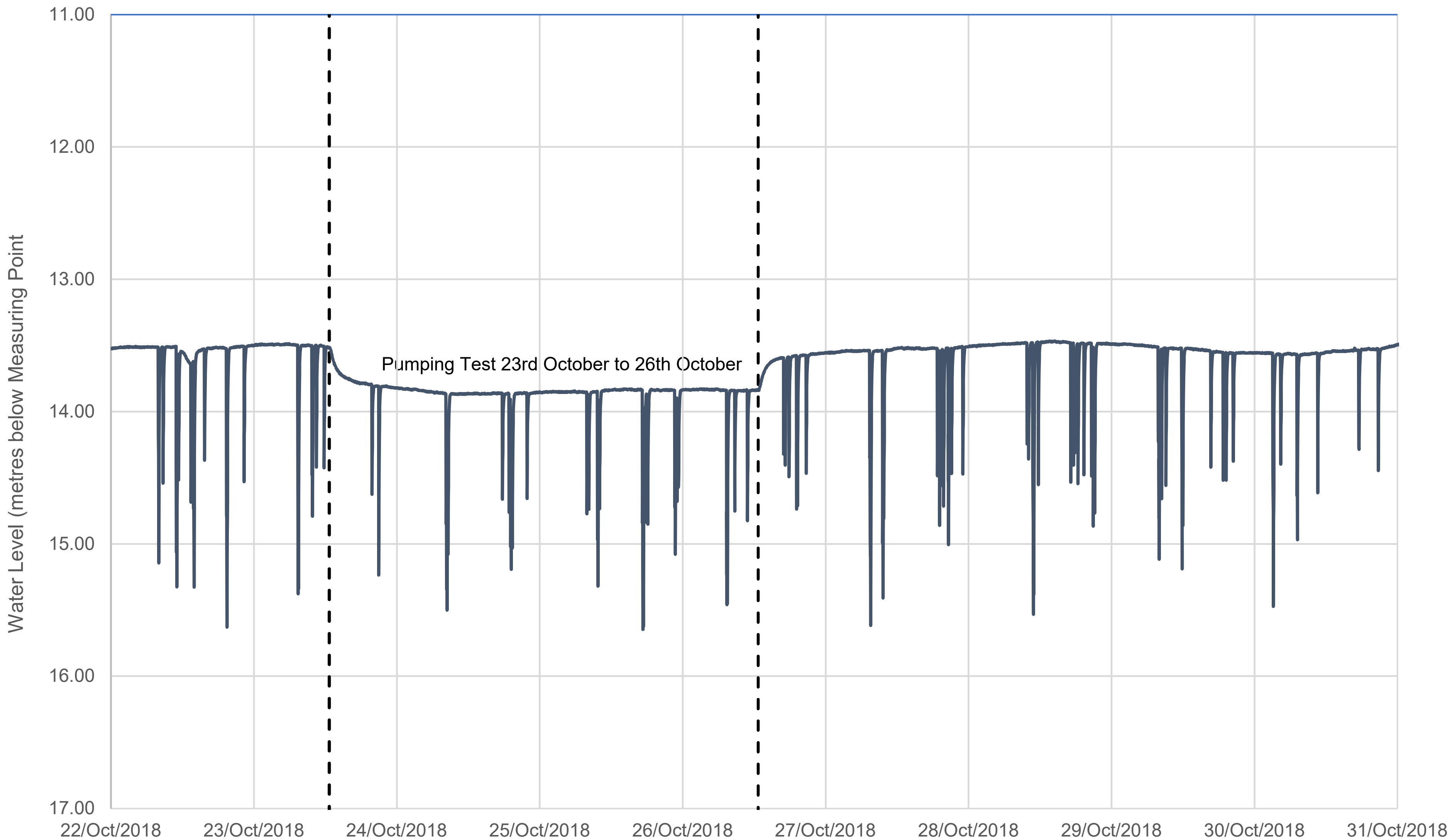
CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE

TITLE
CONSTANT RATE TEST OF TW3
RECORD OF OBSERVATION WELL OW4

PROJECT No.	Phase	Rev	FIGURE
1415404			B-12

N:\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\Construction and Testing TW3 - Klondike\Working_Files\1415404-Combined-Data(JPR,20181105).xlsx



72 Hour Pump Test
Datalogger (Baro-Adjusted)
Hand Level

Pumping Well: TW3
Distance from Pumping Well: 290 m
Static Water Level: 13.52 mbmp
Pumping Level: 13.84 mbmp
*Levels start and Stop of Pumping Test

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

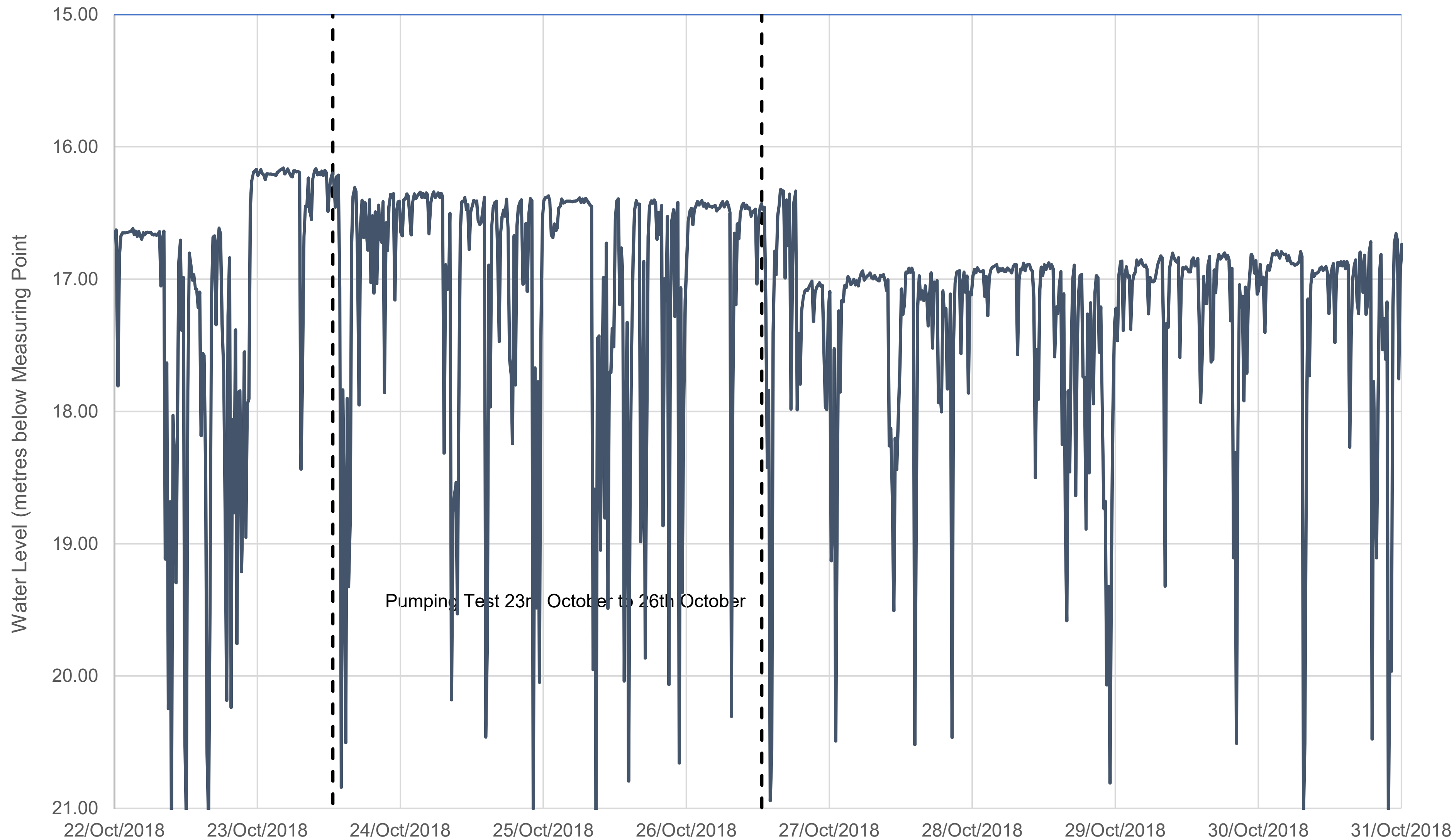
CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE

TITLE
CONSTANT RATE TEST OF TW3
RECORD OF OBSERVATION WELL A233065

PROJECT No.	Phase	Rev	FIGURE
1415404			**B-13**

N:\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\Construction and Testing TW3 - Klondike\Working_Files\1415404-Combined-Data(JPR,20181105).xlsx



72 Hour Pump Test
Datalogger (Baro-Adjusted)
Hand Level

Pumping Well: TW3
Distance from Pumping Well: 350 m
Static Water Level: mbmp
Pumping Level: mbmp
*Levels start and Stop of Pumping Test

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

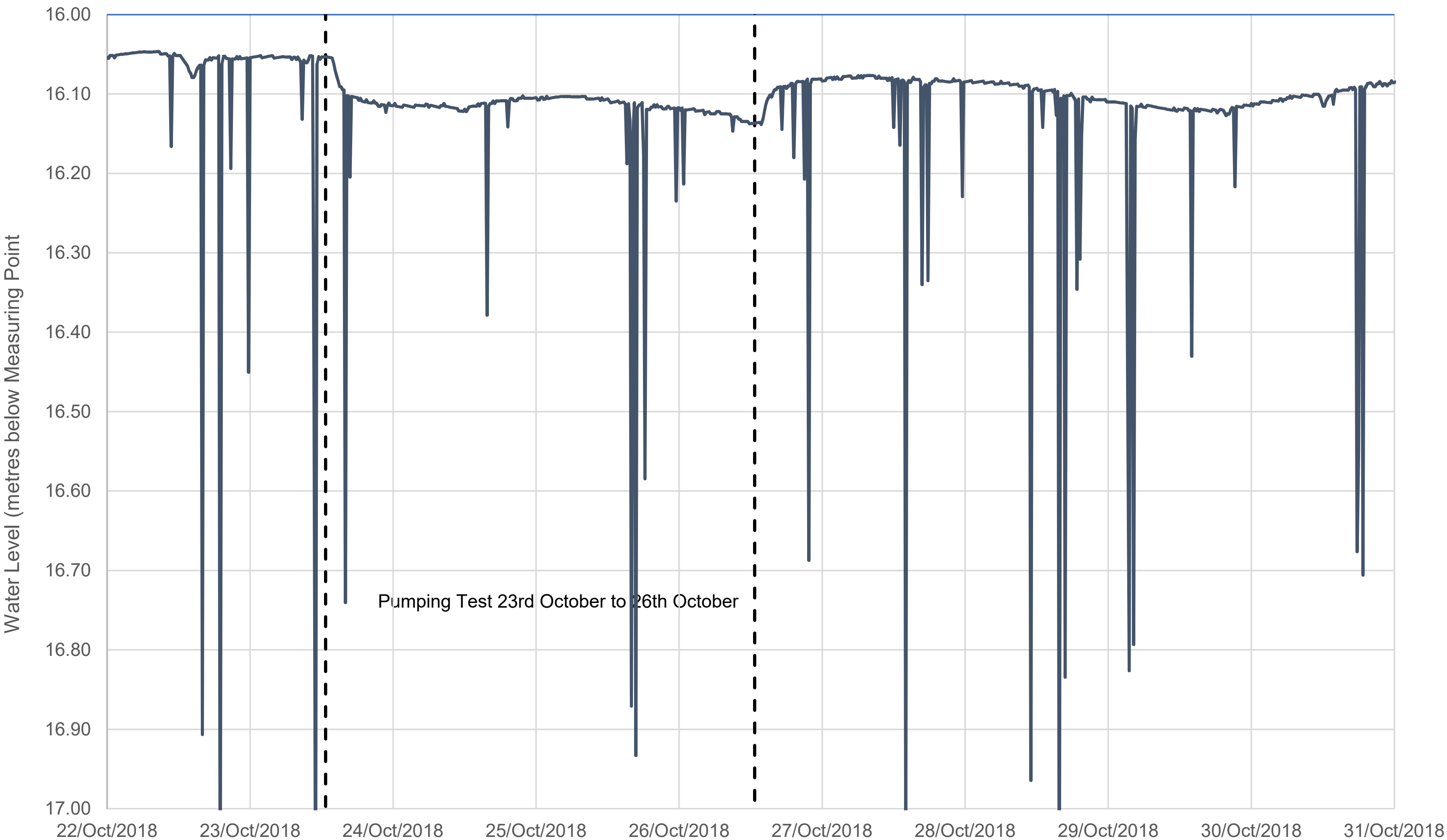
CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE

TITLE
CONSTANT RATE TEST OF TW3
RECORD OF 4341 KLONDIKE PARK ROAD

PROJECT No.	Phase	Rev	FIGURE
1415404			**B-14**

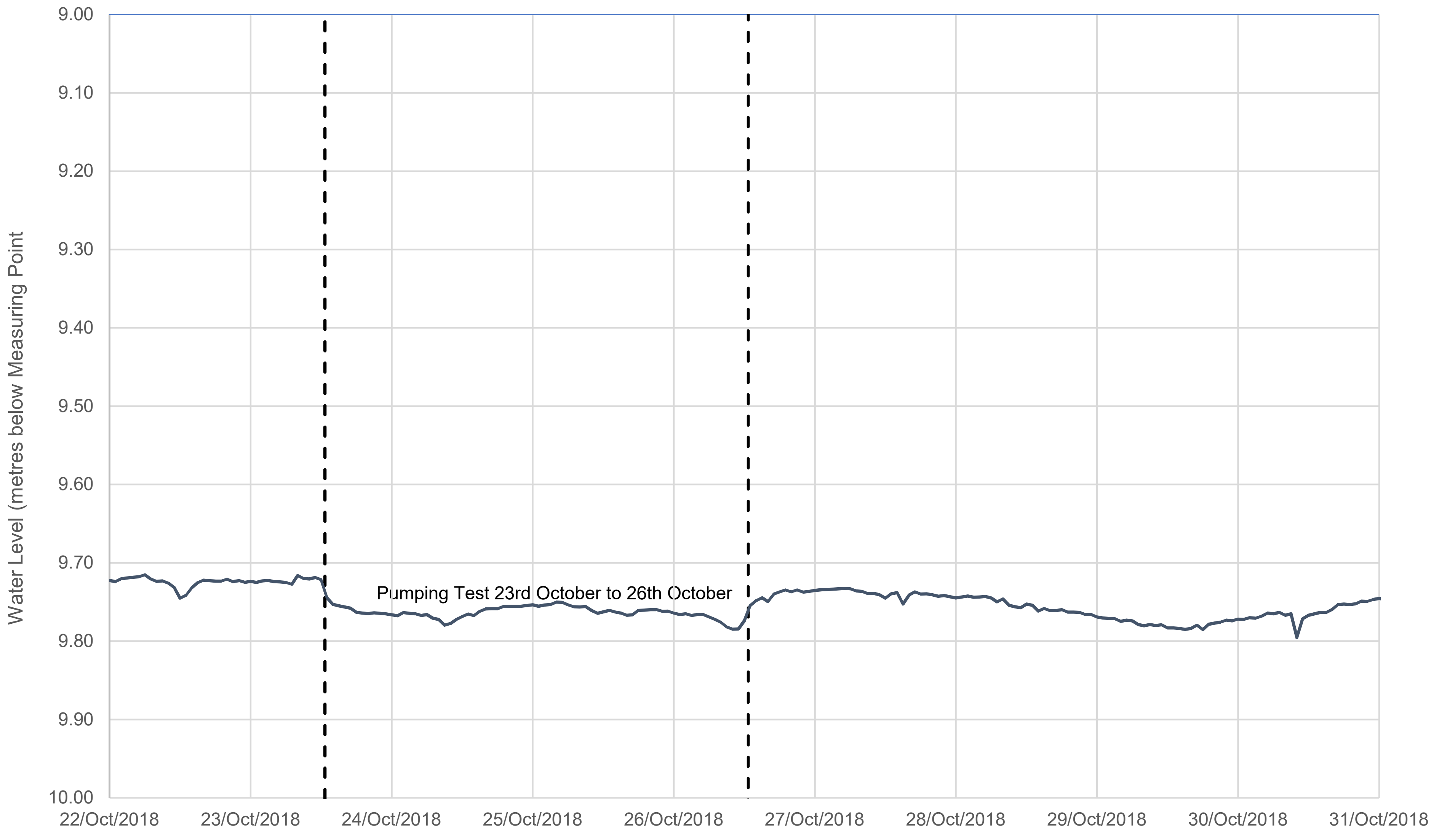
N:\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\Construction and Testing TW3 - Klondike\Working_Files\1415404-Combined-Data(JPR,20181105).xlsx



Pumping Well: TW3
Distance from Pumping Well: 590 m
Static Water Level: mbmp
Pumping Level: mbmp
*Levels start and Stop of Pumping Test

CLIENT	TOWNSHIP OF CLEARVIEW
PROJECT	CLEARVIEW LONG TERM WATER SUPPLY CLASS EA WATER SUPPLY EXPLORATION
CONSULTANT	GOLDER
YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE
TITLE	**CONSTANT RATE TEST OF TW3** **RECORD OF 4440 KLONDIKE PARK ROAD**
PROJECT No.	1415404
Phase	
Rev	
FIGURE	**B-15**

N:\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\Construction and Testing TW3 - Klondike\Working_Files\1415404-Combined-Data(JPR,20181105).xlsx



Pumping Well: TW3
Distance from Pumping Well: 670 m
Static Water Level: mbmp
Pumping Level: mbmp
*Levels start and Stop of Pumping Test

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

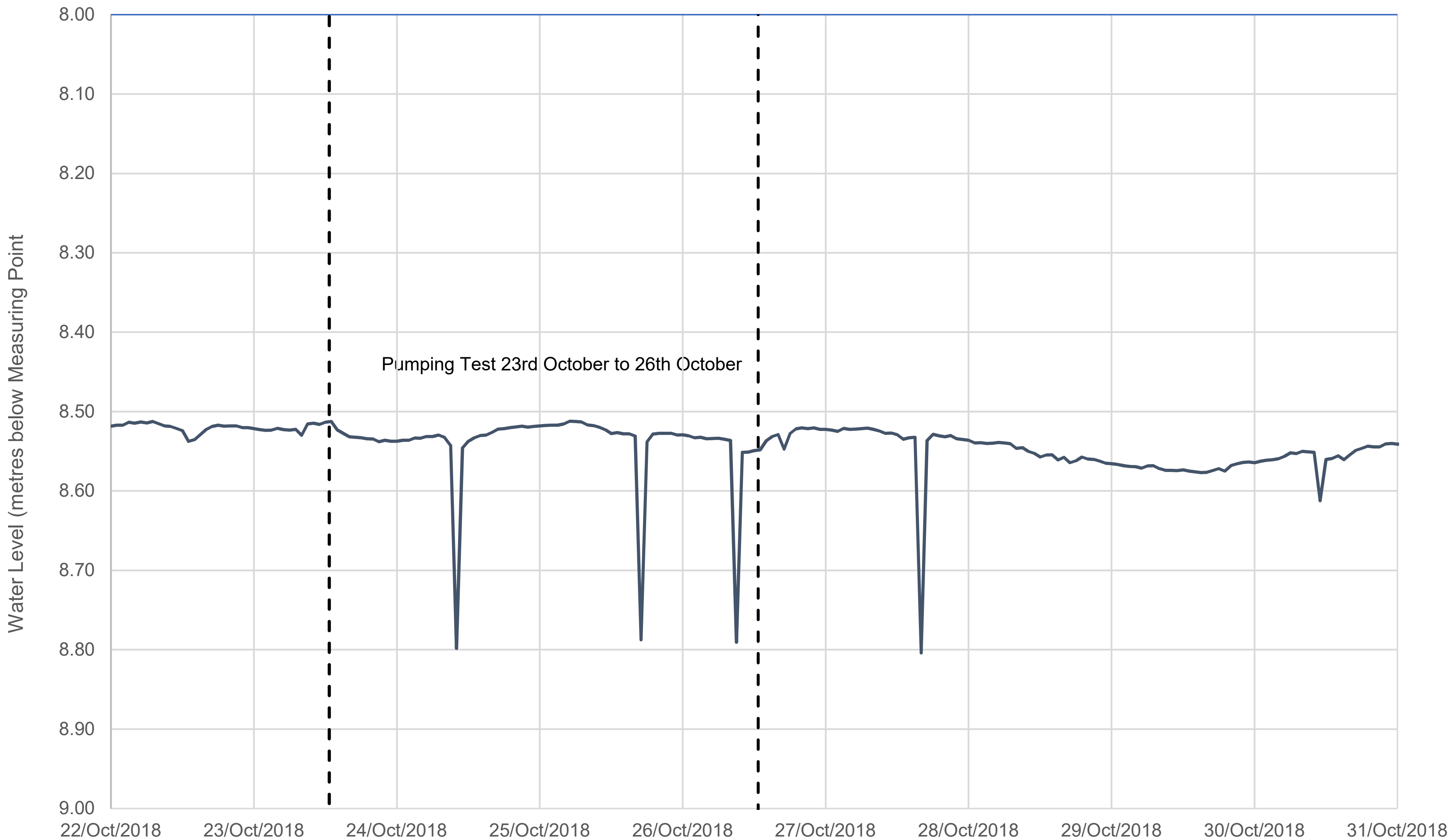
CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE

TITLE
CONSTANT RATE TEST OF TW3
RECORD OF PEACE NATURALS MW3

PROJECT No.	Phase	Rev	FIGURE
1415404			**B-16**

N:\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\Construction and Testing TW3 - Klondike\Working_Files\1415404-Combined-Data(JPR,20181105).xlsx



72 Hour Pump Test
Datalogger (Baro-Adjusted)
Hand Level

Pumping Well: TW3
Distance from Pumping Well: 960 m
Static Water Level: mbmp
Pumping Level: mbmp
*Levels start and Stop of Pumping Test

CLIENT
TOWNSHIP OF CLEARVIEW
STAYNER CLASS ENVIRONMENTAL ASSESSMENT

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

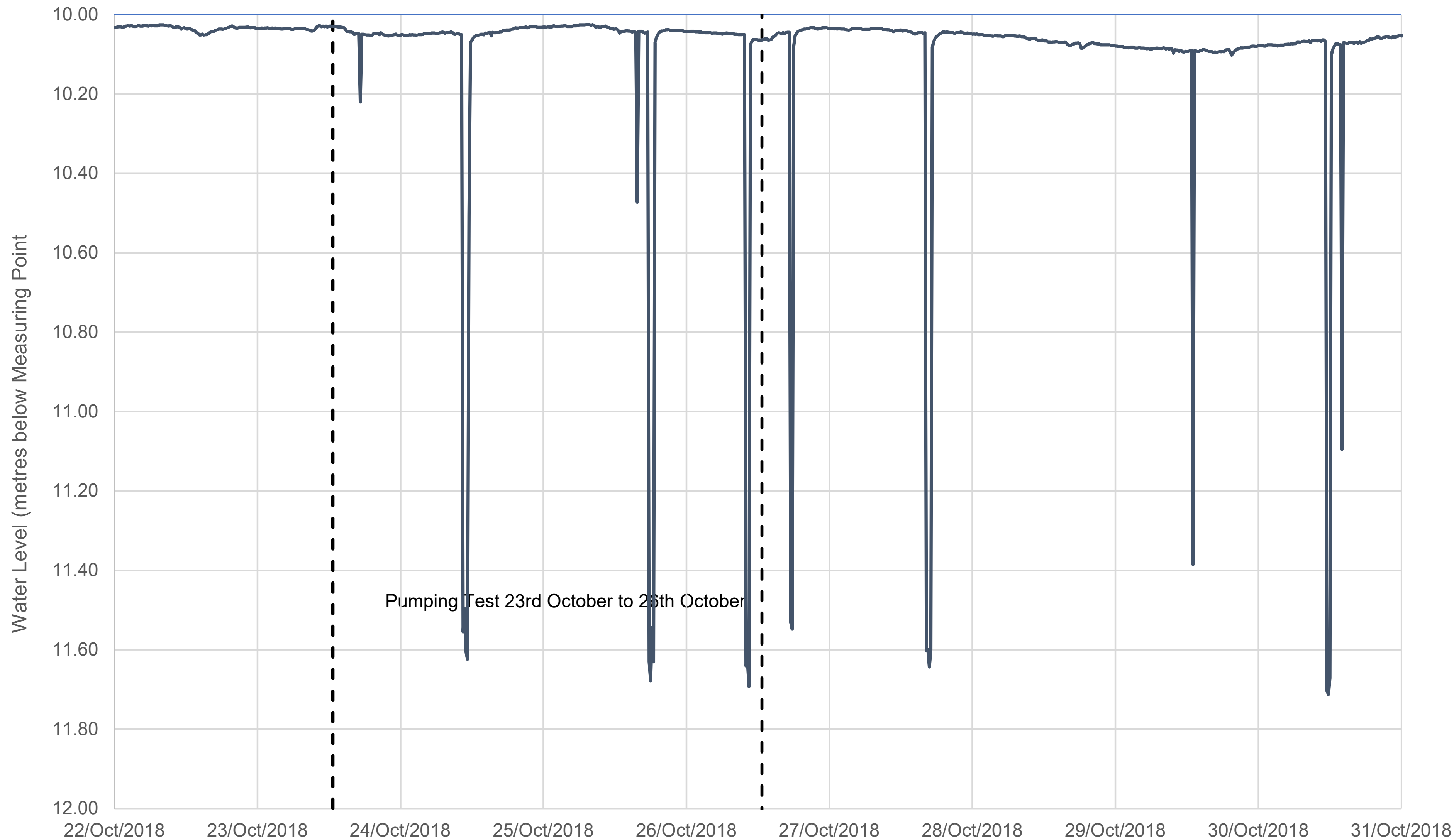
CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE

TITLE
CONSTANT RATE TEST OF TW3
RECORD OF PEACE NATURALS MW1

PROJECT No.	Phase	Rev	FIGURE
1415404			**B-17**

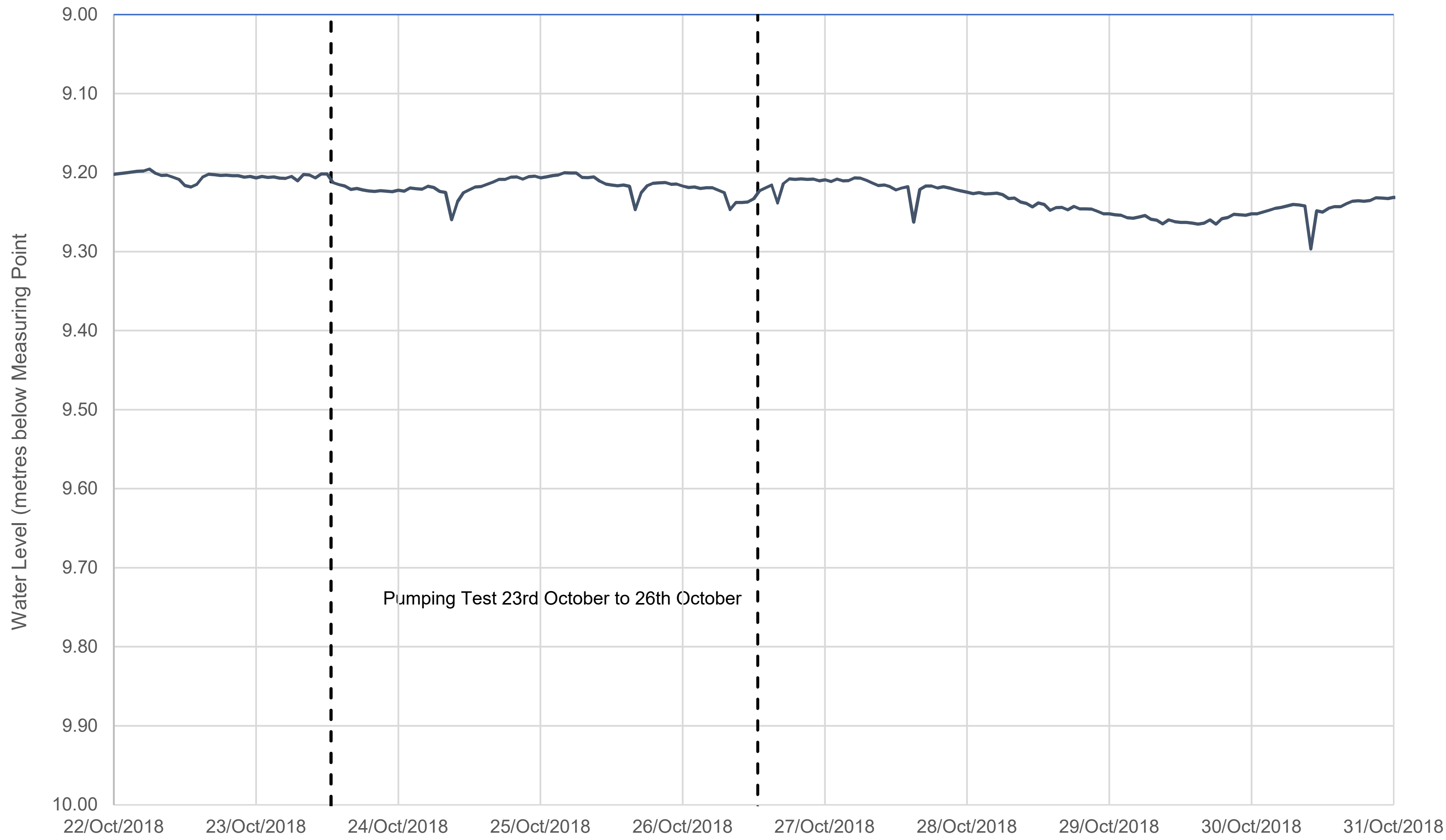
N:\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\Construction and Testing TW3 - Klondike\Working_Files\1415404-Combined-Data(JPR,20181105).xlsx



Pumping Well: TW3
Distance from Pumping Well: 990 m
Static Water Level: mbmp
Pumping Level: mbmp
*Levels start and Stop of Pumping Test

CLIENT	TOWNSHIP OF CLEARVIEW
PROJECT	CLEARVIEW LONG TERM WATER SUPPLY CLASS EA WATER SUPPLY EXPLORATION
CONSULTANT	GOLDER
YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE
TITLE	CONSTANT RATE TEST OF TW3 RECORD OF PEACE NATURALS PW1
PROJECT No.	1415404
Phase	
Rev	
FIGURE	B-18

N:\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\Construction and Testing TW3 - Klondike\Working_Files\1415404-Combined-Data(JPR,20181105).xlsx



72 Hour Pump Test
Datalogger (Baro-Adjusted)
Hand Level

Pumping Well: TW3
Distance from Pumping Well: 1000 m
Static Water Level: mbmp
Pumping Level: mbmp
*Levels start and Stop of Pumping Test

CLIENT
TOWNSHIP OF CLEARVIEW

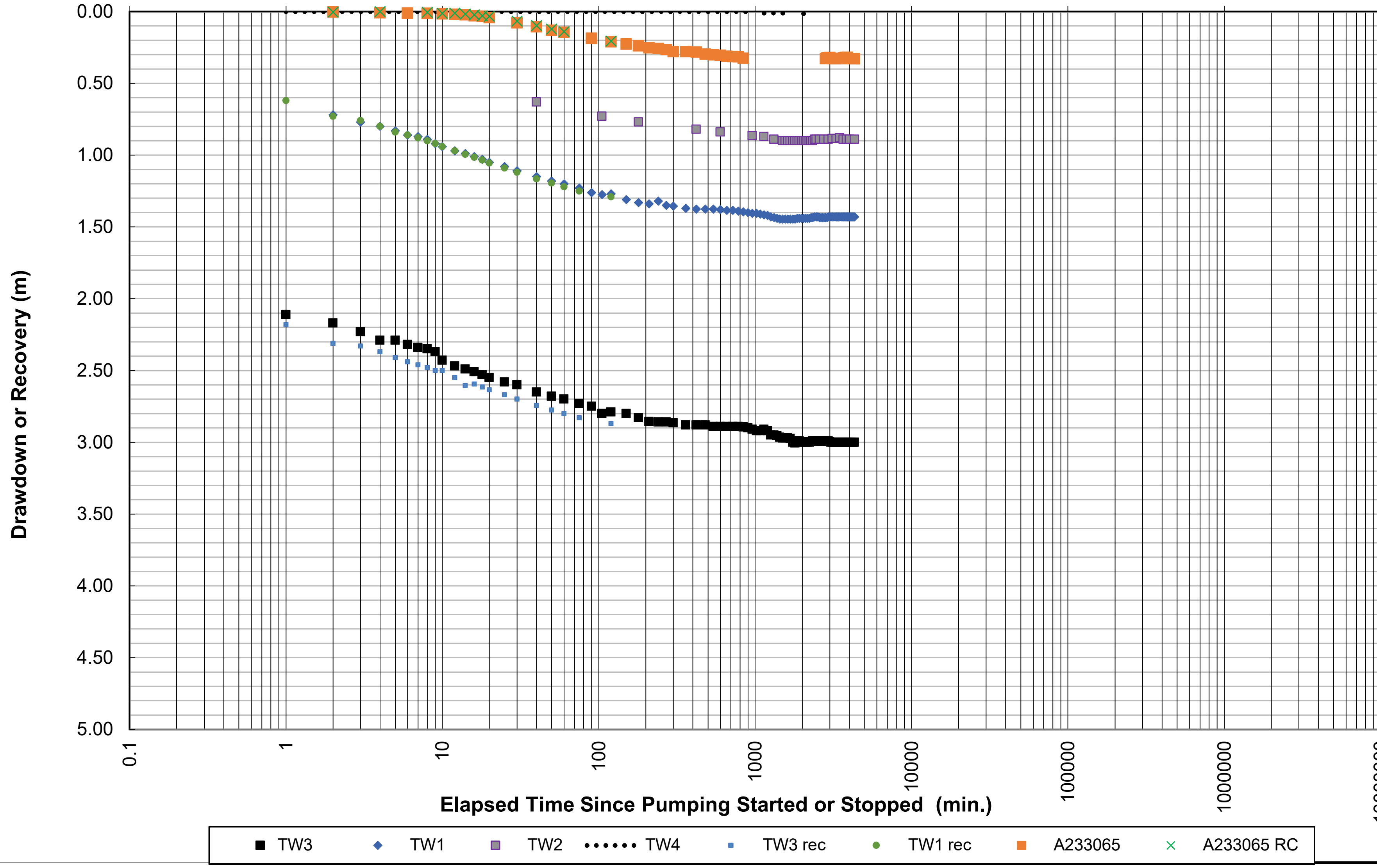
PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-03
PREPARED	
DESIGN	JPR
REVIEW	JAE
APPROVED	JAE

TITLE
CONSTANT RATE TEST OF TW3
RECORD OF PEACE NATURALS MW2

PROJECT No.	Phase	Rev	FIGURE
1415404			**B-19**



Static Level (mbmp)	TW3: 7.96 mbmp
Pumping Rate:	37.9L/sec (3,273 m^3/day)
Pumping Level End:	10.97 mbmp
Well Distance:	TW1 - 8.1 m; OW2- 90 m, OW4 - 12 m
	A233065 - 290 m

CLIENT
TOWNSHIP OF CLEARVIEW

CONSULTANT

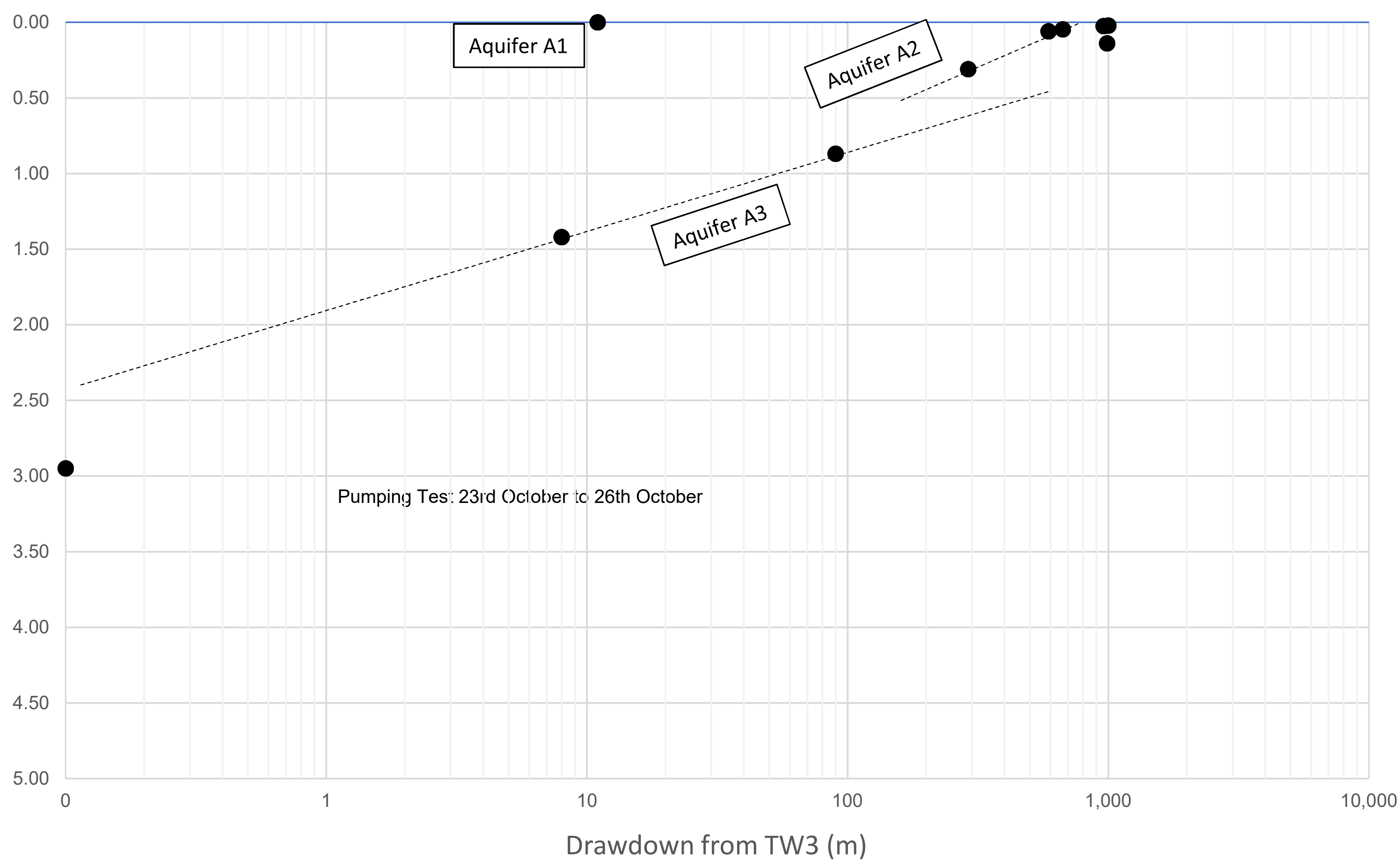
GOLDER

YYYY-MM-DD	2018-11-06
PREPARED	JAE
DESIGN	JPR
REVIEW	
APPROVED	JAE

PROJECT
CLEARVIEW LONG TERM WATER SUPPLY CLASS EA
WATER SUPPLY EXPLORATION

TITLE
CONSTANT RATE TEST TW3
RECORD OF TW3; OW1; OW2; OW4; A233065

PROJECT No.	Phase	Rev	FIGURE
1415404			**B-20**



Pumping Well: TW3
Pumping Rate: 38 L/sec

CLIENT	TOWNSHIP OF CLEARVIEW	PROJECT	CLEARVIEW LONG TERM WATER SUPPLY CLASS EA WATER SUPPLY EXPLORATION
CONSULTANT	YYYY-MM-DD: 2018-12-03	TITLE	DRAWDOWN vs DISTANCE HYDROGRAPH
GOLDER	PREPARED:		
	DESIGN: JPR		
	REVIEW: JAE	PROJECT No. 1415404	Phase / Rev / FIGURE **B-21**
	APPROVED:		

PERMIT TO TAKE WATER
Pumping Test
NUMBER 0123-B3NHDB

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

The Corporation of the Township of Clearview
217 Gideon St
Stayner, Ontario, L0M 1S0
Canada

For the water taking from: TW3-18 (Well Tag# A210653)

Located at: Lot 10, Concession 13, Geographic Township of Sunnidale
Clearview, County of Simcoe

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

DEFINITIONS

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

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

(c) "Ministry" means Ontario Ministry of the Environment, Conservation and Parks.

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

(e) "Permit" means this Permit to Take Water No. 0123-B3NHDB including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

(f) "Permit Holder" means The Corporation of the Township of Clearview.

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

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

TERMS AND CONDITIONS

1. Compliance with Permit

1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated August 1, 2018 and signed by Michael T Rawn , and all Schedules included in this Permit.

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

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

1.4 This Permit is not transferable to another person.

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

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

2. General Conditions and Interpretation

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

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

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

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

2.3 Information

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

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

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

2.4 Rights of Action

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

2.5 Severability

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

2.6 Conflicts

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

3. Water Takings Authorized by This Permit

3.1 **Expiry**

This Permit expires on **July 31, 2019**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

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

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken:	Zone/ Easting/ Northing:
1	TW3-18 (Well Tag# A210653)	Well Drilled	Pumping Test	Miscellaneous	3,000	24	4,320,000	6	17 579362 4923725
						Total Taking:	4,320,000		

3.3 Notwithstanding Table A, this permit is valid for six (6) days of water taking from the source located in Table A between the date of issuance and July 31, 2019.

3.4 Notwithstanding the "Taking Specific Purpose" identified in Table A, the taking of water may also occur during well development of the well identified in Table A.

4. Monitoring

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

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

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

5. Impacts of the Water Taking

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

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

5.3 The discharge of water shall be controlled in such a way as to avoid erosion and sedimentation in the receiving stream.

6. Director May Amend Permit

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

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

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

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

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

Schedule A

This Schedule "A" forms part of Permit to Take Water 0123-B3NHDB dated August 22, 2018.

1. Golder Associates Ltd., 2018. Category 2 Permit To Take Water (PTTW) Application for Pumping Test, Township of Clearview, signed by John Easton, P.Geo., August 1, 2018, includes application signed by Michael T Rawn, August 1, 2018.

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

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

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

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

This notice must be served upon:

The Secretary Environmental Review Tribunal 655 Bay Street, 15th Floor Toronto ON M5G 1E5 Fax: (416) 326-5370 Email: ERTTribunalsecretary@ontario.ca	*AND*	*The Director, Section 34.1, Ministry of the Environment, Conservation and Parks 8th Floor 5775 Yonge St Toronto ON M2M 4J1 Fax: (416) 325-6347*

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

by Telephone at (416) 212-6349 Toll Free 1(866) 448-2248	by Fax at (416) 326-5370 Toll Free 1(844) 213-3474	by e-mail at www.ert.gov.on.ca

Dated at Toronto this 22nd day of August, 2018.

Cynthia Doughty

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

APPENDIX C

Water Quality Analysis

Table C-1 - Water Quality OW1

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G72937 **REPORT No. B18-21096 (i)**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 17-Jul-18
DATE REPORTED: 25-Jul-18
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:
P.O. NUMBER: 141-5404
WATERWORKS NO.

			Client I.D.		TW 1 - 18			
			Sample I.D.		B18-21096-1			
			Date Collected		17-Jul-18			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Total Coliform	cfu/100mL	1	MOE E3407	18-Jul-18/B	NDOGT [1]			
E coli	cfu/100mL	1	MOE E3407	18-Jul-18/B	0			
Background	cfu/100mL	1	MOE E3407	18-Jul-18/B	NDOGT [1]			
pH @25°C	pH Units		SM 4500H	19-Jul-18/O	8.06			
Conductivity @25°C	µmho/cm	1	SM 2510B	19-Jul-18/O	567			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	19-Jul-18/O	247			
Hardness (as CaCO3)	mg/L	1	SM 3120	20-Jul-18/O	274			
Chloride	mg/L	0.5	SM4110C	20-Jul-18/O	10.2			
Fluoride	mg/L	0.1	SM4110C	20-Jul-18/O	< 0.1			
Nitrite (N)	mg/L	0.1	SM4110C	20-Jul-18/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	20-Jul-18/O	< 0.1			
Sulphate	mg/L	1	SM4110C	20-Jul-18/O	42			
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	20-Jul-18/O	0.9			
Colour	TCU	2	SM 2120C	20-Jul-18/O	< 2			
Turbidity	NTU	0.1	SM 2130	20-Jul-18/O	24.0			
UV transmittance	%		SM5910B	25-Jul-18	83.3 [2]			
Sulphide	mg/L	0.01	SM4500-S2	20-Jul-18/K	0.03			
o-Phosphate (P)	mg/L	0.01	MOEE 3366	25-Jul-18/O	< 0.01			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	20-Jul-18/K	0.03			
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	19-Jul-18/K	0.1			
Organic Nitrogen	mg/L	0.1	E3199A.1	25-Jul-18/K	< 0.1			
Tannins and Lignins	mg/L	0.5	SM5500B	23-Jul-18/K	0.5			
Phenolics	mg/L	0.001	MOEE 3179	20-Jul-18/O	< 0.001			
Calcium	mg/L	0.02	SM 3120	20-Jul-18/O	82.2			

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G72937 **REPORT No. B18-21096 (i)**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 17-Jul-18
DATE REPORTED: 25-Jul-18
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:
P.O. NUMBER: 141-5404
WATERWORKS NO.

			Client I.D.		TW 1 - 18			
			Sample I.D.		B18-21096-1			
			Date Collected		17-Jul-18			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Magnesium	mg/L	0.02	SM 3120	20-Jul-18/O	16.7			
Potassium	mg/L	0.1	SM 3120	20-Jul-18/O	1.3			
Sodium	mg/L	0.2	SM 3120	20-Jul-18/O	8.9			
Copper	mg/L	0.002	SM 3120	20-Jul-18/O	< 0.002			
Iron	mg/L	0.005	SM 3120	20-Jul-18/O	0.033			
Iron (Total)	mg/L	0.005	SM 3120	20-Jul-18/O	0.047			
Manganese	mg/L	0.001	SM 3120	20-Jul-18/O	0.040			
Manganese (Total)	mg/L	0.001	SM 3120	20-Jul-18/O	0.042			
Silica	mg/L	0.02	SM 3120	20-Jul-18/O	12.3			
Zinc	mg/L	0.005	SM 3120	20-Jul-18/O	< 0.005			
Anion Sum	meq/L		Calc.	23-Jul-18/O	6.11			
Cation Sum	meq/L		Calc.	23-Jul-18/O	6.07			
% Difference	%		Calc.	23-Jul-18/O	0.321			
Ion Ratio	AS/CS		Calc.	23-Jul-18/O	1.01			
Sodium Adsorption Ratio	-		Calc.	23-Jul-18/O	0.223			
TDS(ion sum calc.)	mg/L	1	Calc.	23-Jul-18/O	314			
Conductivity (calc.)	µmho/cm		Calc.	23-Jul-18/O	568			
TDS(calc.)/EC(actual)	-		Calc.	23-Jul-18/O	0.553			
EC(calc.)/EC(actual)	-		Calc.	23-Jul-18/O	1.00			
Langelier Index(25°C)	S.I.		Calc.	23-Jul-18/O	0.945			

1 . No data overgrown with target
2 . Subcontracted to SGS Lakefield

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Table C-1 - Water Quality OW1

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G72937 **REPORT No. B18-21096 (ii)**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 17-Jul-18
DATE REPORTED: 25-Jul-18
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:
P.O. NUMBER: 141-5404
WATERWORKS NO.

			Client I.D.		TW 1 - 18			
			Sample I.D.		B18-21096-1			
			Date Collected		17-Jul-18			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/L	30	EPA 8260	19-Jul-18/R	< 30			
Benzene	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Bromodichloromethane	µg/L	2	EPA 8260	19-Jul-18/R	< 2			
Bromoform	µg/L	5	EPA 8260	19-Jul-18/R	< 5			
Bromomethane	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Carbon Tetrachloride	µg/L	0.2	EPA 8260	19-Jul-18/R	< 0.2			
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Chloroform	µg/L	1	EPA 8260	19-Jul-18/R	< 1			
Dibromochloromethane	µg/L	2	EPA 8260	19-Jul-18/R	< 2			
Dichlorobenzene,1,2-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichlorobenzene,1,3-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichlorobenzene,1,4-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichlorodifluoromethane	µg/L	2	EPA 8260	19-Jul-18/R	< 2			
Dichloroethane,1,1-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichloroethane,1,2-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichloroethylene,1,1-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichloropropane,1,2-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Dichloropropene 1,3- cis+trans	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Ethylbenzene	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Table C-1 - Water Quality OW1

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G72937 **REPORT No. B18-21096 (ii)**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 17-Jul-18
DATE REPORTED: 25-Jul-18
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:
P.O. NUMBER: 141-5404
WATERWORKS NO.

			Client I.D.		TW 1 - 18			
			Sample I.D.		B18-21096-1			
			Date Collected		17-Jul-18			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	19-Jul-18/R	< 0.2			
Hexane	µg/L	5	EPA 8260	19-Jul-18/R	< 5			
Methyl Ethyl Ketone	µg/L	20	EPA 8260	19-Jul-18/R	< 20			
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	19-Jul-18/R	< 20			
Methyl-t-butyl Ether	µg/L	2	EPA 8260	19-Jul-18/R	< 2			
Dichloromethane (Methylene Chloride)	µg/L	0.3	EPA 8260	19-Jul-18/R	< 0.3			
Styrene	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Tetrachloroethane,1,1,1,2-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Tetrachloroethane,1,1,2,2-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Tetrachloroethylene	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Toluene	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Trichloroethane,1,1,1-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Trichloroethane,1,1,2-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Trichloroethylene	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Trichlorofluoromethane	µg/L	5	EPA 8260	19-Jul-18/R	< 5			
Vinyl Chloride	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Xylene, m,p-	µg/L	1.0	EPA 8260	19-Jul-18/R	< 1.0			
Xylene, o-	µg/L	0.5	EPA 8260	19-Jul-18/R	< 0.5			
Xylene, m,p,o-	µg/L	1.1	EPA 8260	19-Jul-18/R	< 1.1			

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G092058 **REPORT No. B18-32814**

Report To:
Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 23-Oct-18
DATE REPORTED: 01-Nov-18
SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.:
P.O. NUMBER: 1405404
WATERWORKS NO.

			Client I.D.		TW 3-14R			
			Sample I.D.		B18-32814-1			
			Date Collected		23-Oct-18			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Total Coliform	cfu/100mL	1	MOE E3407	24-Oct-18/B	0			
E coli	cfu/100mL	1	MOE E3407	24-Oct-18/B	0			
Background	cfu/100mL	1	MOE E3407	24-Oct-18/B	3			
pH @25°C	pH Units		SM 4500H	26-Oct-18/O	8.11			
Conductivity @25°C	µmho/cm	1	SM 2510B	26-Oct-18/O	563			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	26-Oct-18/O	242			
Hardness (as CaCO3)	mg/L	1	SM 3120	25-Oct-18/O	289			
Chloride	mg/L	0.5	SM4110C	24-Oct-18/O	10.6			
Fluoride	mg/L	0.1	SM4110C	24-Oct-18/O	< 0.1			
Nitrite (N)	mg/L	0.1	SM4110C	24-Oct-18/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	24-Oct-18/O	< 0.1			
Sulphate	mg/L	1	SM4110C	24-Oct-18/O	36			
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	30-Oct-18/O	1.4			
Colour	TCU	2	SM 2120C	26-Oct-18/O	< 2			
Turbidity	NTU	0.1	SM2130B	24-Oct-18/K	4.1			
Sulphide	mg/L	0.01	SM4500-S2	24-Oct-18/K	< 0.01			
o-Phosphate (P)	mg/L	0.01	PE4500-S	26-Oct-18/K	0.01			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	25-Oct-18/K	0.03			
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	24-Oct-18/K	< 0.1			
Organic Nitrogen	mg/L	0.1	E3199A.1	30-Oct-18/K	< 0.1			
Tannins and Lignins	mg/L	0.5	SM5500B	26-Oct-18/K	< 0.5			
Phenolics	mg/L	0.002	MOEE 3179	26-Oct-18/K	< 0.002			
Calcium	mg/L	0.02	SM 3120	25-Oct-18/O	87.3			
Magnesium	mg/L	0.02	SM 3120	25-Oct-18/O	17.1			

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES

Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G092058 **REPORT No. B18-32814**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 23-Oct-18

DATE REPORTED: 01-Nov-18

SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.:

P.O. NUMBER: 1405404

WATERWORKS NO.

				Client I.D.	TW 3-14R			
				Sample I.D.	B18-32814-1			
				Date Collected	23-Oct-18			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Potassium	mg/L	0.1	SM 3120	25-Oct-18/O	1.5			
Sodium	mg/L	0.2	SM 3120	25-Oct-18/O	7.1			
Copper	mg/L	0.002	SM 3120	25-Oct-18/O	< 0.002			
Iron	mg/L	0.005	SM 3120	25-Oct-18/O	0.465			
Manganese	mg/L	0.001	SM 3120	25-Oct-18/O	0.017			
Silica	mg/L	0.02	SM 3120	25-Oct-18/O	12.3			
Zinc	mg/L	0.005	SM 3120	25-Oct-18/O	< 0.005			
Anion Sum	meq/L		Calc.	31-Oct-18/O	5.88			
Cation Sum	meq/L		Calc.	31-Oct-18/O	6.14			
% Difference	%		Calc.	31-Oct-18/O	2.15			
Ion Ratio	AS/CS		Calc.	31-Oct-18/O	0.958			
Sodium Adsorption Ratio	-		Calc.	31-Oct-18/O	0.181			
TDS(ion sum calc.)	mg/L	1	Calc.	31-Oct-18/O	305			
Conductivity (calc.)	µmho/cm		Calc.	31-Oct-18/O	560			
TDS(calc.)/EC(actual)	-		Calc.	31-Oct-18/O	0.542			
EC(calc.)/EC(actual)	-		Calc.	31-Oct-18/O	0.994			
Langelier Index(25°C)	S.I.		Calc.	31-Oct-18/O	0.992			

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: DW092062 **REPORT No. B18-33106 (i)**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 25-Oct-18
DATE REPORTED: 02-Nov-18
SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.:
P.O. NUMBER: 1405404
WATERWORKS NO.

			Client I.D.:		TW 3-18-44hr		**ODWS**	
			Sample I.D.:		B18-33106-1		**Objective**	**Type of Objective**
			Date Collected:		25-Oct-18			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Total Coliform	cfu/100mL	1	MOE E3407	25-Oct-18/B	0		0	MAC
E coli	cfu/100mL	1	MOE E3407	25-Oct-18/B	0		0	MAC
Background	cfu/100mL	1	MOE E3407	25-Oct-18/B	0			
pH @25°C	pH Units		SM 4500H	30-Oct-18/O	8.06		6.5-8.5	OG
Conductivity @25°C	µmho/cm	1	SM 2510B	30-Oct-18/O	566			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	30-Oct-18/O	239		30-500	OG
Hardness (as CaCO3)	mg/L	1	SM 3120	29-Oct-18/O	**284**		80-100	OG
Chloride	mg/L	0.5	SM4110C	26-Oct-18/O	10.2		250	AO
Fluoride	mg/L	0.1	SM4110C	26-Oct-18/O	< 0.1		1.5	MAC
Nitrite (N)	mg/L	0.1	SM4110C	26-Oct-18/O	< 0.1		1	MAC
Nitrate (N)	mg/L	0.1	SM4110C	26-Oct-18/O	< 0.1		10	MAC
Sulphate	mg/L	1	SM4110C	26-Oct-18/O	37		500	AO
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	01-Nov-18/O	1.9		5	AO
Colour	TCU	2	SM 2120C	26-Oct-18/O	< 2		5	AO
Turbidity	NTU	0.1	SM2130B	26-Oct-18/K	**5.1**		5	AO
Sulphide	mg/L	0.01	SM4500-S2	26-Oct-18/K	< 0.01		0.05	AO
o-Phosphate (P)	mg/L	0.01	PE4500-S	30-Oct-18/K	0.02			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	30-Oct-18/K	0.02			
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	26-Oct-18/K	< 0.1			
Organic Nitrogen	mg/L	0.1	E3199A.1	01-Nov-18/K	< 0.1		0.15	OG
Tannins and Lignins	mg/L	0.5	SM5500B	26-Oct-18/K	< 0.5			
Phenolics	mg/L	0.002	MOEE 3179	26-Oct-18/K	< 0.002			
Calcium	mg/L	0.02	SM 3120	29-Oct-18/O	86.8			
Magnesium	mg/L	0.02	SM 3120	29-Oct-18/O	16.2			

ODWS - Ontario Drinking Water Standards
AO - Aesthetic Objectives
IMAC - Interim Maximum Acceptable Concentration
MAC - Maximum Acceptable Concentration
OG - Operational Guidelines

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Table C-3 - Water Quality TW3, 44-h

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: DW092062 **REPORT No. B18-33106 (i)**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 25-Oct-18
DATE REPORTED: 02-Nov-18
SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.:
P.O. NUMBER: 1405404
WATERWORKS NO.

