Consolidated Hydrogeological Study Report

Osaca Hillstreet Subdivision

County Road 65, Osaca, Ontario

D.M. Wills Project Number 22-11056

D.M. Wills Associates Limited
Partners in Engineering, Planning and
Environmental Services
Peterborough

February 2025

Prepared for:
Hillstreet Developments Ltd.
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Submissions Summary

Submission No.	Submission Title	Date of Release	Submissions Summary
1	Final Consolidated Hydrogeological Study Report	February 28, 2025	Final Submission to Client

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1.0 Introduction

D.M. Wills Associates Limited (Wills) was retained by Hillstreet Developments Ltd. c/o Larry MacDonell (Client) to conduct a Hydrogeological Study (Study) in support of the development of a residential subdivision (Proposed Development) on the property located at Pt Lot 27 Concession 5, in the village of Osaca, Ontario (Subject Property). The location of the Subject Property is shown on **Figure 1**.

The Study was requested by the Municipality of Port Hope (Pre-Consultation – Planning Review dated May 25, 2022) to confirm sewage servicing capabilities in context of the Proposed Development, and to confirm that adequate water supply is available. Furthermore, infiltration rates of the subsurface soils and shallow groundwater conditions were evaluated as input to the design of proposed stormwater management features and sewage disposal systems on the Subject Property.

Wills' initial investigations were completed in 2022 on the basis of a Preliminary Draft Plan prepared by D.G. Biddle & Associates Limited (Biddle), dated August 26, 2022, which considered 59 residential lots. Wills' initial investigative findings were summarized in the following document:

- Final Hydrogeological Study Report, Osaca Hillstreet Subdivision, County Road 65, Osaca, Ontario, D.M. Wills Project Number 22-11056, prepared for Hillstreet Developments Ltd. c/o Larry Macdonell, December 7, 2022 (Wills' 2022 Report)

Wills' 2022 Report concluded that the Proposed Development including 59 individual lots would have an impact on groundwater quality that would not satisfy the requirements of the Ministry of Environment, Conservation, and Parks (MECP) *Guideline D-5-4 Individual Onsite Sewage Systems: Water Quality Impact Risk Assessment* (Guideline D-5-4).

Additional investigations were completed by Wills in 2023, including but not limited to, three pumping tests in newly constructed O. Reg. 903 Water Supply Wells, hydrogeological modelling, and an updated Groundwater Impact Assessment. These additional investigations were completed to confirm sewage servicing capabilities and water supply availability following modifications to the Proposed Development. The findings of these additional investigations were summarized in the following document:

- Revised Final Hydrogeological Study Report, Osaca Hillstreet Subdivision, County Road 65, Osaca, Ontario, D.M. Wills Project Number 22-11056, prepared for Hillstreet Developments Ltd. c/o Larry Macdonell, April 2, 2024, (Wills' 2024 Report)

Wills' 2024 Report included:

- A groundwater availability assessment on the basis of a preliminary site plan prepared by Biddle, dated October 15, 2023, which considered 48 residential lots
- An updated Groundwater Impact Assessment on the basis of a preliminary site plan prepared by Biddle, dated February 21, 2024, which considered 40 residential lots

Wills' 2024 Report was peer reviewed by BluMetric Environmental Inc. (BluMetric) on behalf of the Municipality of Port Hope. BluMetric's comments are summarized in the following document:

- Additional Peer Review of Hydrogeology Study – Second Submission, Proposed Residential Development, 5868 County Road 65, Osaca, Project Number 230352, prepared by Ian Macdonald, M.Sc., P.Geo. for the Municipality of Port Hope c/o Ms. Merepeza, May 17, 2024

To address Blumetric's peer review comments, Wills conducted additional field studies and groundwater modelling for the Subject Property, and prepared the following documents:

- Revised Final Hydrogeological Study Report_v2, Osaca Hillstreet Subdivision, County Road 65, Osaca, Ontario, D.M. Wills Project Number 22-11056, prepared for Hillstreet Developments Ltd. c/o Larry Macdonell, July 17, 2024, (Wills' 2024 Revised Report)
- Osaca Hillstreet Subdivision, Northumberland County, Ontario, Hydrogeological Study Report, Answer to BluMetric Environmental following 2nd submission, D.M. Wills Associates Project No. 22-11056, for Hillstreet Developments Ltd. c/o Larry Macdonell, July 17, 2024 (Wills' Response Memo)
- Osaca Hillstreet Subdivision, Northumberland County, Ontario, Hydrogeological Study Report, Addendum #1, D.M. Wills Associates Project No. 22-11056, for Hillstreet Developments Ltd. c/o Larry Macdonell, December 11, 2024 (Wills' Addendum #1)

Prior to the preparation of Wills' Addendum #1, Wills completed a Water Balance Assessment (August 8, 2024) which included a Groundwater Impact Assessment to determine the maximum number of lots that could be supported from a sewage servicing perspective. Based on this assessment, it was concluded that the Subject Property could safely accommodate 38 residential lots.

Wills' Addendum #1 included an updated groundwater availability assessment on the basis of a preliminary site plan prepared by Biddle, dated August 15, 2024, which considered 38 residential lots.

This Consolidated Hydrogeological Study Report summarizes Wills' investigative findings from the initial investigations completed in 2022 to those summarized in Wills' Addendum #1 (December 2024).

The successive preliminary draft plans prepared by Biddle which served as a basis for Wills' Study are provided in **Appendix A-1** through **A-4.** For clarity, the current Proposed Development is presented on the Preliminary Draft Plan dated August 15, 2024, and is included in **Appendix A-4**.

Wills' Study was conducted on the basis of the MECP Guideline D-5-4 and *Guideline D-5-5 Private Wells: Water Supply Assessment* (Guideline D-5-5).

2.0 Scope of Work

Wills' approved Scope of Work to complete the Study included the following:

- A review of available Ministry of Environment, Conservation, and Parks (MECP) well records within 500 meters (m) of the Subject Property to provide a preliminary characterization of the local hydrogeological conditions.
- Prior to initiating field investigations, public and private utility services locates were obtained and reviewed by Wills staff. A Site-Specific Health and Safety Plan and Field Work plan were prepared to ensure safe and efficient fieldwork programs.
- Steenburgh Sand and Gravel (Steenburgh) excavated 12 test pits on the Subject Property to a depth of 3.0 metres below ground (mbg) between September 23 and September 26, 2022.
- Five drive-point monitor wells were installed in the base of select test pits to monitor groundwater levels above a depth of 3 mbg.
- Eight single ring infiltrometers were installed on the Subject Property to determine representative infiltration rates for stormwater management and sewage disposal system design between September 26 and September 27, 2022.
- Retained soils samples were reviewed by Wills prior to submitting select samples to PRI Engineering (PRI), a Canadian Certified Independent Laboratory (CCIL) for analysis of Particle Size Distribution and percolation time estimation.
- Static groundwater level measurements were recorded on October 5, 2022, December 5, 2023, September 9, 2024, and September 27, 2024, in three monitor wells installed by Cambium Inc. (Cambium)on the Subject Property in 2022 and identified BH101-22, BH-107-22 and BH110-22. Groundwater was found at depths ranging from 2.33 to 2.99 mbg.
- Herb Lang Well Drilling Ltd. (HLWD) conducted a 6-hour duration pumping test on six newly installed Ontario Regulation (O. Reg.) 903 Water Supply Wells on the Subject Property, including:
  - In wells identified as A377795, A377796 and A377799 on October 31, November 2, and November 8, 2023, respectively. These wells were installed in 2023 at depths ranging from approximately 10 to 12 mbg.
  - In wells identified as A395881, A395882, and A395883 on September 9, 10 and 11, 2024, respectively. These wells were installed in 2024 at depths ranging from 23.77 mbg (A395881) to approximately 48.50 mbg (A395882 and A395883).
  - The pumping tests were conducted to determine production yield, maximum pumping rate, well recovery, groundwater quality, the potential for interference with existing neighbouring groundwater taking activities as well as future pumping activities on-site.
- Two groundwater samples were collected from each of the newly installed O. Reg. 903 Water Supply Wells during the pumping tests (at the 1-hour and 6-hour

pumping test intervals) and submitted to SGS Canada Inc. (SGS) for analysis of select physical, chemical, and biological parameters for comparison to the Ontario Drinking Water Quality Standards (ODWQS).

- During each of the pumping tests, real-time data logging technology (Solinst Level Loggers) was employed to record the drawdown and groundwater level fluctuations in the pumping well, as well as the response to pumping in all the other existing on-site O. Reg. 903 Water Supply Wells at the time of the test. In addition to the O. Reg. 903 Water Supply Wells, the groundwater level fluctuations were monitored in:
    - The existing dug well on the neighboring property located 5868 County Road 65, Port Hope, ON L1A 3V5, during the pumping tests completed in October/November 2023
    - Monitor wells BH107-22 and BH110-22 during the pumping tests completed in September 2024
- 24 groundwater samples were collected from wells installed on the Subject Property and submitted to SGS for nitrate analysis to inform background nitrate concentration, including:
    - Nine groundwater samples from wells installed in the surficial aquifer to depths ranging from 3.00 to 5.79 mbg, including:
        - Three samples from wells MW22-08, BH107-22 and BH110-22 on October 5, 2022
        - Three samples from wells BH101-22, BH107-22 and BH110-22 on December 5, 2023
        - Three samples from wells BH101-22, BH107-22 and BH110-22 on September 27, 2024
    - 15 groundwater samples from O. Reg. 903 Water Supply Wells installed in the deeper aquifers identified on the Subject Property including:
        - Six samples from wells A377795, A377796 and A377799 (two per well), in October/November 2023, during the pumping tests
        - Three additional samples from wells A377795, A377796 and A377799 in September 2024
        - Six samples from wells A395881, A395882 and A395883 (two per well), in September 2024, during the pumping tests
- Groundwater modelling was used to evaluate the pumping test data with respect to groundwater availability and the potential for post-development interference between on-site and neighbouring water users.
- Assessment of the Subject Property's capacity to support private on-site sewage disposal systems (Groundwater Impact Assessment).
- Evaluation of Wills' desktop review and field investigations findings, and preparation of this Consolidated Hydrogeological Study Report.

Boreholes, monitor wells, O. Reg. 903 Water Supply Wells, test pits, and infiltration test locations are shown on **Figure 2a** and **Figure 2b**.

3.0 Subsurface Investigation

Test pit and infiltration test locations completed between September 23 and September 27, 2022, are shown on **Figure 2a**.

Representative soil samples were submitted to PRI for analysis of Particle Size Distribution and percolation time estimation. Laboratory testing results were compared to the Ministry of Municipal Affairs and Housing, Building and Development Branch (MMAH) Supplementary Standard SB-6 – Percolation Time and Soil Descriptions Table 2 & Table 3 values (Ontario Building Code [OBC], 2012) (OBC Table 2 & OBC Table 3). Percolation times are discussed in **Section 4.0**.

Test pit logs detailing the encountered subsurface conditions are included in **Appendix B**. Boreholes advanced for the purpose of installing infiltrometers were completed using an excavator-mounted auger and were positioned adjacent to existing test pits where possible as a means of confirming the underlying soils. These boreholes were not logged or sampled.

3.1 Soil Profile Summary

The Subject Property is located in the Physiographic Region of the Iroquois Plain (*The Physiography of Southern Ontario, Chapman and Putnam, 1984*), which is characterized by lacustrine deposits including sand plains and beaches associated the former Lake Iroquois. Ontario Geological Survey (OGS) mapping suggests that surficial geology on the Subject Property consists of alluvial deposits.

The results of the test pit program indicate the overburden is generally aligned with published mapping and includes a surficial layer of silty sand topsoil underlain by sand with slight variations in gravel, silt, and clay content. A generally north-south trending band of silt and clay rich soils was observed on the western side of the Subject Property at TP22-10, TP22-08, and TP22-11. This material was encountered at a depth ranging from approximately 1.3 to 1.7 mbg and extended to the test pit termination depths of approximately 3.0 mbg.

Seven laboratory particle size distribution analyses were completed on the collected soil samples. The analytical results are summarized in **Table 1** on the basis of the Unified Soil Classification System (USCS). Certificates of Analysis for the physical soil analysis are included in **Appendix C**.

Table 1– Summary of Particle Size Distribution

Test Pit ID	Sample No.	Sample Depth (mbg)	Soil Unit	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
TP22-01	GS-01	1.4	Sand	3	93	3	1
TP22-02	GS-02	2.9	Sand	3	94	3	0
TP22-03	GS-03	1.0	Sand	0	97	3	0
TP22-05	GS-01	1.7	Sand	2	78	18	2
TP22-08	GS-02	2.0	Silt & Clay	0	4	56	40
TP22-10	GS-02	1.9	Silt & Clay	0	3	62	35
TP22-11	GS-02	2.7	Silt & Clay	0	4	71	25

3.2 Bedrock

Based on the MECP well records associated with O. Reg. 903 Water Supply Wells A395882 and A395883, bedrock was encountered at a depth of 43.6 mbg at the location of well A395882 and 43.3 mbg at the location of well A395883. The well records suggest the bedrock on the Subject Property consists of limestone material. This information is consistent with nearby MECP well records reviewed for the Study, as summarized in **Section 5.1**.

3.3 Groundwater

3.3.1 Shallow Groundwater Levels

Groundwater level monitoring was conducted at the five-drive point monitor well locations, as well as three on-site monitor wells installed by Cambium and detailed in their November 2022 report titled *Geotechnical Investigation – Proposed Residential Development, 5868 County Road 65, Port Hope, ON* (Geotechnical Report). **Figure 2a** shows the locations of the monitor wells included in Wills' shallow groundwater level monitoring. **Table 2** summarizes the static water levels measured by Wills on the Subject Property since 2022. Groundwater elevations for select monitor wells were inferred using the relative elevations provided in the Geotechnical Report and are referenced to a local assumed benchmark (200 masl).

Table 2 – Shallow Groundwater Static Level

Well ID	Installation year	Well depth (mbg)	Ground Elevation (masl)	October 5, 2022		December 5, 2023		September 9, 2024		September 27, 2024	
				GW level (mbg)	GW Elevation (masl)	GW level (mbg)	GW Elevation (masl)	GW level (mbg)	GW Elevation (masl)	GW level (mbg)	GW Elevation (masl)
MW22-01	2022	3.00	--	2.71 (September 27, 2022)	--	--	--	--	--	--	--
MW22-02	2022	3.00	--	dry	--	--	--	--	--	--	--
MW22-05	2022	3.00	--	2.58	--	--	--	--	--	--	--
MW22-08	2022	3.00	--	2.63	--	--	--	--	--	--	--
MW22-11	2022	3.00	--	2.34	--	--	--	--	--	--	--
BH101-22	2022	6.20	199.90	2.66	197.24	2.83	197.07	--	--	2.66	197.24
BH107-22	2022	5.94	200.40	2.54	197.86	2.85	197.55	2.33	198.07	2.48	197.92
BH110-22	2022	5.97	198.70	2.58	196.12	2.99	195.71	2.43	196.27	2.57	196.13

*mbg – metres below ground masl – metres above sea level, measured against an assumed datum (local benchmark)

Additional measurements during spring and at the end of summer are included in Wills' proposed Monitoring Program described in **Section 7.0**.

3.3.2 Groundwater Flow Direction and Hydraulic Gradients

Shallow groundwater flow direction was calculated using Wills' field measurements and assumed monitor well elevations provided in the Geotechnical Report. Based on this information, Wills infers the shallow groundwater flows direction to be to the southeast on the Subject Property. The steepest hydraulic gradient was calculated between BH107-22 and BH110-22 at:

- 0.0043 on October 5, 2022
- 0.0046 on December 5, 2023
- 0.0044 on September 9, 2024
- 0.0044 on September 27, 2024

Shallower hydraulic gradients between BH101-22 to BH110-22 and from BH107-22 to BH101-22 were calculated to be:

- 0.0019 and 0.0016 respectively, on October 5, 2022
- 0.0024 and 0.0012 respectively, on December 5, 2023
- 0.0019 and 0.0017 respectively, on September 27, 2024

The inferred groundwater flow direction is shown in **Figure 2a**.

4.0 In-Situ Infiltration Testing

In-situ Infiltration tests were conducted at select locations on the Subject Property to determine representative shallow infiltration rates for stormwater management and sewage disposal system design. Infiltration testing locations are shown on **Figure 2a**.

The tests were conducted at depths ranging from 0.6 to 2.1 mbg and were completed using 51-millimetre open-end single ring infiltrometers. Water levels within the infiltrometer casings were manually monitored using a Solinst water level tape. The infiltration tests were conducted for a maximum of 96 minutes, with water levels measured at 30-second intervals for the first 5-minutes and increasing intervals as the test progressed. Detailed calculations and supporting infiltration graphs are provided in **Appendix D.**

4.1 Permeability and Percolation Time

Table 3 summarizes the permeability and percolation times of the tested soils on the basis of the in-situ testing, and laboratory results compared to OBC Table 2 and Table 3.

Table 3 – Permeability and Percolation Time Summary

ID	Sample ID	In-situ Testing	Physical Soil Testing Results	Percolation Range (OBC Table 2 and 3)	Laboratory Estimated Percolation (T)	Permeability (Inferred Soil Envelope)
TP22-01 Proxy for INF-01	GS-01	T= 0.42 min/cm or 1429 mm/hr	SP envelope	T = 2 – 8 min/cm or 75 – 300 mm/hr	T = 6 min/cm	Medium
TP22-02 Proxy for INF-02	GS-02	T= 0.49 min/cm or 1224 mm/hr	SP envelope	T = 2 – 8 min/cm or 75 – 300 mm/hr	T = 7 min/cm	Medium
TP22-03 Proxy for INF-03	GS-01	T=0.35 min/cm or 1714 mm/hr	SP envelope	T = 2 – 8 min/cm or 75 – 300 mm/hr	T = 6 min/cm	Medium
TP22-05 Proxy for INF-05	GS-01	T=0.22 min/cm or 2727 mm/hr	SM envelope	T = 8 – 20 min/cm or 30 – 75 mm/hr	T = 12 min/cm	Medium to Low
INF-06	N/A	T=0.78 min/cm or 769 mm/hr	SM envelope	T = 8 – 20 min/cm or 30 – 75 mm/hr	N/A	Medium to Low
INF-07	N/A	T=0.33 min/cm or 1818 mm/hr	SP envelope	T = 2 – 8 min/cm or 75 – 300 mm/hr	N/A	Medium
INF-08A	N/A	T=1.11 min/cm or 540 mm/hr	SP envelope	T = 2 – 8 min/cm or 75 – 300 mm/hr	N/A	Medium
TP22-08 Proxy for INF-08B	GS-02	T= 0 min/cm or 0 mm/hr	OH envelope	T = > 50 min/cm or >50 mm/hr	T = > 50 min/cm	Unacceptable
INF-11	N/A	T= 0.81 min/cm or 740 mm/hr	SM envelope	T = 8 – 20 min/cm or 30 – 75 mm/hr	N/A	Medium to Low

Notes: 1. SM envelope –silty sands, sand-silt mixtures
SP envelope – poorly graded sands, gravelly sand, little or no fines
OH envelope – Organic clays of medium to high plasticity, organic silts

Wills provides the following considerations with respect to the proposed stormwater management and sewage disposal system designs:

- The encountered soils are anticipated to generally fall within the SP and SM soils envelopes. Sewage disposal system and stormwater management feature design should take into account the silt and clay rich soils identified at TP22-08, TP22-10, and TP22-11 that were encountered between 1.3 to 3.0 mbg. Based on INF-08B, these soils do not have an acceptable permeability on the basis of the OBC.
- A Subsurface Infiltration Plan showing the inferred contact between these two distinct shallow soil units is included as **Figure 3**. Subsurface stratigraphy was inferred from the findings of Wills' test pit program and considers soil properties above a depth of 3.0 mbg.
- Within the sand to silty sand areas identified in red in **Figure 3**, Wills recommends using the mid point of the T-time ranges provided in the OBC for stormwater management and sewage disposal system design on the Subject Property. Although these T-time values (mid range) are slower than that measured in the in-situ tests, Wills considers these conservative for the purpose of design and should account for any lateral or vertical variation in infiltration rates.
- Within the clayey silt to silt and clay area identified in green in **Figure 3**, Wills recommends that raised tile beds be used for septic systems installed in this area, and minimum setback distances be evaluated accordingly.

5.0 Groundwater Availability

Wills' preliminary water supply assessment included a review of nearby MECP Well Records and historic hydraulic testing on the neighboring property to the south. Additionally, on-site testing was completed by Wills in six newly installed O. Reg. 903 Water Supply Wells to confirm that adequate groundwater supply and quality is available to the Proposed Development. Pumping tests were conducted as follows:

- In October/November 2023 in wells identified as A377795, A377796 and A377799 installed in 2023 at depths ranging from approximately 10 to 12 mbg.
- In September 2024 in wells identified as A395881, A395882, and A395883 installed in 2024 at depths ranging from 23.77 mbg (A395881) to approximately 48.50 mbg (A395882 and A395883).

5.1 MECP Water Well Record Survey

Wills completed a desktop evaluation of MECP Well Records to assist in characterizing the local hydrogeological conditions within 500 m of the Subject Property. The MECP Well Location Plan showing the relative locations of the MECP wells and their respective identifiers is included as **APP- E1** in **Appendix E**. Details for each MECP Well are summarized as **APP-E2** in **Appendix E**.

Nine well records were identified within the 500 m search radius and are summarized below.

- Seven wells were designated as domestic use and two of the wells had an unknown use.
    - One of the unknown uses had incomplete details on the well record, and the other was in relation to a clean-out of sand and gravel from the well bore.
- Five wells were installed in overburden material and four wells were installed in bedrock.
- Well depths ranged from approximately 7.6 to 46 mbg for the wells installed in overburden (25.5 mbg average), and from 34.1 to 44.8 mbg for those installed in bedrock (40.9 mbg average).
- Static water levels ranged from approximately 5.5 to 9.1 mbg for the wells that were installed in overburden (6.9 mbg average), and from 8.5 to 29 mbg for those installed in bedrock (18.3 mbg average).
- The recommended pumping rates ranged from approximately 7.6 to 30.2 litres per minute (L/min) for the overburden wells (19.9 L/min average), and from 3.8 to 37.8 L/min for the bedrock wells (20.2 L/min average).

Based on Wills review, a viable aquifer is present on lands adjacent to the Subject Property. Several wells directly north of the Subject Property and directly west of the 500 m buffer (within the community of Osaca), are dug wells that are screened within a shallow sand layer. These wells are less useful for inferring available water supply as they are non-compliant with Ontario Regulation 903 with respect to the depth of construction.

The most useful information can be inferred from wells to the south and southeast of the Subject Property, which all intercept a productive aquifer directly above, or within the bedrock stratum. Overburden wells in this area are generally screened within a coarse sand and gravel layer, and have recommended pumping rates between approximately 15 and 30 L/min. Adjacent bedrock wells are noted as supplying fresh groundwater with recommended pumps rates that range from approximately 19 to 38 L/min. Based on the short-term pumping test results provided on the Well Records, all of these Wells satisfy the minimum yield requirement of 13.7 L/min (four bedroom dwelling) provided in the MECP *Guideline D-5-5 Private Wells: Water Supply Assessment* (*Guideline D-5-5*).

Based on the proximity of these wells to the Subject Property, it is likely that the hydrogeological/aquifer conditions extend north below the Subject Property, provided that the underlying bedrock structure and overburden deposits are similar in nature.

5.2 Historic Groundwater Supply Evaluation

Three of the water wells included in Wills' MECP records search were subject to long-term pumping tests and detailed in the report titled *Groundwater Supply Assessment Report – Hope Concession 5, Part Lot 27 County Road No. 65*, prepared by Ted Rannie M.Sc., P. Geo in September 2018 (2018 Report). This report was prepared to support the development of a 20-lot subdivision on lands directly south of the Subject Property. The wells included in this assessment were MECP Well ID 7314568 (overburden), 7314570 (bedrock), and 7314569 (overburden).

The 2018 Report concluded the following:

- The wells screened in overburden (coarse gravel layers) were confirmed to have high K (hydraulic conductivity) values ($2x10^{-2}$ m/s to $8x10^{-1}$ m/s), quickly stabilizing drawdowns, and impressive recovery characteristics (94 – 95% recovery in 75 min and 60 min).
- The well screened in bedrock had a K value 3 orders of magnitude less than the overburden wells ($2x10^{-5}$ m/s), however, also showed impressive recovery (88% recovery in 60 min).
- Groundwater testing results indicated relatively good overall chemical quality, which would require commercial water treatment for several aesthetic parameters.
- Off-site impacts to neighboring water users or surface water resources were not expected in view of the large available drawdown in the tested wells.
- Adequate groundwater supply was inferred for the 20-lot development on the basis of the long duration pumping test results at the three well locations.
- The permeable overburden gravel layers were determined to have the best potential for groundwater source on the property considered.

The results of the 2018 Report speak favorably to the prospect of adequate water supply and quality on the Subject Property. To confirm Wills' preliminary findings, on-site testing was completed by Wills in six newly installed O. Reg. 903 Water Supply Wells in October/November 2023, and September 2024 as presented in the following sections.

5.3 2023 Pumping tests

Herb Lang Well Drilling Ltd. (HLWD) installed 3 new O.Reg. 903 Water Supply Wells (MECP Well ID A377795, A377796 and A377799) on the Subject Property on October 17, October 12 and October 6, 2023, respectively. The location of these wells is shown on **Figure 2b** and the corresponding MECP Well Records are included in **Appendix F**.

A 6-hour pumping test was conducted in each of the three wells on October 31 (A377795), November 2 (A377796) and November 8 (A377799), 2023. The pumping tests were conducted to confirm the performance of the wells over sustained pumping activity, evaluate the cumulative effect of future on-site pumping activities on groundwater availability, evaluate the potential for interference with onsite and neighboring groundwater taking activities, and to enable the collection of groundwater samples for quality analysis.

During each pumping test, drawdown and groundwater level fluctuations were monitored using:

- Solinst Level Loggers and confirmatory manual measurements in the newly installed O. Reg. 903 Water Supply Wells (A377795, A377796 and A377799)
- Manual measurements using a Solinst water level tape in the existing dug well on the neighbor's property located 5868 County Road 65, Port Hope, ON L1A 3V5, shown on **Figure 2a**. It is noted that measurements in the neighbor's well were taken through an access port in concrete casing, slightly above ground surface. Due to lack of better access to the well and interaction with the pumping equipment present in the well, the well depth could not be confirmed.

5.3.1 A377795 Well Test

Following installation of the level loggers, pumping started at an initial rate of 18.9 L/min (i.e. 5 GPM US). The pumping rate was increased to 37.8 L/min (i.e. 10 GPM US) after 7 minutes of pumping, then to 45.4 L/min (i.e. 12 GPM US) after 14 minutes and was maintained at that rate until completion of the 6-hour long test.

Well details, including static water levels measured prior to the initiation of the pumping test, are summarized in **Table 4**.

Table 4– A377795 Well Pumping Test Details

			Date:	Oct. 31, 2023
Well ID	**Well Depth (mbtop)**	**Well Depth (mbg)**	**Stick up**	**Static Water Level (mbg)**
Pumping Well				
A377795	11.70	11.19	0.51 mag	3.40
Observation Well				
A377796	12.24	11.64	0.60 mag	3.03
A377799	10.32	9.71	0.61 mag	3.08
Neighbor's well	unknown	unknown	0.13	4.58

mbtop – metres below top of pipe, **mbg** – metres below ground, **mag** – metres above ground

Hydrographs for the Pumping Well and Observation Wells are included in **Appendix G.**

Pumping test details are summarized in **Table 5** below.

Table 5– Pumping Test Summary Well A377795

	Pumping Rate (L/min)	Time (minutes)	Max Drawdown (m)	Stabilization Depth (mbg)	Cumulated Volume (L)
Step Test	18.9	7	1.07	4.47	132.3
	37.8	7	1.82	5.22	396.9
Constant Rate	45.4	346	2.33	5.73	16,105.3
Recovery Time			**% Recovery**		
3.5 minutes			90%		

The following observations are provided with respect to the A377795 well pumping test results:

- The pumping rate applied for the majority of the test (346 minutes) represents more than twice the peak demand rate considered in MECP Guideline D-5-5 for a residential lot (18.75 L/min).
- Water levels monitored at Observation Wells A377796 and A377799 showed limited response to the pumping activity, dropping approximately 0.02 m and 0.03 m respectively.
- Water levels monitored at the neighbor's dug well showed limited fluctuations with a maximum measured drawdown of 0.10 m. These limited fluctuations are attributed to the use of the well by its owners during the test.
- 90% recovery was observed in the pumping well within 4 minutes of stopping the pump.

Potential interactions between pumping activities both on the Subject Property and neighboring properties are discussed further in **Section 5.5**.

5.3.2 A377796 Well Test

Following installation of the level loggers, pumping started at an initial rate of 18.9 L/min (i.e. 5 GPM US). The pumping rate was increased to 45.4 L/min (i.e. 12 GPM US) after 14 minutes of pumping then decreased to 37.8 L/min (i.e. 10 GPM US) after 16 minutes and was maintained at that rate until completion of the 6-hour long test.

Well details, including static water levels measured prior to the initiation of the pumping test, are summarized in **Table 6**.

Table 6 – A377796 Well Pumping Test Details

			Date:	Nov. 2, 2023
Well ID	**Well Depth (mbtop)**	**Well Depth (mbg)**	**Stick up**	**Static Water Level (mbg)**
Pumping Well				
A377796	12.24	11.64	0.60 mag	3.04
Observation Well				
A377795	11.70	11.19	0.51 mag	3.26
A377799	10.32	9.71	0.61 mag	3.09
Neighbor's well	unknown	unknown	0.13	4.64

Hydrographs for the Pumping Well and Observation Wells are included in **Appendix G.**

Pumping test details are summarized in **Table 7**.

Table 7– Pumping Test Summary Well A377796

	Pumping Rate (L/min)	**Time (minutes)**	**Max Drawdown (m)**	**Stabilization Depth (mbg)**	**Cumulated Volume (L)**
Step Test	18.9	14	2.14	5.18	264.6
	45.4	2	4.36	7.40	355.4
Constant Rate	37.8	344	4.17	7.21	13,358.6
Recovery Time			**% Recovery**		
6 minutes			90%		

The following observations are provided with respect to the A377796 well pumping test results:

- The pumping rate applied for the majority of the test (344 minutes) represents more than twice the peak demand rate considered in MECP Guideline D-5-5 for a residential lot (18.75 L/min).
- Water levels monitored at Observation Wells A377795 and A377799 showed limited response to the pumping activity, dropping approximately 0.01 m and 0.02 m respectively.
- Water levels monitored at the neighbor's dug well showed limited fluctuations with a maximum measured drawdown of 0.02 m. These limited fluctuations are attributed to the use of the well by its owners during the test.
- 90% recovery was observed in the pumping well within 6 minutes of stopping the pump.

Potential interactions between pumping activities both on the Subject Property and neighboring properties are discussed further in **Section 5.5**.

5.3.3 A377799 Well Test

Following installation of the level loggers, pumping started at an initial rate of 18.9 L/min (i.e. 5 GPM US). The pumping rate was increased to 37.8 L/min (i.e. 10 GPM US) after 4 minutes of pumping, then to 45.4 L/min (i.e. 12 GPM US) after 12 minutes and was maintained at that rate until completion of the 6-hour long test.

Well details, including static water levels measured prior to the initiation of the pumping test, are summarized in **Table 8**.

Table 8– A377799 Well Pumping Test Details

			Date:	**Nov. 8, 2023**
Well ID	**Well Depth (mbtop)**	**Well Depth (mbg)**	**Stick up**	**Static Water Level (mbg)**
Pumping Well				
A377799	10.32	9.71	0.61 mag	3.19
Observation Well				
A377795	11.70	11.19	0.51 mag	3.29
A377796	12.24	11.64	0.60 mag	3.08
Neighbor’s well	unknown	unknown	0.13	5.21

Hydrographs for the Pumping Well and Observation Wells are included in **Appendix G.**

Pumping test details are summarized in **Table 9**.

Table 9– Pumping Test Summary Well A377799

	Pumping Rate (L/min)	**Time (minutes)**	**Max Drawdown (m)**	**Stabilization Depth (mbg)**	**Cumulated Volume (L)**
Step Test	18.9	4	0.88	3.89	75.6
	37.8	8	1.62	4.81	378
Constant Rate	45.4	348	2.06	5.25	16.177.2
Recovery Time			**% Recovery**		
3 minutes			90%		

The following observations are provided with respect to the A377799 well pumping test results:

- The pumping rate applied for the majority of the test (348 minutes) represents more than twice the peak demand rate considered in MECP Guideline D-5-5 for a residential lot (18.75 L/min).
- Water levels monitored at Observation Wells A377795 and A377796 showed limited response to the pumping activity, dropping approximately 0.03 m and 0.04 m respectively.
- Water levels monitored at the neighbor's dug well showed limited fluctuations with a maximum amplitude of 0.08 m. The lowest groundwater level was measured before pumping started. These limited fluctuations are attributed to the use of the well by its owners during the test.
- 90% recovery was observed in the pumping well within 3 minutes of stopping the pump.

Potential interactions between pumping activities both on the Subject Property and neighboring properties are discussed further in **Section 5.5**.

5.4 2024 Pumping tests

HLWD installed three O. Reg. 903 Water Supply Wells (A395881, A395882 and A395883) on the Subject Property on August 8, August 6 and July 31, 2024, respectively. The location of these wells is shown on **Figure 2b** and the corresponding MECP Well Records are included in **Appendix F**.

Wells A395882 and A395883 were installed in bedrock at a depth of approximately 49 mbg, and A395881 was installed in a gravel layer at a depth of approximately 24 mbg.

A 6-hour duration pumping test was conducted in each of the three wells on September 9 (A395882), September 10 (A395883) and September 11 (A395881), 2024. The pumping tests were conducted to confirm the performance of the wells over sustained pumping activity, evaluate the cumulative effect of future on-site pumping activities on groundwater availability, the potential for interference with onsite and neighboring groundwater taking activities, and to enable the collection of groundwater samples for quality analysis.

During each pumping test, drawdown and groundwater level fluctuations were monitored using:

- Solinst Level Loggers and confirmatory manual measurements in the O. Reg. 903 Water Supply Wells installed in 2024 (A395881, A395882 and A395883) and the O. Reg. 903 Water Supply Wells installed in 2023 (A377795, A377796 and A377799).
- Manual measurements using a Solinst water level tape in monitor wells BH107-22 and BH110-22, installed by Cambium in 2022 at a depth of approximately 6 mbg.

5.4.1 A395882 Well Test

Following installation of the level loggers, pumping started at an initial rate of 18.9 liters per minute (L/min) (5 US gallons per minute [GPM]). Considering the rapid dewatering of the well observed while pumping at this rate, the pumping rate was decreased to 15.1 L/min (4 GPM US) after 12 minutes of pumping, then to 11.4 L/min (i.e. 3 GPM) after 23 minutes of pumping, and was maintained at that rate until completion of the test. Pumping was stopped after 420 minutes. Well details, including static water levels measured prior to the initiation of the pumping test, are summarized in **Table 10**.

Table 10 – A395882 Well Pumping Test Details

			Date:	**Sept. 9, 2024**
Well ID	**Well Depth (mbtop)**	**Well Depth (mbg)**	**Stick up (mag)**	**Static Water Level (mbg)**
Pumping Well				
A395882	49.10	48.49	0.61	9.54
Observation Wells				
A395883	49.10	48.50	0.60	9.80
A395881	24.40	23.77	0.63	10.43
A377795	11.70	11.19	0.51	2.94
A377796	12.24	11.64	0.60	2.72
A377799	10.32	9.71	0.61	2.81
BH107-22	6.76	5.79	0.97	2.33
BH110-22	6.58	5.67	0.91	2.43

mbtop – metres below top of pipe, **mbg** – metres below ground, **mag** – metres above ground

Hydrographs for the Pumping Well and Observation Wells are included in **Appendix G.** Pumping test details are summarized in **Table 11** below.

Table 11 – Pumping Test Summary Well A395882

	Pumping Rate (L/min)	Duration (minutes)	Max Drawdown (m)	Stabilization Depth (mbg)	Cumulated Volume (L)
Step Test	18.9	12	6.16	No stabilization	226.8
	15.1	11	8.80	No stabilization	392.9
Constant Rate	11.4	397	12.90	22.44*	4,918.7
Recovery Time			**% Recovery**		
50 minutes			90%		

*During the last 30 minutes of the test, groundwater level was still dropping at a relatively slow rate of 0.10 meters per hour (m/h).

The following observations are provided with respect to the A395882 pumping test results:

- The drawdown observed at the initial rate of 18.9 L/min suggests complete dewatering of the well could occur within 76 minutes of starting the pump. Similarly, the drawdown observed at the subsequent rate of 15.1 L/min suggests that complete dewatering of the well would occur before the end of the minimum test duration required by Guideline D-5-5. Therefore, the pumping rate for this test was decreased to 11.4 L/min (3 GPM) and the duration of the test was adjusted to 420 minutes to meet Guideline D-5-5 requirements. The rate of 11.4 L/min, applied during the majority of the test, is consistent with the recommended pumping rate provided by HLWD on the A395882 MECP record.
- 90% recovery was observed in the pumping well within 50 minutes of stopping the pump.
- Water levels monitored at all the observation wells showed no response to the pumping activity, except for well A395883.
- A maximum drawdown of 1.04 m was measured in observation well A395883 after 426 minutes of starting the pump in well A395882 (i.e. 6 minutes after pumping was stopped). Similar to what was observed in the pumping well, the groundwater level in observation well A395883 was still decreasing at a slow rate of approximately 0.04 m/h during the last 30 minutes of pumping.

Based on the results obtained during the pumping test in A395882:

- Interactions due to pumping between O. Reg. 903 Water Supply Wells installed in bedrock are anticipated.
- Significant interactions due to pumping between wells installed in bedrock and wells installed in the shallower on-site aquifers (i.e. 10-12 mbg and 22-24 mbg) are not anticipated.

- If proposed residential properties on the Subject Property are supplied by a bedrock well, secondary storage (i.e. cistern) will be required to compensate for the relatively low yields and meet peak water demand.

Potential interactions between pumping activities both on the Subject Property and neighboring properties are discussed further in **Section 5.5**.

5.4.2 A395883 Well Test

Following installation of the level loggers, pumping started at an initial rate of 18.9 L/min (5 GPM). Considering the rapid dewatering of the well observed while pumping at this rate, the pumping rate was decreased to 15.1 L/min (4 GPM) after 16 minutes of pumping, then to 11.4 L/min (3 GPM) after 29 minutes of pumping, and was maintained at that rate until completion of the test. Pumping was stopped after 413 minutes. Well details, including static water levels measured prior to the initiation of the pumping test, are summarized in **Table 12**.

Table 12 – A395883 Well Pumping Test Details

			Date:	**Sept. 10, 2024**
Well ID	**Well Depth (mbtop)**	**Well Depth (mbg)**	**Stick up (mag)**	**Static Water Level (mbg)**
Pumping Well				
A395883	49.10	48.50	0.60	9.81
Observation Wells				
A395882	49.10	48.49	0.61	9.89
A395881	24.40	23.77	0.63	10.44
A377795	11.70	11.19	0.51	2.95
A377796	12.24	11.64	0.60	2.73
A377799	10.32	9.71	0.61	2.82
BH107-22	6.76	5.79	0.97	2.33
BH110-22	6.58	5.67	0.91	2.44

mbtop – metres below top of pipe, **mbg** – metres below ground, **mag** – metres above ground

Hydrographs for the Pumping Well and Observation Wells are included in **Appendix G.** Pumping test details are summarized in **Table 13** below.