			Client I.D.:		TW 3-18-44hr		**ODWS**	
			Sample I.D.:		B18-33106-1		**Objective**	**Type of Objective**
			Date Collected:		25-Oct-18			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Potassium	mg/L	0.1	SM 3120	29-Oct-18/O	1.5			
Sodium	mg/L	0.2	SM 3120	29-Oct-18/O	6.3		200,20	AO,MAC
Copper	mg/L	0.002	SM 3120	29-Oct-18/O	< 0.002		1	AO
Iron	mg/L	0.005	SM 3120	29-Oct-18/O	**0.375**		0.3	AO
Manganese	mg/L	0.001	SM 3120	29-Oct-18/O	0.017		0.05	AO
Silica	mg/L	0.02	SM 3120	29-Oct-18/O	12.9			
Zinc	mg/L	0.005	SM 3120	29-Oct-18/O	< 0.005		5	AO
Anion Sum	meq/L		Calc.	31-Oct-18/O	5.85			
Cation Sum	meq/L		Calc.	31-Oct-18/O	6.00			
% Difference	%		Calc.	31-Oct-18/O	1.28			
Ion Ratio	AS/CS		Calc.	31-Oct-18/O	0.975			
Sodium Adsorption Ratio	-		Calc.	31-Oct-18/O	0.163			
TDS(ion sum calc.)	mg/L	1	Calc.	31-Oct-18/O	302		500	AO
Conductivity (calc.)	µmho/cm		Calc.	31-Oct-18/O	553			
TDS(calc.)/EC(actual)	-		Calc.	31-Oct-18/O	0.534			
EC(calc.)/EC(actual)	-		Calc.	31-Oct-18/O	0.977			
Langelier Index(25°C)	S.I.		Calc.	31-Oct-18/O	0.935			

ODWS - Ontario Drinking Water Standards
AO - Aesthetic Objectives
IMAC - Interim Maximum Acceptable Concentration
MAC - Maximum Acceptable Concentration
OG - Operational Guidelines

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Table C-3 - Water Quality TW3, 44-h

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: DW092062 **REPORT No. B18-33106 (ii)**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 25-Oct-18
DATE REPORTED: 02-Nov-18
SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.:
P.O. NUMBER: 1405404
WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	TW 3-18-44hr	Trip Blank	ODWS Objective	ODWS Type of Objective
			Sample I.D.:		B18-33106-1	B18-33106-2		
			Date Collected:		25-Oct-18	25-Oct-18		
Acetone	µg/L	30	EPA 8260	29-Oct-18/R	< 30	< 30		
Benzene	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	1	MAC
Bromodichloromethane	µg/L	2	EPA 8260	29-Oct-18/R	< 2	< 2		
Bromoform	µg/L	5	EPA 8260	29-Oct-18/R	< 5	< 5		
Bromomethane	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Carbon Tetrachloride	µg/L	0.2	EPA 8260	29-Oct-18/R	< 0.2	< 0.2	2	MAC
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	80	MAC
Chloroform	µg/L	1	EPA 8260	29-Oct-18/R	< 1	< 1		
Dibromochloromethane	µg/L	2	EPA 8260	29-Oct-18/R	< 2	< 2		
Dichlorobenzene,1,2-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	3,200	AO,MAC
Dichlorobenzene,1,3-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Dichlorobenzene,1,4-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	1,5	AO,MAC
Dichlorodifluoromethane	µg/L	2	EPA 8260	29-Oct-18/R	< 2	< 2		
Dichloroethane,1,1-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Dichloroethane,1,2-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	5	IMAC
Dichloroethylene,1,1-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	14	MAC
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Dichloropropane,1,2-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Dichloropropene 1,3- cis+trans	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Ethylbenzene	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	1.6,140	AO,MAC

ODWS - Ontario Drinking Water Standards
AO - Aesthetic Objectives
IMAC - Interim Maximum Acceptable Concentration
MAC - Maximum Acceptable Concentration
OG - Operational Guidelines

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Christine Burke
Lab Manager

Table C-3 - Water Quality TW3, 44-h

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: DW092062 **REPORT No. B18-33106 (ii)**

Report To:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L,
Barrie ON. L4N 8X1 Canada
Attention: John Easton

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 25-Oct-18
DATE REPORTED: 02-Nov-18
SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.:
P.O. NUMBER: 1405404
WATERWORKS NO.

			Client I.D.:		TW 3-18-44hr	Trip Blank	**ODWS**	
			Sample I.D.:		B18-33106-1	B18-33106-2	**Objective**	**Type of Objective**
			Date Collected:		25-Oct-18	25-Oct-18		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	29-Oct-18/R	< 0.2	< 0.2		
Hexane	µg/L	5	EPA 8260	29-Oct-18/R	< 5	< 5		
Methyl Ethyl Ketone	µg/L	20	EPA 8260	29-Oct-18/R	< 20	< 20		
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	29-Oct-18/R	< 20	< 20		
Methyl-t-butyl Ether	µg/L	2	EPA 8260	29-Oct-18/R	< 2	< 2		
Dichloromethane (Methylene Chloride)	µg/L	0.3	EPA 8260	29-Oct-18/R	< 0.3	< 0.3	50	MAC
Styrene	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Tetrachloroethane,1,1,1,2-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Tetrachloroethane,1,1,2,2-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Tetrachloroethylene	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	10	MAC
Toluene	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	60	MAC
Trichloroethane,1,1,1-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Trichloroethane,1,1,2-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Trichloroethylene	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	5	MAC
Trichlorofluoromethane	µg/L	5	EPA 8260	29-Oct-18/R	< 5	< 5		
Vinyl Chloride	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5	1	MAC
Xylene, m,p-	µg/L	1.0	EPA 8260	29-Oct-18/R	< 1.0	< 1.0		
Xylene, o-	µg/L	0.5	EPA 8260	29-Oct-18/R	< 0.5	< 0.5		
Xylene, m,p,o-	µg/L	1.1	EPA 8260	29-Oct-18/R	< 1.1	< 1.1	20,90	AO,MAC

ODWS - Ontario Drinking Water Standards
AO - Aesthetic Objectives
IMAC - Interim Maximum Acceptable Concentration
MAC - Maximum Acceptable Concentration
OG - Operational Guidelines

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

APPENDIX D

MECP Water Well Database

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR FND mbgl Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
5703664	12 9	Jul-62	579069 4923297	204.8	33.2 Fr	32.9	-1.8	21.6	45	120	27.4	1614 CT	WS DO	**MOE# 5703664** 0.0 MSND 14.3 CLAY STNS 17.1 MSND 23.2 CLAY MSND 25.6 FSND 33.2 MSND 34.4 GRVL 34.7
5703665	12 9	May-65	578739 4923152	204.8	35.1 Fr	35.7	-0.9	19.5	18	360	20.1	3602 CT	WS ST	**MOE# 5703665** 0.0 TPSL 0.3 CLAY MSND 4.6 HPAN STNS 10.7 MSND 18.3 HPAN 21.3 CLAY 35.1 CSND 36.6
5703667	12 10	Dec-67	579399 4923104	205.7	32.3 Fr	34.1	-0.9	19.8	23	120	30.5	3602 CT	WS ST	**MOE# 5703667** 0.0 TPSL 0.3 CLAY MSND 9.1 MSND 24.4 CLAY MSND HPAN 32.0 MSND FSND 35.1
5703671	13 8	Jan-62	578546 4923347	200.9	25.0 Fr	23.8	-1.2	13.7	45	120	16.8	1510 CT	WS ST	**MOE# 5703671** 0.0 TPSL MSND 6.1 BRWN CLAY 22.9 CSND 25.0
5703672	13 8	Nov-65	579816 4923626	198.7	37.2 Fr	39.3	-0.9	13.7	36	120	33.5	3602 CT	WS ST	**MOE# 5703672** 0.0 TPSL 0.6 FSND 7.6 CLAY MSND 35.1 MSND SILT 37.2 MSND CLAY 40.2
5703673	13 9	Sep-59	578842 4923365	205.7	27.1 Fr	22.3	-4.0	16.8	18	120	17.4	5510 CT	WS DO	**MOE# 5703673** 0.0 TPSL 0.3 BRWN CLAY 1.8 BRWN CLAY MSND 8.8 MSND 14.6 HPAN 16.2 BLUE CLAY STNS 21.9 MSND 27.1
5703674	13 10	Jun-63	579395 4923476	199.9	19.8 Fr	20.1	-0.6	12.8	32	120	15.8	2216 CT	WS DO	**MOE# 5703674** 0.0 TPSL 0.3 MSND GRVL 1.5 MSND 3.0 CSND GRVL 9.1 SILT CLAY 19.8 MSND CSND 20.7
5703675	13 10	Oct-67	579639 4923536	199.9	35.7 Fr	35.7	-0.9	12.5	27	60	18.3	3602 CT	WS DO	**MOE# 5703675** 0.0 TPSL 0.3 MSND 4.6 GREY CLAY 25.9 CLAY GRVL 35.1 MSND 36.6
5706511	12 11	Jun-69	580231 4923581	200.9	38.4 Fr	38.7	-0.9	12.5	27	60	17.1	3602 CT	WS DO	**MOE# 5706511** 0.0 TPSL 0.3 MSND CLAY 1.2 BRWN CLAY GRVL 7.9 GRVL MSND 14.6 CLAY 27.4 MSND 32.0 GREY CLAY 38.4 CSND 39.6
5709458	13 8	Nov-72	578491 4923171	200.9	30.5 Fr	31.7	-0.9	15.2	45	60	25.0	3602 RC	WS DO	**MOE# 5709458** 0.0 BRWN TPSL 0.3 BRWN FSND 6.1 GREY CLAY 30.5 BRWN MSND 32.6
5709465	13 9	Dec-72	578961 4923361	204.8	33.5 Fr	35.1	-0.9	18.3	32	60	27.4	3602 CT	WS DO	**MOE# 5709465** 0.0 BRWN CLAY SAND 30.5 GREY CLAY GRVL HPAN 33.5 BRWN FSND 36.0
5710435	13 10	Oct-73	579081 4924659	184.7	19.8 Fr	20.4	-0.9	-3.7	36	45	18.3	3602 RC	WS DO	**MOE# 5710435** 0.0 BRWN SAND CLAY SNDY 4.6 GREY CLAY STKY 19.8 BRWN FSND MSND WBRG 21.3
5710998	13 10	May-74	579474 4923462	201.8	38.7 Fr	39.3	-0.9	6.1	18	90	30.5	3602 RC	WS DO	**MOE# 5710998** 0.0 BRWN TPSL 0.3 BRWN CLAY SAND 12.2 GREY CLAY STNS 38.7 BRWN SAND 40.2
5711523	12 9	Oct-74	579323 4923012	205.7	29.0 Fr 24.4 Fr	29.9 29.0	-0.9 -0.9	18.3	45	90	24.4	3602 RC	WS DO	**MOE# 5711523** 0.0 BRWN CLAY SAND 6.1 GREY CLAY 24.4 GREY SAND 26.2 GREY CLAY SNDS 29.0 BRWN SAND 30.8
5713914	12 11	Sep-76	580311 4923621	203.0	36.6 Fr 32.6 Mn			15.2	45	60	33.5	3602 RC	WS DO	**MOE# 5713914** 0.0 BRWN SAND DRTY 4.3 BRWN SAND CLAY 9.8 GREY CLAY 32.6 BRWN SAND SILT 35.1 GREY CLAY HARD 36.6 BRWN SAND WBRG 39.3

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR FND mbgl Qu	SCR TOP LEN mbgl m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
5715737	13 10	Nov-78	579848 4923703	197.8	38.1 Fr	38.4 -0.9	8.2	9	5520	37.8	4716 CT	WS DO	**MOE# 5715737** 0.0 BRWN TPSL 0.3 GREY CLAY SNDY 13.7 BRWN CLAY SNDY 17.1 GREY CLAY SNDY 20.1 GREY CLAY SOFT 24.7 BRWN SILT SAND 35.4 BRWN SAND SILT DRTY 38.1 BRWN SAND 39.3
5721956	12 9	Jul-87	579007 4923213	205.1	33.8 Fr	34.4 -2.1	19.2	68	90	30.5	3602 RA	WS DO	**MOE# 5721956** 0.0 BRWN TPSL 0.3 BRWN SAND CLAY 4.6 GREY CLAY STNS SNDS 11.6 GREY CLAY SAND SNDY 18.6 GREY CLAY SNDS 21.3 GREY CLAY HARD 33.8 BRWN SAND CLN WBRG 36.6
5722231	12 9	Apr-87	579179 4923305	204.8	32.3 Fr	32.6 -0.9	18.0	73	60	31.1	2514 CT	WS DO	**MOE# 5722231** 0.0 YLLW SAND 13.4 YLLW SAND SILT CLAY 22.3 YLLW SAND 28.3 YLLW CLAY SAND 32.3 YLLW SAND 33.5
5722438	14 9	Sep-87	578995 4924737	184.1	15.8 Fr	16.5 -0.9	NR	91	60	6.1	3602 CT	WS DO	**MOE# 5722438** 0.0 GREY CLAY 13.7 BRWN SAND CLAY 15.8 BRWN SAND CLN WBRG 17.4
5722846	12 10	Nov-87	579759 4923490	199.9	11.0 Fr 7.0 Fr		11.0				3030 BR	WS DO	**MOE# 5722846** 0.0 BRWN SAND 1.2 GREY CLAY STNS 2.4 BRWN SAND 7.0 BRWN CSND 7.6 GREY CLAY 8.5 BRWN SAND 9.8 BRWN SAND DRY 11.0 BRWN SAND 11.9 BRWN SAND 13.4
5724323	12 10	Nov-88	579709 4923419	200.3	24.4 Fr	1.8 -0.9	13.7	27	80	33.5	1920 CT	WS DO	**MOE# 5724323** 0.0 UNKN 17.4 BRWN CLAY 27.1 BRWN CLAY 28.0 BRWN SAND GRVL 37.5
5725137	12 10	Jun-89	579640 4923411	209.4	34.1 Fr	35.1 -1.5	13.4	91	120	19.8	3602 RA	WS DO	**MOE# 5725137** 0.0 BRWN SAND GRVL CLAY 5.5 GREY CLAY HARD 33.5 BRWN SAND CLN WBRG 36.6
5727234	12 10	Aug-90	579709 4922836	209.4	24.4 Fr	24.7 -1.8	10.4	36	1440	22.6	3602 CT	WS DO	**MOE# 5727234** 0.0 BRWN SAND 0.6 GREY CLAY MGRD CLAY 3.0 BRWN CLAY SAND SNDY 22.9 GREY CLAY HARD 24.4 BRWN SAND CLAY WBRG 26.5
5730097	12 11	Aug-93	579953 4923541	198.7	33.5 Fr	33.5 -1.2	9.1	68	60	27.4	3602 RC	WS DO	**MOE# 5730097** 0.0 BRWN SAND 1.5 BRWN SAND CLAY 24.4 BRWN SAND SILT CLAY 33.5 BRWN SAND CLN WBRG 34.7
5730111	12 10	Aug-93	579729 4923479	200.3	36.0 Fr	36.9 -0.9	11.0	91	60	21.3	3602 CT	WS DO	**MOE# 5730111** 0.0 BRWN SAND 0.9 BRWN CLAY STNS STNY 7.6 GREY CLAY GRVL 10.7 GREY CLAY SAND SNDY 14.9 GREY CLAY GRVL 29.0 GREY CLAY SNDS 35.1 BRWN SAND WBRG 37.8
5732471	12 10	Sep-96	579483 4923403	201.8	30.8 Fr	31.4 -1.2	16.2	32	210	29.3	1467 CT	WS DO	**MOE# 5732471** 0.0 BLCK TPSL 0.3 BRWN CLAY SAND 7.3 GREY CLAY SAND 30.8 BRWN SAND 32.6 GREY CLAY 32.6
5732976	12 10	Aug-97	579697 4923466	199.9	28.3 Fr	30.8 -0.9	11.3	27	80	19.2	3602 CT	WS DO	**MOE# 5732976** 0.0 BRWN SAND 0.3 BRWN CLAY STNS 7.3 BRWN CLAY SAND LYRD 12.5 BRWN CLAY STNS HPAN 21.3 BRWN CLAY SAND 28.3 BRWN SAND CLN WBRG 31.7

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR FND mbgl Qu	SCR TOP LEN mbgl m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
5733939	12 9	Dec-98	578926 4923350	205.1	32.0 Fr	32.3 -1.2	15.2	45	180	22.9	1851 CT	WS DO	**MOE# 5733939** 0.0 BLCK TPSL 0.3 BRWN SAND GRVL 4.6 BRWN SAND CLAY 26.5 BRWN CLAY HARD 32.0 BRWN SAND WBRG 33.5
5737227	13 10	Sep-02	579618 4923529	199.3	37.5 Fr 34.7 Fr	35.4 -2.1	13.1	68	90	24.4	3602 CT	WS DO	**MOE# 5737227** 0.0 BLCK TPSL 0.3 BRWN SAND 2.7 BRWN CLAY HARD SOFT 8.2 BRWN SAND CLAY SNDY 12.5 GREY SAND CLAY GRVL 23.2 GREY CLAY HARD 27.7 GREY SAND CLAY SNDY 34.7 BRWN SAND CLN WBRG 37.5
5738686	13 11	Feb-04	580211 4923790	193.5	21.0 Fr 18.0 -	19.5 -2.4	6.4	245	80	7.3	3602 CT	WS DO	**MOE# 5738686 TAG#A003162** 0.0 BRWN SAND 4.9 GREY CLAY SOFT 14.6 GREY CLAY HARD LYRD 18.3 BRWN MSND FSND WBRG 21.3
7185916	12 10	May-12	579717 4923671	197.8	26.2 Fr 23.8 Fr	24.4 -1.8	7.6	45	60	11.0	3602 CT	WS DO	**MOE# 7185916 TAG#A098224** 0.0 BRWN SAND 1.8 BRWN CLAY HARD SOFT 7.0 GREY CLAY SAND GRVL 23.8 BRWN SAND 26.2
7288430	12 9	Apr-17	578923 4922885	203.0		3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288430 TAG#A223651** 0.0 BLCK TPSL LOOS 0.3 BRWN FILL LOOS 0.6 BRWN CLAY SILT DNSE 4.6
7288433		Mar-17	578802 4922848	202.1	3.0 Un	3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288433 TAG#A223650** 0.0 BLCK TPSL LOOS 0.3 BRWN FILL LOOS 0.9 BRWN CLAY SILT DNSE 3.0 BRWN SAND SILT LOOS 4.6
7288434	12 9	Mar-17	578719 4923153	204.5		3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288434 TAG#A223647** 0.0 BLCK TPSL LOOS 0.3 BRWN CLAY SILT HARD 4.6
7288435		Mar-17	578722 4923119	204.2	2.1 Un	3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288435 TAG#A223648** 0.0 BLCK TPSL LOOS 0.6 BRWN CLAY SILT LOOS 4.6
7288436		Mar-17	578926 4923027	204.8	3.4 Un	3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288436 TAG#A223652** 0.0 BLCK TPSL LOOS 0.0 BRWN SAND SILT LOOS 0.6 BRWN CLAY GRVL SLTY 2.1 BRWN SILT CLYY SAND 4.6
7288437	12 9	Mar-17	578767 4922979	203.6	4.0 Un	3.0 -1.5	NR				7230 BR	TH TH	**MOE# 7288437 TAG#A223649** 0.0 BLCK TPSL LOOS 0.3 BRWN FILL CLAY SILT 0.6 BRWN SAND SILT LOOS 4.6
A185915	12 9	Oct-17	578568 4923031	201.8	53.0 -	57.3 -3.0	14.6	80	60	14.9	5528 RC	WS CO	**MOE# A185915 4491 CON 12 SUNNIDALE** 0.0 BRWN CLAY STNS 4.6 GREY CLAY STNS LYRD 9.1 BRWN SAND SILT CLAY 24.1 BRWN SAND SILT DRTY 27.4 BRWN MSND CSND 53.3 GREY GRVL SAND 61.0 GREY SAND HARD 62.5 GREY LMSN FCRD 68.6 BLCK SHLE HARD 70.1
A185916	12 9	Oct-17	578602 4923040	202.4	53.9 -	53.9 -6.1	14.3				5528 RC	OW CO	**MOE# A185916 4491 CON 12 SUNNIDALE** 0.0 BRWN CLAY STNS 4.6 GREY CLAY STNS SAND 9.1 BRWN SAND SILT LYRD 24.1 BRWN SAND SILT DRTY 27.4 BRWN MSND CSND 53.3 GREY GRVL SAND 60.0

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR FND mbgl Qu	SCR TOP LEN mbgl m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
A185917	12 9	Oct-17	578986 4922857	203.0	57.9 -	57.9 -3.0	16.8	80	60	17.1	5528 RC	WS CO	**TAG#A185917 4491 CON 12 SUNNIDALE** 0.0 BRWN SAND CLAY LYRD 19.8 BRWN CLAY 23.5 BRWN FSND 30.5 BRWN CLAY STNS 32.3 BRWN SAND CLAY THIN 38.1 BRWN SAND GRVL CSND 63.1 GREY SAND DRTY 67.1 GREY SAND GRVL SILT 72.8 BLCK SHLE 73.2
A185918	12 9	Oct-17	578981 4922653	199.9	45.1 -	45.7 -3.0	15.5				5528 RC	OW CO	**TAG#A185918 4491 CON 12 SUNNIDALE** 0.0 BRWN FILL 1.8 BRWN CLAY 6.1 GREY CLAY 9.1 GREY SAND CLAY 12.2 BRWN CSND 25.9 GREY CLAY STNS 42.7 BRWN MSND CSND 48.8
A185919	12 9	Oct-17	578578 4923114	202.1	31.1 -	31.1 -3.0	14.3				5528 RC	OW CO	**TAG#A185919 4491 CON 12 SUNNIDALE** 0.0 BRWN CLAY 3.4 BRWN CLAY STNS 3.0 BRWN CLAY 9.1 BRWN FSND 15.2 GREY CLAY 16.8 BRWN FSND 24.4 BRWN MSND 34.4 UNKN 35.1
A210676	13 10	Jun-18	579360 4923724	193.9		44.8 -6.1	NR				9999 RC	TH MU	**OW1-18 TAG#A210676** 0.0 TPSL 0.3 BRWN SAND CLAY STNS 1.5 GREY CLAY STNS 7.6 BRWN SAND 11.6 BRWN SAND GRVL CLAY 27.4 BRWN SAND 35.1 GREY SAND SILT DNSE 41.1 BRWN SAND GRVL PCKD 45.4 BRWN GRVL SAND 54.9 GREY CLAY GRVL SAND 57.0
A210677	13 10	Aug-18	579380 4923637	196.0		47.9 -6.4	NR				9999 RC	OW PU	**OW2-18 TAG#A210677** 0.0 BRWN SAND CLAY STNS 1.5 GREY CLAY STNS 3.0 BRWN SAND 14.6 GREY CLAY SAND TILL 22.3 BRWN SAND 38.7 GREY CLAY 40.8 BRWN FSND DNSE 45.1 BRWN SAND GRVL 54.9 GREY CLAY GRVL SAND 55.5
A233065	13 10	Nov-17	579527 4923483	201.8	37.5 -	36.6 -0.9	13.1	36	60	22.9	7556 RC	WS DO	**TAG#A233065 4328 CON 12 SUNNIDALE** 0.0 BRWN SAND 12.2 GREY CLAY 16.8 GREY SILT 33.5 BRWN SAND 37.5
A210683	13 10	Jun-18	579364 4923726	193.9		47.5 -7.6	NR				9999 RC	TW MU	**TW3-18 TAG#A210683** 0.0 TPSL 0.3 BRWN SAND CLAY STNS 1.5 GREY CLAY STNS 7.6 BRWN SAND 11.6 BRWN SAND GRVL CLAY 27.4 BRWN SAND 35.1 GREY SAND SILT DNSE 41.1 BRWN SAND GRVL 45.4 BRWN GRVL SAND 55.8 GREY CLAY GRVL SAND 58.5
A210683	13 10	Jun-18	579353 4923721	193.9		8.8 -3.0	NR				9999 RC	TH MU	**OW4-18 TAG#A210683** 0.0 BRWN SAND CLAY CBLE 4.9 GREY CLAY STNS 7.6 BRWN SAND 11.9 BRWN SAND GRVL CLAY 12.2

QUALITY:		TYPE:		USE:				METHOD :	
Fr	Fresh	WS	Water Supply	CO	Comercial	NU	Not Used	CT	Cable Tool
Mn	Mineral	AQ	Abandoned Quality	DO	Domestic	IR	Irrigation	JT	Jetting
Sa	Salty	AS	Abandoned Supply	MU	Municipal	AL	Alteration	RC	Rotary Conventional
Su	Sulphur	AB	Abandonment Record	PU	Public	MO	Monitoring	RA	Rotary Air
--	Unrecorded	TH	Test Hole or Observation	ST	Stock	-	Not Recorded	BR	Boring
		TW	Test Well						

Easting and Northings UTM NAD 83 Zone 17, Translated from Recorded UTM NAD, subject to Field Verified Location or Improved Location Accuracy.

APPENDIX E

Phase 1 ESA

REPORT

Phase I Environmental Site Assessment

1585 Klondike Park Road, Township of Clearview, Ontario

Submitted to:

Mike Rawn

Township of Clearview
217 Gideon Street
P.O. Box 200
Stayner, ON
L0M 1S0

Submitted by:

Golder Associates Ltd.

121 Commerce Park Drive, Unit L Barrie, Ontario, L4N 8X1 Canada

+1 705 722 4492

1415404

August 23, 2018

Distribution List

1 electronic copy - Township of Clearview

1 copy - Golder Associates Ltd.

Executive Summary

Golder Associates Ltd. (“Golder”) was retained by the Township of Clearview (the “Township”) to conduct a Phase I Environmental Site Assessment (“Phase I ESA”) of the property located at 1585 Klondike Park Road, Township of Clearview, Ontario (the “Site”). The location, surroundings, and layout of the Site are shown in Figure 1.

The Site is currently owned by Ray Polidoro and is occupied by one single storey building, currently vacant, however, appears to have been formerly used as a residential dwelling or garage for vehicle maintenance.

Authorization to proceed with this investigation was received by email from Mr. Mike Rawn, General Manager of Environmental Services, on behalf of the Township on June 22, 2018. This Phase I ESA report has been prepared for the use of the Township and may not be relied upon by others without written consent from Golder.

The primary objective of the Phase I ESA was to identify, insofar as possible based on readily available information and without an intrusive investigation, former or current practices at the Site that may represent issues of actual or potential environmental concern. Golder understands that this assessment is required for due diligence purposes in support of the potential purchase of the property and is not intended to be used in support of the submission of a Record of Site Condition.

For the purposes of this Phase I ESA, the assessment area included the Site and surrounding properties within 250 m of the Site.

Based on all the information obtained as part of this Phase I ESA, the following issues of potential environmental concern were identified:

- Importation of fill of unknown quality. Three fill piles were noted on Site, east of the building and in the vicinity of the east-central property boundary;
- Potential former use of the building for vehicle maintenance.
- Herbicide/pesticide/fertilizer use on-Site. It is unlikely that there was large quantity storage of these chemicals on-Site.

Based on all the information obtained as part of this Phase I ESA, the following Special Attention Items were identified on the Site:

- Building materials may include friable and non-friable ACM; and
- Interior or exterior surface coatings may contain significant lead concentrations. The observed painted surfaces of the Site building were generally noted to be in poor condition with significant sections of paint that were peeling and/or flaking.

These Special Attention Items are not considered to represent issues of potential environmental concern, provided they are managed in accordance with applicable environmental, health, and safety legislation. In the event the Site building was renovated or demolished, there is the potential for disturbance of these materials. A survey of hazardous materials should be completed prior to any renovation or demolition activities.

Household debris was noted on-Site. While these are not typically associated with contamination, the removal of this debris is recommended prior to purchase.

To address the issue(s) of potential environmental concern identified a Phase II ESA would be required to investigate the potential presence of soil or groundwater impacts at the Site.

Table of Contents

TABLES

FIGURES

APPENDICES

APPENDIX A
EcoLog ERIS Report

APPENDIX B
Regulatory Responses

APPENDIX C
Site Photographs

1.0 INTRODUCTION

1.1 Background and Objective

Golder Associates Ltd. ("Golder") was retained by the Township of Clearview (the "Township") to conduct a Phase I Environmental Site Assessment ("Phase I ESA") of the property located at 1585 Klondike Park Road, Township of Clearview, Ontario (the "Site"). The location, surroundings, and layout of the Site are shown in Figure 1.

The Site is currently owned by Ray Polidoro and is occupied by one single storey building, currently vacant, however, appears to have been formerly used as a residential dwelling or garage for vehicle maintenance.

The primary objective of the Phase I ESA was to identify, insofar as possible based on readily available information and without an intrusive investigation, former or current practices at the Site that may represent issues of actual or potential environmental concern. Golder understands that this assessment is required for due diligence purposes in support of the potential purchase of the property and is not intended to be used in support of the submission of a Record of Site Condition.

Authorization to proceed with this investigation was received by email from Mr. Mike Rawn, General Manager of Environmental Services, on behalf of the Township on June 22, 2018. This Phase I ESA report has been prepared for the use of the Township and may not be relied upon by others without written consent from Golder.

1.2 Scope of Work

Golder's assessment was carried out in general accordance with Canadian Standards Association ("CSA") Standard Z768-01, *Phase I Environmental Site Assessment* (reaffirmed 2016), and involved the following scope of work:

- reviewing readily available records to collect data on past and present activities on the Site;
- visiting the Site to observe current Site conditions and operations and further assess any potential environmental concerns identified in the records review;
- interviewing knowledgeable individual(s) to corroborate or augment the information gathered from the records review and Site visit;
- evaluating the information from the records review, Site visit, and interviews; and
- preparing a Phase I ESA report.

For the purposes of this Phase I ESA, the assessment area included the Site and surrounding properties within 250 m of the Site.

In preparing this Phase I ESA, Golder has applied professional judgement in considering readily-available information and has relied in good faith on information provided by others. This level of effort is a method of risk reduction rather than risk elimination. This assessment included a cursory overview of the neighbouring land uses and does not constitute a complete assessment of neighbouring land uses. Further reductions in risk can be achieved through a program of intrusive testing at the Site, including sample collection and analysis.

2.0 SITE DESCRIPTION

2.1 Site Location and Setting

The Site consists of a rectangular parcel of land 38.6 hectares in area located in Clearview, Ontario, at 1585 Klondike Park Road, Township of Clearview, Ontario. The Site is approximately 5.4 km southeast of Georgian Bay and 2.5 km north of the Highway 26.

2.2 Site Uses and Structures

The Site is occupied by one single storey building with a footprint area of approximately 90 m^2. The building is vacant and appears to have been formally used as a residential dwelling or possible a garage used for vehicle maintenance. No other information was known regarding former site uses. There is an unmaintained dirt access road leading to the Site building, comprising less than 5% of the Site area, with the remainder of the Site area consisting of agricultural field and forest.

2.3 Topographic, Geologic, and Hydrogeologic Setting

The following summary of the Site's topographic, geologic, and hydrogeologic setting is based on Golder's observations during the Site visit and on a review of the following maps:

One creek was noted on the northern portion of the Site which flows north toward the Nottawasaga River[1], approximately 0.4 km north of the Site, and ultimately discharges to Georgian Bay, approximately 5.4 km northwest of the Site. Topography at the Site is generally flat and appears to be at grade with surrounding properties.

The surficial geology in the vicinity of the Site consists of glaciolacustrine nearshore sand and minor gravel, fluvial sand. To the south of the site in areas of higher elevation Newmarket Till, both silt and sand facies are present[2]. A glacial lake shoreline crosses the property and forms a low relief terrace that correlates to the Nipissing Phase of the Great Lakes. On-site drilling indicates sand overlying till and interlayered silt/clay, which in turn overlies regional Aquifer A3[1] and sand and gravel to a depth of 55 mbgl. Till is at the base of the Quaternary sequence overlies carbonate sedimentary bedrock of Ordovician age[3].

At the time of the Site visit, subsurface soil was exposed in two test pits noted 20 m east of the Site building. According to the Site Representative, the excavations were present with the purchase of the property in 2008. The depth of the excavations were less than 1 metre below ground surface (mbgs). The exposed surficial soil was observed to consist of a coarse-grained sand and gravel and topsoil with vegetation noted on the base of each pit. Groundwater seepage into the excavation was not observed.

Regional groundwater flow in the underlying aquifers is typically to the northwest towards Georgian Bay. On Site local shallow groundwater flow is generally expected to flow north towards the Nottawasaga River. Buried utilities,

---

[1] Golder Associates, 2004. South Simcoe Municipal Groundwater Study. Golder Associates, Barrie.

[2] Mulligan, R.P.M., 2017. Quaternary Geology of the Western Half of the Barrie and Elmvale Areas. Map P.3816, Scale 1:50,000

[3] Ministry of Northern Development and Mines, 1991. Bedrock Geology of Ontario, Southern Sheet, Map 2544, Scale 1:1,000,000

underground structures, and septic systems can affect local (shallow) groundwater flow conditions. Inferred groundwater flow directions are subject to confirmation with field measurements.

3.0 PROPERTY-USE INFORMATION REVIEW

3.1 Aerial Photographs

Aerial photographs of the Site and vicinity for the years 1946, 1962, and 1975 (obtained from the National Air Photo Library), 1989, 1997, 2002, 2008, and 2016 (obtained from the Simcoe County Interactive Mapping website) were reviewed by Golder. The presence and absence of structures on the Site and on neighbouring properties were noted (Table 1).

Table 1: Aerial Photographs

Year (Scale)	Site	Surrounding Properties
1946	The Site is under agricultural land use. A creek is evident flowing through the northeast portion of the Site.	**North:** Freethy Road (to the northwest) is bordered mainly by agricultural land and associated buildings. **East:** Agricultural land use. **South:** Sunnidale Road and residential land, with agricultural land use beyond. **West:** Klondike Park Road with agricultural and undeveloped land beyond.
1962	Similar to the 1946 aerial photograph.	Similar to the 1946 aerial photograph.
1975	Similar to the 1962 aerial photograph; however, there may be a building present along Klondike Park Road, approximately 340 m north of Sunnidale Road. The scale of the photograph prevents further assessment.	Similar to the 1962 aerial photograph, except the property on the southeast corner of the intersection of Klondike Park Road and Freethy Road is developed.
1989	The Site remains under agricultural land use. A building is present in a similar location as the 1975 photograph, however, additional trees have been cleared in that area. What appears to be hay bales are present throughout the Site.	Similar to the 1975 aerial photograph.
1997	Similar to the 1989 photograph.	Similar to the 1989 aerial photograph.
2002	Several vehicles are evident surrounding the building. The remainder of the Site appears similar to the 1997 photograph.	Similar to the 1997 aerial photograph. The area to the east of the southern portion of the Site appears to be reforested.

Year (Scale)	Site	Surrounding Properties
2008	An additional building is present to the northwest of the previous building. No vehicles are present. The remainder of the Site is under agricultural land use.	Similar to the 2002 aerial photograph.
2016	Similar to the 2008 photograph. Excavation equipment is evident to the east of the buildings.	Similar to the 2008 aerial photograph.

3.2 Fire Insurance Records

Golder asked Opta Information Intelligence (“Opta”) to provide any fire insurance plans (“FIPs”), property underwriters’ reports (“PURs”) and property underwriters’ plans (“PUPs”) related to the Site and surrounding properties. Golder was received the Enviroscan report from Opta on June 18, 2018 that concluded no records were found.

3.3 EcoLog ERIS Search of Environmental Databases

Golder contracted EcoLog Environmental Risk Information Services Ltd. (“EcoLog ERIS”) to search available federal, provincial, and private-sector environmental databases for the Site and within 250 m from the centre of the Site. The complete database report is included in Appendix B. Noteworthy findings of the EcoLog ERIS report are summarized in the following sections.

3.3.1 Site

Based on Golder’s review, the EcoLog ERIS report indicated the following noteworthy findings originating at the Site, on-site monitoring well have not yet been added to the water well database:

- One well was listed at the Site in the water well information system (WWIS) along the southern boundary of the Site. The WWIS record indicates that stratigraphy on Site consists of sand from 0.3 to 9.1 meters below ground surface (mbgs), silt to 19.2 mbgs, and sand to 20.7 mbgs. The static water level was reported to be 12.8 mbgs. On-site drilling OW2-18, indicates sand from 0 to 1.5 m, silt till to 3.1 m, sand to 14.6 m, silt till to 24.1 m, layered sand, silt, and clay to 27.4 m, sand to 38.7 m, clay to 40.8 m, sand and gravel to 54.9 m, and till to 55.5 m. A static water was measured to be 9.0 mbgs.

3.3.2 Surrounding Properties

Based on Golder’s review, the EcoLog ERIS report indicated the following noteworthy findings originating on the surrounding properties:

- Ten wells were listed in the WWIS database within the study area. Water well records indicate that the stratigraphy within the study area generally consists of clay overlain by sand. The static water level is expected to range from 3.7 metres above grade (artesian) to 18 metres below grade.

3.4 Chain of Title

Golder was not provided with a chain of title for review.

3.5 Agreement of Purchase and Sale

Golder was not provided with an agreement of purchase and sale.

3.6 Previous Environmental Reports

The following environmental report related to the Site was obtained by Golder. While a technical peer review of the report was not completed, noteworthy findings are summarized in Table 6. Golder consulted this report to develop an understanding of any issues previously identified for the Site and surrounding properties.

1) **"Township of Clearview, Long Term Water Supply, Environmental Assessment, Groundwater Source Evaluation": "***Environmental Assessment Groundwater Source Report",* File No. 06-1112-501, prepared by Golder Associates for the Township of Clearview, March 2006.

Table 2: Noteworthy Factual Information from Previous Environmental Reports

Report		Factual Information
1	2006 Environmental Assessment Groundwater Source Report	The report did not provide any evidence of environmental contamination. No other relevant information was noted. The surficial geology in the vicinity of the Site was reported to consist predominantly of tills to the west and sand and gravel outwash plains to the north and southeast. Much of the western part of the Township is covered by drumlinized and beveled till plains.

4.0 REGULATORY INFORMATION REVIEW

4.1 Provincial Ministry of Environment

The Ministry of the Environment, Conservation and Parks ("MECP") was asked to respond in writing to the following questions:

- Has the MECP ever issued any approvals, permits or licences for the Site?
- Has the MECP ever issued any control orders or violation notices with respect to the Site?

The MECP responded in a letter dated July 10, 2018 indicating that no records were located in their files with respect to the Site.

A copy of the response is provided in Appendix C.

4.2 Technical Standards & Safety Authority, Fuels Safety Division

The Technical Standards & Safety Authority ("TSSA"), Fuels Safety Division maintains records related to registered fuel storage tanks and other petroleum-related infrastructure. The TSSA was contacted to identify whether any active, decommissioned, or in-service storage tanks were present on the Site, and to search for outstanding instructions, incident reports, spills, or contamination records.

Based on email correspondence between Golder and TSSA's Public Information Services department on June 13, 2018, the TSSA has no record of fuel storage tanks on file pertaining to the Site.

A copy of TSSA correspondence is provided in Appendix C.

5.0 SITE VISIT AND INTERVIEW(S)

Golder's Site Assessor visited the Site on June 20, 2018. The Site Assessor was not accompanied on Site by a Site Representative. A telephone interview was conducted Mr. Ray Polidoro, the current owner, subsequent to the site visit. During the Site visit, the Site Assessor walked through and observed accessible areas of the interior and exterior of the Site, observed neighbouring properties, and photographed representative Site features (Appendix D).

5.1 Past Site Uses

The Site Representative stated that to the best of his knowledge, the Site has been used for agricultural and residential purposes; however, the building may have historically been used for vehicle maintenance. The Site Representative had no knowledge of previous or other uses of the Site.

The Site Representative was asked whether any of the specific activities of potential environmental concern listed in Table 8 had occurred at the Site or surrounding properties. A summary of the Site Representative's response is provided in Table 8.

Table 3: Past Uses of the Site and Neighbouring Properties

Reported Use	Details
Dry cleaner	None reported.
Industrial metal finishing, including painting or electroplating	None reported.
Other industry	None reported.
Fuel storage	None reported.
Retail fuel outlet or vehicle service garage	The Site Representative indicated that the building may have historically been used for vehicle maintenance. Based on the 2002 aerial photograph, several vehicles were present on the Site surrounding the building and may be the time where these activities occurred. No vehicles were evident in the 1997 or 2009 photographs.
Landfilling or placement of fill	Two fill piles were located east of the building, one consisted of granular fill and was grassed covered, the other was a pile of boulders and was also grass covered. A third fill pile was located in the forested area, near the east-central property line. It was also grassed covered.
Waste water impoundments	None reported.
Solid or liquid waste storage or disposal	None reported.
Environmental sampling, wells, or evidence of drilling	Two drilled wells, south of the building, in the southern portion of the Site

Reported Use	Details
Any other activities that may have affected the environmental condition of the Site or neighbouring properties	There has been a long history of agricultural use at the Site with the potential for herbicide, pesticide, and fertilizer use; however, based on a review of aerial photographs and the lack of a large scale operation, it is unlikely that large quantities of these chemicals have been stored at the Site.

5.2 Present Site Uses

At the time of the Site visit, the Site was vacant with a one-storey house with a large garage.

5.3 Site Buildings and Equipment

At the time of the Site visit, the Site was developed with one building, as described in Section 5.2.

Table 4: Site Building(s) and Equipment

Topic	Findings and Assessor Comments
Construction date(s)	House – between 1975 and 1989 No additional information from Site Representative.
Renovation date(s)	NA
Building footprint area	House: approximately 90 m^2.
Total building area	90 m^2.
Number of above-ground floors	House: One (ground floor).
Below-ground floors and uses	None.
Frequently occupied rooms in contact with the ground	All main floor rooms. Currently vacant.
Number of tenant units	None.
Building exterior	Wood siding and shingles
Building interior	Not accessible.
Heating system	Unknown.
Cooling system	None anticipated.

Topic	Findings and Assessor Comments
Backup power supply	None.
Potable water supply	No municipal supply
Other services	The Site is serviced with electricity from the municipal grid. No fuel oil tanks were evident. There was a chimney stack on the house, which may indicate a wood fired furnace.
Hydraulic lift equipment	None
Other mechanical equipment	None.
X-ray equipment	None.

5.4 Chemical and Fuel Storage

During the site visit, there was no evidence of chemical and/or fuel storage.

5.5 Waste Generation and Handling

Waste generation and handling practices at the Site are described in Table 12.

Table 5: Waste Generation and Handling

Item	Details
Bricks and rubble	Debris, possibly from the demolition of the second building were noted southwest of the building.
Motorhome	An old motorhome is located adjacent to the west side of the building
Household items (sinks, chairs, baskets, etc.)	Surrounding the area by the building

No spills or staining associated with these items were reported or observed.

5.6 Surrounding Properties

Golder observed surrounding properties from publicly accessible areas and from the Site.

The Site Assessor made the following observations of the surrounding properties:

West (inferred to be hydraulically upgradient of the Site): Klondike Park Road. A Quonset hut was noted approximately 250 to 300 m west of the Site. The remainder of the area to the west was under agricultural land use.

North (inferred downgradient): North of the Site are residential and agricultural land.

South (inferred cross-gradient): Residential and Sunnidale Road with agricultural land use beyond.

East (inferred downgradient): Agricultural land and a reforested area adjacent to the central portion of the Site.

6.0 SPECIAL ATTENTION ITEMS

Information about Special Attention Items was collected during the Site visit and from the interview with the Site Representative. In the following subsections, information collected during the Site visit and interview is supplemented with information from previous reports, where such reports exist.

6.1 Polychlorinated Biphenyls

Polychlorinated biphenyls ("PCB") are a group of organic chemicals that were widely used in caulking and electrical equipment manufactured between the 1950's and 1980. Caulking potentially containing PCB can found in any building constructed during this period. Electrical equipment potentially containing PCB is restricted to transformers, capacitors, heat transfer equipment, hydraulic equipment, electromagnets and vapour diffusion pumps manufactured prior to September 1977 and in lamp ballasts manufactured prior to July 1980. The PCB regulations of the Canadian Environmental Protection Act (SOR/2008-273) require that equipment containing more than 50 mg/kg PCB should be decommissioned, with PCB use to be eliminated by 2025.

No PCB-containing equipment was noted on-Site. There is a pole mounted transfer along Klondike Park Road.

6.2 Asbestos-Containing Materials

The use of asbestos-containing building materials ("ACM"), including both friable and non-friable asbestos, in building construction materials significant declined on a voluntarily basis in the mid-1970's. The use of materials containing friable asbestos in Canada was effectively discontinued by 1986 as a result of strict provincial regulation. Typical examples of friable ACM include thermal, fire-proofing or acoustical insulating materials and can include deteriorated materials containing non-friable ACM (e.g., Transite™ pipe). Typical examples of non-friable ACM can include packings, gaskets, sealants, resilient flooring, asphalt roofing, mastics, drywall joint compounds, stuccos, cementitious and Transite™ materials (including drains and downspouts), and Transite™ shingles. Buildings constructed prior to 1986 potentially contain both friable and non-friable ACM. Buildings constructed after 1986 potentially contain non-friable ACM; however, as a practical matter, the condition of some non-friable ACM can deteriorate, releasing asbestos fibres if disturbed.

The potential presence of ACM requires an asbestos survey and management plan in accordance with Ontario Regulation 278/05.

6.3 Lead and Lead-Containing Surface Coatings

Paints manufactured prior to 1960 commonly contained significant lead. In 1976, the Canadian Hazardous Products Act restricted the lead content of paints and other surface coatings on furniture, household products, children's products, and exterior and interior surfaces and since that time lead content of paints has continued to decline. Lead-containing surface coatings in good condition are not typically associated with health risks to building occupants; however, unacceptable lead exposures can occur during building renovations, modifications or demolition activities. Other potential sources of lead in buildings include soldered plumbing joints installed prior to 1986 and lead plumbing pipe (used up until 1975). Lead is present in leaded glass and other type of radiation shielding that are used where radiation sources are present (e.g., medical and dental clinics).

Due to the age of the building (circa 1970s), it cannot be concluded that it was constructed with lead free products. The observed painted surfaces of the Site building were generally noted to be in poor condition with sections of paint that were peeling and/or flaking.

6.4 Ozone-Depleting Substances

Refrigeration and air conditioning equipment in service prior to 1998 may contain chlorofluorocarbon refrigerants that are designated as ozone-depleting substances (“ODS”). Non-ODS refrigerants have been developed and are available to replace these materials in newer equipment. Other ODS include halons, methyl chloroform and carbon tetrachloride. Under the Ozone Depleting Substances Regulations 1998 of the Canadian Environmental Protection Act (SOR/99-07), all ODS are being phased out of use in Canada.

At the time of the Site visit, Golder did not observe any ODS’s on Site.

6.5 Urea Formaldehyde Foam Insulation

Urea formaldehyde foam insulation (“UFFI”) is low-density foam that was used as an insulating material in the 1970s until it was banned from use in Canada in 1980. UFFI was commonly injected through walls by drilling injection holes, typically in walls, roof structures, ceilings and overhangs.

The assessor did not see any areas of concern pertaining to UFFI.

6.6 Radon and Radioactive Substances

Radon is a radioactive gas formed by the decay of naturally occurring uranium. In 2012 Health Canada released a major study demonstrating that radon concentrations in 7% of Canadian homes exceed the recommended guideline of 200 Becquerels/m^3. It is likely that similar proportion of commercial and industrial buildings are also impacted by radon at concentrations exceeding this recommended guideline. Although radon concentrations vary significantly across Canada, no geographic area is radon-free, and Health Canada recommends the completion of long-term radon testing to determine radon concentrations within a building.

Radioactive sources are found within a wide range of testing equipment including lasers, x-ray sources, imaging and radiography equipment, industrial gauges (including density gauges and other materials testing equipment), and smoke detectors. Radioactive products include any uranium containing material and medical isotopes.

No radioactive sources were observed or reported to be present at the Site.

6.7 Mercury

Mercury may be present in both mechanical and electrical equipment including thermometers, thermostats, switch gears, barometers, vacuum gauges, gas pressure regulators, electrical switches/relays, batteries and electrolytic manufacturing processes. Small amounts of mercury are present in some fluorescent lights, including mercury vapour, metal halide, and sodium vapour lamps.

During the Site visit, Golder did not observe any equipment or products potentially containing mercury.

6.8 Mould or Water Damage

Mould can grow on damp building materials such as ceiling tiles, drywall, carpeting, and areas. Mould growth is commonly associated with water leakage.

No areas of moisture, water ingress and/or suspected mould growth were observed or reported to be present at the time of the Site reconnaissance.

6.9 Noise and Vibration

No major or persistent sources of noise and vibration were observed or reported to be present other than that typical of vehicular traffic on the adjacent roadways.

6.10 Non-ionizing Electromagnetic Radiation

Non-ionizing types of electromagnetic radiation include radiofrequency and microwave radiation, which can be associated with tissue damage through heating. Radiofrequency radiation is produced by radio and TV transmitters, induction heaters, and dielectric sealers. Microwave radiation is produced by microwave ovens, parabolic antennas, radar devices, and diathermy applicators. No human health risks are known to be associated with the low-energy electromagnetic radiation from commercial electronics and power transmission lines.

No sources of non-ionizing electromagnetic radiation were observed or reported to be present at the time of the Site reconnaissance.

7.0 ISSUES OF ENVIRONMENTAL CONCERN

Based on all the information obtained as part of this Phase I ESA, the following issues of potential environmental concern were identified:

- Importation of fill of unknown quality. Three fill piles were noted on Site, east of the building and in the vicinity of the east-central property boundary;
- Potential former use of the building for vehicle maintenance.
- Herbicide/pesticide/fertilizer use on-Site. It is unlikely that there was large quantity storage of these chemicals on-Site.

Based on all the information obtained as part of this Phase I ESA, the following Special Attention Items were identified on the Site:

- Building materials may include friable and non-friable ACM; and,
- Interior or exterior surface coatings may contain significant lead concentrations. The observed painted surfaces of the Site building were generally noted to be in poor condition with significant sections of paint that were peeling and/or flaking.

These Special Attention Items are not considered to represent issues of potential environmental concern provided they are managed in accordance with applicable environmental, health, and safety legislation. In the event the Site building was renovated or demolished, there is the potential for disturbance of these materials. A survey of hazardous materials should be completed prior to any renovation or demolition activities.

Household debris was noted on-Site. While these are not typically associated with contamination, the removal of this debris should be completed prior to purchase.

7.1 Outstanding Information

At the time of preparation of this report, no regulatory responses were outstanding.

8.0 LIMITATIONS

This report (the "Report") was prepared for the exclusive use of the Township of Clearview for the express purpose of providing advice with respect to the environmental condition of the Site. In evaluating the site, Golder Associates Ltd. has relied in good faith on information provided by others as noted in the Report. We have assumed that the information provided is factual and accurate. We accept no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Any use which a third party makes of this Report, or any reliance on or decisions to be made based on it, are the sole responsibility of the third parties. If a third party require reliance on this Report, written authorization from Golder is required. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The scope and the period of Golder's assessment are described in this Report, and are subject to restrictions, assumptions and limitations. Except as noted herein, the work was conducted in accordance with the scope of work and terms and conditions within Golder's proposal. Distances noted in this report were determined using mapping data of variable accuracy and should therefore be considered approximate. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report. Conditions may therefore exist which were not detected given the limited nature of the assessment Golder was retained to undertake with respect to the Site and additional environmental studies and actions may be required. In addition, it is recognized that the passage of time affects the information provided in the Report. Golder's opinions are based upon information available to Golder as of the date of the Site visit. It is understood that the services provided for in the scope of work allowed Golder to form no more than an opinion of the actual conditions at the Site at the time of the site visit, and cannot be used to assess the effect of any subsequent changes in any laws or regulations and the environmental quality of the Site or its surroundings. Asbestos and mould surveys were not performed. If a service is not expressly indicated, do not assume it has been provided.

The results of an assessment of this nature should in no way be construed as a warranty that the Site is free from any and all contamination from past or current practices

9.0 CLOSURE

We trust that this report meets your immediate requirements. If you have any questions regarding the content of this report, please do not hesitate to contact this office.

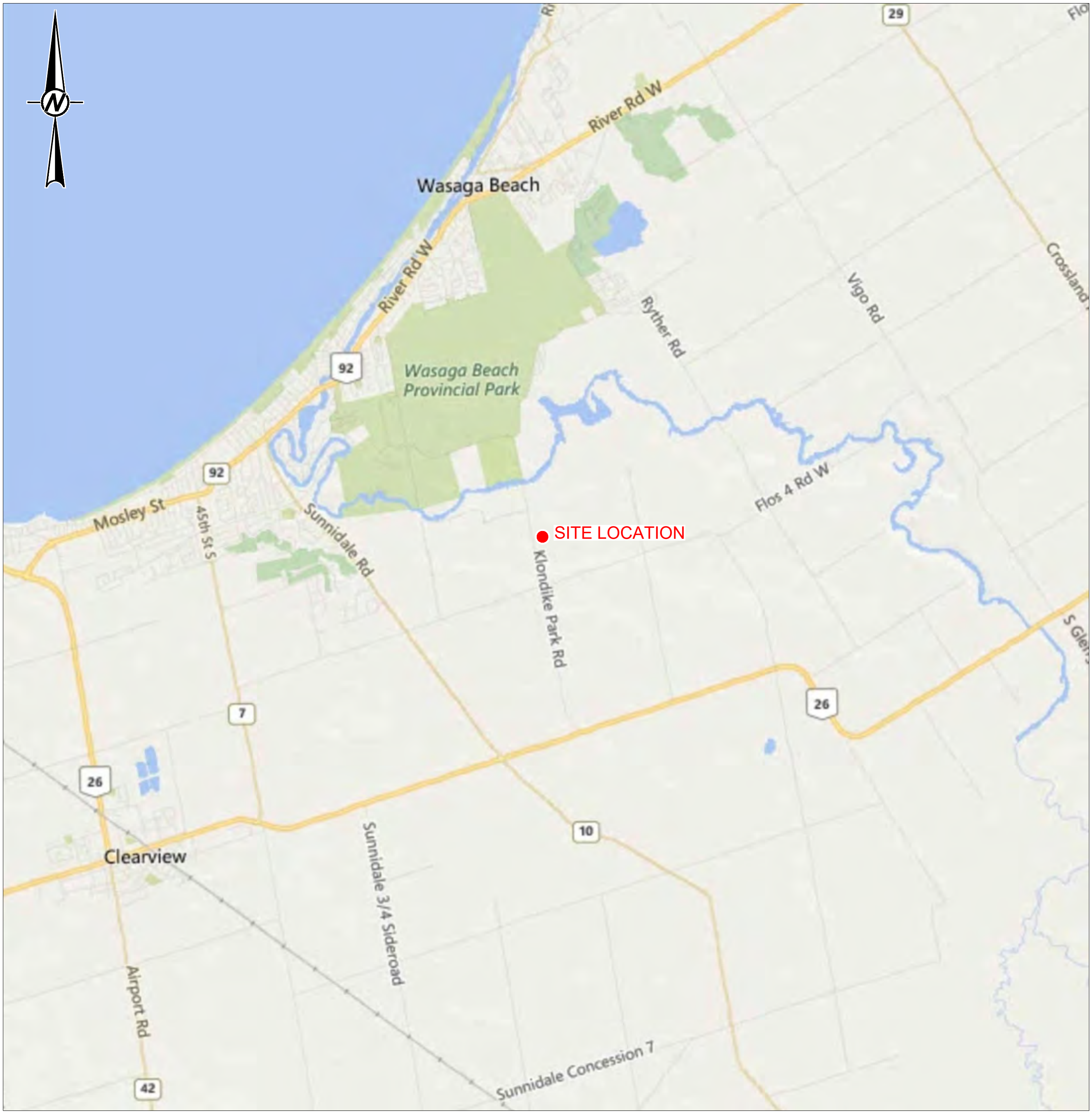
Signature Page

Golder Associates Ltd.