Table 13 – Pumping Test Summary Well A395883

	Pumping Rate (L/min)	Duration (minutes)	Max Drawdown (m)	Stabilization Depth (mbg)	Cumulated Volume (L)
Step Test	18.9	16	7.76	No stabilization	302.4
	15.1	13	8.63	No stabilization	498.7
Constant Rate	11.4	384	10.59	20.40*	4,876.3
Recovery Time			**% Recovery**		
145 minutes			90%		

* During the last 30 minutes of the test, groundwater level was still dropping at a relatively slow rate of 0.14 meters per hour (m/h).

The following observations are provided with respect to the A395882 pumping test results:

- The drawdown observed at the initial rate of 18.9 L/min suggests complete dewatering of the well would occur within 80 minutes of starting the pump. Similarly, the drawdown observed at the subsequent pumping rate of 15.1 L/min suggests complete dewatering of the well could occur before the end of the minimum test duration required by Guideline D-5-5. Therefore, the pumping rate for this test was decreased to 11.4 L/min (3 GPM) and the duration of the test was adjusted to 413 minutes to meet Guideline D-5-5 requirements. The rate of 11.4 L/min applied during the majority of the test is consistent with the recommended pumping rate provided by HLWD on the A395883 MECP record.
- 90% recovery was observed in the pumping well within 145 minutes of stopping the pump.
- Water levels monitored at all the observation wells showed no response to the pumping activity, except for A395882.
- A maximum drawdown of 0.94 m was measured in observation well A395882 after 416 minutes of starting the pump in A395883 (i.e. 3 minutes after pumping was stopped). Similarly to what was observed in the pumping well, the groundwater level in A395882 was still decreasing at a slow rate of approximately 0.04 m/h during the last 30 minutes of pumping.

Based on the results obtained during the pumping test in A395883:

- Interactions due to pumping between O. Reg. 903 Water Supply Wells installed in bedrock are anticipated.
- Significant interactions due to pumping between wells installed in bedrock and wells installed in the shallower aquifers identified on the Subject Property (i.e. 10-12 mbg and 22-24 mbg) are not anticipated.

- If proposed residential properties on the Subject Property are supplied by a bedrock well, secondary storage (i.e. cistern) will be required to compensate for the relatively low yields and meet peak water demand.

Potential interactions between pumping activities both on the Subject Property and neighboring properties are evaluated further in **Section 5.5**.

5.4.3 A395881 Well Test

Following installation of the level loggers, pumping started at a rate of 94.6 L/min (25 GPM). This rate was maintained during the entirety of the 6-hour duration pumping test. Well details, including static water levels measured prior to the initiation of the pumping test, are summarized in **Table 14**.

Table 14 – A395881 Well Pumping Test Details

			Date:	**Sept. 11, 2024**
Well ID	**Well Depth (mbtop)**	**Well Depth (mbg)**	**Stick up (mag)**	**Static Water Level (mbg)**
Pumping Well				
A395881	24.40	23.77	0.63	10.44
Observation Wells				
A395882	49.10	48.49	0.61	9.86
A395883	49.10	48.50	0.60	10.90
A377795	11.70	11.19	0.51	2.95
A377796	12.24	11.64	0.60	2.74
A377799	10.32	9.71	0.61	2.83
BH107-22	6.76	5.79	0.97	2.34
BH110-22	6.58	5.67	0.91	2.45

mbtop – metres below top of pipe, **mbg** – metres below ground, **mag** – metres above ground

Hydrographs for the Pumping Well and Observation Wells are included in **Appendix G.** Pumping test details are summarized in **Table 15** below.

Table 15 – Pumping Test Summary Well A395883

	Pumping Rate (L/min)	Duration (minutes)	Max Drawdown (m)	Stabilization Depth (mbg)	Cumulated Volume (L)
Constant Rate	94.6	360	0.48*	10.92	34,056.00
Recovery Time			**% Recovery**		
27.5 minutes			90%		

*Maximum drawdown was measured after 356 minutes of pumping. At the 6-hour mark, the measured drawdown was 0.465 m.

The following observations are provided with respect to the A395881 pumping test results:

- The pumping rate applied for the test represents more than 5 times the peak demand rate considered in MECP Guideline D-5-5 for a residential lot (18.75 L/min).
- Considering a pump installation depth of 20.7 mbg as recommended on the MECP record for A395881 (i.e. approximately 1.83 m above the top of the well's screen), the maximum drawdown observed in well A395881 during the test represents less than 5 % of the available drawdown.
- 90% recovery was observed in the pumping well within 28 minutes of stopping the pump.
- Water levels monitored at all the observation wells showed no response to the pumping activity in well A395881.

Based on the results obtained during the pumping test in well A395881:

- A395881 is more than capable of supplying sufficient groundwater supply to a single dwelling.
- Significant interactions between wells installed in the same stratigraphic unit as A395881 to supply individual dwellings are not anticipated.
- Significant interactions between wells installed in the same stratigraphic unit as A395881 and wells installed in the same stratigraphic units as the observation wells included in the test are not anticipated.

Potential interactions between pumping activities both on the Subject Property and neighboring properties are discussed further in **Section 5.5**.

5.5 Hydrogeological modelling

The proposed development includes 38 residential lots, as shown on the Preliminary Draft Plan dated August 15, 2024, included in **Appendix A-4**.

Based on Guideline D-5-5, the drinking water requirement for a residential lot is 2.25 m^3/day. Results obtained during the pumping tests completed by Wills in October/November 2023 on wells A377795, A377796 and A377799, and in September 2024 on wells A395881, A395882 and A395883 suggest that each tested well can support the anticipated demand on individual residential lot, with supplementary storage systems proposed for wells constructed in bedrock.

Wills developed an eight-layer three-dimensional computer groundwater model (Model) to evaluate the capacity of the various on-site aquifers to meet the water taking requirements of the proposed 38 residential lots, including the potential for interference between pumping activities both on-site and on neighboring properties.

Due to uncertainty of the lateral extent and water bearing capacity of the coarse gravel formation intercepted at A395881, the Model was used to evaluate several scenarios with respect to the anticipated installation depths of the future O. Reg. 903 Water Supply Wells on the Subject Property:

- Scenario 1: All 38 wells installed in bedrock, pumping for 6 hours in each well simultaneously, at a rate of:
  - Scenario 1.1: 18.75 L/min
  - Scenario 1.2: 11.36 L/min
- Scenario 2: 5 wells installed in a gravel layer similar to the one intercepted by A395881 (wells associated with lots 11 through 15 in the southeast corner of the Subject Property), and the remaining 33 wells installed in bedrock.
  - Scenario 2.1: pumping at 18.75 L/min for 6 hours in each of the 38 wells simultaneously
  - Scenario 2.2: pumping at 18.75 L/min in each of the 5 wells installed in the gravel layer, and at 11.36 L/min in each of the 33 wells installed in bedrock, for 6 hours, simultaneously
- Scenario 3: All 38 wells installed in the intermediate aquifer intercepted by A377795, A377796 and A377799, pumping for 6 hours at a rate of 18.75 L/min in each of the 38 wells simultaneously.

The pumping rates used in the scenarios described above are based on Wills' pumping tests results and the Guideline D-5-5 requirement for a minimum pumping rate of 18.75 L/min over a minimum duration of 6 hours, for an individual residential lot.

The approximate location of the 38 virtual wells used in the Model is shown on **Figure 4**. The following sections describe the Model used to evaluate Scenarios one through three and the results obtained for each scenario.

Elevations provided in the following sections are approximate as no survey of ground elevations was undertaken at the Subject Property. Elevations were inferred from a topographic map of the Subject Property. Ground surface at each of the three wells installed in 2024 (A395881, A395882 and A395883) was estimated to be 164.0 masl.

5.5.1 Aquifer Parameters

Wells A395882 and A395883 were installed in bedrock, as little available water was found in the alternating sediments of varying texture and hydraulic conductivity encountered above bedrock at these two locations. In wells A395882 and A395883, bedrock was encountered at a depth of 43.59 mbg (i.e. at an approximate elevation of 120.72 masl). A thin layer (approximately 0.3 metres [m]) of fractured bedrock and gravel was encountered on top of the bedrock and appeared to be water bearing. Pumping tests were carried out in both wells to determine aquifer parameters.

Well A395881 encountered a permeable water-bearing gravel layer at a depth of 22.3 mbg (i.e. elevation 141.75 masl). The gravel formation was drilled to 23.8 m mbg and a screen installed from 22.6 to 23.8 m mbg. Following construction, a preliminary yield test was conducted at a rate of 78.6 m^3/day (i.e. 54.6 L/min). Based on the MECP record for A395881, this gravel layer is at least 1.5 m thick. Observations by the driller during installation of the well suggest that the gravel formation may have extended at least 0.3 m below the installation depth and had considerable yield.

A lateral extension of the permeable gravel formation encountered at a depth of 22.3 mbg in well A395881 appeared to be present in well A395882 at a depth of 25.91 mbg, with a thickness of approximately 0.91 m. In well A395882 however, this formation contains more sand and did not yield sufficient groundwater. A cross section (A-A') showing the inferred extent of the gravel formation between wells A395881 and A395882 is included as **Figure 5**.

Similarly, the sand and gravel formation encountered in well A395883 at a depth of 21.95 mbg (5.48 m thick) appears to be a lateral extension of the permeable gravel encountered in well A395881. However, similar to what was observed at well A395882, this formation at well A395883 did not yield sufficient groundwater. Well A395883 is approximately 85 m from well A395881.

Figure 2b shows the location of all O. Reg. 903 Water Supply Wells installed on the Subject Property as part of Wills' Study, as well as wells TW1, TW2 and TW3 installed in 2018 on a neighboring property to the south.

Information regarding wells TW1 through TW3 used in Wills' assessment is based on Ted Rannie's 2018 Report. The MECP well records included in this report indicate that TW1, TW2 and TW3 are assigned Well Tag Numbers A248943, A248945 and A248942 respectively.

Based on the review of the 2018 Report, it appears that the gravel layer encountered in well A395881 was also encountered in TW2 and TW1 with respective thicknesses of approximately 1 m (TW2) to 10 m (TW1). Similarly to the case between wells A395881 and A395883, sufficient groundwater was not found in the gravel formation in TW1, according to the drilling contractor, while TW2 yielded relatively high volumes of water from the same formation. Well TW3 did not encounter this gravel layer during drilling. A cross section (B-B') showing the inferred extent of the gravel formation between wells A395883 and TW1 is included as **Figure 6**.

A plausible explanation for the existence of this permeable gravel formation is that it is a meltwater channel (tunnel channel) deposited during the waning of the last ice age. The gravel in well A395881 and TW2 may have been deposited in a high energy environment at the center of the channel and the fast-flowing water washed away all the fine materials, leaving coarse gravel. The gravel deposits in wells A395882, A395883 and TW1 represent the lower energy depositional sides of the channel with lower permeability.

The static groundwater levels measured in wells A395881, A395882 and A395883 range from approximately 9.5 to 10.5 mbg, and are significantly higher than where water was encountered during drilling. This indicates a confined or semi-confined aquifer. A semi-confined aquifer indicates that leakage from the overlying low permeability aquitard contributes to well yield. Data obtained during the pumping tests completed by Wills in September 2024 (drawdown data versus pumping rates) was analyzed to determine transmissivity "T" and storativity, "S" of the aquifers intersected by wells A395881, A395882 and A395883. Aquifer parameters were derived from curve matching using the Hantush method for leaky confined aquifers, which provided the best curve match. Therefore, results obtained during Will's Study suggest that the aquifers intersected by wells A395881, A395882 and A395883 on the Subject Property are semi-confined with leakage from above and below.

Table 16 shows the aquifer parameters derived from the method described above.

Table 16 – Derived Aquifer Parameters – Subject Property

Well ID	Pumping Rate (m^3/d)	Transmissivity (T) (m^2/d)	Storativity (S)	Maximum drawdown (m)	Test length (min)	Aquifer Thickness (m)	Hydraulic Conductivity (K) (m/d)
September 9, 2024 Test – Pumping Well (PW) = A395882							
A395882	16.35	1.49	9.54E-5	12.9	420	5.18	0.29
A395883	--	3.38	2.93E-05	1.04	420	1.22	2.77
A395881	--	no response	--	--	--	--	--
September 10, 2024 Test – PW = A395883							
A395883	16.35	0.95	0.045	10.59	413	1.22	7.5
A395882	--	3.11	4.1E-5	0.94	413	5.18	6.8
A395881	--	no response	--	--	--	--	--
September 11, 2024 Test – PW = A3395881							
A395881	136.3	196.6	0.035	0.465	360	1.52	129.3
A395883	--	no response	--	--	--	--	--
A395882	--	no response	--	--	--	--	--

The results show a transmissivity and hydraulic conductivity of 196.6 m^2/d and 129.3 m/d respectively for the coarse gravel layer encountered in well A395881. The fractured bedrock and bedrock encountered in A395883 and A395882 indicate a much lower transmissivity and hydraulic conductivity of 0.95 to 3.38 m^2/d and 0.29 to 7.5 m/day respectively. A high transmissivity and hydraulic conductivity imply a high water yield from wells. In contrast low transmissivity and hydraulic conductivity imply low water yields from wells.

5.5.2 Comparison with the Results Obtained on the Neighbouring Property

Data from the 2018 Report pertaining to the pumping tests completed in wells TW1 and TW3 on the neighboring property to the south was also analysed to derive aquifer parameters. The results of the analysis are summarized in **Table 17**. Data for the pumping well TW2 was not available.

Table 17 – Derived Aquifer Parameters – Property to the South

Well ID	Pumping Rate (m^3/d)	Transmissivity (T) (m^2/d)	Storativity (S)	Maximum drawdown (m)	Test length (min)	Aquifer Thickness (m)	Hydraulic Conductivity (K) (m/d)
PW = TW1*							
TW1	28.22	0.50	0.20	26.17	420	2.7	0.185
PW = TW2*							
TW2	163.58	no data	--	3.35	480	1.2	--
TW1	--	49.9	1.08E-6	0.20	480	2.7	18.5
TW3	--	1.53	8.4E-12	22.61	480	3.1	4.74
PW = TW3*							
TW3	109.0	0.42	7.31E-5	22.55	482	3.1	0.135
TW3**	--	5.36	--	--	--	3.1	1.73

*TW1 pumping in sand and gravel overlying bedrock; TW2 pumping from intermediate depth coarse gravel; TW3 pumping from limestone bedrock.

**Hvorslev Test 2018

On the Subject Property, pumping at 136.3 m^3/day in well A395881 produced a drawdown of 0.465 m after 6 hours in the coarse gravel layer. No response was detected during the test in any other O. Reg. 903 well installed on the Subject Property, including wells A395882 and A395883 installed in bedrock. Pumping in one of the bedrock wells influenced the other non-pumping observation well installed in bedrock, implying a fairly extensive hydraulic connection in the bedrock. However, pumping in the wells installed in bedrock had no effect on any of the other wells installed in the overburden.

It is likely that the hydraulic conductivity of the coarse gravel layer in the area of TW2 is similar to the hydraulic conductivity of the gravel layer encountered in well A395881. The pumping test in TW2 also produced a drawdown effect of 0.20 m in TW1, in the gravel layer just overlying bedrock 132.4 m away from TW2, and a drawdown of 22.6 m in TW3 in the bedrock 168.1 m away from TW2. This indicates some hydraulic connection between the bedrock, the gravel layer overlying bedrock and the shallower coarse gravel layer. The coarse gravel layer is separated from the bedrock and overlying gravel by 6.5 m of sandy silt in TW1. The coarse gravel layer does not occur in TW3.

5.5.3 Model Construction and Calibration

A detailed computer three-dimensional groundwater model was constructed based on the results of subsurface investigations and aquifer testing. Eight layers were input spanning the depth from surface (Layer 1) to the bottom of the deepest wells in the bedrock (Layer 8). A 1:10,000 topographic map was used as the basis of the model so that hydraulic boundaries (e.g. rivers and wetlands) at their respective elevations could be incorporated into the model as boundary conditions.

Aquifer parameters derived from the pumping tests completed in 2023 in wells A377795, A377796 and A377799 were input into the model in Layer 3 (sand). Aquifer parameters derived from the pumping tests completed in 2024 were input into the model in Layer 5 (coarse gravel formation) and Layer 8 (bedrock).

Hydraulic conductivity was derived from transmissivity divided by the thickness of the aquifer. Storativities used in the model were those derived from the pumping tests in Layers 3, 5 and 8. Specific yield was set at 0.25 which is characteristic of the surficial material encountered. Hydraulic parameters for the low permeability layers (silt and clay) were estimated based on professional experience. Recharge was estimated at 213 mm/yr based on the water balance analysis (existing conditions) completed by Wills' and discussed in **Section 6.0**.

Initially, a steady-state model was set up and calibrated to the static water level measured in wells A395881, A395882, A395883, TW1, TW2 and TW3. This model was then converted to a transient (time-based) model with two stress periods (pumping periods). The first stress period was run to produce quasi steady-state conditions to obtain simulated static water level elevations. The second stress period was for the length of the pumping tests, usually 6-hours (0.25 days). Each pumping test was simulated in the model and parameters adjusted until a reasonable match between simulated and observed drawdown was obtained. The Peaceman correction translates the simulated drawdown in the model cell to the simulated drawdown in the pumping well, which has a significantly smaller diameter than the model cell. The model predictions of Peaceman corrected simulated drawdowns are considered excellent compared to the observed drawdowns. The results of the calibration analysis described above are summarized in **Table 18**.

Table 18 – Simulated and Observed Drawdowns

Well ID*	Simulated Static Water Level (masl)	Simulated Pumping Level (masl)	Simulated Drawdown (m)	Peaceman Corrected Drawdown (m)	Observed Drawdown (m)
PW A395881	154.61	154.40	0.21	0.41	0.47
OBS A395882	154.64	154.22	0.42		0.94
PW A395883	154.49	150.48	4.0	10.59	9.27

*PW: Pumping Well; OBS: Observation Well

Well A395882 was an observation well (OBS A395882) during the pumping test on well A395883 (PW A395883). The match between simulated corrected drawdowns and observed drawdowns are considered very good.

This calibrated and verified (with pumping test data) model simulated drawdowns in the 38 proposed domestic wells based on the pumping scenarios described in **Section 5.5**. Results obtained are described in the following sections.

5.5.4 Scenario 1 - Evaluation

In Scenario 1, all 38 wells are installed in bedrock (Layer 8). The model was used to simulate drawdowns after pumping for 6 hours in each well simultaneously at a rate of:

- Scenario 1.1: 18.75 L/min
- Scenario 1.2: 11.36 L/min

The proposed 38 wells pumping in relatively close proximity will interfere with each other to some degree. The drawdown in each well (assuming the same pumping rate) will vary depending on the hydraulic conductivity of the bedrock and the proximity of each well to those around it. Thus, to determine the effect of all wells in the bedrock, two wells at the approximate centre of the well field were chosen to compare results of the simulations. These selected wells are designated in **Table 19** and subsequent tables by the model row (R) and column (C) in which the wells are located.

Simulated drawdowns and elevations obtained for Scenario 1.1 and Scenario 1.2 are summarized in **Table 19** and **Table 20** respectively.

Table 19 – Scenario 1.1 – Simulation Results

Well	Simulated			Peaceman Corrected		Estimated Bedrock Elevation (masl)
	Static Water Level (masl)	Pumping Level (masl)	Drawdown (m)	Drawdown (m)	Water Level Elevation (masl)	
R60 C66	154.02	129.33	24.69	40.05	113.97	120.41
R63 C57	154.73	128.22	26.51	41.10	112.92	120.41

The results obtained for Scenario 1.1 suggest that pumping in all 38 wells installed in bedrock for 6 hours at a rate of 18.75 L/min would dewater the wells. Scenario 1.1 is therefore considered not feasible.

Table 20 – Scenario 1.2 – Simulation Results

Well	Simulated			Peaceman Corrected		Estimated Bedrock Elevation (masl)
	Static Water Level (masl)	Pumping Level (masl)	Drawdown (m)	Drawdown (m)	Water Level Elevation (masl)	
R60 C66	153.99	139.83	14.16	23.47	130.52	120.41
R63 C57	154.70	138.16	16.54	25.60	129.10	120.41

The results obtained for Scenario 1.2 suggest that the bedrock is capable of sustaining a pumping rate of 11.36 L/min (16.36 m^3/d) for 6 hours each day without dewatering the wells and with minimum drawdown effects on adjacent properties as shown of **Figure 7**. Please note that the Peaceman corrected drawdown refers only to the drawdown in each well. Between wells the simulated drawdowns shown in **Table 20** and those shown in **Figure 7** will occur.

5.5.5 Scenario 2 – Evaluation

A simulation of all domestic wells pumping from the coarse gravel layer (model Layer 5) each at 18.75 L/min for 6 hours showed cumulative drawdowns of less than 1.0 m. Depending on the extent of this gravel layer and its water bearing capacity, the water needs of the Proposed Development could easily be met. However, as mentioned previously, the water bearing capacity of this layer varies from substantial water availability to no apparent water availability. The only way to confirm the existence and water bearing capacity of this gravel layer is to drill water wells to intercept it. It is likely that some of the wells drilled on the Subject Property will encounter this water bearing gravel layer. However, it is impossible to know how many of the 38 wells will intercept this layer. Therefore, a relatively conservative Scenario 2 was tested.

In Scenario 2, the 5 wells associated with lots 11 through 15 in the southeast corner of the Subject Property are installed in Layer 5 (coarse gravel formation) while the remaining 33 wells are installed in Layer 8 (bedrock). The model was used to simulate drawdowns after pumping for 6 hours at a rate of:

- Scenario 2.1: 18.75 L/min in each of the 38 wells simultaneously
- Scenario 2.2: 18.75 L/min in the 5 wells installed in Layer 5, and 11.36 L/min in the 33 wells installed in Layer 8, simultaneously

Simulated drawdowns and elevations obtained for Scenario 2.1 are summarized in **Table 21** and **Table 22**. As drawdowns are slightly different in all the wells due to their spacing, the drawdowns for representative wells are given in each layer.

Table 21 – Scenario 2.1 – Simulation Results – Layer 8

Groundwater Model Well ID	Simulated			Peaceman Corrected		Estimated Bedrock Elevation (masl)
	Static Water Level (masl)	Pumping Level (masl)	Drawdown (m)	Drawdown (m)	Water Level Elevation (masl)	
R60 C66	153.99	130.68	23.31	32.62	121.37	120.41
R63 C57	154.71	128.87	25.84	34.90	119.81	120.41

Table 22 – Scenario 2.1 – Simulation Results – Layer 5

Groundwater Model Well ID	Simulated			Peaceman Corrected		Estimated Bedrock Elevation (masl)
	Static Water Level (masl)	Pumping Level (masl)	Drawdown (m)	Drawdown (m)	Water Level Elevation (masl)	
R68 C67	154.66	154.61	0.05	0.09	154.57	120.41
R74 C72	154.52	154.48	0.04	0.08	154.44	120.41

Pumping in 5 wells installed in Layer 5 has almost negligible effect on groundwater levels. However, the simulation of pumping 33 domestic wells at 18.75 L/min for 6 hours from the bedrock resulted in the water level in the bedrock wells declining to the level of the bedrock surface. It would be prudent to assume a safety factor and aim at maintaining a pumping water level of at least 5 metres above the bedrock surface. Therefore, based on the results of the simulation, scenario 2.1 is not sustainable.

Simulated drawdowns and elevations obtained for Scenario 2.2 are summarized in **Table 23** and **Table 24**.

Table 23 – Scenario 2.2 – Simulation Results – Layer 8

Groundwater Model Well ID	Simulated			Peaceman Corrected		Estimated Bedrock Elevation (masl)
	Static Water Level (masl)	Pumping Level (masl)	Drawdown (m)	Drawdown (m)	Water Level Elevation (masl)	
R60 C66	153.99	138.71	15.28	24.59	129.40	120.41
R63 C57	154.70	138.68	16.02	25.08	129.62	120.41

Table 24 – Scenario 2.2 – Simulation Results – Layer 5

Groundwater Model Well ID	Simulated			Peaceman Corrected		Estimated Bedrock Elevation (masl)
	Static Water Level (masl)	Pumping Level (masl)	Drawdown (m)	Drawdown (m)	Water Level Elevation (masl)	
R68 C67	154.66	154.60	0.05	0.08	154.58	120.41
R74 C72	154.52	154.48	0.04	0.06	154.46	120.41

The results of the simulation suggest that Scenario 2.2 is sustainable.

5.5.6 Scenario 3 – Evaluation

In Scenario 3, all 38 wells installed in the model Layer 3 which corresponds to the intermediate aquifer intercepted by wells A377795, A377796 and A377799. Drawdowns and elevations were simulated after pumping at a rate of 18.75 L/min in each of the 38 wells simultaneously, for 6 hours.

Simulated drawdowns and elevations obtained for Scenario 3 are summarized in **Table 25.**

Table 25 – Scenario 3 – Simulation Results – Layer 3

Groundwater Model Well ID	Simulated			Peaceman Corrected		Estimated Bedrock Elevation (masl)
	Static Water Level (masl)	Pumping Level (masl)	Drawdown (m)	Drawdown (m)	Water Level Elevation (masl)	
R60 C66	159.66	159.55	0.11	0.36	159.30	120.41
R63 C57	161.79	161.69	0.10	0.36	161.43	120.41

In Scenario 3, drawdown in the wells is less than 0.5 m and negligible between wells. The results of the simulation suggest that Scenario 3 is feasible.

5.6 Groundwater Quality

Two groundwater samples were collected from the pumping well during each pumping test. One sample was collected 1-hour into the pumping test and the second sample was collected at the 6-hour or 7-hour mark, prior to shutting off the pump. Samples were collected in dedicated sample bottles, kept in a cooler with ice and transported to SGS immediately following completion of the field activities. Analytical results were compared to the ODWQS. The Certificates of Analysis provided by SGS are included in **Appendix H**.

5.6.1 2023 Pumping Tests

The quality of the groundwater samples collected during the pumping tests completed in 2023 complies with most ODWQS, except for the following:

A377795 Well

- Turbidity in both the 1-hour and 6-hour samples
- Total Coliform in the 6-hour sample

Exceedances of Aesthetic Objectives or Operational Guidelines were measured for the following non-health related parameters:

- Organic Nitrogen and hardness in both the 1-hour and 6-hour samples.

A377796 Well

- Turbidity in both the 1-hour and 6-hour samples

Exceedances of Aesthetic Objectives or Operational Guidelines were measured for the following non-health related parameters:

- Hardness and iron in both the 1-hour and 6-hour samples.

A377799 Well

- Total Coliform in both the 1-hour and 6-hour samples

Exceedances of Aesthetic Objectives or Operational Guidelines were measured for the following non-health related parameters:

- Hardness in both the 1-hour and 6-hour samples.

Sources for coliform can be multiple and not one specific source can be identified with certainty based on available information. However, the wells are installed on farmed land which was covered in crops when the pumping tests were completed. Animal manure may have been used in this field which may have caused the contamination of the samples at surface during sampling or during well construction. Similarly, fertilizer high in nitrogen may have been used, which could explain the presence of Organic Nitrogen in the samples collected from well A377795.

Water treatment systems for the Proposed Development should consider the exceedances noted in this section. Commercial filtration and disinfection methods may be used to effectively remove metals and inactivate any harmful protozoa, bacteria and viruses, and commercial water softening may be used to treat elevated levels of hardness.

It is noted that nitrate concentrations for all tested samples collected from wells A377795, A377796 and A377799 met the ODWQS.

5.6.2 2024 Pumping Tests

The quality of the groundwater samples collected during the pumping tests complies with most ODWQS, except for the following:

A395881 Well

- Turbidity in both the 1-hour and 6-hour samples
- Total Coliform in both the 1-hour and 6-hour samples (1 cfu/100 ml)

Exceedances of the ODWQS Aesthetic Objectives or Operational Guidelines were measured for the following non-health related parameters:

- Colour in the 6-hour sample
- Hardness and Iron in both the 1-hour and 6-hour samples

A395882 Well

- Turbidity, Sodium and Total Coliform in both the 1-hour and 7-hour samples
- *E. coli* in the 1-hour sample

Exceedances of the ODWQS Aesthetic Objectives or Operational Guidelines were measured for the following non-health related parameters:

- Colour, Hardness, Iron and Chloride in both the 1-hour and 7-hour samples
- Manganese in the 1-hour sample

A395883 Well

- Turbidity, Sodium and Total Coliform in both the 1-hour and 7-hour samples
- *E. coli* in the 1-hour sample

Exceedances of Aesthetic Objectives or Operational Guidelines were measured for the following non-health related parameters:

- Colour, Hardness, Iron, Manganese and Chloride in both the 1-hour and 7-hour samples
- Aluminum in the 1-hour sample

Sources for Total Coliform and *E. coli* can be multiple and not one specific source can be identified with certainty based on available information. However, the wells are installed on recently farmed land. Animal manure may have been used during agricultural operations, which may have caused the contamination of the samples at surface during sampling or during well construction.

Water treatment systems for the Proposed Development should consider the exceedances noted in this section. Commercial filtration and disinfection methods may be used to effectively remove metals and inactivate any harmful protozoa, bacteria and viruses, and commercial water softening may be used to treat elevated levels of hardness.

It is noted that nitrate was not detected in any of the samples collected from wells A395881, A395882 and A395883.

5.6.3 Nitrate Concentrations in Groundwater

Table 26 summarizes nitrate concentrations in groundwater samples collected on the Subject Property by Wills between October 2022 and September 2024. Certificates of Analysis provided by SGS for all the sampling events listed below are included in **Appendix H**.

Table 26 – Nitrate concentrations in groundwater on the subject Property

Well ID	Installation date (yyyy-mm-dd)	Well Depth (mbg)	Nitrate Concentrations (mg/L)			
			Oct. 2022	Oct. 2023	Dec. 2023	Sept. 2024
Surficial Aquifer (approximate depth 3-6 mbg)						
MW22-08	2022-09-23	3.00	4.35	--	--	--
BH101-22	2022-09-23	5.73	--	--	8.84	8.67
BH107-22	2022-09-23	5.79	0.68	--	0.188	0.17
BH110-22	2022-09-23	5.67	0.39	--	2.72	4.81
Intermediate Aquifer (approximate depth 10-12 mbg)						
A377795	2023-10-17	11.19	--	5.69*	--	1.18
A377796	2023-10-12	11.64	--	0.11*	--	0.09
A377799	2023-10-06	9.71	--	1.73*	--	1.82
Deep Overburden Aquifer (approximate depth 22-24 mbg)						
A395881	2024-08-08	23.77	--	--	--	<0.06*
Bedrock Aquifer (approximate depth to bedrock 43 mbg)						
A395882	2024-08-06	48.49	--	--	--	<0.06*
A395883	2024-07-31	48.50	--	--	--	<0.06*

*Average of concentrations measured in the 1-hr and 6-hr/7-hr samples collected during pumping tests.

Analytical results obtained during the pumping tests completed in 2023 showed the presence of nitrate in the intermediate aquifer (10 – 12 mbg). Assuming deeper aquifers would be less exposed to potential nitrate contamination from surface, Wills recommended installing deeper wells on the Subject Property to evaluate groundwater quality and availability at greater depths.

Based on the results obtained in September 2024, the deeper aquifers in which wells A395881, A395882 and A395883 were installed appear unaffected by nitrate. The subsurface soil stratigraphy encountered during the installation of these wells is described in the MECP well records prepared by HLWD and included in **Appendix F**. All three well records mention the presence of an approximately 10 m thick layer of relatively compact clayey material from approximately 12 to 22 mbg. The presence of this layer could mitigate the vertical migration of nitrate and explain the low nitrate concentrations in wells A395881, A395882 and A395883.

Additional sampling events of the surficial aquifer and intermediate aquifer are included in Wills' proposed Monitoring Program described in **Section 7.0**.

6.0 Groundwater Impact Assessment

This section summarizes the result of the latest Groundwater Impact Assessment completed by Wills for the Subject Property in August 2024 and considering 38 individual residential lots for the Proposed Development.

Wills' Groundwater Impact Assessment was conducted on the basis of the *Guideline D-5-4* to determine the feasibility and potential for impacts to down-gradient water resources arising from the proposed sewage disposal systems.

Available post-development dilution/recharge water for the Subject Property was estimated through a water balance analysis. A summary of the water balance calculations, including the Groundwater Impact Assessment, is included in **Appendix I**. The water balance analysis considered the following elements:

- Historical Climate Normals – Oshawa WPCP (Climate ID 6155878).
- The total monthly water surplus available for dilution was calculated - accounting for evapotranspiration using the Thornthwaite method.
- Infiltration factors for topography, soils, and cover were applied based on the MOEE document, *Hydrogeological Technical Information Requirements For Land Development Applications*, April 1995.
- The additional groundwater recharge that will occur from the low impact development (LID) features within the proposed development.

The mass balance equation used in Wills' Groundwater Impact Assessment is included in **Appendix J**.

6.1 Water Balance Analysis

In order to determine the average annual infiltration volume that will be available for dilution as part of the proposed development, a water balance analysis has been completed in accordance with the Conservation Authority Guidelines for Hydrological Assessments. The site was divided into catchments for existing and proposed conditions using the same impervious assumptions employed for the stormwater management design, completed by D.G. Biddle & Associates Limited. In the proposed condition, to account for actual drainage area contributing to each proposed LID feature, some catchments were further subdivided. The existing and proposed catchments for the water balance analysis are provided in **Appendix I**.

Without accounting for the additional groundwater recharge that occurs as a result of the proposed LID features, the development would significantly reduce the volume of available water for dilution. However, as the LID features have been designed to retain stormwater runoff, the added infiltration potential should be calculated.

The average annual infiltration volume provided by each LID feature was calculated by completing a daily water balance analysis using precipitation and temperature data for the Oshawa Water Pollution Control Plan from 1981 to 2006 (26 years). This date range was selected because it contains the most recent data available for the gauge station and did not have a significant quantity of missing data. A summary of the water balance analysis results is shown in **Table 27** and detailed water balance calculations are provided in **Appendix I**.

Table 27– Water Balance Summary

Catchment Parameters	Existing	Proposed Without LID	Change Without LID	Proposed with LID	Change With LID
Precipitation (mm/year)	872				
Precipitation (m^3/year)	215,471	215,471	0.0%	215,471	0.0%
Evapotranspiration (m^3/year)	150,056	145,692	-2.9%	145,692	-2.9%
Infiltration (m^3/year)	52,561	49,027	-6.7%	57,538	9.5%
Runoff (m^3/year)	12,854	21,575	67.8%	13,064	1.6%

Notes: 1. No infiltration has been calculated for LID features during months with a negative average temperature.

A review of **Table 27** shows that the average annual infiltration volume for the proposed condition will increase from the existing condition when accounting for the additional infiltration provided by the LID features.

6.2 Predictive Assessment

The results from the Predictive Assessment are outlined below:

Table 28 – Predictive Assessment of Nitrate Concentration

Parameter	Value
Number of Lots	38
Volume of Effluent (Q_e)	38 lots x 1,000 L/day = 38,000 L/day
Effluent nitrate concentration	40 mg/L
Nitrate loading - Development	1,520,000 mg/day
Background Nitrate	2.86 mg/L
Nitrate loading - Rainfall	384,157 mg/day
Stormwater Effluent Nitrate	0 mg/L
Nitrate loading – Run-off	0 mg/day
Total Nitrate Loading	1,904,157 mg/day
Total Dilution Water Available	195,639 L/day
Total nitrate concentration at property boundary	**9.73 mg/L**

In view of the results presented in **Table 28**, Wills concludes that the current configuration of the Proposed Development would result in acceptable levels of nitrate at the property boundary.

7.0 Conclusions and Recommendations

The following conclusions and recommendations are provided with respect to Wills' Study.

- Shallow subsurface soils were generally consistent across the Subject Property and included a thin layer of silty sand topsoil underlain by sand with slight variations in gravel, silt, and clay content. A north-south trending band of silt and clay rich soils was observed on the western side of the Subject Property at TP22-10, TP22-08, and TP22-11 at a depth of approximately 1.3 to 1.7 mbg and extended to the test pit termination depths of approximately 3.0 mbg.
- Five drivepoint monitor wells were installed in the base of select test pits to monitor groundwater levels above a depth of 3 mbg. Static water levels were also monitored in 3 monitor wells installed by Cambium to support their geotechnical investigation.
- Static groundwater levels were generally consistent across the Subject Property and ranged from:
    - 2.34 mbg to 2.71 mbg on September 27/October 5, 2022
    - 2.83 mbg to 2.99 mbg on December 5, 2023
    - 2.48 mbg to 2.66 mbg on September 27, 2024
- Groundwater seepage was encountered in all test pits at an approximate depth of 2.9 mbg to 3 mbg, with the exception of TP22-06, TP22-07, and TP22-10, which were found to be dry prior to backfilling.
- Eight in-situ infiltration tests were conducted between September 26 and September 27, 2022. T-Times were calculated to range from 0 min/cm to 0.81 min/cm, with an average of 0.46 min/cm across all eight tests.
- A review of the physical soil characteristics and comparison against OBC Table 2 and Table 3 suggests a percolation time (T-Time) that is generally between 2 to 12 min/cm for the shallow sand to silty sand soils, and > 50 min/cm for the clayey silt to silt material. Laboratory percolation estimates suggest the T-time ranges from 6 min/cm to 12 min/cm for the sand to silty sand material, and > 50 min/cm for the clayey silt to silt material.
- In view of the in-situ infiltration testing and physical soil testing results, Wills recommends using the middle of the T-time range for the individual soil units/soil envelopes (OBC Table 2 and Table 3) to be conservative. The individual shallow soil types and respective envelopes are shown on **Figure 3.** Within the clayey silt to silt and clay area identified in green in **Figure 3**, Wills recommends that raised tile beds be used for septic systems installed in this area and set-back distances adjusted accordingly.
- Any proposed LID and sewage disposal system design should consider the shallow groundwater depths encountered on the Subject Property, which may impact the respective designs in the areas investigated by Wills.

- Infiltration rates and percolation times may vary across the Subject Property, as topography, moisture content, soil gradation and relative compactness will affect in-situ infiltration rates.
- The Groundwater Impact Assessment considered 38 residential lots, and anticipated flows to the sewage disposal systems of 1,000 L/day with a nitrate loading of 40 mg/lot/day on the basis of *D-5-4*. The Groundwater Impact Assessment concludes that a groundwater nitrate concentration of 9.73 mg/L will be achieved at the property boundary, which meets the ODWQS and satisfies the requirements of *D-5-4*.
- The following is provided with respect to Wills' interpretation of the MECP Well Records and historic groundwater investigations on neighboring properties:
    - Viable water supply aquifers have been identified within both coarse grained sand and gravel layers, as well as within the underlying bedrock stratum.
    - The recommended pumping rates ranged from approximately 7.6 to 30.2 litres per minute (L/min) for the nearby overburden wells (19.9 L/min average), and from 3.8 to 37.8 L/min for the bedrock wells (20.2 L/min average).
    - Shallow aquifers were generally more high-producing north of the Subject Property, and deeper wells installed in overburden and bedrock south of the Subject Property were generally more high-performing.
    - Detailed hydraulic assessment (2018 Ted Rannie Report) completed for the property directly south of the Subject Property, concluded that the underlying aquifer could support a 20-lot residential development without causing off-site impacts to neighbouring water users or surface resources.
- The results of the pumping tests and hydrogeological modelling completed by Wills suggest the following:
    - Installing any number of the proposed 38 domestic wells either in the same aquifer as the wells installed in 2023 (approximately10-12 mbg), or in the same coarse gravel formation intercepted by well A395881 installed in 2024 (approximately 22-24 mbg) would meet the need of the proposed development without secondary storage systems. In this configuration, Wills does not anticipate significant interactions between pumping activities on the Subject Property nor with neighboring water user. It is noted that the coarse gravel formation intercepted by well A395881 is not present and/or suitable for water supply (quantity wise) everywhere on the Subject Property.
    - Safe yields for the two O. Reg. 903 Water Supply Wells installed in bedrock on the Subject Property were estimated to be 11.36 L/min (3 GPM) or lower. This implies that residential lots equipped with a well installed in bedrock may require secondary storage to meet water demand at peak hour. Bedrock wells can be significantly variable in yield depending on

  whether or not the well has intercepted a network of water bearing fractures.

  - Although the results of groundwater modelling suggest that the configuration where all proposed 38 wells are installed in bedrock and pumped at a reduced rate of 11.36 L/min (Scenario 1.2) is feasible, the level of interactions between pumping activities on the Subject Property is significant. Where possible, shallower water bearing formations with acceptable water quality should be the preferred option to install future water supply wells on the Subject Property.

- The lateral extent of the water-bearing coarse gravel formation intercepted by well A395881 is unknown. Results obtained during Wills' investigations, including the review of available information about wells TW1, TW2 and TW3 installed on the property to the south, suggest that:
  - This formation is present and its water bearing capacity is suitable for drinking water supply on the portion of the Subject Property located south of well A395881.
  - This formation is either not present or its water bearing capacity is insufficient elsewhere on the Subject Property.
- Assumptions above with respect to the lateral extension of the water-bearing coarse gravel formation can only be verified through exploratory drilling.
- Nitrate concentrations ranging from 0.09 to 6.21 mg/L were measured in October 2023 in the three O. Reg. 903 Water Supply Wells installed in 2023 at depths ranging from approximately 10 to 12 mbg (A377795, A377796 and A377799). In September 2024, nitrate concentrations measured in these wells ranged from 0.09 to 1.82 mg/L. It is noted that nitrate concentrations for all tested samples collected from wells A377795, A377796 and A377799 met the ODWQS.
- Nitrate was not detected in any of the three O. Reg. 903 Water Supply Wells installed in 2024 on the Subject Property (A395881, A395882, and A395883). These results suggest that nitrate does not migrate vertically to the deeper aquifers identified on the Subject Property at depths of approximately 22-24 mbg (Deep Overburden Aquifer) and 47-49 mbg (Bedrock Aquifer).
- Nitrate concentrations measured in September 2024 in the monitor wells installed by Cambium in 2022 and the three O. Reg. 903 Water Supply Wells installed in 2023 showed little variability when compared to the concentrations measured in October and December 2023, except for the following:
  - The concentration measured in well BH110-22, installed at approximately 6 mbg in the southeast portion of the Subject Property, which increased from 2.72 mg/L in December 2023 to 4.81 mg/L in September 2024.

  - The concentration measured in well A377795, installed at 11.19 mbg in the central portion of the Subject Property, which decreased from 5.69 mg/L (average of 5.16 and 6.21 mg/L) in October 2023 to 1.18 mg/L in September 2024.
- Water treatment systems for the Proposed Development should consider the exceedances noted in **Section 5.6**.

Based on the above and satisfy the outstanding peer review comments, Wills recommends that a Monitoring Program be implemented on the Subject Property, to include:

- Prior to proposed development construction:
  - Install seven monitor wells on the Subject Property, to a depth of 6 mbg, including five wells along the downgradient limit of the Subject Property and two wells along the upgradient limit to the north and west. Proposed locations for these seven monitor wells are shown on **Figure 8**.
  - Record static groundwater levels in all seven monitor wells on a bi-annual basis, during the spring and summer.
  - Collect groundwater samples in the seven newly installed monitor wells and the three existing O. Reg. 903 Water Supply Wells A377795, A377796 and A377799, twice a year during spring and summer, for analysis of the following parameters on all samples: Nitrite, Nitrate, Organic Nitrogen, Total Coliform and *E. Coli*.
  - Preparation of technical memo summarizing the pre-development results on an annual basis.
- During construction of the proposed development and after, as required:
  - Collect groundwater samples in the seven newly installed monitor wells and the three existing O. Reg. 903 Water Supply Wells A377795, A377796 and A377799, twice a year during spring and summer, for a period of three years. This timeframe may be extended pending the duration of construction and results obtained. This includes the recording of groundwater static levels in all wells.
  - Following each sampling event, submit all ten groundwater samples to an accredited laboratory of for analysis of the following parameters: Nitrite, Nitrate, Organic Nitrogen, Total Coliform and *E. coli*.
  - Prepare technical memos summarizing the results obtained during the groundwater monitoring activities, on an annual basis. These memos should include an analysis of the evolution of groundwater quality and appropriate recommendations with respect to the renewal of the 3-year monitoring period and any mitigation measures required.

Should the construction of the proposed development commence in the spring of 2025, Wills recommends that:

- The new monitor wells be installed during late winter or early spring of 2025.
- Pre-development groundwater levels be recorded, and groundwater samples collected and analysed during spring and summer 2025.

We trust that the information contained in and attached to this report meets your needs at this time. The following Statement of Limitations should be read carefully and is an integral part of this report. Do not hesitate to contact the undersigned if you have any questions or concerns.

Respectfully submitted,

Prepared by: ______________________________
Ralf Bolvin, P. Eng., QP$_{ESA}$
Project Engineer

Reviewed by: ______________________________
Ian Ames, M.Sc., P.Geo.
Environmental Monitoring and
Management Lead

RB/IA/jh

Statement of Limitations

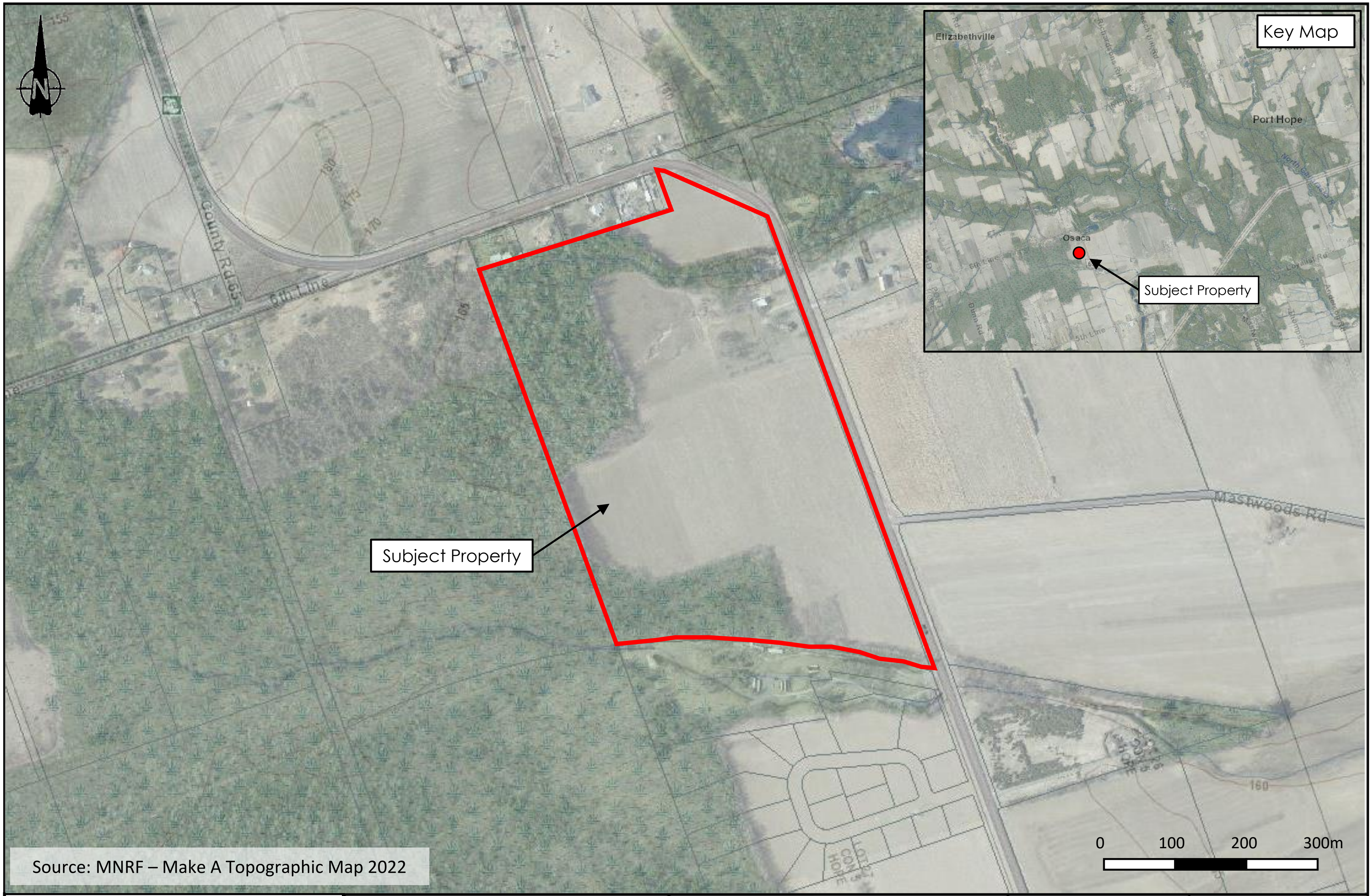
This report is intended solely for Hillstreet Developments Ltd. c/o Larry MacDonell (Client) for the Proposed Development located on Pt Lot 27Concession 5, in the village of Osaca, Ontario, and is prohibited for use by others without D.M. Wills Associates Limited's (Wills) prior written consent. This report is considered Wills' professional work product and shall remain the sole property of Wills. Any unauthorized reuse, redistribution of or reliance on this report shall be at the Client and recipient's sole risk, without liability to Wills. The Client shall defend, indemnify and hold Wills harmless from any liability arising from or related to the Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include supporting drawings and appendices.

The recommendations made in this report are based on Wills' present understanding of the Project, the current and proposed site use, ground and subsurface conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with the level of care and skill ordinarily exercised by members of geoscience or engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. 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 such third parties.

The recommendations and comments made in this report are based on Wills' investigations and resulting understanding of the Project, as defined at the time of the assignment. Wills should be retained to review our recommendations when the final or any modified design drawings and specifications are complete. Without this review, Wills shall not be liable for any misunderstanding of our recommendations or their application and adaptation.

Soil, bedrock, and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations. Should any conditions at the Subject Property be encountered which differ from those found at the test locations, Wills must be notified immediately in order to permit a reassessment of our recommendations. If different conditions are identified, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by Wills is completed.

FIGURES



Source: MNRF – Make A Topographic Map 2022

Legend

━ Subject Property

Subject Property Plan

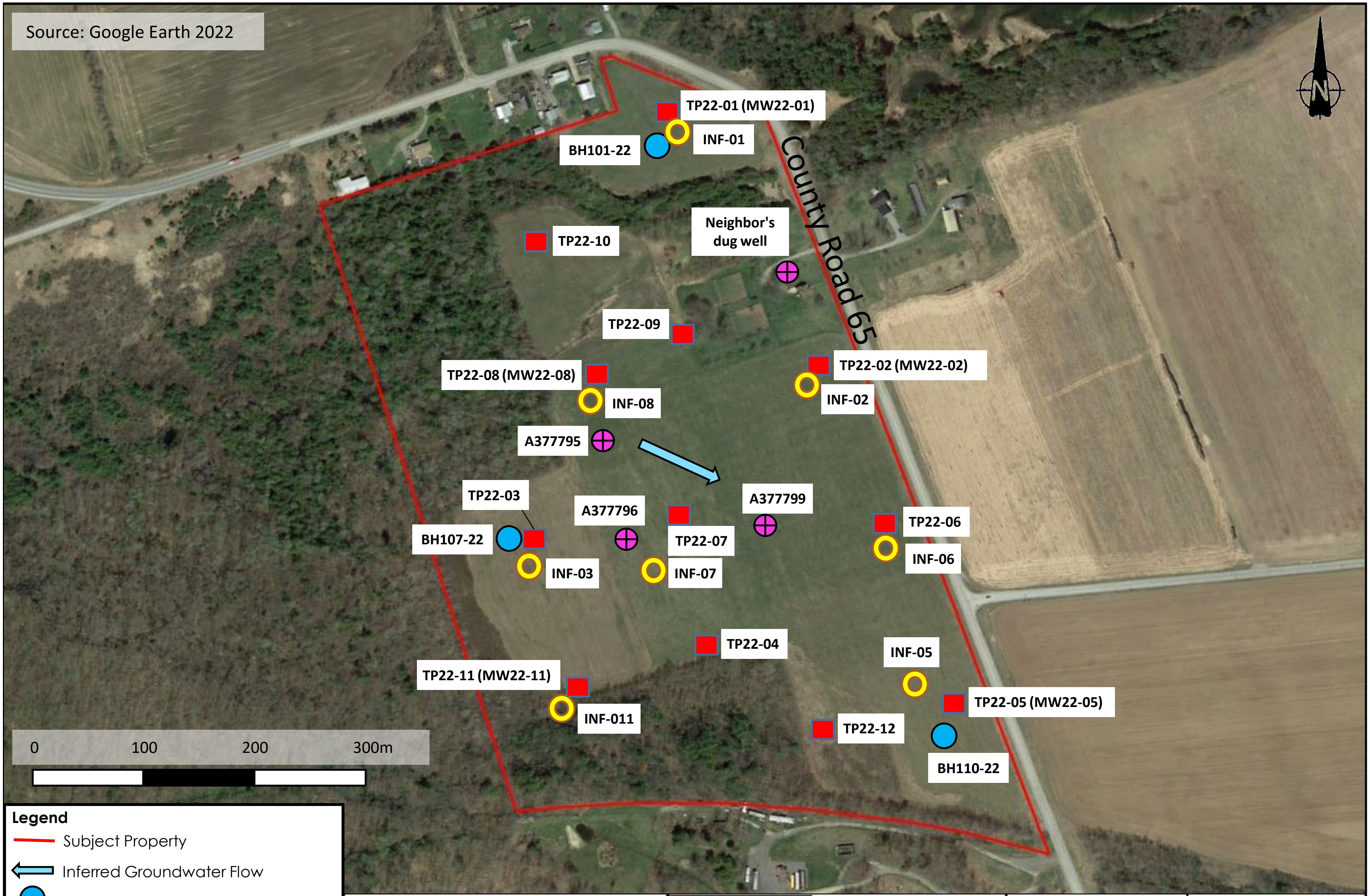
Hydrogeological Study
County Road 65
Osaca, ON

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.749.9944
E. wills@dmwills.com

Drawn By	LT	**Scale**	See Scale Bar
Checked	IA	**Date**	November 2022
Project No.	22-11056	**Drawing File No.**	Figure 1



Legend

- ▬ Subject Property
- ⇦ Inferred Groundwater Flow
- ● Geotechnical Monitor Well
- 🟥 Test Pit Location
- ○ Infiltration Test Location
- ⊕ Water Supply Well

Subsurface Investigation Plan

Hydrogeological Study
County Road 65
Osaca, ON

WILLS

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150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

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E. wills@dmwills.com

Drawn By	RB	Scale	See Scale Bar
Checked	IA	Date	December 2023
Project No.	22-11056	Drawing File No.	Figure 2a

Legend

- ▬ Subject Property Limits
- ⊕ Water Supply Wells Installed in 2023
- ⊕ Water Supply Wells Installed in 2024
- ⊕ Water Supply Wells Installed in 2018 on the Property to the South
- ⊕ Wells installed by Cambium in 2022 (6 m deep)
- –·–· Cross Section

Source(s):
- Google Earth
- Groundwater Supply Assessment Report – Hope Concession 5, Part Lot 27 County Road No. 65, prepared by Ted Rannie M.Sc., P. Geo in September 2018
- Geotechnical Investigation – Proposed Residential Development, 5868 County Road 65, Port Hope, ON - Cambium Inc, November 2022

Existing Wells Locations

Part of lot 27, Concession 5
Municipality of Port Hope
County of Northumberland

WILLS

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150 Jameson Drive
Peterborough, Ontario
K9J 0B9

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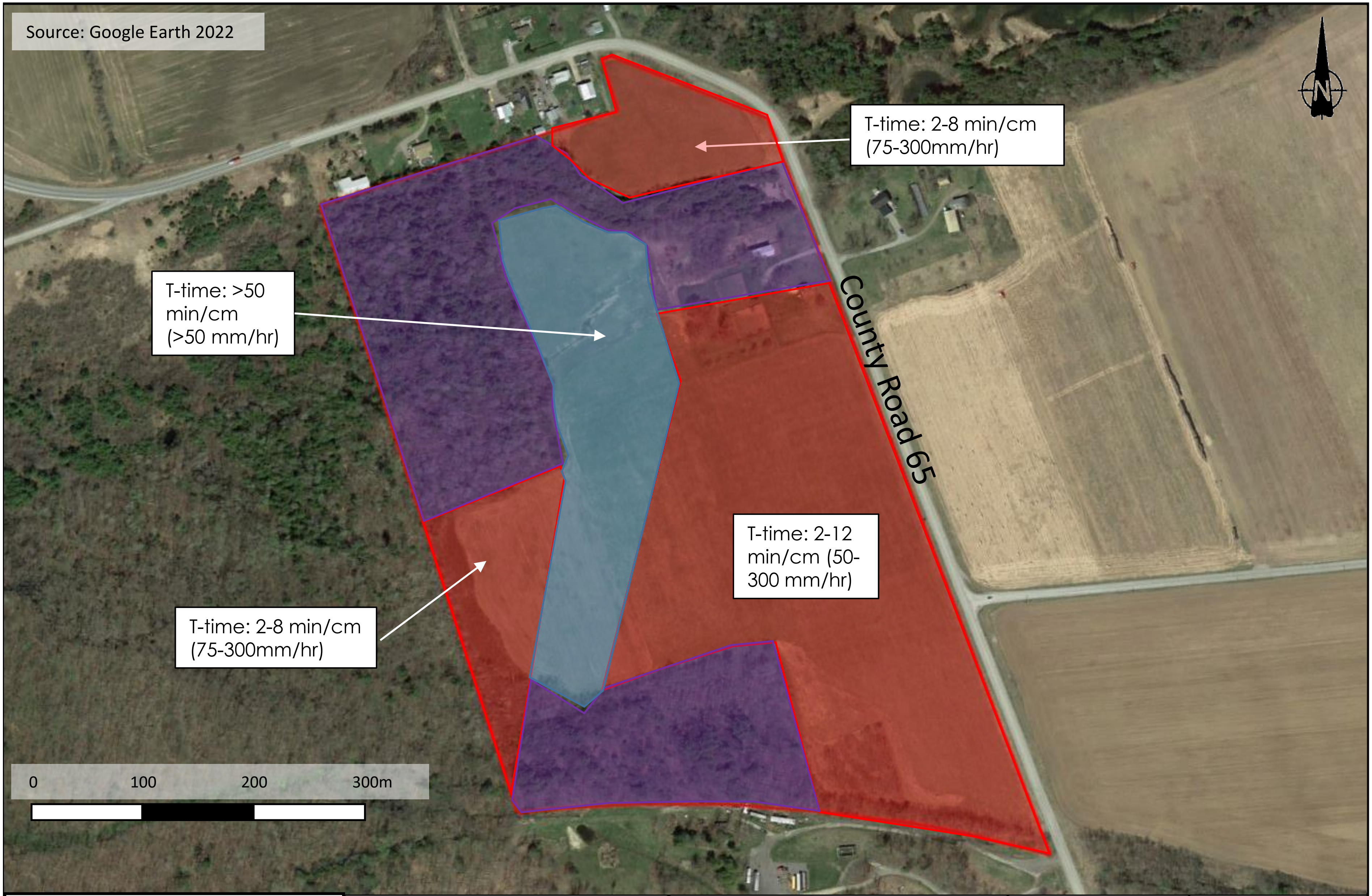
F. 705.748.9944
E. wills@dmwills.com

Drawn by: R. BOLVIN	Scale: 1:6 000 on 8.5"x11" (US Letter)
Checked: I. AMES	Date: November 14, 2024
Project No.: 11056	Drawing file No.: Figure 2a



Legend

— Subject Property

🟦 Clayey silt to silt and clay above 3 .0 mbg

🟥 Sand to silty sand above 3.0 mbg

🟪 Uncharacterized

Subsurface Infiltration Plan

Hydrogeological Study
County Road 65
Osaca, ON

WILLS

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150 Jameson Drive
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Canada K9J 0B9

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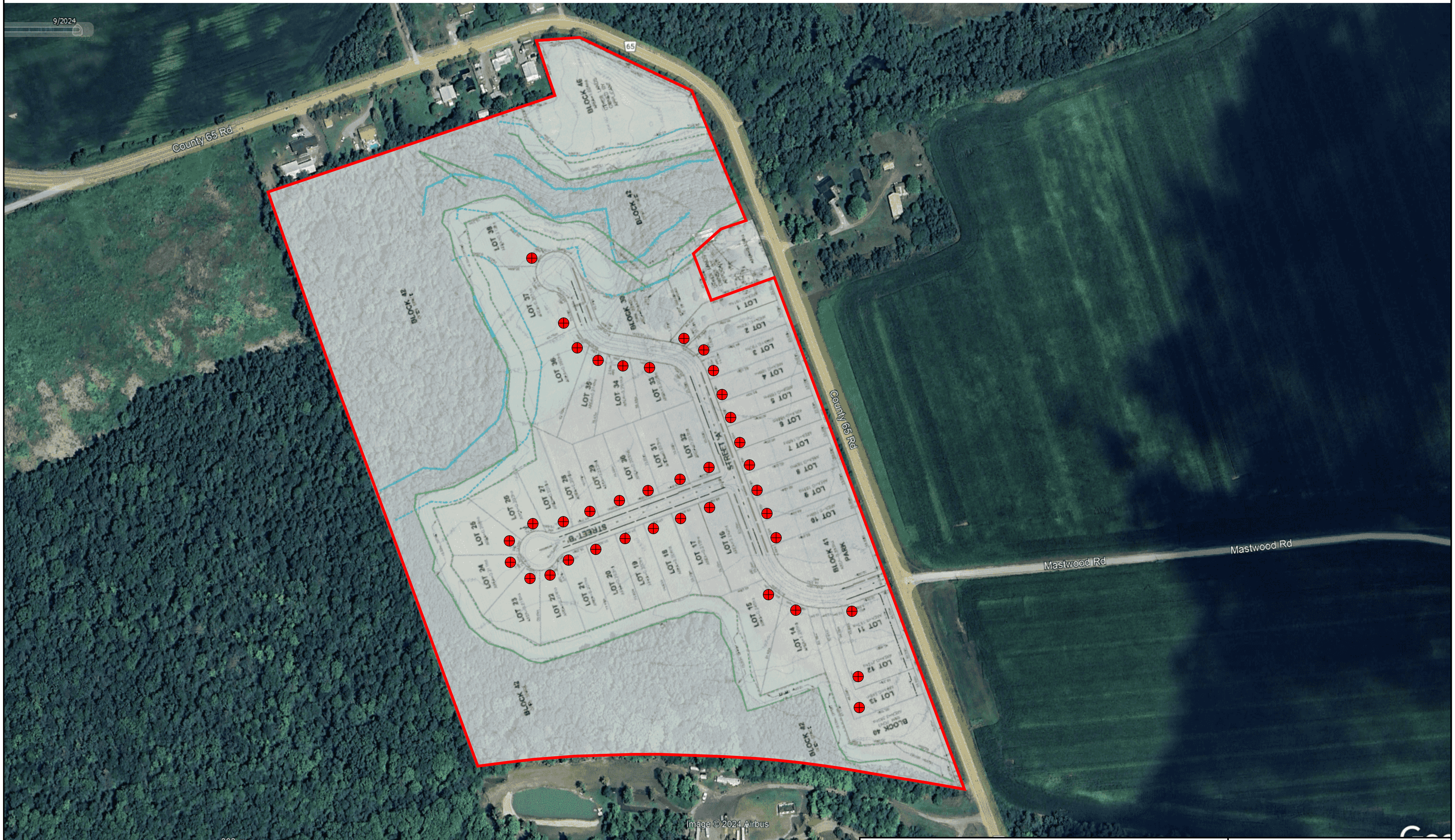
E. wills@dmwills.com

Drawn By	LT	**Scale**	See Scale Bar
Checked	IA	**Date**	November 2022
Project No.	22-11056	**Drawing File No.**	Figure 3



Source(s):
- Google Earth
- Preliminary Draft Plan, D.G. Biddle & Associates Limited, August 15, 2024

GRAPHIC SCALE
0 25 50 100 150 m

Legend

— Subject Property Limits

● Domestic Water Supply Wells (38 Wells)

Hydrogeological Modelling
Domestic Wells Locations

Part of lot 27, Concession 5
Municipality of Port Hope
County of Northumberland

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
K9J 0B9

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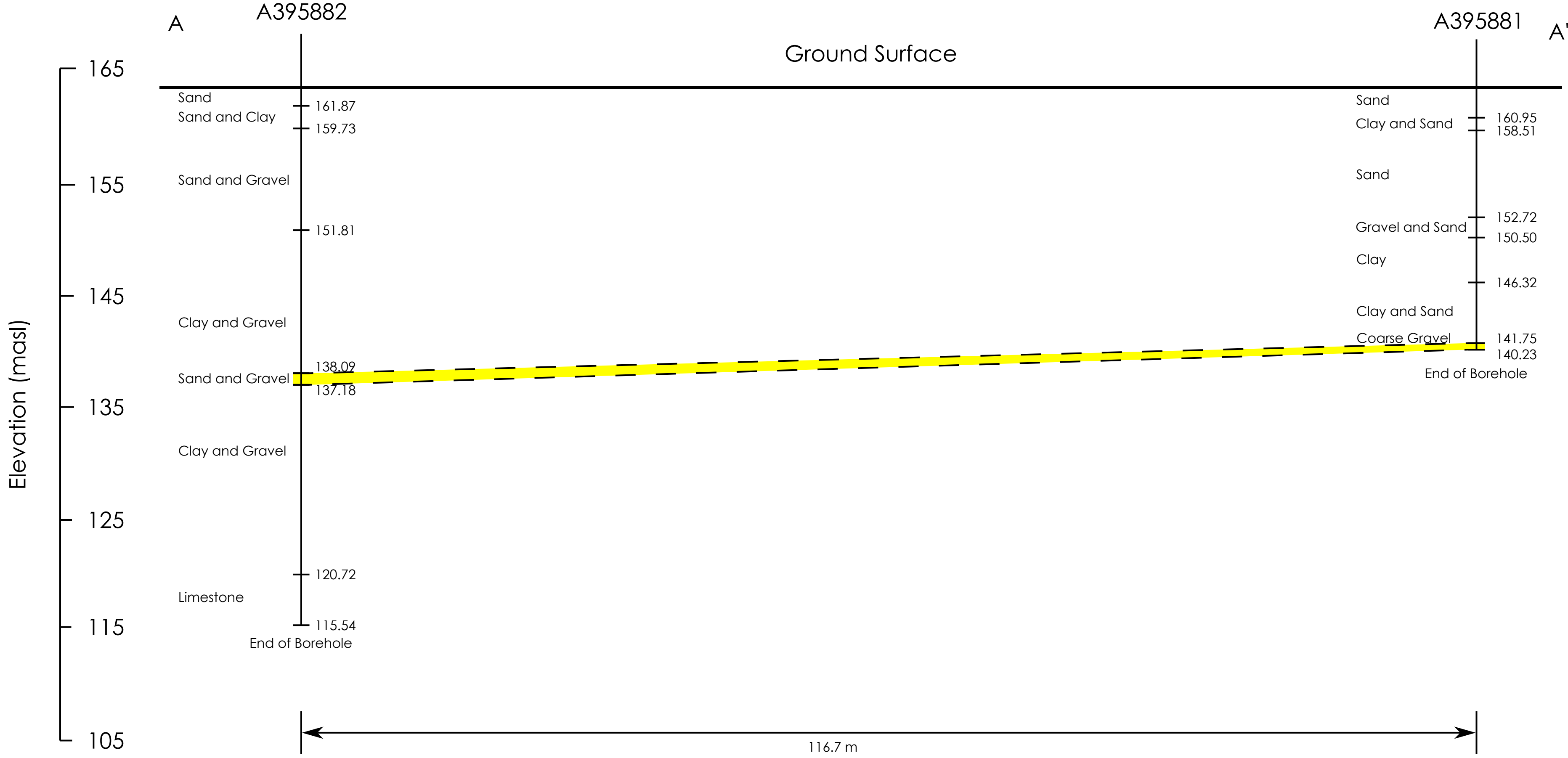
Drawn by: R. BOLVIN	**Scale:** 1:5 000 on 8.5"x11" (US Letter)
Checked: I. AMES	**Date:** November 13, 2024
Project No.: 11056	**Drawing file No.:** Figure 4



Legend

▬ ▬ Gravel Formation

Cross Section A-A'

Part of lot 27, Concession 5
Municipality of Port Hope
County of Northumberland

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
K9J 0B9

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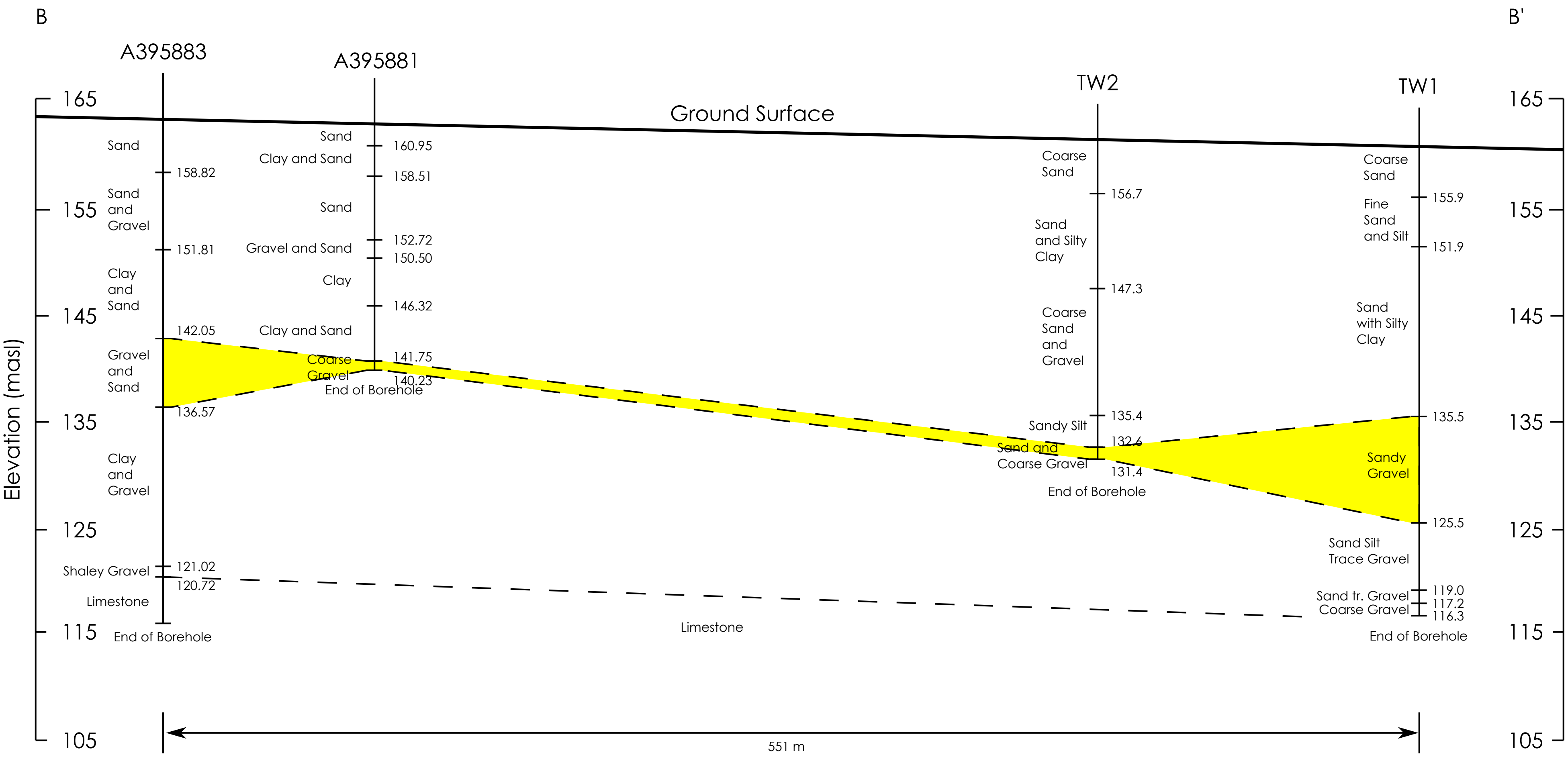
E. wills@dmwills.com

Drawn by: R. BOLVIN	Scale: See graphic scale
Checked: I. AMES	Date: November 14, 2024
Project No.: 11056	Drawing file No.: Figure 5



Legend

🟨 Gravel Formation

Cross Section B-B'

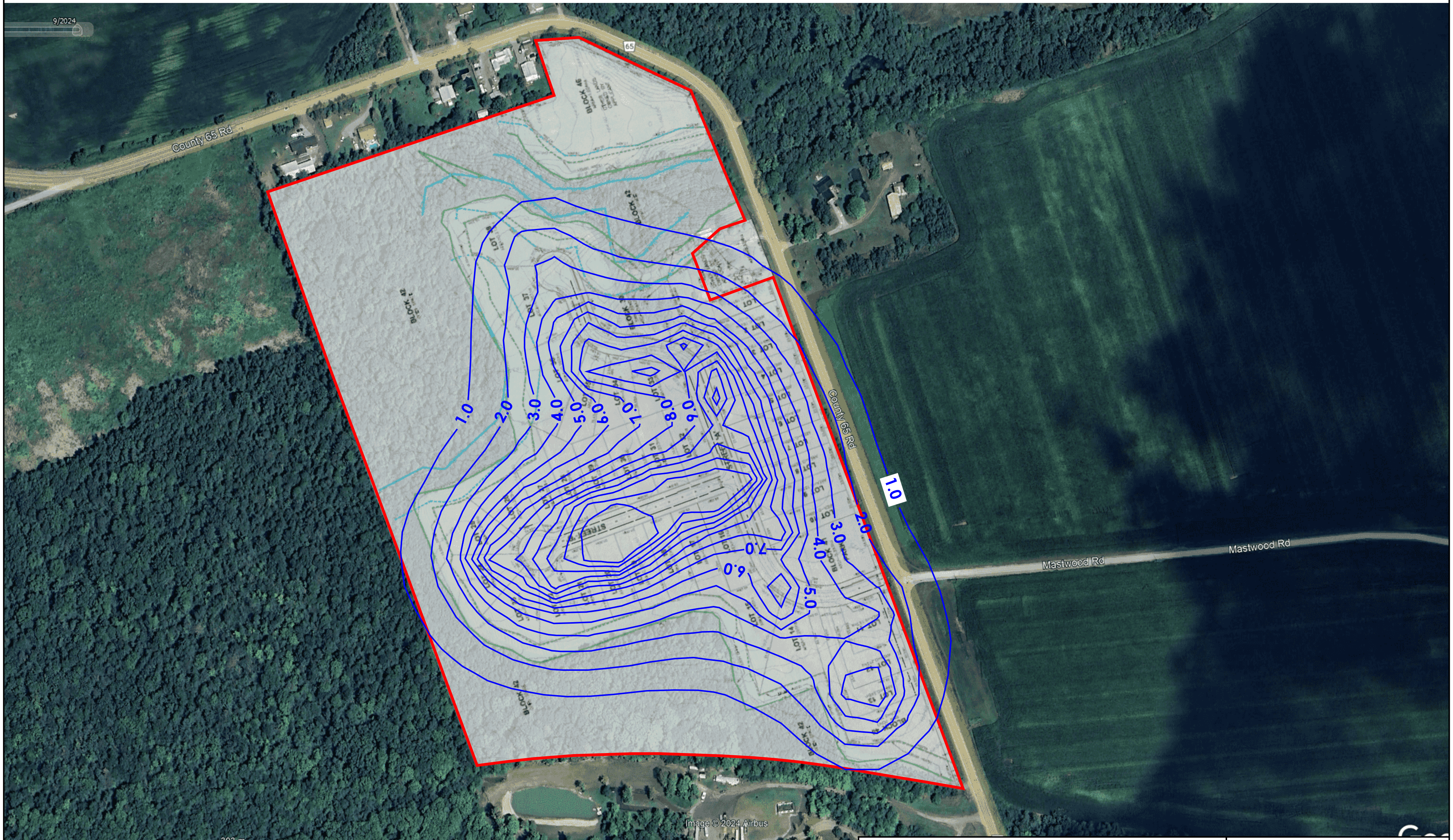
Part of lot 27, Concession 5
Municipality of Port Hope
County of Northumberland

W I L L S

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
K9J 0B9

P. 705.742.2297
F. 705.748.9944
E. wills@dmwills.com

Drawn by: R. BOLVIN	Scale: See graphic scale
Checked: I. AMES	Date: November 14, 2024
Project No.: 11056	Drawing file No.: Figure 6



Source(s):
- Google Earth
- Preliminary Draft Plan, D.G. Biddle & Associates Limited, August 15, 2024

GRAPHIC SCALE
0 25 50 100 150 m

Legend

🟥 Subject Property Limits

● Domestic Water Supply Wells (38 Wells)

—1.0— Simulated Drawdown (meters)