Christi Groves, B.Sc.(Hons)	Mike Cleverdon, B.Sc.(Hons)
Senior Environmental Scientist	*Principal*

CLG/JAE/MLC/cdr

FIGURES



0 2,500 5,000

1:100,000 METRES

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
PHASE I ENVIRONMENTAL SITE ASSESSMENT
1585 KLONDIKE PARK ROAD, WASAGA BEACH, ONTARIO

TITLE
KEY PLAN

NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)
BASE DATA - MNR LIO, OBTAINED 2018
BASE IMAGERY - © 2018 DIGITALGLOBE IMAGE COURTESY OF USGS EARTHSTAR GEOGRAPHICS SIO © 2018 MICROSOFT CORPORATION
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENSE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2018
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CONSULTANT
GOLDER

YYYY-MM-DD	2018-08-16
DESIGNED	
PREPARED	STB
REVIEWED	
APPROVED	

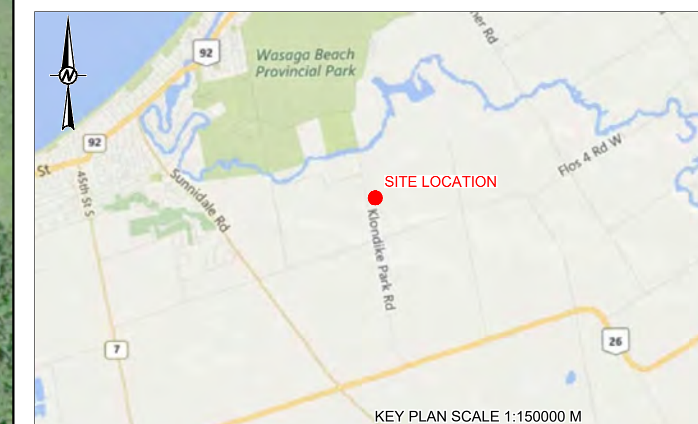
PROJECT NO.	CONTROL	REV.	FIGURE
1415404		A	1

Last Edited By: sbowerman Date: 2018-07-18 Time:3:15:43 PM | Printed By: Sbowerman Date: 2018-08-16 Time:3:02:39 PM
Path: \\golder.gds\gal\Barrie\CAD\Projects\2014\141-5404 (Clearview, HydroG Stayner)\-18ESA\ | File Name: 1415404018ESA0001.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
25 mm
0

LEGEND

- TEST WELL LOCATION
- PHASE ONE PROPERTY BOUNDARY
- PHASE ONE STUDY AREA (250 m RADIUS)



0 125 250
1:7,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE
2. TO BE READ IN CONJUNCTION AND ACCORDANCE WITH THE REPORT

REFERENCE(S)

BASE DATA - MNR LIO, OBTAINED 2018
BASE IMAGERY - © 2018 DIGITALGLOBE IMAGE COURTESY OF USGS EARTHSTAR GEOGRAPHICS SIO © 2018 MICROSOFT CORPORATION
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENSE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2018
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
PHASE I ENVIRONMENTAL SITE ASSESSMENT
1585 KLONDIKE PARK ROAD, WASAGA BEACH, ONTARIO

TITLE
SITE AND SURROUNDING LAND USE PLAN

CONSULTANT
GOLDER

YYYY-MM-DD	2018-08-16
DESIGNED	
PREPARED	STB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
1415404		A	2

APPENDIX A

EcoLog ERIS Report

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

DATABASE REPORT

Project Property:	*1585 Klondike Park Road, Clearview* *1585 Klondike Park Road* *Wasaga Beach ON L9Z 2W8*
Project No:	
Report Type:	*Quote - Custom-Build Your Own Report*
Order No:	*20180612132*
Requested by:	*Golder Associates Ltd.*
Date Completed:	*June 18, 2018*

Environmental Risk Information Services
A division of Glacier Media Inc.
P: 1.866.517.5204
E: info@erisinfo.com

www.erisinfo.com

Table of Contents

Executive Summary

Property Information:

Project Property:	*1585 Klondike Park Road, Clearview* *1585 Klondike Park Road Wasaga Beach ON L9Z 2W8*
Project No:	

Order Information:

Order No:	*20180612132*
Date Requested:	*June 12, 2018*
Requested by:	*Golder Associates Ltd.*
Report Type:	*Quote - Custom-Build Your Own Report*

Historical/Products:

Executive Summary: Report Summary

Database	Name	Searched	Project Property	Boundary to 0.25km	Total
AAGR	Abandoned Aggregate Inventory	Y	0	0	0
AGR	Aggregate Inventory	Y	0	0	0
AMIS	Abandoned Mine Information System	Y	0	0	0
ANDR	Anderson's Waste Disposal Sites	Y	0	0	0
AUWR	Automobile Wrecking & Supplies	Y	0	0	0
BORE	Borehole	Y	0	0	0
CA	Certificates of Approval	Y	0	0	0
CFOT	Commercial Fuel Oil Tanks	Y	0	0	0
CHEM	Chemical Register	Y	0	0	0
CNG	Compressed Natural Gas Stations	Y	0	0	0
COAL	Inventory of Coal Gasification Plants and Coal Tar Sites	Y	0	0	0
CONV	Compliance and Convictions	Y	0	0	0
CPU	Certificates of Property Use	Y	0	0	0
DRL	Drill Hole Database	Y	0	0	0
DRYCLEANERS	Dry Cleaning Facilities	Y	0	0	0
EASR	Environmental Activity and Sector Registry	Y	0	0	0
EBR	Environmental Registry	Y	0	0	0
ECA	Environmental Compliance Approval	Y	0	0	0
EEM	Environmental Effects Monitoring	Y	0	0	0
EHS	ERIS Historical Searches	Y	0	0	0
EIIS	Environmental Issues Inventory System	Y	0	0	0
EMHE	Emergency Management Historical Event	Y	0	0	0
EXP	List of TSSA Expired Facilities	Y	0	0	0
FCON	Federal Convictions	Y	0	0	0
FCS	Contaminated Sites on Federal Land	Y	0	0	0
FOFT	Fisheries & Oceans Fuel Tanks	Y	0	0	0
FST	Fuel Storage Tank	Y	0	0	0
FSTH	Fuel Storage Tank - Historic	Y	0	0	0
GEN	Ontario Regulation 347 Waste Generators Summary	Y	0	0	0
GHG	Greenhouse Gas Emissions from Large Facilities	Y	0	0	0
HINC	TSSA Historic Incidents	Y	0	0	0
IAFT	Indian & Northern Affairs Fuel Tanks	Y	0	0	0
INC	TSSA Incidents	Y	0	0	0
LIMO	Landfill Inventory Management Ontario	Y	0	0	0
MINE	Canadian Mine Locations	Y	0	0	0
MISA PENALTY	Environmental Penalty Annual Report	Y	0	0	0

Database	Name	Searched	Project Property	Boundary to 0.25km	Total
MNR	*Mineral Occurrences*	Y	0	0	0
NATE	*National Analysis of Trends in Emergencies System (NATES)*	Y	0	0	0
NCPL	*Non-Compliance Reports*	Y	0	0	0
NDFT	*National Defense & Canadian Forces Fuel Tanks*	Y	0	0	0
NDSP	*National Defense & Canadian Forces Spills*	Y	0	0	0
NDWD	*National Defence & Canadian Forces Waste Disposal Sites*	Y	0	0	0
NEBI	*National Energy Board Pipeline Incidents*	Y	0	0	0
NEBW	*National Energy Board Wells*	Y	0	0	0
NEES	*National Environmental Emergencies System (NEES)*	Y	0	0	0
NPCB	*National PCB Inventory*	Y	0	0	0
NPRI	*National Pollutant Release Inventory*	Y	0	0	0
OGW	*Oil and Gas Wells*	Y	0	0	0
OOGW	*Ontario Oil and Gas Wells*	Y	0	0	0
OPCB	*Inventory of PCB Storage Sites*	Y	0	0	0
ORD	*Orders*	Y	0	0	0
PAP	*Canadian Pulp and Paper*	Y	0	0	0
PCFT	*Parks Canada Fuel Storage Tanks*	Y	0	0	0
PES	*Pesticide Register*	Y	0	0	0
PINC	*TSSA Pipeline Incidents*	Y	0	0	0
PRT	*Private and Retail Fuel Storage Tanks*	Y	0	0	0
PTTW	*Permit to Take Water*	Y	0	0	0
REC	*Ontario Regulation 347 Waste Receivers Summary*	Y	0	0	0
RSC	*Record of Site Condition*	Y	0	0	0
RST	*Retail Fuel Storage Tanks*	Y	0	0	0
SCT	*Scott's Manufacturing Directory*	Y	0	0	0
SPL	*Ontario Spills*	Y	0	0	0
SRDS	*Wastewater Discharger Registration Database*	Y	0	0	0
TANK	*Anderson's Storage Tanks*	Y	0	0	0
TCFT	*Transport Canada Fuel Storage Tanks*	Y	0	0	0
VAR	*TSSA Variances for Abandonment of Underground Storage Tanks*	Y	0	0	0
WDS	*Waste Disposal Sites - MOE CA Inventory*	Y	0	0	0
WDSH	*Waste Disposal Sites - MOE 1991 Historical Approval Inventory*	Y	0	0	0
WWIS	*Water Well Information System*	Y	1	10	11
		Total:	1	10	11

Executive Summary: Site Report Summary - Project Property

Map Key	*DB*	*Company/Site Name*	*Address*	*Dir/Dist (m)*	*Elev diff (m)*	*Page Number*
1	WWIS		lot 10 con 13 ON	-/0.0	13.94	12

Executive Summary: Site Report Summary - Surrounding Properties

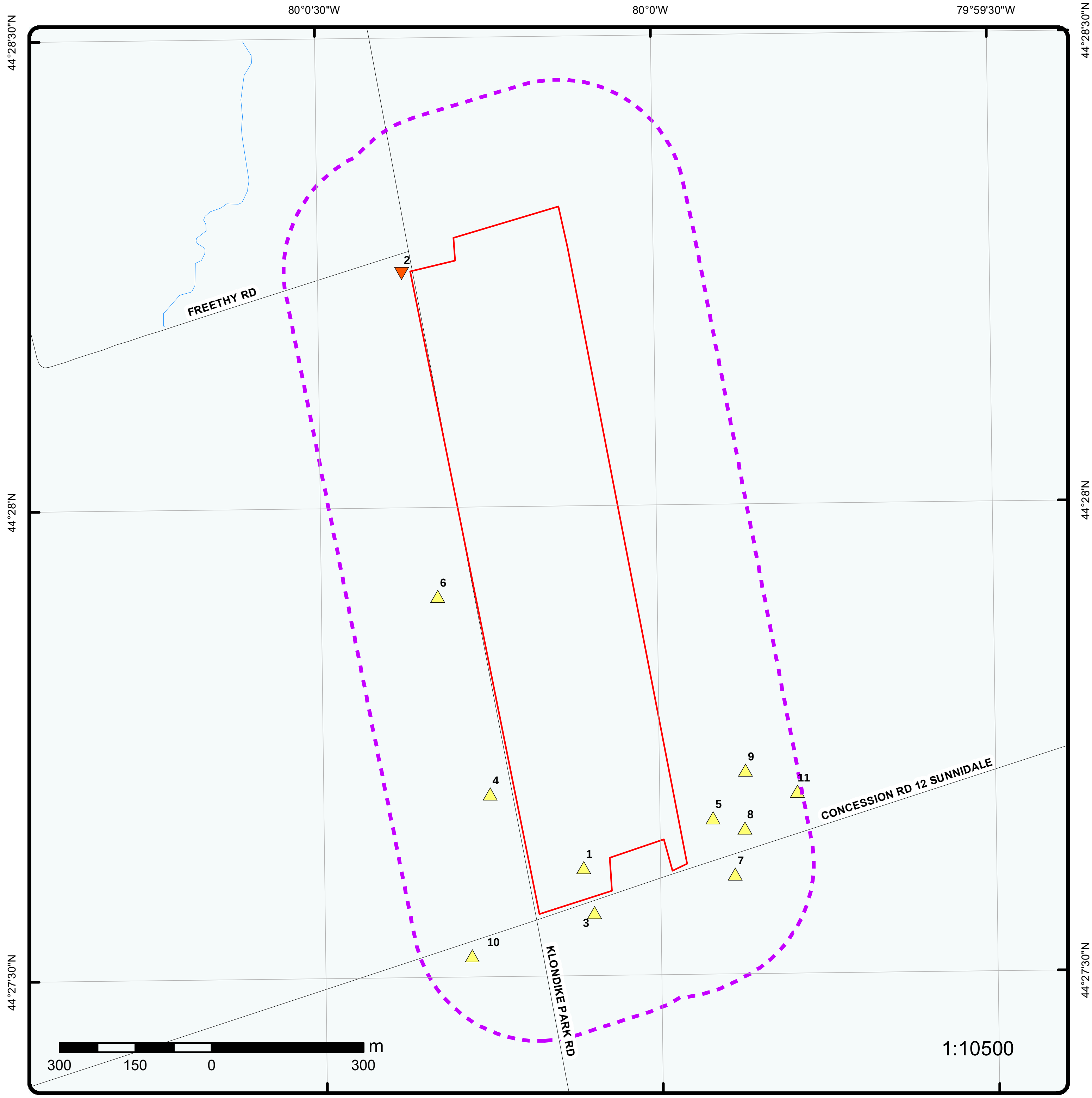
Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
2	WWIS		lot 10 con 13 ON	NNW/17.6	-2.03	15
3	WWIS		lot 10 con 13 ON	S/30.4	14.88	18
4	WWIS		lot 10 con 13 ON	SSW/48.0	9.83	21
5	WWIS		lot 10 con 13 ON	SSE/68.1	12.92	24
6	WWIS		lot 9 con 14 ON	WSW/72.7	1.03	27
7	WWIS		lot 10 con 12 ON	SSE/97.4	12.92	30
8	WWIS		lot 10 con 13 ON	SE/125.6	12.19	34
9	WWIS		lot 10 con 12 CLEARVIEW TOWNSHIP ON	SE/148.5	8.11	38
10	WWIS		lot 9 con 12 ON	S/155.3	17.92	44
11	WWIS		lot 8 con 13 ON	SE/240.9	12.12	47

Executive Summary: Summary By Data Source

WWIS - Water Well Information System

A search of the WWIS database, dated Dec 31, 2017 has found that there are 11 WWIS site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
	lot 10 con 13 ON	0.0	1
	lot 10 con 13 ON	17.6	2
	lot 10 con 13 ON	30.4	3
	lot 10 con 13 ON	48.0	4
	lot 10 con 13 ON	68.1	5
	lot 9 con 14 ON	72.7	6
	lot 10 con 12 ON	97.4	7
	lot 10 con 13 ON	125.6	8
	lot 10 con 12 CLEARVIEW TOWNSHIP ON	148.5	9
	lot 9 con 12 ON	155.3	10
	lot 8 con 13 ON	240.9	11



Map : 0.25 Kilometer Radius

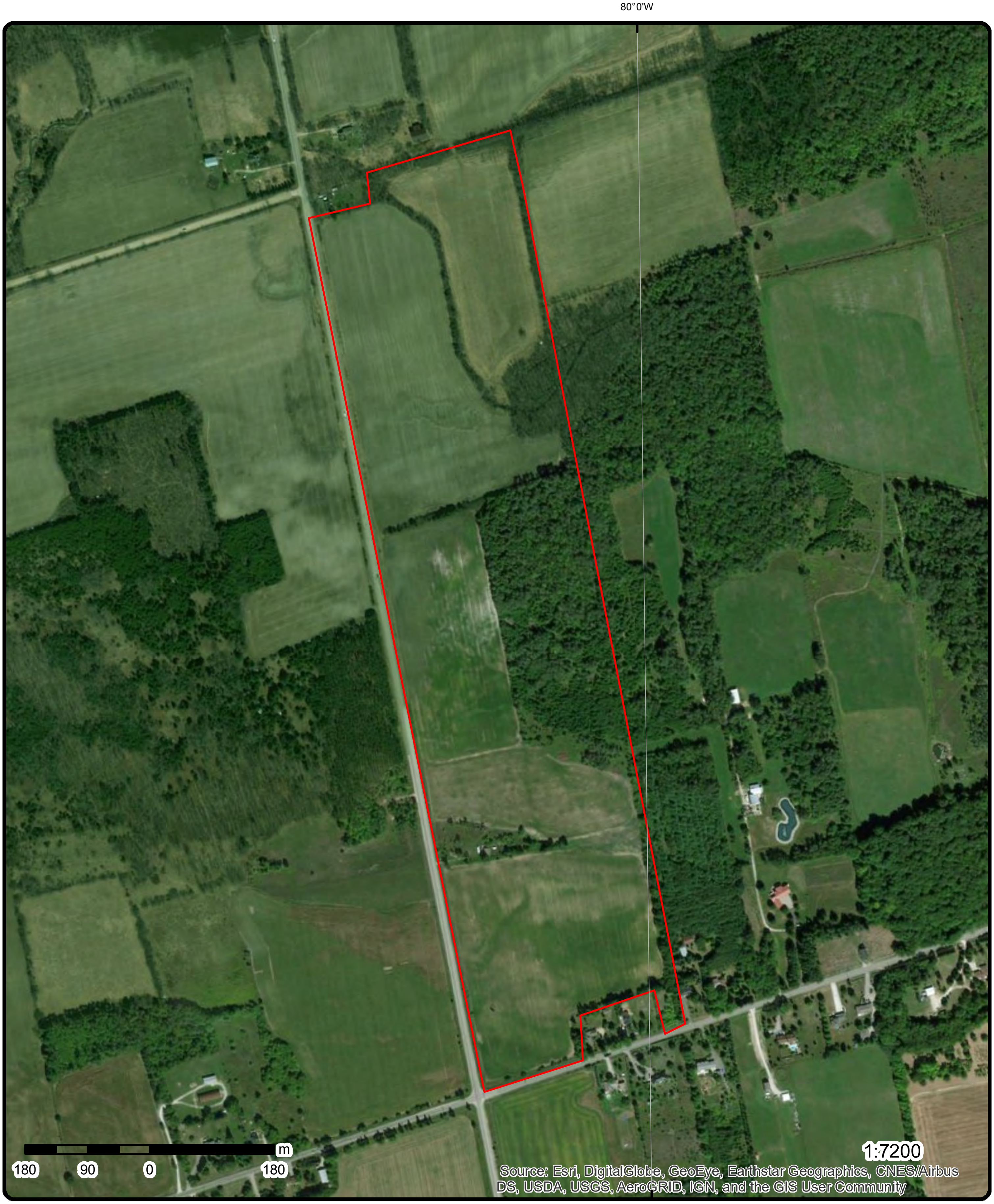
Order No: 20180612132

Address: 1585 Klondike Park Road, Wasaga Beach, ON, L9Z 2W8

ERIS ENVIRONMENTAL RISK INFORMATION SERVICES

Project Property	Expressway	Industrial and Resource - Regions	National Park
Buffer Outline	Principal Highway	Main Line	Provincial or Territorial Park
Eris Sites with Higher Elevation	Secondary Highway	Sidetrack	Other Park
Eris Sites with Same Elevation	Major Road	Transit Line	Golf Course or Driving Range
Eris Sites with Lower Elevation	Local road	Abandoned Line	Park or Sports Field
Eris Sites with Unknown Elevation	Trail		Other Recreation Area
	Proposed Road		
	Ferry Route/Ice Road		

Source: © 2015 DMTI Spatial Inc.

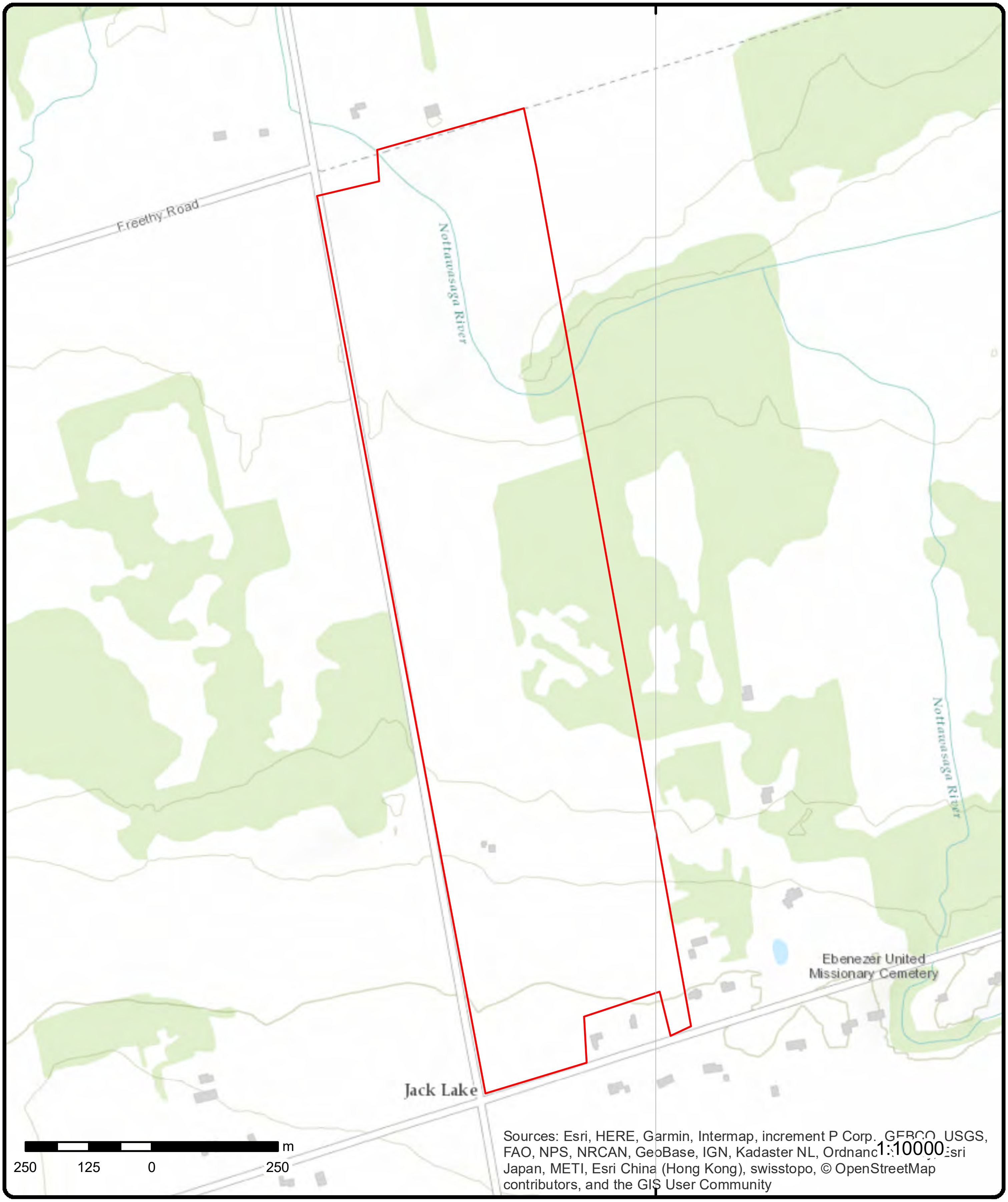


Aerial (2016)

Order No: 20180612132

Address: 1585 Klondike Park Road, Wasaga Beach, ON, L9Z 2W8

Source: ESRI World Imagery



Topographic Map

Order No: 20180612132

Address: 1585 Klondike Park Road, Wasaga Beach, ON, L9Z 2W8

Source: ESRI World Topographic Map

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	1 of 1	-/0.0	200.9 / 13.94	lot 10 con 13 ON	WWIS

Well ID:	5703674	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Domestic	***Date Received:***	7/9/1963
Sec. Water Use:	0	***Selected Flag:***	Yes
Final Well Status:	Water Supply	***Abandonment Rec:***	
Water Type:		***Contractor:***	2216
Casing Material:		***Form Version:***	1
Audit No:		***Owner:***	
Tag:		***Street Name:***	
Construction Method:		***County:***	SIMCOE
Elevation (m):		***Municipality:***	SUNNIDALE TOWNSHIP
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	010
Well Depth:		***Concession:***	13
Overburden/Bedrock:		***Concession Name:***	CON
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10381564	***Elevation:***	200.78
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:	o	***East83:***	579398.3
Code OB Desc:	Overburden	***Org CS:***	
Open Hole:		***North83:***	4923479
Cluster Kind:		***UTMRC:***	5
Date Completed:	22-JUN-63	***UTMRC Desc:***	margin of error : 100 m - 300 m
Remarks:		***Location Method:***	p5
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932270151
Layer:	4
Color:	
General Color:	
Mat1:	10
Most Common Material:	COARSE SAND
Mat2:	11
Other Materials:	GRAVEL

Mat3:	
Other Materials:	
Formation Top Depth:	10
Formation End Depth:	30
Formation End Depth UOM:	ft
Formation ID:	932270153
Layer:	6
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	10
Other Materials:	COARSE SAND
Mat3:	
Other Materials:	
Formation Top Depth:	65
Formation End Depth:	68
Formation End Depth UOM:	ft
Formation ID:	932270152
Layer:	5
Color:	
General Color:	
Mat1:	06
Most Common Material:	SILT
Mat2:	05
Other Materials:	CLAY
Mat3:	
Other Materials:	
Formation Top Depth:	30
Formation End Depth:	65
Formation End Depth UOM:	ft
Formation ID:	932270150
Layer:	3
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	5
Formation End Depth:	10
Formation End Depth UOM:	ft
Formation ID:	932270148
Layer:	1
Color:	
General Color:	
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft
Formation ID:	932270149
Layer:	2
Color:	
General Color:	

Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Other Materials:	GRAVEL
Mat3:	
Other Materials:	
Formation Top Depth:	1
Formation End Depth:	5
Formation End Depth UOM:	ft

<u>Method of Construction & Well Use</u>

Method Construction ID:	965703674
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

<u>Pipe Information</u>

Pipe ID:	10930134
Casing No:	1
Comment:	
Alt Name:	

<u>Construction Record - Casing</u>

Casing ID:	930630181
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	66
Casing Diameter:	4
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

<u>Construction Record - Screen</u>

Screen ID:	933364146
Layer:	1
Slot:	006
Screen Top Depth:	66
Screen End Depth:	68
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	

<u>Results of Well Yield Testing</u>

Pump Test ID:	995703674
Pump Set At:	
Static Level:	42
Final Level After Pumping:	52
Recommended Pump Depth:	55
Pumping Rate:	7
Flowing Rate:	
Recommended Pump Rate:	5
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1

Water State After Test: CLEAR
Pumping Test Method: 1
Pumping Duration HR: 2
Pumping Duration MIN: 0
Flowing: N

Water Details

Water ID: 933863022
Layer: 1
Kind Code: 1
Kind: FRESH
Water Found Depth: 65
Water Found Depth UOM: ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
2	1 of 1	NNW/17.6	184.9 / -2.03	lot 10 con 13 ON	WWIS

Well ID:	5710435	**Data Entry Status:**	
Construction Date:		**Data Src:**	1
Primary Water Use:	Domestic	**Date Received:**	12/7/1973
Sec. Water Use:	0	**Selected Flag:**	Yes
Final Well Status:	Water Supply	**Abandonment Rec:**	
Water Type:		**Contractor:**	3602
Casing Material:		**Form Version:**	1
Audit No:		**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	SIMCOE
Elevation (m):		**Municipality:**	SUNNIDALE TOWNSHIP
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	010
Well Depth:		**Concession:**	13
Overburden/Bedrock:		**Concession Name:**	CON
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10388251	**Elevation:**	184.95
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:	o	**East83:**	579039.3
Code OB Desc:	Overburden	**Org CS:**	
Open Hole:		**North83:**	4924649
Cluster Kind:		**UTMRC:**	5
Date Completed:	17-OCT-73	**UTMRC Desc:**	margin of error : 100 m - 300 m
Remarks:		**Location Method:**	p5
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID: 932298248
Layer: 3

Color:	6
General Color:	BROWN
Mat1:	08
Most Common Material:	FINE SAND
Mat2:	09
Other Materials:	MEDIUM SAND
Mat3:	91
Other Materials:	WATER-BEARING
Formation Top Depth:	65
Formation End Depth:	70
Formation End Depth UOM:	ft

Formation ID:	932298246
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	05
Other Materials:	CLAY
Mat3:	81
Other Materials:	SANDY
Formation Top Depth:	0
Formation End Depth:	15
Formation End Depth UOM:	ft

Formation ID:	932298247
Layer:	2
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	86
Other Materials:	STICKY
Mat3:	
Other Materials:	
Formation Top Depth:	15
Formation End Depth:	65
Formation End Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965710435
Method Construction Code:	2
Method Construction:	Rotary (Convent.)
Other Method Construction:	

Pipe Information

Pipe ID:	10936821
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930637871
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	67

Casing Diameter:	4
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933367319
Layer:	1
Slot:	006
Screen Top Depth:	67
Screen End Depth:	70
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	4

Results of Well Yield Testing

Pump Test ID:	995710435
Pump Set At:	
Static Level:	-12
Final Level After Pumping:	60
Recommended Pump Depth:	60
Pumping Rate:	8
Flowing Rate:	1
Recommended Pump Rate:	8
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	2
Pumping Duration HR:	0
Pumping Duration MIN:	45
Flowing:	Y

Draw Down & Recovery

Pump Test Detail ID:	934571898
Test Type:	Draw Down
Test Duration:	30
Test Level:	60
Test Level UOM:	ft

Pump Test Detail ID:	934303514
Test Type:	Draw Down
Test Duration:	15
Test Level:	60
Test Level UOM:	ft

Pump Test Detail ID:	934830014
Test Type:	Draw Down
Test Duration:	45
Test Level:	60
Test Level UOM:	ft

Water Details

Water ID:	933870282
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	65

Water Found Depth UOM:	ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
3	1 of 1	S/30.4	201.8 / 14.88	lot 10 con 13 ON	WWIS

Well ID:	5710998	**Data Entry Status:**	
Construction Date:		**Data Src:**	1
Primary Water Use:	Domestic	**Date Received:**	5/29/1974
Sec. Water Use:	0	**Selected Flag:**	Yes
Final Well Status:	Water Supply	**Abandonment Rec:**	
Water Type:		**Contractor:**	3602
Casing Material:		**Form Version:**	1
Audit No:		**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	SIMCOE
Elevation (m):		**Municipality:**	SUNNIDALE TOWNSHIP
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	010
Well Depth:		**Concession:**	13
Overburden/Bedrock:		**Concession Name:**	CON
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10388809	**Elevation:**	202.25
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:	o	**East83:**	579419.3
Code OB Desc:	Overburden	**Org CS:**	
Open Hole:		**North83:**	4923390
Cluster Kind:		**UTMRC:**	4
Date Completed:	14-MAY-74	**UTMRC Desc:**	margin of error : 30 m - 100 m
Remarks:		**Location Method:**	p4
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932300698
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft

Formation ID:	932300699
Layer:	2

Color:	6
General Color:	BROWN
Mat1:	05
Most Common Material:	CLAY
Mat2:	28
Other Materials:	SAND
Mat3:	
Other Materials:	
Formation Top Depth:	1
Formation End Depth:	40
Formation End Depth UOM:	ft

Formation ID:	932300700
Layer:	3
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	12
Other Materials:	STONES
Mat3:	
Other Materials:	
Formation Top Depth:	40
Formation End Depth:	127
Formation End Depth UOM:	ft

Formation ID:	932300701
Layer:	4
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	127
Formation End Depth:	132
Formation End Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965710998
Method Construction Code:	2
Method Construction:	Rotary (Convent.)
Other Method Construction:	

Pipe Information

Pipe ID:	10937379
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930638494
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	129

Casing Diameter:	4
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933367554
Layer:	1
Slot:	008
Screen Top Depth:	129
Screen End Depth:	132
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	4

Results of Well Yield Testing

Pump Test ID:	995710998
Pump Set At:	
Static Level:	20
Final Level After Pumping:	100
Recommended Pump Depth:	110
Pumping Rate:	4
Flowing Rate:	
Recommended Pump Rate:	4
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	1
Pumping Duration HR:	1
Pumping Duration MIN:	30
Flowing:	N

Draw Down & Recovery

Pump Test Detail ID:	934572555
Test Type:	Draw Down
Test Duration:	30
Test Level:	100
Test Level UOM:	ft

Pump Test Detail ID:	935088771
Test Type:	Draw Down
Test Duration:	60
Test Level:	100
Test Level UOM:	ft

Pump Test Detail ID:	934298057
Test Type:	Draw Down
Test Duration:	15
Test Level:	100
Test Level UOM:	ft

Pump Test Detail ID:	934831774
Test Type:	Draw Down
Test Duration:	45
Test Level:	100
Test Level UOM:	ft

Water Details

Water ID: 933870842
Layer: 1
Kind Code: 1
Kind: FRESH
Water Found Depth: 127
Water Found Depth UOM: ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
4	1 of 1	SSW/48.0	196.8 / 9.83	lot 10 con 13 ON	WWIS

Well ID: 5715737
Construction Date:
Primary Water Use: Domestic
Sec. Water Use: 0
Final Well Status: Water Supply
Water Type:
Casing Material:
Audit No:
Tag:
Construction Method:
Elevation (m):
Elevation Reliability:
Depth to Bedrock:
Well Depth:
Overburden/Bedrock:
Pump Rate:
Static Water Level:
Flowing (Y/N):
Flow Rate:
Clear/Cloudy:

Data Entry Status:
Data Src: 1
Date Received: 1/12/1979
Selected Flag: Yes
Abandonment Rec:
Contractor: 4716
Form Version: 1
Owner:
Street Name:
County: SIMCOE
Municipality: SUNNIDALE TOWNSHIP
Site Info:
Lot: 010
Concession: 13
Concession Name: CON
Easting NAD83:
Northing NAD83:
Zone:
UTM Reliability:

Bore Hole Information

Bore Hole ID: 10393445
DP2BR:
Spatial Status:
Code OB: o
Code OB Desc: Overburden
Open Hole:
Cluster Kind:
Date Completed: 14-NOV-78
Remarks:
Elevrc Desc:
Location Source Date:
Improvement Location Source:
Improvement Location Method:
Source Revision Comment:
Supplier Comment:

Elevation: 197.37
Elevrc:
Zone: 17
East83: 579214.3
Org CS:
North83: 4923624
UTMRC: 5
UTMRC Desc: margin of error : 100 m - 300 m
Location Method: p5

Overburden and Bedrock Materials Interval

Formation ID: 932321575
Layer: 1
Color: 6
General Color: BROWN
Mat1: 02
Most Common Material: TOPSOIL
Mat2:
Other Materials:
Mat3:
Other Materials:

Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft
Formation ID:	932321576
Layer:	2
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	81
Other Materials:	SANDY
Mat3:	
Other Materials:	
Formation Top Depth:	1
Formation End Depth:	45
Formation End Depth UOM:	ft
Formation ID:	932321578
Layer:	4
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	81
Other Materials:	SANDY
Mat3:	
Other Materials:	
Formation Top Depth:	56
Formation End Depth:	66
Formation End Depth UOM:	ft
Formation ID:	932321579
Layer:	5
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	85
Other Materials:	SOFT
Mat3:	
Other Materials:	
Formation Top Depth:	66
Formation End Depth:	81
Formation End Depth UOM:	ft
Formation ID:	932321582
Layer:	8
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	125
Formation End Depth:	129
Formation End Depth UOM:	ft
Formation ID:	932321577
Layer:	3
Color:	6
General Color:	BROWN
Mat1:	05
Most Common Material:	CLAY

Mat2:	81
Other Materials:	SANDY
Mat3:	
Other Materials:	
Formation Top Depth:	45
Formation End Depth:	56
Formation End Depth UOM:	ft
Formation ID:	932321580
Layer:	6
Color:	6
General Color:	BROWN
Mat1:	06
Most Common Material:	SILT
Mat2:	28
Other Materials:	SAND
Mat3:	
Other Materials:	
Formation Top Depth:	81
Formation End Depth:	116
Formation End Depth UOM:	ft
Formation ID:	932321581
Layer:	7
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	06
Other Materials:	SILT
Mat3:	67
Other Materials:	DIRTY
Formation Top Depth:	116
Formation End Depth:	125
Formation End Depth UOM:	ft

<u>Method of Construction & Well Use</u>

Method Construction ID:	965715737
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

<u>Pipe Information</u>

Pipe ID:	10942015
Casing No:	1
Comment:	
Alt Name:	

<u>Construction Record - Casing</u>

Casing ID:	930643950
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	126
Casing Diameter:	6
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933369848
Layer:	1
Slot:	010
Screen Top Depth:	126
Screen End Depth:	129
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	6

Results of Well Yield Testing

Pump Test ID:	995715737
Pump Set At:	
Static Level:	27
Final Level After Pumping:	124
Recommended Pump Depth:	127
Pumping Rate:	2
Flowing Rate:	
Recommended Pump Rate:	2
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	1
Pumping Duration HR:	92
Pumping Duration MIN:	0
Flowing:	N

Draw Down & Recovery

Pump Test Detail ID:	935092745
Test Type:	Recovery
Test Duration:	60
Test Level:	61
Test Level UOM:	ft

Water Details

Water ID:	933875611
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	125
Water Found Depth UOM:	ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
5	***1 of 1***	***SSE/68.1***	***199.9 / 12.92***	***lot 10 con 13 ON***	***WWIS***

Well ID:	5703675	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Domestic	***Date Received:***	1/30/1968
Sec. Water Use:	0	***Selected Flag:***	Yes
Final Well Status:	Water Supply	***Abandonment Rec:***	
Water Type:		***Contractor:***	3602
Casing Material:		***Form Version:***	1
Audit No:		***Owner:***	
Tag:		***Street Name:***	
Construction Method:		***County:***	SIMCOE
Elevation (m):		***Municipality:***	SUNNIDALE TOWNSHIP

Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	010
Well Depth:		***Concession:***	13
Overburden/Bedrock:		***Concession Name:***	CON
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10381565	***Elevation:***	200.09
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:	o	***East83:***	579653.3
Code OB Desc:	Overburden	***Org CS:***	
Open Hole:		***North83:***	4923577
Cluster Kind:		***UTMRC:***	5
Date Completed:	18-OCT-67	***UTMRC Desc:***	margin of error : 100 m - 300 m
Remarks:		***Location Method:***	p5
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932270158
Layer:	5
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	115
Formation End Depth:	120
Formation End Depth UOM:	ft

Formation ID:	932270156
Layer:	3
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	15
Formation End Depth:	85
Formation End Depth UOM:	ft

Formation ID:	932270157
Layer:	4
Color:	
General Color:	
Mat1:	05

Most Common Material:	CLAY
Mat2:	11
Other Materials:	GRAVEL
Mat3:	
Other Materials:	
Formation Top Depth:	85
Formation End Depth:	115
Formation End Depth UOM:	ft
Formation ID:	932270155
Layer:	2
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	1
Formation End Depth:	15
Formation End Depth UOM:	ft
Formation ID:	932270154
Layer:	1
Color:	
General Color:	
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965703675
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	10930135
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930630182
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	117
Casing Diameter:	4
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933364147
Layer:	1
Slot:	010
Screen Top Depth:	117
Screen End Depth:	120
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	

Results of Well Yield Testing

Pump Test ID:	995703675
Pump Set At:	
Static Level:	41
Final Level After Pumping:	60
Recommended Pump Depth:	70
Pumping Rate:	6
Flowing Rate:	
Recommended Pump Rate:	6
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	1
Pumping Duration HR:	1
Pumping Duration MIN:	0
Flowing:	N

Water Details

Water ID:	933863023
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	117
Water Found Depth UOM:	ft

6	***1 of 1***	***WSW/72.7***	***188.0 / 1.03***	***lot 9 con 14 ON***	***WWIS***

Well ID:	5722438	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Domestic	***Date Received:***	10/19/1987
Sec. Water Use:		***Selected Flag:***	Yes
Final Well Status:	Water Supply	***Abandonment Rec:***	
Water Type:		***Contractor:***	3602
Casing Material:		***Form Version:***	1
Audit No:	09754	***Owner:***	
Tag:		***Street Name:***	
Construction Method:		***County:***	SIMCOE
Elevation (m):		***Municipality:***	WASAGA BEACH TOWN (SUNNIDALE)
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	009
Well Depth:		***Concession:***	14
Overburden/Bedrock:		***Concession Name:***	CON
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	

Flow Rate:
Clear/Cloudy:
UTM Reliability:

Bore Hole Information

Bore Hole ID: 10400056
DP2BR:
Spatial Status:
Code OB: o
Code OB Desc: Overburden
Open Hole:
Cluster Kind:
Date Completed: 28-SEP-87
Remarks:
Elevrc Desc:
Location Source Date:
Improvement Location Source:
Improvement Location Method:
Source Revision Comment:
Supplier Comment:

Elevation: 188.15
Elevrc:
Zone: 17
East83: 579110.9
Org CS:
North83: 4924013
UTMRC: 5
UTMRC Desc: margin of error : 100 m - 300 m
Location Method: gis

Overburden and Bedrock Materials Interval

Formation ID: 932350712
Layer: 3
Color: 6
General Color: BROWN
Mat1: 28
Most Common Material: SAND
Mat2: 62
Other Materials: CLEAN
Mat3: 91
Other Materials: WATER-BEARING
Formation Top Depth: 52
Formation End Depth: 57
Formation End Depth UOM: ft

Formation ID: 932350711
Layer: 2
Color: 6
General Color: BROWN
Mat1: 28
Most Common Material: SAND
Mat2: 05
Other Materials: CLAY
Mat3:
Other Materials:
Formation Top Depth: 45
Formation End Depth: 52
Formation End Depth UOM: ft

Formation ID: 932350710
Layer: 1
Color: 2
General Color: GREY
Mat1: 05
Most Common Material: CLAY
Mat2:
Other Materials:
Mat3:
Other Materials:
Formation Top Depth: 0
Formation End Depth: 45

Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	933188448
Layer:	1
Plug From:	8
Plug To:	10
Plug Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965722438
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	10948626
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930652404
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	54
Casing Diameter:	5
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933373059
Layer:	1
Slot:	014
Screen Top Depth:	54
Screen End Depth:	57
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	5

Results of Well Yield Testing

Pump Test ID:	995722438
Pump Set At:	
Static Level:	
Final Level After Pumping:	20
Recommended Pump Depth:	40
Pumping Rate:	20
Flowing Rate:	
Recommended Pump Rate:	20
Levels UOM:	ft

Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	2
Pumping Duration HR:	1
Pumping Duration MIN:	0
Flowing:	N

Draw Down & Recovery

Pump Test Detail ID:	934569241
Test Type:	Recovery
Test Duration:	30
Test Level:	20
Test Level UOM:	ft

Pump Test Detail ID:	935094721
Test Type:	Recovery
Test Duration:	60
Test Level:	20
Test Level UOM:	ft

Pump Test Detail ID:	934312187
Test Type:	Recovery
Test Duration:	15
Test Level:	20
Test Level UOM:	ft

Pump Test Detail ID:	934836427
Test Type:	Recovery
Test Duration:	45
Test Level:	20
Test Level UOM:	ft

Water Details

Water ID:	933882244
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	52
Water Found Depth UOM:	ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
7	1 of 1	SSE/97.4	199.9 / 12.92	lot 10 con 12 ON	WWIS

Well ID:	5732976	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Domestic	***Date Received:***	9/19/1997
Sec. Water Use:		***Selected Flag:***	Yes
Final Well Status:	Water Supply	***Abandonment Rec:***	
Water Type:		***Contractor:***	3602
Casing Material:		***Form Version:***	1
Audit No:	158554	***Owner:***	
Tag:		***Street Name:***	
Construction Method:		***County:***	SIMCOE
Elevation (m):		***Municipality:***	SUNNIDALE TOWNSHIP
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	010
Well Depth:		***Concession:***	12
Overburden/Bedrock:		***Concession Name:***	CON
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	

Flowing (Y/N):
Flow Rate:
Clear/Cloudy:

Zone:
UTM Reliability:

Bore Hole Information

Bore Hole ID: 10410508
DP2BR:
Spatial Status:
Code OB: o
Code OB Desc: Overburden
Open Hole:
Cluster Kind:
Date Completed: 18-AUG-97
Remarks:
Elevrc Desc:
Location Source Date:
Improvement Location Source:
Improvement Location Method:
Source Revision Comment:
Supplier Comment:

Elevation: 200.37
Elevrc:
Zone: 17
East83: 579697
Org CS:
North83: 4923466
UTMRC: 5
UTMRC Desc: margin of error : 100 m - 300 m
Location Method: gis

Overburden and Bedrock Materials Interval

Formation ID: 932401586
Layer: 2
Color: 6
General Color: BROWN
Mat1: 05
Most Common Material: CLAY
Mat2: 12
Other Materials: STONES
Mat3:
Other Materials:
Formation Top Depth: 1
Formation End Depth: 24
Formation End Depth UOM: ft

Formation ID: 932401589
Layer: 5
Color: 6
General Color: BROWN
Mat1: 05
Most Common Material: CLAY
Mat2: 28
Other Materials: SAND
Mat3:
Other Materials:
Formation Top Depth: 70
Formation End Depth: 93
Formation End Depth UOM: ft

Formation ID: 932401590
Layer: 6
Color: 6
General Color: BROWN
Mat1: 28
Most Common Material: SAND
Mat2: 62
Other Materials: CLEAN
Mat3: 91
Other Materials: WATER-BEARING
Formation Top Depth: 93

Formation End Depth:	104
Formation End Depth UOM:	ft
Formation ID:	932401585
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft
Formation ID:	932401587
Layer:	3
Color:	6
General Color:	BROWN
Mat1:	05
Most Common Material:	CLAY
Mat2:	28
Other Materials:	SAND
Mat3:	74
Other Materials:	LAYERED
Formation Top Depth:	24
Formation End Depth:	41
Formation End Depth UOM:	ft
Formation ID:	932401588
Layer:	4
Color:	6
General Color:	BROWN
Mat1:	05
Most Common Material:	CLAY
Mat2:	12
Other Materials:	STONES
Mat3:	14
Other Materials:	HARDPAN
Formation Top Depth:	41
Formation End Depth:	70
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	933195634
Layer:	1
Plug From:	4
Plug To:	11
Plug Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965732976
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	10959078
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930665426
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	101
Casing Diameter:	6
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933378937
Layer:	1
Slot:	008
Screen Top Depth:	101
Screen End Depth:	104
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	6

Results of Well Yield Testing

Pump Test ID:	995732976
Pump Set At:	
Static Level:	37
Final Level After Pumping:	63
Recommended Pump Depth:	90
Pumping Rate:	6
Flowing Rate:	
Recommended Pump Rate:	10
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	2
Pumping Duration HR:	1
Pumping Duration MIN:	20
Flowing:	N

Draw Down & Recovery

Pump Test Detail ID:	934318248
Test Type:	Draw Down
Test Duration:	15
Test Level:	63
Test Level UOM:	ft

Pump Test Detail ID:	934832084
Test Type:	Draw Down
Test Duration:	45
Test Level:	63
Test Level UOM:	ft

Pump Test Detail ID: 934584628
Test Type: Draw Down
Test Duration: 30
Test Level: 63
Test Level UOM: ft

Pump Test Detail ID: 935099545
Test Type: Draw Down
Test Duration: 60
Test Level: 63
Test Level UOM: ft

Water Details

Water ID: 933893080
Layer: 1
Kind Code: 1
Kind: FRESH
Water Found Depth: 93
Water Found Depth UOM: ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
8	1 of 1	SE/125.6	199.1 / 12.19	lot 10 con 13 ON	WWIS

Well ID: 5737227
Construction Date:
Primary Water Use: Domestic
Sec. Water Use:
Final Well Status: Water Supply
Water Type:
Casing Material:
Audit No: 236414
Tag:
Construction Method:
Elevation (m):
Elevation Reliability:
Depth to Bedrock:
Well Depth:
Overburden/Bedrock:
Pump Rate:
Static Water Level:
Flowing (Y/N):
Flow Rate:
Clear/Cloudy:

Data Entry Status:
Data Src: 1
Date Received: 10/4/2002
Selected Flag: Yes
Abandonment Rec:
Contractor: 3602
Form Version: 1
Owner:
Street Name:
County: SIMCOE
Municipality: SUNNIDALE TOWNSHIP
Site Info:
Lot: 010
Concession: 13
Concession Name: CON
Easting NAD83:
Northing NAD83:
Zone:
UTM Reliability:

Bore Hole Information

Bore Hole ID: 10535433
DP2BR:
Spatial Status:
Code OB: o
Code OB Desc: Overburden
Open Hole:
Cluster Kind:
Date Completed: 26-SEP-02
Remarks:
Elevrc Desc:
Location Source Date:
Improvement Location Source:
Improvement Location Method:
Source Revision Comment:
Supplier Comment:

Elevation: 199.1
Elevrc:
Zone: 17
East83: 579716
Org CS:
North83: 4923556
UTMRC: 5
UTMRC Desc: margin of error : 100 m - 300 m
Location Method: gis

Overburden and Bedrock Materials Interval

Formation ID: 932898640
Layer: 5
Color: 2
General Color: GREY
Mat1: 28
Most Common Material: SAND
Mat2: 05
Other Materials: CLAY
Mat3: 11
Other Materials: GRAVEL
Formation Top Depth: 41
Formation End Depth: 76
Formation End Depth UOM: ft

Formation ID: 932898639
Layer: 4
Color: 6
General Color: BROWN
Mat1: 28
Most Common Material: SAND
Mat2: 05
Other Materials: CLAY
Mat3: 81
Other Materials: SANDY
Formation Top Depth: 27
Formation End Depth: 41
Formation End Depth UOM: ft

Formation ID: 932898636
Layer: 1
Color: 8
General Color: BLACK
Mat1: 02
Most Common Material: TOPSOIL
Mat2:
Other Materials:
Mat3:
Other Materials:
Formation Top Depth: 0
Formation End Depth: 1
Formation End Depth UOM: ft

Formation ID: 932898641
Layer: 6
Color: 2
General Color: GREY
Mat1: 05
Most Common Material: CLAY
Mat2: 73
Other Materials: HARD
Mat3:
Other Materials:
Formation Top Depth: 76
Formation End Depth: 91
Formation End Depth UOM: ft

Formation ID: 932898638
Layer: 3
Color: 6
General Color: BROWN
Mat1: 05

Most Common Material:	CLAY
Mat2:	73
Other Materials:	HARD
Mat3:	85
Other Materials:	SOFT
Formation Top Depth:	9
Formation End Depth:	27
Formation End Depth UOM:	ft
Formation ID:	932898642
Layer:	7
Color:	2
General Color:	GREY
Mat1:	28
Most Common Material:	SAND
Mat2:	05
Other Materials:	CLAY
Mat3:	81
Other Materials:	SANDY
Formation Top Depth:	91
Formation End Depth:	114
Formation End Depth UOM:	ft
Formation ID:	932898643
Layer:	8
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	62
Other Materials:	CLEAN
Mat3:	91
Other Materials:	WATER-BEARING
Formation Top Depth:	114
Formation End Depth:	123
Formation End Depth UOM:	ft
Formation ID:	932898637
Layer:	2
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	1
Formation End Depth:	9
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	933234779
Layer:	1
Plug From:	2
Plug To:	13
Plug Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965737227

Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	11084003
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930670820
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	
Casing Diameter:	6
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933404099
Layer:	1
Slot:	016
Screen Top Depth:	116
Screen End Depth:	123
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	6

Results of Well Yield Testing

Pump Test ID:	995737227
Pump Set At:	
Static Level:	43
Final Level After Pumping:	80
Recommended Pump Depth:	106
Pumping Rate:	15
Flowing Rate:	
Recommended Pump Rate:	15
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	2
Pumping Duration HR:	1
Pumping Duration MIN:	30
Flowing:	N

Draw Down & Recovery

Pump Test Detail ID:	934845511
Test Type:	Draw Down
Test Duration:	45
Test Level:	80
Test Level UOM:	ft

Pump Test Detail ID: 934589058
Test Type: Draw Down
Test Duration: 30
Test Level: 80
Test Level UOM: ft

Pump Test Detail ID: 935112437
Test Type: Draw Down
Test Duration: 60
Test Level: 80
Test Level UOM: ft

Pump Test Detail ID: 934314638
Test Type: Draw Down
Test Duration: 15
Test Level: 80
Test Level UOM: ft

Water Details

Water ID: 934028875
Layer: 2
Kind Code: 1
Kind: FRESH
Water Found Depth: 123
Water Found Depth UOM: ft

Water ID: 934028874
Layer: 1
Kind Code: 1
Kind: FRESH
Water Found Depth: 114
Water Found Depth UOM: ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
9	1 of 1	SE/148.5	195.1 / 8.11	lot 10 con 12 CLEARVIEW TOWNSHIP ON	WWIS

Well ID: 7185916
Construction Date:
Primary Water Use: Domestic
Sec. Water Use:
Final Well Status: Water Supply
Water Type:
Casing Material:
Audit No: Z141715
Tag: A098224
Construction Method:
Elevation (m):
Elevation Reliability:
Depth to Bedrock:
Well Depth:
Overburden/Bedrock:
Pump Rate:
Static Water Level:
Flowing (Y/N):
Flow Rate:
Clear/Cloudy:

Data Entry Status:
Data Src:
Date Received: 8/27/2012
Selected Flag: Yes
Abandonment Rec:
Contractor: 3602
Form Version: 7
Owner:
Street Name: 4282 SUNNIDALE CON 12 RR 2
County: SIMCOE
Municipality: SUNNIDALE TOWNSHIP
Site Info:
Lot: 010
Concession: 12
Concession Name: CON
Easting NAD83:
Northing NAD83:
Zone:
UTM Reliability:

Bore Hole Information

Bore Hole ID: 1004154555
DP2BR:
Spatial Status:

Elevation: 195.9
Elevrc:
Zone: 17

Code OB:		***East83:***	579717
Code OB Desc:		***Org CS:***	UTM83
Open Hole:		***North83:***	4923671
Cluster Kind:		***UTMRC:***	4
Date Completed:	09-MAY-12	***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	1004434778
Layer:	3
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	28
Other Materials:	SAND
Mat3:	11
Other Materials:	GRAVEL
Formation Top Depth:	23
Formation End Depth:	78
Formation End Depth UOM:	ft

Formation ID:	1004434776
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	6
Formation End Depth UOM:	ft

Formation ID:	1004434777
Layer:	2
Color:	6
General Color:	BROWN
Mat1:	05
Most Common Material:	CLAY
Mat2:	73
Other Materials:	HARD
Mat3:	85
Other Materials:	SOFT
Formation Top Depth:	6
Formation End Depth:	23
Formation End Depth UOM:	ft

Formation ID:	1004434779
Layer:	4
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	

Other Materials:
Mat3:
Other Materials:
Formation Top Depth: 78
Formation End Depth: 86
Formation End Depth UOM: ft

Annular Space/Abandonment Sealing Record

Plug ID: 1004434815
Layer: 2
Plug From:
Plug To:
Plug Depth UOM: ft

Plug ID: 1004434814
Layer: 1
Plug From: 0
Plug To: 20
Plug Depth UOM: ft

Method of Construction & Well Use

Method Construction ID: 1004434813
Method Construction Code: 1
Method Construction: Cable Tool
Other Method Construction:

Pipe Information

Pipe ID: 1004434774
Casing No: 0
Comment:
Alt Name:

Construction Record - Casing

Casing ID: 1004434784
Layer: 2
Material: 1
Open Hole or Material: STEEL
Depth From: -2.5
Depth To: 80
Casing Diameter: 6.25
Casing Diameter UOM: inch
Casing Depth UOM: ft

Casing ID: 1004434783
Layer: 1
Material: 1
Open Hole or Material: STEEL
Depth From: 0
Depth To: 20
Casing Diameter: 8.25
Casing Diameter UOM: inch
Casing Depth UOM: ft

Construction Record - Screen

Screen ID: 1004434785

Layer:	1
Slot:	8
Screen Top Depth:	80
Screen End Depth:	86
Screen Material:	1
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	5.5

<u>Results of Well Yield Testing</u>

Pump Test ID:	1004434775
Pump Set At:	70
Static Level:	25.333
Final Level After Pumping:	35.917
Recommended Pump Depth:	70
Pumping Rate:	10
Flowing Rate:	
Recommended Pump Rate:	10
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	0
Pumping Duration HR:	1
Pumping Duration MIN:	
Flowing:	N

<u>Draw Down & Recovery</u>

Pump Test Detail ID:	1004434803
Test Type:	Recovery
Test Duration:	25
Test Level:	25.333
Test Level UOM:	ft

Pump Test Detail ID:	1004434805
Test Type:	Recovery
Test Duration:	30
Test Level:	25.333
Test Level UOM:	ft

Pump Test Detail ID:	1004434806
Test Type:	Draw Down
Test Duration:	40
Test Level:	35.917
Test Level UOM:	ft

Pump Test Detail ID:	1004434807
Test Type:	Recovery
Test Duration:	40
Test Level:	25.333
Test Level UOM:	ft

Pump Test Detail ID:	1004434786
Test Type:	Draw Down
Test Duration:	1
Test Level:	31.167
Test Level UOM:	ft

Pump Test Detail ID:	1004434788
Test Type:	Draw Down
Test Duration:	2
Test Level:	33.25

Test Level UOM: ft

Pump Test Detail ID: 1004434791
Test Type: Recovery
Test Duration: 3
Test Level: 25.917
Test Level UOM: ft

Pump Test Detail ID: 1004434797
Test Type: Recovery
Test Duration: 10
Test Level: 25.333
Test Level UOM: ft

Pump Test Detail ID: 1004434801
Test Type: Recovery
Test Duration: 20
Test Level: 25.333
Test Level UOM: ft

Pump Test Detail ID: 1004434787
Test Type: Recovery
Test Duration: 1
Test Level: 28.417
Test Level UOM: ft

Pump Test Detail ID: 1004434789
Test Type: Recovery
Test Duration: 2
Test Level: 26.667
Test Level UOM: ft

Pump Test Detail ID: 1004434792
Test Type: Draw Down
Test Duration: 4
Test Level: 25.25
Test Level UOM: ft

Pump Test Detail ID: 1004434799
Test Type: Recovery
Test Duration: 15
Test Level: 25.333
Test Level UOM: ft

Pump Test Detail ID: 1004434800
Test Type: Draw Down
Test Duration: 20
Test Level: 35.917
Test Level UOM: ft

Pump Test Detail ID: 1004434810
Test Type: Draw Down
Test Duration: 60
Test Level: 35.917
Test Level UOM: ft

Pump Test Detail ID: 1004434798
Test Type: Draw Down
Test Duration: 15
Test Level: 35.917
Test Level UOM: ft

Pump Test Detail ID: 1004434793
Test Type: Recovery
Test Duration: 4
Test Level: 25.667

Test Level UOM:	ft
Pump Test Detail ID:	1004434794
Test Type:	Draw Down
Test Duration:	5
Test Level:	35.5
Test Level UOM:	ft
Pump Test Detail ID:	1004434795
Test Type:	Recovery
Test Duration:	5
Test Level:	25.5
Test Level UOM:	ft
Pump Test Detail ID:	1004434796
Test Type:	Draw Down
Test Duration:	10
Test Level:	35.75
Test Level UOM:	ft
Pump Test Detail ID:	1004434802
Test Type:	Draw Down
Test Duration:	25
Test Level:	35.917
Test Level UOM:	ft
Pump Test Detail ID:	1004434808
Test Type:	Draw Down
Test Duration:	50
Test Level:	35.917
Test Level UOM:	ft
Pump Test Detail ID:	1004434809
Test Type:	Recovery
Test Duration:	50
Test Level:	25.333
Test Level UOM:	ft
Pump Test Detail ID:	1004434790
Test Type:	Draw Down
Test Duration:	3
Test Level:	34.583
Test Level UOM:	ft
Pump Test Detail ID:	1004434804
Test Type:	Draw Down
Test Duration:	30
Test Level:	35.917
Test Level UOM:	ft
Pump Test Detail ID:	1004434811
Test Type:	Recovery
Test Duration:	60
Test Level:	25.333
Test Level UOM:	ft

Water Details

Water ID:	1004434782
Layer:	2
Kind Code:	1
Kind:	FRESH
Water Found Depth:	86
Water Found Depth UOM:	ft

Water ID:	1004434781
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	78
Water Found Depth UOM:	ft

Hole Diameter

Hole ID:	1004434780
Diameter:	5.5
Depth From:	80
Depth To:	86
Hole Depth UOM:	ft
Hole Diameter UOM:	inch

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
10	1 of 1	S/155.3	204.9 / 17.92	lot 9 con 12 ON	WWIS

Well ID:	5722231	**Data Entry Status:**	
Construction Date:		**Data Src:**	1
Primary Water Use:	Domestic	**Date Received:**	9/2/1987
Sec. Water Use:		**Selected Flag:**	Yes
Final Well Status:	Water Supply	**Abandonment Rec:**	
Water Type:		**Contractor:**	2514
Casing Material:		**Form Version:**	1
Audit No:	06631	**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	SIMCOE
Elevation (m):		**Municipality:**	SUNNIDALE TOWNSHIP
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	009
Well Depth:		**Concession:**	12
Overburden/Bedrock:		**Concession Name:**	CON
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10399852	**Elevation:**	205
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:	o	**East83:**	579179
Code OB Desc:	Overburden	**Org CS:**	
Open Hole:		**North83:**	4923305
Cluster Kind:		**UTMRC:**	5
Date Completed:	22-APR-87	**UTMRC Desc:**	margin of error : 100 m - 300 m
Remarks:		**Location Method:**	gis
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932349855

Layer:	5
Color:	5
General Color:	YELLOW
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	106
Formation End Depth:	110
Formation End Depth UOM:	ft

Formation ID:	932349851
Layer:	1
Color:	5
General Color:	YELLOW
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	44
Formation End Depth UOM:	ft

Formation ID:	932349852
Layer:	2
Color:	5
General Color:	YELLOW
Mat1:	28
Most Common Material:	SAND
Mat2:	06
Other Materials:	SILT
Mat3:	05
Other Materials:	CLAY
Formation Top Depth:	44
Formation End Depth:	73
Formation End Depth UOM:	ft

Formation ID:	932349854
Layer:	4
Color:	5
General Color:	YELLOW
Mat1:	05
Most Common Material:	CLAY
Mat2:	28
Other Materials:	SAND
Mat3:	
Other Materials:	
Formation Top Depth:	93
Formation End Depth:	106
Formation End Depth UOM:	ft

Formation ID:	932349853
Layer:	3
Color:	5
General Color:	YELLOW
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	73

Formation End Depth:	93
Formation End Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965722231
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	10948422
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930652156
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	107
Casing Diameter:	6
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933372949
Layer:	1
Slot:	010
Screen Top Depth:	107
Screen End Depth:	110
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	6

Results of Well Yield Testing

Pump Test ID:	995722231
Pump Set At:	
Static Level:	59
Final Level After Pumping:	102
Recommended Pump Depth:	89
Pumping Rate:	16
Flowing Rate:	
Recommended Pump Rate:	10
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	2
Pumping Duration HR:	1
Pumping Duration MIN:	0
Flowing:	N

Draw Down & Recovery

Pump Test Detail ID:	934311601
Test Type:	Recovery
Test Duration:	15
Test Level:	60
Test Level UOM:	ft

Pump Test Detail ID:	934835984
Test Type:	Recovery
Test Duration:	45
Test Level:	59
Test Level UOM:	ft

Pump Test Detail ID:	935094135
Test Type:	Recovery
Test Duration:	60
Test Level:	59
Test Level UOM:	ft

Pump Test Detail ID:	934577423
Test Type:	Recovery
Test Duration:	30
Test Level:	59
Test Level UOM:	ft

Water Details

Water ID:	933882038
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	106
Water Found Depth UOM:	ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
11	1 of 1	SE/240.9	199.1 / 12.12	lot 8 con 13 ON	WWIS

Well ID:	5703672	**Data Entry Status:**	
Construction Date:		**Data Src:**	1
Primary Water Use:	Livestock	**Date Received:**	11/30/1965
Sec. Water Use:	Domestic	**Selected Flag:**	Yes
Final Well Status:	Water Supply	**Abandonment Rec:**	
Water Type:		**Contractor:**	3602
Casing Material:		**Form Version:**	1
Audit No:		**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	SIMCOE
Elevation (m):		**Municipality:**	SUNNIDALE TOWNSHIP
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	008
Well Depth:		**Concession:**	13
Overburden/Bedrock:		**Concession Name:**	CON
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10381562	**Elevation:**	199.39
DP2BR:		**Elevrc:**	

Spatial Status:		***Zone:***	17
Code OB:	o	***East83:***	579819.3
Code OB Desc:	Overburden	***Org CS:***	
Open Hole:		***North83:***	4923629
Cluster Kind:		***UTMRC:***	9
Date Completed:	04-NOV-65	***UTMRC Desc:***	unknown UTM
Remarks:		***Location Method:***	p9
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932270139
Layer:	4
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	06
Other Materials:	SILT
Mat3:	
Other Materials:	
Formation Top Depth:	115
Formation End Depth:	122
Formation End Depth UOM:	ft

Formation ID:	932270136
Layer:	1
Color:	
General Color:	
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	2
Formation End Depth UOM:	ft

Formation ID:	932270140
Layer:	5
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	05
Other Materials:	CLAY
Mat3:	
Other Materials:	
Formation Top Depth:	122
Formation End Depth:	132
Formation End Depth UOM:	ft

Formation ID:	932270138
Layer:	3
Color:	
General Color:	
Mat1:	05
Most Common Material:	CLAY

Mat2:	09
Other Materials:	MEDIUM SAND
Mat3:	
Other Materials:	
Formation Top Depth:	25
Formation End Depth:	115
Formation End Depth UOM:	ft

Formation ID:	932270137
Layer:	2
Color:	
General Color:	
Mat1:	08
Most Common Material:	FINE SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	2
Formation End Depth:	25
Formation End Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965703672
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	10930132
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930630179
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	132
Casing Diameter:	4
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933364144
Layer:	1
Slot:	010
Screen Top Depth:	132
Screen End Depth:	135
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	

Results of Well Yield Testing

Pump Test ID:	995703672
Pump Set At:	
Static Level:	45
Final Level After Pumping:	110
Recommended Pump Depth:	120
Pumping Rate:	8
Flowing Rate:	
Recommended Pump Rate:	5
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	1
Pumping Duration HR:	2
Pumping Duration MIN:	0
Flowing:	N

Water Details

Water ID:	933863020
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	122
Water Found Depth UOM:	ft

Unplottable Summary

Total: 11 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal
AAGR		Lot 9 Con 13	Sunnidale ON	
CA	SEELEY & ARNILL AGGREGATES LTD.	SUNNIDALE RD.,PT.LOT 4/CON.14	WASAGA BEACH TOWN ON	L0L 2P0
CA	SEELEY & ARNILL AGGREGATES LTD.	PT.LOT 2/CON.14,SUNNIDALE RD.	WASAGA BEACH TOWN ON	L0L 2P0
CA		Part of Lots 2 & 3, West of Sunnidale Road	Wasaga Beach ON	L0L 2P0
PRT	471263 ONTARIO LTD	LOT 10 CON 12 TAY TWP	SIMCOE CO ON	
SPL	ONTARIO HYDRO	LOT 10 CONC 12 NORTH WALSINGHAM TRANSFORMER	SIMCOE TOWN ON	
WWIS		lot 10 con 1	ON	
WWIS		lot 9	ON	
WWIS		lot 10	ON	
WWIS		lot 10	ON	
WWIS		lot 10	ON	

Unplottable Report

Site: *Lot 9 Con 13 Sunnidale ON*

Database: **AAGR**

Type:	Pit
Region/County:	Simcoe
Township:	Sunnidale
Concession::	13
Lot::	9
Size (ha)::	
Landuse::	
Comments::	naturally rehabilitated

Site: ***SEELEY & ARNILL AGGREGATES LTD.***
SUNNIDALE RD.,PT.LOT 4/CON.14 WASAGA BEACH TOWN ON L0L 2P0

Database: **CA**

Certificate #:	7-0109-94-
Application Year:	94
Issue Date:	3/11/1994
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name::	
Client Address::	
Client City::	
Client Postal Code::	
Project Description::	
Contaminants::	
Emission Control::	

Site: ***SEELEY & ARNILL AGGREGATES LTD.***
PT.LOT 2/CON.14,SUNNIDALE RD. WASAGA BEACH TOWN ON L0L 2P0

Database: **CA**

Certificate #:	7-0005-96-
Application Year:	96
Issue Date:	4/1/1996
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name::	
Client Address::	
Client City::	
Client Postal Code::	
Project Description::	
Contaminants::	
Emission Control::	

Site: ***Part of Lots 2 & 3, West of Sunnidale Road Wasaga Beach ON L0L 2P0***

Database: **CA**

Certificate #:	3-0566-93-006
Application Year:	00
Issue Date:	8/11/00
Approval Type:	Municipal & Private sewage
Status:	Cancelled
Application Type:	Notice

Client Name::	Arnill Developments Limited
Client Address::	46 Kelley Crescent
Client City::	Wasaga Beach
Client Postal Code::	L0L 2P0
Project Description::	This application is for the addition of a perforated storm drain under roadside swales to service McIntyre Creek Estates in the former Township of Sunnidale now in the Town of Wasaga Beach.
Contaminants::	
Emission Control::	

Site: ***471263 ONTARIO LTD***
LOT 10 CON 12 TAY TWP SIMCOE CO ON

Database: ***PRT***

Location ID:	13399
Type:	retail
Expiry Date:	1995-06-30
Capacity (L):	170000
Licence #:	0056063001

Site: ***ONTARIO HYDRO***
LOT 10 CONC 12 NORTH WALSINGHAM TRANSFORMER SIMCOE TOWN ON

Database: ***SPL***

Ref No:	90534	***Discharger Report:***	
Site No:		***Material Group:***	
Incident Dt:	8/28/1993	***Client Type:***	
Year:		***Sector Type:***	
Incident Cause:	COOLING SYSTEM LEAK	***Source Type:***	
Incident Event:		***Nearest Watercourse:***	
Contaminant Code:		***Site Name:***	
Contaminant Name:		***Site Address:***	
Contaminant Limit 1:		***Site District Office:***	
Contam Limit Freq 1:		***Site County/District:***	
Contaminant UN No 1:		***Site Postal Code:***	
Contaminant Qty:		***Site Region:***	
Environment Impact:	CONFIRMED	***Site Municipality:***	12403
Nature of Impact:	Soil contamination	***Site Lot:***	
Receiving Medium:	LAND	***Site Conc:***	
Receiving Env:		***Northing:***	
Health/Env Conseq:		***Easting:***	
MOE Response:		***Site Geo Ref Accu:***	
Dt MOE Arvl on Scn:		***Site Geo Ref Meth:***	
MOE Reported Dt:	8/28/1993	***Site Map Datum:***	
Dt Document Closed:			
SAC Action Class:			

Incident Reason:	EQUIPMENT FAILURE
Incident Summary:	ONTARIO HYDRO - 15 L OF MINERAL OIL TO GROUND FROM TRANSFORMER

Site:
lot 10 con 1 ON

Database: ***WWIS***

Well ID:	5734111	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Commerical	***Date Received:***	5/18/1999
Sec. Water Use:		***Selected Flag:***	Yes
Final Well Status:	Water Supply	***Abandonment Rec:***	
Water Type:		***Contractor:***	3602
Casing Material:		***Form Version:***	1
Audit No:	200028	***Owner:***	
Tag:		***Street Name:***	
Construction Method:		***County:***	SIMCOE
Elevation (m):		***Municipality:***	WASAGA BEACH TOWN (NOTTAWASAGA)
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	010
Well Depth:		***Concession:***	01
Overburden/Bedrock:		***Concession Name:***	CON

Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10411641	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:	o	***East83:***	
Code OB Desc:	Overburden	***Org CS:***	
Open Hole:		***North83:***	
Cluster Kind:		***UTMRC:***	9
Date Completed:	23-APR-99	***UTMRC Desc:***	unknown UTM
Remarks:		***Location Method:***	na
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932407097
Layer:	6
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	62
Other Materials:	CLEAN
Mat3:	91
Other Materials:	WATER-BEARING
Formation Top Depth:	77
Formation End Depth:	103
Formation End Depth UOM:	ft

Formation ID:	932407093
Layer:	2
Color:	2
General Color:	GREY
Mat1:	28
Most Common Material:	SAND
Mat2:	05
Other Materials:	CLAY
Mat3:	81
Other Materials:	SANDY
Formation Top Depth:	21
Formation End Depth:	27
Formation End Depth UOM:	ft

Formation ID:	932407096
Layer:	5
Color:	2
General Color:	GREY
Mat1:	28
Most Common Material:	SAND
Mat2:	05
Other Materials:	CLAY
Mat3:	81
Other Materials:	SANDY
Formation Top Depth:	61
Formation End Depth:	77

Formation End Depth UOM:	ft

Formation ID:	932407094
Layer:	3
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	73
Other Materials:	HARD
Mat3:	85
Other Materials:	SOFT
Formation Top Depth:	27
Formation End Depth:	43
Formation End Depth UOM:	ft

Formation ID:	932407095
Layer:	4
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	28
Other Materials:	SAND
Mat3:	11
Other Materials:	GRAVEL
Formation Top Depth:	43
Formation End Depth:	61
Formation End Depth UOM:	ft

Formation ID:	932407092
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	21
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	933196699
Layer:	1
Plug From:	3
Plug To:	10
Plug Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965734111
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	10960211
Casing No:	1
Comment:	

Alt Name:

Construction Record - Casing

Casing ID:	930666829
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	100
Casing Diameter:	6
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933379654
Layer:	1
Slot:	012
Screen Top Depth:	100
Screen End Depth:	103
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	6

Results of Well Yield Testing

Pump Test ID:	995734111
Pump Set At:	
Static Level:	28
Final Level After Pumping:	50
Recommended Pump Depth:	80
Pumping Rate:	20
Flowing Rate:	
Recommended Pump Rate:	30
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	2
Pumping Duration HR:	1
Pumping Duration MIN:	30
Flowing:	N

Draw Down & Recovery

Pump Test Detail ID:	934844813
Test Type:	Draw Down
Test Duration:	45
Test Level:	50
Test Level UOM:	ft

Pump Test Detail ID:	934321117
Test Type:	Draw Down
Test Duration:	15
Test Level:	50
Test Level UOM:	ft

Pump Test Detail ID:	934588323
Test Type:	Draw Down
Test Duration:	30
Test Level:	50
Test Level UOM:	ft

Pump Test Detail ID:	935103384
Test Type:	Draw Down
Test Duration:	60
Test Level:	50
Test Level UOM:	ft

Water Details

Water ID:	933894249
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	103
Water Found Depth UOM:	ft

Site:
lot 9 ON

Database: ***WWIS***

Well ID:	5722006	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Domestic	***Date Received:***	8/24/1987
Sec. Water Use:		***Selected Flag:***	Yes
Final Well Status:	Water Supply	***Abandonment Rec:***	
Water Type:		***Contractor:***	3602
Casing Material:		***Form Version:***	1
Audit No:	05427	***Owner:***	
Tag:		***Street Name:***	
Construction Method:		***County:***	SIMCOE
Elevation (m):		***Municipality:***	WASAGA BEACH TOWN (NOTTAWASAGA)
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	009
Well Depth:		***Concession:***	
Overburden/Bedrock:		***Concession Name:***	
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10399630	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:	o	***East83:***	
Code OB Desc:	Overburden	***Org CS:***	
Open Hole:		***North83:***	
Cluster Kind:		***UTMRC:***	9
Date Completed:	20-MAY-87	***UTMRC Desc:***	unknown UTM
Remarks:		***Location Method:***	na
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932348951
Layer:	2
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY

Mat2:	12
Other Materials:	STONES
Mat3:	
Other Materials:	
Formation Top Depth:	4
Formation End Depth:	71
Formation End Depth UOM:	ft

Formation ID:	932348950
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	4
Formation End Depth UOM:	ft

Formation ID:	932348952
Layer:	3
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	11
Other Materials:	GRAVEL
Mat3:	
Other Materials:	
Formation Top Depth:	71
Formation End Depth:	78
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	933188352
Layer:	1
Plug From:	8
Plug To:	10
Plug Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965722006
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	10948200
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930651873
Layer:	1
Material:	1

Open Hole or Material:	STEEL
Depth From:	
Depth To:	74
Casing Diameter:	5
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933372826
Layer:	1
Slot:	018
Screen Top Depth:	74
Screen End Depth:	78
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	4

Results of Well Yield Testing

Pump Test ID:	995722006
Pump Set At:	
Static Level:	4
Final Level After Pumping:	15
Recommended Pump Depth:	25
Pumping Rate:	20
Flowing Rate:	
Recommended Pump Rate:	20
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	2
Pumping Duration HR:	1
Pumping Duration MIN:	30
Flowing:	N

Draw Down & Recovery

Pump Test Detail ID:	934835389
Test Type:	Recovery
Test Duration:	45
Test Level:	15
Test Level UOM:	ft

Pump Test Detail ID:	934310446
Test Type:	Recovery
Test Duration:	15
Test Level:	15
Test Level UOM:	ft

Pump Test Detail ID:	934576819
Test Type:	Recovery
Test Duration:	30
Test Level:	15
Test Level UOM:	ft

Pump Test Detail ID:	935093116
Test Type:	Recovery
Test Duration:	60
Test Level:	15
Test Level UOM:	ft

Water Details

Water ID:	933881804
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	72
Water Found Depth UOM:	ft

Site:
lot 10 ON

Database: ***WWIS***

Well ID:	5736567	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Domestic	***Date Received:***	1/23/2002
Sec. Water Use:		***Selected Flag:***	Yes
Final Well Status:	Water Supply	***Abandonment Rec:***	
Water Type:		***Contractor:***	3030
Casing Material:		***Form Version:***	1
Audit No:	229600	***Owner:***	
Tag:		***Street Name:***	
Construction Method:		***County:***	SIMCOE
Elevation (m):		***Municipality:***	SUNNIDALE TOWNSHIP
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	010
Well Depth:		***Concession:***	
Overburden/Bedrock:		***Concession Name:***	
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10527579	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:	o	***East83:***	
Code OB Desc:	Overburden	***Org CS:***	
Open Hole:		***North83:***	
Cluster Kind:		***UTMRC:***	9
Date Completed:	24-OCT-01	***UTMRC Desc:***	unknown UTM
Remarks:		***Location Method:***	na
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932870389
Layer:	5
Color:	2
General Color:	GREY
Mat1:	28
Most Common Material:	SAND
Mat2:	06
Other Materials:	SILT
Mat3:	
Other Materials:	
Formation Top Depth:	18
Formation End Depth:	34
Formation End Depth UOM:	ft

Formation ID:	932870388
Layer:	4
Color:	2
General Color:	GREY
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	12
Formation End Depth:	18
Formation End Depth UOM:	ft

Formation ID:	932870386
Layer:	2
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	1
Formation End Depth:	6
Formation End Depth UOM:	ft

Formation ID:	932870387
Layer:	3
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	6
Formation End Depth:	12
Formation End Depth UOM:	ft

Formation ID:	932870385
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	933228393
Layer:	1
Plug From:	0
Plug To:	8
Plug Depth UOM:	ft

Method of Construction & Well

Use

Method Construction ID:	965736567
Method Construction Code:	6
Method Construction:	Boring
Other Method Construction:	

Pipe Information

Pipe ID:	11076149
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930669952
Layer:	2
Material:	
Open Hole or Material:	
Depth From:	
Depth To:	
Casing Diameter:	24
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Casing ID:	930669951
Layer:	1
Material:	3
Open Hole or Material:	CONCRETE
Depth From:	
Depth To:	
Casing Diameter:	36
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Results of Well Yield Testing

Pump Test ID:	995736567
Pump Set At:	
Static Level:	6
Final Level After Pumping:	
Recommended Pump Depth:	26
Pumping Rate:	
Flowing Rate:	
Recommended Pump Rate:	3
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	
Water State After Test:	
Pumping Test Method:	
Pumping Duration HR:	
Pumping Duration MIN:	
Flowing:	N

Water Details

Water ID:	934020488
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	34
Water Found Depth UOM:	ft

Site: ***Database:***

Well ID:	5736568	**Data Entry Status:**	
Construction Date:		**Data Src:**	1
Primary Water Use:	Domestic	**Date Received:**	1/23/2002
Sec. Water Use:		**Selected Flag:**	Yes
Final Well Status:	Water Supply	**Abandonment Rec:**	
Water Type:		**Contractor:**	3030
Casing Material:		**Form Version:**	1
Audit No:	229599	**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	SIMCOE
Elevation (m):		**Municipality:**	SUNNIDALE TOWNSHIP
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	010
Well Depth:		**Concession:**	
Overburden/Bedrock:		**Concession Name:**	
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10527580	**Elevation:**	
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:	o	**East83:**	
Code OB Desc:	Overburden	**Org CS:**	
Open Hole:		**North83:**	
Cluster Kind:		**UTMRC:**	9
Date Completed:	24-OCT-01	**UTMRC Desc:**	unknown UTM
Remarks:		**Location Method:**	na
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932870394
Layer:	5
Color:	2
General Color:	GREY
Mat1:	06
Most Common Material:	SILT
Mat2:	28
Other Materials:	SAND
Mat3:	
Other Materials:	
Formation Top Depth:	18
Formation End Depth:	31
Formation End Depth UOM:	ft

Formation ID:	932870393
Layer:	4
Color:	2
General Color:	GREY
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	

Other Materials:	
Formation Top Depth:	11
Formation End Depth:	18
Formation End Depth UOM:	ft

Formation ID:	932870391
Layer:	2
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	1
Formation End Depth:	6
Formation End Depth UOM:	ft

Formation ID:	932870390
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft

Formation ID:	932870392
Layer:	3
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	6
Formation End Depth:	11
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	933228394
Layer:	1
Plug From:	0
Plug To:	8
Plug Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965736568
Method Construction Code:	6
Method Construction:	Boring
Other Method Construction:	

Pipe Information

Pipe ID:	11076150
Casing No:	1
Comment:	
Alt Name:	

<u>Construction Record - Casing</u>

Casing ID:	930669953
Layer:	1
Material:	
Open Hole or Material:	
Depth From:	
Depth To:	
Casing Diameter:	36
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Casing ID:	930669954
Layer:	2
Material:	2
Open Hole or Material:	GALVANIZED
Depth From:	
Depth To:	
Casing Diameter:	24
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

<u>Results of Well Yield Testing</u>

Pump Test ID:	995736568
Pump Set At:	
Static Level:	6
Final Level After Pumping:	
Recommended Pump Depth:	26
Pumping Rate:	
Flowing Rate:	
Recommended Pump Rate:	3
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	
Water State After Test:	
Pumping Test Method:	1
Pumping Duration HR:	
Pumping Duration MIN:	
Flowing:	N

<u>Water Details</u>

Water ID:	934020489
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	31
Water Found Depth UOM:	ft

<u>Site:</u>
lot 10 ON

Database: ***WWIS***

Well ID:	5736569	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Domestic	***Date Received:***	1/24/2002
Sec. Water Use:		***Selected Flag:***	Yes
Final Well Status:	Water Supply	***Abandonment Rec:***	
Water Type:		***Contractor:***	3030
Casing Material:		***Form Version:***	1
Audit No:	229601	***Owner:***	

Tag:		***Street Name:***	
Construction Method:		***County:***	SIMCOE
Elevation (m):		***Municipality:***	SUNNIDALE TOWNSHIP
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	010
Well Depth:		***Concession:***	
Overburden/Bedrock:		***Concession Name:***	
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

Bore Hole Information

Bore Hole ID:	10527581	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:	o	***East83:***	
Code OB Desc:	Overburden	***Org CS:***	
Open Hole:		***North83:***	
Cluster Kind:		***UTMRC:***	9
Date Completed:	24-NOV-01	***UTMRC Desc:***	unknown UTM
Remarks:		***Location Method:***	na
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932870399
Layer:	5
Color:	2
General Color:	GREY
Mat1:	06
Most Common Material:	SILT
Mat2:	28
Other Materials:	SAND
Mat3:	
Other Materials:	
Formation Top Depth:	18
Formation End Depth:	32
Formation End Depth UOM:	ft

Formation ID:	932870398
Layer:	4
Color:	2
General Color:	GREY
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	11
Formation End Depth:	18
Formation End Depth UOM:	ft

Formation ID:	932870397
Layer:	3
Color:	6
General Color:	BROWN
Mat1:	28

Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	6
Formation End Depth:	11
Formation End Depth UOM:	ft

Formation ID:	932870396
Layer:	2
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	1
Formation End Depth:	6
Formation End Depth UOM:	ft

Formation ID:	932870395
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Other Materials:	
Mat3:	
Other Materials:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	933228395
Layer:	1
Plug From:	0
Plug To:	8
Plug Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	965736569
Method Construction Code:	6
Method Construction:	Boring
Other Method Construction:	

Pipe Information

Pipe ID:	11076151
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930669955
Layer:	1

Material:	3
Open Hole or Material:	CONCRETE
Depth From:	
Depth To:	
Casing Diameter:	36
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Casing ID:	930669956
Layer:	2
Material:	2
Open Hole or Material:	GALVANIZED
Depth From:	
Depth To:	
Casing Diameter:	24
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

<u>Results of Well Yield Testing</u>

Pump Test ID:	995736569
Pump Set At:	
Static Level:	6
Final Level After Pumping:	
Recommended Pump Depth:	
Pumping Rate:	
Flowing Rate:	
Recommended Pump Rate:	3
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	
Water State After Test:	
Pumping Test Method:	1
Pumping Duration HR:	
Pumping Duration MIN:	
Flowing:	N

<u>Water Details</u>

Water ID:	934020490
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	32
Water Found Depth UOM:	ft

Appendix: Database Descriptions

*Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. **Note:** Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Abandoned Aggregate Inventory: Provincial AAGR

The MAAP Program maintains a database of abandoned pits and quarries. Please note that the database is only referenced by lot and concession and city/town location. The database provides information regarding the location, type, size, land use, status and general comments.*

Government Publication Date: Sept 2002*

Aggregate Inventory: Provincial AGR

The Ontario Ministry of Natural Resources maintains a database of all active pits and quarries. The database provides information regarding the registered owner/operator, location name, operation type, approval type, and maximum annual tonnage.

Government Publication Date: Up to Sep 2017

Abandoned Mine Information System: Provincial AMIS

The Abandoned Mines Information System contains data on known abandoned and inactive mines located on both Crown and privately held lands. The information was provided by the Ministry of Northern Development and Mines (MNDM), with the following disclaimer: "the database provided has been compiled from various sources, and the Ministry of Northern Development and Mines makes no representation and takes no responsibility that such information is accurate, current or complete". Reported information includes official mine name, status, background information, mine start/end date, primary commodity, mine features, hazards and remediation.

Government Publication Date: 1800-Nov 2016

Anderson's Waste Disposal Sites: Private ANDR

The information provided in this database was collected by examining various historical documents which aimed to characterize the likely position of former waste disposal sites from 1860 to present. The research initiative behind the creation of this database was to identify those sites that are missing from the Ontario MOE Waste Disposal Site Inventory, as well as to provide revisions and corrections to the positions and descriptions of sites currently listed in the MOE inventory. In addition to historic waste disposal facilities, the database also identifies certain auto wreckers and scrap yards that have been extrapolated from documentary sources. Please note that the data is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1860s-Present

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 1999-Jan 31, 2018

Borehole: Provincial BORE

A borehole is the generalized term for any narrow shaft drilled in the ground, either vertically or horizontally. The information here includes geotechnical investigations or environmental site assessments, mineral exploration, or as a pilot hole for installing piers or underground utilities. Information is from many sources such as the Ministry of Transportation (MTO) boreholes from engineering reports and projects from the 1950 to 1990's in Southern Ontario. Boreholes from the Ontario Geological Survey (OGS) including The Urban Geology Analysis Information System (UGAIS) and the York Peel Durham Toronto (YPDT) database of the Conservation Authority Moraine Coalition. This database will include fields such as location, stratigraphy, depth, elevation, year drilled, etc. For all water well data or oil and gas well data for Ontario please refer to WWIS and OOGW.

Government Publication Date: 1875-Jul 2014

Certificates of Approval: Provincial CA

This database contains the following types of approvals: Air & Noise, Industrial Sewage, Municipal & Private Sewage, Waste Management Systems and Renewable Energy Approvals. The MOE in Ontario states that any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste, must have a Certificate of Approval before it can operate lawfully. Fields include approval number, business name, address, approval date, approval type and status. This database will no longer be updated, as CofA's have been replaced by either Environmental Activity and Sector Registry (EASR) or Environmental Compliance Approval (ECA). Please refer to those individual databases for any information after Oct.31, 2011.

Government Publication Date: 1985-Oct 30, 2011*

Commercial Fuel Oil Tanks: Provincial CFOT

Since May 2002, Ontario developed a new act where it became mandatory for fuel oil tanks to be registered with Technical Standards & Safety Authority (TSSA). This data would include all commercial underground fuel oil tanks in Ontario with fields such as location, registration number, tank material, age of tank and tank size.

Government Publication Date: Feb 28, 2017

Chemical Register: Private CHEM

This database includes information from both a one time study conducted in 1992 and private source and is a listing of facilities that manufacture or distribute chemicals. The production of these chemical substances may involve one or more chemical reactions and/or chemical separation processes (i.e. fractionation, solvent extraction, crystallization, etc.).

Government Publication Date: 1999-Jan 31, 2018

Compressed Natural Gas Stations: Private CNG

Canada has a network of public access compressed natural gas (CNG) refuelling stations. These stations dispense natural gas in compressed form at 3,000 pounds per square inch (psi), the pressure which is allowed within the current Canadian codes and standards. The majority of natural gas refuelling is located at existing retail gasoline that have a separate refuelling island for natural gas. This list of stations is made available by the Canadian Natural Gas Vehicle Alliance.

Government Publication Date: Dec 31, 2012

Inventory of Coal Gasification Plants and Coal Tar Sites: Provincial COAL

This inventory includes both the "Inventory of Coal Gasification Plant Waste Sites in Ontario-April 1987" and the Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario-November 1988) collected by the MOE. It identifies industrial sites that produced and continue to produce or use coal tar and other related tars. Detailed information is available and includes: facility type, size, land use, information on adjoining properties, soil condition, site operators/occupants, site description, potential environmental impacts and historic maps available. This was a one-time inventory.*

Government Publication Date: Apr 1987 and Nov 1988*

Compliance and Convictions: Provincial CONV

This database summarizes the fines and convictions handed down by the Ontario courts beginning in 1989. Companies and individuals named here have been found guilty of environmental offenses in Ontario courts of law.

Government Publication Date: 1989-Nov 2017

Certificates of Property Use: Provincial CPU

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all CPU's on the registry such as (EPA s. 168.6) - Certificate of Property Use.

Government Publication Date: 1994-Feb 28, 2018

Drill Hole Database: Provincial DRL

The Ontario Drill Hole Database contains information on more than 113,000 percussion, overburden, sonic and diamond drill holes from assessment files on record with the department of Mines and Minerals. Please note that limited data is available for southern Ontario, as it was the last area to be completed. The database was created when surveys submitted to the Ministry were converted in the Assessment File Research Image Database (AFRI) project. However, the degree of accuracy (coordinates) as to the exact location of drill holes is dependent upon the source document submitted to the MNDM. Levels of accuracy used to locate holes are: centering on the mining claim; a sketch of the mining claim; a 1:50,000 map; a detailed company map; or from submitted a "Report of Work".

Government Publication Date: 1886-Nov 30, 2017

Dry Cleaning Facilities: Federal DRYCLEANERS

List of dry cleaning facilities made available by Environment and Climate Change Canada. Environment and Climate Change Canada's Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations (SOR/2003-79) are intended to reduce releases of tetrachloroethylene to the environment from dry cleaning facilities.

Government Publication Date: Jan 2004-Dec 2016

Environmental Activity and Sector Registry: Provincial EASR

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. The EASR allows businesses to register certain activities with the ministry, rather than apply for an approval. The registry is available for common systems and processes, to which preset rules of operation can be applied. The EASR is currently available for: heating systems, standby power systems and automotive refinishing. Businesses whose activities aren't subject to the EASR may apply for an ECA (Environmental Compliance Approval), Please see our ECA database.

Government Publication Date: Oct 2011-Apr 30, 2018

Environmental Registry: Provincial EBR

The Environmental Registry lists proposals, decisions and exceptions regarding policies, Acts, instruments, or regulations that could significantly affect the environment. Through the Registry, thirteen provincial ministries notify the public of upcoming proposals and invite their comments. For example, if a local business is requesting a permit, license, or certificate of approval to release substances into the air or water; these are notified on the registry. Data includes: Approval for discharge into the natural environment other than water (i.e. Air) - EPA s. 9, Approval for sewage works - OWRA s. 53(1), and EPA s. 27 - Approval for a waste disposal site. For information regarding Permit to Take Water (PTTW), Certificate of Property Use (CPU) and (ORD) Orders please refer to those individual databases.

Government Publication Date: 1994-Feb 28, 2018

Environmental Compliance Approval: Provincial ECA

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. In the past, a business had to apply for multiple approvals (known as certificates of approval) for individual processes and pieces of equipment. Today, a business either registers itself, or applies for a single approval, depending on the types of activities it conducts. Businesses whose activities aren't subject to the EASR may apply for an ECA. A single ECA addresses all of a business's emissions, discharges and wastes. Separate approvals for air, noise and waste are no longer required. This database will also include Renewable Energy Approvals. For certificates of approval prior to Nov 1st, 2011, please refer to the CA database. For all Waste Disposal Sites please refer to the WDS database.

Government Publication Date: Oct 2011-Apr 30, 2018

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Feb 28, 2018

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Emergency Management Historical Event: Provincial EMHE

List of locations of historical occurrences of emergency events, including those assigned to the Ministry of Natural Resources by Order-In-Council (OIC) under the Emergency Management and Civil Protection Act, as well as events where MNR provided requested emergency response assistance. Many of these events will have involved community evacuations, significant structural loss, and/or involvement of MNR emergency response staff. These events fall into one of ten (10) type categories: Dam Failure; Drought / Low Water; Erosion; Flood; Forest Fire; Soil and Bedrock Instability; Petroleum Resource Center Event, EMO Requested Assistance, Continuity of Operations Event, Other Requested Assistance. EMHE record details are reproduced by ERIS under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2017.

Government Publication Date: Dec 31, 2016

List of TSSA Expired Facilities: Provincial EXP

List of facilities with removed tanks which were once registered with the Fuels Safety Program of the Technical Standards and Safety Authority (TSSA). Includes private fuel outlets, bulk plants, fuel oil tanks, gasoline stations, marinas, propane filling stations, liquid fuel tanks, piping systems, etc. Tanks which have been removed automatically fall under the expired facilities inventory held by TSSA.

Government Publication Date: Feb 28, 2017

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government.

Government Publication Date: Jun 2000-Mar 2018

Fisheries & Oceans Fuel Tanks: Federal FOFT

Fisheries & Oceans Canada maintains an inventory of aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Government Publication Date: 1964-Sep 2017

Fuel Storage Tank: Provincial FST

The Technical Standards & Safety Authority (TSSA), under the Technical Standards & Safety Act of 2000 maintains a database of registered private and retail fuel storage tanks in Ontario with fields such as location, tank status, license date, tank type, tank capacity, fuel type, installation year and facility type.

Government Publication Date: Feb 28, 2017

Fuel Storage Tank - Historic: Provincial FSTH

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks. Public records of private fuel storage tanks are only available since the registration became effective in September 1989. This information is now collected by the Technical Standards and Safety Authority.

Government Publication Date: Pre-Jan 2010*

Ontario Regulation 347 Waste Generators Summary: Provincial GEN

Regulation 347 of the Ontario EPA defines a waste generation site as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number, company name and address of registered generators including the types of hazardous wastes generated. It includes data on waste generating facilities such as: drycleaners, waste treatment and disposal facilities, machine shops, electric power distribution etc. This information is a summary of all years from 1986 including the most currently available data. Some records may contain, within the company name, the phrase "See & Use..." followed by a series of letters and numbers. This occurs when one company is amalgamated with or taken over by another registered company. The number listed as "See & Use", refers to the new ownership and the other identification number refers to the original ownership. This phrase serves as a link between the 2 companies until operations have been fully transferred.

Government Publication Date: 1986-December 31, 2017

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO_2 eq).

Government Publication Date: 2013-Dec 2016

TSSA Historic Incidents: Provincial HINC

This database will cover all incidences recorded by TSSA with their older system, before they moved to their new management system. TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. The TSSA works to protect the public, the environment and property from fuel-related hazards such as spills, fires and explosions. This database will include spills and leaks from pipelines, diesel, fuel oil, gasoline, natural gas, propane and hydrogen recorded by the TSSA.

Government Publication Date: 2006-June 2009*

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

TSSA Incidents: Provincial INC

TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. Includes incidents from fuel-related hazards such as spills, fires and explosions. This database will include spills and leaks from diesel, fuel oil, gasoline, natural gas, propane and hydrogen recorded by the TSSA.

Government Publication Date: Feb 28, 2017

Landfill Inventory Management Ontario: Provincial LIMO

The Landfill Inventory Management Ontario (LIMO) database is updated every year, as the ministry compiles new and updated information. The inventory will include small and large landfills. Additionally, each year the ministry will request operators of the larger landfills complete a landfill data collection form that will be used to update LIMO and will include the following information from the previous operating year. This will include additional information such as estimated amount of total waste received, landfill capacity, estimated total remaining landfill capacity, fill rates, engineering designs, reporting and monitoring details, size of location, service area, approved waste types, leachate of site treatment, contaminant attenuation zone and more. The small landfills will include information such as site owner, site location and certificate of approval # and status.

Government Publication Date: Dec 31, 2013

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Environmental Penalty Annual Report: Provincial MISA PENALTY

This database contains data from Ontario's annual environmental penalty report published by the Ministry of the Environment and Climate Change. These reports provide information on environmental penalties for land or water violations issued to companies in one of the nine industrial sectors covered by the Municipal Industrial Strategy for Abatement (MISA) regulations.

Government Publication Date: Jan 1, 2011 - Dec 31, 2017

Mineral Occurrences: Provincial MNR

In the early 70's, the Ministry of Northern Development and Mines created an inventory of approximately 19,000 mineral occurrences in Ontario, in regard to metallic and industrial minerals, as well as some information on building stones and aggregate deposits. Please note that the "Horizontal Positional Accuracy" is approximately +/- 200 m. Many reference elements for each record were derived from field sketches using pace or chain/tape measurements against claim posts or topographic features in the area. The primary limiting factor for the level of positional accuracy is the scale of the source material. The testing of horizontal accuracy of the source materials was accomplished by comparing the plan metric (X and Y) coordinates of that point with the coordinates of the same point as defined from a source of higher accuracy.

Government Publication Date: 1846-Jan 2018

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

Non-Compliance Reports: Provincial NCPL

The Ministry of the Environment provides information about non-compliant discharges of contaminants to air and water that exceed legal allowable limits, from regulated industrial and municipal facilities. A reported non-compliance failure may be in regard to a Control Order, Certificate of Approval, Sectoral Regulation or specific regulation/act.

Government Publication Date: Dec 31, 2016

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Aug 2010

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Pipeline Incidents: Federal NEBI

Locations of pipeline incidents from 2008 to present, made available by the National Energy Board (NEB). Includes incidents reported under the Onshore Pipeline Regulations and the Processing Plant Regulations related to pipelines under federal jurisdiction, does not include incident data related to pipelines under provincial or territorial jurisdiction.

Government Publication Date: 2008-Mar 31, 2018

National Energy Board Wells: Federal NEBW

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: 1993-May 2017

Oil and Gas Wells: Private OGW

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-December 31, 2017

Ontario Oil and Gas Wells: Provincial OOGW

In 1998, the MNR handed over to the Ontario Oil, Gas and Salt Resources Corporation, the responsibility of maintaining a database of oil and gas wells drilled in Ontario. The OGSR Library has over 20,000+ wells in their database. Information available for all wells in the ERIS database include well owner/operator, location, permit issue date, and well cap date, license No., status, depth and the primary target (rock unit) of the well being drilled. All geology/stratigraphy table information, plus all water table information is also provide for each well record.

Government Publication Date: 1800-Oct 2017

Inventory of PCB Storage Sites: Provincial OPCB

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of PCB storage sites within the province. Ontario Regulation 11/82 (Waste Management - PCB) and Regulation 347 (Generator Waste Management) under the Ontario EPA requires the registration of inactive PCB storage equipment and/or disposal sites of PCB waste with the Ontario Ministry of Environment. This database contains information on: 1) waste quantities; 2) major and minor sites storing liquid or solid waste; and 3) a waste storage inventory.

Government Publication Date: 1987-Oct 2004; 2012-Dec 2013

Orders: Provincial ORD

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all Orders on the registry such as (EPA s. 17) - Order for remedial work, (EPA s. 18) - Order for preventative measures, (EPA s. 43) - Order for removal of waste and restoration of site, (EPA s. 44) - Order for conformity with Act for waste disposal sites, (EPA s. 136) - Order for performance of environmental measures.

Government Publication Date: 1994-Feb 28, 2018

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009-2014

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Pesticide Register: Provincial PES

The Ontario Ministry of the Environment and Climate Change maintains a database of licensed operators and vendors of registered pesticides.

Government Publication Date: 1988-Mar 2018

TSSA Pipeline Incidents: Provincial PINC

TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. This database will include spills, strike and leaks from recorded by the TSSA.

Government Publication Date: Feb 28, 2017

Private and Retail Fuel Storage Tanks: Provincial PRT

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks and licensed retail fuel outlets. This database includes an inventory of locations that have gasoline, oil, waste oil, natural gas and/or propane storage tanks on their property. The MCCR no longer collects this information. This information is now collected by the Technical Standards and Safety Authority (TSSA).

Government Publication Date: 1989-1996*

Permit to Take Water: Provincial PTTW

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all PTTW's on the registry such as OWRA s. 34 - Permit to take water.

Government Publication Date: 1994-Feb 28, 2018

Ontario Regulation 347 Waste Receivers Summary: Provincial REC

Part V of the Ontario Environmental Protection Act ("EPA") regulates the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. Regulation 347 of the Ontario EPA defines a waste receiving site as any site or facility to which waste is transferred by a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address, and includes receivers of waste such as: landfills, incinerators, transfer stations, PCB storage sites, sludge farms and water pollution control plants. This information is a summary of all years from 1986 including the most currently available data.

Government Publication Date: 1986-2016

Record of Site Condition: Provincial RSC

The Record of Site Condition (RSC) is part of the Ministry of the Environment's Brownfields Environmental Site Registry. Protection from environmental cleanup orders for property owners is contingent upon documentation known as a record of site condition (RSC) being filed in the Environmental Site Registry. In order to file an RSC, the property must have been properly assessed and shown to meet the soil, sediment and groundwater standards appropriate for the use (such as residential) proposed to take place on the property. The Record of Site Condition Regulation (O. Reg. 153/04) details requirements related to site assessment and clean up.
RSCs filed after July 1, 2011 will also be included as part of the new (O.Reg. 511/09).

Government Publication Date: 1997-Sept 2001, Oct 2004-Apr 2018

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999-Jan 31, 2018

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Ontario Spills: Provincial SPL

This database identifies information such as location (approximate), type and quantity of contaminant, date of spill, environmental impact, cause, nature of impact, etc. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X.

Government Publication Date: 1988-Feb 2018

Wastewater Discharger Registration Database: Provincial SRDS

Information under this heading is combination of the following 2 programs. The Municipal/Industrial Strategy for Abatement (MISA) division of the Ontario Ministry of Environment maintained a database of all direct dischargers of toxic pollutants within nine sectors including: Electric Power Generation; Mining; Petroleum Refining; Organic Chemicals; Inorganic Chemicals; Pulp & Paper; Metal Casting; Iron & Steel; and Quarries. All sampling information is now collected and stored within the Sample Result Data Store (SRDS).

Government Publication Date: 1990-Dec 31, 2016

Anderson's Storage Tanks: Private TANK

The information provided in this database was collected by examining various historical documents, which identified the location of former storage tanks, containing substances such as fuel, water, gas, oil, and other various types of miscellaneous products. Information is available in regard to business operating at tank site, tank location, permit year, permit & installation type, no. of tanks installed & configuration and tank capacity. Data contained within this database pertains only to the city of Toronto and is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1915-1953*

Transport Canada Fuel Storage Tanks: Federal TCFT

List of fuel storage tanks currently or previously owned or operated by Transport Canada. This inventory also includes tanks on The Pickering Lands, which refers to 7,530 hectares (18,600 acres) of land in Pickering, Markham, and Uxbridge owned by the Government of Canada since 1972; properties on this land has been leased by the government since 1975, and falls under the Site Management Policy of Transport Canada, but is administered by Public Works and Government Services Canada. This inventory provides information on the site name, location, tank age, capacity and fuel type.

Government Publication Date: 1970-Aug 2017

TSSA Variances for Abandonment of Underground Storage Tanks: Provincial VAR

List of variances granted for abandoned tanks. Under the Technical Standards and Safety Authority (TSSA) Liquid Fuels Handling Code and Fuel Oil Code, all underground storage tanks must be removed within two years of disuse. If removal of a tank is not feasible, an application may be sought for a variance from this code requirement.

Government Publication Date: Feb 28, 2017

Waste Disposal Sites - MOE CA Inventory: Provincial WDS

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of known open (active or inactive) and closed disposal sites in the Province of Ontario. Active sites maintain a Certificate of Approval, are approved to receive and are receiving waste. Inactive sites maintain Certificate(s) of Approval but are not receiving waste. Closed sites are not receiving waste. The data contained within this database was compiled from the MOE's Certificate of Approval database. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number. All new Environmental Compliance Approvals handed out after Oct 31, 2011 for Waste Disposal Sites will still be found in this database.

Government Publication Date: Oct 2011-Apr 30, 2018

Waste Disposal Sites - MOE 1991 Historical Approval Inventory: Provincial WDSH

In June 1991, the Ontario Ministry of Environment, Waste Management Branch, published the "June 1991 Waste Disposal Site Inventory", of all known active and closed waste disposal sites as of October 30st, 1990. For each "active" site as of October 31st 1990, information is provided on site location, site/CA number, waste type, site status and site classification. For each "closed" site as of October 31st 1990, information is provided on site location, site/CA number, closure date and site classification. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number.

Government Publication Date: Up to Oct 1990*

Water Well Information System: Provincial WWIS

This database describes locations and characteristics of water wells found within Ontario in accordance with Regulation 903. It includes such information as coordinates, construction date, well depth, primary and secondary use, pump rate, static water level, well status, etc. Also included are detailed stratigraphy information, approximate depth to bedrock and the approximate depth to the water table.

Government Publication Date: Dec 31, 2017

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

APPENDIX B

Regulatory Responses

Ministry of the Environment, Conservation and Parks

Freedom of Information and Protection of Privacy Office

12[th] Floor
40 St. Clair Avenue West
Toronto ON M4V 1M2
Tel: (416) 314-4075

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Bureau de l'accès à l'information et de la protection de la vie privée

12[e] étage
40, avenue St. Clair ouest
Toronto ON M4V 1M2
Tél. : (416) 314-4075

Ontario

July 10, 2018

Jaime Noble
Golder Associates
100 Scotia Ct
Whitby, ON L1N 8Y6

Dear Jaime Noble:

RE: ***Freedom of Information and Protection of Privacy Act*** **Request**
Our File # A-2018-04406, Your Reference 1415404(1000)

This letter is in response to your request made pursuant to the *Freedom of Information and Protection of Privacy Act* relating to 1585 Klondike Park Road, Clearview.

After a thorough search through the files of the Ministry's Barrie District Office, Sector Compliance Branch and Safe Drinking Water Branch, no records were located responsive to your request. To provide you with this response and in accordance with Section 57 of the *Freedom of Information and Protection of Privacy Act*, the fee owed is $30.00 for 1 hour of search time @ $30.00 per hour. **We have applied the $30.00 for this request from your initial payment. This file is now closed.**

You may request a review of my decision by contacting the Information and Privacy Commissioner/Ontario, 2 Bloor Street East, Suite 1400, Toronto, ON M4W 1A8 (800-387-0073 or 416-326-3333). Please note that there is a $25.00 fee and you only have 30 days from receipt of this letter to request a review.

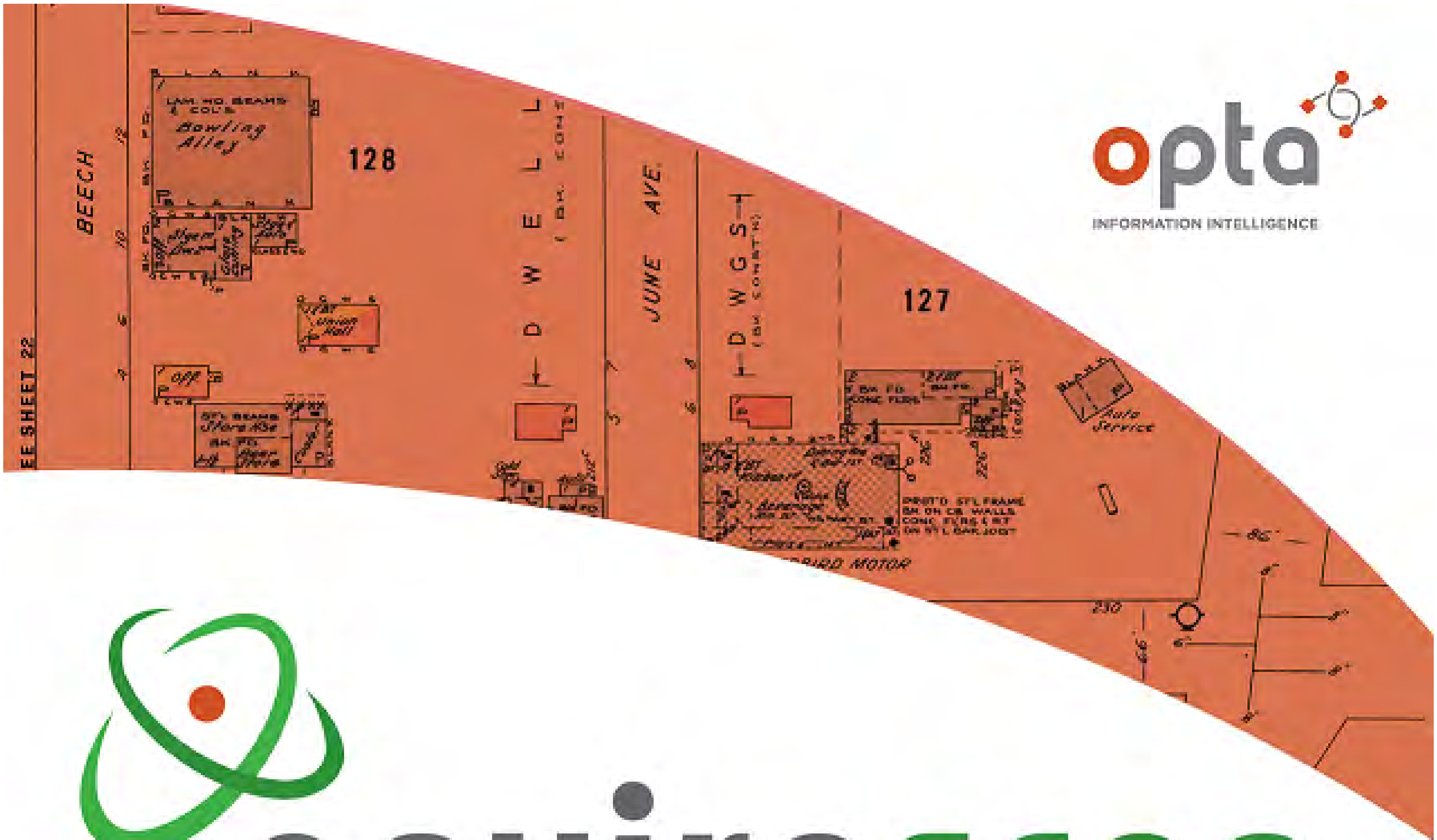
If you have any questions regarding this matter, please contact Biraveena Pathmasiri at biraveena.pathmasiri4@ontario.ca.

Yours truly,

BP

for Janet Dadufalza
FOI Manager

opta
INFORMATION INTELLIGENCE



enviroscan

An SCM Company

175 Commerce Valley Drive W
Markham, Ontario L3T 7Z3

T: 905-882-6300
W: www.optaintel.ca

Report Completed By:

Sunita

Site Address:
1585 Klondike Park Road Wasaga Beach ON Canada

Project No:
1415404

Requested by:
Jaime Noble
Golder Associates

Opta Order ID:
50141

Date Completed:
6/18/2018 12:37:41 PM

Project Name: 1585 Klondike Park Road Clearview Ontario

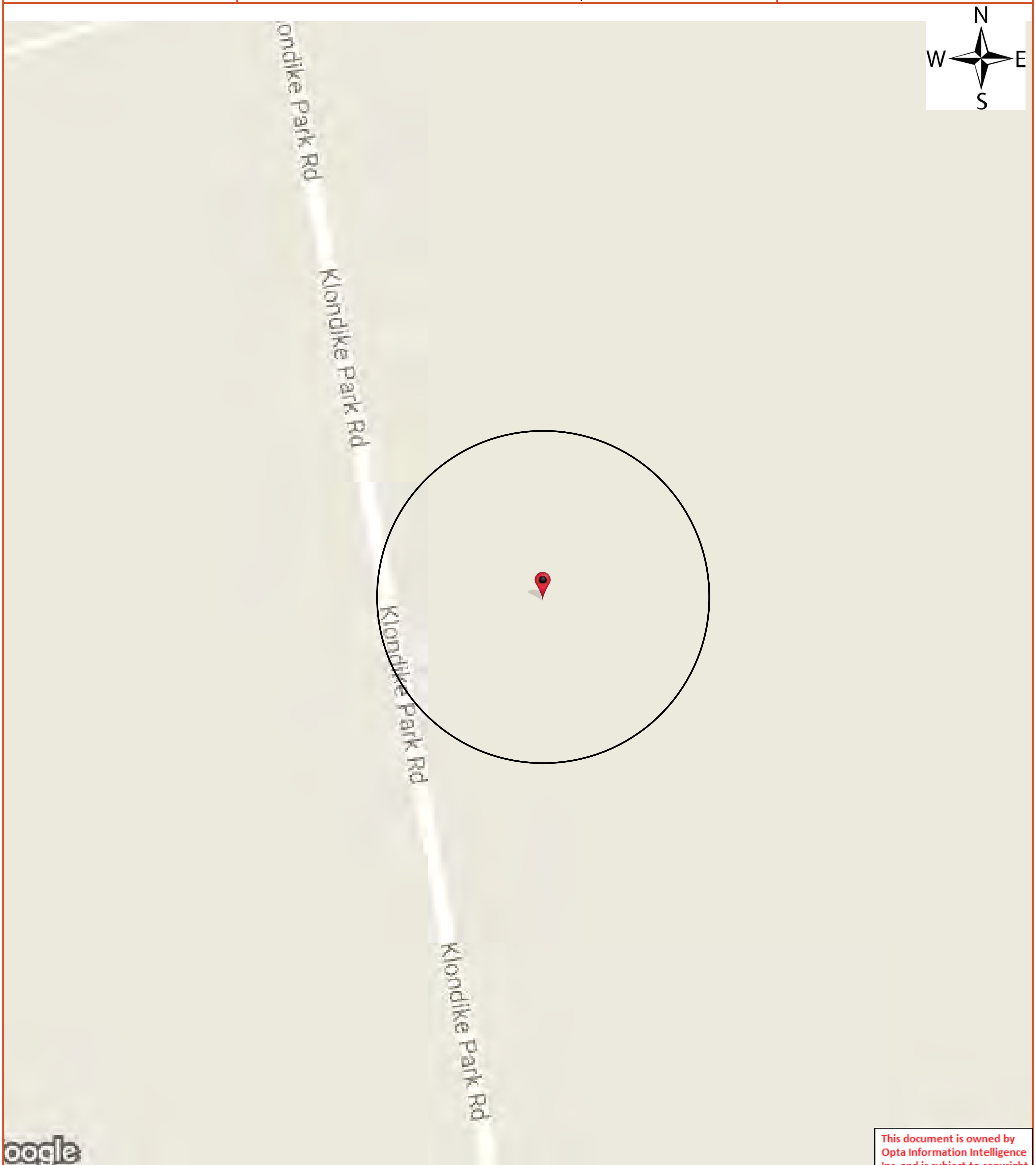
Project #: 1415404

ENVIROSCAN Report

Search Area: 1585 Klondike Park Road Wasaga Beach ON Canada

Requested by:
Jaime Noble
Date Completed: 06/18/2018 12:37:41

OPTA INFORMATION INTELLIGENCE



Opta Historical Environmental Services Enviroscan ™ Terms and Conditions

Report

The documents (hereinafter referred to as the "Documents") to be released as part of the report (hereinafter referred to as the "Report") to be delivered to the purchaser as set out above are documents in Opta's records relating to the described property (hereinafter referred to as the "Property"). Opta makes no representations or warranties respecting the Documents whatsoever, including, without limitation, with respect to the completeness, accuracy or usefulness of the Documents, and does not represent or warrant that these are the only plans and reports prepared in association with the Property or in Opta's possession at the time of Report delivery to the purchaser. The Documents are current as of the date(s) indicated on them. Interpretation of the Documents, if any, is by inference based upon the information which is apparent and obvious on the face of the Documents only. Opta does not represent, warrant or guarantee that interpretations other than those referred to do not exist from other sources. The Report will be prepared for use by the purchaser of the services as shown above hereof only.