Hydrogeological Modelling
Simulated Drawdown - Scenario 1.2

Part of lot 27, Concession 5
Municipality of Port Hope
County of Northumberland

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
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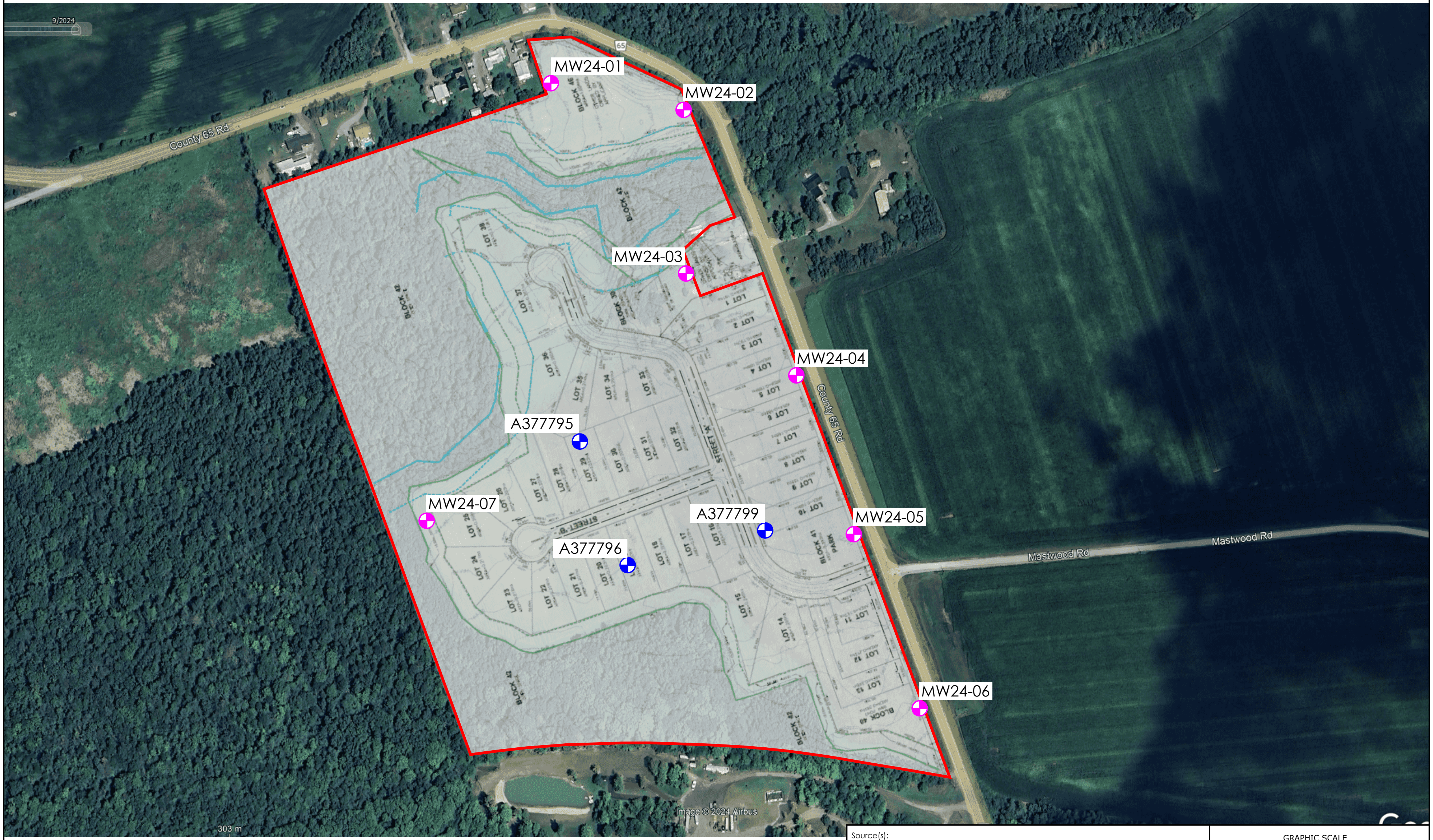
E. wills@dmwills.com

Drawn by: R. BOLVIN	**Scale:** 1:5 000 on 8.5"x11" (US Letter)
Checked: I. AMES	**Date:** November 14, 2024
Project No.: 11056	**Drawing file No.:** Figure 7



Source(s):
- Google Earth
- Preliminary Draft Plan, D.G. Biddle & Associates Limited, August 15, 2024

GRAPHIC SCALE
0 25 50 100 150 m

Legend

— Subject Property Limits

⊕ Water Supply Wells Installed in 2023

⊕ Proposed New Wells (6 m deep)

Groundwater Monitoring Program
Proposed Monitor wells

Part of lot 27, Concession 5
Municipality of Port Hope
County of Northumberland

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
K9J 0B9

P. 705.742.2297
F. 705.748.9944
E. wills@dmwills.com

Drawn by: R. BOLVIN	Scale: 1:5 000 on 8.5"x11" (US Letter)
Checked: I. AMES	Date: November 14, 2024
Project No.: 11056	Drawing file No.: Figure 8

Appendix A

Site Plans - D.G. Biddle & Associates Limited

Appendix A-1

Preliminary Draft Plan – D.G. Biddle & Associates Limited – August 26, 2022

LAND USE SCHEDULE				
PROPOSED USE	LOT/BLK #	# OF LOTS/BLKS	# OF UNITS	AREA (ha)
LOW DENSITY RESIDENTIAL				
SINGLE DETACHED	LOTS 1 – 59	59	59	16.012
NON RESIDENTIAL				
OPEN SPACE	BLOCKS 60 & 61	2	2	6.379
ROADS	20.0m ROW			2.223
TOTALS		61	59	24.623

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 OF THE PLANNING ACT

E NORTH –RURAL RESIDENTIAL
SOUTH –RURAL RESIDENTIAL
EAST –AGRICULTURAL
WEST –AGRICULTURAL
H –PIPED MUNICIPAL WATER
I –TILL
K –NO MUNICIPAL SERVICES AVAILABLE

No.	REVISION	DATE	BY	APPROVED

REVISIONS

OWNER'S AUTHORIZATION

I/WE LAND OWNER
BEING THE REGISTERED OWNER OF THE SUBJECT LANDS HEREBY AUTHORIZE
D.G.BIDDLE AND ASSOC. LTD.
TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL

SIGNED ____________
TITLE

DATE ____________

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARY OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN
ONTARIO LAND SURVEYOR
ONTARIO LAND SURVEYORS

SIGNED ____________
O.L.S

DATE ____________

D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST • OSHAWA,ON L1H 1B6
PHONE (905)576–8500 • FAX (905)576–9730
info@dgbiddle.com

PRELIMINARY
DRAFT PLAN
PART OF LOT 27, CONCESSION 5
FORMERLY IN THE TOWNSHIP OF HOPE
NOW IN THE
MUNICIPALITY OF PORT HOPE
COUNTY OF NORTHUMBERLAND

SCALE:	1:1000	122049
DRAWN BY:	B.B.	DP-1
DESIGN BY:	M.F.	
CHECKED BY:	M.F.	
PLOT DATE:	26/08/2022	

Y:\JOB FILES\122000\122049 5868 COUNTY RD 65\122049 DRAWINGS\122049 DRAWINGS CIVIL\122049 ENGINEERING DRAWINGS\122049-2D-LOT PLAN – 3.DWG

Appendix A-2

Preliminary Draft Plan – D.G. Biddle & Associates Limited – October 15, 2023

LAND USE SCHEDULE

PROPOSED USE	LOT/BLK #	# OF LOTS/BLKS	# OF UNITS	AREA (ha)
LOW DENSITY RESIDENTIAL				
SINGLE DETACHED	LOTS 1 – 48	48	48	10.349
NON RESIDENTIAL				
SWM PONDS	BLOCK 49,50	2		0.720
OPEN SPACE	BLOCK 51	1		11.520
ROADS	20.0m ROW			2.034
TOTALS		51	48	24.623

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) AS SHOWN ON THE DRAFT PLAN
b) AS SHOWN ON THE DRAFT PLAN
c) AS SHOWN ON THE DRAFT PLAN
d) SEE LAND USE SCHEDULE
e) AS SHOWN ON THE DRAFT PLAN
f) AS SHOWN ON THE DRAFT PLAN
f.1) NOT APPLICABLE
g) AS SHOWN ON THE DRAFT PLAN
h) WELL AND SEPTIC
i) SAND AND SANDY SILT
j) AS SHOWN ON THE DRAFT PLAN
k) PRIVATE WELL
l) AS SHOWN ON THE DRAFT PLAN

No.	REVISION	DATE	BY	APPROVED

REVISIONS

OWNER'S AUTHORIZATION

I/WE **LAND OWNER**
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TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL

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TITLE

DATE ______________________

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ONTARIO LAND SURVEYOR
ONTARIO LAND SURVEYORS

SIGNED ______________________
O.L.S

DATE ______________________

PRELIMINARY

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FORMERLY IN THE TOWNSHIP OF HOPE
NOW IN THE

MUNICIPALITY OF PORT HOPE

COUNTY OF NORTHUMBERLAND

D.G. Biddle & Associates Limited
consulting engineers and planners
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PHONE (905)576-8500 • FAX (905)576-9730
info@dgbiddle.com

MICHAEL J. FRY
REGISTERED PROFESSIONAL PLANNER
R.P.P.

SCALE:	1:1000	122049
DRAWN BY:	B.B.	DP-1
DESIGN BY:	M.F.	
CHECKED BY:	M.F.	
PLOT DATE:	15/10/2023	

X:\STAFF\JOB FILES\122000\122049 5868 COUNTY RD 65\122049 DRAWINGS\122049 DRAWINGS CIVIL\122049 ENGINEERING DRAWINGS\122049-20231003-DRAFT PLAN.DWG

Appendix A-3

Preliminary Draft Plan – D.G. Biddle & Associates Limited – February 21, 2024

LAND USE SCHEDULE

PROPOSED USE	LOT/BLK #	# OF LOTS/BLKS	# OF UNITS	AREA (ha)
LOW DENSITY RESIDENTIAL				
SINGLE DETACHED	LOTS 1 – 40	40	40	9.450
NON RESIDENTIAL				
SWM PONDS	BLOCK 41,42	2		0.674
OPEN SPACE	BLOCK 43	1		11.354
OTHER LANDS OWNED BY APPLICANT	BLOCK 44	1		1.093
ROADS	20.0m ROW			1.718
TOTALS		44	40	24.289

LEGEND

▬	WETLANDS (20231024) BOUNDARY
- - -	30.0m SETBACK FROM WETLANDS (20231024)
▬	TREELINE (20231024) BOUNDARY
- - -	5.0m SETBACK FROM WOODLANDS (20231024)

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) AS SHOWN ON THE DRAFT PLAN
b) AS SHOWN ON THE DRAFT PLAN
c) AS SHOWN ON THE DRAFT PLAN
d) SEE LAND USE SCHEDULE
e) AS SHOWN ON THE DRAFT PLAN
f) AS SHOWN ON THE DRAFT PLAN
f.1) NOT APPLICABLE
g) AS SHOWN ON THE DRAFT PLAN
h) WELL AND SEPTIC
i) SAND AND SANDY SILT
j) AS SHOWN ON THE DRAFT PLAN
k) PRIVATE WELL
l) AS SHOWN ON THE DRAFT PLAN

No.	REVISION	DATE	BY	APPROVED

REVISIONS

OWNER'S AUTHORIZATION

I/WE **LAND OWNER**

BEING THE REGISTERED OWNER OF THE SUBJECT LANDS HEREBY AUTHORIZE

D.G.BIDDLE AND ASSOC. LTD.

TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL

SIGNED ______________________
TITLE

DATE ______________________

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARY OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN

ONTARIO LAND SURVEYOR
ONTARIO LAND SURVEYORS

SIGNED ______________________
O.L.S

DATE ______________________

D.G.Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST · OSHAWA,ON L1H 1B6
PHONE (905)576-8500 · FAX (905)576-9730
info@dgbiddle.com

PRELIMINARY

DRAFT PLAN

PART OF LOT 27, CONCESSION 5
FORMERLY IN THE TOWNSHIP OF HOPE
NOW IN THE

MUNICIPALITY OF PORT HOPE

COUNTY OF NORTHUMBERLAND

MICHAEL J. FRY
REGISTERED PROFESSIONAL PLANNER
R.P.P.

SCALE:	1:1000
DRAWN BY:	B.B.
DESIGN BY:	M.F.
CHECKED BY:	M.F.
PLOT DATE:	21/02/2024

122049

DP-1

X:\STAFF\JOB FILES\122000\122049 5868 COUNTY RD 65\122049 DRAWINGS\122049 DRAWINGS CIVIL\122049 ENGINEERING DRAWINGS\122049-20240221-DRAFT PLAN.DWG

Appendix A-4

Preliminary Draft Plan – D.G. Biddle & Associates Limited – August 15, 2024

LAND USE SCHEDULE

PROPOSED USE	LOT/BLK #	# OF LOTS/BLKS	# OF UNITS	AREA (ha)
LOW DENSITY RESIDENTIAL				
SINGLE DETACHED	LOTS 1 – 38	38	38	8.050
NON RESIDENTIAL				
SWM PONDS	BLOCK 39,40	2		0.834
PARK	BLOCK 41	1		0.393
OPEN SPACE	BLOCK 42	1		12.235
ROAD WIDENING	BLOCK 43,44,45	3		0.306
OTHER LANDS OWNED BY APPLICANT	BLOCK 46	1		1.024
ROADS	20.0m ROW			1.447
TOTALS		46	38	24.289

LEGEND

━	WETLANDS (20231024) BOUNDARY
╌	30.0m SETBACK FROM WETLANDS (20231024)
━	TREELINE (20231024) BOUNDARY
╌	10.0m/15.0m SETBACK FROM WOODLANDS (20231024)

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) AS SHOWN ON THE DRAFT PLAN
b) AS SHOWN ON THE DRAFT PLAN
c) AS SHOWN ON THE DRAFT PLAN
d) SEE LAND USE SCHEDULE
e) AS SHOWN ON THE DRAFT PLAN
f) AS SHOWN ON THE DRAFT PLAN
f.1) NOT APPLICABLE
g) AS SHOWN ON THE DRAFT PLAN
h) WELL AND SEPTIC
i) SAND AND SANDY SILT
j) AS SHOWN ON THE DRAFT PLAN
k) PRIVATE WELL
l) AS SHOWN ON THE DRAFT PLAN

No.	REVISION	DATE	BY	APPROVED

REVISIONS

OWNER'S AUTHORIZATION

I/WE **LAND OWNER**

BEING THE REGISTERED OWNER OF THE SUBJECT LANDS HEREBY AUTHORIZE

D.G.BIDDLE AND ASSOC. LTD.

TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL

SIGNED ______________________
TITLE

DATE ______________________

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARY OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN

ONTARIO LAND SURVEYOR
ONTARIO LAND SURVEYORS

SIGNED ______________________
O.L.S

DATE ______________________

D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST • OSHAWA,ON L1H 1B6
PHONE (905)576–8500 • FAX (905)576–9730
info@dgbiddle.com

PRELIMINARY

DRAFT PLAN

PART OF LOT 27, CONCESSION 5
FORMERLY IN THE TOWNSHIP OF HOPE
NOW IN THE

MUNICIPALITY OF PORT HOPE

COUNTY OF NORTHUMBERLAND

MICHAEL J. FRY
REGISTERED PROFESSIONAL PLANNER
R.P.P.

SCALE:	1:1000
DRAWN BY:	B.B.
DESIGN BY:	M.F.
CHECKED BY:	M.F.
PLOT DATE:	15/08/2024

122049

DP-1

X:\STAFF\JOB FILES\122000\122049 5868 COUNTY RD 65\122049 DRAWINGS\122049 DRAWINGS CIVIL\122049 ENGINEERING DRAWINGS\122049–20240815–DRAFT PLAN.DWG

Appendix B

Test Pit Logs

Test Pit Log – TP22-01

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, moist.
0.2 – 3.0	Brown to grey sand, trace gravel, trace silt, moist to saturated.
Grab Sample Summary	
GS-01 collected at approximately 1.4 mbg.	GS-01 GSA: 3% Gravel 93% Sand 3% Silt 1% clay

Groundwater

- Groundwater encountered at 3.0 mbg.

Additional Notes

- Test pit terminated at 3.0 mbg.
- Water pooling at the bottom of test pit upon completion.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.
- MW22-01 installed in test pit prior to backfilling.

Test Pit Photos

TP22-01
September 26, 2022
17T
705479 mE
4875999 mN

Test Pit Log – TP22-02

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, rootlets, moist.
0.2 – 3.0	Brown sand, trace gravel, trace silt, moist.
Grab Sample Summary	
GS-02 collected at approximately 2.9 mbg.	GS-02 GSA: 3% Gravel 94% Sand 3% Silt 0% Clay

Groundwater

- No groundwater encountered.

Additional Notes

- Test pit terminated at 3.0 mbg.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.
- MW22-02 installed in test pit prior to backfilling.

Test Pit Photos

TP22-02
September 23, 2022
17T
705628 mE
4875766 mN

Test Pit Log – TP22-03

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, moist.
0.2 – 3.0	Brown to grey sand, trace gravel, moist to saturated.

Grab Sample Summary

GS-01 collected at approximately 1.0 mbg.	GS-01 GSA: 0% Gravel 97% Sand 3% Silt 0% Clay

Groundwater

- Groundwater encountered at 3.0 mbg.

Additional Notes

- Test pit terminated at 3.0 mbg.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.

Test Pit Photos

TP22-03
September 23, 2022
17T
705389 mE
4875605 mN

Test Pit Log – TP22-04

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, moist.
0.2 – 0.5	Brown sand, some silt, moist.
0.5 – 3.0	Brown to grey sand, trace gravel, trace silt, moist to saturated.

Groundwater

- Groundwater encountered at 3.0 mbg.

Additional Notes

- Test pit terminated at 3.0 mbg.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.

Test Pit Photos

TP22-04
September 23, 2022
17T
705528 mE
4875523 mN

Test Pit Log – TP22-05

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, rootlets, moist.
0.2 - 2.4	Brown sand, some silt, trace gravel, trace clay, moist.
2.4 – 3.0	Brown to grey sand, some silt, trace gravel, trace clay, moist to saturated.
Grab Sample Summary	
GS-01 collected at approximately 1.7 mbg.	GS-01 GSA: 2% Gravel 78% Sand 18% Silt 2% Clay

Groundwater

- Groundwater encountered at 2.9 mbg.

Additional Notes

- Test pit terminated at 3.0 mbg.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.
- MW22-05 installed in test pit prior to backfilling.

Test Pit Photos

TP22-05
September 23, 2022
17T
705743 mE
4875493 mN

Test Pit Log – TP22-06

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, some rootlets, moist.
0.2 – 3.0	Brown to grey sand, some silt, trace gravel, trace clay, moist.

Groundwater

- No groundwater encountered.

Additional Notes

- Test pit terminated at 3.0 mbg.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.

Test Pit Photos

TP22-06
September 23, 2022
17T
705682 mE
4875632 mN

Test Pit Log – TP22-07

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, moist.
0.2 - 3.0	Brown to grey sand, some silt, moist to wet.

Groundwater

- Groundwater not encountered.

Additional Notes

- Test pit terminated at 3.0 mbg.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.

Test Pit Photos

TP22-07
September 23, 2022
17T
705514 mE
4875641 mN

Test Pit Log – TP22-08

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, moist.
0.2 – 1.3	Brown to grey sand, some silt, trace clay, moist.
1.3 – 3.0	Brown to grey silt and clay, trace sand, about plastic limit to much wetter than plastic limit.

Grab Sample Summary

GS-02 collected at approximately 2.0 mbg.	<u>GS-02 GSA:</u> 0% Gravel 4% Sand 56% Silt 40% Clay

Groundwater

- Groundwater encountered at 3.0 mbg.

Additional Notes

- Test pit terminated at 3.0 mbg.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.
- MW22-08 installed in test pit prior to backfilling.

Test Pit Photos

TP22-08
September 23, 2022
17T
705426 mE
4875745 mN

Test Pit Log – TP22-09

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, rootlets, moist.
0.2 - 2.4	Brown sand, trace silt, trace gravel, moist.
2.4 – 3.0	Brown to grey silty sand, some clay, moist to saturated.

Groundwater

- Groundwater encountered at 3.0 mbg.

Additional Notes

- Test pit terminated at 3.0 mbg
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.

Test Pit Photos

TP22-09
September 23, 2022
17T
705509 mE
4875797 mN

Test Pit Log – TP22-10

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, moist.
0.2 - 1.7	Brown silty sand, trace clay, moist
1.7 – 3.0	Brown to grey silt and clay, trace sand, about plastic limit.
Grab Sample Summary	
GS-02 collected at approximately 1.9 mbg.	GS-02 GSA: 0% Gravel 3% Sand 62% Silt 35% Clay

Groundwater

- Groundwater not encountered.

Additional Notes

- Test pit terminated at 3.0 mbg
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.

Test Pit Photos

TP22-10
September 23, 2022
17T
705372 mE
4875876 mN

Test Pit Log – TP22-11

Depth (mbg)	Soil Description
0.0 – 0.2	Brown silty sand topsoil, moist.
0.2 - 1.7	Brown silty sand, trace clay, moist.
1.7 – 3.0	Brown to grey silt and clay, trace sand, about plastic limit.

Grab Sample Summary

GS-03 collected at approximately 2.7 mbg.	GS-03 GSA: 0% Gravel 4% Sand 71% Silt 25% Clay

Groundwater

- Groundwater encountered at 3.0 mbg.

Additional Notes

- Test pit terminated at 3.0 mbg
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.
- MW22-11 installed in test pit prior to backfilling.

Test Pit Photos

TP22-11
September 23, 2022
17T
705435 mE
4875489 mN

Test Pit Log – TP22-12

Depth (mbg)	Soil Description
0.0 – 0.1	Brown silty sand topsoil, moist.
0.1 - 0.8	Brown sand, some silt, moist.
0.8 – 2.6	Brown to grey sand, trace silt, trace gravel, moist to wet.
2.6 – 2.8	Grey sand, some gravel, trace silt, saturated.

Groundwater

- Groundwater encountered at 2.6 mbg.

Additional Notes

- Test pit terminated at 2.8 mbg.
- Test pit backfilled and compacted using excavator following completion of stratigraphic logging and sampling.

Test Pit Photos

TP22-12
September 23, 2022
17T
705636 mE
4875461 mN

Appendix C

Certificates of Analysis – Physical Soil Testing

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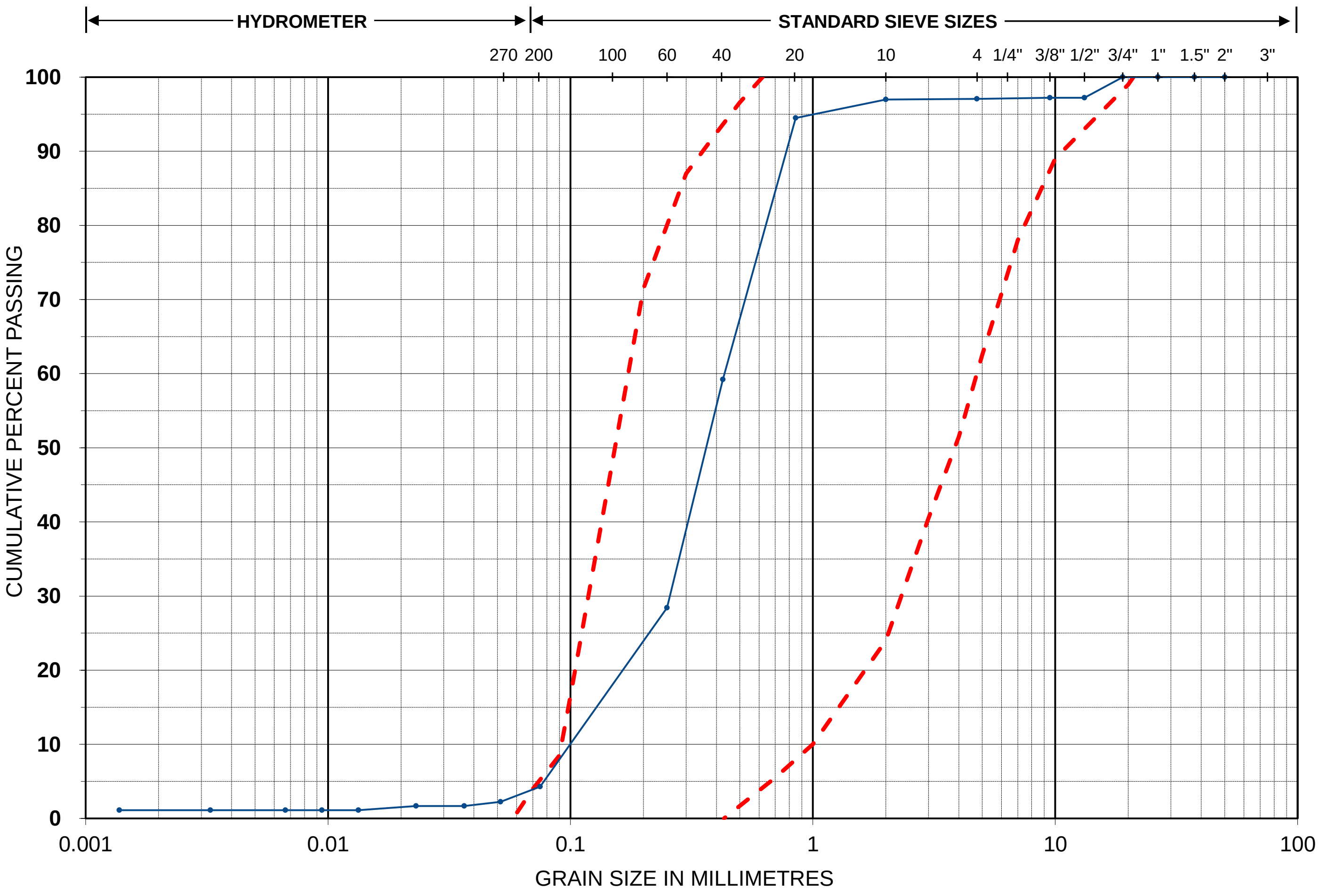
PARTICLE SIZE DISTRIBUTION

LS - 702

Project Name: Osaca (11056)
Project No.: 22-154
Sample Date: 26-Sep-22
Borehole/Test Pit ID.: TP22-01
Sample No./Depth: GS1
LAB ID: 22HYD-224



Silt or Clay	Sand	Gravel

— — — — — sp envelope T = 2 - 8 min/cm

Estimated T = 6 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	100.0
13.2	97.2
9.5	97.2
4.750	97.1
2.000	97.0
0.850	94.5
0.425	59.2
0.250	28.4
0.075	4.3

Hydrometer (mm)	% Passing
0.051	2.2
0.036	1.7
0.023	1.7
0.013	1.1
0.009	1.1
0.007	1.1
0.003	1.1
0.001	1.1

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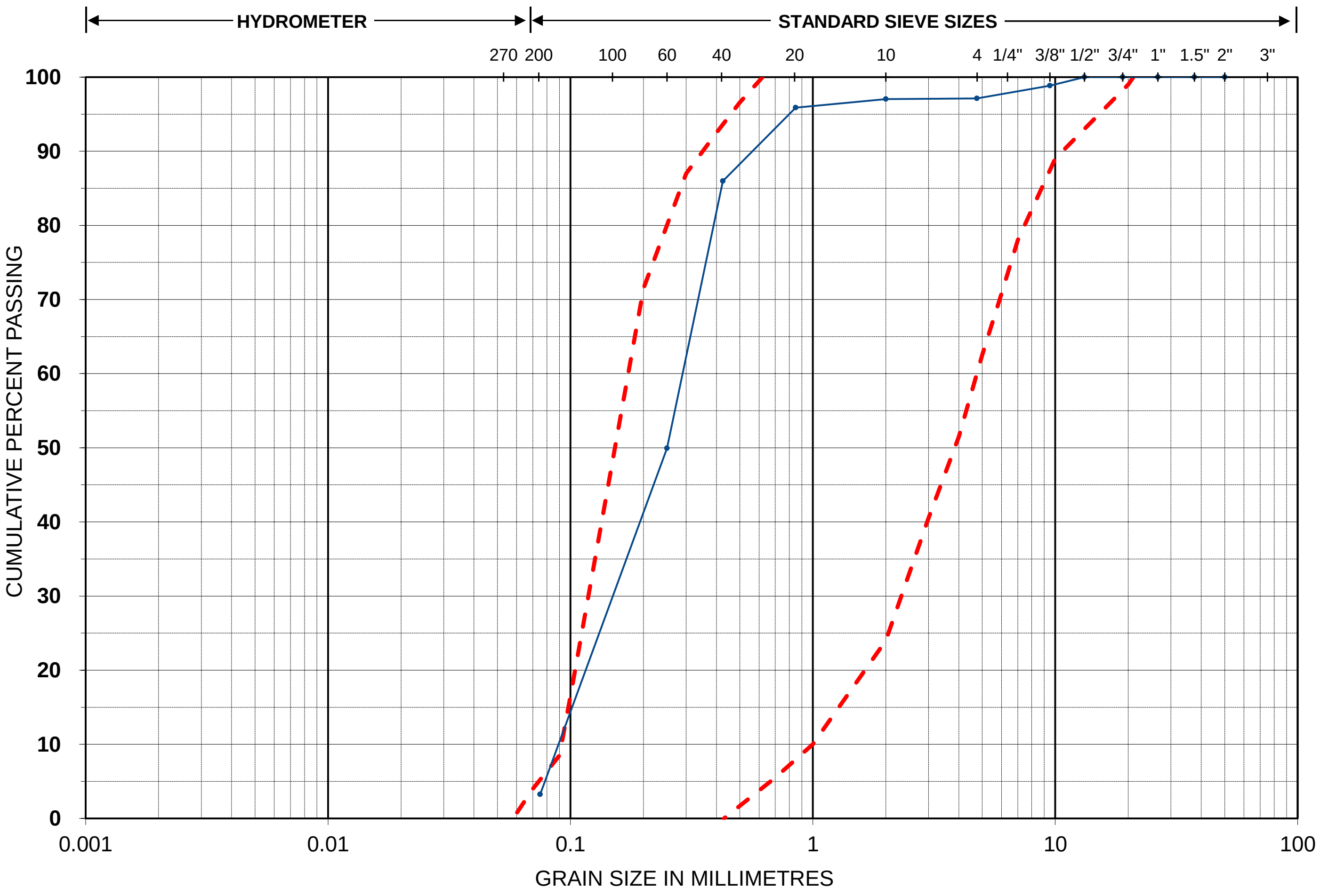
Project Name: Osaca (11056)
Project No.: 22-154
Sample Date: 23-Sep-22
Borehole/Test Pit ID.: TP22-02
Sample No./Depth: GS2
LAB ID: 22HYD-225



Silt or Clay	Sand	Gravel

— — — — — sp envelope T = 2 - 8 min/cm

Estimated T = 7 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	100.0
13.2	100.0
9.5	98.8
4.750	97.1
2.000	97.0
0.850	95.9
0.425	86.0
0.250	49.9
0.075	3.2

Hydrometer (mm)	% Passing
0.052	0.0
0.036	0.0
0.023	0.0
0.013	0.0
0.009	0.0
0.007	0.0
0.003	0.0
0.001	0.0

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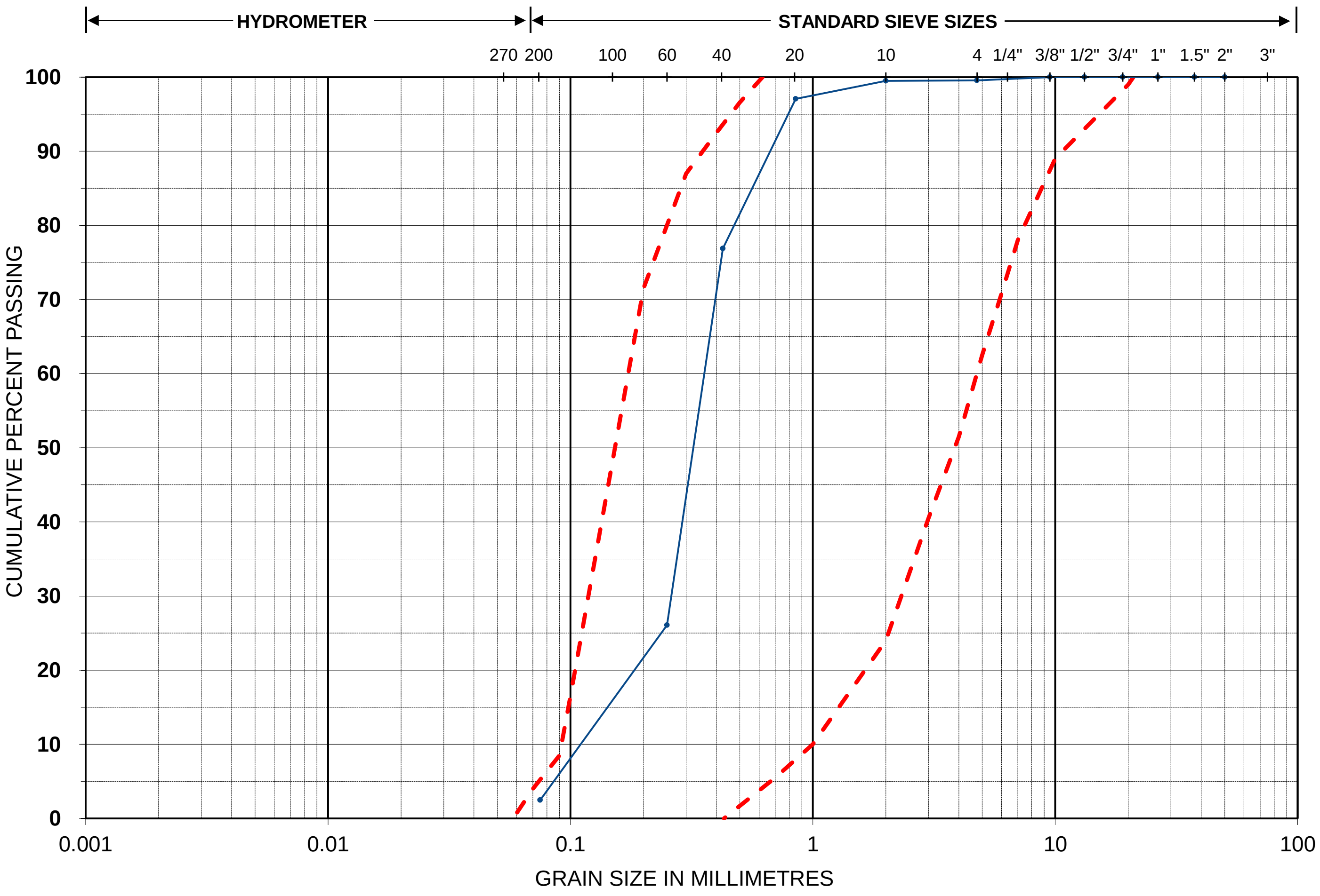
Project Name: Osaca (11056) **Project No.:** 22-154 **Sample Date:** 23-Sep-22

Borehole/Test Pit ID.: TP22-03 **Sample No./Depth:** GS1 **LAB ID:** 22HYD-226



Silt or Clay	Sand	Gravel

sp envelope T = 2 - 8 min/cm

Estimated T = 6 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	100.0
13.2	100.0
9.5	100.0
4.750	99.6
2.000	99.5
0.850	97.1
0.425	76.9
0.250	26.1
0.075	2.5

Hydrometer (mm)	% Passing
0.052	0.0
0.037	0.0
0.023	0.0
0.013	0.0
0.009	0.0
0.007	0.0
0.003	0.0
0.001	0.0

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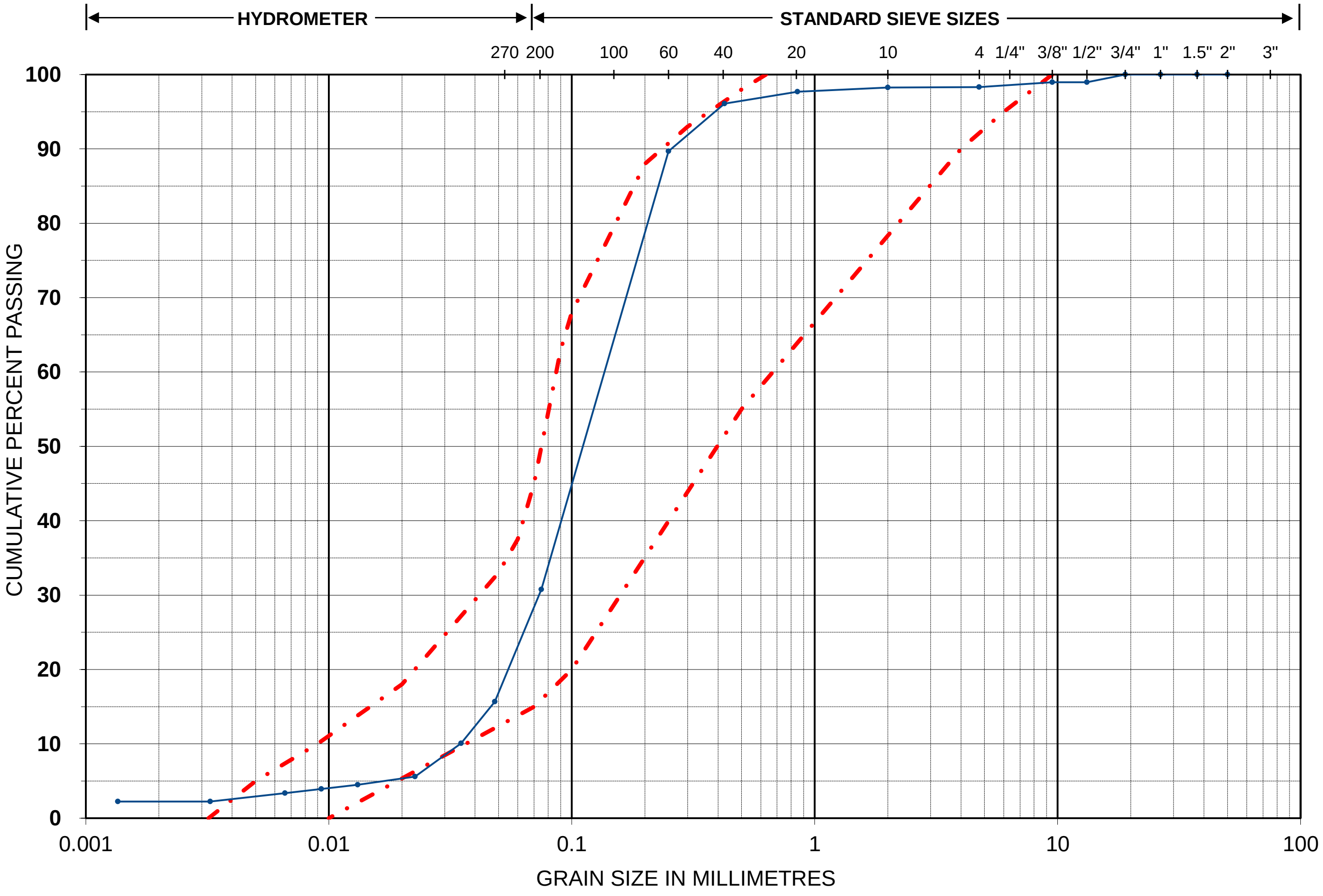
Project Name: Osaca (11056)
Project No.: 22-154
Sample Date: 23-Sep-22
Borehole/Test Pit ID.: TP22-05
Sample No./Depth: GS1
LAB ID: 22HYD-227



Silt or Clay	Sand	Gravel

- · - · - · - · sm envelope T = 8 - 20 min/cm

Estimated T = 12 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	100.0
13.2	99.0
9.5	99.0
4.750	98.3
2.000	98.3
0.850	97.7
0.425	96.1
0.250	89.7
0.075	30.8

Hydrometer (mm)	% Passing
0.048	15.7
0.035	10.1
0.023	5.6
0.013	4.5
0.009	3.9
0.007	3.4
0.003	2.2
0.001	2.2

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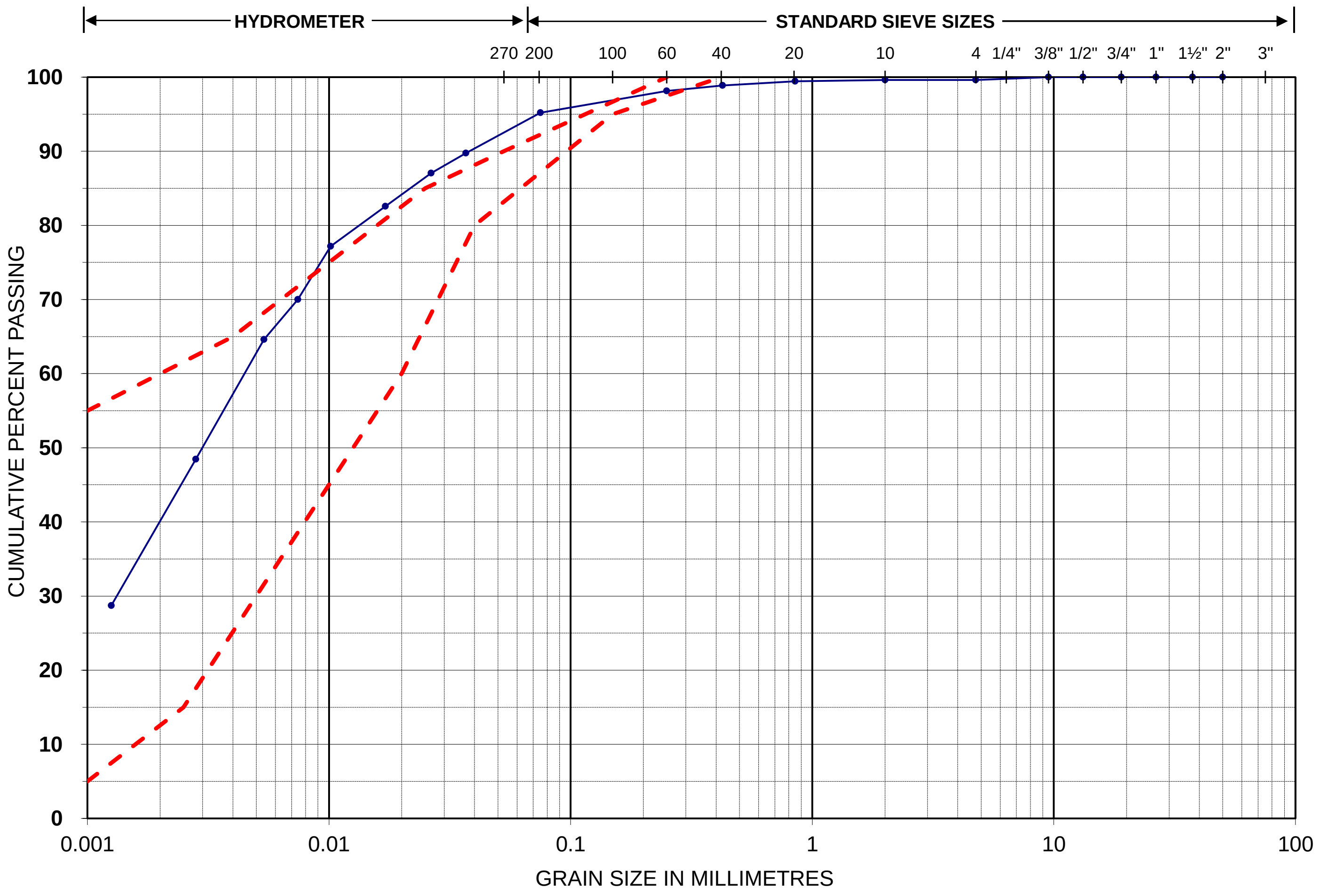
Project Name: Osaca (11056)
Project No.: 22-154
Sample Date: 23-Sep-22
Borehole/Test Pit ID.: TP22-08
Sample No./Depth: GS2
LAB ID: 22HYD-228



Silt or Clay	Sand	Gravel

– – – OH envelope T > 50 min/cm

Estimated T > 50 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	100.0
13.2	100.0
9.5	100.0
4.750	99.6
2.000	99.6
0.850	99.4
0.425	98.9
0.250	98.1
0.075	95.2

Hydrometer (mm)	% Passing
0.037	89.7
0.026	87.0
0.017	82.6
0.010	77.2
0.007	70.0
0.005	64.6
0.003	48.5
0.001	28.7

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PARTICLE SIZE DISTRIBUTION
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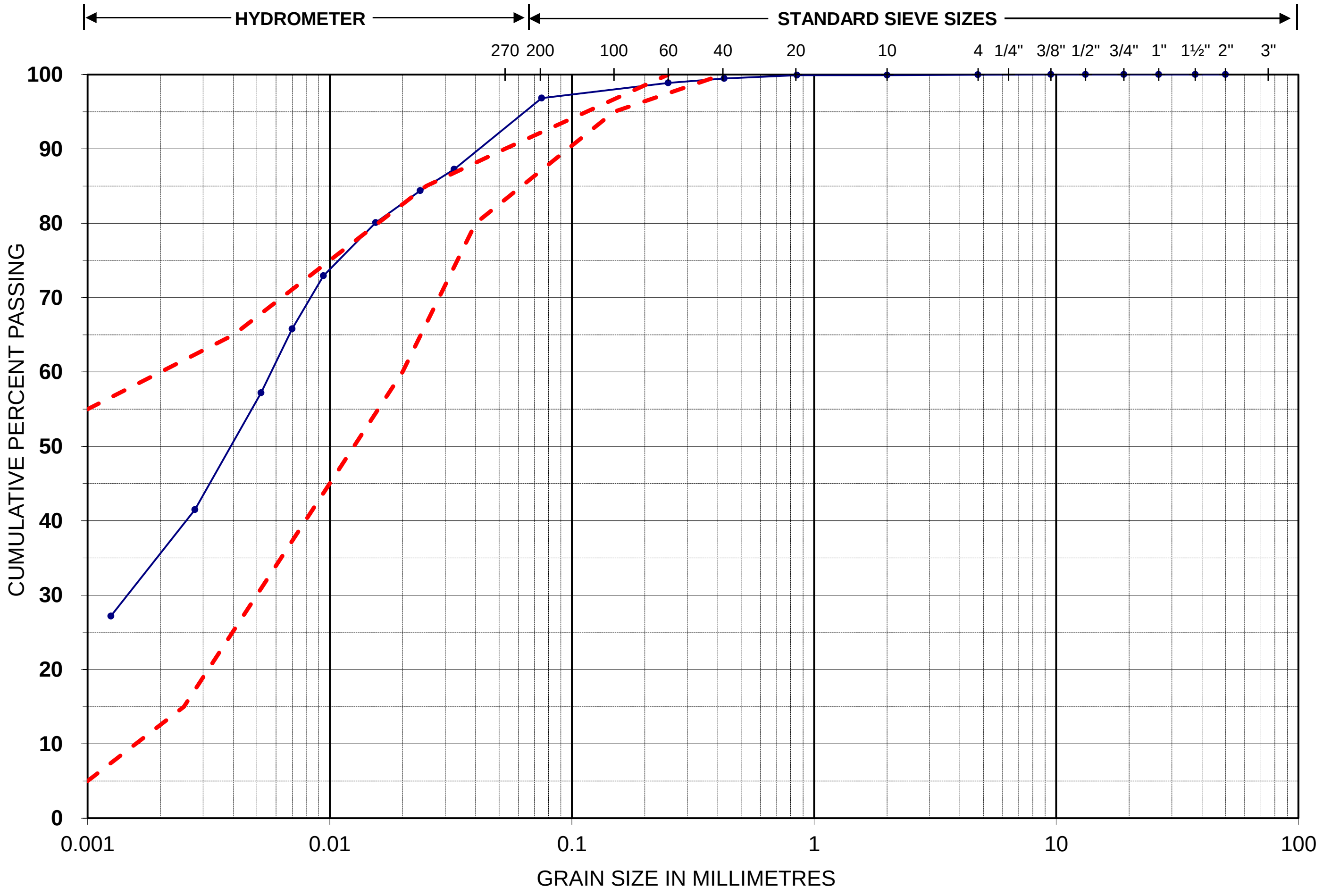
Project Name: Osaca (11056) **Project No.:** 22-154 **Sample Date:** 23-Sep-22

Borehole/Test Pit ID.: TP22-10 **Sample No./Depth:** GS2 **LAB ID:** 22HYD-229



Silt or Clay	Sand	Gravel

OH envelope T > 50 min/cm

Estimated T > 50 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	100.0
13.2	100.0
9.5	100.0
4.750	100.0
2.000	99.9
0.850	99.9
0.425	99.5
0.250	98.9
0.075	96.8

Hydrometer (mm)	% Passing
0.033	87.2
0.024	84.4
0.015	80.1
0.009	72.9
0.007	65.8
0.005	57.2
0.003	41.5
0.001	27.2

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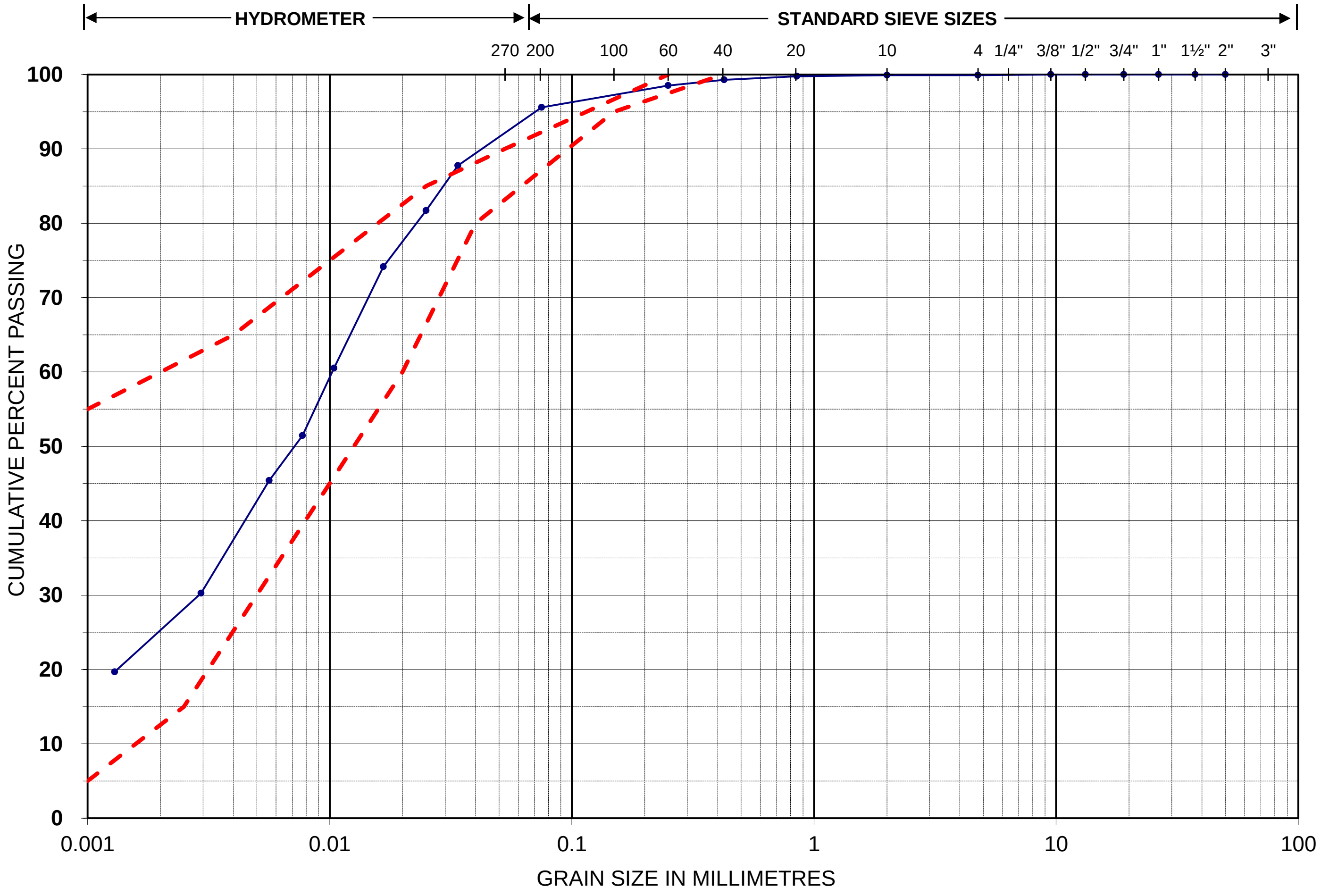
Project Name: Osaca (11056)
Project No.: 22-154
Sample Date: 23-Sep-22
Borehole/Test Pit ID.: TP22-11
Sample No./Depth: GS3
LAB ID: 22HYD-230



Silt or Clay	Sand	Gravel

OH envelope T > 50 min/cm

Estimated T > 50 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	100.0
13.2	100.0
9.5	100.0
4.750	99.9
2.000	99.9
0.850	99.8
0.425	99.3
0.250	98.5
0.075	95.6

Hydrometer (mm)	% Passing
0.034	87.8
0.025	81.7
0.017	74.1
0.010	60.5
0.008	51.4
0.006	45.4
0.003	30.3
0.001	19.7

Appendix D

Infiltration Graphs

IN-SITU INFILTRATION TEST

APPENDIX C

Project: Osaca Hillstreet subdivision
Site Location: 5868 County road 65, Osaca, ON
Test ID: INF-01

PROJECT NO.: 11056
Date: 26-Sep-22
Start Time: 12:30 PM
Test No.: 1

Depth of Test Pit (m):	1.4	**Pipe Stickup (m):**	0.34	**Total Pipe Length(m):**	1.56

Time* (Seconds)	**Measurement Interval (sec)**	**Depth** (m)**	**Water Column Height (m)**	**Distance dropped per interval (m1)**	**Infiltration Rate per Interval (m/sec)**	**Cumulative Infiltration Rate (m/sec)**
0	-	0.600	0.960	-	--	--
30	30	0.640	0.92	0.040	1.333E-03	1.333E-03
60	30	0.660	0.90	0.020	6.667E-04	1.000E-03
90	30	0.695	0.87	0.035	1.167E-03	1.056E-03
120	30	0.720	0.84	0.025	8.333E-04	1.000E-03
150	30	0.745	0.82	0.025	8.333E-04	9.667E-04
180	30	0.765	0.80	0.020	6.667E-04	9.167E-04
210	30	0.785	0.78	0.020	6.667E-04	8.810E-04
240	30	0.805	0.76	0.020	6.667E-04	8.542E-04
270	30	0.825	0.74	0.020	6.667E-04	8.333E-04
300	30	0.840	0.72	0.015	5.000E-04	8.000E-04
360	60	0.875	0.69	0.035	5.833E-04	7.639E-04
420	60	0.910	0.65	0.035	5.833E-04	7.381E-04
480	60	0.940	0.62	0.030	5.000E-04	7.083E-04
540	60	0.965	0.60	0.025	4.167E-04	6.759E-04
600	60	0.995	0.57	0.030	5.000E-04	6.583E-04
720	120	1.045	0.52	0.050	4.167E-04	6.181E-04
840	120	1.090	0.47	0.045	3.750E-04	5.833E-04
960	120	1.140	0.42	0.050	4.167E-04	5.625E-04
1,080	120	1.180	0.38	0.040	3.333E-04	5.370E-04
1,200	120	1.215	0.35	0.035	2.917E-04	5.125E-04
1,500	300	1.300	0.26	0.085	2.833E-04	4.667E-04
1,800	300	1.365	0.20	0.065	2.167E-04	4.250E-04
2,100	300	1.425	0.14	0.060	2.000E-04	3.929E-04

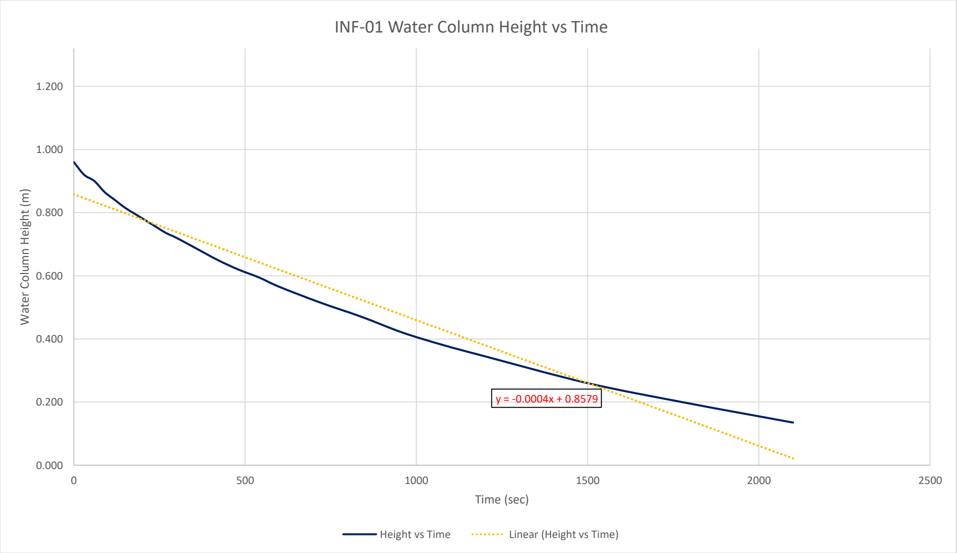
** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	**(mm/sec)**	**(mm/hour)**
Maximum Infiltration Rate Between Sampling Intervals -	1.33E-03	1.33E+00	4800
Minimum Infiltration Rate Between Sampling Intervals -	2.00E-04	2.00E-01	720
Median Infiltration Rate Between Sampling Intervals -	5.00E-04	5.00E-01	1800
Average Infiltration Rate Between Sampling Intervals -	**5.70E-04**	**5.70E-01**	**2053**
Cumulative Infiltration Rate for Entire Data Set -	**3.93E-04**	**3.93E-01**	**1414**

In-situ Infiltration Rate Measured in the Field (mm/sec): **0.39**

In-situ Infiltration Rate Measured in the Field (mm/hour): **1414**

Calculated Percolation Time (T) based on field infiltration (min/cm): **0.42**



		Test 1 - Observed
Test Duration (seconds)		**2,100**
Total Drop Distance (mm)		**825**
Total Number of Measured Intervals		**24**
Infiltration Rate (mm/sec) - Test Average		**0.39**
Infiltration Rate (mm/hour) - Test Average		**1414**
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		**0.42**

IN-SITU INFILTRATION TEST

Project: Osaca Hillstreet subdivision
Site Location: 5868 County road 65, Osaca, ON
Test ID: INF-02

PROJECT NO.: 11056
Date: 27-Sep-22
Start Time: 10:40 AM
Test No. 1

Depth of Test Pit (m):	1	**Pipe Stickup (m):**	1.245	**Total Pipe Length(m):**	2.41

Time* (Seconds)	Measurement Interval (sec)	Depth** (m)	Water Column Height (m)	Distance dropped per interval (m1)	Infilitration Rate per Interval (m/sec)	Cumulative Infiltration Rate (m/sec)
0	-	1.025	1.380	-	--	--
30	30	1.095	1.31	0.070	2.333E-03	2.333E-03
60	30	1.140	1.27	0.045	1.500E-03	1.917E-03
90	30	1.195	1.21	0.055	1.833E-03	1.889E-03
120	30	1.235	1.17	0.040	1.333E-03	1.750E-03
150	30	1.280	1.13	0.045	1.500E-03	1.700E-03
180	30	1.320	1.09	0.040	1.333E-03	1.639E-03
210	30	1.360	1.05	0.040	1.333E-03	1.595E-03
240	30	1.380	1.03	0.020	6.667E-04	1.479E-03
270	30	1.415	0.99	0.035	1.167E-03	1.444E-03
300	30	1.445	0.96	0.030	1.000E-03	1.400E-03
360	60	1.490	0.92	0.045	7.500E-04	1.292E-03
420	60	1.530	0.88	0.040	6.667E-04	1.202E-03
480	60	1.565	0.84	0.035	5.833E-04	1.125E-03
540	60	1.595	0.81	0.030	5.000E-04	1.056E-03
600	60	1.625	0.78	0.030	5.000E-04	1.000E-03
720	120	1.675	0.73	0.050	4.167E-04	9.028E-04
840	120	1.720	0.69	0.045	3.750E-04	8.274E-04
960	120	1.765	0.64	0.045	3.750E-04	7.708E-04
1,080	120	1.800	0.61	0.035	2.917E-04	7.176E-04
1,200	120	1.835	0.57	0.035	2.917E-04	6.750E-04
1,500	300	1.915	0.49	0.080	2.667E-04	5.933E-04
1,800	300	1.975	0.43	0.060	2.000E-04	5.278E-04
2,100	300	2.035	0.37	0.060	2.000E-04	4.810E-04
2,400	300	2.085	0.32	0.050	1.667E-04	4.417E-04
3,000	600	2.170	0.24	0.085	1.417E-04	3.817E-04
3,600	600	2.240	0.17	0.070	1.167E-04	3.375E-04

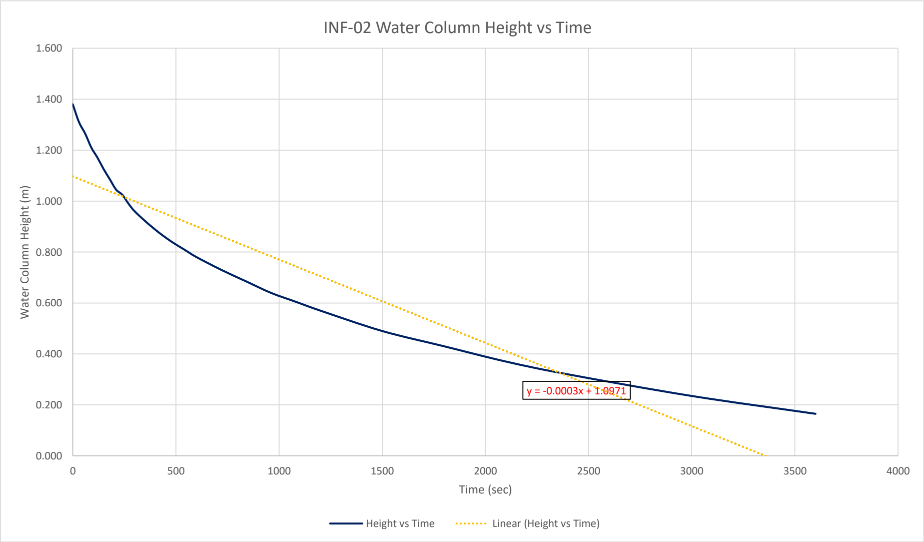
** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	(mm/sec)	(mm/hour)
Maximum Infiltration Rate Between Sampling Intervals -	2.33E-03	2.33E+00	8400
Minimum Infiltration Rate Between Sampling Intervals -	1.17E-04	1.17E-01	420
Median Infiltration Rate Between Sampling Intervals -	5.42E-04	5.42E-01	1950
Average Infiltration Rate Between Sampling Intervals -	**7.63E-04**	**7.63E-01**	**2747**
Cumulative Infiltration Rate for Entire Data Set -	**3.38E-04**	**3.38E-01**	**1215**

In-situ Infiltration Rate Measured in the Field (mm/sec): **0.34**

In-situ Infiltration Rate Measured in the Field (mm/hour): **1215**

Calculated Percolation Time (T) based on field infiltration (min/cm): **0.49**



		Test 1 - Observed
Test Duration (seconds)		3,600
Total Drop Distance (mm)		1215
Total Number of Measured Intervals		27
Infiltration Rate (mm/sec) - Test Average		0.34
Infiltration Rate (mm/hour) - Test Average		1215
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		0.49

IN-SITU INFILTRATION TEST

APPENDIX C

Project: Osaca Hillstreet subdivision
Site Location: 5868 County road 65, Osaca, ON
Test ID: INF-03

PROJECT NO.: 11056
Date: 27-Sep-22
Start Time: 1:44 PM
Test No. 1

Depth of Test Pit (m):	0.9	**Pipe Stickup (m):**	1.17	**Total Pipe Length(m):**	2.27

Time* (Seconds)	**Measurement Interval (sec)**	**Depth** (m)**	**Water Column Height (m)**	**Distance dropped per interval (m1)**	**Infiltration Rate per Interval (m/sec)**	**Cumulative Infiltration Rate (m/sec)**
0	-	0.910	1.360	-	--	--
30	30	1.000	1.27	0.090	3.000E-03	3.000E-03
60	30	1.050	1.22	0.050	1.667E-03	2.333E-03
90	30	1.100	1.17	0.050	1.667E-03	2.111E-03
120	30	1.125	1.15	0.025	8.333E-04	1.792E-03
150	30	1.160	1.11	0.035	1.167E-03	1.667E-03
180	30	1.190	1.08	0.030	1.000E-03	1.556E-03
210	30	1.215	1.06	0.025	8.333E-04	1.452E-03
240	30	1.235	1.04	0.020	6.667E-04	1.354E-03
270	30	1.260	1.01	0.025	8.333E-04	1.296E-03
300	30	1.285	0.99	0.025	8.333E-04	1.250E-03
360	60	1.330	0.94	0.045	7.500E-04	1.167E-03
420	60	1.370	0.90	0.040	6.667E-04	1.095E-03
480	60	1.415	0.86	0.045	7.500E-04	1.052E-03
540	60	1.445	0.83	0.030	5.000E-04	9.907E-04
600	60	1.480	0.79	0.035	5.833E-04	9.500E-04
720	120	1.545	0.73	0.065	5.417E-04	8.819E-04
840	120	1.600	0.67	0.055	4.583E-04	8.214E-04
960	120	1.650	0.62	0.050	4.167E-04	7.708E-04
1,080	120	1.700	0.57	0.050	4.167E-04	7.315E-04
1,200	120	1.750	0.52	0.050	4.167E-04	7.000E-04
1,500	300	1.840	0.43	0.090	3.000E-04	6.200E-04
1,800	300	1.920	0.35	0.080	2.667E-04	5.611E-04
2,100	300	1.985	0.29	0.065	2.167E-04	5.119E-04
2,400	300	2.045	0.23	0.060	2.000E-04	4.729E-04

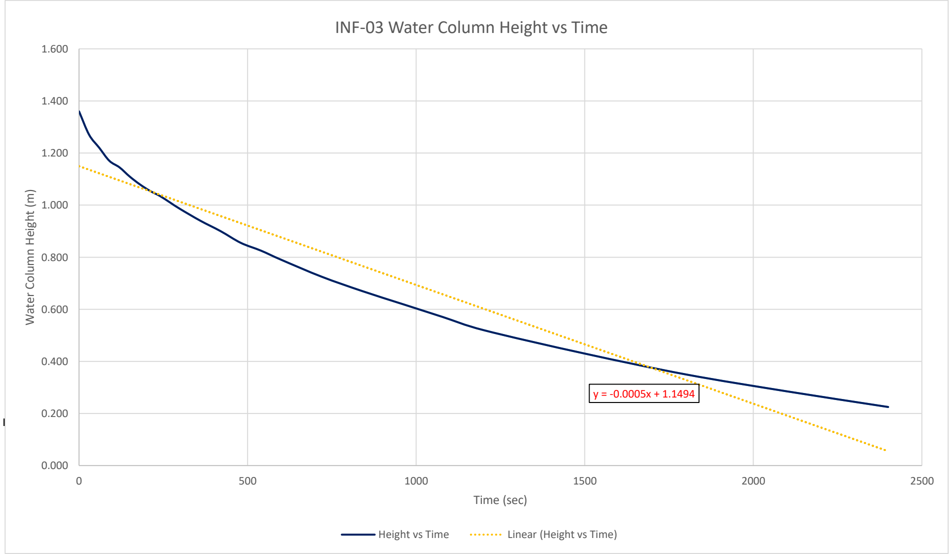
** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	**(mm/sec)**	**(mm/hour)**
Maximum Infiltration Rate Between Sampling Intervals -	3.00E-03	3.00E+00	10800
Minimum Infiltration Rate Between Sampling Intervals -	2.00E-04	2.00E-01	720
Median Infiltration Rate Between Sampling Intervals -	6.67E-04	6.67E-01	2400
Average Infiltration Rate Between Sampling Intervals -	**7.91E-04**	**7.91E-01**	**2848**
Cumulative Infiltration Rate for Entire Data Set -	**4.73E-04**	**4.73E-01**	**1703**

In-situ Infiltration Rate Measured in the Field (mm/sec): **0.47**

In-situ Infiltration Rate Measured in the Field (mm/hour): **1703**

Calculated Percolation Time (T) based on field infiltration (min/cm): **0.35**



		Test 1 - Observed
Test Duration (seconds)		**2,400**
Total Drop Distance (mm)		**1135**
Total Number of Measured Intervals		**25**
Infiltration Rate (mm/sec) - Test Average		**0.47**
Infiltration Rate (mm/hour) - Test Average		**1703**
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		**0.35**

IN-SITU INFILTRATION TEST **APPENDIX C**

Project: Osaca Hillstreet subdivision
Site Location: 5868 County road 65, Osaca, ON
Test ID: INF-05

PROJECT NO.: 11056
Date: 27-Sep-22
Start Time: 8:02 AM
Test No. 1

Depth of Test Pit (m):	1.14	**Pipe Stickup (m):**	1.37	**Total Pipe Length(m):**	2.38

Time* (Seconds)	**Measurement Interval (sec)**	**Depth** (m)**	**Water Column Height (m)**	**Distance dropped per interval (m1)**	**Infiltration Rate per Interval (m/sec)**	**Cumulative Infiltration Rate (m/sec)**
0	-	0.900	1.480	-	--	--
30	30	0.950	1.43	0.050	1.667E-03	1.667E-03
60	30	1.090	1.29	0.140	4.667E-03	3.167E-03
90	30	1.145	1.24	0.055	1.833E-03	2.722E-03
120	30	1.190	1.19	0.045	1.500E-03	2.417E-03
150	30	1.225	1.16	0.035	1.167E-03	2.167E-03
180	30	1.260	1.12	0.035	1.167E-03	2.000E-03
210	30	1.300	1.08	0.040	1.333E-03	1.905E-03
240	30	1.330	1.05	0.030	1.000E-03	1.792E-03
270	30	1.365	1.02	0.035	1.167E-03	1.722E-03
300	30	1.395	0.99	0.030	1.000E-03	1.650E-03
360	60	1.460	0.92	0.065	1.083E-03	1.556E-03
420	60	1.515	0.87	0.055	9.167E-04	1.464E-03
480	60	1.565	0.82	0.050	8.333E-04	1.385E-03
540	60	1.615	0.77	0.050	8.333E-04	1.324E-03
600	60	1.660	0.72	0.045	7.500E-04	1.267E-03
720	120	1.755	0.63	0.095	7.917E-04	1.188E-03
840	120	1.830	0.55	0.075	6.250E-04	1.107E-03
960	120	1.900	0.48	0.070	5.833E-04	1.042E-03
1,080	120	1.965	0.42	0.065	5.417E-04	9.861E-04
1,200	120	2.025	0.36	0.060	5.000E-04	9.375E-04
1,500	300	2.155	0.23	0.130	4.333E-04	8.367E-04
1,620	120	2.195	0.19	0.040	3.333E-04	7.994E-04
1,740	120	2.235	0.15	0.040	3.333E-04	7.672E-04

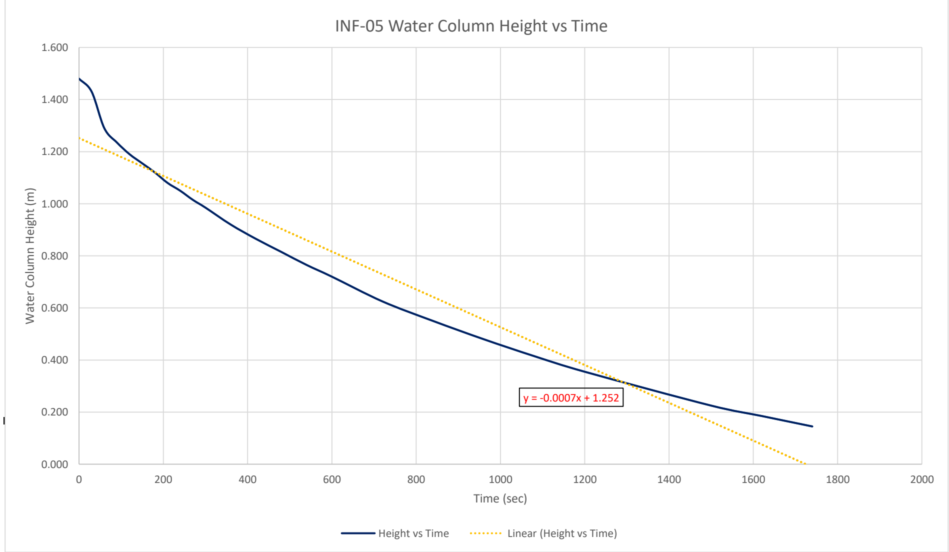
** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	**(mm/sec)**	**(mm/hour)**
Maximum Infiltration Rate Between Sampling Intervals -	4.67E-03	4.67E+00	16800
Minimum Infiltration Rate Between Sampling Intervals -	3.33E-04	3.33E-01	1200
Median Infiltration Rate Between Sampling Intervals -	9.17E-04	9.17E-01	3300
Average Infiltration Rate Between Sampling Intervals -	**1.09E-03**	**1.09E+00**	**3922**
Cumulative Infiltration Rate for Entire Data Set -	**7.67E-04**	**7.67E-01**	**2762**

In-situ Infiltration Rate Measured in the Field (mm/sec): **0.77**

In-situ Infiltration Rate Measured in the Field (mm/hour): **2762**

Calculated Percolation Time (T) based on field infiltration (min/cm): **0.22**



		Test 1 - Observed
Test Duration (seconds)		**1,740**
Total Drop Distance (mm)		**1335**
Total Number of Measured Intervals		**24**
Infiltration Rate (mm/sec) - Test Average		**0.77**
Infiltration Rate (mm/hour) - Test Average		**2762**
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		**0.22**

IN-SITU INFILTRATION TEST

Project: Osaca Hillstreet subdivision
Site Location: 5868 County road 65, Osaca, ON
Test ID: INF-06

PROJECT NO.: 11056
Date: 27-Sep-22
Start Time: 9:04 AM
Test No.: 1

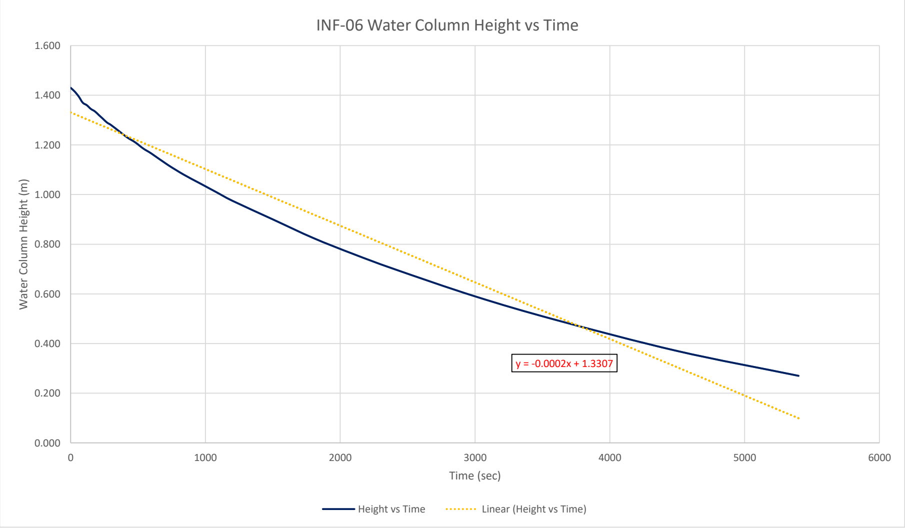
Depth of Test Pit (m):	1.1	**Pipe Stickup (m):**	1.165	**Total Pipe Length(m):**	2.27

Time* (Seconds)	Measurement Interval (sec)	Depth** (m)	Water Column Height (m)	Distance dropped per interval (m1)	Infiltration Rate per Interval (m/sec)	Cumulative Infiltration Rate (m/sec)
0	-	0.840	1.430	-	--	--
30	30	0.855	1.42	0.015	5.000E-04	5.000E-04
60	30	0.875	1.40	0.020	6.667E-04	5.833E-04
90	30	0.900	1.37	0.025	8.333E-04	6.667E-04
120	30	0.910	1.36	0.010	3.333E-04	5.833E-04
150	30	0.925	1.35	0.015	5.000E-04	5.667E-04
180	30	0.935	1.34	0.010	3.333E-04	5.278E-04
210	30	0.950	1.32	0.015	5.000E-04	5.238E-04
240	30	0.965	1.31	0.015	5.000E-04	5.208E-04
270	30	0.980	1.29	0.015	5.000E-04	5.185E-04
300	30	0.990	1.28	0.010	3.333E-04	5.000E-04
360	60	1.015	1.26	0.025	4.167E-04	4.861E-04
420	60	1.040	1.23	0.025	4.167E-04	4.762E-04
480	60	1.060	1.21	0.020	3.333E-04	4.583E-04
540	60	1.085	1.19	0.025	4.167E-04	4.537E-04
600	60	1.105	1.17	0.020	3.333E-04	4.417E-04
720	120	1.150	1.12	0.045	3.750E-04	4.306E-04
840	120	1.190	1.08	0.040	3.333E-04	4.167E-04
960	120	1.225	1.05	0.035	2.917E-04	4.010E-04
1,080	120	1.260	1.01	0.035	2.917E-04	3.889E-04
1,200	120	1.295	0.98	0.035	2.917E-04	3.792E-04
1,500	300	1.370	0.90	0.075	2.500E-04	3.533E-04
1,800	300	1.445	0.83	0.075	2.500E-04	3.361E-04
2,100	300	1.510	0.76	0.065	2.167E-04	3.190E-04
2,400	300	1.570	0.70	0.060	2.000E-04	3.042E-04
3,000	600	1.680	0.59	0.110	1.833E-04	2.800E-04
3,600	600	1.775	0.50	0.095	1.583E-04	2.597E-04
4,500	900	1.900	0.37	0.125	1.389E-04	2.356E-04
5,400	900	2.000	0.27	0.100	1.111E-04	2.148E-04

** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	(mm/sec)	(mm/hour)
Maximum Infiltration Rate Between Sampling Intervals -	8.33E-04	8.33E-01	3000
Minimum Infiltration Rate Between Sampling Intervals -	1.11E-04	1.11E-01	400
Median Infiltration Rate Between Sampling Intervals -	3.33E-04	3.33E-01	1200
Average Infiltration Rate Between Sampling Intervals -	**3.57E-04**	**3.57E-01**	**1287**
Cumulative Infiltration Rate for Entire Data Set -	**2.15E-04**	**2.15E-01**	**773**

In-situ Infiltration Rate Measured in the Field (mm/sec):	**0.21**
In-situ Infiltration Rate Measured in the Field (mm/hour):	**773**
Calculated Percolation Time (T) based on field infiltration (min/cm):	**0.78**



	Test 1 - Observed
Test Duration (seconds)	**5,400**
Total Drop Distance (mm)	**1160**
Total Number of Measured Intervals	**29**
Infiltration Rate (mm/sec) - Test Average	**0.21**
Infiltration Rate (mm/hour) - Test Average	**773**
Calculated Percolation Time (T) based on Field Infiltration (min/cm)	**0.78**

Project: Osaca Hillstreet subdivision
Site Location: 5868 County road 65, Osaca, ON
Test ID: INF-07

PROJECT NO.: 11056
Date: 27-Sep-22
Start Time: 4:07 PM
Test No. 1

Depth of Test Pit (m):	0.97	**Pipe Stickup (m):**	1.41	**Total Pipe Length(m):**	2.38