Disclaimer

Opta disclaims responsibility for any losses or damages of any kind whatsoever, whether consequential or other, however caused, incurred or suffered, arising directly or indirectly as a result of the services (which services include, but are not limited to, the preparation of the Report provided hereunder), including but not limited to, any losses or damages arising directly or indirectly from any breach of contract, fundamental or otherwise, from reliance on Opta Reports or from any tortious acts or omissions of Opta's agents, employees or representatives.

Entire Agreement

The parties hereto acknowledge and agree to be bound by the terms and conditions hereof. The request form constitutes the entire agreement between the parties pertaining to the subject matter hereof and supersedes all prior and contemporaneous agreements, negotiations and discussions, whether oral or written, and there are no representations or warranties, or other agreements between the parties in connection with the subject matter hereof except as specifically set forth herein. No supplement, modification, waiver, or termination of the request shall be binding, unless confirmed in writing by the parties hereto.

Governing Document

In the event of any conflicts or inconsistencies between the provisions hereof and the Reports, the rights and obligations of the parties shall be deemed to be governed by the request form, which shall be the paramount document.

Law

This agreement shall be governed by and construed in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein.

Project Name: 1585 Klondike Park Road Clearview Ontario

Project #: 1415404

ENVIROSCAN Report

No Records Found

Requested by:
Jaime Noble
Date Completed: 06/18/2018 12:37:41

OPTA INFORMATION INTELLIGENCE

No Records Found

N
W E
S

LGI
COPY SERVICE CANADA
www.lgicscanada.com
alantos@lgicscanada.com
Phone: 613 875-7387

City Directory Information Source
Polk's Clearview (Wasaga Beach), Ontario, City Directory

1999	
Project Number: 14015404 **Site Address: 1585 Klondike Park Drive, Clearview (Wasaga Beach), Ontario**	
Site Listing:	-Address not listed
Adjacent Properties:	
Klondike Park Drive (1520-1790)	-No listings within radius

*****Clearview (Wasaga Beach), ON is listed in 1999 within the city directory archives*****

From:	Public Information Services
To:	Noble, Jaime
Subject:	NO RECORD FOUND (FUEL STORAGE TANKS ONLY): 1415404 TSSA Database Search
Date:	June-13-18 1:51:00 PM
Attachments:	image001.jpg image003.jpg

NO RECORD FOUND (FUEL STORAGE TANKS ONLY)

Hello Jaime. Thank you for your request for confirmation of public information.

We confirm that there are no records in our database of any fuel storage tanks at the subject addresses.

For a further search in our archives please complete our release of public information form found at https://www.tssa.org/en/about-tssa/release-of-public-information.aspx?_mid_=392 and email the completed form to publicinformationservices@tssa.org or through mail along with a fee of $56.50 (including HST) per location. The fee is payable with credit card (Visa or MasterCard) or with a Cheque made payable to TSSA.

Although TSSA believes the information provided pursuant to your request is accurate, please note that TSSA does not warrant this information in any way whatsoever.

Kind regards,

Gaya

From: Noble, Jaime <Jaime_Noble@golder.com>
Sent: June 13, 2018 11:23 AM
To: Public Information Services <publicinformationservices@tssa.org>
Subject: 1415404 TSSA Database Search

Good Afternoon,

May you please perform a TSSA database record search for any underground storage tanks, registered fuel tanks, outstanding instructions, incident reports, fuel oil spills or contaminations records for the following locations. We found additional information that lead us to this address:

- 1585 Klondike Park Road, Clearview, Ontario

Jaime

Jaime Noble (B.A. Hons.)
Environmental Technician

100 Scotia Court, Whitby, Ontario, Canada L1N 8Y6
T: +1 905 723 2727 | **D:** +1 (905) 723-2727 x6612 | **golder.com**
LinkedIn | Facebook | Twitter

Work Safe, Home Safe

APPENDIX C

Site Photographs

Photo 1 – View of the site building and motorhome facing east.

Photo 2 – View of the site building facing southeast.

CLIENT

Township of Clearview

CONSULTANT

GOLDER

YYYY-MM-DD	2018-06-20
TAKEN BY	SDP
CHECKED BY	CLG

PROJECT

Phase I ESA – 1585 Klondike Park Road, Wasaga Beach (Clearview), Ontario

TITLE

Photographic Record

PROJECT No. 1415404

FIGURE **C1**

Photo 3 – View of the interior of the site building.

Photo 4 – View of the southern portion of the Site facing southeast.

CLIENT		PROJECT	
Township of Clearview		**Phase I ESA – 1585 Klondike Park Road, Wasaga Beach (Clearview), Ontario**	
CONSULTANT	YYYY-MM-DD 2018-06-20	TITLE	
GOLDER	TAKEN BY SDP	**Photographic Record**	
	CHECKED BY CLG	PROJECT No. 1415404	FIGURE **C2**

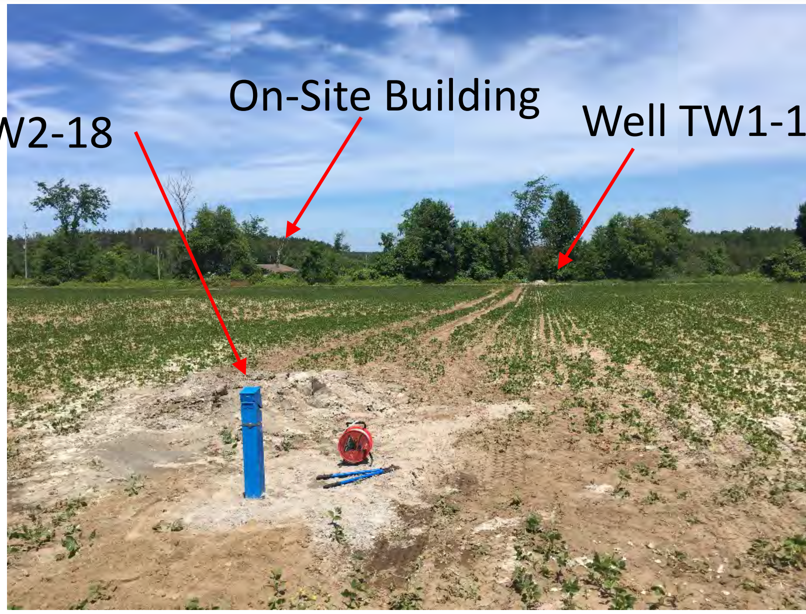


Photo 5 – View of the on-Site wells, facing north.

Photo 6 – View of the debris pile (former building) facing north.

CLIENT **Township of Clearview**		PROJECT **Phase I ESA – 1585 Klondike Park Road, Wasaga Beach (Clearview), Ontario**	
CONSULTANT GOLDER	YYYY-MM-DD: 2018-06-20 TAKEN BY: SDP CHECKED BY: CLG	TITLE **Photographic Record**	
		PROJECT No. 1415404	FIGURE **C3**

Photo 7 – View of the northern portion of the Site, facing northwest.

Photo 8 – View of fill pile along the east property line. Not grass cover.

CLIENT

Township of Clearview

PROJECT

Phase I ESA – 1585 Klondike Park Road, Wasaga Beach (Clearview), Ontario

CONSULTANT

GOLDER

YYYY-MM-DD	2018-06-20
TAKEN BY	SDP
CHECKED BY	CLG

TITLE

Photographic Record

PROJECT No. 1415404 FIGURE **C4**

Photo 9 – Fill pile in the central portion of the Site.

Photo 10 – View of the southern portion of the Site, facing south.
Note adjacent property across Sunnidale Road.

CLIENT	**Township of Clearview**	PROJECT	**Phase I ESA – 1585 Klondike Park Road, Wasaga Beach (Clearview), Ontario**
CONSULTANT	GOLDER	TITLE	**Photographic Record**
YYYY-MM-DD	2018-06-20	PROJECT No.	1415404
TAKEN BY	SDP	FIGURE	**C5**
CHECKED BY	CLG		

Photo 11 – View looking east across the northern portion of the Site. Note the adjacent property use (forested) to the east.

Photo 12 – View of the adjacent property to the west across Klondike Park Road, facing west.

CLIENT	PROJECT
Township of Clearview	**Phase I ESA – 1585 Klondike Park Road, Wasaga Beach (Clearview), Ontario**

CONSULTANT	YYYY-MM-DD	2018-06-20
GOLDER	TAKEN BY	SDP
	CHECKED BY	CLG

TITLE			
Photographic Record			
PROJECT No.	1415404	FIGURE	**C6**

Photo 13 – View looking north across the northern portion of the Site.

CLIENT

Township of Clearview

CONSULTANT

GOLDER

YYYY-MM-DD	2018-06-20
TAKEN BY	SDP
CHECKED BY	CLG

PROJECT

Phase I ESA – 1585 Klondike Park Road, Wasaga Beach (Clearview), Ontario

TITLE

Photographic Record

PROJECT No. 1415404

FIGURE **C7**

GOLDER

golder.com

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C2

Appendix C2

Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Groundwater Modelling and Source Water Protection (Golder Associates, October 2020)

REPORT

Township of Clearview
Stayner Long Term Water Supply
Schedule B Municipal Class EA

Groundwater Modelling and Source Water Protection

Submitted to:

Mr. Mike Rawn, C.E.T.
Township of Clearview
217 Gideon St.
Stayner, ON
L0M 1S0

Submitted by:

Golder Associates Ltd.
121 Commerce Park Drive, Unit L, Barrie, Ontario, L4N 8X1, Canada

+1 705 722 4492

1415404

October 2020

Distribution List

1 PDF - Township of Clearview

1 PDF - R.J. Burnside and Associates

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) is pleased to present this report to the Township of Clearview describing groundwater modelling of a proposed supplementary water supply for the community of Stayner, Ontario. This report is prepared in support of the ongoing Township of Clearview Long Term Stayner Long Term Water Supply Municipal Class Environmental Assessment (EA) project. The project seeks to evaluate various solutions for water and sewer servicing to accommodate future growth within the Township.

The population of Stayner is approximately 4,000 (Statistics Canada, 2016) within an area of 214 hectares (ha) (Figure 1). The ultimate population is estimated to grow to 28,200 beyond the year 2034 based on an additional settlement area of 496 ha (Burnside, 2008). Stayner's current water supply is provided by four groundwater wells, with two wells located on the east side of the town and two other wells located to the south of Stayner (Figure 1). In total, the wells have an allowable capacity of 76 litres per second (L/s) of water with actual use typically less than 40 L/s (Township of Clearview, 2018). At full build-out, Stayner's future average day demand (ADD) and maximum day demand (MDD) are estimated to increase to 164 L/s and 313 L/s, respectively (Burnside, 2008).

Golder has conducted a drilling and aquifer testing field study to find additional sources of groundwater for Stayner as documented in *Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Water Supply Exploration Addendum* (Golder, 2018). The study found a viable water supply exists within a deep aquifer underlying the property at 1585 Klondike Park Road (the Site), approximately 9 kilometres northeast of Stayner. Based on the 2018 testing, it is inferred that the construction of four municipal wells at the Site (with one well as stand-by for firm capacity) would be able to supply an additional 120 L/s of MDD to Stayner. Assuming a maximum day factor of 2.0, the ADD would be 60 L/s.

The purpose of the groundwater modelling is to estimate the hydrogeological effects of the Site's proposed groundwater supply well pumping, including potential drawdown, well interference and baseflow changes at surface water features. In addition, supply well capture zones are simulated to identify the source of water to the wells. With the capture zones serving as a basis, vulnerable areas (in this case, Wellhead Protection Areas or WHPAs) for the "Klondike Park Rd Wellfield" are delineated and undergo vulnerability scoring and drinking water threats assessment.

Modelling is undertaken using an updated version of the pre-existing "Wasaga Beach" three-dimensional (3D) MODFLOW groundwater model. The Wasaga Beach model (or "the model") was originally developed during the South Simcoe Groundwater Study (Golder and WHI, 2004) and thereafter used to develop a source water protection threat assessment (Golder, 2010). The results of these studies have been incorporated into the *Nottawasaga Valley Source Protection Area Approved Assessment Report* (NVCA, 2015), completed per the Ministry of Environment Technical Rules under the Clean Water Act (MOE, 2009).

The model spans an area of 191 km^2 along Georgian Bay (Figure 1). The Site lies somewhat centrally within the model domain; however, Stayner itself lies just southwest of the domain and therefore is not explicitly considered in the model. The Wasaga Beach municipal wells, and namesake of the model, lie to the northwest of the Site.

This report describes model conceptualization, construction, calibration, effects assessment results and source water protection mapping. This document serves as a companion report to, and is intended to be read in conjunction with, *Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Water Supply Exploration Addendum* (Golder, 2018). Lastly, this report supersedes the draft modelling report *Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Groundwater Modelling Addendum* (Golder, 2019).

1.1 Scope of Work

The modelling scope of work examines two main scenarios: 1) Existing Conditions; and 2) Future Conditions.

Existing Conditions

- Update model surfaces and parameters in accordance with recent field activities including test well drilling and pumping tests;
- Calibrate the model in steady-state mode (long-term average) to static water levels at the Site and surrounding regional wells as documented in the Ministry of Environment, Conservation and Parks (MECP) Water Well Information System database (MECP, 2019);
- Compare steady-state simulated versus average measured baseflow at the Nottawasaga River; and
- Calibrate the model in transient (time-variable) mode to the results of a 72-hour pumping test at Site test well TW3 (Golder, 2018).

The Existing Conditions model forms the baseline for assessing the effects of Future Conditions pumping.

Future Conditions

- Input proposed Site wells and future pumping rates;
- Estimate long-term aquifer drawdown and potential well interference as a result of the additional water taking;
- Estimate baseflow changes as a result of the additional water taking; and
- Delineate base case capture zones for the proposed Site wells and also assess if the additional water taking affects Wasaga Beach municipal well capture zones.

Source Water Protection

Based on the results of the Future Conditions modeling, the following Source Water Protection items are reported on:

- Vulnerable area / WHPA delineation for the Klondike Park Rd wellfield using the base case results and an additional uncertainty analysis “envelope”;
- Aquifer Vulnerability Index (AVI) mapping;
- Vulnerability Scoring within WHPAs;
- Drinking Water Issues Evaluation; and
- Drinking Water Threats Assessment.

2.0 MODEL CONCEPTUALIZATION

A detailed conceptual basis for the numerical model construction is provided in Golder, 2004 and Golder and WHI, 2004; a brief summary is provided below.

2.1 Climate

The model lies within the Georgian Bay Climatic region. Applicable climatic data is available for nearby Thornbury, Collingwood, and Midhurst. Mean annual precipitation for the area ranges from 813 millimetres (mm) to 1,248 mm with an average of 904 mm to 960 mm depending on the climate station. Water budget calculations indicate an annual water surplus (precipitation minus evapotranspiration) of approximately 250 mm to 377 mm depending on soil type.

2.2 Topography and Drainage

Topography within the model domain generally slopes in a northwesterly direction, ranging from a high of approximately 210 metres above sea level (masl) in the southeast of the model to a low of 176 masl at Georgian Bay (Figure 2).

The model domain lies within the "Lower Nottawasaga River" subwatershed (NVCA, 2015). The Nottawasaga River is the predominant drainage feature within the model, flowing northwesterly from the Minesing Wetland then westerly across the central model domain and finally flowing northeast to its final discharge location at Georgian Bay (Figure 2). The Nottawasaga River watershed is approximately 3,361 km^2.

Water Survey of Canada (WSC) Station No. 02ED027 records continuous flow measurements at the Nottawasaga River centrally within the model domain (Figure 2). The upstream catchment area for this station is approximately 2,690 km^2, of which 41 km^2 lies within the model domain. Historic data indicates flow rates range from approximately 10,000 L/s to 75,000 L/s with the greatest flows typically occurring in April through May and the lowest flows typically occurring in August through October. Baseflow, the groundwater component of total streamflow, is estimated to be 17,000 L/s on average, with a unit baseflow of 6.32 L/s/km^2 (Golder, 2004).

McIntyre Creek, a relatively large tributary of the Nottawasaga River, flows roughly northwards from Stayner to its discharge location at the Nottawasaga just south of Wasaga Beach. The McIntyre Creek subwatershed is approximately 120 km^2 with the downstream 20 km^2 located within the model domain.

Little Marl Creek, a smaller tributary of the Nottawasaga River, flows southward through Marl Lake to its discharge location just upstream of Jack's Lake (itself part of the Nottawasaga River). Little Marl Creek is occasionally referred to as Marl Creek, although the true Marl Creek, a much larger feature, lies outside of the model domain to the southeast near Edenvale. The Little Marl Creek subwatershed is approximately 6 km^2 with the majority of the area located within the model domain. Whereas Little Marl Creek and Marl Lake are considered in the model, they likely receive little groundwater baseflow and are thus largely sustained by surface water inputs. There are several points of evidence to support this inference. Firstly, Little Marl Creek lies within a low-permeability clay environment that would tend to limit groundwater discharge (Section 2.3). Secondly, Marl Lake has been identified as warmwater habitat (NVCA and DFO, 2009), which would suggest that cool to cold water (i.e. groundwater inputs) are minimal. Lastly, prior low flow measurements just upstream of Marl Lake, including a catchment area of 5.6 km^2 (the majority of the subwatershed), indicated zero baseflow (Golder, 2004).

2.3 Geology

The model is located within the Simcoe Lowlands physiographic region, as defined by Chapman and Putman (1984). The Simcoe Lowlands are subdivided into two areas: 1) the Simcoe Basin; and 2) the Nottawasaga Basin. The Nottawasaga Basin constitutes all of the lowlands from Barrie to Georgian Bay, including the model domain.

The present-day land surface of the Nottawasaga Basin was part of the floor of glacial Lake Algonquin, and therefore the surficial materials are composed of both shallow and deep-water lacustrine (or lake derived) deposits and bevelled clayey till (Figure 3). The surficial materials within the model domain range from lacustrine sand plains and dunes near the Wasaga Beach shoreline to silts, marl and clay beyond the sand dunes, and ice deposited till further inland. Underlying the surficial materials is an alternating sequence of quaternary-aged fine-grained and coarse-grained unconsolidated sediments of varying thicknesses and lateral extents (Section 2.4). In its totality, overburden thickness within the model domain ranges from 50 m to 110 m (Figure 4).

Underlying the overburden is Paleozoic-aged limestone of the Verulam and Lindsay Formations (Figure 5). The model bedrock surface has been updated from 2004 and considers recent MECP WWIS database bedrock well logs (MECP, 2019) as well as new Ontario Geologic Survey boreholes near Phelpston and in Clearview (Mulligan, 2016 and Mulligan, 2017). The resulting surface reaches a high of approximately 150 masl near Stayner and then rapidly declines to 100 masl centrally within the model domain, suggesting that at least a portion of a buried bedrock valley may underlie the Site.

2.4 Hydrostratigraphy

The conceptual hydrostratigraphy, derived via examination of MECP well records and cross-section analysis (Golder and WHI, 2004), consists of an alternating sequence of aquifer and aquitard units (Figure 6A/6B). The Site is underlain by three principle aquifer systems: the upper aquifer (A1); the intermediate aquifer (A2); and the lower aquifer (A3). Most domestic wells in the area are completed in Aquifer A2, whereas the Wasaga Beach municipal wells and the Site test well are completed in Aquifer A3; as such, Aquifer A3 is a primary focus of this analysis.

The A-series aquifers are primarily comprised of sand and gravel. Aquifer A1 and A2 are separated by the presence of a thick, continuous silt and clay confining unit (C1). Aquifer A2 and A3 are also separated by a silty clay till confining unit (C2), although there are areas centrally within the model domain and near the Site where this confining unit thins out and Aquifer A2 and A3 may be in more direct hydraulic connection.

Underlying Aquifer A3 is a thick basal clay till (C3), which rests upon limestone bedrock. Neither the till nor the bedrock are considered viable sources of water in this area.

2.5 Aquifer Properties

The majority of high-quality aquifer testing data is from Aquifer A3 where the municipal wells are completed. Historic testing at the Wasaga Beach municipal wells has indicated aquifer transmissivity ranging from 370 m^2/day to 1,400 m^2/day with storativity values of 5E-5 to 8E-3 (Golder and WHI, 2004). A recent pumping test at the Site test well TW3 demonstrated an A3 aquifer transmissivity of 1,900 m^2/day with a storativity of 4E-4 (Golder, 2018). Based on an observed aquifer thickness of approximately 15 m, aquifer A3 has an estimated hydraulic conductivity of 1E-3 m/s and a specific storage of 3E-5/m in the vicinity of the Site.

2.6 Groundwater Flow

Regional estimates of recharge indicate bulk infiltration rates of approximately 214 mm/yr to 256 mm/yr within the model area (Golder, 2004). At a local scale, the recharge distribution will be influenced in part by the capacity of surficial soils to infiltrate surplus. Areas overlain by sands and gravels will be more likely to infiltrate greater than the regional average and surficial tills, silts and clays more likely to infiltrate less than the regional average.

Inferred groundwater elevation mapping of Aquifers A2 and A3 derived from MECP well records indicate north to northwesterly flow patterns, ranging from 195 masl to the south of the model domain to 176 masl at Georgian Bay (Figure 7).

3.0 MODEL CONSTRUCTION

Modelling is undertaken using an updated version of the pre-existing “Wasaga Beach” three-dimensional (3D) MODFLOW groundwater model (Golder and WHI, 2004). The following subsections describe foundational aspects of the prior work but mainly focus on the refinements completed under this current analysis. A summary table comparing the 2004 versus current model construction and calibration results is provided in Appendix A.

3.1 Code

The MODFLOW-2000 code (Harbaugh et al., 2000) continues to be used to simulate groundwater flow in this study. MODFLOW is a 3D groundwater flow code developed by the United States Geological Survey and is recognized as an industry standard for general purpose groundwater flow modelling. It is modular in nature and uses the finite difference formulation of the groundwater flow equation in its solution. The Pre-Conditioned Conjugate Gradient (PCG) Solver is used to solve the groundwater flow equations in this analysis. The software Visual MODFLOW Classic is used as the pre- and post-processor for the simulations.

MODPATH (Pollock, 1989), a companion code to MODFLOW, is used to conduct particle tracking for capture zone delineation.

3.2 Domain and Grid

The current model domain is retained from prior work (Golder and WHI, 2004). The area is roughly trapezoidal in shape and spans an area of 191 km^2 (Figure 1). The model extents are based on hydrogeological boundaries and/or inferred groundwater flow patterns (Section 3.5).

Horizontally, numerical grid cell size ranges from approximately 500 m x 500 m regionally to 1 m x 1m in the vicinity of proposed pumping wells and the surrounding Site. Additional grid refinement is imposed at the Site relative to prior modelling, in order to adequately simulate local drawdown around the new Site wellfield.

Vertically, the model top is constrained by topography and the bottom is bounded by shallow bedrock. Within this construct are seven numerical layers representing the conceptual hydrostratigraphy described previously (Figure 6A/6B).

The model is comprised of 374,997 active cells.

3.3 Modelled Hydrostratigraphy and Material Properties

The modelled hydrostratigraphy and material properties are summarized in Table 1 and illustrated in both cross-section (Figure 6A/6B) and plan view (Figure 8). Plan view Figure 8 shows hydraulic conductivity (“K”) distribution per layer and also includes individual layer isopach thickness contours.

The current work largely retains the hydrostratigraphic layer structure of the prior work (Golder and WHI, 2004) with the main exception being that Aquifer A3 is thickened and Aquitard C2 is thinned in the area of the Site to reflect recent drilling data (Golder, 2018). Also, the bedrock surface is updated as mentioned previously. Layer 1 through 4 (A1, C1,A2 and C2) thicknesses in the Wasaga Beach area are maintained per the original 2004 parameterization (Figure 8).

The prior hydraulic conductivity distribution is mostly retained; however, the following updates are undertaken as part of this current work (Figure 8):

- Layer 1 hydraulic conductivity and recharge distribution is re-configured to more accurately follow surficial geology mapping with soils being grouped into three broad subunits: 1) Sand (K = 1E-4 m/s); 2) Till (K = 1E-6 m/s); Silt/Clay (K = 5E-7 m/s).
- Aquifer A3 is subdivided into three hydraulic conductivity zones: 1) Wasaga Beach coastal area (K = 5E 4 m/s); 2) Wasaga Beach inland area (K = 5E-5 m/s) and 3) Site area (K = 1E-3 m/s). Note that the hydraulic conductivity of the first two zones remain unchanged from the 2004 interpretation whereas the third zone is updated based on recent pumping test data.

Effective porosity assignments, a parameter used in groundwater velocity calculations during particle tracking / capture zone delineation, is retained from prior work.

Under the prior analysis, which was entirely steady-state flow conditions, storage parameters were implicitly ignored as there was no change in flow over time. However, under the current analysis, which includes a transient (time-variable) component, storage parameters are introduced. Specific storage (Ss) for all units is assigned a value of 3E-5/m based on the pumping test results. Specific yield (S_y) is assumed to be 0.2 m^3/m^3 for all units, a blanket value that covers both fine and coarse-grained materials (Morris and Johnson, 1967).

Table 1: Modelled Material Properties Summary

Model Layer	Nominal Unit	Material	Hydraulic Conductivity K (m/s)[1]	Effective Porosity (m^3/m^3)	Recharge (mm/yr)
1	A1	Sand, Till, Silt/Clay	Sand: 1E-4 Till: 1E-6 Silt/Clay: 5E-7	0.3	Sand: 300 Till: 150 Silt/Clay: 100
2	C1	Silt and Clay	1E-7	0.2	-
3	A2	Sand, Gravel	1E-4 to 5E-4	0.3	-
4	C2	Silty Clay Till	5E-6	0.2	-
5	A3	Sand, Gravel	5E-5 to 1E-3	0.3	-
6	C3	Clay Till	2E-9	0.2	-
7	BR	Limestone	2E-9	0.1	-

[1]All materials isotropic.

3.4 Recharge

The modelled recharge distribution (Figure 9) adheres to the surficial geology mapping with sand, till, and silt/clay subunits receiving recharge rates of 300 mm/yr, 150 mm/yr, and 100 mm/yr, respectively. This recharge distribution is a refinement over prior work in that it better aligns recharge rates with surficial materials and also reasonably increases those rates to better reflect the regional characterization (Golder, 2004) and calibration to Nottawasaga River baseflows (Section 4).

3.5 Boundary Conditions

Boundary conditions at the model perimeter maintain the layout of the prior (2004) work (Figure 10). The south and northeastern model flanks are comprised of constant head cells with specified heads of 195 masl and 190 / 185 masl; these cells act as regional inflow boundaries. The northwestern flank of the model follows Georgian Bay and consists of constant head cells with a specified head of 176 masl; these cells reflect average lake level and act as a regional outflow boundary. The southeastern and northern flanks of the model consist of "no-flow" or inactive cells which will cause groundwater to flow perpendicular to these boundaries. The implementation of these regional boundaries is delineated on the basis of inferred groundwater flow patterns (Figure 7).

The Nottawasaga River and its tributaries are assigned as river cells in the upper layer of the model with heads approximating topography / river stage. The assigned riverbed bottom is typically about 1 m below stage. The conductance of the river cells (an input parameter representing the degree of hydraulic connection between the river and the underlying groundwater system as moderated by the riverbed) is 100 m^2/day, a value derived through the calibration process (Section 4). The originally modelled (2004) river cells were assigned using a default conductance formula within Visual MODFLOW that considers, amongst individual grid cell dimensions, physical properties such as riverbed thickness and hydraulic conductivity. Documentation of these physical properties was not available from the original 2004 work and as such it is uncertain how the original river conductances were determined. In any event, the prior calibration indicated baseflows were significantly underpredicted; however, the updated river conductance provides a good match (Section 4).

3.6 Pumping Wells

The model includes the existing Wasaga Beach Powerline Road and Jeanetta Street municipal wells and the proposed Klondike Road wells (Figure 1). In addition, the only groundwater Permit To Take Water holder within 2 km of the Site, Peace Naturals Project Inc. (Permit No. 4171-AYZMXR), is also included. Table 2 lists the well details and applied rates under Existing and Future Conditions.

Table 2: Pumping Well Details

Wellfield	Well ID	Easting	Northing	Ground Elevation (masl)	Screened Interval (mbgs)	Aquifer	Existing Conditions Rate (L/s)	Future Conditions Rate (L/s)
Powerline Road	Well 1	576,760	4,926,965	189.2	51.8 - 59.8	A3	17	17[1], 27[2]
	Well 2	576,761	4,926,960	189.2	51.8 - 57.9	A3	17	17[1], 27[2]
	Well 3	576,763	4,926,953	189.2	53.6 - 61.8	A3	17	17[1], 27[2]

Wellfield	Well ID	Easting	Northing	Ground Elevation (masl)	Screened Interval (mbgs)	Aquifer	Existing Conditions Rate (L/s)	Future Conditions Rate (L/s)
Jeanetta Street	Well 1	578,047	4,930,716	178.8	62.2 - 54.6	A3	10	10[1], 40[2]
	Well 2	578,075	4,930,714	178.8	59.4 - 67.1	A3	10	10[1], 40[2]
	Well 3	578,065	4,930,729	178.8	59.1 - 66.8	A3	10	10[1], 40[2]
Klondike Road	Well 1	579,349	4,923,725	190.1	42.3 - 57.4	A3	0	20
	Well 2	579,396	4,923,732	190.1	42.3 - 57.6	A3	0	20
	Well 3	579,451	4,923,734	190.1	42.2 - 58.0	A3	0	20
Peace Naturals	PW1	578,638	4,923,077	205.1	57.4 - 60.4	A3	3[3]	3[3]
	PW2	578,980	4,923,017	205.0	58.0 - 61.0	A3	2.5[3]	2.5[3]
	Farm House	578,807	4,923,128	205.1	35.6 - 36.6	A2	0.7[3]	0.7[3]

Note 1: Current (2019) average water use. Employed in both Existing Conditions and Future Conditions Modelling (EA Impact Assessment).

Note 2: Previously modelled (2004) ‘Future PTTW Average’. Employed in Future Conditions Modelling (WHPA Comparison Only).

Note 3: Permitted maximum daily rate.

3.6.1 Existing Conditions

The Existing Conditions rates for the Wasaga Beach wells are based on recent annual summary reports of water usage (Ontario Clean Water Agency, 2019). It is notable that current average water use at the three Powerline Road wells (17 L/s per well) has substantially increased from the 2004 calibrated model rates, which were based on 2001 measured average use (8 L/s per well). Average water use at the three Jeanetta Street wells (10 L/s per well) remains similar to prior calibrated model rates (11 L/s per well).

For the transient calibration, the model is run for 7 days in total: a 2-day ramp up period where test well TW3 is inactive, followed by the 3-day pumping test where TW3 is pumped at 38 L/s, followed by a 2-day recovery.

3.6.2 Future Conditions

The Future Conditions Klondike Road pumping (20 L/s per proposed well) is based on the expected long-term average use of 60 L/s (Section 1). The Future Conditions pumping rates at the Wasaga Beach municipal wells consider two sets of rates in this analysis (see Notes 1 and 2 in Table 2). The first set of rates maintains the Existing Conditions rates to allow for the isolation of the additive effects of Site pumping for the purposes of the EA impact assessment. The second set of rates (i.e. a different model scenario) employs the 'future PTTW average' used in the original 2004 modelling to allow for review of any potential changes to the previously developed Wasaga Beach capture zones.

3.6.3 Particle Tracking Methodology

Each pumping well is assigned a set of particles to allow for eventual capture zone delineation (Section 5). The particle set includes an outer circle of 100 particles at a radial distance of 25 m and a group of 10 particles within the 1 m x 1 m pumping well cell itself. Vertically, the particles are positioned in accordance with the screened interval in A3 (Layer 5).

After a flow field has been output by MODFLOW the particles are "backward tracked" in MODPATH to generate 3D pathlines which ultimately indicate the source and travel pathway of recharge supplying the well. For this analysis we examine the 2-year, 5-year and 25-year time of travel capture zones as these periods correspond to the WHPA-B, C and D wellhead protection area (WHPA) designations under the Technical Rules (MECP, 2017).

The 2D (i.e. plan view) projection of the 3D pathlines is considered the capture zone within a specified groundwater time of travel; this mapping implicitly ignores vertical travel time, which is accounted for separately in the vulnerability assessment. The actual travel time for source water entering the groundwater table to reach the wells may be longer for deep units residing beneath lower permeability aquitards.

4.0 EXISTING CONDITIONS CALIBRATION

Calibration involves the adjustment of model inputs to attain simulated groundwater level or flow conditions reasonably consistent with measured or observed data. The following subsections describe prior work, methodology, parameter adjustments and results.

4.1 Prior Work

The original Wasaga Beach model was calibrated in steady-state mode to 164 static water levels in the MECP WWIS database, baseflow estimates at Nottawasaga River WSC Station No. 02ED027 and low flow spot measurements at McIntyre Creek (Golder, 2004). The principal model inputs examined during this process were recharge and hydraulic conductivity for the various aquifer and aquitard units. The results of the model calibration indicated the model output was reasonably similar to observed water levels available at the time although it was noted that the model underpredicted baseflow at the Nottawasaga River by roughly 50%.

A summary table comparing the 2004 versus current model construction and calibration results is provided in Appendix A. The additional data collected since 2004 as has led to refinements in hydrogeologic conceptualization and model construction (Section 2 and 3) with associated improvement in model accuracy and calibration results as reported below.

4.2 Current Methodology

For the Existing Conditions model we revisit the steady-state calibration but also introduce a transient calibration to recent pumping test results at the Site (Golder, 2018). The calibration targets are as follows:

- Steady-State:
  - 863 static water levels in the MECP WWIS database (MECP, 2019) and static water levels at TW3, OW1, OW2, and OW4. Note that the MECP WWIS lists a single static water level at a well post-drilling and therefore the dataset represents a broad timeframe. However, the water levels are deemed reasonably indicative of Existing Conditions at a regional scale. It is notable that the current steady-state calibration dataset is much larger than the 164 static water levels used in the 2004 modelling.
  - Nottawasaga River Water Survey of Canada (WSC) Station No. 02ED027 average unit baseflow of 6 L/s/km^2 (Section 2).
  - Groundwater flow patterns in Aquifers A2/A3 (Figure 7).
- Transient:
  - A 72-hour pumping test at TW3 with drawdown at associated observation wells OW1, OW2, and OW4.

The calibration methodology involves a “trial and error” approach by adjusting the recharge, hydraulic conductivity, storage terms, and boundary condition inputs (where necessary) in an iterative manner to achieve a reasonable match to observed data. In this case, an improvement over prior (2004) work is also sought.

For the steady-state calibration to water levels, goodness-of-fit for each iteration is assessed via statistical and other quantitative or qualitative means including:

- *Mean Residual*: This term indicates the average difference between observed and simulated water levels. The mean residual may suggest the degree to which the model is, on average, predicting heads above or below the observed dataset. A mean residual approaching zero is usually desired.
- *Mean Absolute Residual*: This indicator represents the average absolute value of the difference between observed and simulated water levels. A mean absolute residual of 5 m or less is considered optimal in this regional setting.
- *RMS Error and NRMS*: RMS error reflects the average of the squared differences between observed and simulated water levels. RMS is akin to standard deviation and is a measure of the spread of error about the mean residual. NRMS, is the RMS divided by (or normalized by) the range of observed values for the dataset multiplied by 100%. NRMS may be considered a better indicator of goodness of fit as it accounts for the scale of the potential range of water levels. In this assessment NRMS magnitude is subjective, and, aside from the expectation of a decreasing NRMS with a calibration improvement, there is not a set target value that may be quantitatively ascribed. Nonetheless, an NRMS target of 10% or less is frequently employed as the minimum target in Ontario.
- *Calibration Plot*: Simulated versus observed head values are compared on a plot with a central 45-degree line. In an idealized result, each point will lie along the line; however, this rarely occurs in practice. Instead, the calibration plot is used as a visual inspection tool to determine goodness-of-fit and to detect any simulation bias (too high or too low relative to measured data) in the output.
- *Comparison to Water Level Maps*: The model output is visually compared to inferred groundwater elevation mapping.
- *Comparison to Measured Flows*: Simulated discharge to rivers is compared to measured baseflow (as inferred from total streamflow).

For baseflow calibration, the simulated Nottawasaga River discharge upstream of WSC Station No. 02ED027 is assessed via zone budgeting and divided by the subcatchment area within the model. This modelled baseflow per unit area is then compared to the observed average per unit area baseflow. The comparison is done on a unit area basis because the modelled subcatchment (41 km^2) is much smaller than the total catchment area of the station (2,690 km^2) (i.e. a direct comparison of flows is not possible).

For the transient calibration, model output is compared to drawdown trends at three nearby observation wells over a 72-hour, constant rate pumping test (Golder, 2018). The model is run for 7 days in total: a 2-day ramp up period where TW3 is inactive, followed by the 3-day pumping test where TW3 is pumped at 38 L/s followed by a 2-day allowance for recovery. As will be discussed further below, the steady-state model calibration provides a sufficient parameterization such that the subsequent transient calibration is more of a check on the steady-state inputs than a true calibration; although the transient approach did allow for a refinement in specific storage (a parameter not considered in steady-state flow).

4.3 Calibration Adjustments

The following main parameter adjustments are employed to provide a reasonable match to observed data and to improve upon prior (2004) results:

- Layer 1 hydraulic conductivity and recharge distribution is re-configured to follow surficial geology mapping with soils being grouped into three broad subunits (Figure 8 and Figure 9): 1) Sand (K = 1E-4 m/s, Recharge = 300 mm/yr); 2) Till (K = 1E-6 m/s, Recharge = 150 mm/yr); Silt/Clay (K = 5E-7 m/s, Recharge = 100 mm/yr). These adjustments lead to a more accurate assessment of water table position and baseflow estimates.

- Aquifer A3 is subdivided into three hydraulic conductivity zones: 1) Wasaga Beach coastal area (K = 5E-4 m/s); 2) Wasaga Beach inland area (K = 5E-5 m/s) and 3) Site area (K = 1E-3 m/s). Note that the hydraulic conductivity of the first two zones remain unchanged from the 2004 interpretation whereas the third zone is updated based on recent pumping test data.
- River cell conductance, previously spanning several orders of magnitude and variable from cell to cell, is set to a single value (100 m^2/day) to more closely simulate observed baseflow rates.
- For the purposes of the transient simulation, specific yield and specific storage parameters are added to the model inputs (Section 3).

4.4 Calibration Results

The steady-state simulated groundwater elevations within Aquifers A2/A3 are shown on Figure 11. The simulated flow patterns exhibit north to northwesterly flow and compare reasonably well with those inferred from static water level measurements (Figure 7).

The steady-state calibration to water levels is summarized on Figure 12, including a calibration plot and goodness-of-fit indicators. Residual mean is 0.6 m, absolute residual mean is 1.6 m, and NRMS is 7.8%. These statistics indicate an excellent overall fit to the observed data and an overall improvement compared to prior (2004) work.

Simulated baseflow on a per unit area basis is 6.63 L/s/km^2, which compares closely with the measured baseflow of 6.32 L/s/km^2 and is again an improvement over prior work.

The transient calibration to pumping test drawdown is illustrated on Figure 13. The simulated drawdown at each well closely follows the slope and magnitude (within 0.5 m) of the observed drawdown at the monitoring wells.

Thus, through the calibration process, it is found that the Existing Conditions recharge rates, hydrostratigraphic parameterization and simulated flow patterns are in good agreement with available field data. The calibrated model inputs are therefore considered reasonable for use in estimating Future Conditions pumping effects.

5.0 FUTURE CONDITIONS HYDROGEOLOGIC EFFECTS ASSESSMENT

The Future Conditions scenario takes the Existing Conditions scenario and adds the three proposed Site wells pumping at 20 L/s each from Aquifer A3. Resulting steady-state (i.e. long-term) drawdown, well interference, baseflow changes and capture zones are assessed as described below.

5.1 Drawdown

Simulated water level declines in Aquifers A3, A2, and A1 as a result of the proposed Site pumping are illustrated on Figures 14A, 14B, and 14C, respectively. As expected, the greatest amount of drawdown occurs in A3, reaching a maximum of 3 m at the pumping wells themselves. Maximum drawdown in Aquifer A2 and A1 is more subdued, reaching a maximum of approximately 2 m.

The lateral extent of the drawdown cone in A3, as defined by the 1 m drawdown contour, is roughly circular in shape and reaches a maximum distance of approximately 1.1 km from the Site. The drawdown extent is similar in A2 whereas the drawdown extent in A1 is significantly diminished.

The drawdown zone of influence lies over 2 km from the closest Wasaga Beach municipal well.

5.2 Private Well Interference

There are 24 private wells within the simulated zone of influence (Figure 14A). A summary of well completion details as indicated in the MECP WWIS is provided in Table 3. All wells are drilled (as opposed to dug or bored) and are used for largely for domestic or livestock watering purposes.

Of the 24 wells, 22 are completed in aquifer A2. The available water column in these wells ranges from 7.9 to 31.3 m. Meanwhile, simulated drawdown at the wells ranges from 1.2 m to 1.7 m, with the greatest drawdown occurring at wells closest to the Site pumping.

The two Aquifer A3 wells are associated with the Peace Naturals operation (7302400 and 7302402). These deeper wells have a water column of approximately 56 m and a simulated drawdown of 1.2 m.

Drawdown at 20 of the 24 wells is less than 10% of the available water column and is thus unlikely to cause an adverse effect to well operation. Drawdown at wells 5703674, 5703673, 5703671, and 5703664 is greater than 10% of the available water column and may cause an adverse effect to well operation. A water level monitoring program should be established for these wells and, in the event that drawdown from municipal water taking affects the operation of these private wells, remedial options such as connecting the homes to the municipal water supply, lowering pumping equipment, or drilling new and deeper wells could be considered.

Table 3: MECP Well Records in Drawdown Zone of Influence

ID	Easting	Northing	Date Completed	Drill Method	Use	Depth (mbgs)	Static Water Level (mbgs)	Available Water Column (m)	Simulated Drawdown (m)	Drawdown as % of Water Column
5703674	579,398	4,923,479	22-Jun-63	Cable Tool	Domestic	20.7	12.8	7.9	1.6	20.6
5703673	578,845	4,923,368	26-Sep-59	Cable Tool	Domestic	27.1	16.8	10.3	1.3	12.5
5703671	578,549	4,923,350	10-Jan-62	Cable Tool	Livestock	25.0	13.7	11.3	1.2	10.4
5703664	579,072	4,923,300	10-Jul-62	Cable Tool	Domestic	34.7	21.6	13.1	1.4	10.3
5711523	579,326	4,923,015	2-Oct-74	Rotary	Domestic	30.8	18.3	12.5	1.2	9.9
5722231	579,179	4,923,305	22-Apr-87	Cable Tool	Domestic	33.5	18.0	15.5	1.4	9.0
5703667	579,402	4,923,107	11-Dec-67	Cable Tool	Livestock	35.1	19.8	15.3	1.3	8.4
7185916	579,717	4,923,671	9-May-12	Cable Tool	Domestic	26.2	7.7	18.5	1.5	8.1
5709465	578,964	4,923,364	14-Dec-72	Cable Tool	Domestic	36.0	18.3	17.7	1.3	7.6
5738686	580,211	4,923,791	17-Feb-04	Cable Tool	Domestic	21.5	6.5	15.0	1.1	7.2
5732976	579,697	4,923,466	18-Aug-97	Cable Tool	Domestic	31.7	11.3	20.4	1.4	7.0
5703665	578,638	4,923,077	19-May-65	Cable Tool	Livestock	36.6	19.5	17.1	1.1	6.7
5703675	579,653	4,923,577	18-Oct-67	Cable Tool	Domestic	36.6	12.8	23.8	1.5	6.5
5709458	578,494	4,923,174	13-Nov-72	Rotary	Domestic	32.6	15.2	17.4	1.1	6.5

ID	Easting	Northing	Date Completed	Drill Method	Use	Depth (mbgs)	Static Water Level (mbgs)	Available Water Column (m)	Simulated Drawdown (m)	Drawdown as % of Water Column
5737227	579,716	4,923,556	26-Sep-02	Cable Tool	Domestic	37.5	13.1	24.4	1.5	6.0
7249614	578,268	4,923,070	3-Sep-15	Cable Tool	Domestic	29.9	11.9	18.0	1.0	5.8
5715737	579,214	4,923,624	14-Nov-78	Cable Tool	Domestic	39.3	8.2	31.1	1.7	5.5
5710435	579,039	4,924,649	17-Oct-73	Rotary	Domestic	21.3	-3.7	25.0	1.2	4.7
5713914	580,314	4,923,624	22-Sep-76	Rotary	Domestic	39.3	15.2	24.1	1.0	4.3
5703666	579,374	4,922,362	3-Dec-65	Cable Tool	Livestock	37.5	12.2	25.3	1.0	4.0
5706511	580,234	4,923,584	6-Jun-69	Cable Tool	Domestic	39.6	12.5	27.1	1.1	4.0
7302400	578,980	4,923,017	17-Oct-17	Rotary	Commercial	70.2	14.5	55.7	1.2	2.2
7302402	578,807	4,923,128	17-Oct-17	Rotary	Commercial	73.2	16.9	56.3	1.2	2.1
5701998	572,980	4,925,011	26-May-96	Cable Tool	Domestic	24.4	2.4	22.0	0.0	0.1
5703673	578,845	4,923,368	26-Sep-59	Cable Tool	Domestic	27.1	16.8	10.3	1.3	12.5
5703671	578,549	4,923,350	10-Jan-62	Cable Tool	Livestock	25.0	13.7	11.3	1.2	10.4

5.3 Baseflow Changes

Simulated groundwater flow budgets for Existing and Future Conditions are presented in Table 4. As noted previously, the only change in model input between Existing and Future Conditions is the new 60 L/s of pumping from Site well within Aquifer A3. An examination of the difference in net flows indicates that the additional 60 L/s pumped from A3 is ultimately drawn from a broad range of sources including the Nottawasaga River and its tributaries subcatchments, Georgian Bay, and the regional inflow boundary conditions (West and East Flank).

Stream baseflow losses may be examined in terms of overall flow reduction and/or percent loss, with the latter approach being more meaningful as losses in excess of 10% are often applied as the limit for potentially adverse effect. Volumetrically, the greatest flow loss per model component is simulated to occur at the Nottawasaga River (21 L/s) and its tributaries Little Marl Creek (1 L/s) and McIntyre Creek (8 L/s) for a total of 30 L/s loss within the river catchment. However, as noted previously (Section 2), the average baseflow at the Nottawasaga River is greater than 17,000 L/s; as such, the percent loss (0.2%) at the river is considered negligible.

The greatest relative stream baseflow loss occurs at McIntyre Creek, where a Future Conditions decline in baseflow of 8 L/s results in a baseflow loss of 8% relative to Existing Conditions. It is further noted that Little Marl Creek experiences a 1 L/s (6%) loss in discharge. Whereas the estimated loss at Little Marl Creek is minor and still under 10%, it is re-emphasized that this feature is not considered groundwater dependent anyway (Section 2).

Table 4: Simulated Groundwater Flow Budgets

	Existing Conditions (L/s)			Future Conditions (L/s)			
Component	In	Out	Net	In	Out	Net	Difference (L/s)
Wells	0	86	-86	0	144	-144	58
Recharge	1,122	0	1,122	1,122	0	1,122	0
Nottawasaga R.	0	543	-543	0	522	-522	-21
Little Marl C.	15	18	-3	15	17	-2	-1
McIntyre C.	3	112	-109	4	104	-100	-8
Georgian Bay	0	342	-342	0	338	-338	-4
West Flank	67	23	43	75	21	54	-11
East Flank	121	204	-83	129	200	-70	-12
TOTAL	1,328	1,328	0	1,345	1,345	0	-

5.4 Permit To Take Water Considerations

All water takings in Ontario exceeding 50,000 L/day are required to obtain a Permit To Take Water (PTTW) from the MECP. The project's future construction activities and proposed water supply will require PTTWs prior to operation. This groundwater modelling report, in addition to meeting the requirements of the Class EA, may be used to support the PTTW review and approval process. The model itself may also continue to be used as a groundwater management tool by the Township of Clearview. In addition, and in consultation with the MECP during the PTTW process, a monitoring program will be instituted to ensure that private water supplies are not adversely impacted by the water taking.

With respect to construction dewatering, the design of a reservoir for the Site should consider the groundwater table at approximately five metres below grade at OW4. As such, temporary dewatering may be required during the initial placement of the reservoir. Such short-term actions within the shallow aquifer are not expected to adversely affect nearby wells, surface water resources, or have settlement issues given the distance of the reservoir from the property boundaries and off-Site environmental features. Nonetheless, a localized Site assessment examining any potential dewatering effects is recommended to support future PTTW or Environmental Activity and Sector Registry (EASR) applications prior to construction.

5.5 Capture Zones

Municipal well capture zones are simulated for both Existing (Figure 15) and Future Conditions (Figure 16). The model is used to assess the 2-year, 5-year and 25-year time of travel capture zones. The capture zones reflect 2D projections to ground surface and do not necessarily account for vertical travel time. The actual travel time for source water entering the groundwater table to reach the wells may be longer than illustrated as Aquifer A3 is a deep unit residing beneath lower permeability aquitards.

5.5.1 Existing Conditions

Capture zones at the existing Wasaga Beach wells are re-assessed given the current model parameter refinements (Figure 15). The resulting Jeanetta Street and Powerline Road well's 25-year capture zones display a similar shape to, and generally lie within, the original (2004) WHPA-Ds, although their total areas are relatively reduced because these base results do not include an "uncertainty envelope". There are a few areas where the 25-year pathlines extend slightly beyond the 2004 WHPA-D perimeter; we attribute this occurrence primarily to the updated recharge inputs and, in the case of the Powerline Road wells, the updated river conductance term.

5.5.2 Future Conditions

Both the Wasaga Beach and Site wells are assessed under Future Conditions (Figure 16). The Jeanetta Street and Powerline Road well's capture zones remain the same as under Existing Conditions and are thus demonstrated to be unaffected by the Klondike Park Rd pumping. The new Klondike Park Rd wellfield capture zones trend to the southeast, reaching a width of 1.5 km and an upgradient length of 2.1 km.

As previously noted, the Site capture zones are assessed under the Future Conditions pumping rates that consider an ADD of 20 L/s per well. The ADD is considered the most realistic portrayal of long-term water use and would avoid unnecessarily large vulnerable area delineations which may occur if the MDD was used. Rather, conservatism in WHPA delineation is introduced through uncertainty analysis (see below).

5.5.3 Uncertainty Analysis and Final WHPAs

To account for uncertainty in model parameters, an "uncertainty envelope" is developed to expand the Klondike Park Rd wellfield capture zones areas and thus add conservatism relative to water quality protection. For consistency, we have adopted the approach utilized in the original Wasaga Beach capture zone modelling by adjusting the base case model as shown below.

Table 5: Uncertainty Analysis Model Parameter Adjustments

Case	Hydraulic Conductivity	Recharge Rate	Porosity
Scenario 1 (Base Case)	Calibrated Value Per Table 1	Calibrated Value Per Table 1	Per Table 1
Scenario 2	Calibrated Value x 1.5	Calibrated Value x 1.5	Aquifer – 0.25 Aquitard – 0.2 Bedrock – 0.1
Scenario 3	Calibrated Value x 0.5	Calibrated Value x 0.5	Aquifer – 0.25 Aquitard – 0.2 Bedrock – 0.1

The resulting "uncertainty envelope" for the combined three Scenarios is shown on Figure 17. The WHPA-A shown in Figure 17 is a 100 m radius around each well and resides entirely within the Site property boundary. The WHPA-B, C and D shown in Figure 17 refer to the 2-year, 5-year and 25-year time of travel with the uncertainty expansion included. In their totality, the Klondike Park Rd wellfield WHPAs reach a width of 2.3 km and upgradient length of 2.8 km.

The final result shown on Figure 17 illustrates the proposed new Klondike Park Rd Wellfield WHPA-A, B, C and D that are to be used for source water protection planning and mapping.

6.0 SOURCE WATER PROTECTION

6.1 Aquifer Vulnerability Index

The vulnerability of municipal supply Aquifer A3 was calculated using the Aquifer Vulnerability Index (AVI) method per the previous Wasaga Beach Threat Assessment approach under the Technical Rules (Golder, 2010). As most wells within the model domain do not reach the depth of Aquifer A3, the model layers themselves were used to calculate the AVI scoring.

The AVI method involves assignment of a numerical score for each model grid cell as determined by multiplying "hydraulic conductivity factor" by the thickness of the model layer and summing the product for all layers above Aquifer A3.

The AVI method provides three categories of vulnerability in accordance with the mapped score: Low (AVI > 80), Medium (AVI between 30 and 80), and High (AVI <30).

The resulting AVI map in the Site area is shown on Figure 18. The Aquifer A3 AVI score within the Klondike Park Rd WHPAs ranges from approximately 110 to 280 and is thus classified as having a "Low" intrinsic vulnerability. This result is consistent with the aquifer vulnerability classification for the Wasaga Beach municipal wells which are constructed within the same deep and confined Aquifer A3 (Golder, 2010).

6.2 Vulnerability Score

The Vulnerability Score of the WHPA is determined by the intrinsic vulnerability classification (in this case "Low") and the WHPA zone (Table 6). A Vulnerability Score of 10 represents a high Vulnerability versus a score of 2 represents a Low vulnerability within the WHPA; the Vulnerability Score decreases with distance away from the well and with decreasing aquifer vulnerability.

Table 6: WHPA Vulnerability Score

Intrinsic Vulnerability	WHPA-A (100 m Radius)	WHPA-B (2 Year ToT)	WHPA-C (5 Year ToT)	WHPA-D (25 Year ToT)
High	10	10	8	6
Medium	10	8	6	4
Low	10	6	4	2

Given that the intrinsic vulnerability of the aquifer is Low, the resulting Vulnerability Scores for the Klondike Park Rd wellhead are 10, 6, 4 and 2 for WHPA-A, B, C and D, respectively (Figure 19).

A score of 10 is assigned to WHPA-A regardless of the intrinsic vulnerability classification as this area is near the wellhead. However, it is important to note that the Klondike Park Rd wellfield WHPA-A lies entirely within the Site property boundary. This means that Township of Clearview would have control over land use activities within the most vulnerable WHPA and could manage the property to avoid any Significant Threats within this zone.

6.2.1 Vulnerability Score Modifiers

Constructed Transport Pathways

The Technical Rules allow for increasing the Vulnerability Score based on transport pathways that are anthropogenic in origin, including:

- Private water wells, unused water wells and abandoned water wells;
- Construction of underground services;
- Subsurface excavations; and
- Pit and quarries.

Due to the depth of Aquifer A3, it is unlikely that underground services or subsurface excavations would reach the aquifer. Further, there are no pits or quarries in the area. Thus, the only transport pathway of potential concern would involve private wells.