Time* (Seconds)	Measurement Interval (sec)	Depth** (m)	Water Column Height (m)	Distance dropped per interval (m1)	Infiltration Rate per Interval (m/sec)	Cumulative Infiltration Rate (m/sec)
0	-	0.700	1.680	-	--	--
30	30	0.830	1.55	0.130	4.333E-03	4.333E-03
60	30	0.925	1.46	0.095	3.167E-03	3.750E-03
90	30	1.010	1.37	0.085	2.833E-03	3.444E-03
120	30	1.065	1.32	0.055	1.833E-03	3.042E-03
150	30	1.110	1.27	0.045	1.500E-03	2.733E-03
180	30	1.145	1.24	0.035	1.167E-03	2.472E-03
210	30	1.195	1.19	0.050	1.667E-03	2.357E-03
240	30	1.230	1.15	0.035	1.167E-03	2.208E-03
270	30	1.260	1.12	0.030	1.000E-03	2.074E-03
300	30	1.290	1.09	0.030	1.000E-03	1.967E-03
360	60	1.360	1.02	0.070	1.167E-03	1.833E-03
420	60	1.400	0.98	0.040	6.667E-04	1.667E-03
480	60	1.445	0.94	0.045	7.500E-04	1.552E-03
540	60	1.490	0.89	0.045	7.500E-04	1.463E-03
600	60	1.530	0.85	0.040	6.667E-04	1.383E-03
720	120	1.600	0.78	0.070	5.833E-04	1.250E-03
840	120	1.670	0.71	0.070	5.833E-04	1.155E-03
960	120	1.735	0.65	0.065	5.417E-04	1.078E-03
1,080	120	1.775	0.61	0.040	3.333E-04	9.954E-04
1,200	120	1.820	0.56	0.045	3.750E-04	9.333E-04
1,500	300	1.920	0.46	0.100	3.333E-04	8.133E-04
1,800	300	2.000	0.38	0.080	2.667E-04	7.222E-04
2,100	300	2.070	0.31	0.070	2.333E-04	6.524E-04
2,400	300	2.130	0.25	0.060	2.000E-04	5.958E-04
3,000	600	2.220	0.16	0.090	1.500E-04	5.067E-04

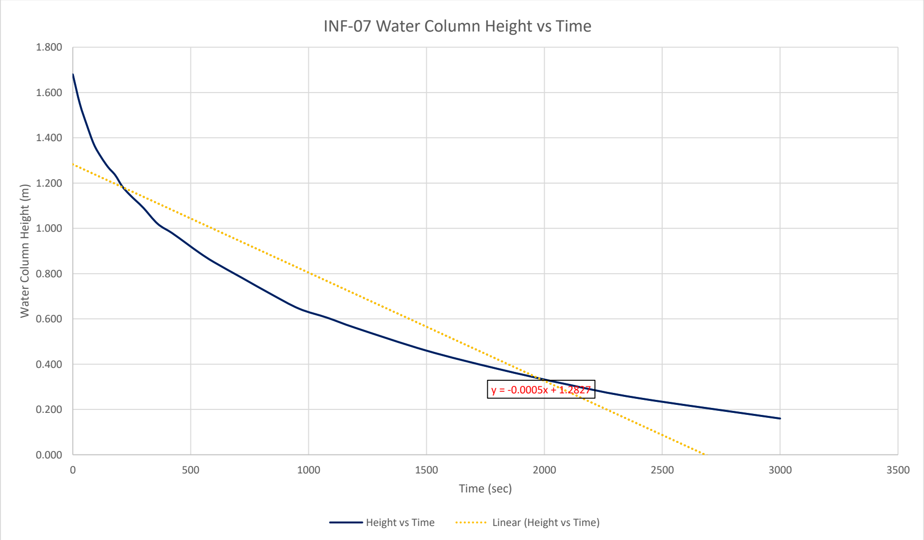
** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	(mm/sec)	(mm/hour)
Maximum Infiltration Rate Between Sampling Intervals -	4.33E-03	4.33E+00	15600
Minimum Infiltration Rate Between Sampling Intervals -	1.50E-04	1.50E-01	540
Median Infiltration Rate Between Sampling Intervals -	7.50E-04	7.50E-01	2700
Average Infiltration Rate Between Sampling Intervals -	**1.09E-03**	**1.09E+00**	**3926**
Cumulative Infiltration Rate for Entire Data Set -	**5.07E-04**	**5.07E-01**	**1824**

In-situ Infiltration Rate Measured in the Field (mm/sec): **0.51**

In-situ Infiltration Rate Measured in the Field (mm/hour): **1824**

Calculated Percolation Time (T) based on field infiltration (min/cm): **0.33**



		Test 1 - Observed
Test Duration (seconds)		**3,000**
Total Drop Distance (mm)		**1520**
Total Number of Measured Intervals		**26**
Infiltration Rate (mm/sec) - Test Average		**0.51**
Infiltration Rate (mm/hour) - Test Average		**1824**
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		**0.33**

IN-SITU INFILTRATION TEST **APPENDIX C**

Project: Osaca Hillstreet subdivision
Site Location: 5868 County road 65, Osaca, ON
Test ID: INF-08-A

PROJECT NO.: 11056
Date: 27-Sep-22
Start Time: 12:08 PM
Test No. 1

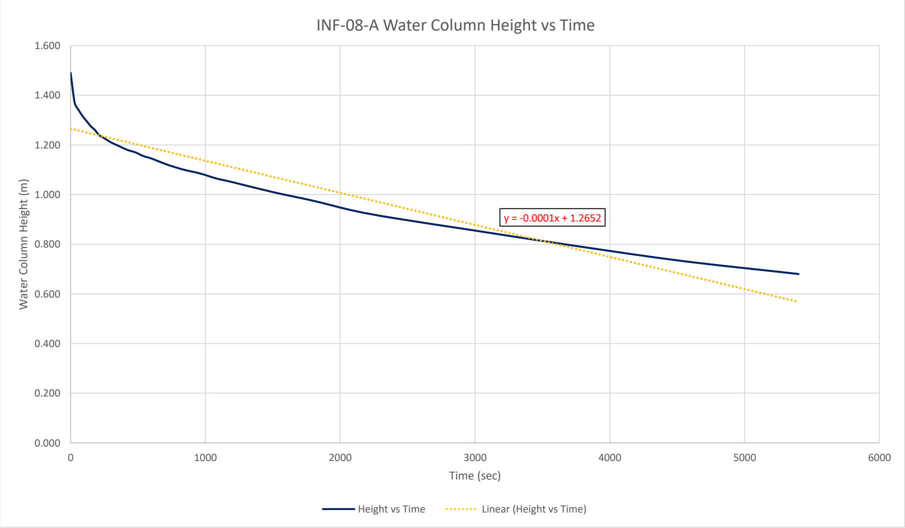
Depth of Test Pit (m):	0.55	**Pipe Stickup (m):**	0.945	**Total Pipe Length(m):**	1.56

Time* (Seconds)	**Measurement Interval (sec)**	**Depth** (m)**	**Water Column Height (m)**	**Distance dropped per interval (m1)**	**Infiltration Rate per Interval (m/sec)**	**Cumulative Infiltration Rate (m/sec)**
0	-	0.070	1.490	-	--	--
30	30	0.190	1.37	0.120	4.000E-03	4.000E-03
60	30	0.220	1.34	0.030	1.000E-03	2.500E-03
90	30	0.245	1.32	0.025	8.333E-04	1.944E-03
120	30	0.265	1.30	0.020	6.667E-04	1.625E-03
150	30	0.285	1.28	0.020	6.667E-04	1.433E-03
180	30	0.300	1.26	0.015	5.000E-04	1.278E-03
210	30	0.320	1.24	0.020	6.667E-04	1.190E-03
240	30	0.330	1.23	0.010	3.333E-04	1.083E-03
270	30	0.340	1.22	0.010	3.333E-04	1.000E-03
300	30	0.350	1.21	0.010	3.333E-04	9.333E-04
360	60	0.365	1.20	0.015	2.500E-04	8.194E-04
420	60	0.380	1.18	0.015	2.500E-04	7.381E-04
480	60	0.390	1.17	0.010	1.667E-04	6.667E-04
540	60	0.405	1.16	0.015	2.500E-04	6.204E-04
600	60	0.415	1.15	0.010	1.667E-04	5.750E-04
720	120	0.440	1.12	0.025	2.083E-04	5.139E-04
840	120	0.460	1.10	0.020	1.667E-04	4.643E-04
960	120	0.475	1.09	0.015	1.250E-04	4.219E-04
1,080	120	0.495	1.07	0.020	1.667E-04	3.935E-04
1,200	120	0.510	1.05	0.015	1.250E-04	3.667E-04
1,500	300	0.550	1.01	0.040	1.333E-04	3.200E-04
1,800	300	0.585	0.98	0.035	1.167E-04	2.861E-04
2,100	300	0.625	0.94	0.040	1.333E-04	2.643E-04
2,400	300	0.655	0.91	0.030	1.000E-04	2.438E-04
3,000	600	0.705	0.86	0.050	8.333E-05	2.117E-04
3,600	600	0.755	0.81	0.050	8.333E-05	1.903E-04
4,500	900	0.825	0.74	0.070	7.778E-05	1.678E-04
5,400	900	0.880	0.68	0.055	6.111E-05	1.500E-04

** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	**(mm/sec)**	**(mm/hour)**
Maximum Infiltration Rate Between Sampling Intervals -	4.00E-03	4.00E+00	14400
Minimum Infiltration Rate Between Sampling Intervals -	6.11E-05	6.11E-02	220
Median Infiltration Rate Between Sampling Intervals -	1.88E-04	1.88E-01	675
Average Infiltration Rate Between Sampling Intervals -	**4.28E-04**	**4.28E-01**	**1543**
Cumulative Infiltration Rate for Entire Data Set -	**1.50E-04**	**1.50E-01**	**540**

In-situ Infiltration Rate Measured in the Field (mm/sec):	**0.15**
In-situ Infiltration Rate Measured in the Field (mm/hour):	**540**
Calculated Percolation Time (T) based on field infiltration (min/cm):	**1.11**



		Test 1 - Observed
Test Duration (seconds)		**5,400**
Total Drop Distance (mm)		**810**
Total Number of Measured Intervals		**29**
Infiltration Rate (mm/sec) - Test Average		**0.15**
Infiltration Rate (mm/hour) - Test Average		**540**
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		**1.11**

IN-SITU INFILTRATION TEST **APPENDIX C**

Project: Osaca Hillstreet subdivision
Site Location: 5868 County road 65, Osaca, ON
Test ID: INF-08-B

PROJECT NO.: 11056
Date: 27-Sep-22
Start Time: 11:48 AM
Test No. 1

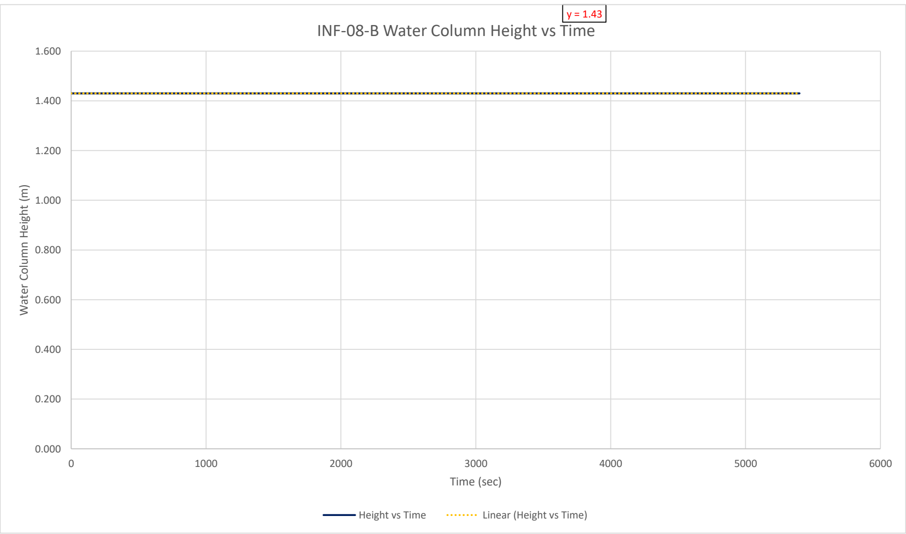
Depth of Test Pit (m):	2.08	**Pipe Stickup (m):**	0.925	**Total Pipe Length(m):**	3.08

Time* (Seconds)	**Measurement Interval (sec)**	**Depth** (m)**	**Water Column Height (m)**	**Distance dropped per interval (m1)**	**Infiltration Rate per Interval (m/sec)**	**Cumulative Infiltration Rate (m/sec)**
0	-	1.650	1.430	-	--	--
30	30	1.650	1.43	0.000	0.000E+00	0.000E+00
60	30	1.650	1.43	0.000	0.000E+00	0.000E+00
90	30	1.650	1.43	0.000	0.000E+00	0.000E+00
120	30	1.650	1.43	0.000	0.000E+00	0.000E+00
150	30	1.650	1.43	0.000	0.000E+00	0.000E+00
180	30	1.650	1.43	0.000	0.000E+00	0.000E+00
210	30	1.650	1.43	0.000	0.000E+00	0.000E+00
240	30	1.650	1.43	0.000	0.000E+00	0.000E+00
270	30	1.650	1.43	0.000	0.000E+00	0.000E+00
300	30	1.650	1.43	0.000	0.000E+00	0.000E+00
360	60	1.650	1.43	0.000	0.000E+00	0.000E+00
420	60	1.650	1.43	0.000	0.000E+00	0.000E+00
480	60	1.650	1.43	0.000	0.000E+00	0.000E+00
540	60	1.650	1.43	0.000	0.000E+00	0.000E+00
600	60	1.650	1.43	0.000	0.000E+00	0.000E+00
720	120	1.650	1.43	0.000	0.000E+00	0.000E+00
840	120	1.650	1.43	0.000	0.000E+00	0.000E+00
960	120	1.650	1.43	0.000	0.000E+00	0.000E+00
1,080	120	1.650	1.43	0.000	0.000E+00	0.000E+00
1,200	120	1.650	1.43	0.000	0.000E+00	0.000E+00
1,500	300	1.650	1.43	0.000	0.000E+00	0.000E+00
1,800	300	1.650	1.43	0.000	0.000E+00	0.000E+00
2,100	300	1.650	1.43	0.000	0.000E+00	0.000E+00
2,400	300	1.650	1.43	0.000	0.000E+00	0.000E+00
3,000	600	1.650	1.43	0.000	0.000E+00	0.000E+00
3,600	600	1.650	1.43	0.000	0.000E+00	0.000E+00
4,500	900	1.650	1.43	0.000	0.000E+00	0.000E+00
5,400	900	1.650	1.43	0.000	0.000E+00	0.000E+00

** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	**(mm/sec)**	**(mm/hour)**
Maximum Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Minimum Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Median Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Average Infiltration Rate Between Sampling Intervals -	**0.00E+00**	**0.00E+00**	**0**
Cumulative Infiltration Rate for Entire Data Set -	**0.00E+00**	**0.00E+00**	**0**

In-situ Infiltration Rate Measured in the Field (mm/sec):	**0.00**
In-situ Infiltration Rate Measured in the Field (mm/hour):	**0**
Calculated Percolation Time (T) based on field infiltration (min/cm):	**#DIV/0!**



		Test 1 - Observed
Test Duration (seconds)		**5,400**
Total Drop Distance (mm)		**0**
Total Number of Measured Intervals		**29**
Infiltration Rate (mm/sec) - Test Average		**0.00**
Infiltration Rate (mm/hour) - Test Average		**0**
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		**#DIV/0!**

IN-SITU INFILTRATION TEST

APPENDIX C

Project:	Osaca Hillstreet subdivision	**PROJECT NO.:**	11056
Site Location:	5868 County road 65, Osaca, ON	**Date:**	27-Sep-22
Test ID:	INF-11	**Start Time:**	2:53 PM
		Test No.	1

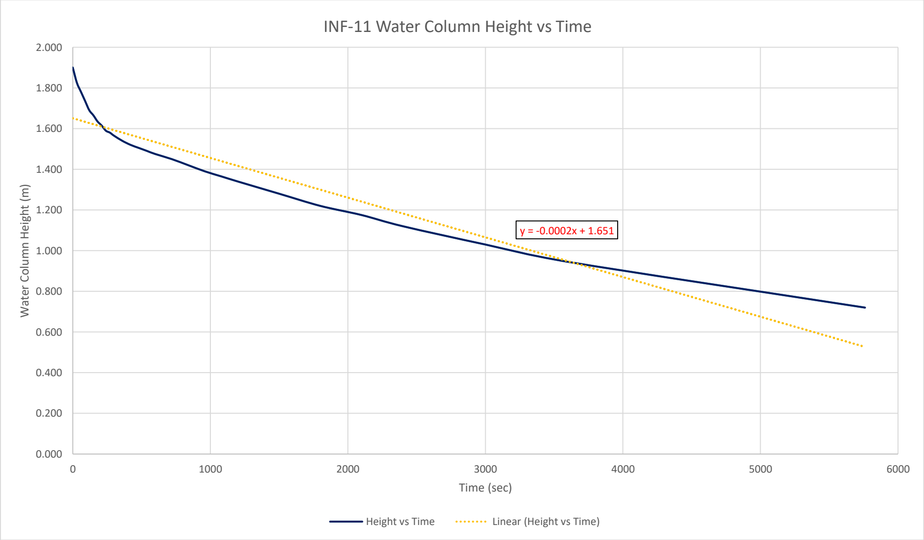
Depth of Test Pit (m):	1.13	**Pipe Stickup (m):**	1.02	**Total Pipe Length(m):**	2.30

Time* (Seconds)	**Measurement Interval (sec)**	**Depth** (m)**	**Water Column Height (m)**	**Distance dropped per interval (m1)**	**Infiltration Rate per Interval (m/sec)**	**Cumulative Infiltration Rate (m/sec)**
0	-	0.400	1.900	-	--	--
30	30	0.475	1.83	0.075	2.500E-03	2.500E-03
60	30	0.520	1.78	0.045	1.500E-03	2.000E-03
90	30	0.565	1.74	0.045	1.500E-03	1.833E-03
120	30	0.610	1.69	0.045	1.500E-03	1.750E-03
150	30	0.635	1.67	0.025	8.333E-04	1.567E-03
180	30	0.665	1.64	0.030	1.000E-03	1.472E-03
210	30	0.685	1.62	0.020	6.667E-04	1.357E-03
240	30	0.710	1.59	0.025	8.333E-04	1.292E-03
270	30	0.720	1.58	0.010	3.333E-04	1.185E-03
300	30	0.735	1.57	0.015	5.000E-04	1.117E-03
360	60	0.760	1.54	0.025	4.167E-04	1.000E-03
420	60	0.780	1.52	0.020	3.333E-04	9.048E-04
480	60	0.795	1.51	0.015	2.500E-04	8.229E-04
540	60	0.810	1.49	0.015	2.500E-04	7.593E-04
600	60	0.825	1.48	0.015	2.500E-04	7.083E-04
720	120	0.850	1.45	0.025	2.083E-04	6.250E-04
840	120	0.880	1.42	0.030	2.500E-04	5.714E-04
960	120	0.910	1.39	0.030	2.500E-04	5.313E-04
1,080	120	0.935	1.37	0.025	2.083E-04	4.954E-04
1,200	120	0.960	1.34	0.025	2.083E-04	4.667E-04
1,500	300	1.020	1.28	0.060	2.000E-04	4.133E-04
1,800	300	1.080	1.22	0.060	2.000E-04	3.778E-04
2,100	300	1.125	1.18	0.045	1.500E-04	3.452E-04
2,400	300	1.180	1.12	0.055	1.833E-04	3.250E-04
3,000	600	1.270	1.03	0.090	1.500E-04	2.900E-04
3,600	600	1.355	0.95	0.085	1.417E-04	2.653E-04
5,760	2,160	1.580	0.72	0.225	1.042E-04	2.049E-04

** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
Not used for statistical analysis

	(m/sec)	**(mm/sec)**	**(mm/hour)**
Maximum Infiltration Rate Between Sampling Intervals -	2.50E-03	2.50E+00	9000
Minimum Infiltration Rate Between Sampling Intervals -	1.04E-04	1.04E-01	375
Median Infiltration Rate Between Sampling Intervals -	2.50E-04	2.50E-01	900
Average Infiltration Rate Between Sampling Intervals -	**5.53E-04**	**5.53E-01**	**1989**
Cumulative Infiltration Rate for Entire Data Set -	**2.05E-04**	**2.05E-01**	**738**

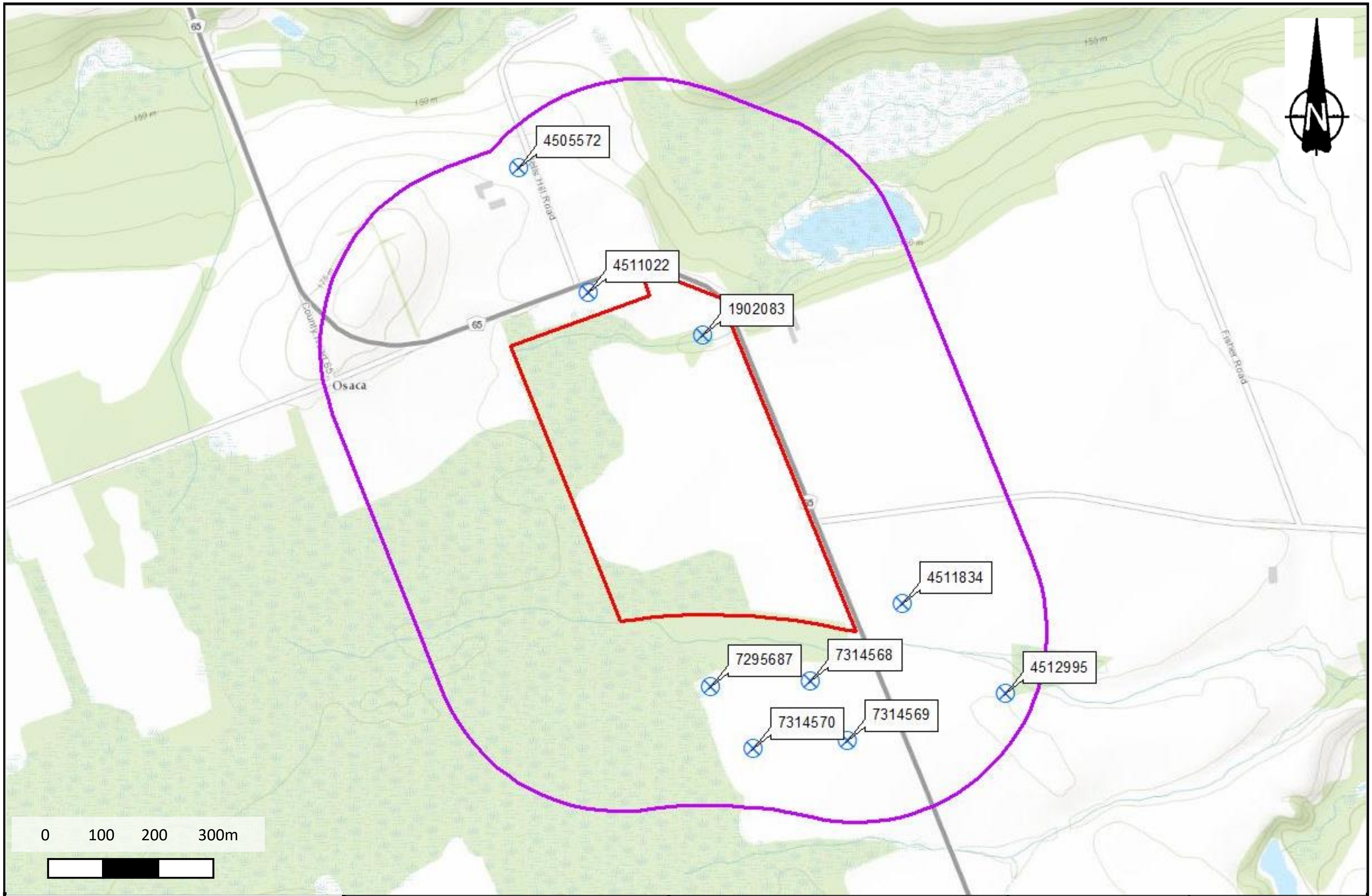
In-situ Infiltration Rate Measured in the Field (mm/sec):	**0.20**
In-situ Infiltration Rate Measured in the Field (mm/hour):	**738**
Calculated Percolation Time (T) based on field infiltration (min/cm):	**0.81**



		Test 1 - Observed
Test Duration (seconds)		**5,760**
Total Drop Distance (mm)		**1180**
Total Number of Measured Intervals		**28**
Infiltration Rate (mm/sec) - Test Average		**0.20**
Infiltration Rate (mm/hour) - Test Average		**738**
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		**0.81**

Appendix E

MECP Well Record Survey



Legend

▭	MECP Well Survey – 500 m buffer
▭	Subject Property
⊗	WECP Well Location and ID

MECP Well Location Plan

Hydrogeological Study
Part Lot 27, Concession 5, Village of Osaca, Ontario

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.749.9944
E. wills@dmwills.com

Drawn By	LT	**Scale**	See Scale Bar
Checked	IA	**Date**	July 2022
Project No.	22-11056	**Drawing File No.**	APP-E1

APPENDIX E-2 - MECP WELL SUMMARY

Well Record Summary - Bedrock

Project No.: 11056

Lot No.	UTM	M.O.E. Well No.	Well Use	Water Found		Static Level		REC Pump Rate		Well Depth		Depth to Bedrock		Comments
				Feet	Metres	Feet	Metres	Igpm	L/min	Feet	Metres	Feet	Metres	
Con. 05														
Lot 27	705556 4875265	7295687	Unknown	-	-	-	-	-	-	-	-	-	-	No information available
Lot 26	Unknown	4512995	Domestic	44	13.4	57	17.4	4.16	18.9	156	47.5	144	43.9	Fresh water observed from 44-156 ft. in limestone bedrock.
Lot 27	705637 4875147	7314570	Domestic	32	9.8	27.9	8.5	8.33	37.8	157	47.9	147	44.8	Fresh water observed at 32 ft. in limestone bedrock.
Con. 6														
Lot 27	Unknown	4505572	Domestic	130	39.6	95	29.0	0.83	3.8	135	41.1	112	34.1	Fresh water observed at 130 ft. in limestone bedrock.

Number of Wells = 4

	Water Found		Static Level		REC Pump Rate		Well Depth		Depth to Bedrock	
	Feet	Metres	Feet	Metres	Igpm	L/min	Feet	Metres	Feet	Metres
AVERAGE	68.7	20.9	60.0	18.3	4.4	20.2	149.3	45.5	134.3	40.9
MAXIMUM	130.0	39.6	95.0	29.0	8.3	37.8	157.0	47.9	147.0	44.8
MINIMUM	32.0	9.8	27.9	8.5	0.8	3.8	135.0	41.1	112.0	34.1

APPENDIX E-2 - MECP WELL SUMMARY

Well Record Summary - Overburden

Project No.: 11056

Lot No.	UTM	M.O.E. Well No.	Well Use	Water Found		Static Level		REC Pump Rate		Well Depth		Depth to Bedrock		Comments
				Feet	Metres	Feet	Metres	Igpm	L/min	Feet	Metres	Feet	Metres	
Con. 5														
Lot 26	Unknown	4511834	Domestic	58	17.7	30	9.1	3.33	15.1	58	17.7	-	-	Fresh water observed at 58 ft. in brown sand
Lot 27	705815 4875162	7314569	Domestic	32	9.8	21.6	6.6	5.83	26.5	151	46.0	-	-	Fresh water observed at 32 ft. in coarse gravel
Lot 27	705746 4875275	7314568	Domestic	40	12.2	21	6.4	6.66	30.2	101	30.8	-	-	Fresh water observed at 40 ft. in coarse gravel
Lot 27	705527 4875703	1902083	Domestic	17	5.2	18	5.5	1.67	7.6	25	7.6	-	-	Fresh water observed at 17 ft. in clay material
Lot 27	-	4511022	-	-	-	-	-	10	45.4	13	4.0	-	-	No information - well record in relation to well cleanout of sand and gravel

Number of Wells = 5

	Water Found		Static Level		0		Well Depth		Depth to Bedrock	
	Feet	Metres	Feet	Metres	Igpm	L/min	Feet	Metres	Feet	Metres
AVERAGE	36.8	11.2	22.7	6.9	5.5	25.0	69.6	21.2	-	-
MAXIMUM	58.0	17.7	30.0	9.1	10.0	45.4	151.0	46.0	-	-
MINIMUM	17.0	5.2	18.0	5.5	1.7	7.6	13.0	4.0	-	-

Appendix F

MECP Well Records – Well ID A377795, A377796, A377799, A395881, A395882 and A395883

Ontario

Ministry of the Environment,
Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

False and Misleading Information

Subsection 98(2) of the *Ontario Water Resources Act*, R.S.O. 1990 c. O. 40, states that:

"No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations."

Further, subsection 98(3) of the Act states that:

"No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act."

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner's Information

A "well owner" means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the "well owner" is an individual, record the owner's last name and first name or if the "well owner" is a business, government or other organization, record the name in the "organization" area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the “Comments” area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check “Other (specify)” and record the type of equipment, check each equipment that applies.

Well Use

If the well’s use is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well’s status is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing “Depth From” as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing “Depth From” as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A “well screen” means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is “Untested,” “Fresh” (i.e., not salty), or “Other (specify).” If “Other (specify)” is recorded, use the “Other (specify)” dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off “Gas” if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off “Pumping Discontinued” if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off “Pumping Discontinued” on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off “Flowing Well” (i.e., static water level above the ground surface).

In the “Results of Well Yield Testing” section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the “Map of Well Location” section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on “Add Map (+)” to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: “I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate”.

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from “**incomplete**” to an assigned audit number. The signature field will then be available. Click on “signature” to enter the well technician’s electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Ontario Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903
Ontario Water Resources Act

Notice of Collection of Personal Information

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

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 377795

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

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

Last Name	First Name
Organization Hillstreet Developments Ltd	Email Address

Current Address

Unit Number	Street Number * 524	Street Name * Rosebank Rd	City/Town/Village Pickering
Country Canada	Province Ontario	Postal Code L1W 2N5	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 5688	Street Name * Concession Rd.65	Township Hope
Lot 27	Concession 5	County/District/Municipality NORTHUMBERLAND	
City/Town Osaca	Province Ontario	Postal Code	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	705444	4875700	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 36 (ft)

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

				(ft)	(ft)
Brown	Sand		Loose	0	28
Brown	Medium Sand		Loose	28	36

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Chips - 175 lbs	2.45
0	20	Bentonite Slurry - 24 gal	3.21

5. Method of Construction *

☑ Cable Tool
☐ Jetting
☐ Rotary (Conventional)
☐ Driving
☐ Digging
☐ Rotary (Reverse)
☐ Rotary (Air)
☐ Boring
☐ Augering
☐ Air percussion
☐ Direct Push
☐ Diamond
☐ Other (specify) __________

6. Well Use *

☐ Public
☑ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not Used
☐ Monitoring
☐ Dewatering
☐ Other (specify) __________

7. Status of Well *

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

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

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6.25	Steel	0.188	-2	32
5.25	Steel	0.188	29	32

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
5.5	Stainless Steel	14	32	36

10. Water Details

Water found at Depth 38 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	8.75
20	36	6.58

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	10	11.2	13.4	15.6	16.1	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	14.1	12.2	10.5	10	10	10	10	10	10	10	10	10	10

After test of well yield, water was

☑ Clear and sand free ☐ Other (specify)

Pump intake set at 33 (ft)

Pumping rate 10 (GPM)

Duration of pumping 1 hrs + 00 min

Final water level end of pumping 16.1 (ft)

Disinfected? * ☑ Yes ☐ No

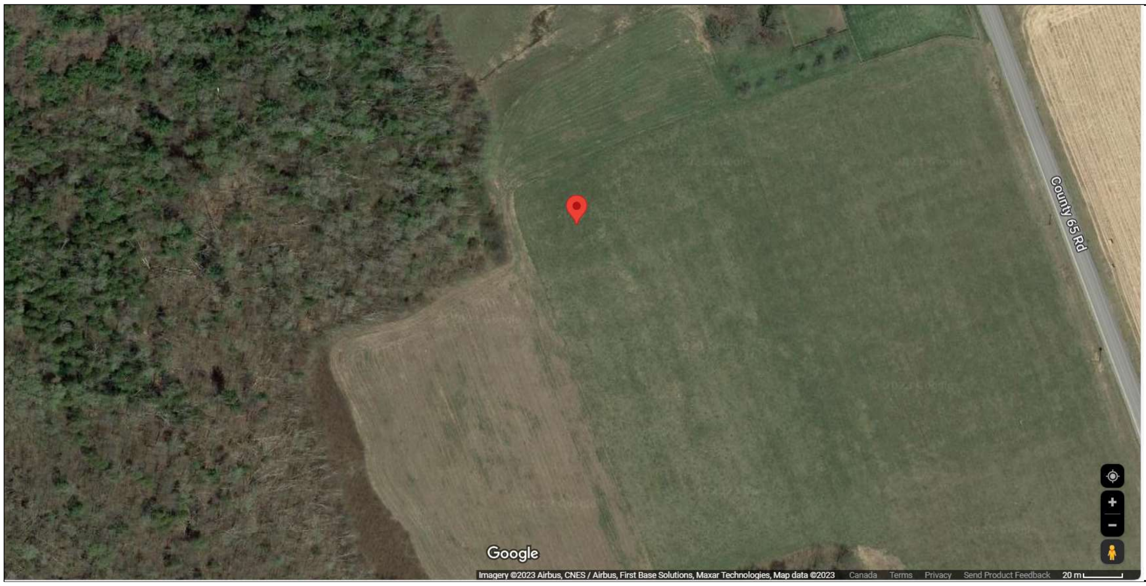
Recommended pump depth 33 (ft)

Recommended pump rate 10 (GPM)

Well production 10 (GPM)

13. Map of Well Location *

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



14. Information

Well owner's information package delivered
☑ Yes ☐ No

Date Package Delivered (yyyy/mm/dd)
2023/10/03

Date Work Completed (yyyy/mm/dd) *
2023/10/17

Comments
breakaway guides @ 6' & 16"
K-packer and leader pipe above screen
sand was loose with pressure

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *
Herb Lang Well Drilling Ltd.

Well Contractor's License Number *
7560

Business Address

Unit Number

Street Number
4852

Street Name *
Highway 7

City/Town/Village *
Omemee

Province
ON

Postal Code *
K0L 2W0

Business Telephone Number
705-799-7088

Business Email Address
hlwelldrilling@gmail.com

Last Name of Well Technician *
Foster

First Name of Well Technician *
Nick

Well Technician's License Number *
3920

16. Declaration *

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

Last Name
Foster

First Name
Nick

Email Address
hlwelldrilling@gmail.com

Signature
Nick Foster
Digitally signed by Nick Foster
Date: 2023.10.25 06:32:28 -04'00'

Date Submitted (yyyy/mm/dd)
2023/10/25

17. Ministry Use Only

Audit Number
SDBJ 9K63

Ontario

Ministry of the Environment,
Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

False and Misleading Information

Subsection 98(2) of the *Ontario Water Resources Act*, R.S.O. 1990 c. O. 40, states that:

"No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations."

Further, subsection 98(3) of the Act states that:

"No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act."

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner's Information

A "well owner" means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the "well owner" is an individual, record the owner's last name and first name or if the "well owner" is a business, government or other organization, record the name in the "organization" area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the “Comments” area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check “Other (specify)” and record the type of equipment, check each equipment that applies.

Well Use

If the well’s use is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well’s status is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing “Depth From” as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing “Depth From” as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A “well screen” means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is “Untested,” “Fresh” (i.e., not salty), or “Other (specify).” If “Other (specify)” is recorded, use the “Other (specify)” dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off “Gas” if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off “Pumping Discontinued” if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off “Pumping Discontinued” on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off “Flowing Well” (i.e., static water level above the ground surface).

In the “Results of Well Yield Testing” section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the “Map of Well Location” section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on “Add Map (+)” to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: “I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate”.

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from “**incomplete**” to an assigned audit number. The signature field will then be available. Click on “signature” to enter the well technician’s electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Ontario Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903
Ontario Water Resources Act

Notice of Collection of Personal Information

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

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 377796

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

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

Last Name	First Name
Organization Hillstreet Developments Ltd	Email Address

Current Address

Unit Number	Street Number * 524	Street Name * Rosebank Rd	City/Town/Village Pickering
Country Canada	Province Ontario	Postal Code L1W 2N5	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 5688	Street Name * Concession Rd. 65	Township Hope
Lot 27	Concession 5	County/District/Municipality NORTHUMBERLAND	
City/Town Osaca	Province Ontario	Postal Code	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	705464	4875609	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 38 (ft)

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

				(ft)	(ft)
Brown	Sand		Loose	0	31
Brown	Medium Sand		Loose	31	38

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Chips - 150lbs	2.1
0	20	Bentonite Slurry - 48 gals	6.42

5. Method of Construction *

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

6. Well Use *

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

7. Status of Well *

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

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

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6.25	Steel	0.188	-2	34
5.25	Steel	0.188	31	34

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
5.5	Stainless Steel	14	34	38

10. Water Details

Water found at Depth 38 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	8.75
20	38	6.58

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	10	17	20.5	20.9	21.7	22.2	23.2	23.4	23.4	23.4	23.5	23.5	23.6	23.6

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	18.6	15.5	13.7	12.4	11.5	10	10	10	10	10	10	10	10

After test of well yield, water was

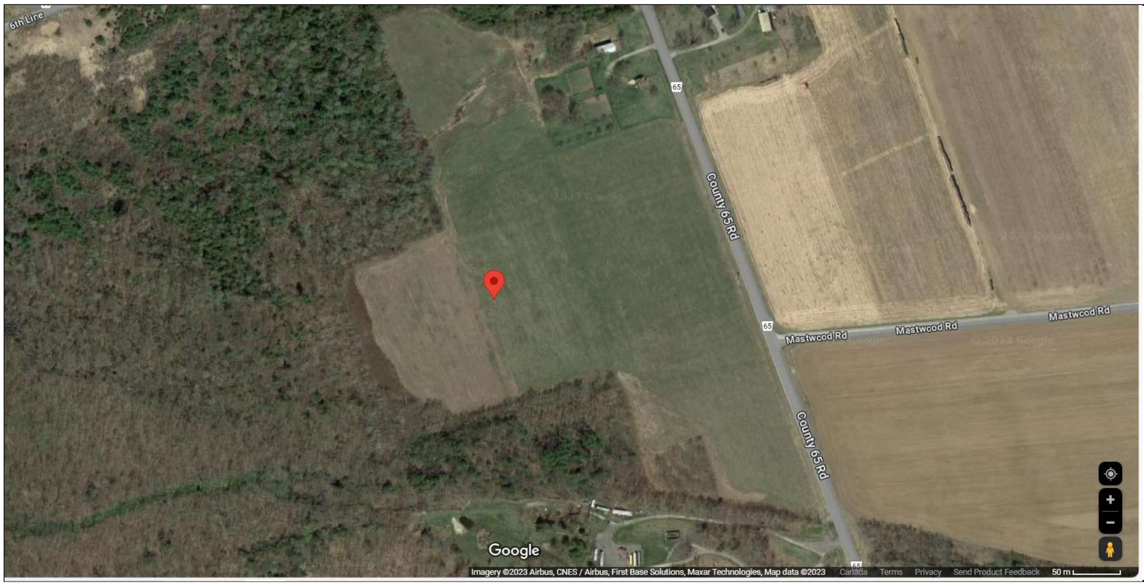
☑ Clear and sand free ☐ Other (specify)

Pump intake set at	Pumping rate	Duration of pumping	Final water level end of pumping	Disinfected? *
35 (ft)	10 (GPM)	1 hrs + 00 min	23.6 (ft)	☑ Yes ☐ No

Recommended pump depth	Recommended pump rate	Well production
35 (ft)	10 (GPM)	10 (GPM)

13. Map of Well Location *

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



14. Information

Well owner's information package delivered
☑ Yes ☐ No

Date Package Delivered (yyyy/mm/dd)
2023/10/03

Date Work Completed (yyyy/mm/dd) *
2023/10/12

Comments
breakaway guides @ 6' & 16"
K-packer and leader pipe above screen
sand was loose with pressure

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *
Herb Lang Well Drilling Ltd.

Well Contractor's License Number *
7560

Business Address

Unit Number

Street Number
4852

Street Name *
Highway 7

City/Town/Village *
Omemee

Province
ON

Postal Code *
K0L 2W0

Business Telephone Number
705-799-7088

Business Email Address
hlwelldrilling@gmail.com

Last Name of Well Technician *
Foster

First Name of Well Technician *
Nick

Well Technician's License Number *
3920

16. Declaration *

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

Last Name
Foster

First Name
Nick

Email Address
hlwelldrilling@gmail.com

Signature
Nick Foster
Digitally signed by Nick Foster
Date: 2023.10.25 06:23:49 -04'00'

Date Submitted (yyyy/mm/dd)
2023/10/25

17. Ministry Use Only

Audit Number
AXN9 ON2Y

Ontario

Ministry of the Environment,
Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

General Instructions and Explanations for completing a Well Record

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Well Owner’s Information

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Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the "Comments" area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check "Other (specify)" and record the type of equipment, check each equipment that applies.

Well Use

If the well's use is not provided on the list, check "Other (specify)" and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well's status is not provided on the list, check "Other (specify)" and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing "Depth From" as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing "Depth From" as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A "well screen" means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is "Untested," "Fresh" (i.e., not salty), or "Other (specify)." If "Other (specify)" is recorded, use the "Other (specify)" dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off “Gas” if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off “Pumping Discontinued” if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off “Pumping Discontinued” on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off “Flowing Well” (i.e., static water level above the ground surface).

In the “Results of Well Yield Testing” section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the “Map of Well Location” section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on “Add Map (+)” to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: “I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate”.

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from “**incomplete**” to an assigned audit number. The signature field will then be available. Click on “signature” to enter the well technician’s electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Ontario **Ministry of the Environment, Conservation and Parks**

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

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

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 377799

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

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

Last Name	First Name
Organization Hillstreet Developments Ltd	Email Address

Current Address

Unit Number	Street Number * 524	Street Name * Rosebank Rd	City/Town/Village Pickering
Country Canada	Province Ontario	Postal Code L1W 2N5	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 5868	Street Name * County Rd. 65	Township Hope
Lot 27	Concession 5	County/District/Municipality NORTHUMBERLAND	
City/Town Osaca	Province Ontario	Postal Code	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	705582	4875640	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 33 (ft)

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

				(ft)	(ft)
Brown	Sand		Loose	0	18
Grey	Clay	Stones	Soft	18	25
Brown	Medium Sand		Loose	25	33

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Chips	7.0
0	20	Bentonite Slurry	3.21

5. Method of Construction *

☑ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☐ Direct Push
☐ Other (specify) ______

6. Well Use *

☐ Public
☑ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not Used
☐ Monitoring
☐ Dewatering
☐ Other (specify) ______

7. Status of Well *

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

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

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6.25	Steel	0.188	-2	29
5.25	Steel	0.188	26	29

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
5.5	Stainless Steel	14	29	33

10. Water Details

Water found at Depth 33 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	8.75
20	33	6.58

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	9.5	13.5	14.3	14.8	15.1	15.2	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	11.6	10.5	9.7	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5

After test of well yield, water was

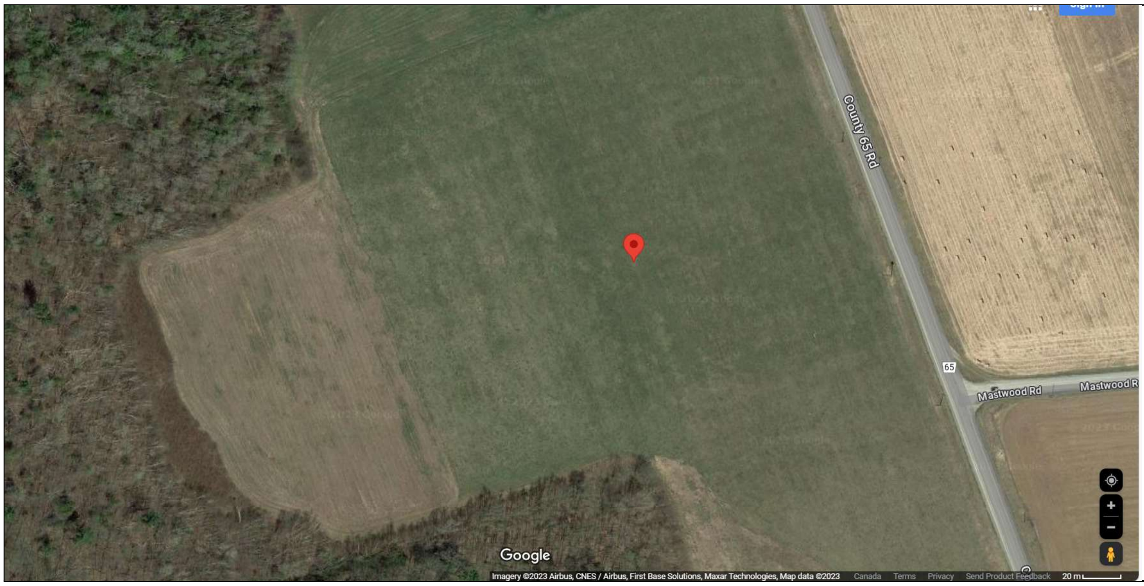
☑ Clear and sand free ☐ Other (specify)

Pump intake set at	Pumping rate	Duration of pumping	Final water level end of pumping	Disinfected? *
31 (ft)	10 (GPM)	1 hrs + 00 min	15.3 (ft)	☑ Yes ☐ No

Recommended pump depth	Recommended pump rate	Well production
31 (ft)	10 (GPM)	10 (GPM)

13. Map of Well Location *

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



14. Information

Well owner's information package delivered ☑ Yes ☐ No	Date Package Delivered (yyyy/mm/dd) 2023/10/03	Date Work Completed (yyyy/mm/dd) * 2023/10/06

Comments
breakaway guides @ 6' & 16"
K-packer and leader pipe above screen
sand was loose with pressure

15. Well Contractor and Well Technician Information

Business Name of Well Contractor * Herb Lang Well Drilling Ltd.	Well Contractor's License Number * 7560

Business Address

Unit Number	Street Number 4852	Street Name * Highway 7

City/Town/Village * Omemee	Province ON	Postal Code * K0L 2W0

Business Telephone Number 705-799-7088	Business Email Address hlwelldrilling@gmail.com

Last Name of Well Technician * Foster	First Name of Well Technician * Nick	Well Technician's License Number * 3920

16. Declaration *

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

Last Name Foster	First Name Nick	Email Address hlwelldrilling@gmail.com

Signature Nick Foster Digitally signed by Nick Foster Date: 2023.10.23 21:57:46 -04'00'	Date Submitted (yyyy/mm/dd) 2023/10/23

17. Ministry Use Only

Audit Number
3H6V X9ZB

Well Record - Regulation 903

Ontario Water Resources Act

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

False and Misleading Information

Subsection 98(2) of the *Ontario Water Resources Act*, R.S.O. 1990 c. O. 40, states that:

“No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations.”

Further, subsection 98(3) of the Act states that:

“No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act.”

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner’s Information

A “well owner” means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the “well owner” is an individual, record the owner’s last name and first name or if the “well owner” is a business, government or other organization, record the name in the “organization” area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the “Comments” area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check “Other (specify)” and record the type of equipment, check each equipment that applies.

Well Use

If the well’s use is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well’s status is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing “Depth From” as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing “Depth From” as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A “well screen” means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is “Untested,” “Fresh” (i.e., not salty), or “Other (specify).” If “Other (specify)” is recorded, use the “Other (specify)” dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off “Gas” if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off “Pumping Discontinued” if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off “Pumping Discontinued” on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off “Flowing Well” (i.e., static water level above the ground surface).

In the “Results of Well Yield Testing” section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the “Map of Well Location” section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on “Add Map (+)” to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: “I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate”.

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from “**incomplete**” to an assigned audit number. The signature field will then be available. Click on “signature” to enter the well technician’s electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Ontario **Ministry of the Environment,**
Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 395881

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

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

Last Name	First Name
Organization Hillstreet Develpments Ltd.	Email Address

Current Address

Unit Number	Street Number * 524	Street Name * Rosebank Rd.	City/Town/Village Pickering
Country Canada	Province Ontario	Postal Code	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 5868	Street Name * Country Rd. 65	Township Hope
Lot 27	Concession 5	County/District/Municipality NORTHUMBERLAND	
City/Town Osaca	Province Ontario	Postal Code	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	705633	4875621	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 78 (ft)

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

				(ft)	(ft)
Brown	Topsoil	Sand	Soft		2
Brown	Sand		Soft	2	10
Brown	Clay	Sand	Soft	10	18
Brown	Medium Sand		Loose	18	37
Grey	Gravel	Sand	Dense	37	44
Grey	Clay		Packed	44	58
Grey	Clay	Sand	Packed	58	73
Grey	Coarse Gravel	Sand	Loose	73	78

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Chips - 100 lbs	1.4
		Bentonite Slurry - 50 gal	6.68

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☐ Direct Push
☑ Other (specify) DR-12W

6. Well Use *

☐ Public
☑ Domestic
☐ Livestock
☐ Irrigation
☐ Other (specify)

☐ Industrial
☐ Commercial
☐ Municipal
☐ Test Hole

☐ Cooling & Air Conditioning
☐ Not Used
☐ Monitoring
☐ Dewatering

7. Status of Well *

☑ Water Supply
☐ Recharge Well
☐ Alteration (Construction)
☐ Abandoned, other (specify)
☐ Other (specify)

☐ Replacement Well
☐ Dewatering Well
☐ Abandoned, Insufficient Supply

☐ Test Hole
☐ Observation and/or Monitoring Hole
☐ Abandoned, Poor Water Quality

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

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6.25	Steel	0.188	-2	74
5.25	Steel	0.188	71	74

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
5.5	Stainless Steel	35	74	78

10. Water Details

Water found at Depth 78 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	11.5
20	78	7.5

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	33.8	34.3	34.4	34.4	34.4	34.4	34.4	34.5	34.6	34.6	34.6	34.6	34.6	34.6

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8

After test of well yield, water was

☑ Clear and sand free ☐ Other (specify)

Pump intake set at	Pumping rate	Duration of pumping	Final water level end of pumping	Disinfected? *
76 (ft)	12 (GPM)	1 hrs + 00 min	34.6 (ft)	☑ Yes ☐ No

Recommended pump depth	Recommended pump rate	Well production
68 (ft)	20 (GPM)	30 (GPM)

13. Map of Well Location *

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

14. Information

Well owner's information package delivered ☑ Yes ☐ No	Date Package Delivered (yyyy/mm/dd) 2024/07/26	Date Work Completed (yyyy/mm/dd) * 2024/08/08

Comments
Sand was loose with pressure
K-packer and leader pipe above screen

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Herb Lang Well Drilling Ltd.	7560

Business Address

Unit Number	Street Number	Street Name *
	4852	Highway 7
City/Town/Village *	Province	Postal Code *
Omemee	ON	K0L 2W0

Business Telephone Number	Business Email Address
705-799-7088	hlwelldrilling@gmail.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Guthrie	Ken	4198

16. Declaration *

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

Last Name	First Name	Email Address
Guthrie	Ken	hlwelldrilling@gmail.com

Signature	Date Submitted (yyyy/mm/dd)
Ken Guthrie Digitally signed by Ken Guthrie Date: 2024.08.13 13:50:19 -04'00'	2024/08/13

17. Ministry Use Only

Audit Number

A5H9 IELR

Ontario

Ministry of the Environment,
Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

False and Misleading Information

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“No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations.”

Further, subsection 98(3) of the Act states that:

“No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act.”

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner’s Information

A “well owner” means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the “well owner” is an individual, record the owner’s last name and first name or if the “well owner” is a business, government or other organization, record the name in the “organization” area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the “Comments” area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check “Other (specify)” and record the type of equipment, check each equipment that applies.

Well Use

If the well’s use is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well’s status is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing “Depth From” as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing “Depth From” as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A “well screen” means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is “Untested,” “Fresh” (i.e., not salty), or “Other (specify).” If “Other (specify)” is recorded, use the “Other (specify)” dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off “Gas” if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off “Pumping Discontinued” if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off “Pumping Discontinued” on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off “Flowing Well” (i.e., static water level above the ground surface).

In the “Results of Well Yield Testing” section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the “Map of Well Location” section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on “Add Map (+)” to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: “I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate”.

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from “**incomplete**” to an assigned audit number. The signature field will then be available. Click on “signature” to enter the well technician’s electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Ontario Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903
Ontario Water Resources Act

Notice of Collection of Personal Information

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

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 395882

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

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

Last Name	First Name
Organization Hillstreet Development Ltd.	Email Address

Current Address

Unit Number	Street Number * 524	Street Name * Rosebank Rd.	City/Town/Village Pickering
Country Canada	Province Ontario	Postal Code	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 5868	Street Name * County Rd. 65	Township Hope
Lot 247	Concession 5	County/District/Municipality NORTHUMBERLAND	
City/Town Osaca	Province Ontario	Postal Code	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	705522	4875585	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 159 (ft)

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

				(ft)	(ft)
Brown	Topsoil	Sand	Soft		2
Brown	Medium Sand		Soft	2	7
Brown	Sand	Clay	Soft	7	14
Brown	Medium Sand	Gravel	Loose	14	40
Grey	Clay	Gravel	Packed	40	85
Grey	Fine Gravel	Sand	Loose	85	88
Grey	Clay	Gravel	Cemented	88	142
Grey	Shale	Gravel	Layered	142	143
Grey	Limestone		Hard	143	159

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Chips - 150 lbs	2.1
		Bentonite Slurry - 50 gals	6.68

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☐ Direct Push
☑ Other (specify) DR-12W

6. Well Use *

☐ Public
☑ Domestic
☐ Livestock
☐ Irrigation
☐ Other (specify)

☐ Industrial
☐ Commercial
☐ Municipal
☐ Test Hole

☐ Cooling & Air Conditioning
☐ Not Used
☐ Monitoring
☐ Dewatering

7. Status of Well *

☑ Water Supply
☐ Recharge Well
☐ Alteration (Construction)
☐ Abandoned, other (specify)
☐ Other (specify)

☐ Replacement Well
☐ Dewatering Well
☐ Abandoned, Insufficient Supply

☐ Test Hole
☐ Observation and/or Monitoring Hole
☐ Abandoned, Poor Water Quality

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

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6.25	Steel	0.188	-2	143
6	Open Hole		143	159

9. Construction Record - Screen

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

10. Water Details

Water found at Depth 143 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

Water found at Depth 156 ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	11.5
20	143	7.5
143	159	6

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	37.5	43.1	45.8	48.2	50.3	52.3	61.3	69.2	75.7	80.4	85.5	93.1	99	103.6

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	102.6	97.9	95.5	93.5	91.4	81.8	75.6	65.2	60.4	55.6	48.3	43.2	40.1

After test of well yield, water was

☑ Clear and sand free ☐ Other (specify)

Pump intake set at	Pumping rate	Duration of pumping	Final water level end of pumping	Disinfected? *
158 (ft)	4 (GPM)	10 hrs + min	108.4 (ft)	☑ Yes ☐ No

Recommended pump depth	Recommended pump rate	Well production
150 (ft)	3 (GPM)	3 (GPM)

13. Map of Well Location *

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

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☑ Yes ☐ No	2023/10/23	2024/08/06

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Herb Lang Well Drilling Ltd.	7560

Business Address

Unit Number	Street Number	Street Name *
	4852	Highway 7

City/Town/Village *	Province	Postal Code *
Omemee	ON	K0L 2W0

Business Telephone Number	Business Email Address
705-799-7088	hlwelldrilling@gmail.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Guthrie	Ken	4198

16. Declaration *

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

Last Name	First Name	Email Address
Guthrie	Ken	hlwelldrilling@gmail.com

Signature	Date Submitted (yyyy/mm/dd)
Ken Guthrie Digitally signed by Ken Guthrie Date: 2024.08.13 14:03:28 -04'00'	2024/08/13

17. Ministry Use Only

Audit Number

22CI ZWJK

Well Record - Regulation 903

Ontario Water Resources Act

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

False and Misleading Information

Subsection 98(2) of the *Ontario Water Resources Act*, R.S.O. 1990 c. O. 40, states that:

"No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations."

Further, subsection 98(3) of the Act states that:

"No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act."

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner's Information

A "well owner" means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the "well owner" is an individual, record the owner's last name and first name or if the "well owner" is a business, government or other organization, record the name in the "organization" area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the “Comments” area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check “Other (specify)” and record the type of equipment, check each equipment that applies.

Well Use

If the well’s use is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well’s status is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing “Depth From” as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing “Depth From” as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A “well screen” means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is “Untested,” “Fresh” (i.e., not salty), or “Other (specify).” If “Other (specify)” is recorded, use the “Other (specify)” dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off “Gas” if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off “Pumping Discontinued” if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off “Pumping Discontinued” on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off “Flowing Well” (i.e., static water level above the ground surface).

In the “Results of Well Yield Testing” section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the “Map of Well Location” section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on “Add Map (+)” to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: “I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate”.

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from “**incomplete**” to an assigned audit number. The signature field will then be available. Click on “signature” to enter the well technician’s electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Ontario Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903
Ontario Water Resources Act

Notice of Collection of Personal Information

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 395883

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

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

Last Name	First Name
Organization Hillstreet Development Ltd.	Email Address

Current Address

Unit Number	Street Number * 524	Street Name * Rosebank Rd	City/Town/Village Pickering
Country Canada	Province Ontario	Postal Code	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 5868	Street Name * County Rd. 65	Township Hope
Lot 27	Concession 5	County/District/Municipality NORTHUMBERLAND	
City/Town Osaca	Province Ontario	Postal Code	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	705553	4875651	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 159 (ft)

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

				(ft)	(ft)
Brown	Topsoil	Sand	Soft		2
Brown	Medium Sand		Soft	2	7
Brown	Sand		Packed	7	17
Brown	Sand	Gravel	Loose	17	40
Grey	Clay	Sand	Packed	40	72
Grey	Gravel	Sand	Packed	72	90
Grey	Clay	Gravel	Dense	90	141
Grey	Shale	Gravel	Layered	141	142
Grey	Limestone		Hard	142	159

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	20	Bentonite Chips - 100 lbs	1.4
		Bentonite Slurry - 60 gals	8

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond

☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☐ Direct Push

☑ Other (specify) DR-12W

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning

☑ Domestic ☐ Commercial ☐ Not Used

☐ Livestock ☐ Municipal ☐ Monitoring

☐ Irrigation ☐ Test Hole ☐ Dewatering

☐ Other (specify)

7. 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)

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

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6.25	Steel	0.188	-2	141
5.25	Steel	0.188	135	138
5.25	Steel	0.188	142	148

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
5.25	Stainless Steel	18	138	142

10. Water Details

Water found at Depth 142 (ft) ☐ Gas Kind of water ☐ Fresh ☑ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	11.56
20	142	7.5
142	159	6

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	35.1	38.5	42.2	43.5	44.7	45	49	52.4	55.7	58.1	59.9	64.2	65.9	67.8

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	69.8	68.9	66.8	65.4	63.8	57.7	53.9	51.1	48.4	45.7	43.7	42.2	40.9

After test of well yield, water was

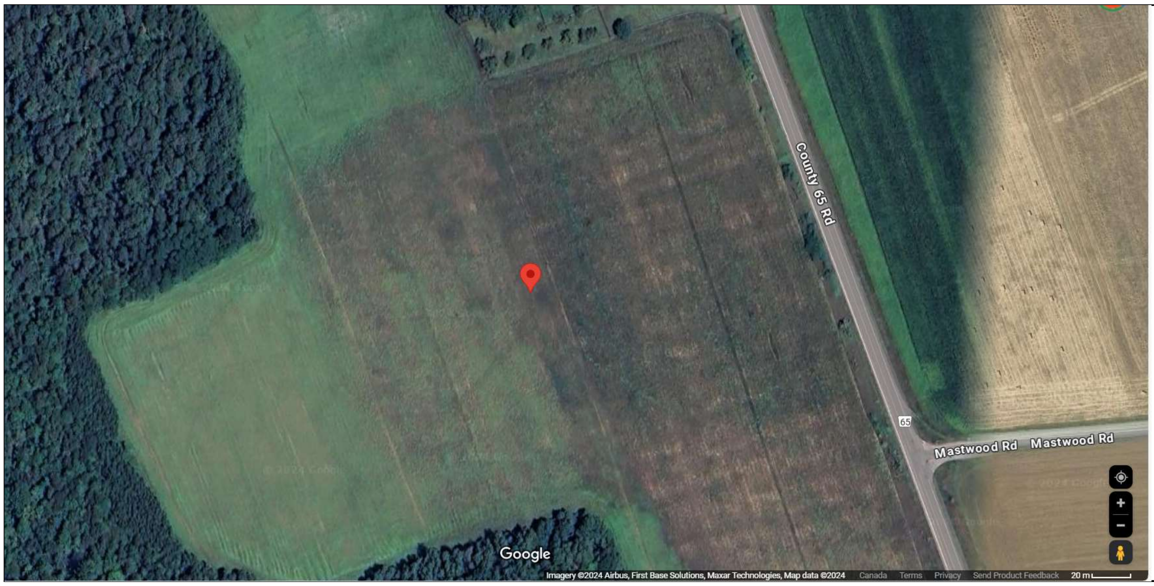
☑ Clear and sand free ☐ Other (specify)

Pump intake set at	Pumping rate	Duration of pumping	Final water level end of pumping	Disinfected? *
145 (ft)	4 (GPM)	1 hrs + 30 min	72.3 (ft)	☑ Yes ☐ No

Recommended pump depth	Recommended pump rate	Well production
132 (ft)	4 (GPM)	3 (GPM)

13. Map of Well Location *

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



14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☑ Yes ☐ No	2023/10/03	2024/07/31

Comments
K-packer and leader pipe above screen, tail pipe below screen
Salt was encountered at 159ft in the rock. We filled the hole in, back to 148ft.
Then set screen with a drop pipe from there on back. Salt appears to be gone.

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Herb Lang Well Drilling Ltd.	7560

Business Address

Unit Number	Street Number	Street Name *
	4852	Highway 7

City/Town/Village *	Province	Postal Code *
Omemee	ON	K0L 2W0

Business Telephone Number	Business Email Address
705-799-7088	hlwelldrilling@gmail.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Guthrie	Ken	4198

16. Declaration *

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

Last Name	First Name	Email Address
Guthrie	Ken	hlwelldrilling@gmail.com

Signature	Date Submitted (yyyy/mm/dd)
Ken Guthrie Digitally signed by Ken Guthrie Date: 2024.08.15 12:15:23 -04'00'	2024/08/15

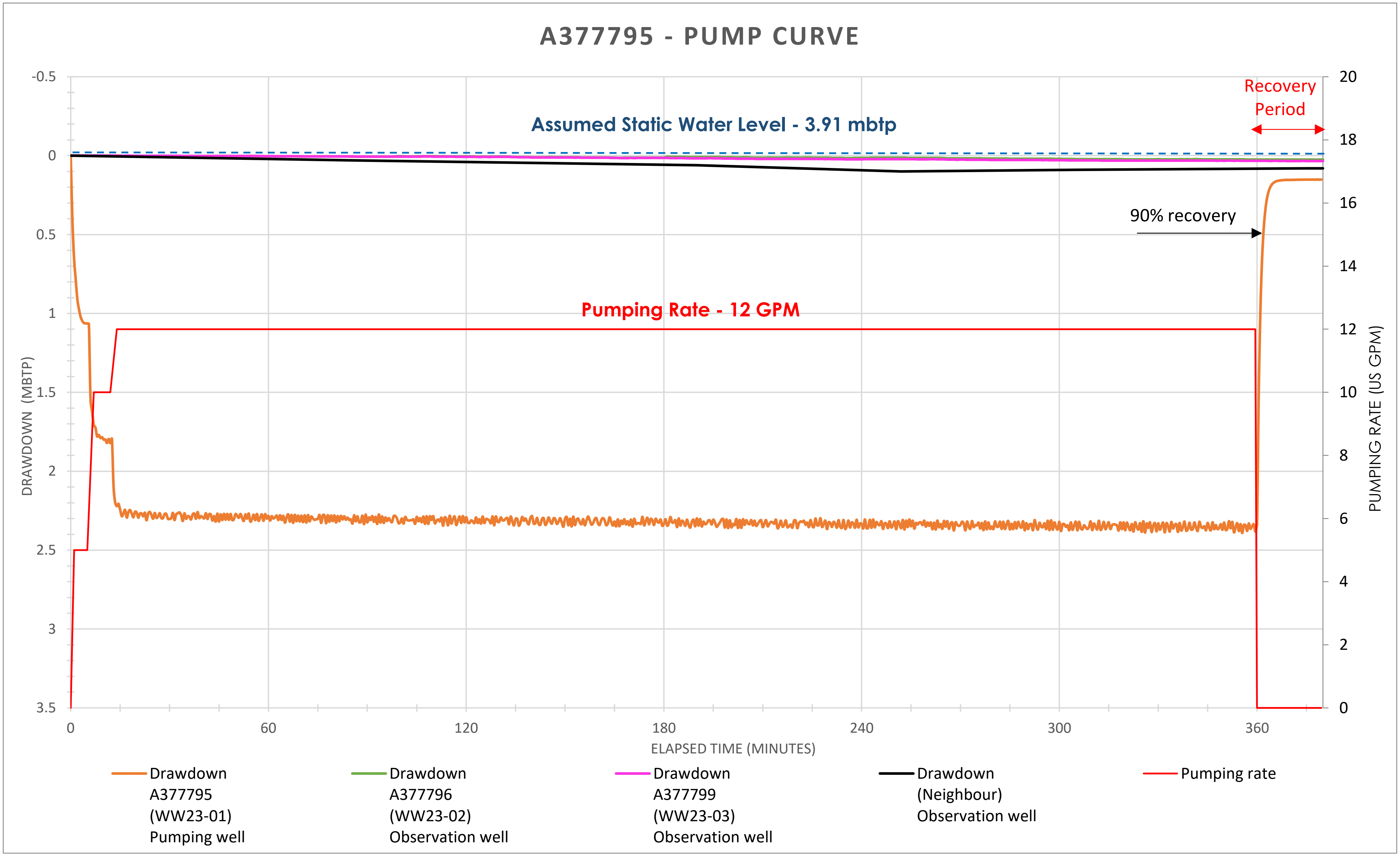
17. Ministry Use Only

Audit Number

2AOU S3DP

Appendix G

Pumping Test Hydrographs



Hydrograph

A377795

Pumping Date: October 31, 2023
Pumping Initiation Time: 10:00 am

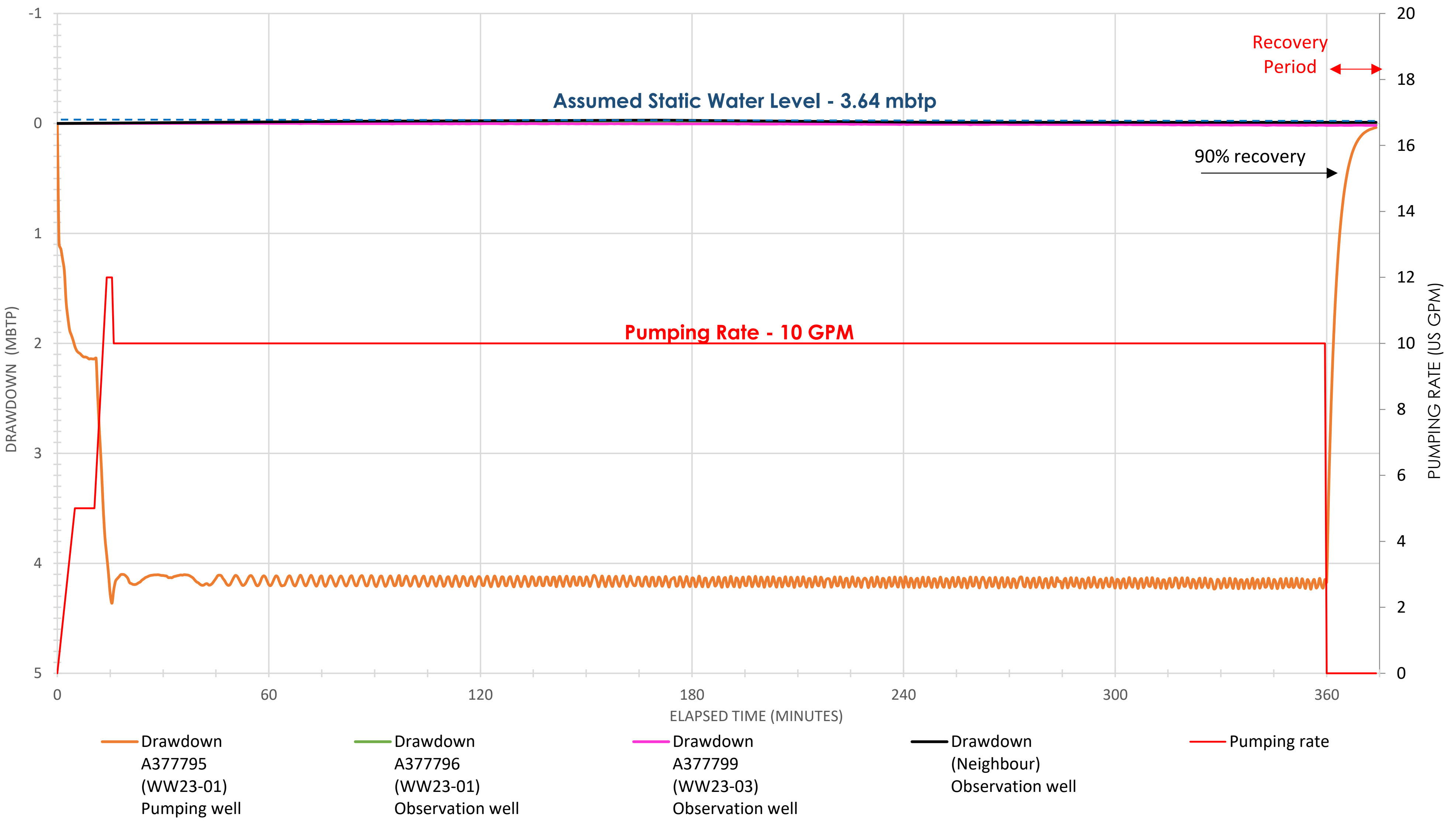
W I L L S

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.748.9944
E. wills@dmwills.com

Created By: CO
Checked By: IA
Date: November 1, 2023
Project No.: 11056

A377796 - PUMP CURVE



Hydrograph

A377796

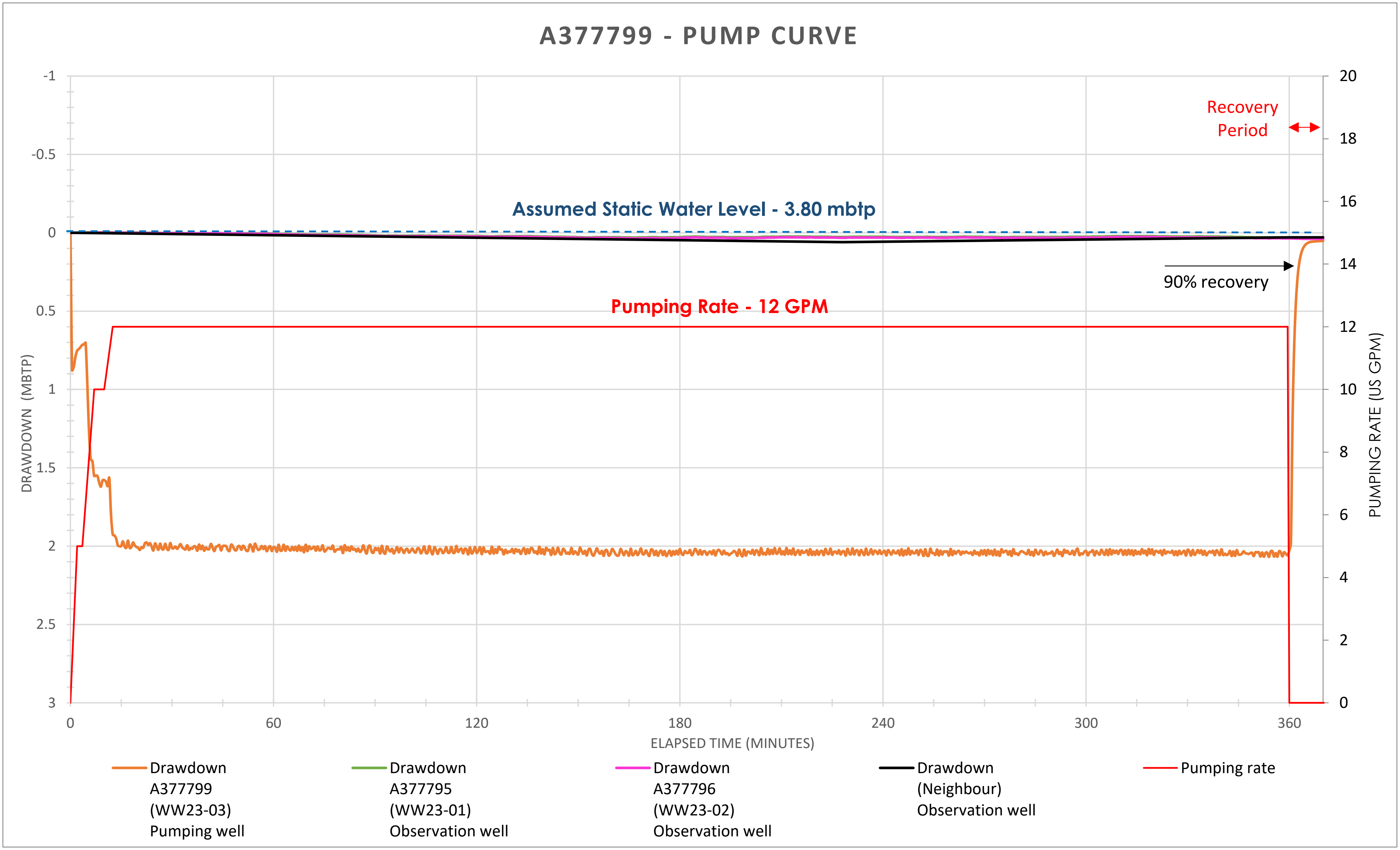
Pumping Date: November 2nd, 2023
Pumping Initiation Time: 9:20 am

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.748.9944
E. wills@dmwills.com

Created By: CO
Checked By: IA
Date: November 6, 2023
Project No.: 11056



Hydrograph

A377799

Pumping Date: November 8th, 2023
Pumping Initiation Time: 9:20 am

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.748.9944
E. wills@dmwills.com