For this analysis, we examined private wells within the WHPAs and find that, out of a total of 29 wells, only two wells (the Peace Natural wells) extend into Aquifer A3. MECP WWIS records indicates that one well was finished with a steel casing that extends between 0.6 m above grade. Although the second well does not indicate casing height above grade, given that the two wells were constructed on the same day by the same driller, it is assumed to be similar in construction. As such, these wells are not considered a high risk to increasing vulnerability to Aquifer A3 and the previously described Vulnerability Scores are maintained without modification.

Water Quality

The available water quality information (Golder, 2018) is consulted as another verification tool to assess the aquifer vulnerability assessment. The absence or low concentrations of adverse water quality indicators including nitrate (non-detect) and chloride (~10 mg/L) are compatibility with the intrinsic vulnerability classification of “Low”. As such, the previously described Vulnerability Scores are maintained without modification.

6.2.2 Vulnerability Uncertainty

The Technical Rules require an analysis of the uncertainty, characterized as high or low, be made for the completed Vulnerability and WHPA assessments. Within the Technical Rules a specific uncertainty analysis is not outlined but indicates that the following factors are to be considered in the analysis:

- The distribution, variability, quality and relevance of data used in the assessment;
- The ability of the methods and models used to accurately reflect the flow processes in the hydrogeological system;
- The quality assurance and quality control procedures applied; and,
- The extent and level of calibration and validation achieved for models used or calculations or general assessments completed.

In addition, previous guidance documents (MOE, 2006) list some of the factors where it would be reasonable to expect that a **low** uncertainty would be applied:

- In areas where the density of the data is high, and there is a high level of confidence in the quality of the data;
- In areas where hydrogeological studies have been completed to confirm the regional scale mapping that has been completed; and,
- Where a numerical model has been sufficiently calibrated to observed data that includes aquifer testing at the well location, and water level data across the capture zone footprint, and there is a high level of confidence in the representation of the flow system (and flow system boundaries) through local hydrogeological studies, or subsequent verification simulations.

The Vulnerability assessment for the Klondike Park Rd wellfield is based on the AVI method using the numerical model layers for the calculation. The WHPA delineation was also based on the numerical flow model and therefore the uncertainty associated with both items are similar as they are both linked with the ability of the numerical flow model to satisfactorily represent actual conditions.

The model updates in the Site area are based on high-quality drill logs and aquifer testing. The subsequent model calibration (Section 4) demonstrates that the model can achieve a reasonable representation of hydrogeologic conditions, particularly in the area of the Site. Considering these factors, the level of uncertainty is considered low in the area of the Site and increases to the outer reaches of the WHPA-D area. However, as described previously, the final WHPA-D incorporates a conservative “uncertainty envelope” which, in effect, reduces overall uncertainty in the capture zone results. As such, the overall vulnerability and WHPA uncertainty is characterized as Low.

6.3 Drinking Water Issues Evaluation

A Drinking Water Issue is defined in the Technical Rules as:

- The presence of a parameter or pathogen in water at a well or monitoring well if the parameter is listed in Schedule 1, 2 or 3 of the Ontario Drinking Water Standards (ODWS) or Table 4 of the Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines and,
  - The parameter is present at a concentration that may result in the deterioration of the quality of water for use as a source of drinking water; or
  - There is a trend of increasing concentrations of the parameter or pathogen and a continuation of that trend would result in the deterioration of the quality of the water for use as a source of drinking water.

The MECP has indicated that naturally occurring parameters that exceed the ODWS (e.g., iron and manganese) should be noted in assessment reports but not be listed as Drinking Water Issues unless there is concern that human activities would adversely affect the concentration.

The Site water quality testing indicates that the Aquifer A3 test well TW3 meets the ODWS for all parameters tested except for turbidity and the aesthetic parameters iron and hardness (Golder, 2018). Nitrate concentrations are below detection limits, while chloride is low (~10 mg/l) and sodium is less than 10 mg/L. The well water was free from volatile organic compounds and pesticides. As such, based on the current dataset, no drinking water issues are identified.

6.4 Drinking Water Threats Assessment

A Drinking Water Threat is an Activity or Condition that adversely affects or has the potential to adversely affect the quality of drinking water and includes an Activity or Condition that is prescribed in the Technical Rules. An Activity is a current land use whereas a Condition is the result of past Activities at a location in which contamination of the subsurface has occurred.

The MECP defines the following as prescribed Threats:

1) The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act;
2) The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage;
3) The application of agricultural source material (ASM) to land;
4) The storage of ASM;
5) The management of ASM;
6) The application of non-agricultural source material (NASM) to land;
7) The handling and storage of NASM;
8) The application of commercial fertilizer to land;
9) The handling and storage of commercial fertilizer;
10) The application of pesticide to land;
11) The handling and storage of pesticide;
12) The application of road salt;
13) The handling and storage of road salt;
14) The storage of snow;
15) The handling and storage of fuel;
16) The handling and storage of a dense non-aqueous phase liquid;
17) The handling and storage of an organic solvent;
18) The management of runoff that contains chemicals used in the de-icing of aircraft;
19) An Activity that takes water from an aquifer or surface water body without returning the water taken to the same aquifer or surface water body;
20) An Activity that reduces the recharge of an aquifer; and,
21) The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard.

Prescribed Threats 19 and 20 are considered water quantity Threats and are not within the scope of this report.

The MECP has prepared Tables of Drinking Water Threats which detail specific 'Circumstances' for each prescribed Activity to determine if the Threat would be characterized as Significant, Moderate or Low (https://www.ontario.ca/page/tables-drinking-water-threats).

Figures 20, 21, 22 and 23 identify the areas where Chemical, Pathogen, DNAPL and Conditions, respectively, would be Significant, Moderate or Low Drinking Water Threats within the WHPAs. Links are noted within these Figures, which reference MOE Tables of Circumstances for a specific combination of Vulnerability Score and Threat Ranking. It is noted that the only area where Significant Threats could be realized are within WHPA-A, other than DNAPLs, which extend into WHPA-C. It is also noted that the WHPAs lie external to any landfill.

6.4.1 Impervious Area Mapping

The Technical Rules require calculation and mapping of the percentage of impervious land where road salt can be applied. This impervious surface area mapping is used in the risk scoring and assessment of Threat Circumstances relating to road salt application. For this assessment, total impervious land is defined as the surface area of all highways and other impervious land surfaces used for vehicular traffic and parking and all pedestrian paths.

Impervious features and their associated areas within the WHPAs were manually quantified using GIS measurement tool and using Bing satellite imagery. It is found that the percent impervious land within WHPA-A is zero, and between 1% and 3% for WHPA-B, C and D. Consistent with the Wasaga Beach Threats Assessment (Golder, 2010), impervious land is mapped per the following classes: less than 1%; 1% to 8%; 8% to 80%; and greater than 80% groupings (Figure 24).

6.4.2 Managed Land Mapping

Managed land is land to which nutrients (ASM, commercial fertilizer, NASM) are applied. Managed land is broken into two subsets; agricultural managed lands and non-agricultural managed lands. Agricultural managed lands include areas of crop land, fallow and pasture land that may receive nutrients. Non-agricultural managed lands includes golf courses, sports fields and residential lawns and other built up grassed areas that may receive nutrients (primarily commercial fertilizers).

According to the Technical Rules, managed lands are to be identified within each WHPA zone where the Vulnerability Score for that area is high enough for Activities to be considered a Significant, Moderate or Low Drinking Water Threat. Based on the MOE Table of Threats, any area with a Vulnerability Score of 6 or higher can have Threats identified. WHPAs with managed lands of less than 40% of the total land area are considered as areas with low potential contamination risk, 40 to 80% as moderate potential contamination risk and over 80% as high potential contamination risk related to nutrient application.

For the purposes of this Class EA, the methodology used to calculate percent managed land included a review of the South Simcoe Groundwater Study contaminant source inventory land classification (Golder, 2004), aerial imagery, and a windshield survey completed in 2020. It is found that the total percent managed land within WHPA-B,C and D is between 70% and 80%. The WHPA-A, which lies within the property line, may be "managed" in the future; however, Township of Clearview will be able to limit or prohibit nutrient application within the Site. Consistent with the Wasaga Beach Threats Assessment (Golder, 2010), the percent managed land are mapped per the following classes: less than 40%; 40 to 80%; and greater than 80% (Figure 25).

6.4.3 Livestock Density Mapping

For the purposes of determining the Circumstances related to the application of nutrients, the livestock density (NU/acre) is calculated using the areas of agricultural managed lands within each WHPA with a Vulnerability

Score of 6 or greater. The total nutrient units (NU) of all livestock generated nutrients in the WHPA is divided by the acreage of the agricultural managed land. If the livestock density is less than 0.5 NU/acre, the area is considered to have low potential for nutrient application exceeding crop requirements, if livestock density is over 0.5 and less than 1.0 NU/acre, the area is considered to have Moderate potential for nutrient unit application exceeding requirements and if livestock density is over 1.0 NU/acre, the area is considered to have a high potential for nutrient application exceeding requirements.

For the purposes of this Class EA, the methodology used to calculate livestock density included identifying agricultural properties within a WHPA based on MPAC property codes; reviewing satellite imagery for suspected livestock barns; and conducting a windshield survey completed in October 2020. Based on this search no livestock operations are found within WHPAs with a Vulnerability Score of 6 or greater (i.e. WHPA-A and WHPA-B). It follows that the mapped livestock density is less than 0.5 NU/acre (Figure 26).

6.5 Identification of Significant Threats

Currently, land use within the WHPAs is almost entirely agricultural fields or forest, with the exception of residential properties and a few small commercial businesses along Highway 26 and the Peace Natural facility along Sunnidale Road. Notably, the WHPAs do not underlie the landfill's along Sideroad 12/13. With reference to the MECP Tables of Drinking Water Threats, we find that there are no Significant drinking water threats are found within the Klondike Park Rd WHPAs based on:

- South Simcoe Groundwater Study Contaminant Source Inventory (Golder, 2004);
- Examination of satellite imagery;
- Windshield survey (October 20, 2020), which notably did not identify any obvious locations for DNAPL handling or storage; and
- The Circumstances mapping described previously in this section.

Thus, in the context of the Class EA impact assessment, we conclude that no landowners or other entities will be affected by Klondike Park Rd wellfield vulnerable area land use restrictions or policies that would relate to the elimination or mitigation of Significant drinking water threats.

6.6 SGBLS Internal Process Documentation

The South Georgian Bay Lake Simcoe Region (SGBLS) has published a guide entitled Assessment Report and Plan Amendments Under S.34 of the Clean Water Act – Internal Process for Implementing Regulatory Requirements in the SGBLS Region (July, 2019). The purpose of the guide is to provide Source Protection Authorities a framework for implementing the regulatory requirements under the Safe Drinking Water Act, 2002, O. Reg. 205/18 and the Clean Water Act, 2006, s.48(1.1) (b), O. Reg. 287/07 in order to incorporate source protection planning into the municipal drinking water supply process. The guide further provides a mechanism to demonstrate how a project addresses Municipal Class Environmental Assessment Amendment A.2.10.6 The Clean Water Act, which links the EA process to Source Protection Plans. To this end, we have provided a response to the SGBLS documentation (Appendix B). In summary, and as noted in the Appendix B "checklists", it is our opinion that this project has either met or exceeded all requirements of the SGBLS that could be reasonably expected at this point in the Class EA process.

7.0 CONCLUSIONS

A groundwater modelling assessment of proposed Stayner water supply wells at 1585 Klondike Park Road is conducted using an updated version of the 2004 Wasaga Beach MODFLOW model. An Existing Conditions model scenario is refined and further calibrated in accordance with recent drilling, aquifer testing and MECP well record data. Subsequently, a Future Conditions model simulates three new Site wells withdrawing a combined 60 L/s from confined Aquifer A3. Drawdown, well interference, baseflow changes, and Wellhead Protection Areas (WHPAs) are assessed. The following conclusions are made regarding the Future Conditions:

- The greatest amount of drawdown is estimated within Aquifer A3, reaching a maximum of 3 m underneath the Site under Future Conditions. The approximately radial zone of influence, as defined by the 1 m drawdown contour, extends 1.1 km from the Site wells.
- There are 24 private wells within the simulated zone of influence. Drawdown at 20 of the 24 wells is less than 10% of the available water column and is thus unlikely to cause an adverse effect to well operation at these wells. A water level monitoring program for the remaining wells should be established and, in the event that drawdown from municipal water taking affects the operation of these private wells, remedial options such as connecting the homes to the municipal water supply, lowering pumping equipment, or drilling new and deeper wells could be considered.
- The Site withdrawal of 60 L/s pumped from A3 is ultimately drawn from a broad range of sources including the Nottawasaga River and its tributaries, Georgian Bay, and the regional flow external to the model domain. Volumetrically, the greatest flow loss per model component is simulated to occur at the Nottawasaga River (21 L/s) and its tributaries Little Marl Creek (1 L/s) and McIntyre Creek (8 L/s) for a total of 30 L/s loss within the river catchment. However, the average baseflow at the Nottawasaga River is greater than 17,000 L/s; as such, the percent loss (0.2%) at the river is considered negligible. The greatest relative stream baseflow loss occurs at McIntyre Creek, where a Future Conditions decline in baseflow of 8 L/s results in a baseflow loss of 8% relative to Existing Conditions. It is further noted that Little Marl Creek experiences a 1 L/s (6%) loss in discharge. Whereas the estimated loss at Little Marl Creek is minor and still under 10%, it is re-emphasized that this feature is not considered groundwater dependent anyway.
- The Klondike Park Rd wellfield pumping has no affect on Wasaga Beach municipal well water level or capture zones.
- The Klondike Park Rd wellfield WHPAs are shown on Figure 17. In their totality, the Klondike Park Rd wellfield WHPAs reaches a width of 2.3 km and southeast upgradient length of 2.8 km.
- The Klondike Park Rd wellfield Aquifer Vulnerability Index (AVI) mapping indicates a Low vulnerability classification with Low uncertainty in the area of the Site.
- The level of uncertainty related to WHPA delineation and vulnerability scoring is considered Low.
- The Klondike Park Rd wellfield has no Drinking Water Issues identified.
- Impervious areas, managed land and livestock density mapping have been completed.
- The Klondike Park Rd wellfield vulnerable areas (i.e. WHPAs) have no Significant Drinking Water Threats identified.

8.0 LIMITATIONS

8.1 Use of This Report

This report has been prepared by Golder Associates Ltd. (Golder) for use by Township of Clearview and its agents. The factual information, descriptions, interpretations, comments, results, conclusions and electronic files contained herein are specific to the project described in this report. Information used in this report should be restricted to that specified in the scope of work unless otherwise mutually agreed upon by the Township of Clearview and Golder. This report should be read in its entirety as some sections could be falsely interpreted when taken individually or out-of-context. Golder is not responsible for any use of this report and its content by a third party, and/or for its use for purposes other than those intended.

Golder is not responsible for any damages that may result from unpredictable or unknown underground conditions, from erroneous information provided by and/or obtained from sources other than Golder, and from ulterior changes in the site conditions unless Golder has been notified of any occurrence, activity, information or discovery, past or future, susceptible of modifying the underground conditions described herein, and have had the opportunity of revising its interpretations. In addition, Golder is not responsible for any decrease of a property's value or any failure to complete a transaction as a consequence of this report.

8.2 Groundwater Modelling General Limitations

Hydrogeological investigations and groundwater modelling are dynamic and inexact sciences. They are dynamic in the sense that the state of any hydrological system is changing with time and the science is continually developing new techniques to evaluate these systems. They are inexact in the sense that field data provides a fraction of information for the site or model domain; as such a truly complete, comprehensive characterization of the groundwater system is not possible. Therefore, every groundwater model is, by necessity, a simplification of a reality.

The professional groundwater modelling services described in this report are conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions. The results of previous or simultaneous work provided by sources other than Golder and quoted and/or used herein are considered as having been obtained according to recognized and accepted professional rules and practices, and therefore deemed valid.

The model presented herein provides a predictive scientific tool to evaluate the impacts of specified hydrological stressors on a real groundwater system and to compare various scenarios in support of a decision-making process. The model's accuracy is bound to the normal uncertainty associated to groundwater modelling and no warranty, express or implied, is made.

9.0 CLOSURE

We trust this report meets your current requirements. Should you have any questions please do not hesitate to contact the undersigned.

Signature Page

Golder Associates Ltd.

Devin Hannan, P.Eng.
Associate, Environmental Engineer

John Piersol, M.Sc., P.Geo.
Associate, Hydrogeologist

DH/JP/cdr

\\golder.gds\gal\barrie\active\2014\141-5404 township of clearview hydrog stayner\report\gw modelling\1415404 rep 2020'10'30 stayner groundwater modelling report october 2020_final(rev1).docx

10.0 REFERENCES

Armstrong, D.K. and Dodge, J.E.P., 2007. *Paleozoic geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 219.*

Burnside, 2008. *Township of Clearview, Long Term Water Supply for Clearview, Schedule B Municipal Class EA.* MG 03 4662. February 13, 2008.

Chapman, L.J. and Putnam D.F., 1984. *Physiography of Southern Ontario; Ontario Geological Survey, Map P.2715*.

Golder, 2019. *Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Groundwater Modelling Addendum (Draft).* 1415404. July 2019.

Golder, 2018. *Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Water Supply Exploration Addendum*. 1415404. December 2018.

Golder, 2010. *Town of Wasaga Beach, Source Water Protection Threat Assessment*. 07-1170-0014 (4000). July 2010.

Golder, 2004. *South Simcoe Groundwater Study, Main Report.* 04-1112-551. August 2004.

Golder and WHI, 2004. *South Simcoe Groundwater Study, Appendix M, WHPA – Wasaga Beach*. 04-1112-551. August 2004.

Harbaugh et al., 2000. *MODFLOW-2000, The U.S. Geological Survey Modular Ground-Water Model - User Guide to Modularization Concepts and the Ground-Water Flow Process*. Open-File Report 2000-92.

Ministry of Environment, Conservation and Parks [MECP] (2019[1]). Water Well Information System Open Data Catalogue. Ontario, Canada

Ministry of Environment, Conservation and Parks [MECP] (2019[2]). Permits to Take Water Open Data Catalogue. Ontario, Canada.

Ministry of Environment, Conservation and Parks [MECP], 2017. *2017 technical rules under the Clean Water Act.*

Morris, D.A. and A.I. Johnson, 1967. *Summary of hydrologic and physical properties of rock and soil materials as analyzed by the Hydrologic Laboratory of the U.S. Geological Survey.* U.S. Geological Survey Water-Supply Paper 1839-D, 42p.

Mulligan, R.P.M., 2016. *Subsurface Data Collection for Three-Dimensional Sediment Mapping in the Central Part of the County of Simcoe, Southern Ontario.* Project Unit 14-015. Earth Resources and Geoscience Mapping Section, Ontario Geological Survey.

Mulligan, R.P.M., 2017. Update on Subsurface Data Collection for Three-Dimensional Sediment Mapping in the Central Part of the County of Simcoe, Southern Ontario, Project Unit 14-015; in Summary of Field Work and Other Activities, 2017, Ontario Geological Survey, Open File Report 6333, p. 25-01 to 25-10.

NVCA, 2015. *Nottawasaga Valley Source Protection Area Approved Assessment Report.* Approved January 26, 2015.

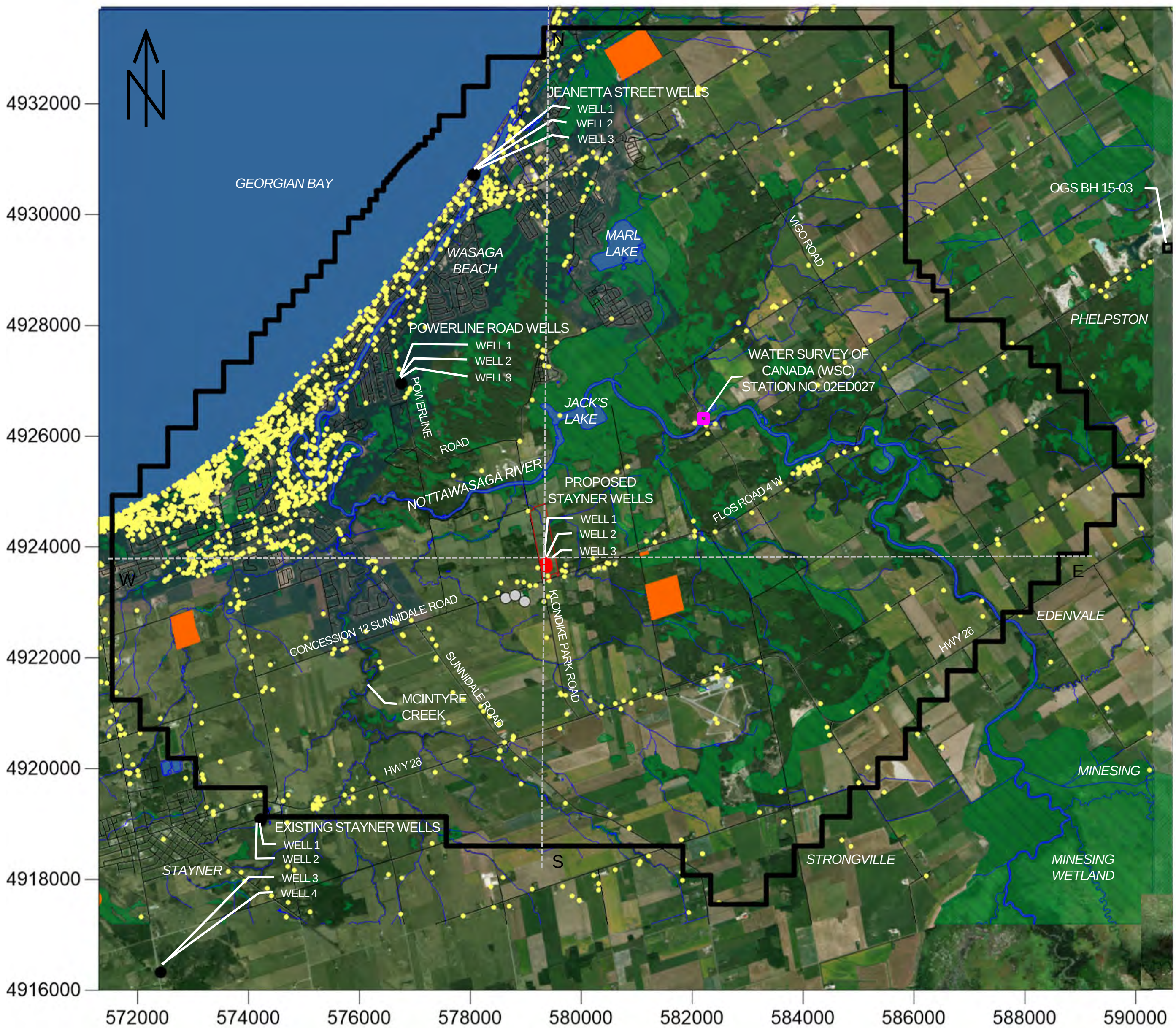
NVCA and DFO, 2009. *Fisheries Habitat Management Plan*, *Nottawasaga Valley Conservation Authority Area of Jurisdiction.* March 2009.

OGS, 2010. Surficial Geology of Southern Ontario. Miscellaneous Release--Data 128-REV ISBN 978-1-4435-2482-7.

Pollock, D.W., 1989. *Documentation of computer programs to compute and display pathlines using results form the U.S. Geological Survey modular three-dimensional finite-difference ground-water flow model.* Open File Report 89-381.

Township of Clearview, 2018. *2017 Annual Summary Report for Drinking Water Systems*. Report to Council. February 12, 2018

Figures



LEGEND

- MODEL BOUNDARY
- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL
- MECP WELL RECORD
- PEACE NATURALS WELL
- WSC STREAM GAUGE
- CROSS SECTION LOCATION

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

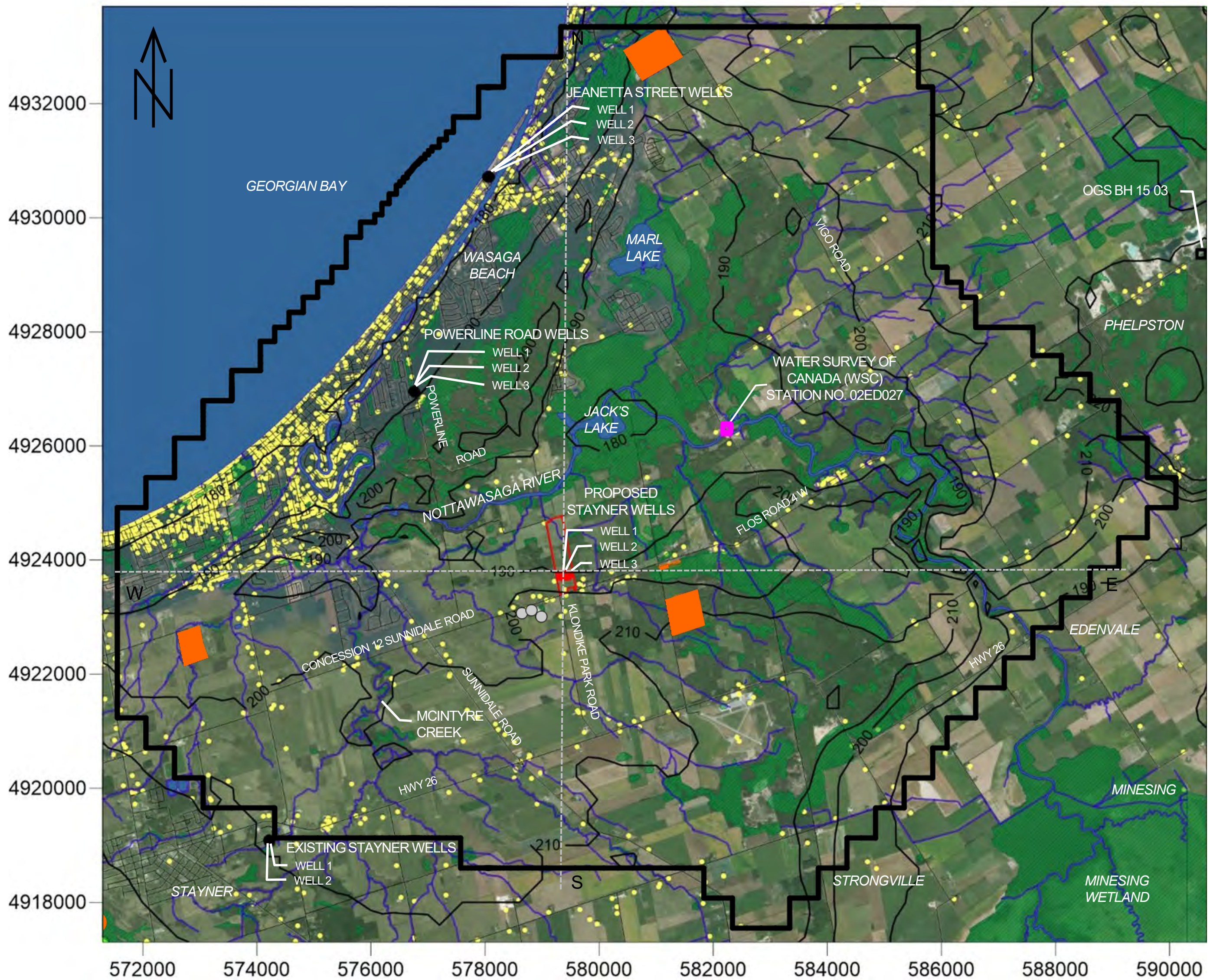
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

STUDY AREA AND MODEL DOMAIN

PROJECT No.	Rev.	FIGURE
1415404	**B**	**1**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

	MODEL BOUNDARY		PROPOSED STAYNER WELL
	RIVERS/ STREAMS		EXISTING MUNICIPAL WELL
	ROADS		MECP WELL RECORD
	SITE BOUNDARY		PEACE NATURALS WELL
	WATER		WSC STREAM GAUGE
	WETLANDS		CROSS SECTION LOCATION
	LANDFILL	-200-	ELEVATION

NOTE
1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
STAYNER WATER SUPPLY MODELLING

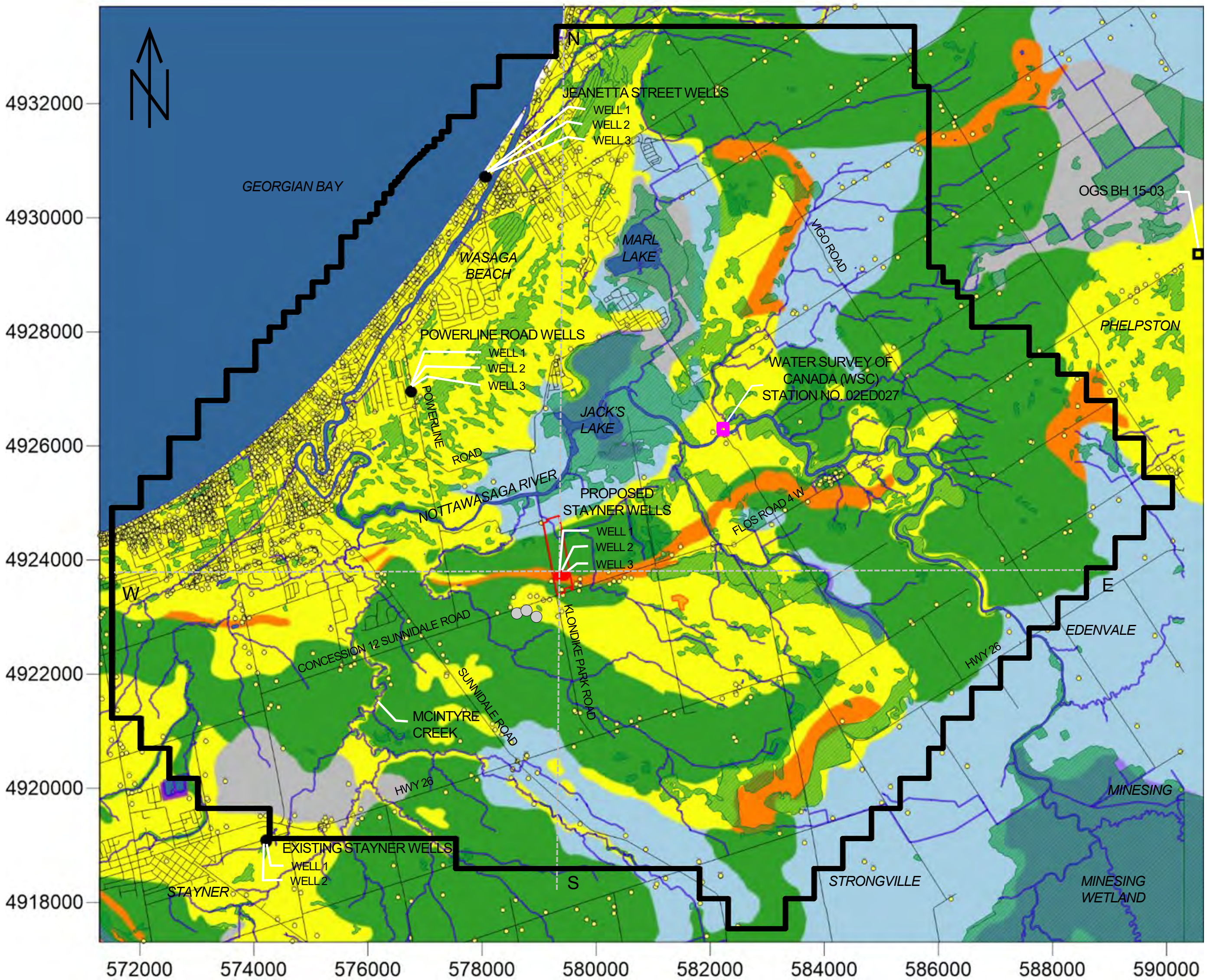
CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE
TOPOGRAPHY AND DRAINAGE

PROJECT No. **1415404** Rev. **B** FIGURE **2**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

SURFICIAL GEOLOGY

- TILL
- GRAVEL
- CLAY
- ORGANIC DEPOSITS
- SAND
- SILT

- MODEL BOUNDARY
- RIVERS AND STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- MECP WELL RECORD
- CROSS SECTION LOCATION
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. SOURCE OF SURFICIAL GEOLOGY: ONTARIO GEOLOGICAL SURVEY 2010. SURFICIAL GEOLOGY OF SOUTHERN ONTARIO; ONTARIO GEOLOGICAL SURVEY, MISCELLANEOUS RELEASE--DATA 128-REV ISBN 978-1-4435-2482-7 [ZIP FILE]
4. COORDINATES IN UTM NAD83, ZONE 17.

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
STAYNER WATER SUPPLY MODELLING

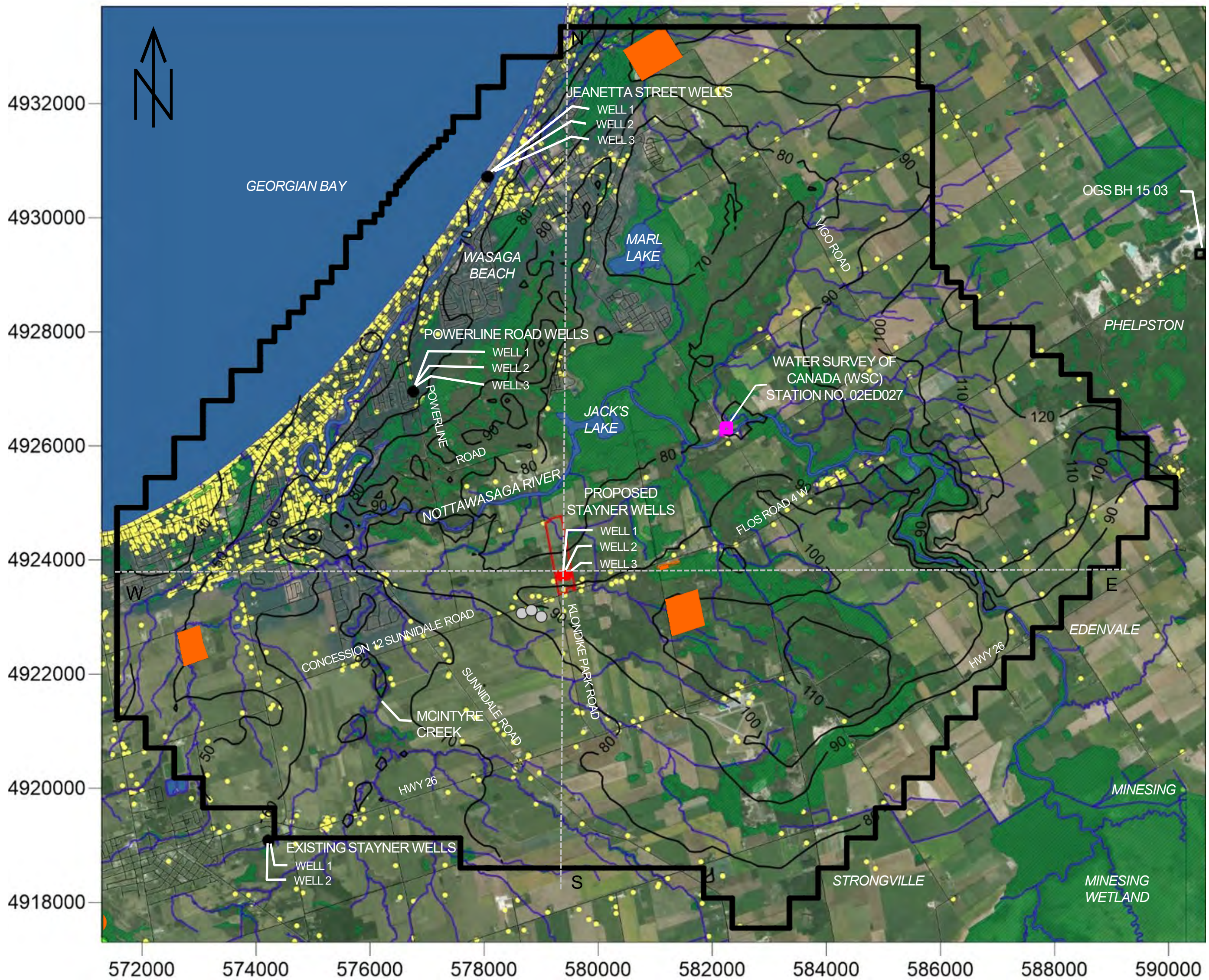
CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE
SURFICIAL GEOLOGY

PROJECT No.	Rev.	FIGURE
1415404	**B**	**3**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

- MODEL BOUNDARY
- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL
- MECP WELL RECORD
- PEACE NATURALS WELL
- WSC STREAM GAUGE
- CROSS SECTION LOCATION
- 20 - OVERBURDEN THICKNESS (M)

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

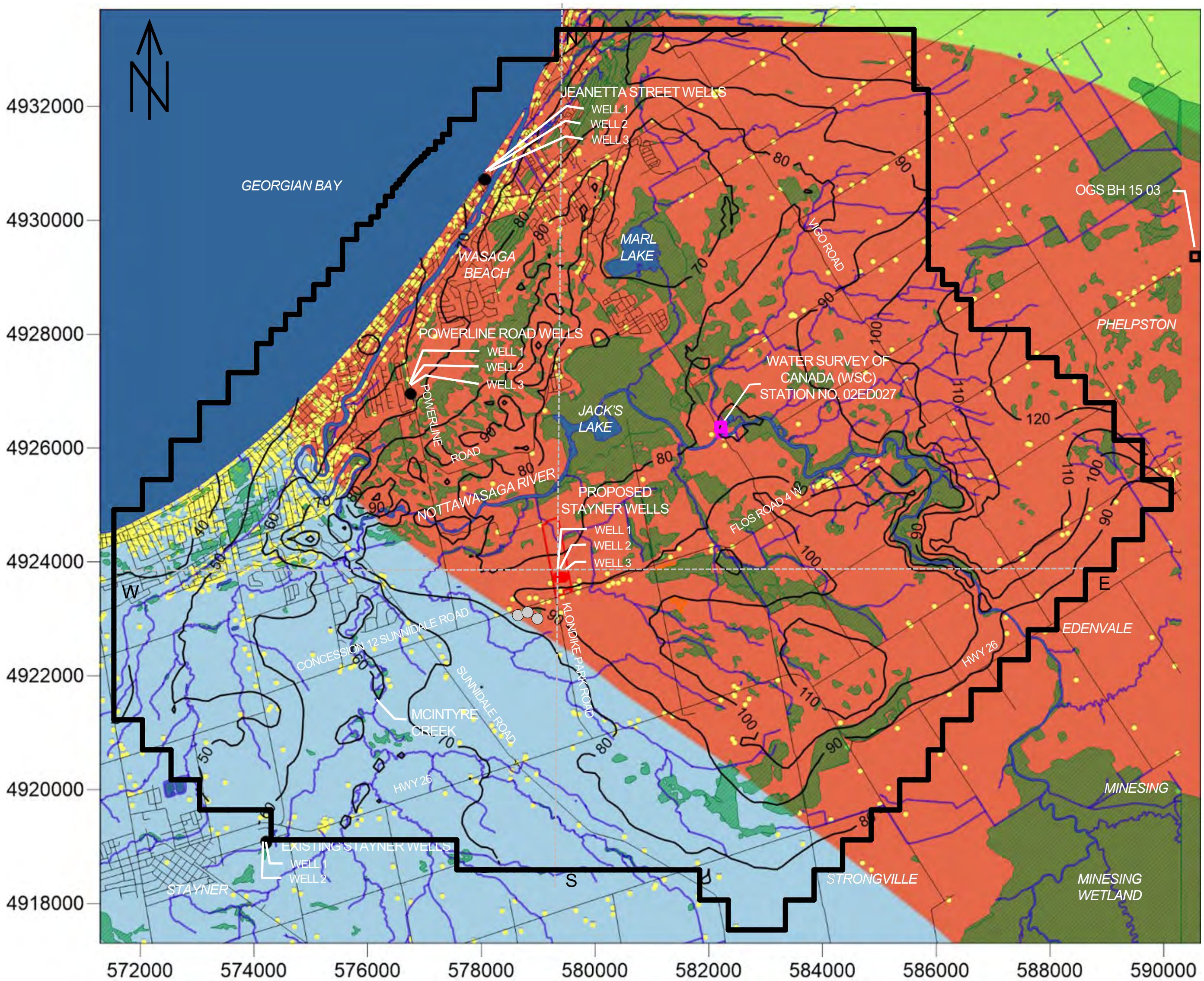
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

OVERBURDEN THICKNESS

PROJECT No. **1415404** Rev. **B** FIGURE **4**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

BEDROCK GEOLOGY
- LINDSAY FM
- VERULAM FM
- BOBCAYGEON FM

- MODEL BOUNDARY
- RIVERS AND STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- MECP WELL RECORD
- CROSS SECTION LOCATION
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. SOURCE OF BEDROCK GEOLOGY: ARMSTRONG, D.K. AND DODGE, J.E.P. 2007. PALEOZOIC GEOLOGY OF SOUTHERN ONTARIO; ONTARIO GEOLOGICAL SURVEY, MISCELLANEOUS RELEASE—DATA 219
4. COORDINATES IN UTM NAD83, ZONE 17.

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
STAYNER WATER SUPPLY MODELLING

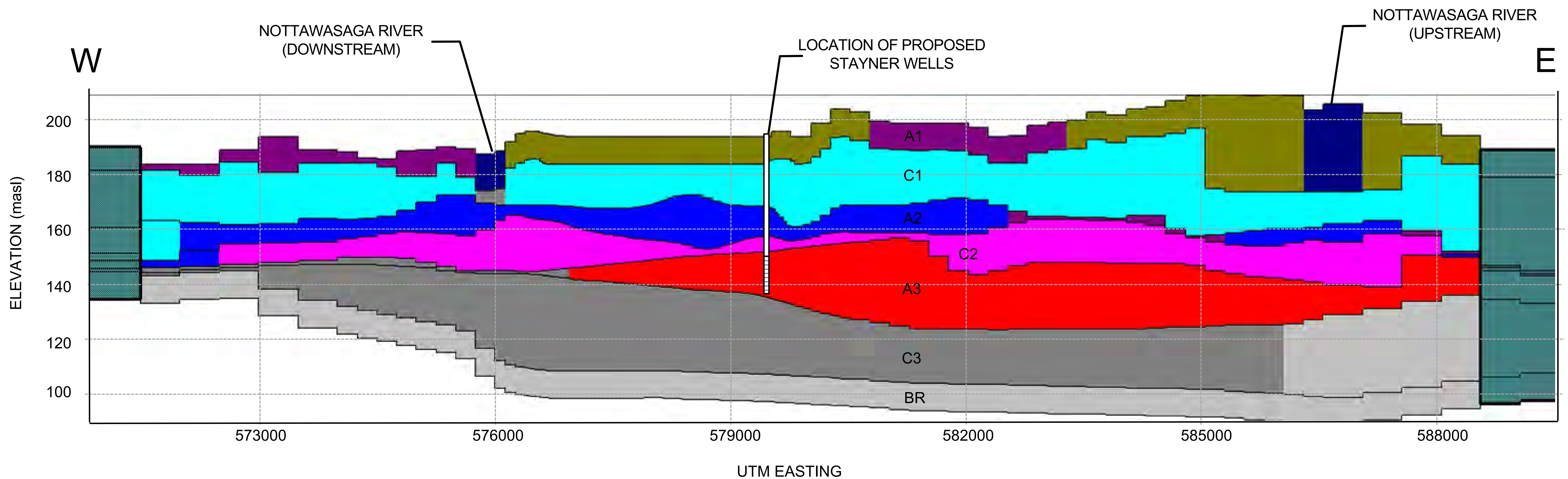
CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE
BEDROCK GEOLOGY AND SURFACE ELEVATION

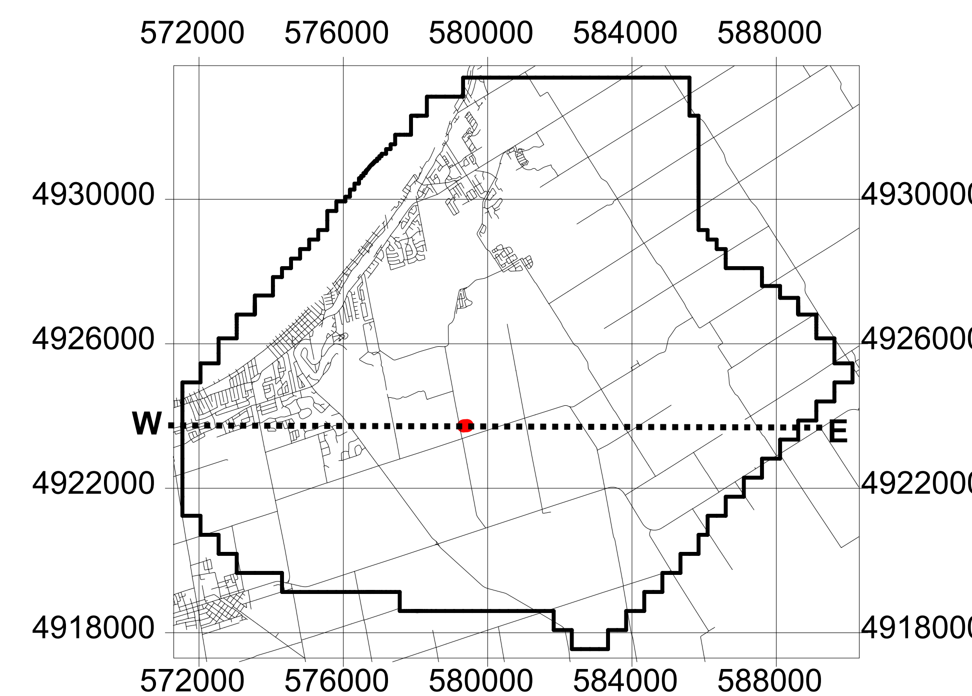
PROJECT No. **1415404** Rev. **B** FIGURE **5**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

- SURFICIAL TILL (K= 1E-6 M/S)
- A1 SAND AQUIFER (K= 1E-4 M/S)
- SURFICIAL CLAY/ ORGANICS (K= 5E-7 M/S)
- C1 SILT CLAY AQUITARD (K= 1E-7 M/S)
- A2 SAND AQUIFER (K= 5E-4 M/S)
- C2 SILT CLAY TILL AQUITARD (K= 5E-6 M/S)
- A3 SAND AND GRAVEL AQUIFER (K= 1E-3 M/S)
- C3 CLAY TILL (K= 5E-5 M/S)
- BEDROCK (K= 2E-9 M/S)
- INACTIVE FLOW BOUNDARY
- RIVER BOUNDARY
- CONSTANT HEAD BOUNDARY



NOTES

1. VERTICAL EXAGGERATION IS 35X
2. HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY FOR EACH MODEL LAYER = 1:1

CLIENT
TOWNSHIP OF CLEARVIEW

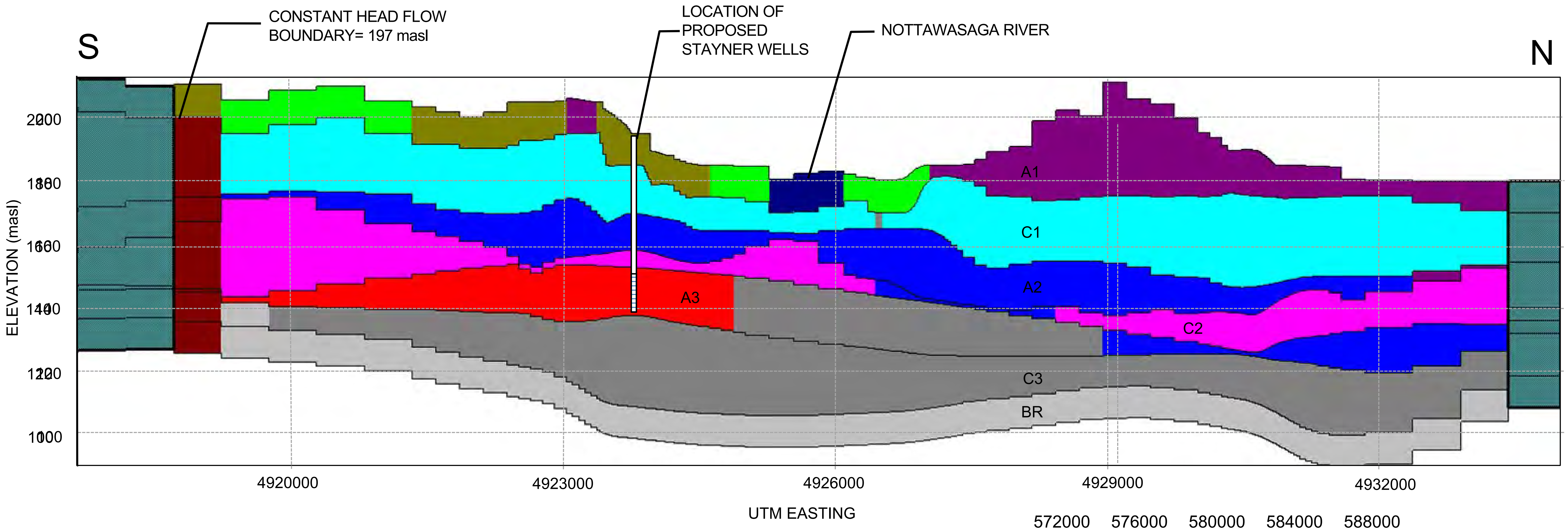
PROJECT
STAYNER WATER SUPPLY MODELLING

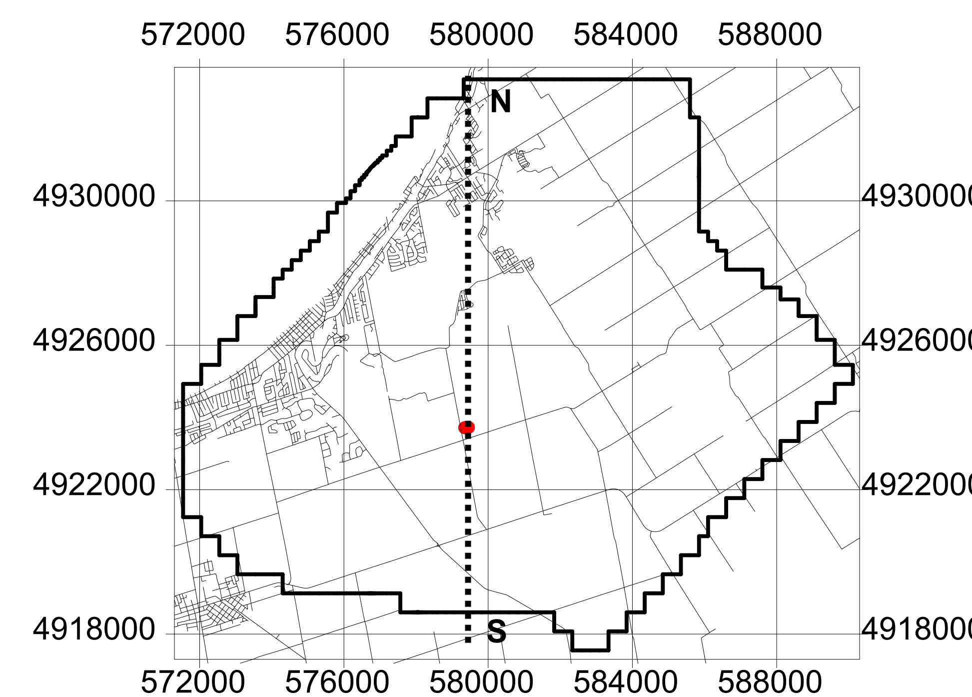
CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE
WEST-EAST MODEL CROSS SECTION

PROJECT No.	Rev.	FIGURE
1415404	B	6A





LEGEND

SURFICIAL TILL (K= 1E-6 M/S)	A3 SAND AND GRAVEL AQUIFER (K= 1E-3 M/S)
A1 SAND AQUIFER (K= 1E-4 M/S)	C3 CLAY TILL (K= 5E-5 M/S)
SURFICIAL CLAY/ ORGANICS (K= 5E-7 M/S)	BEDROCK (K= 2E-9 M/S)
C1 SILT CLAY AQUITARD (K= 1E-7 M/S)	INACTIVE FLOW BOUNDARY
A2 SAND AQUIFER (K= 5E-4 M/S)	RIVER BOUNDARY
C2 SILT CLAY TILL AQUITARD (K= 5E-6 M/S)	CONSTANT HEAD BOUNDARY

NOTES

1. VERTICAL EXAGGERATION IS 35X
2. HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY FOR EACH MODEL LAYER = 1:1

CLIENT
TOWNSHIP OF CLEARVIEW

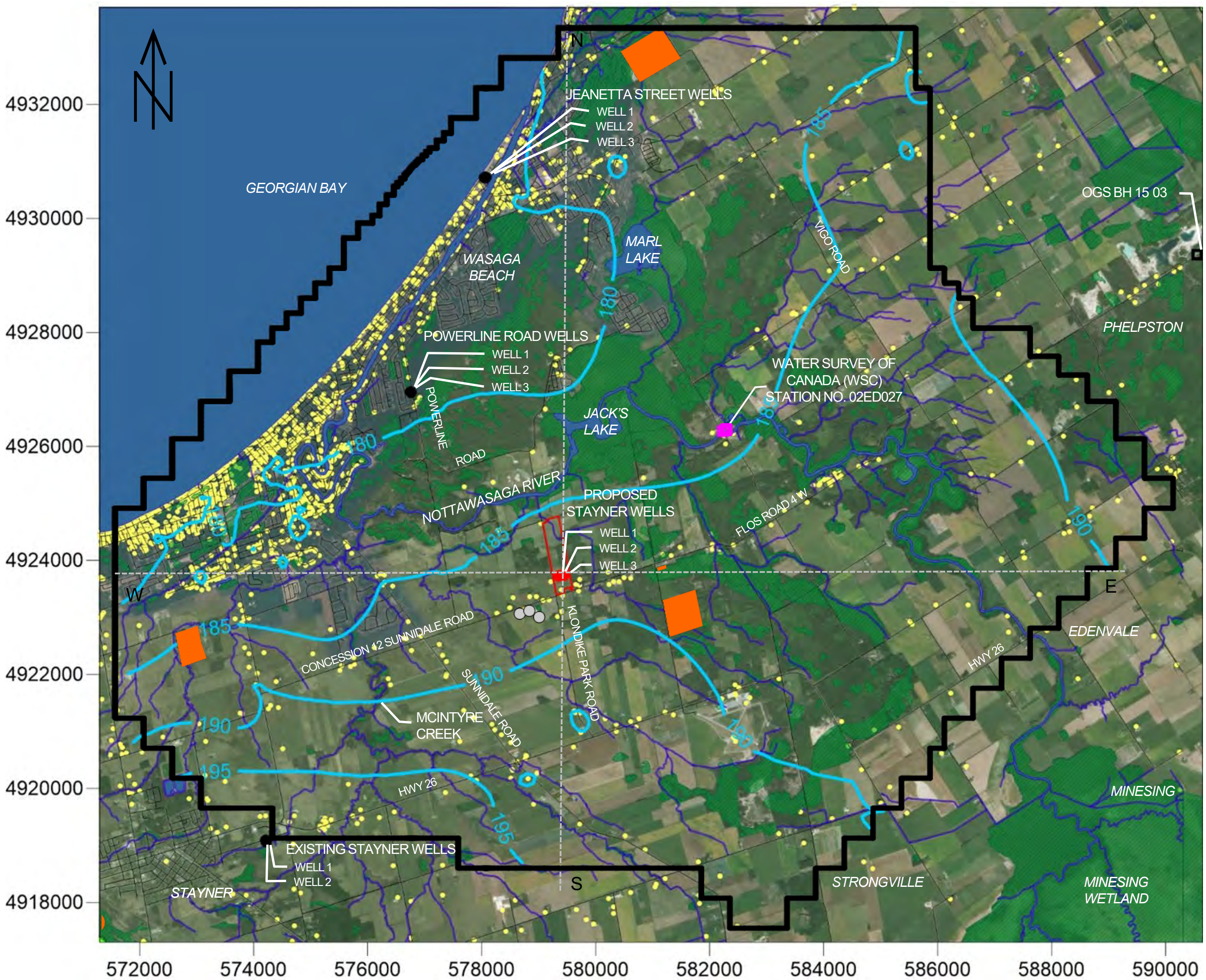
PROJECT
STAYNER WATER SUPPLY MODELLING

CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE
SOUTH-NORTH MODEL CROSS SECTION

PROJECT No. 1415404 Rev. B FIGURE 6B



LEGEND

MODEL BOUNDARY	PROPOSED STAYNER WELL
RIVERS/ STREAMS	EXISTING MUNICIPAL WELL
ROADS	MECP WELL RECORD
SITE BOUNDARY	PEACE NATURALS WELL
WATER	WSC STREAM GAUGE
WETLANDS	CROSS SECTION LOCATION
LANDFILL	200 GROUNDWATER ELEVATION

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17.

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

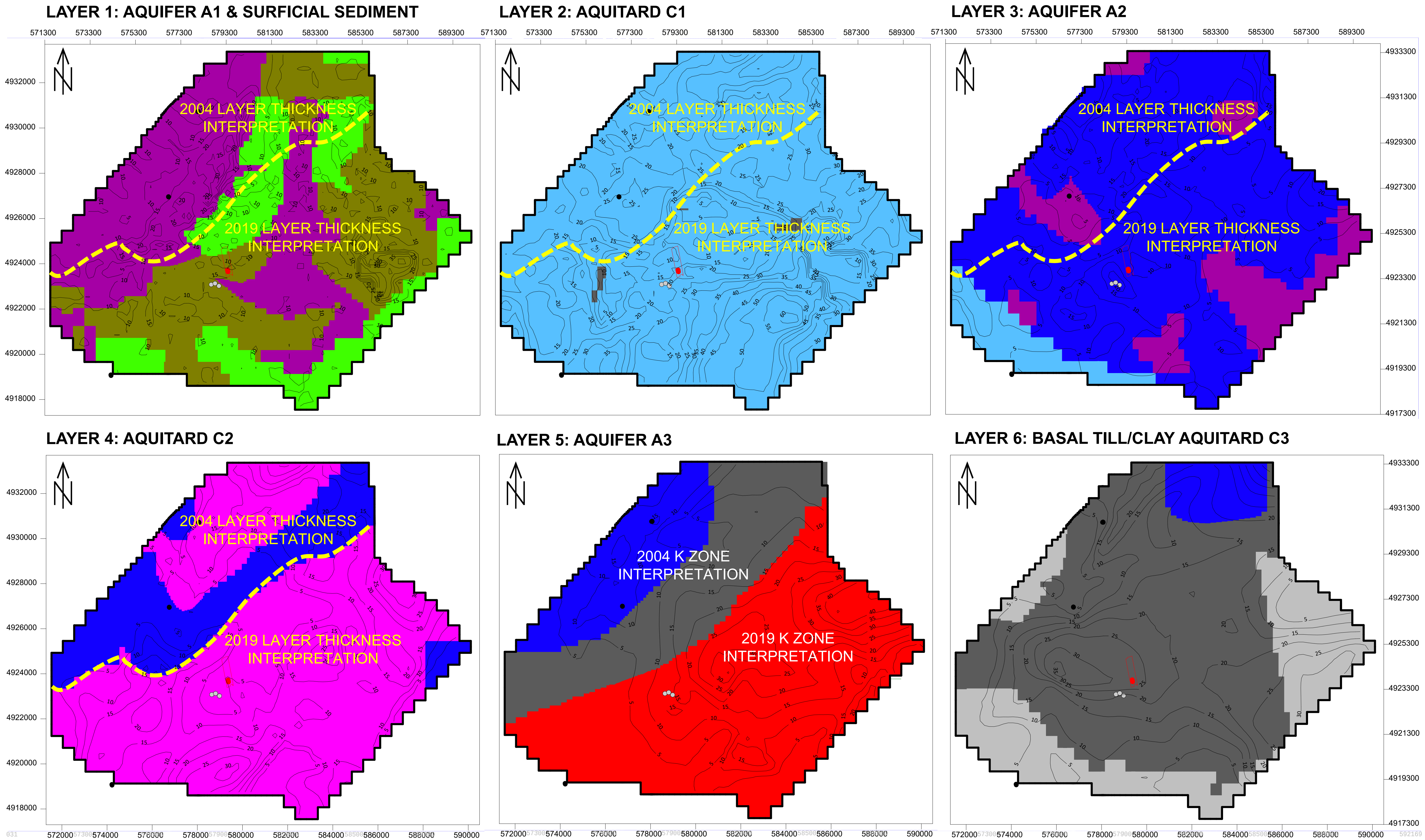
GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

INFERRED GROUNDWATER ELEVATION (A2/A3)

PROJECT No.	Rev.	FIGURE
1415404	**B**	**7**



LEGEND

- SURFICIAL TILL (K= 1E-6 M/S)
- A1 SAND AQUIFER (K= 1E-4 M/S)
- SURFICIAL CLAY/ ORGANICS (K= 5E-7 M/S)
- C1 SILT CLAY AQUITARD (K= 1E-7 M/S)
- A2 SAND AQUIFER (K= 5E-4 M/S)
- C2 SILT CLAY TILL AQUITARD (K= 5E-6 M/S)
- A3 SAND & GRAVEL AQUIFER (K= 1E-3 M/S)
- C3 CLAY TILL (K= 5E-5 M/S)
- BEDROCK (K= 2E-9 M/S)
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL
- PEACE NATURALS WELL

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
STAYNER WATER SUPPLY MODELLING

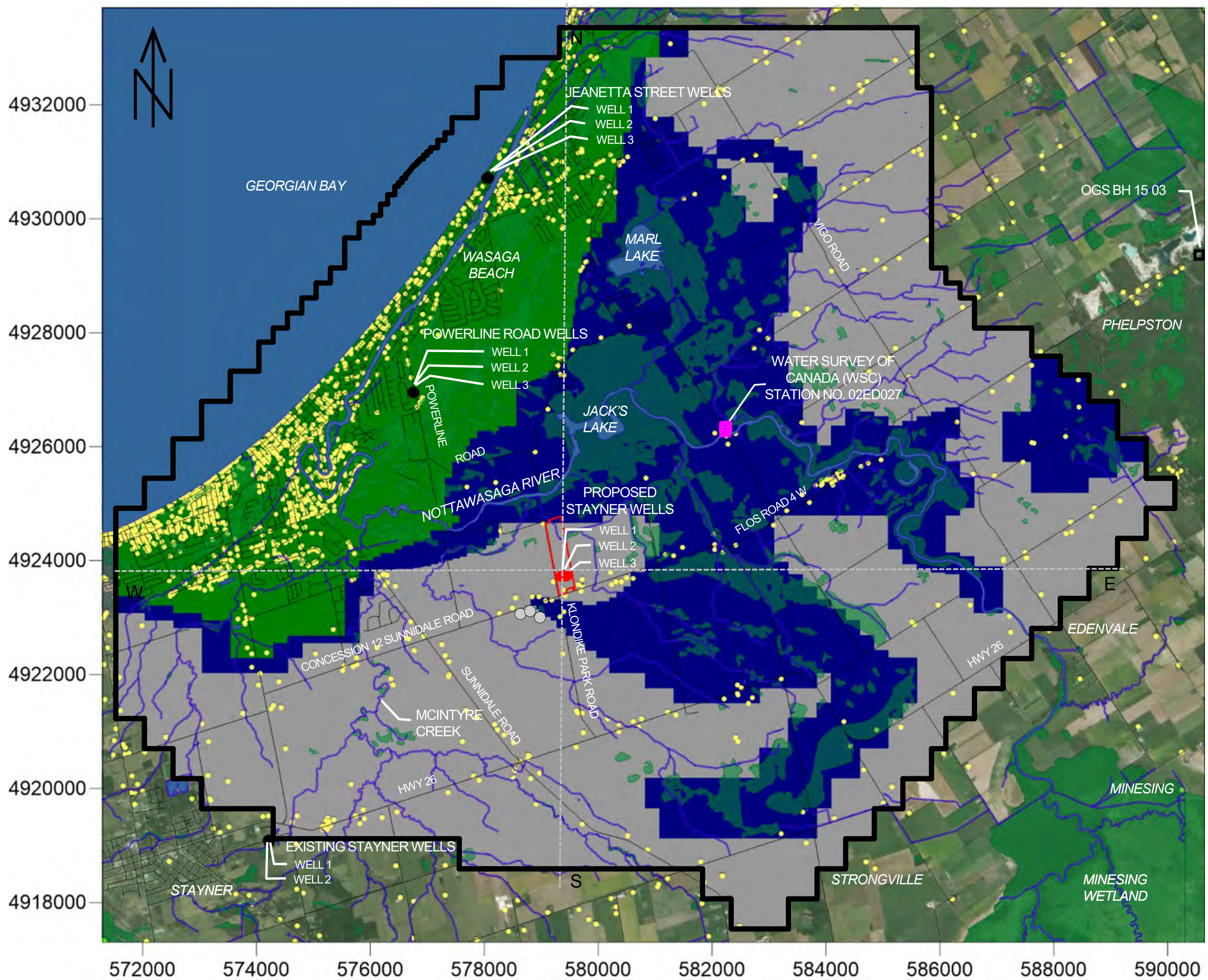
CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE
HYDROSTRATIGRAPHIC UNIT THICKNESS AND HYDRAULIC CONDUCTIVITY

PROJECT No.	Rev.	FIGURE
1415404	B	8

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

RECHARGE (MM/YR)

- 300
- 150
- 100

- MODEL BOUNDARY
- RIVERS AND STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- MECP WELL RECORD
- CROSS SECTION LOCATION
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17.

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

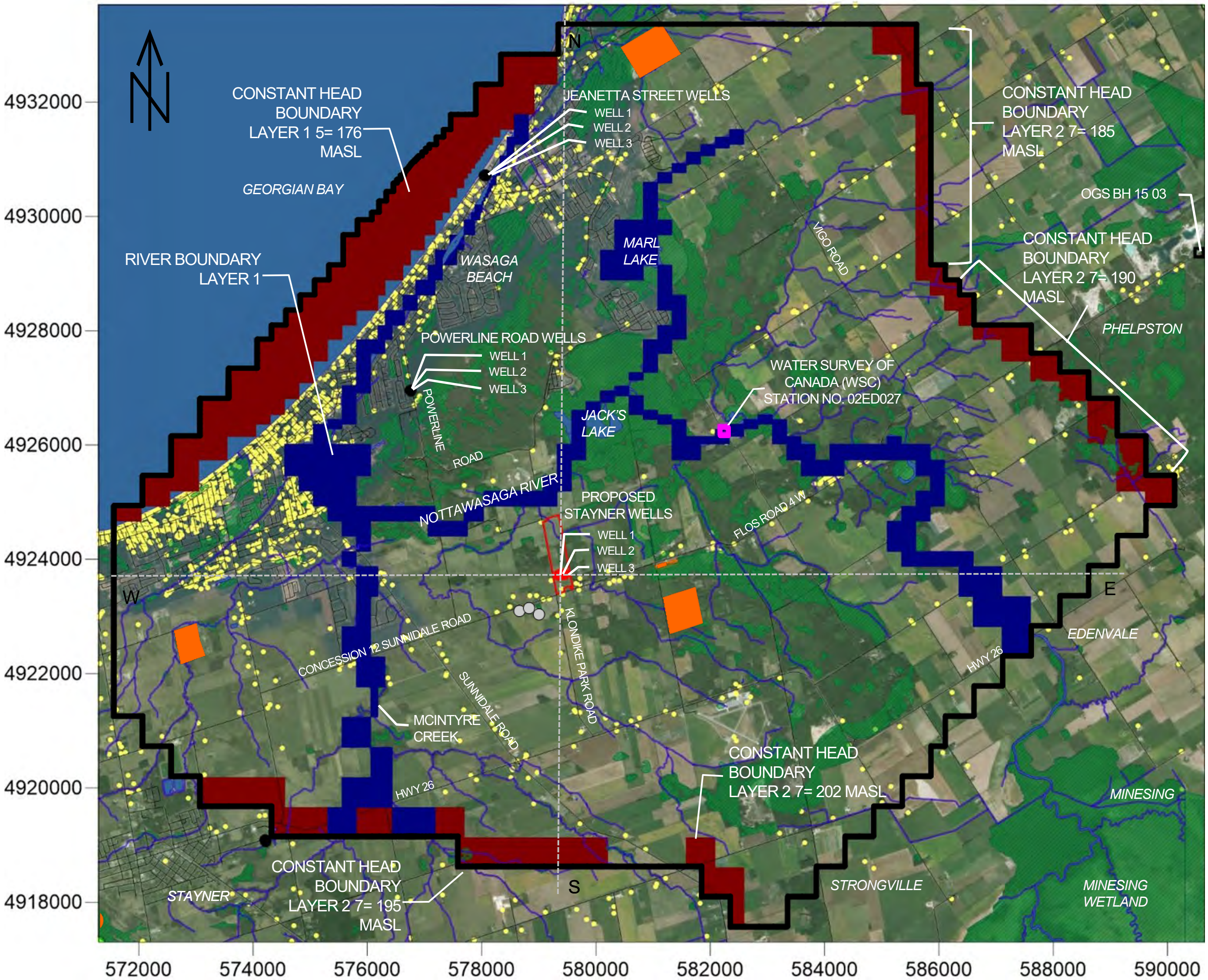
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

MODEL RECHARGE DISTRIBUTION

PROJECT No. **1415404** Rev. **B** FIGURE **9**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

MODEL BOUNDARY	PROPOSED STAYNER WELL
RIVERS/ STREAMS	EXISTING MUNICIPAL WELL
ROADS	MECP WELL RECORD
SITE BOUNDARY	PEACE NATURALS WELL
WATER	CROSS SECTION LOCATION
WETLANDS	CONSTANT HEAD BOUNDARY CONDITION
LANDFILL	RIVER BOUNDARY CONDITION

NOTE
1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17.

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
STAYNER WATER SUPPLY MODELLING

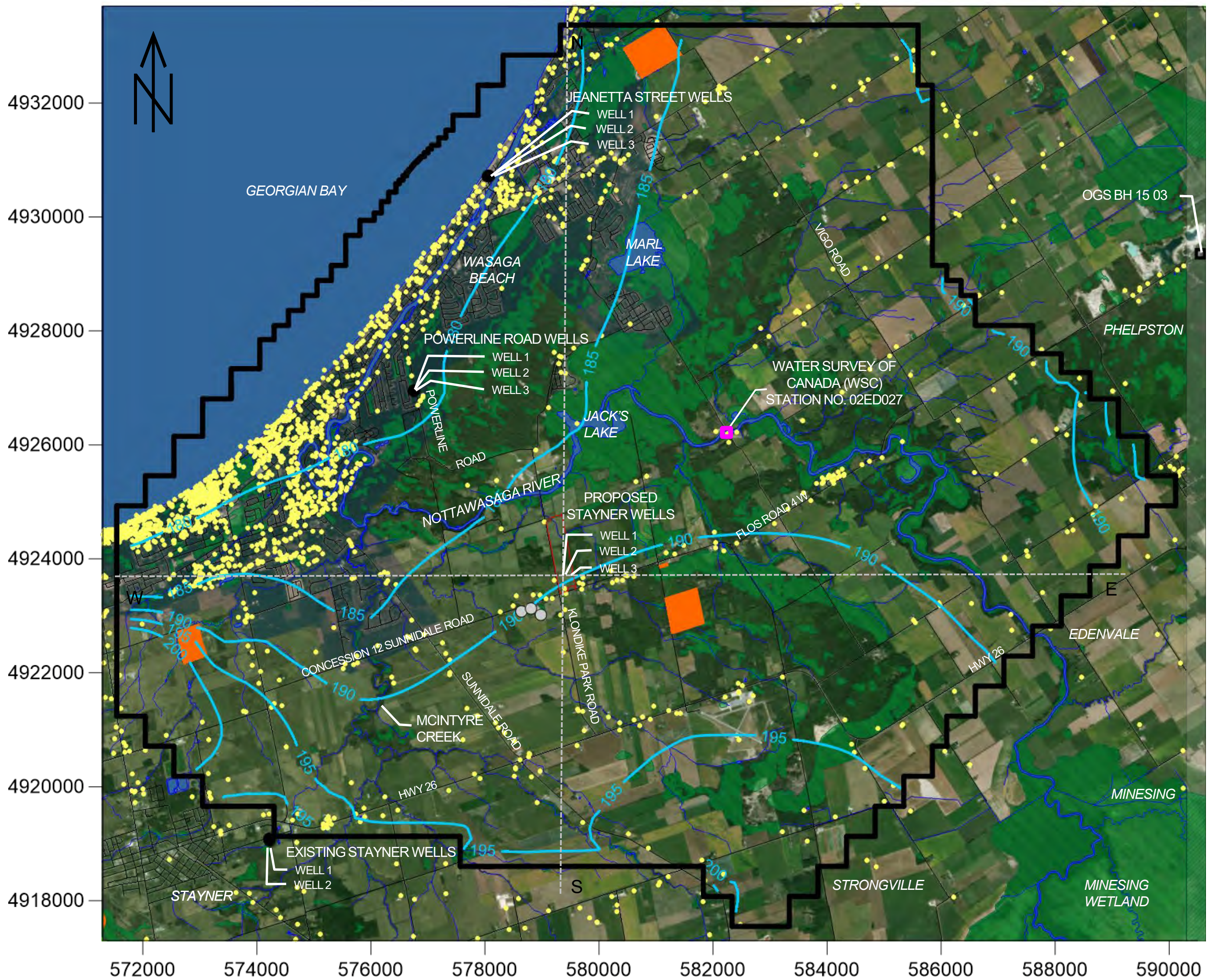
CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE
MODEL BOUNDARY CONDITIONS

PROJECT No. 1415404 | Rev. B | FIGURE 10

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

	MODEL BOUNDARY		PROPOSED STAYNER WELL
	RIVERS/ STREAMS		EXISTING MUNICIPAL WELL
	ROADS		MECP WELL RECORD
	SITE BOUNDARY		PEACE NATURALS WELL
	WATER		WSC STREAM GAUGE
	WETLANDS		CROSS SECTION LOCATION
	LANDFILL	200	GROUNDWATER ELEVATION

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17.

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

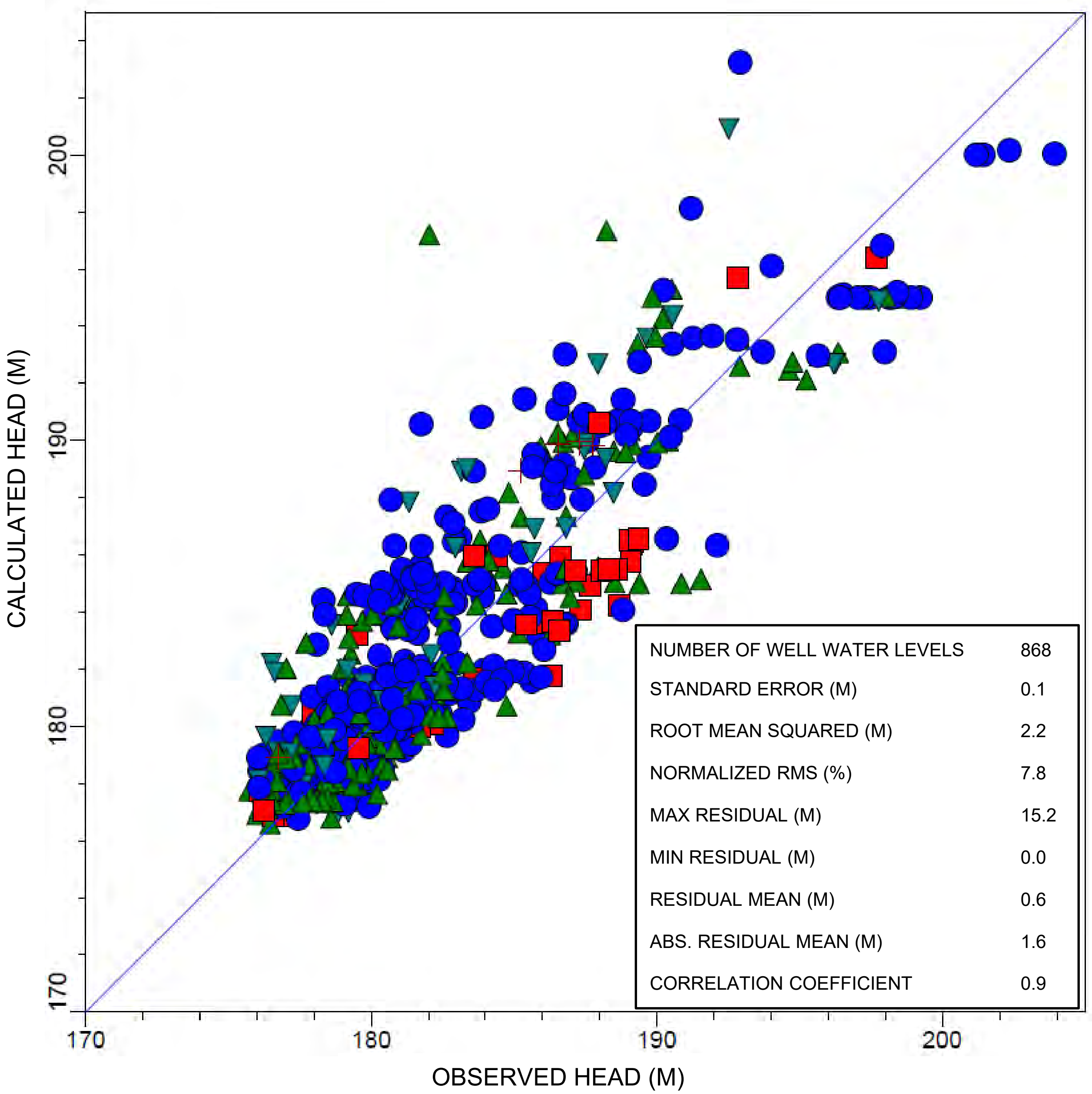
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

EXISTING CONDITIONS SIMULATED GROUNDWATER ELEVATION (A2/A3)

PROJECT No. **1415404** Rev. **B** FIGURE **11**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

OBSERVATION WELLS

- LAYER 1
- LAYER 2
- LAYER 3
- LAYER 4
- LAYER 5

NOTE

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

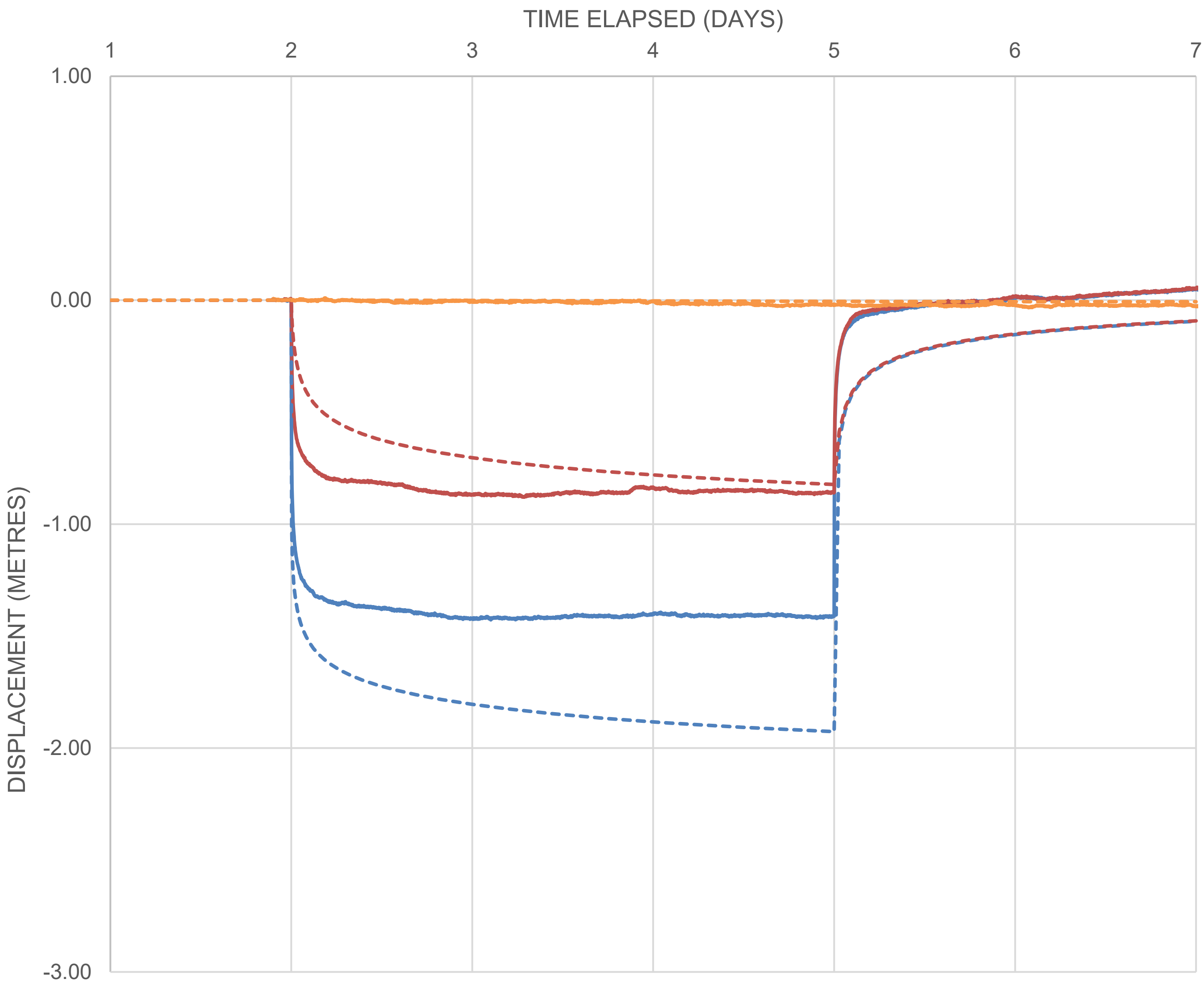
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

STEADY STATE WATER LEVEL CALIBRATION RESULTS

PROJECT No. **1415404** Rev. **B** FIGURE **12**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

- OW1 OBSERVED
- OW1 CALCULATED
- OW2 OBSERVED
- OW2 CALCULATED
- OW4 OBSERVED
- OW4 CALCULATED

NOTE

OBSERVATION WELL ID\	DISTANCE FROM TW3 (M)
OW1	8
OW2	57
OW4	6

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

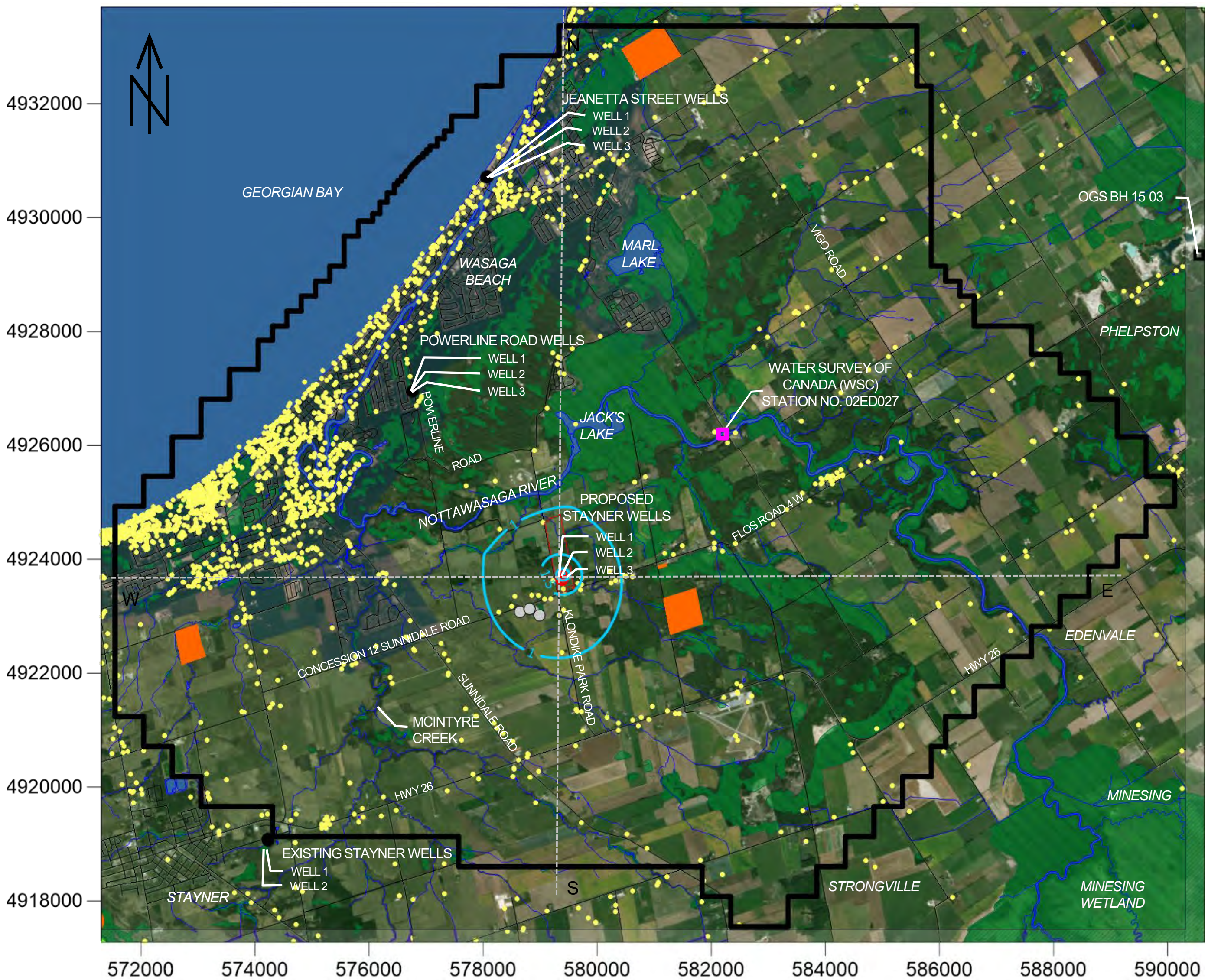
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

TRANSIENT PUMPING TEST CALIBRATION RESULTS

PROJECT No. **1415404** Rev. **B** FIGURE **13**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

- MODEL BOUNDARY
- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL
- MECP WELL RECORD
- PEACE NATURALS WELL
- WSC STREAM GAUGE
- CROSS SECTION LOCATION
- 2 SIMULATED DRAWDOWN (M)

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17.
4. DRAWDOWN CONTOUR LINES ARE IN 0.5M INCREMENTS.

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

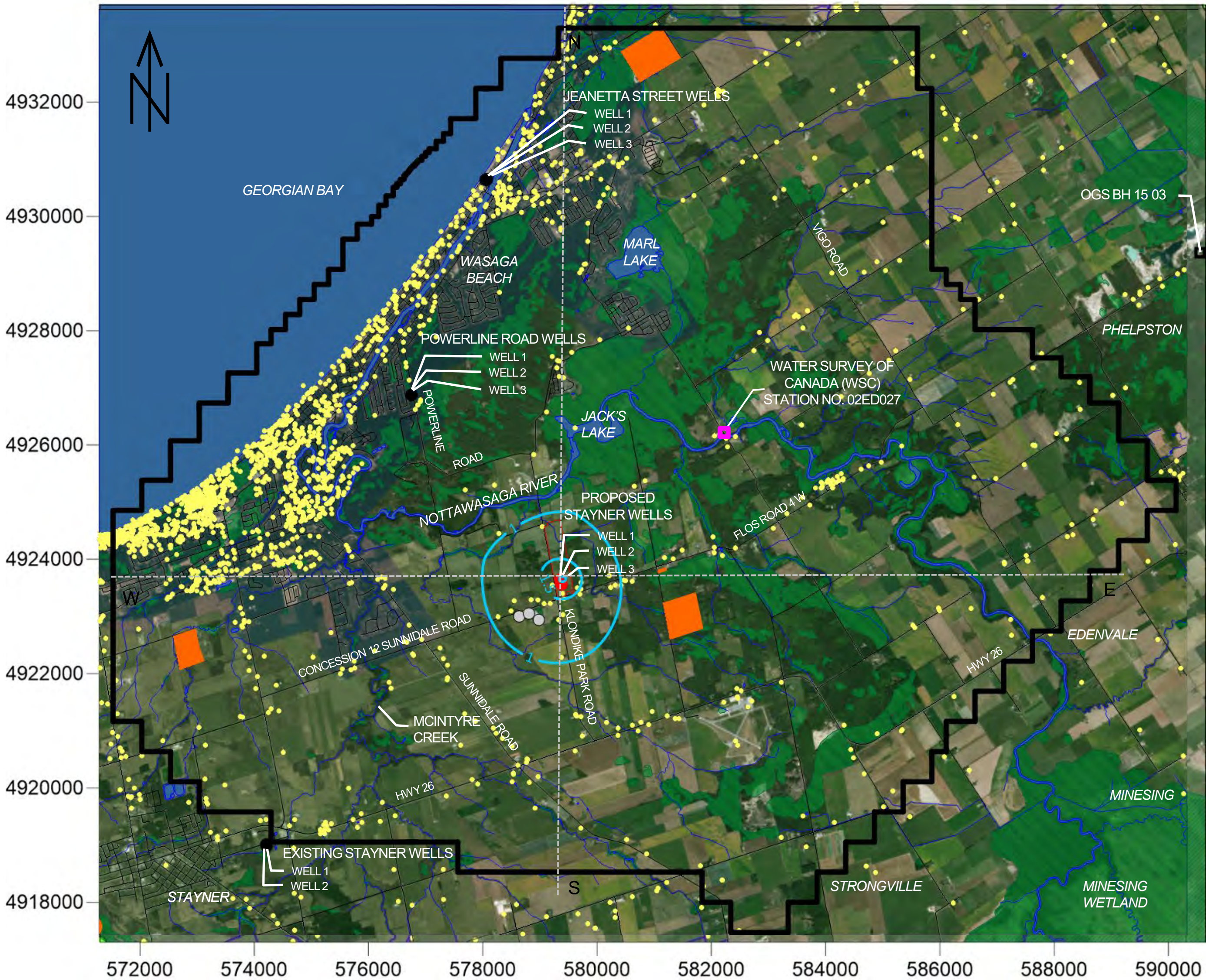
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

SIMULATED DRAWDOWN AQUIFER A3

PROJECT No. **1415404** Rev. **B** FIGURE **14A**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

MODEL BOUNDARY	PROPOSED STAYNER WELL
RIVERS/ STREAMS	EXISTING MUNICIPAL WELL
ROADS	MECP WELL RECORD
SITE BOUNDARY	PEACE NATURALS WELL
WATER	WSC STREAM GAUGE
WETLANDS	CROSS SECTION LOCATION
LANDFILL	2 SIMULATED DRAWDOWN (M)

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17.
4. DRAWDOWN CONTOUR LINES ARE IN 0.5M INCREMENTS.

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

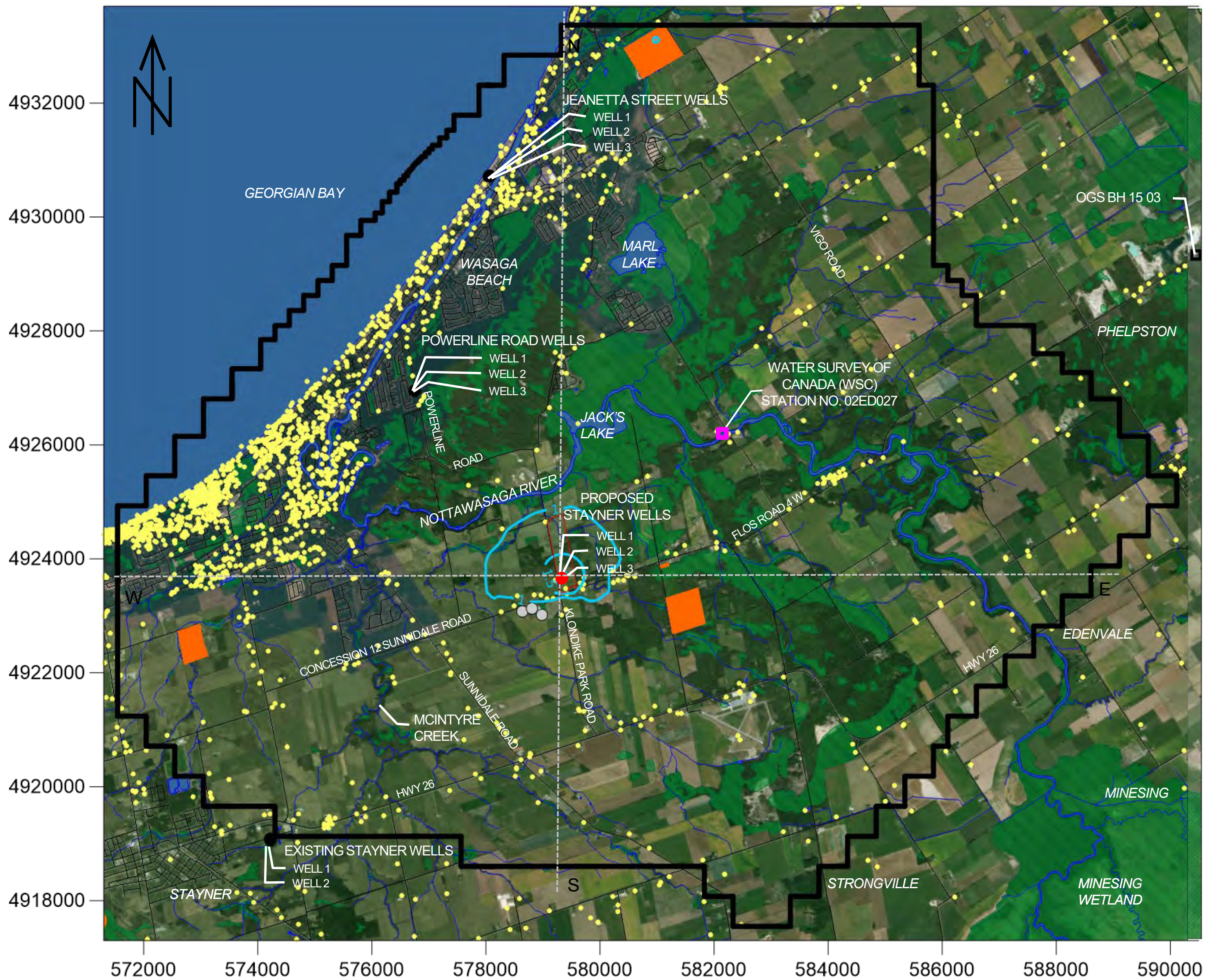
YYYY-MM-DD	2019-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

SIMULATED DRAWDOWN AQUIFER A2

PROJECT No. **1415404** Rev. **B** FIGURE **14B**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

MODEL BOUNDARY	PROPOSED STAYNER WELL
RIVERS/ STREAMS	EXISTING MUNICIPAL WELL
ROADS	MECP WELL RECORD
SITE BOUNDARY	PEACE NATURALS WELL
WATER	WSC STREAM GAUGE
WETLANDS	CROSS SECTION LOCATION
LANDFILL	2 SIMULATED DRAWDOWN (M)

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17.
4. DRAWDOWN CONTOUR LINES ARE IN 0.5M INCREMENTS.

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

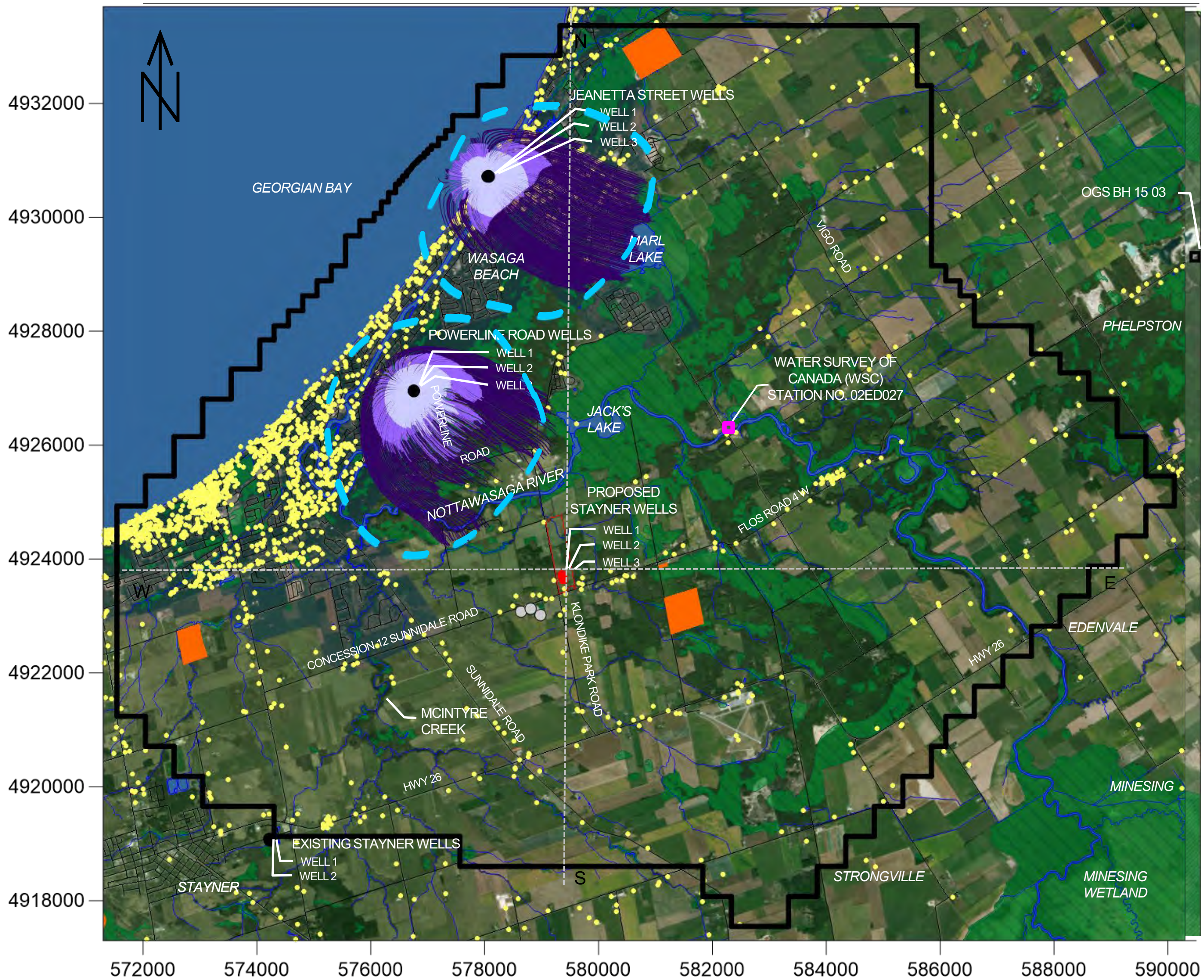
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

SIMULATED DRAWDOWN AQUIFER A1

PROJECT No. **1415404** Rev. **B** FIGURE **14C**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

CAPTURE ZONE

- 2 YEAR BASE CASE
- 5 YEAR BASE CASE
- 25 YEAR BASE CASE
- 2004 WHPA-D

- MODEL BOUNDARY
- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- MECP WELL RECORD
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

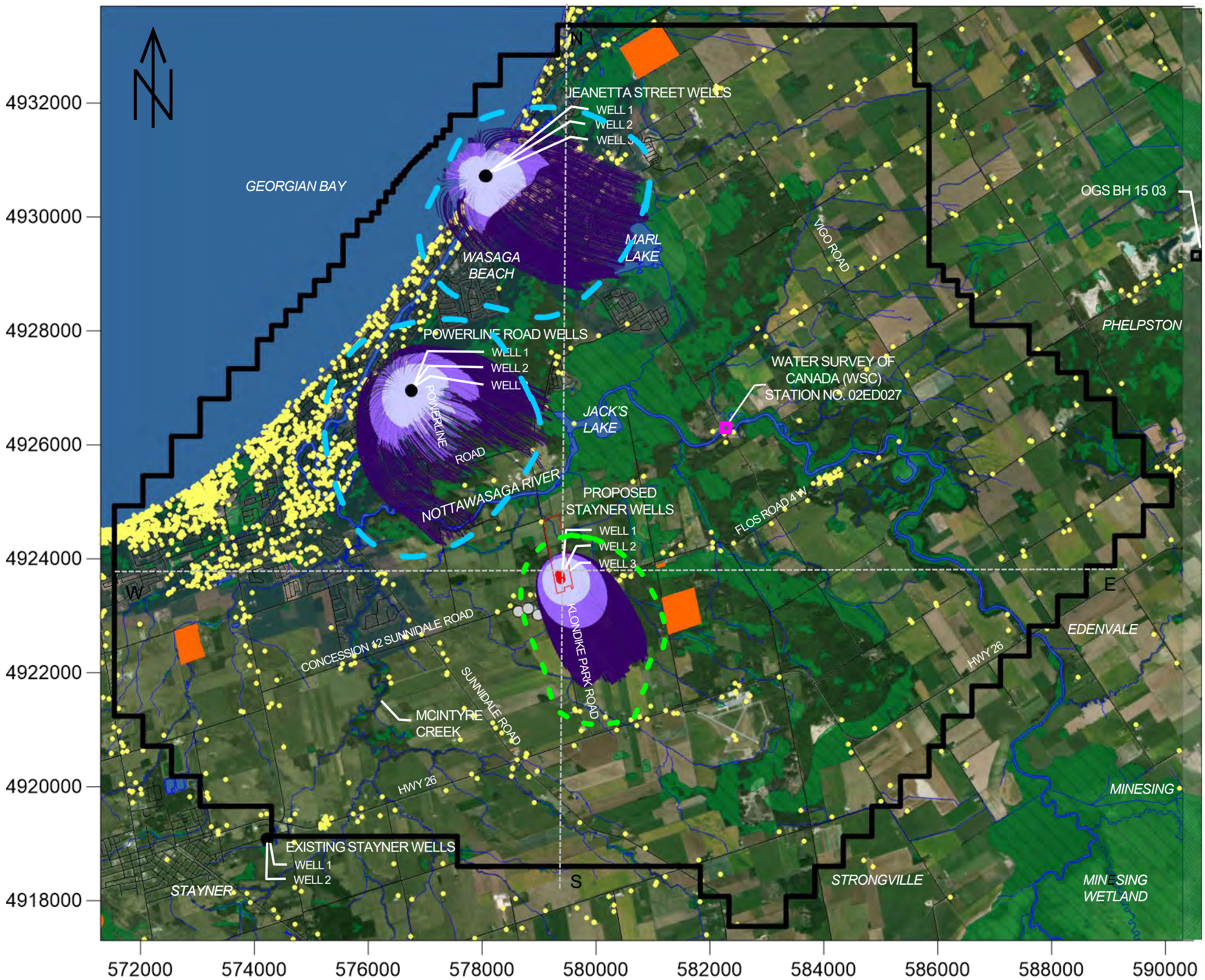
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

EXISTING CONDITIONS CAPTURE ZONES

PROJECT No.	Rev.	FIGURE
1415404	B	15

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

CAPTURE ZONE

- 2 YEAR BASE CASE
- 5 YEAR BASE CASE
- 25 YEAR BASE CASE
- 2004 WHPA-D
- 2020 WHPA-D (KLONDIKE)

- MODEL BOUNDARY
- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- MECP WELL RECORD
- PROPOSED STAYNER WELL
- EXISTING MUNICIPAL WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

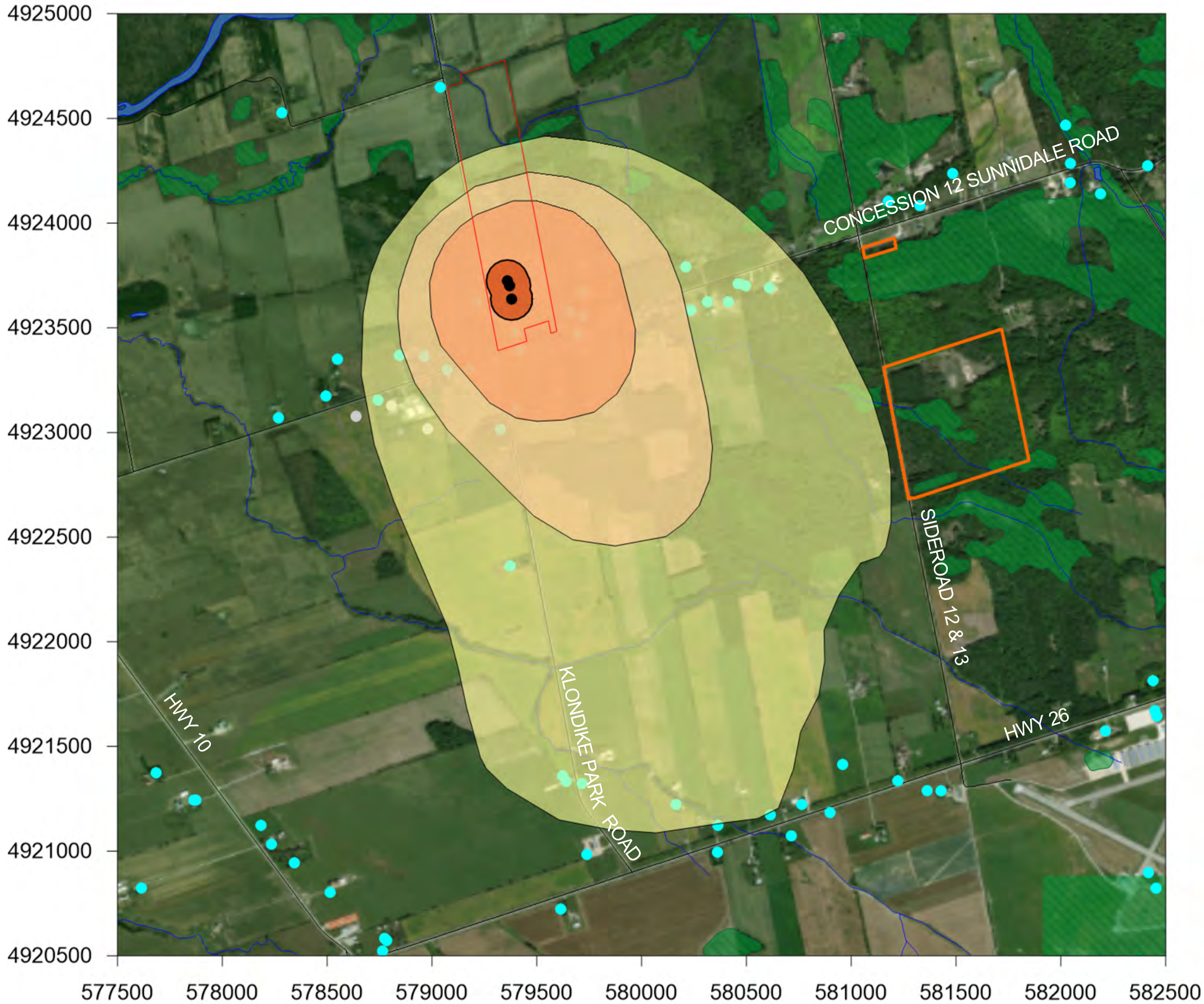
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

FUTURE CONDITIONS CAPTURE ZONES

PROJECT No. **1415404** Rev. **B** FIGURE **16**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

WHPA

- WHPA-A
- WHPA-B
- WHPA-C
- WHPA-D
- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- KLONDIKE PARK RD WELL
- MECP WELL RECORD
- PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

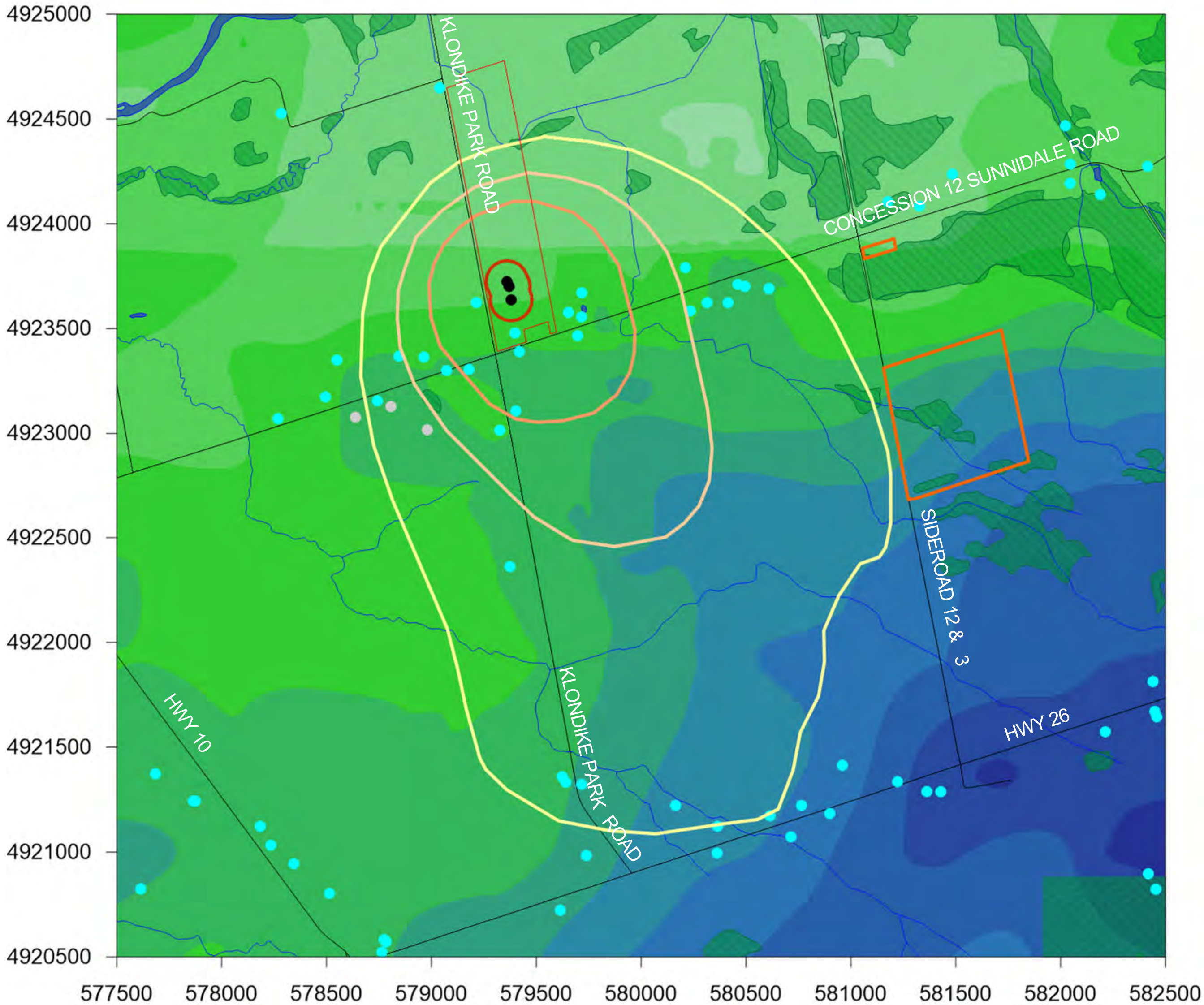
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD WHPAS

PROJECT No. **1415404** Rev. **A** FIGURE **17**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

WHPA

- WHPA-A
- WHPA-B
- WHPA-C
- WHPA-D

- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- KLONDIKE PARK RD WELL
- MECP WELL RECORD
- PEACE NATURALS WELL

MODEL CALCULATED AQUIFER VULNERABILITY INDEX

- 0-30
- 30-80
- 80-100
- 100-125
- 125-150
- 150-175
- 175-200
- 200-225
- 225-250
- 250-275
- 275-300
- 300-325
- 325-350

NOTE
1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT
TOWNSHIP OF CLEARVIEW

PROJECT
STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE
AQUIFER VULNERABILITY INDEX (AVI) MAPPING

PROJECT No. **1415404** Rev. **A** FIGURE **18**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures

LEGEND

VULNERABILITY SCORE

- 10
- 8
- 6
- 4
- 2

- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- KLONDIKE PARK RD WELL
- MECP WELL RECORD
- PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD: VULNERABILITY SCORING

PROJECT No.	Rev.	FIGURE
1415404	A	19

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures

LEGEND

VULNERABILITY SCORE	
10	RIVERS/ STREAMS
8	ROADS
6	SITE BOUNDARY
4	WATER
2	WETLANDS
	LANDFILL
	KLONDIKE PARK RD WELL
	MECP WELL RECORD
	PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17
4. PROVINCIAL TABLE THAT LISTS APPLICABLE DRINKING WATER THREATS MAY BE FOUND AT https://www.ontario.ca/page/tables-drinking-water-threats. A DESCRIPTION OF SOURCE WATER PROTECTION LAND USE POLICIES MAY BE FOUND AT https://ourwatershed.ca/assets/uploads/2019/11/08-20-2019-AmendedSourceProtectionPlan.pdf

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

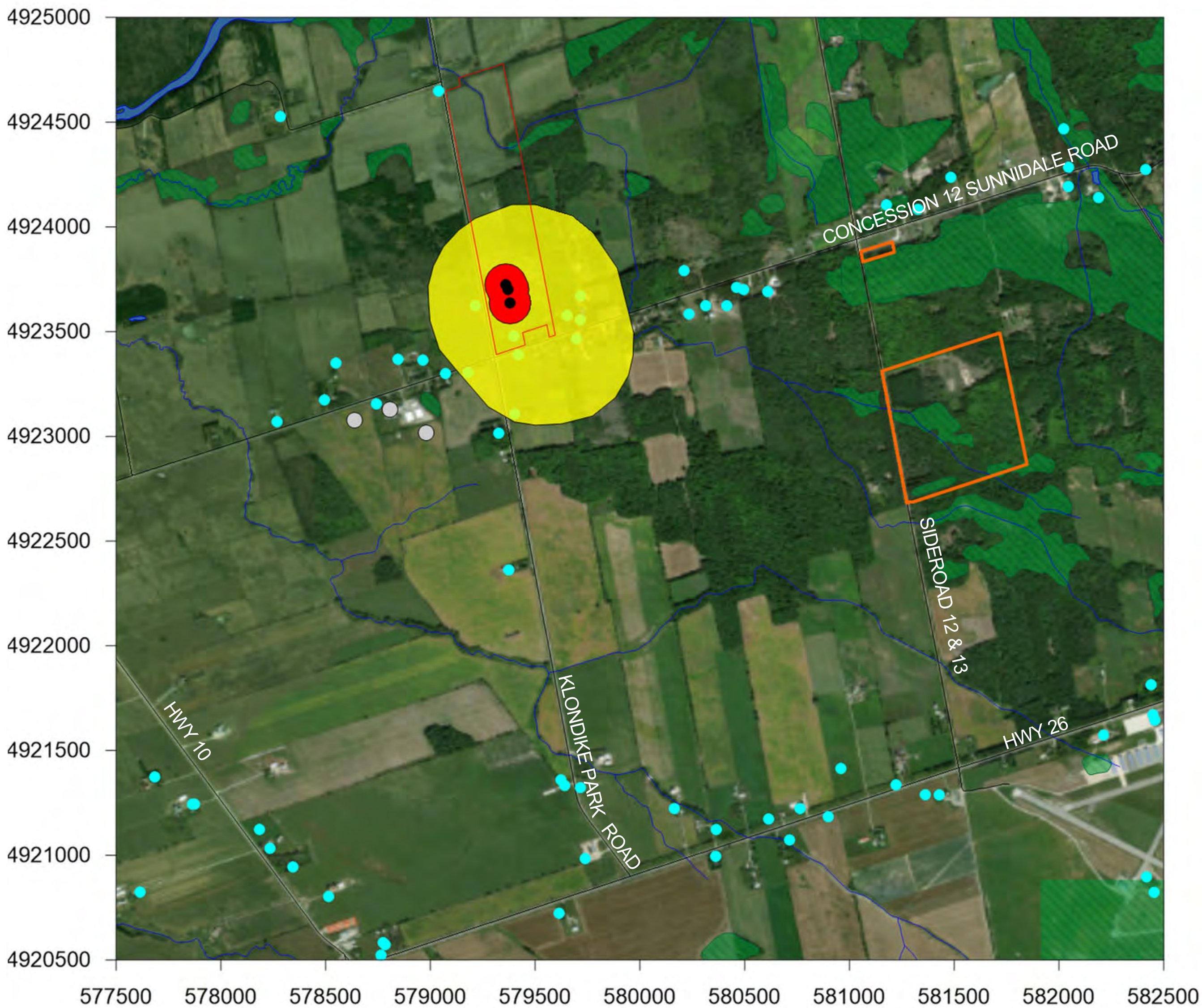
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD: AREAS THAT ARE OR WOULD BE A SIGNIFICANT, MODERATE OR LOW DRINKING WATER THREATS- CHEMICAL

PROJECT No.	Rev.	FIGURE
1415404	A	20

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

VULNERABILITY SCORE

- 10
- 8
- 6
- 4
- 2

- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- KLONDIKE PARK RD WELL
- MECP WELL RECORD
- PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17
4. PROVINCIAL TABLE THAT LISTS APPLICABLE DRINKING WATER THREATS MAY BE FOUND AT https://www.ontario.ca/page/tables-drinking-water-threats. A DESCRIPTION OF SOURCE WATER PROTECTION LAND USE POLICIES MAY BE FOUND AT https://ourwatershed.ca/assets/uploads/2019/11/08-20-2019-AmendedSourceProtectionPlan.pdf

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

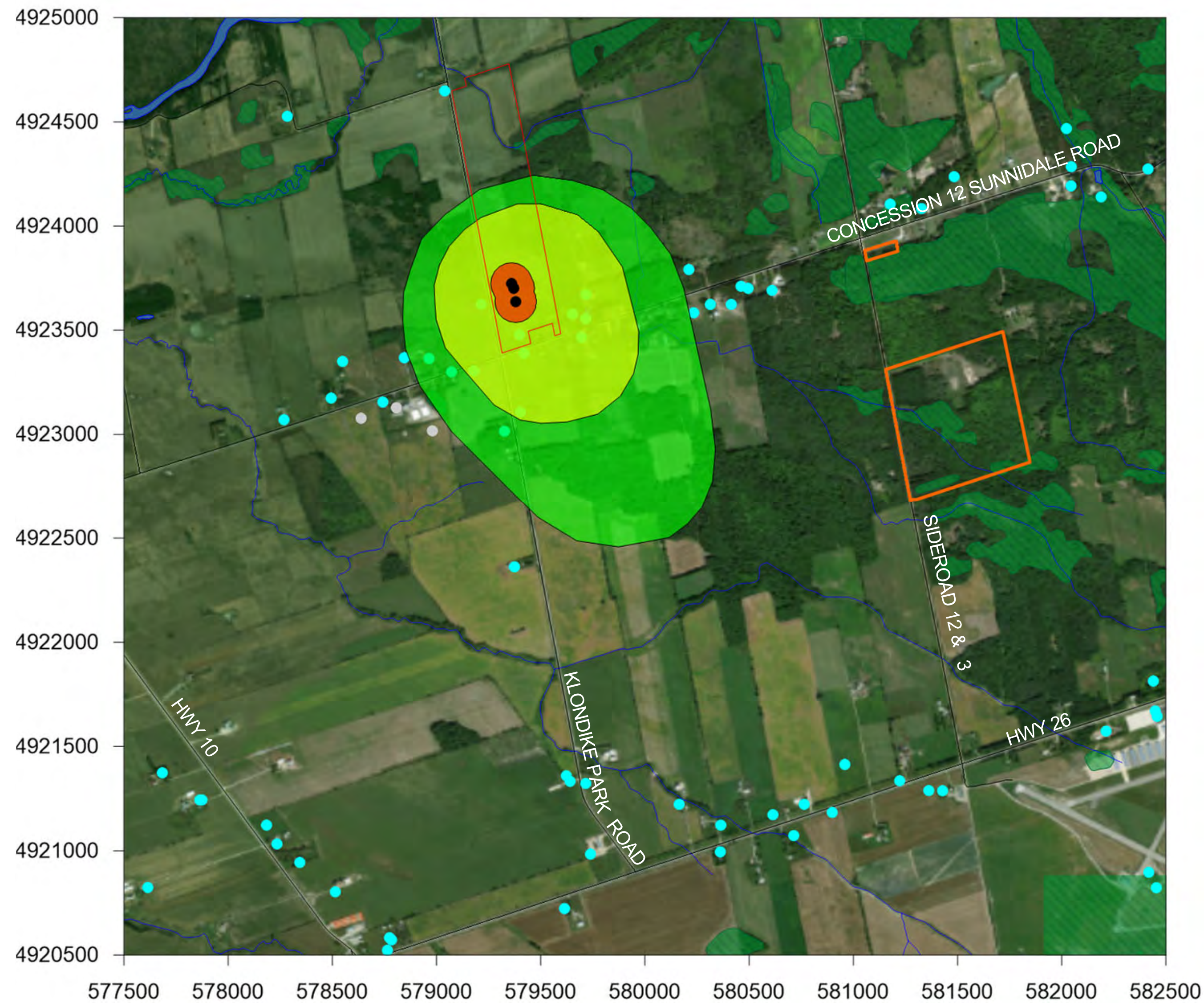
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD: AREAS THAT ARE OR WOULD BE A SIGNIFICANT, MODERATE OR LOW DRINKING WATER THREATS- PATHOGEN

PROJECT No.	Rev.	FIGURE
1415404	A	21

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

VULNERABILITY SCORE

- 10
- 8
- 6
- 4
- 2

- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- KLONDIKE PARK RD WELL
- MECP WELL RECORD
- PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17
4. PROVINCIAL TABLE THAT LISTS APPLICABLE DRINKING WATER THREATS MAY BE FOUND AT https://www.ontario.ca/page/tables-drinking-water-threats. A DESCRIPTION OF SOURCE WATER PROTECTION LAND USE POLICIES MAY BE FOUND AT https://ourwatershed.ca/assets/uploads/2019/11/08-20-2019-AmendedSourceProtectionPlan.pdf

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

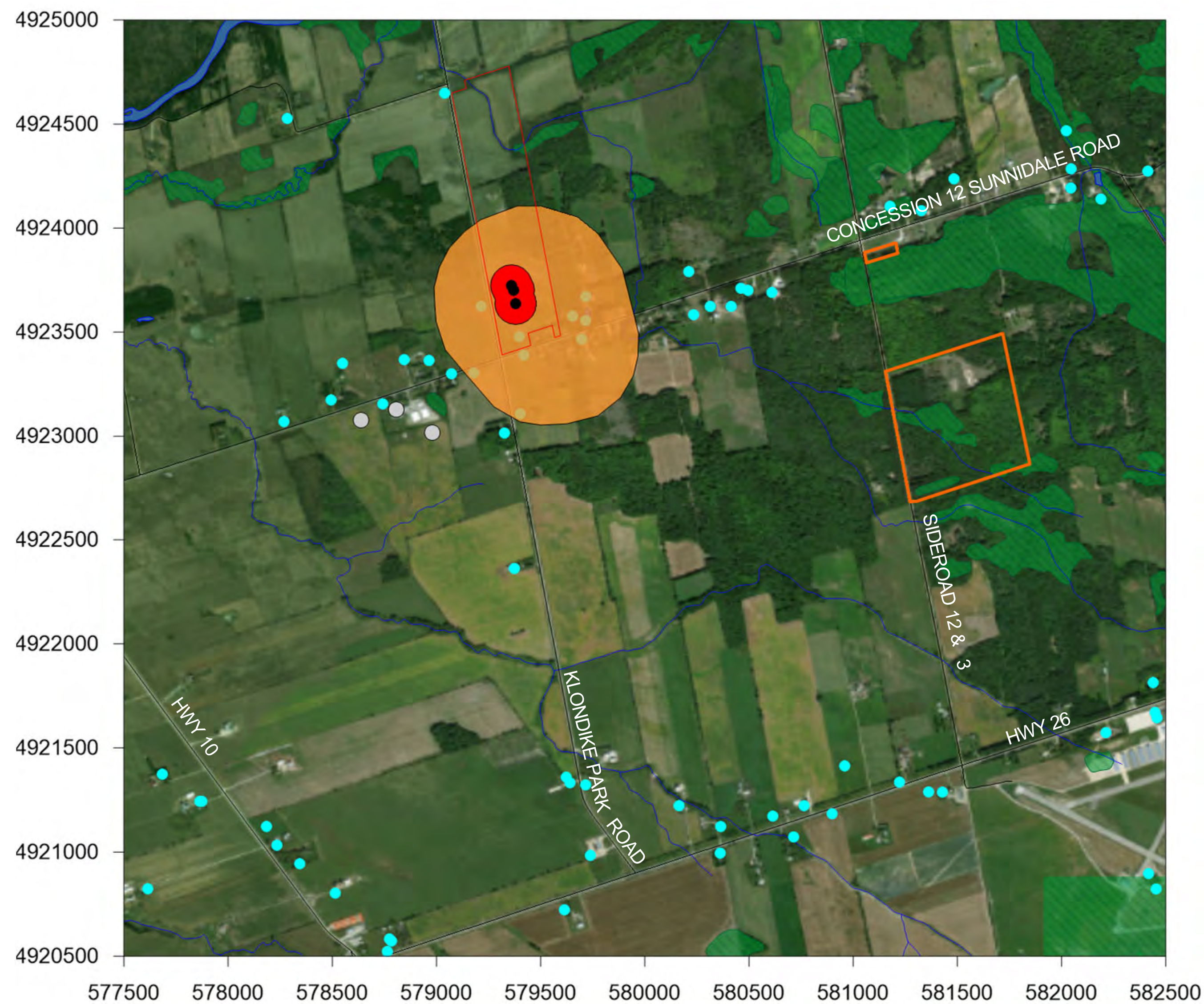
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD: AREAS THAT ARE OR WOULD BE A SIGNIFICANT, MODERATE OR LOW DRINKING WATER THREATS- DNAPLS

PROJECT No. **1415404** Rev. **A** FIGURE **22**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

- SIGNIFICANT
- MODERATE
- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- KLONDIKE PARK RD WELL
- MECP WELL RECORD
- PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17
4. PROVINCIAL TABLE THAT LISTS APPLICABLE DRINKING WATER THREATS MAY BE FOUND AT https://www.ontario.ca/page/tables-drinking-water-threats. A DESCRIPTION OF SOURCE WATER PROTECTION LAND USE POLICIES MAY BE FOUND AT https://ourwatershed.ca/assets/uploads/2019/11/08-20-2019-AmendedSourceProtectionPlan.pdf

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD: AREAS THAT ARE OR WOULD BE A SIGNIFICANT, MODERATE OR LOW DRINKING WATER THREATS- CONDITIONS

PROJECT No.	Rev.	FIGURE
1415404	**A**	**23**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures

LEGEND

PERCENT OF IMPERVIOUS LAND

- 0.0%- 1.0%
- 1.1%- 8.0%
- 8.1%-80.0%
- 80.0%- 100.0%

- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- KLONDIKE PARK RD WELL
- MECP WELL RECORD
- PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

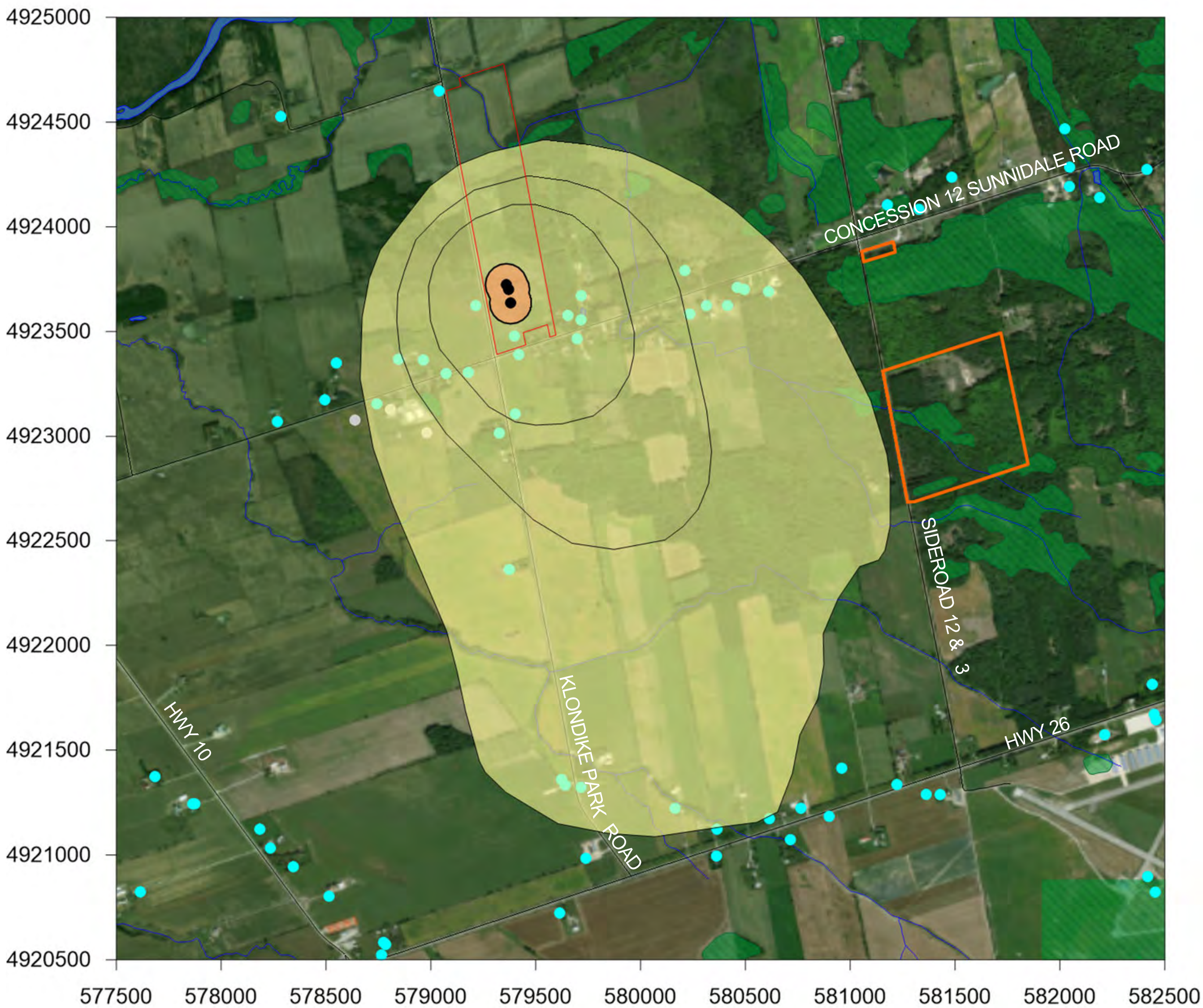
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD: IMPERVIOUS AREAS

PROJECT No.	Rev.	FIGURE
1415404	A	24

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

PERCENT OF MANAGED LAND

- <40%
- 40%- 80%
- >80%
- RIVERS/ STREAMS
- ROADS
- SITE BOUNDARY
- WATER
- WETLANDS
- LANDFILL
- KLONDIKE PARK RD WELL
- MECP WELL RECORD
- PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

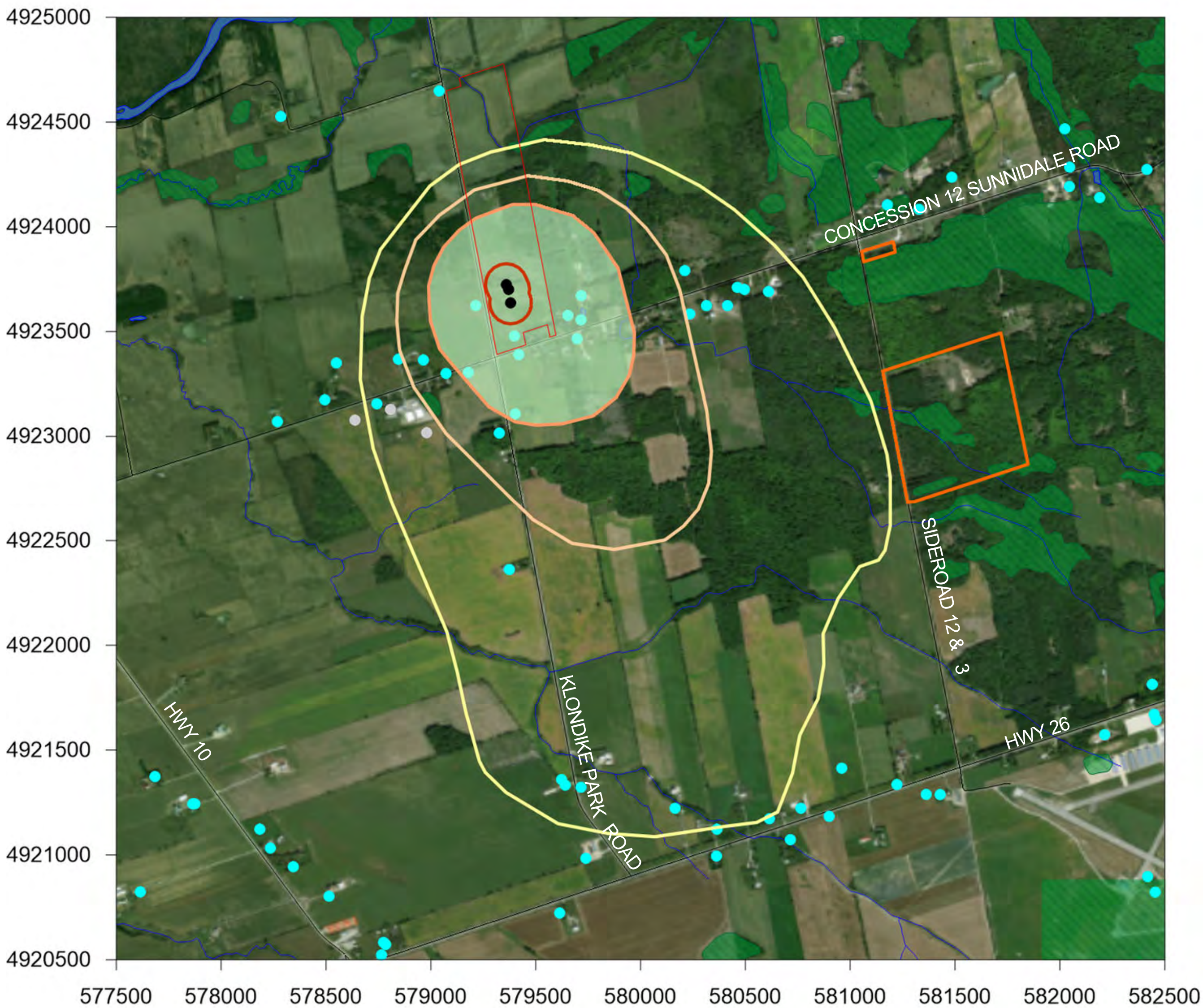
YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD: MANAGED LAND

PROJECT No.	Rev.	FIGURE
1415404	A	25

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures



LEGEND

LIVESTOCK DENSITY

<0.5 NU/ACRE

WHPA

WHPA-A

WHPA-B

WHPA-C

WHPA-D

RIVERS/ STREAMS

ROADS

SITE BOUNDARY

WATER

WETLANDS

LANDFILL

KLONDIKE PARK RD WELL

MECP WELL RECORD

PEACE NATURALS WELL

NOTE

1. SOURCE OF SPATIAL MAPPING OF WATERCOURSES, WETLANDS, AND ROADS: LAND INFORMATION ONTARIO (MNRF, 2018)
2. SOURCE OF SATELLITE IMAGERY: BING
3. COORDINATES IN UTM NAD83, ZONE 17

CLIENT

TOWNSHIP OF CLEARVIEW

PROJECT

STAYNER WATER SUPPLY MODELLING

CONSULTANT

GOLDER

YYYY-MM-DD	2020-10-21
PREPARED	HW
DESIGN	HW
REVIEW	DAH
APPROVED	DAH

TITLE

KLONDIKE PARK ROAD WELLFIELD: LIVESTOCK DENSITY

PROJECT No.	Rev.	FIGURE
1415404	**A**	**26**

Path: \\golder.gds\gal\Barrie\Active\2014\141-5404 Township of Clearview Hydrog Stayner\Report\GW Modelling\Figures

APPENDIX A

Model Comparison Summary: 2004 Versus 2020

TABLE A1: WASAGA BEACH MODEL UPDATES SUMMARY – 2004 VERSUS 2020

Parameter	2004 Model	2020 Model	Reasons for Update	Primary Outcome
Layer 1 Surficial K distribution	5E-6 to 1E-4 m/s	5E-7 to 1E-4 m/s (in accordance with surficial geology mapping).	More accurate adherence to surficial geology mapping.	Improvement to steady state baseflow calibration.
Layer 1 Recharge distribution	100-150 mm/yr	100-300 mm/yr (spatially distributed in accordance with surficial geology mapping).	More realistic / typical recharge estimates based on surficial geology materials.	Improvement to steady state baseflow calibration.
Layer 3 thickness southwest of Powerline Road/ Jeanetta Street Area (inland)	1m to 20 m	1 m to 26 m (generally thicker than 2004).	Updated in accordance with deeper drilling longs and consultant logs obtained post-2004.	More accurate representation of A2 in area of Site.
Layer 4 thickness southwest of Powerline Road/ Jeanetta Street Area (inland)	1m to 40 m	1m to 30 m (generally thinner than 2004).	Updated in accordance with deeper drilling longs and consultant logs obtained post-2004.	More accurate representation of C2/A3 in area of Site.
Layer 5 A3 Inland K	5E-5 m/s	1E-3 m/s.	Site aquifer testing results.	Successful transient calibration to pumping test at Site well TW3.

Note: The table summarizes significant updates from the 2004 model to the 2020 model. Minor changes, and unchanged parameters, are not included. See main report for a detailed description of overall model construction, parametrization, and calibration.

APPENDIX B

Assessment Report and Plan Amendments under s.34 of the Clean Water Act – Internal Process for Implementing Regulatory Requirements in the SGBLS Region

TECHNICAL MEMORANDUM

DATE October 30, 2020 **Project No.** 1415404

TO Ryan Post, Hydrogeologist Source Protection Coordinator
Nottawasaga Valley Conservation Authority (NVCA)

CC Mike Rawn (Township of Clearview), Jennifer Georgas (Burnside)

FROM Devin Hannan, Associate, Environmental Engineer **EMAIL dhannan@golder.com**

STAYNER LONG TERM WATER SUPPLY CLASS EA: ASSESSMENT REPORT AND PLAN AMENDMENTS UNDER S.34 OF THE CLEAN WATER ACT – INTERNAL PROCESS FOR IMPLEMENTING REGULATORY REQUIREMENTS IN THE SGBLS REGION

1.0 INTRODUCTION

The Township of Clearview is in the process of completing a Schedule B Municipal Class Environmental Assessment of a proposed supplementary water supply for the community of Stayner, Ontario (the Project). The Project Site is a 38.6 hectare rural property located at 1585 Klondike Park Road, approximately 9 kilometres northeast of Stayner. The construction of three municipal wells at the Site could supply an additional 60 L/s of Average Day Demand and 120 L/s of Maximum Day Demand to Stayner. Golder has been supporting the Township of Clearview with hydrogeology services related to the Project.

The Nottawasaga Valley Conservation Authority (NVCA) is the Source Protection Authority (SPA) responsible for source water protection planning and implementation within the Nottawasaga Valley watershed wherein the Project is located. The NVCA may be interested in how the Project addresses *Municipal Class Environmental Assessment Amendment A.2.10.6 The Clean Water Act*, which links the EA process to Source Protection Plans (see Municipal Engineers Association website https://municipalclassea.ca/manual/page19.html). As such, we have provided herein a response to *South Georgian Bay Lake Simcoe Region, 2019. Assessment Report and Plan Amendments under s.34 of the Clean Water Act – Internal Process for Implementing Regulatory Requirements in the SGBLS Region* (July, 2019) [attached].

This memorandum is arranged to address the appendices of the SGBLS process documentation as follows:

- Section 2: Appendix A – Work Flow Diagram
- Section 3: Appendix B – Checklist of Required Steps to be Completed by SPA
- Section 4: Appendix C – Series of Class Environmental Assessment and Source Protection Matrices
- Section 5: Appendix D – Checklist of Files to be Submitted to SPA

We note that the final appendix of the SGBLS document, Appendix E – Example SPA Notice of Amendments to SPP, is to be filled out by the SPA during the post-EA stages of the Project and is thus not included in this response.

2.0 APPENDIX A – WORK FLOW DIAGRAM

The following table is excerpted from SGBLS, 2019. The following is noted:

- Step 1, Step 2, and Step 3 have been completed as reported in *Township of Clearview, Stayner Long Term Water Supply Schedule B Municipal Class EA, Groundwater Modelling Addendum* (Golder, 2020).
- This current submission and subsequent NVCA review may comprise the first part of Step 4: *"Local SPA reviews technical work to determine if work is sufficiently complete to identify amendments needed to the SPP…"* We note that the prescribed timeline for Step 4 is one month; as such, we interpret this to mean that any comments on the technical work will be provided by the NVCA prior to the end of 2020.
- Steps 5 through 7 are future tasks that function on the premise that the Project Class EA has been approved and the system has been constructed. As such, commenting on these steps is considered premature at this stage.

Step 1: Early Planning Municipal residential drinking water system owners and local SPA discuss the owner's intention of establishing or altering a system	
Step 2: Notice from Owner System owner conducts technical EA and source protection planning work (mapping, vulnerability) and provides a written notice to the local SPA of their intent of applying for a permit/license from MECP.	**Approximate timing for SPA to complete steps after receiving notice ***
Step 3: Source Protection Work Complete and submit WHPA mapping and vulnerability delineation to the local SPA and the Lead SPA program Manager. Note that even after approval of EA, the provision of water cannot commence until the updated SPP is approved	
Step 4: Notice from SPA Local SPA reviews technical work to determine if work is sufficiently complete to identify amendments needed to the SPP and if complete, issue a notice to the owner stating that the work is complete. Owner can then apply for a drinking water works permit/licence	~1 month
Step 5: SPP Update	
Step 5a: Early Engagement 1 Local SPA to inform affected Municipalities that council resolution will be required and start early engagement with MECP for feedback	~1 month (may be completed concurrently with Step 4)
Step 5b: Plan Amendment(s) Developed SPA and SPC agree on amendments required	~3 months

Step 5c: Early Engagement 2 At the discretion of the local SPA copies of proposed amendments can be provided to Clerk of affected Municipalities and other persons	~1-2 months (may be able to be completed concurrently with Step 5b)
Step 5d: Pre-consultation Notice of SPP revisions including draft policy text, summary of rationale for changes, and request for written comments sent to impacted bodies including Municipalities and government bodies	
Step 5d: Municipal Endorsement Municipality(ies) affected by proposed amendments pass a council resolution endorsing the amendments if it has not already been accomplished in pre-consultation step 5c	TBD municipality by municipality
Step 5e: Public Consultation Local SPA publishes proposed amendments on website with hardcopies to be made available and notification in newspaper and to affected parties. Public consultation to last at minimum 35-days from date of notification	~1-2 months
Step 6: SPA Submission to MECP Including a cover letter confirming SPA support of amendments, proposed amendments, revised explanatory document, summary of all consultation activities, and example notices	~3 months
Step 7: Provision of Water Chair of SPC, Local and Lead SPAs will receive notification from Ministry that amendments to the SGBLS Source Protection Plan have been approved. The drinking water system owner can supply water to the public	

3.0 APPENDIX B – CHECKLIST OF REQUIRED STEPS TO BE COMPLETED BY SPA

The following subsections address the SGBLS checklist of specific tasks for each step in the work flow. In addition to providing the checklist, we have added commentary beneath each item in *italics*.

3.1 Step 1: Early Planning

☒ Initiated by Municipality to inform local SPA of anticipated s.34 update.

- *Notice of Intent to Amend Drinking Water Works Permit – Township of Clearview, Stayner Water Supply Class Environmental Assessment Water Supply Development (Golder, July 3 2019) received by NVCA on July 9 2019.*

☒ Recommended that Local SPA provide Municipality with PDF document of protocol for s.34 update so Municipality is aware of expectations, requirements and anticipated timelines of the local SPA.

- *Assessment Report and Plan Amendments under s.34 of the Clean Water Act – Internal Process for Implementing Regulatory Requirements in the SGBLS Region (SGBLS, 2019) received from NVCA in August 2019.*

3.2 Step 2: Notice from Owner

☒ Initiated by Municipality to confirm intent.

- *Notice of Intent to Amend Drinking Water Works Permit – Township of Clearview, Stayner Water Supply Class Environmental Assessment Water Supply Development (Golder, July 3 2019) received by NVCA on July 9 2019.*

☒ Recommended that local SPA confirm with the owner the municipal well/ intake alteration category (to determine required technical work as outlined in the planning matrix Appendix C).

- *As per Table 1 of Appendix C (see below), the Project falls under Category #5 "New well, existing water supply system, new location" and as such does not require technical work to confirm its category but does require technical work assessment report modelling. Such technical work is presented in Township of Clearview, Stayner Long Term Water Supply Schedule B Municipal Class EA, Groundwater Modelling Addendum (Golder, 2020).*

☒ Recommended that local SPA provide Municipality with pdf document of protocol for s.34 update if haven't already.

- *Assessment Report and Plan Amendments under s.34 of the Clean Water Act – Internal Process for Implementing Regulatory Requirements in the SGBLS Region PDF received from NVCA in August 2019.*

☒ Local SPA to confirm with municipality a list of files to be submitted to the SPA based on extent of technical changes expected as outlined in the protocol document (Appendix D).

- *As per Appendix D, the list of files to be submitted to the SPA will comply with the files described in the 'New Technical Work- WHPAs' section.*

☒ Local SPA to inform lead SPA of Municipality intent and upcoming s.34 amendment.

- *We assume that the NVCA is both the local and the lead SPA in this instance; however, if this is not the case, we trust the NVCA will disseminate the enclosed information as appropriate.*

3.3 Step 3: Source Protection Work

☒ Initiated by Municipality and provided to local SPA and should include the following technical work/documents but will depend on the EA category (as outlined in Appendix C and D):

☒ Mapping and GIS files of any new vulnerable areas or alteration of existing vulnerable areas.

- ♦ *Please see Golder, 2020, for new vulnerable areas (WHPAs). GIS files may be provided upon Project finalization.*

☒ Mapping and GIS files of percent impervious, percent managed lands, and livestock density where applicable.

- ♦ *Please see Golder, 2020, for new vulnerable areas (WHPAs). GIS files may be provided upon Project finalization.*

☒ Any information related to existing issues / conditions that municipalities are aware of.

- ♦ *Please see Golder, 2020.*

☐ Local SPA to ensure all appropriate documentation of technical work required for submission to MECP has been provided by municipality (refer to appendix D for required documents).

- *To be completed by NVCA.*

4.0 APPENDIX C – SERIES OF CLASS ENVIRONMENTAL ASSESSMENT AND SOURCE PROTECTION PLANNING MATRICES

Appendix C Table 1, Class Environmental Assessment and Source Protection Planning Matrix – New Supply Well, contains a total of eight categories. For brevity, we have only included the applicable category for the Project in the table below.

Table 1: Class Environmental Assessment and Source Protection Planning Matrix - New Supply Well (Project Applicable Only)

Category #	Municipal Supply Well Category	Class EA Schedule	Technical Work Required to Confirm Category	Technical Work for AR (Modelling)	Changes to AR	Changes to Time of Travel	Notice Required	Content of Notice	Type of Amendment	Clean Water Act Public Consultation Requirement	Comments
5	New well, existing water supply system, new location	B	No	Yes	Major	Yes	Yes (New)	Satisfied that work is complete (new technical work)	S.34	Formal 35-day public consultation period for AR and SPP + property owner notification	New WHPAs

5.0 APPENDIX D – CHECKLIST OF FILES TO BE SUBMITTED TO THE SPA

According to SGBLS, 2019, the Appendix D preamble states: "System owner conducts technical work and provides a notice to the SPA of their intent of applying for a permit/license from the MECP. Technical work required, based on anticipated changes, is below." In this case, the Class EA has not yet been approved and no municipal wells have been constructed; as such, there is not yet a formal intent of applying for a Permit To Take Water or Drinking Water System License. Nonetheless, much of the following information has been garnered as part of the Class EA process.

5.1 New Technical Work WHPAs

A report submitted with a stamp from a qualified professional confirming the following details:

☒ Description and map of wellhead protection areas and vulnerability scores.

- *Completed; see Golder, 2020.*

☒ Description of wells obtained from borehole information (depth, screen depth, geologic unit etc).

- *A description of test wells are included in Golder, 2018.*

☐ Pumping rates from Permit-To-Take-Water (maximum and average).

- *A Permit To Take Water will be submitted after the Class EA has been approved and the municipal well constructed. However, prospective pumping rates are described in Golder, 2020.*

☒ Description of groundwater model and assumptions (model inputs such as infiltration rates, model boundary conditions, etc.).

- *Completed; see Golder, 2020.*

☒ Mapping of groundwater vulnerability ratings (high, medium, low).

- *Completed; see Golder, 2020.*

☒ Description of how vulnerability scores were determined.

- *Completed; see Golder, 2020.*

☒ Description of the groundwater vulnerability ratings.

- *Completed; see Golder, 2020.*

☒ List and counts of existing prescribed significant threats (please identify number of threats removed or added if within an existing system) and number of parcels.

- *Completed; see Golder, 2020.*

☒ Mailing list of properties with significant drinking water threats and type of threat.

- *Not required at this time as no significant drinking water threats have been identified.*

☒ Uncertainty analysis for WHPAs should be completed for new systems and are optional for existing systems (i.e., can be updated based on discretion of municipality).

- *Completed; see Golder, 2020.*

☒ Make sure that we also get material necessary to identify areas where an activity or condition is or would be a significant/moderate/low drinking water threat. In some cases this may mean maps of percent impervious, percent managed lands, and livestock density

- *Completed; see Golder, 2020.*

☒ NOTE: for percent managed lands there are two methods for calculating (September 2009 and November 2009). If the newer November 2009 methodology is estimated to change the % managed lands scoring such that a commercial fertilizer, ASM or NASM would become a threat then the new method should be used. However, if there is no major difference between the methods then use whichever method is consistent with the exiting methodology within the Municipality. Also keep in mind that if there are existing WHPAs in the same system they should use the same methodology (i.e. if changing methodologies they would require being updated to the new methodology also).

- *Completed, see Golder, 2020. As noted in Golder, 2020, the methodology utilized was consistent with the previous threat assessment completed for Wasaga Beach municipal wells.*

6.0 CLOSURE

We look forward to addressing any comments or questions the NVCA may have on the above information.

Sincerely,

Devin Hannan, P.Eng.
Associate, Environmental Engineer

John Piersol, M.Sc., P.Geo.
Associate, Hydrogeologist

DAH/JP/cdr

\\golder.gds\gal\barrie\active\2014\141-5404 township of clearview hydrog stayner\report\gw modelling\appendix b\1415404 appendix b sgbls checklist response(rev1).docx

REFERENCES

Golder, 2020. *Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Groundwater Modelling and Source Water Protection.* 1415404. October 2020.

Golder, 2018. *Township of Clearview, Stayner Long Term Water Supply, Schedule B Municipal Class EA, Water Supply Exploration Addendum.* 1415404. December 2018.

Golder, 2010. Town of Wasaga Beach, Source Water Protection Threat Assessment. 07-1170-0014 (4000). July 2010.

SGBLS, 2019. Assessment Report and Plan Amendments under s.34 of the Clean Water Act – Internal Process for Implementing Regulatory Requirements in the SGBLS Region. July 2019.

golder.com

Appendix C3

Stayner Water EA Addendum Technical Memorandum (Burnside, 2021)

R.J. Burnside & Associates Limited 3 Ronell Crescent Collingwood ON L9Y 4J6 CANADA
telephone (705) 446-0515 **fax** (705) 446-2399 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

Technical Memorandum

Date:	February 2, 2021	**Project No.:**	300044192.0000
Project Name:	Stayner Water EA Addendum		
Client Name:	Township of Clearview		
Submitted To:	Mike Rawn, Director of Public Works		
Submitted By:	Jennifer Georgas, P.Eng.		
Reviewed By:	Jeff Langlois, P.Eng., MBA		

On behalf of the Township of Clearview, R.J. Burnside & Associates Limited is completing an addendum to the "Township of Clearview Long Term Water Supply Municipal Class Environmental Assessment", completed in 2008, by R.J. Burnside & Associates Limited. The original EA encompassed numerous communities in Clearview; however, the Addendum is focusing on the community of Stayner only. The addendum has been triggered by hydrogeological (completed by Golder) investigations which have found that a viable groundwater source has been found north east of Stayner.

This memorandum focuses on the technical aspects of the addition of a well source and associated infrastructure to the Stayner water system. Please see the complete EA Addendum document for discussions on the environmental, social, cultural, etc., aspects of the site.

The existing Stayner system consists of four groundwater production wells, three pumphouses with treatment and a reservoir. Utilizing the groundwater source at Klondike Park Road will expand the existing groundwater system.

1.0 System Functionality

The existing system functions based on Airport Road reservoir levels. When the reservoir level reaches a certain set point, a well is turned on. As the reservoir levels continue to drop, additional wells come on line. It is expected that this type of control will translate to the new well site (Wells 5, 6,7 and 8). However, as Wells 5 to 8 would pump to a new reservoir at the new well site the high lift pumps drawing from the new reservoir would pump in response to level in the existing Airport Road reservoir. It is noted that the four wells include three duty wells and one standby. These details will be refined during detailed design.

Fire protection will continue to be provided by the existing Airport Road reservoir. However, additional fire pumps may be included at the reservoir site, to be confirmed at detailed design. At a minimum, during a 'maximum day plus fire' scenario, the well pumps would be on to continue to supply the domestic maximum day demands.

The current system demand does not require all three pumps to supply maximum day demand. However, as development progresses demands will increase. The pace of development will determine the requirement for additional flow volumes. The site could be built with all four wells functional, or the construction of the wells could be phased. If all four wells are constructed, controls will be required to ensure all wells are cycled so that the wells do not sit unused, as this can lead to corrosion and degrading of the well infrastructure.

2.0 System Demands

The historical demands are in Table 1 below.

Table 1: Historical Demands

Year	**Maximum Day Demand (m^3/day)**	**Maximum Day Demand (L/s)**
2015	2,844	32.9
2016	3,892	45.0
2017	3,280	38.0
2018	3,500	40.5
2019	3,303	38.2
5 Year Average	*3,364*	*38.9*

The current water supply in Stayner consists of four wells. The rated capacity of the wells is provided in Table 2.

Table 2: Rated Well Capacity

Well No.	**Capacity (L/s)**	**Capacity (m^3/day)**
1	15.15	1,309
2	30.30	2,618
3	15.15	1,309
4	15.15	1,309
Total	*75.75*	*6,545*

However, Well 2 and 4 are not able to supply the rated capacity. The actual total available system capacity of the well supply is approximately 64 L/s (5,500 m^3/day). The current supply exceeds the current demand.

There are a number of developments in various stages of approval which will require water supply. These are summarized in the Tables below.

Due to the variation in persons per unit and therefore demand in different types of housing (ie single family home, apartment, etc.) the number of units has been converted to the equivalent number of single-family detached dwellings. This is consistent with the approach used in the 2019 Development Charges Background Study (Watson & Associates). These Tables do not include developments in the pre-consultation stage of the process, infill, or any non-residential applications.

The MECP Guidelines identify typical average daily per capita water usage as ranging from 270 L/s to 450 L/p/day. Based on current usage data, the water usage rate in Stayner is less than 450 L/p/day; however, 450 L/s has been used conservatively Assuming 3.0 persons per unit (2019 Development Charges Study, Watson & Associates, Schedule 4 page A-7, for a single family dwelling), and a historical maximum day factor of 2.0, the maximum day water usage of single detached residential unit would be 2,700 L/unit/day (2.7 m^3/unit/day).

We note that these assumptions vary slightly from the original EA, as they have been updated to better reflect current information. These changes to the assumptions do not have a significant impact and do not change the preferred solution.

Table 3: Proposed Developments with Final Approval

Development Name	**Level of Municipal Approval**	**Residential Units**	**Single Detached Equivalent (SDE)**
Aspen Ridge Phase 2	Final Approval	64	51
Stayner Ridge Phase 2	Final Approval	55	55
Ridgeview	Final Approval	101 (Phase 2 – 36)	101
Quebec Street, Multiple Developments	Final Approval	39	39
Nottawasaga Station Phase 1	Final Approval	70	70
Total, Final Approval		*329*	*316*

Table 4: Proposed Development with Draft Plan Approval

Development Name	**Level of Municipal Approval**	**Residential Units**	**Single Detached Equivalent (SDE)**
Ashton Meadows Phase 1	Draft Plan Approval, Pre-Servicing Agreement Pending	224	224
Cityscape	Draft Plan Approval	200	183
Emerald Creek	Draft Plan Approval	198	172
Clearview Park	Draft Plan Approval	304	304
Manortown Homes	Draft Plan Approval	81	73

Development Name	Level of Municipal Approval	Residential Units	Single Detached Equivalent (SDE)
Nottawasaga Station, All Other Phases	Draft Plan Approval	925	858
Simcoe Gardens	Draft Plan Approval	18	14
Mamta – Margaret Street	Draft Plan Approval	57	57
211 North Street	Draft Plan Approval	36	34
Bridle Park	Draft Plan Approval	857	751
Total, Draft Plan Approval		*2,900*	*2670*

Table 5: Proposed Developments with Draft Plan Application

Development Name	Level of Municipal Approval	Residential Units	Single Detached Equivalent (SDE)
Clearview Gardens	Draft Plan Application	730	480
Ashton Meadows Phases 2 and 3	Draft Plan Application	173	173
Mamta (Airport Road and Margaret Street)	Draft Plan Application	107	76
Total, Draft Plan Application		*1,010*	*729*

The total number of SDE residential units at various stages of application is 3,715 units. Assuming a maximum day demand rate of 2.7 m^3/unit/day, this is equivalent to 10,030 m^3/day in additional demand required. The existing wells have an unused capacity of 2,136 m^3/day. This results in a deficit of supply of 7,894 m^3/day, or 91 L/s in the existing system. This assumes all wells are in service with no wells in reserve. Based on the estimated capacity of 40 L/s per new well, we recommend all wells be constructed (providing 120 L/s in capacity) to service the above developments. This will also provide some level of redundancy, should one of the wells be out-of-service for maintenance.

It should be noted that these demands are estimated based on the current development applications. There is additional undeveloped land within the settlement boundary which will ultimately require water supply when developed. The original EA provides calculations for this ultimate build-out scenario, and an estimated total maximum day flow requirement of 313 L/s. However, based on the current rate of development, it is expected that the new well site will be able to provide sufficient supply for many years. Per the 2019 Development Charges Background Study by Watson and Associates, the growth in Stayner is expected to be 3,257 units by 2039. Therefore, by these estimates, the new will site will provide adequate supply for the next 20 years or more.

3.0 Wells, Pumphouse and Reservoir

Per the Phase 1 Environmental Site Assessment completed by Golder, the existing structures on site include a building, motorhome, outhouse, and general building debris and granular fill piles. These structures have now been removed, including the completion of a survey of hazardous materials to ensure that any hazardous materials were identified and disposed of in the proper manner.

The new well site will include four drilled wells, and associated pumphouse and reservoir. The pumphouse will connect into the existing system through a watermain main on Concession 12, County Road 7, and Nottawasaga 27/28 Sideroad (County Road 96).

Per the Golder reports, the wells should be constructed a minimum of 100 m from the property boundaries such that Clearview can be in control of the land use activities within the wellhead protection area (WHPA-A). Individual wells with a diameter of 200 mm or 250 mm should be adequate to supply 40 L/s.

The pumps will be sized to provide the required flows at system pressures consistent with MECP recommendations and aligned with the existing Stayner pressure zone. The TDH of the pumps will be designed to match the hydraulic grade line of the existing Airport Road reservoir and will function in the same pressure zone. Submersible well pumps will pump the water into the provided storage, and highlift pumps will pump the water from storage into the distribution system. One pumphouse building will be used to house all highlift pumps and treatment systems. As noted in the Golder report the test well contained turbidity of 4-5 NTU which was attributed to iron being present in the range of 0.375 to 0.465 mg/L. It is assumed that the iron can be sequestered and that filtration to address turbidity will not be required. The assumed minimum level of treatment required is assumed to be 4 log inactivation of viruses which can be attained using chlorine disinfection alone. The pumphouse building will be equipped with chemical disinfection, and an iron sequestering system. An emergency generator will be provided, outside the pumphouse building. The building’s appearance will align with its surroundings and be similar to the existing Well 2 and 4 site. Please see Figure 1A and 1B for a preliminary layout.

Per the Golder investigation, the water level of the upper aquifer (non-supply aquifer) taken on June 25, 2019 was 5.18 mbgl. This will be taken into consideration when completing the detailed design of the depth of the reservoir. If possible, the bottom of the reservoir structure will be constructed above the groundwater level. If this is determined to be impractical, a groundwater pumping system can be implemented to protect the structural integrity of the building. The recorded water level in the lower aquifer (water supply aquifer) taken on June 25, 2019 was 6.9 mbgl. The reservoir will not be built this deep, to avoid the risk of depressurization. More details can be found in the Golder reports.

The pumphouse site will include a reservoir to provide the necessary chlorine contact time, as well as a storage volume designed to continue to provide water to the system should the wells be unavailable for a short duration, such as for maintenance. For the purposes of this EA, we have assumed a storage volume equivalent to twice the ultimate maximum day demand, which is equivalent to 5,700 m^3. In the case that the wells require maintenance or could not supply flow, the storage could supply the system temporarily. This will be refined during detailed design of the site.

We note that the site itself is quite large and provides flexibility of the building footprint when moving into the detailed design stage of the project.

The determination of costs for this option is based on the following design assumptions:

- Four drilled wells
- Four well pumps
- One pumphouse building
- Disinfection and iron-sequestering treatment
- Four high lift pumps
- On-site generator
- Ground level storage
- Chlorine contact facilities
- 8 km of 600 mm diameter watermain

4.0 Connecting Watermain

The existing wells supply 64 L/s. Per the current Golder investigations, the recommended maximum day flows generated from the well site are 120 L/s. The expected maximum day ultimate build-out for the community of Stayner is 313 L/s. As such, there is a long-term deficit of 129 L/s. As development in Stayner progresses in the long term and additional supply is required, there is a possibility that additional supply may be available at the new well site or in the general vicinity, to supplement this deficit. The connecting watermain would be required to convey this flow. Therefore, the connecting watermain has been sized for the ultimate build-out flow of 249 L/s (313 L/s less 64 L/s existing supply). This will ensure flexibility in the future when additional supply is required.

The connecting watermain has been sized based on headloss and velocity design criteria. Per MECP, velocities are not to exceed 3 m/s. The higher the headloss in the watermain, the larger the pumps required. MECP does not appear to have standards for headloss; however, the City of Toronto Design Standards state that the maximum allowable head loss is 2 to 5 m/1000 meters (translating to 0.002 to 0.005 m/m). The values below have been calculated in the section of connecting watermain from the well site to the Public Works building.

Table 6: Headloss in Connecting Watermain

Size (mm)	Flow (L/s)							
	40		80		120		249	
	m/m	Total (m)	m/m	Total (m)	m/m	Total (m)	m/m	Total (m)
450	0.00019	1.59	0.00069	5.76	0.0015	12.2	0.0057	47.1
500	0.00012	0.96	0.00042	3.45	0.00088	7.30	0.0034	28.2
600	0.000041	0.34	0.00015	1.22	0.00031	2.59	0.0012	10.0

Table 7: Maximum Velocity (m/s) in Connecting Watermain

Size (mm)	Flow (L/s)			
	40	80	120	249
450	0.25	0.50	0.76	1.57
500	0.20	0.41	0.61	1.27
600	0.14	0.28	0.42	0.88

The watermain alignment is illustrated in Figure 2.

5.0 Permits and Approvals

The following permits and approvals are expected to be required as a result of the development of the well site and the connecting watermain:

- Permit to Take Water (PTTW)
- Amendment to the Drinking Water Works Permit
- Amendment to the Source Water Protection Plan
- Form 1 – Watermain
- Consultation with the NVCA with respect to working within a Regulated Area
- Letter of Advice through submission of a Request for Review from the DFO

6.0 Cost Estimate

The estimated cost including engineering and contingencies, for this project is as follows:

5,700 m^3 Reservoir	$8,184,000
Raw Watermain (200 mm)	$156,600
Well Pumps and Booster Pumping Station	$7,235,000
Well Supply (Four Wells)	$1,720,000
Connecting Watermain (600 mm)	$13,800,000
Total	$31,095,600

R.J. Burnside & Associates Limited

Jennifer Georgas

Jennifer Georgas, P.Eng.
Project Engineer
JMG:sj

Enclosure(s) Figure 1A and 1B
Figure 2

044192 Tech Memo 210202.docx
2/2/2021 2:56 PM

N

0 40 80 120 160
Metres

BURNSIDE

Figure Title

NEW WELL SITE ALTERNATIVE

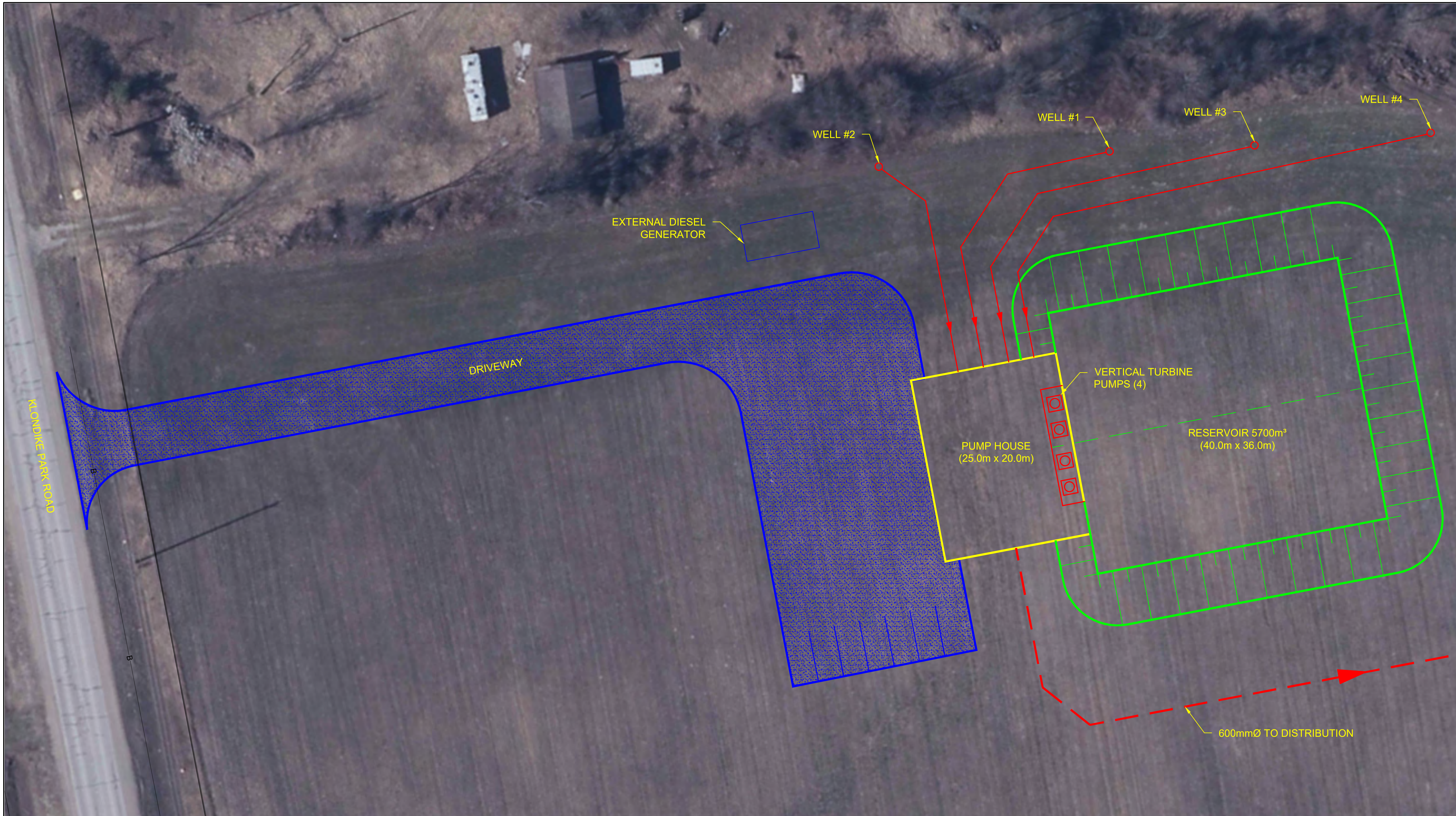
ADDENDUM TO SCH B MUNICIPAL CLASS E.A.
LONG TERM WATER SUPPLY FOR CLEARVIEW

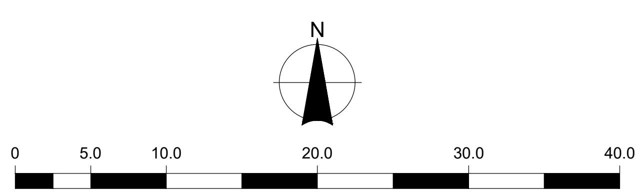
Client

TOWNSHIP OF CLEARVIEW

Drawn	Checked	Date	Figure No.
DMC		11/02/20	**FIG 1A**
Scale		Project No.	
1:2000		300044192	

File: \\collingwood\Shared Work Areas\044192-Stayner Water EA\03 ProductionDwg\044192 FIG-1X CONCEPTUAL PUMPHOUSE - LARGE SCALE.dwg Date Plotted: November 2, 2020 - 4:01 PM





BURNSIDE

Client

TOWNSHIP OF CLEARVIEW

Figure Title

NEW WELL SITE ALTERNATIVE

ADDENDUM TO SCH B MUNICIPAL CLASS E.A.
LONG TERM WATER SUPPLY FOR CLEARVIEW

Drawn	Checked	Date	Figure No.
DMC		11/02/20	**FIG 1B**
Scale		Project No.	
1:500		300044192	

File: \\collingwood\Shared Work Areas\044192-Stayner Water EA\03_ProductionDwg\044192_FIG-1X_CONCEPTUAL PUMPHOUSE.dwg Date Plotted: November 2, 2020 - 3:58 PM

N

0 400 800 1,200 1,600

Metres

LEGEND
TRANSMISSION WATERMAIN

BURNSIDE

Figure Title

NEW WELL SITE ALTERNATIVE

ADDENDUM TO SCH B MUNICIPAL CLASS E.A.
LONG TERM WATER SUPPLY FOR CLEARVIEW

Client

TOWNSHIP OF CLEARVIEW

Drawn	Checked	Date	Figure No.
DMC		19/08/12	**FIG 2**
Scale		Project No.	
1:500		300044192	

File: \\collingwood\Shared Work Areas\044192-Stayner Water EA\03 ProductionDwg\044192 FIG-1X CONCEPTUAL WATERMAIN - LARGE SCALE.dwg Date Plotted: January 22, 2020 - 4:36 PM

R.J. Burnside & Associates Limited