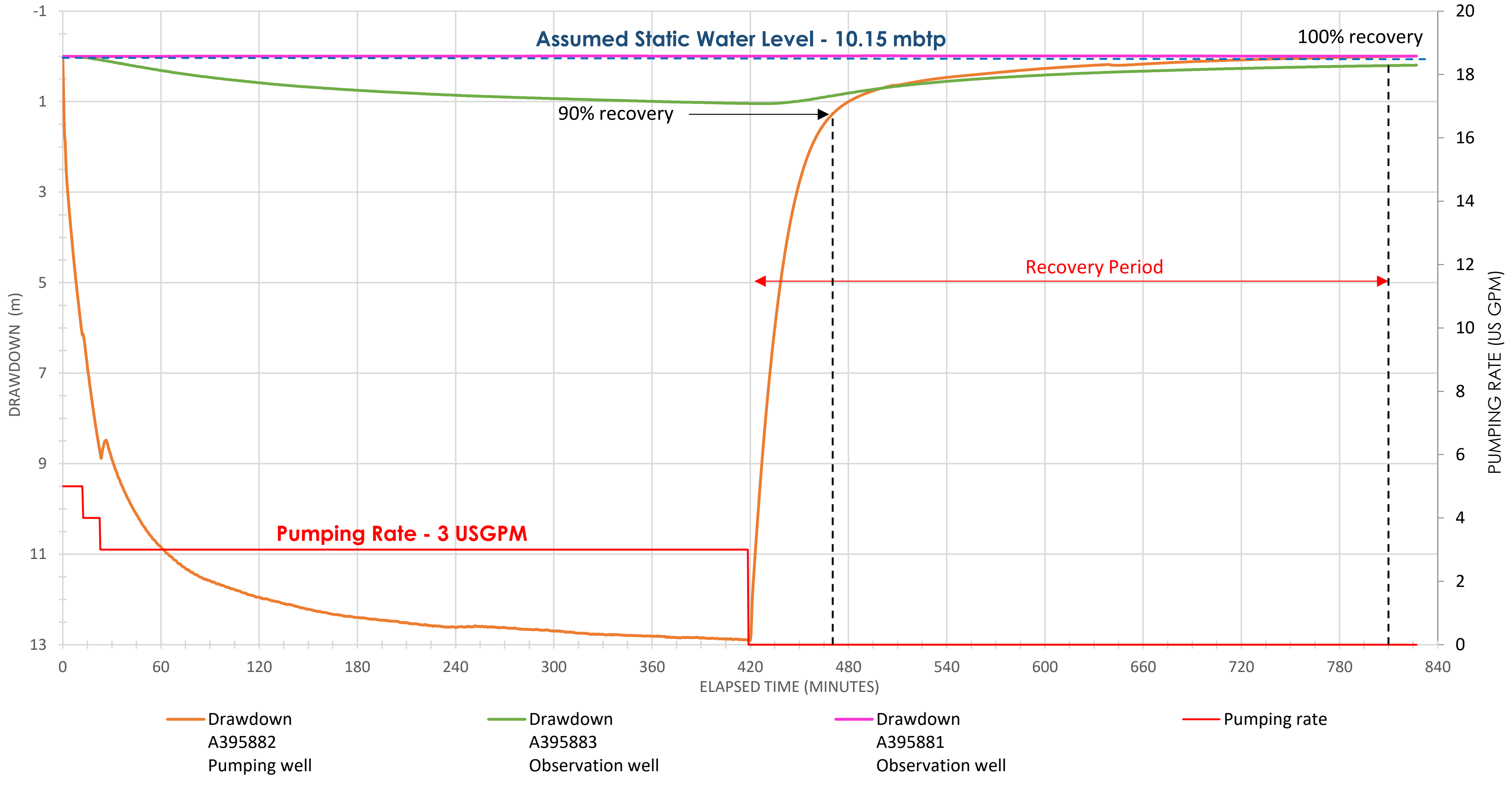
Created By: CO

Checked By: IA

Date: November 10, 2023

Project No.: 11056

A395882 - PUMP CURVE



Hydrograph

A395882

Pumping Date: September 9, 2024
Pumping Initiation Time: 10:12 AM

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

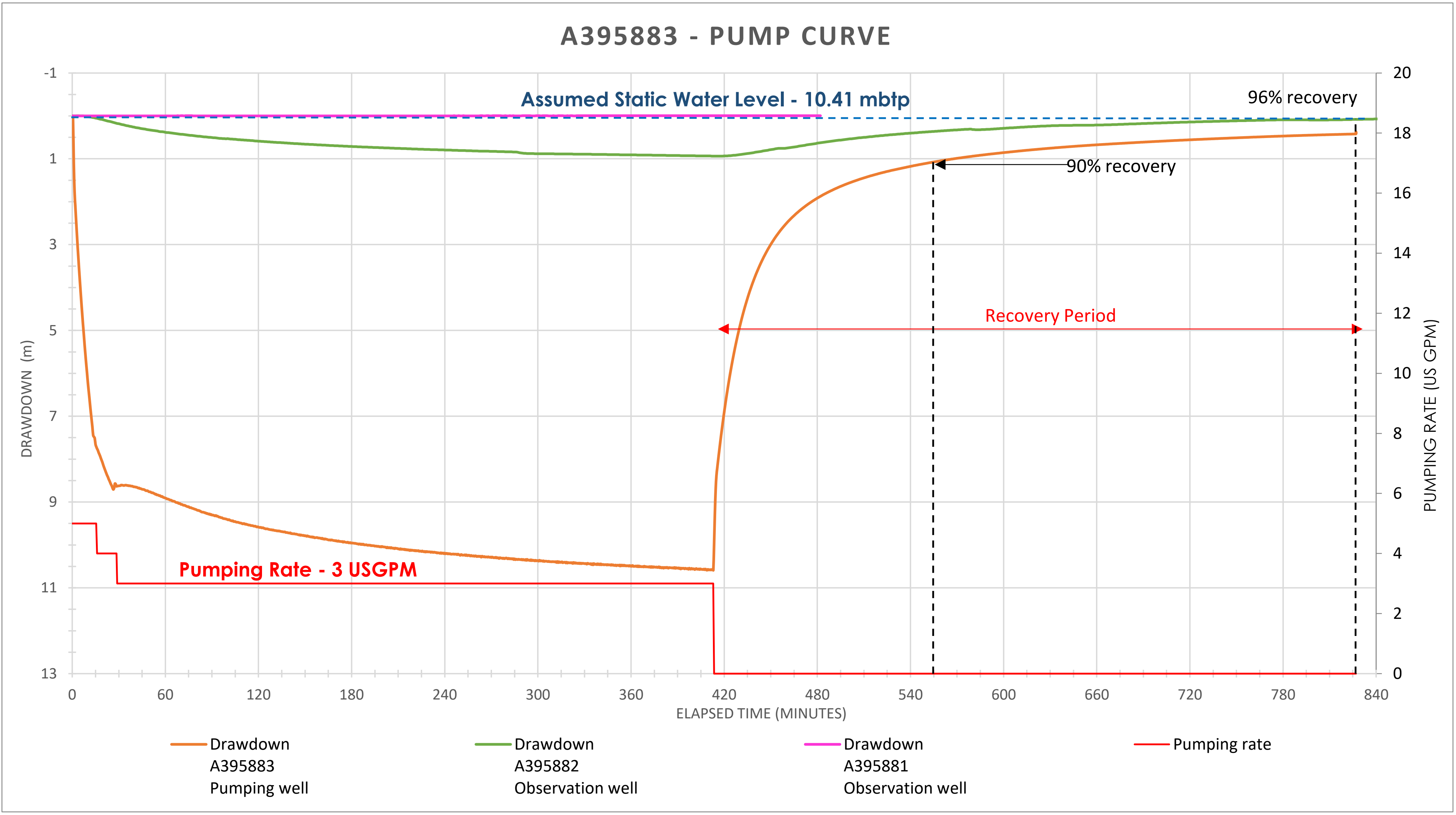
P. 705.742.2297
F. 705.748.9944
E. wills@dmwills.com

Created By: RB

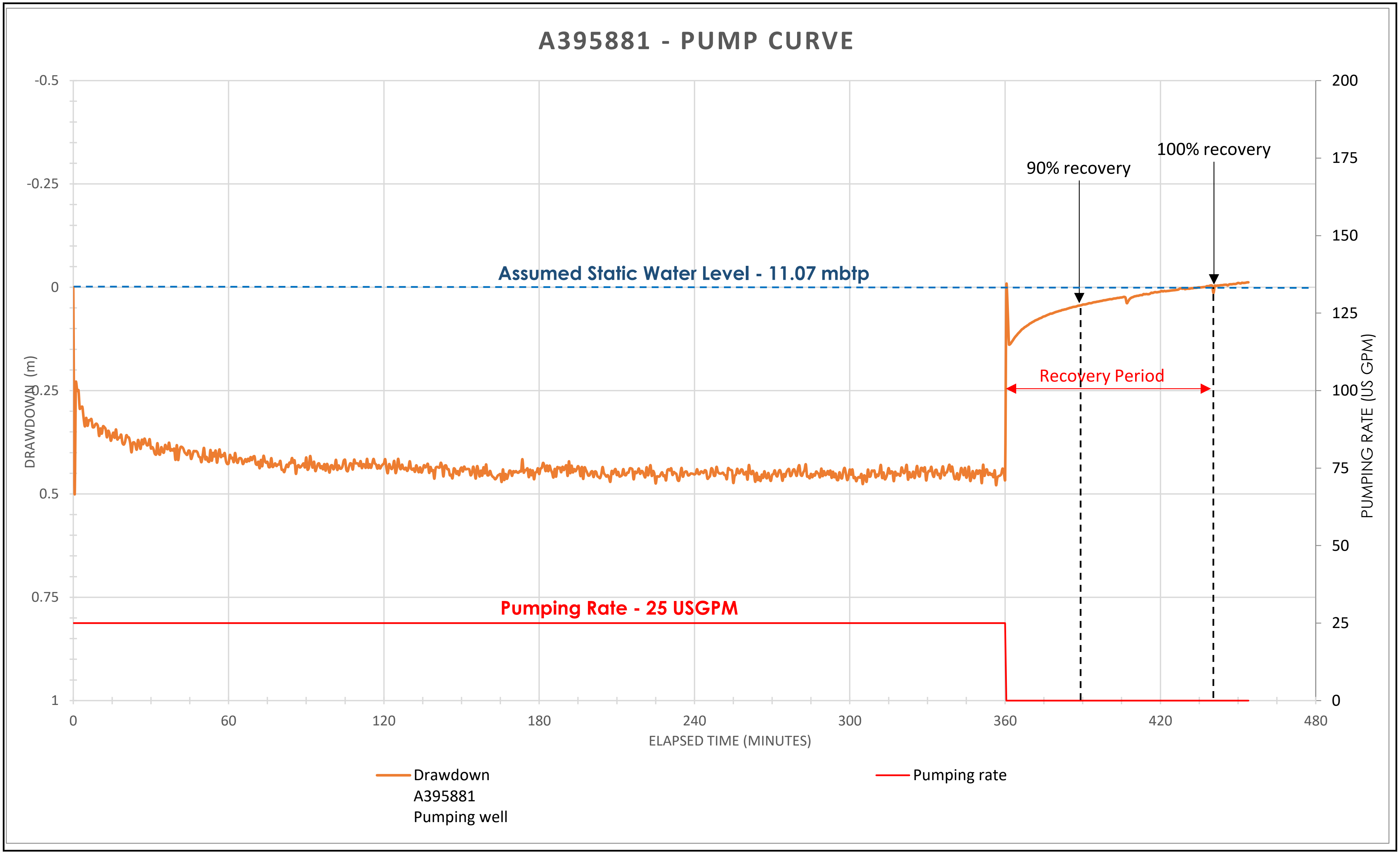
Checked By: IA

Date: September 20, 2024

Project No.: 11056



Hydrograph A395883 Pumping Date: September 10, 2024 Pumping Initiation Time: 10:12 AM	WILLS	**D.M. Wills Associates Limited** **150 Jameson Drive** **Peterborough, Ontario** **Canada K9J 0B9** **P. 705.742.2297** **F. 705.748.9944** **E. wills@dmwills.com**	Created By: RB Checked By: IA Date: September 20, 2024 Project No.: 11056



Hydrograph

A395881

Pumping Date: September 11, 2024
Pumping Initiation Time: 9:26 AM

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.748.9944
E. wills@dmwills.com

Created By: RB

Checked By: IA

Date: September 23, 2024

Project No.: 11056

Appendix H

Certificates of Analysis – Groundwater

FINAL REPORT

CA12213-OCT22 R---

11056 - OSAC.A

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

CA12213-OCT22 R---

First Page

CLIENT DETAILS

Client	D.M. Wills -Peterborough
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada
Contact	Lynsey Tuters
Telephone	289-385-6230
Facsimile	705-741-3568
Email	ltuters@dmwills.com
Project	11056 - OSAC.A
Order Number	
Samples	Ground Water (3)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA12213-OCT22
Received	10/05/2022
Approved	10/18/2022
Report Number	CA12213-OCT22 R---
Date Reported	10/18/2022

COMMENTS

Temperature of Sample upon Receipt: 20 degrees C

Cooling Agent Present: Yes

Custody Seal Present: Yes

Chain of Custody Number: 031488

SIGNATORIES

Brad Moore Hon. B.Sc

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QC Summary.. 5-6

Legend.. 7

Annexes.. 8

MATRIX: WATER

L1 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

			Sample Number	5	6	7
			Sample Name	11056 - MW22 - 08	11056 - MW05 - Geotech3	11056 - MW11 - Geotech 2
			Sample Matrix	Ground Water	Ground Water	Ground Water
			Sample Date	05/10/2022	05/10/2022	05/10/2022
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**
Metals and Inorganics						
Nitrite (as N)	as N mg/L	0.03	1	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06	10	4.35	0.39	0.68
Nitrate + Nitrite (as N)	as N mg/L	0.06		4.35	0.39	0.68

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate + Nitrite (as N)	DIO0214-OCT22	mg/L	0.06	<0.06	NA		NA			NA		
Nitrite (as N)	DIO0214-OCT22	mg/L	0.03	<0.03	ND	20	93	90	110	95	75	125
Nitrate (as N)	DIO0214-OCT22	mg/L	0.06	<0.06	0	20	99	90	110	NV	75	125
Nitrate + Nitrite (as N)	DIO0229-OCT22	mg/L	0.06	<0.06	NA		NA			NA		
Nitrite (as N)	DIO0229-OCT22	mg/L	0.03	<0.03	0	20	94	90	110	84	75	125
Nitrate (as N)	DIO0229-OCT22	mg/L	0.06	<0.06	0	20	100	90	110	96	75	125

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

SGS Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 031488

Page ______ of ______

Laboratory Information Section - Lab use only

Received By: Sindoori Satheesh
Received Date: OCT 0 5 2022 (mm/dd/yy)
Received Time: 14 : 40 (hr : min)

Received By (signature): Sin.
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐

Cooling Agent Present: Yes ☑ No ☐ Type: ice
Temperature Upon Receipt (°C) 20 , x , 3

CA12213-OCT22
LAB LIMS #: ______

REPORT INFORMATION

Company: D.M. Wills
Contact: L. Tuters
Address: 150 Jameson Dr.
Peterborough
Phone: 289-385-6230
Fax: ______
Email: ltuters@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)
Company: ______
Contact: ______
Address: ______
Phone: ______
Email: accounts@dmwills.com

Quotation #: ______
P.O. #: 11056
Project #: 11056-OSACA
Site Location/ID: ______

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date: ______

***NOTE:** DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ **O.Reg 153/04** ☐ **O.Reg 406/19**
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table ______ Appx. ______
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other: ______
☐ MISA
☑ ODWS Not Reportable *See note

Sewer By-Law:
☐ Sanitary
☐ Storm
Municipality: ______

RECORD OF SITE CONDITION (RSC) ☐ **YES** ☐ **NO**

ANALYSIS REQUESTED

						M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)						SPLP	TCLP	
	SAMPLE IDENTIFICATION	DATE SAMPLED ✓	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN,Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs Total ☐ Aroclor ☐	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other	Nitrates				Sewer Use: Specify pkg:	Water Characterization Pkg General ☐ Extended ☐	Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:
1	11056-MW22-08	oct 5/22	AM	1	GW													✓								
2	11056-MW05-Geotech3	oct 5/22	AM	1	GW													✓								
3	11056-MW11-Geotech 2	oct 5/22	AM	1	GW													✓								
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): L. Tuters **Signature:** L Tuters Date: Oct 05 / 2022 (mm/dd/yy) Pink Copy - Client

Relinquished by (NAME): L. Tuters **Signature:** L Tuters Date: Oct 05 / 2022 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.6
Date of Issue: 02 May 2022

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Sn.

FINAL REPORT

CA14187-DEC23 R

11056

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

First Page

CLIENT DETAILS

Client	D.M. Wills -Peterborough
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada
Contact	Ralf Bolvin
Telephone	705-868-1691
Facsimile	705-741-3568
Email	rbolvin@dmwills.com
Project	11056
Order Number	
Samples	Ground Water (3)

LABORATORY DETAILS

Project Specialist	Jill Campbell, B.Sc.,GISAS
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	2165
Facsimile	705-652-6365
Email	jill.campbell@sgs.com
SGS Reference	CA14187-DEC23
Received	12/06/2023
Approved	12/11/2023
Report Number	CA14187-DEC23 R
Date Reported	12/11/2023

COMMENTS

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
MDL - SGS Method Detection Limit

Temperature of Sample upon Receipt: 4 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes
Chain of Custody Number: 036540

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

Jill Campbell

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Exceedance Summary 5

QC Summary 6

Legend 7

Annexes 8

FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

			Sample Number	8	9	10
			Sample Name	BH101-22	BH107-22	BH110-22
			Sample Matrix	Ground Water	Ground Water	Ground Water
			Sample Date	05/12/2023	05/12/2023	05/12/2023
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**
Metals and Inorganics						
Nitrite (as N)	as N mg/L	0.003	1	0.003#<MDL	0.003#<MDL	0.003#<MDL
Nitrate (as N)	as N mg/L	0.006	10	8.84	0.188	2.72
Nitrate + Nitrite (as N)	as N mg/L	0.006		8.84	0.188	2.72

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate + Nitrite (as N)	DIO0149-DEC23	mg/L	0.006	<0.006	NA		NA			NA		
Nitrite (as N)	DIO0149-DEC23	mg/L	0.003	<0.003	ND	20	100	90	110	80	75	125
Nitrate (as N)	DIO0149-DEC23	mg/L	0.006	<0.006	1	20	99	90	110	103	75	125

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY

No: 036540

Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Page____ of____

Laboratory Information Section - Lab use only

Received By: Katelyn Medland
Received By (signature): Km
Received Date: 12 / 06 / 23 (mm/dd/yy)
Custody Seal Present: Yes ☐ No ☑
Cooling Agent Present: Yes ☑ No ☐ Type: Ice
Received Time: 15 : 15 (hr : min)
Custody Seal Intact: Yes ☐ No ☐
Temperature Upon Receipt (°C) 3, 4, 5
LAB LIMS #: CA14187-DEC23

REPORT INFORMATION

Company: DM WILLS
Contact: RALF BOLVIN
Address: 150 JAMESON DRIVE
PETERBOROUGH, ON
Phone: 705-868-1691
Fax:
Email: rbolvin@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email: accounts@dmwills.com

Quotation #:
P.O. #: 11056
Project #: 11056
Site Location/ID:

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table ______ Appx. ______
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☑ ODWS Not Reportable *See note

Sewer By-Law:
☐ Sanitary
☐ Storm
Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

M & I: Field Filtered (Y/N); Metals & Inorganics incl CrVI, CN,Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water); Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI; ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn
SVOC: PAHs only; SVOCs all incl PAHs, ABNs, CPs
PCB: PCBs Total ☐ Aroclor ☐
PHC: F1-F4 + BTEX; F1-F4 only no BTEX
VOC: VOCs all incl BTEX; BTEX only
Pest: Pesticides Organochlorine or specify other
Other (please specify): NITRATES; Sewer Use: Specify pkg:; Water Characterization Pkg General ☐ Extended ☐
SPLP Specify tests: ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN
TCLP Specify tests: ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics	Full Metals Suite	ICP Metals only	PAHs only	SVOCs	PCBs	F1-F4 + BTEX	F1-F4 only	VOCs	BTEX only	Pesticides	NITRATES				Sewer Use	Water Characterization Pkg	SPLP	TCLP	COMMENTS:
1	BH101-22	DEC 5/23	AM	2	GW	N												X								
2	BH107-22	↓	↓	↓	↓	N												X								
3	BH110-22	↓	↓	↓	↓	N												X								
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 12 / 05 / 23 (mm/dd/yy) Pink Copy - Client
Relinquished by (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 12 / 06 / 23 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.7
Date of Issue: 07 JUNE 2023

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

FINAL REPORT

CA19813-OCT23 R1

11056

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

First Page

CLIENT DETAILS

Client	D.M. Wills -Peterborough
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada
Contact	Ralf Bolvin
Telephone	705-868-1691
Facsimile	705-741-3568
Email	rbolvin@dmwills.com
Project	11056
Order Number	
Samples	Ground Water (2)

LABORATORY DETAILS

Project Specialist	Jill Campbell, B.Sc.,GISAS
Laboratory	SGS Canada Inc.
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SGS Reference	CA19813-OCT23
Received	10/31/2023
Approved	11/07/2023
Report Number	CA19813-OCT23 R1
Date Reported	11/07/2023

COMMENTS

MAC - Maximum Acceptable Concentration

AO/OG - Aesthetic Objective / Operational Guideline

NR - Not reportable under applicable Provincial drinking water regulations as per client.

Temperature of Sample upon Receipt: 5 degrees C

Cooling Agent Present: Yes

Custody Seal Present: Yes

Chain of Custody Number: 037594

Phenol Spk low due to sample matrix

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

Jill Campbell

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FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056 Well A377795_1 hr	11056 Well A377795_6 hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	31/10/2023	31/10/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
General Chemistry						
UV Transmittance	%T				94.3	93.4
Alkalinity	mg/L as CaCO3	2	500		221	213
Bicarbonate	mg/L as CaCO3	2			221	213
Carbonate	mg/L as CaCO3	2			< 2	< 2
OH	mg/L as CaCO3	2			< 2	< 2
Colour	TCU	3	5		< 3	3
Conductivity	uS/cm	2			480	479
Total Suspended Solids	mg/L	2			< 2	< 2
Turbidity	NTU	0.10	5	1	**1.9**	**3.1**
Organic Nitrogen	mg/L	0.05	0.15		**0.76**	**0.50**
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			0.77	0.51
Ammonia+Ammonium (N)	as N mg/L	0.04			< 0.04	< 0.04
Dissolved Organic Carbon	mg/L	1	5		1	1
Total Organic Carbon	mg/L	1			1	1

FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056 Well A377795_1 hr	11056 Well A377795_6 hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	31/10/2023	31/10/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics						
Fluoride	mg/L	0.06		1.5	< 0.06	< 0.06
Bromide	mg/L	0.3			< 0.3	< 0.3
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	5.16	6.21
Sulphate	mg/L	2	500		11	13
Sulphide	mg/L	0.02			< 0.02	< 0.02
Hardness	mg/L as CaCO3	0.05	100		244	239
Aluminum (total)	mg/L	0.001	0.1		0.007	0.003
Arsenic (total)	mg/L	0.0002		0.01	< 0.0002	< 0.0002
Boron (total)	mg/L	0.002		5	0.010	0.012
Barium (total)	mg/L	0.00008		1	0.00821	0.00903
Beryllium (total)	mg/L	0.000007			< 0.000007	< 0.000007
Bismuth (total)	mg/L	0.00001			< 0.00001	< 0.00001
Cobalt (total)	mg/L	0.000004			0.000135	0.000073
Calcium (total)	mg/L	0.01			90.8	88.8
Cadmium (total)	mg/L	0.000003		0.005	< 0.000003	< 0.000003
Copper (total)	mg/L	0.0002	1		0.0021	0.0019
Chromium (total)	mg/L	0.00008		0.05	0.00029	0.00027
Iron (total)	mg/L	0.007	0.3		0.124	0.032
Potassium (total)	mg/L	0.009			0.442	0.469
Magnesium (total)	mg/L	0.001			4.06	4.16

Client: D.M. Wills -Peterborough

Project: 11056

Project Manager: Ralf Bolvin

Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056 Well A377795_1 hr	11056 Well A377795_6 hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	31/10/2023	31/10/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Manganese (total)	mg/L	0.00001	0.05		0.00666	0.00284
Molybdenum (total)	mg/L	0.00004			0.00036	0.00059
Nickel (total)	mg/L	0.0001			0.0006	0.0004
Sodium (total)	mg/L	0.01	200	20	2.63	2.56
Phosphorus (total)	mg/L	0.003			< 0.003	< 0.003
Lead (total)	mg/L	0.00009		0.01	< 0.00009	< 0.00009
Silicon (total)	mg/L	0.02			3.69	3.66
Silver (total)	mg/L	0.00005			< 0.00005	< 0.00005
Strontium (total)	mg/L	0.00008			0.155	0.155
Thallium (total)	mg/L	0.000005			< 0.000005	< 0.000005
Tin (total)	mg/L	0.00006			0.00011	0.00021
Titanium (total)	mg/L	0.00007			0.00026	0.00010
Antimony (total)	mg/L	0.0009		0.006	< 0.0009	< 0.0009
Selenium (total)	mg/L	0.00004		0.05	0.00004	0.00012
Uranium (total)	mg/L	0.000002		0.02	0.000264	0.000281
Vanadium (total)	mg/L	0.00001			0.00023	0.00020
Zinc (total)	mg/L	0.002	5		0.003	0.002
Cation sum	meq/L	-9999			5.00	4.90
Anion Sum	meq/L	-9999			5.00	4.88
Anion-Cation Balance	% difference	-9999			0.06	0.24
Ion Ratio	none	-9999			1.00	1.00

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Sample Number	7	8
Sample Name	11056 Well A377795_1 hr	11056 Well A377795_6 hr
Sample Matrix	Ground Water	Ground Water
Sample Date	31/10/2023	31/10/2023

Metals and Inorganics (continued)

Parameter	Units	RL	L1	L2	Result	Result
Total Dissolved Solids (calculated)	mg/L	-9999			257	252
Conductivity (calculated)	uS/cm	-9999			500	489
Langeliers Index 4° C	@ 4° C	-9999			0.14	0.09
Saturation pH 4°C	pHs @ 4°C	-9999			7.65	7.67

Microbiology

Parameter	Units	RL	L1	L2	Result	Result
Total Coliform	cfu/100mL	0		0	0	1
E. Coli	cfu/100mL	0		0	0	0
Heterotrophic Plate Count (HPC)	cfu/1mL	0			740	117

Other (ORP)

Parameter	Units	RL	L1	L2	Result	Result
pH	No unit	0.05	8.5		7.79	7.76
Chloride	mg/L	1	250		9	9
Mercury (total)	mg/L	0.00001			< 0.00001	< 0.00001

Phenols

Parameter	Units	RL	L1	L2	Result	Result
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2

11056 Well A377795_1 hr

Organic Nitrogen		mg/L	0.76	0.15	
Turbidity	SM 2130	NTU	1.9		1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	244	100	

11056 Well A377795_6 hr

Organic Nitrogen		mg/L	0.50	0.15	
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	1		0
Turbidity	SM 2130	NTU	3.1		1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	239	100	

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0113-NOV23	mg/L as CaCO3	2	< 2	1	20	96	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0040-NOV23	mg/L	0.04	<0.04	ND	10	100	90	110	93	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5006-NOV23	mg/L	1	<1	11	20	104	80	120	106	75	125
Sulphate	DIO5006-NOV23	mg/L	2	<2	ND	20	102	80	120	105	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bromide	DIO0147-NOV23	mg/L	0.3	<0.3	ND	20	103	90	110	99	75	125
Nitrite (as N)	DIO0147-NOV23	mg/L	0.03	<0.03	19	20	100	90	110	103	75	125
Nitrate (as N)	DIO0147-NOV23	mg/L	0.06	<0.06	0	20	99	90	110	84	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0038-NOV23	mg/L	1	<1	1	20	97	90	110	95	75	125
Total Organic Carbon	SKA0038-NOV23	mg/L	1	<1	1	20	97	90	110	95	75	125

Carbonate/Bicarbonate

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Carbonate	EWL0113-NOV23	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0113-NOV23	mg/L as CaCO3	2	< 2	1	10	NA	90	110	NA		
OH	EWL0113-NOV23	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

QC SUMMARY

Colour

Method: SM 2120 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0037-NOV23	TCU	3	< 3	0	10	105	80	120	NA		

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0113-NOV23	uS/cm	2	< 2	0	20	100	90	110	NA		

Fluoride by Specific Ion Electrode

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0035-NOV23	mg/L	0.06	<0.06	ND	10	97	90	110	98	75	125
Fluoride	EWL0090-NOV23	mg/L	0.06	<0.06	0	10	96	90	110	96	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0005-NOV23	mg/L	0.00001	< 0.00001	13	20	101	80	120	100	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0028-NOV23	mg/L	0.00005	<0.00005	ND	20	102	90	110	73	70	130
Aluminum (total)	EMS0028-NOV23	mg/L	0.001	<0.001	9	20	100	90	110	90	70	130
Arsenic (total)	EMS0028-NOV23	mg/L	0.0002	<0.0002	6	20	97	90	110	100	70	130
Barium (total)	EMS0028-NOV23	mg/L	0.00008	<0.00008	2	20	97	90	110	96	70	130
Beryllium (total)	EMS0028-NOV23	mg/L	0.000007	<0.000007	ND	20	98	90	110	97	70	130
Boron (total)	EMS0028-NOV23	mg/L	0.002	<0.002	5	20	107	90	110	95	70	130
Bismuth (total)	EMS0028-NOV23	mg/L	0.00001	<0.00001	ND	20	91	90	110	97	70	130
Calcium (total)	EMS0028-NOV23	mg/L	0.01	<0.01	2	20	102	90	110	100	70	130
Cadmium (total)	EMS0028-NOV23	mg/L	0.000003	<0.000003	2	20	100	90	110	106	70	130
Cobalt (total)	EMS0028-NOV23	mg/L	0.000004	<0.000004	7	20	101	90	110	99	70	130
Chromium (total)	EMS0028-NOV23	mg/L	0.00008	<0.00008	15	20	101	90	110	85	70	130
Copper (total)	EMS0028-NOV23	mg/L	0.0002	<0.0002	3	20	98	90	110	81	70	130
Iron (total)	EMS0028-NOV23	mg/L	0.007	<0.007	4	20	97	90	110	100	70	130
Potassium (total)	EMS0028-NOV23	mg/L	0.009	<0.009	4	20	101	90	110	99	70	130
Magnesium (total)	EMS0028-NOV23	mg/L	0.001	<0.001	5	20	99	90	110	98	70	130
Manganese (total)	EMS0028-NOV23	mg/L	0.00001	<0.00001	3	20	98	90	110	97	70	130
Molybdenum (total)	EMS0028-NOV23	mg/L	0.00004	<0.00004	1	20	106	90	110	107	70	130
Sodium (total)	EMS0028-NOV23	mg/L	0.01	<0.01	4	20	97	90	110	95	70	130
Nickel (total)	EMS0028-NOV23	mg/L	0.0001	<0.0001	1	20	100	90	110	98	70	130
Lead (total)	EMS0028-NOV23	mg/L	0.00009	<0.00009	ND	20	99	90	110	76	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	EMS0028-NOV23	mg/L	0.003	<0.003	3	20	100	90	110	NV	70	130
Antimony (total)	EMS0028-NOV23	mg/L	0.0009	<0.0009	ND	20	109	90	110	106	70	130
Selenium (total)	EMS0028-NOV23	mg/L	0.00004	<0.00004	ND	20	98	90	110	99	70	130
Silicon (total)	EMS0028-NOV23	mg/L	0.02	<0.02	4	20	105	90	110	NV	70	130
Tin (total)	EMS0028-NOV23	mg/L	0.00006	<0.00006	3	20	106	90	110	NV	70	130
Strontium (total)	EMS0028-NOV23	mg/L	0.00008	<0.00008	4	20	101	90	110	100	70	130
Titanium (total)	EMS0028-NOV23	mg/L	0.00007	<0.00005	9	20	108	90	110	NV	70	130
Thallium (total)	EMS0028-NOV23	mg/L	0.000005	<0.000005	7	20	96	90	110	99	70	130
Uranium (total)	EMS0028-NOV23	mg/L	0.000002	<0.000002	1	20	99	90	110	102	70	130
Vanadium (total)	EMS0028-NOV23	mg/L	0.00001	<0.00001	8	20	97	90	110	96	70	130
Zinc (total)	EMS0028-NOV23	mg/L	0.002	<0.002	3	20	103	90	110	123	70	130

QC SUMMARY

Microbiology

Method: OMOE MICROMFDC-E3407A | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9011-NOV23	cfu/100mL	-	ACCEPTED	ACCEPTED							
Heterotrophic Plate Count (HPC)	BAC9011-NOV23	cfu/1mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9011-NOV23	cfu/100mL	-	ACCEPTED	ACCEPTED							

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0113-NOV23	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0023-NOV23	mg/L	0.002	<0.002	ND	10	100	80	120	60	75	125

Sulphide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-008

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0030-NOV23	mg/L	0.02	<0.02	ND	20	94	80	120	NA	75	125

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0120-NOV23	mg/L	2	< 2	5	10	95	90	110	NA		

FINAL REPORT

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0045-NOV23	mg/L	0.05	<0.05	5	10	101	90	110	89	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0027-NOV23	NTU	0.10	< 0.10	0	10	100	90	110	NA		

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

No: 037594

SGS

Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Page______ of______

Laboratory Information Section - Lab use only

Received By: ____________
Received Date: 10 / 31 / 23 (mm/dd/yy)
Received Time: 17 : 00 (hr : min)

Received By (signature): ne
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐

Cooling Agent Present: Yes ☑ No ☐ Type:____________
Temperature Upon Receipt (°C) 5 x 3,
LAB LIMS #: CA19813-Oct23

REPORT INFORMATION

Company: DM WILLS
Contact: RALF BOLVIN
Address: 150 JAMESON DRIVE
PETERBOROUGH, ON
Phone: 705-868-1691
Fax:
Email: rbolvin@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email: accounts@dmwills.com

Quotation #:
P.O. #: 11056
Project #: 11056
Site Location/ID:

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:____________

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table ____ Appx.
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☑ ODWS Not Reportable *See note

Sewer By-Law:
☐ Sanitary
☐ Storm
Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

						M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)						SPLP	TCLP	
	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN,Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs ☐ Total ☐ Aroclor	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other					Sewer Use: Specify pkg:	Water Characterization Pkg ☐ General ☑ Extended	Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:
1	11056 Well A377795-1hr	Oct 31/23	11:00AM	13	GW	N																	X			
2	11056 Well A377795-6hr	Oct 31/23	4:00PM	13	GW	N																	X			
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 10 / 31 / 23 (mm/dd/yy) Pink Copy - Client
Relinquished by (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 10 / 31 / 23 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.7
Date of Issue: 07 JUNE 2023

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

FINAL REPORT

CA14079-NOV23 R1

11056

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	D.M. Wills -Peterborough	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Ralf Bolvin	Telephone	2165
Telephone	705-868-1691	Facsimile	705-652-6365
Facsimile	705-741-3568	Email	jill.campbell@sgs.com
Email	rbolvin@dmwills.com	SGS Reference	CA14079-NOV23
Project	11056	Received	11/02/2023
Order Number		Approved	11/09/2023
Samples	Ground Water (2)	Report Number	CA14079-NOV23 R1
		Date Reported	11/09/2023

COMMENTS

MAC - Maximum Acceptable Concentration

AO/OG - Aesthetic Objective / Operational Guideline

NR - Not reportable under applicable Provincial drinking water regulations as per client.

Temperature of Sample upon Receipt: 6 degrees C

Cooling Agent Present: Yes

Custody Seal Present: Yes

Chain of Custody Number: 011390

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

Jill Campbell

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FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056WellA3777 96_1hr	11056WellA3777 96_6hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	02/11/2023	02/11/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
General Chemistry						
UV Transmittance	%T				92.4	91.8
Alkalinity	mg/L as CaCO3	2	500		225	224
Bicarbonate	mg/L as CaCO3	2			225	224
Carbonate	mg/L as CaCO3	2			< 2	< 2
OH	mg/L as CaCO3	2			< 2	< 2
Colour	TCU	3	5		5	4
Conductivity	uS/cm	2			454	461
Total Suspended Solids	mg/L	2			3	3
Turbidity	NTU	0.10	5	1	6.9	2.4
Organic Nitrogen	mg/L	0.05	0.15		< 0.05	< 0.05
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			< 0.05	< 0.05
Ammonia+Ammonium (N)	as N mg/L	0.04			0.05	< 0.04
Dissolved Organic Carbon	mg/L	1	5		1	1
Total Organic Carbon	mg/L	1			1	1

FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056WellA377796_1hr	11056WellA377796_6hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	02/11/2023	02/11/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics						
Fluoride	mg/L	0.06		1.5	< 0.06	< 0.06
Bromide	mg/L	0.3			< 0.3	< 0.3
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	0.09	0.12
Sulphate	mg/L	2	500		23	21
Sulphide	mg/L	0.02			< 0.02	< 0.02
Hardness	mg/L as CaCO3	0.05	100		260	256
Aluminum (total)	mg/L	0.001	0.1		0.012	0.003
Arsenic (total)	mg/L	0.0002		0.01	0.0002	< 0.0002
Boron (total)	mg/L	0.002		5	0.010	0.008
Barium (total)	mg/L	0.00008		1	0.0285	0.0313
Beryllium (total)	mg/L	0.000007			0.000007	< 0.000007
Bismuth (total)	mg/L	0.00001			< 0.00001	< 0.00001
Cobalt (total)	mg/L	0.000004			0.000113	0.000043
Calcium (total)	mg/L	0.01			96.2	94.7
Cadmium (total)	mg/L	0.000003		0.005	0.000003	< 0.000003
Copper (total)	mg/L	0.0002	1		0.0006	0.0007
Chromium (total)	mg/L	0.00008		0.05	0.00021	0.00015
Iron (total)	mg/L	0.007	0.3		0.804	0.371
Potassium (total)	mg/L	0.009			0.377	0.365
Magnesium (total)	mg/L	0.001			4.83	4.72

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056WellA377796_1hr	11056WellA377796_6hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	02/11/2023	02/11/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Manganese (total)	mg/L	0.00001	0.05		0.0199	0.0134
Molybdenum (total)	mg/L	0.00004			0.00024	0.00019
Nickel (total)	mg/L	0.0001			0.0006	0.0004
Sodium (total)	mg/L	0.01	200	20	2.37	2.24
Phosphorus (total)	mg/L	0.003			0.003	< 0.003
Lead (total)	mg/L	0.00009		0.01	< 0.00009	< 0.00009
Silicon (total)	mg/L	0.02			4.76	4.72
Silver (total)	mg/L	0.00005			< 0.00005	< 0.00005
Strontium (total)	mg/L	0.00008			0.168	0.165
Thallium (total)	mg/L	0.000005			< 0.000005	< 0.000005
Tin (total)	mg/L	0.00006			0.00007	< 0.00006
Titanium (total)	mg/L	0.00007			0.00049	0.00011
Antimony (total)	mg/L	0.0009		0.006	< 0.0009	< 0.0009
Selenium (total)	mg/L	0.00004		0.05	0.00013	0.00012
Uranium (total)	mg/L	0.000002		0.02	0.000176	0.000202
Vanadium (total)	mg/L	0.00001			0.00015	0.00016
Zinc (total)	mg/L	0.002	5		< 0.002	< 0.002
Cation sum	meq/L	-9999			5.36	5.25
Anion Sum	meq/L	-9999			5.16	5.09
Anion-Cation Balance	% difference	-9999			1.99	1.55
Ion Ratio	none	-9999			1.04	1.03

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Sample Number	7	8
Sample Name	11056WellA377796_1hr	11056WellA377796_6hr
Sample Matrix	Ground Water	Ground Water
Sample Date	02/11/2023	02/11/2023

Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Total Dissolved Solids (calculated)	mg/L	-9999			268	264
Conductivity (calculated)	uS/cm	-9999			526	517
Langeliers Index 4° C	@ 4° C	-9999			0.38	0.32
Saturation pH 4°C	pHs @ 4°C	-9999			7.61	7.62
Microbiology						
Total Coliform	cfu/100mL	0		0	0	0
E. Coli	cfu/100mL	0		0	0	0
Heterotrophic Plate Count (HPC)	cfu/1mL	0			130	36
Other (ORP)						
pH	No unit	0.05	8.5		7.99	7.94
Chloride	mg/L	1	250		6	6
Mercury (total)	mg/L	0.00001			< 0.00001	< 0.00001
Phenols						
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
11056WellA377796_1hr					
Turbidity	SM 2130	NTU	6.9	5	1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	260	100	
Iron	SM 3030/EPA 200.8	mg/L	0.804	0.3	
11056WellA377796_6hr					
Turbidity	SM 2130	NTU	2.4		1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	256	100	
Iron	SM 3030/EPA 200.8	mg/L	0.371	0.3	

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0114-NOV23	mg/L as CaCO3	2	< 2	1	20	102	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0056-NOV23	mg/L	0.04	<0.04	ND	10	97	90	110	92	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5010-NOV23	mg/L	1	<1	ND	20	104	80	120	107	75	125
Sulphate	DIO5010-NOV23	mg/L	2	<2	13	20	102	80	120	105	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bromide	DIO0191-NOV23	mg/L	0.3	<0.3	ND	20	103	90	110	93	75	125
Nitrite (as N)	DIO0191-NOV23	mg/L	0.03	<0.03	ND	20	99	90	110	103	75	125
Nitrate (as N)	DIO0191-NOV23	mg/L	0.06	<0.06	ND	20	101	90	110	105	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0054-NOV23	mg/L	1	<1	2	20	95	90	110	98	75	125
Total Organic Carbon	SKA0054-NOV23	mg/L	1	<1	2	20	95	90	110	98	75	125

Carbonate/Bicarbonate

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Carbonate	EWL0114-NOV23	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0114-NOV23	mg/L as CaCO3	2	< 2	1	10	NA	90	110	NA		
OH	EWL0114-NOV23	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

QC SUMMARY

Colour

Method: SM 2120 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0166-NOV23	TCU	3	< 3	0	10	105	80	120	NA		

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0114-NOV23	uS/cm	2	< 2	0	20	99	90	110	NA		

Fluoride by Specific Ion Electrode

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0169-NOV23	mg/L	0.06	<0.06	ND	10	100	90	110	94	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0007-NOV23	mg/L	0.00001	< 0.00001	ND	20	93	80	120	91	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0035-NOV23	mg/L	0.00005	<0.00005	ND	20	98	90	110	87	70	130
Aluminum (total)	EMS0035-NOV23	mg/L	0.001	<0.001	7	20	100	90	110	112	70	130
Arsenic (total)	EMS0035-NOV23	mg/L	0.0002	<0.0002	ND	20	98	90	110	97	70	130
Barium (total)	EMS0035-NOV23	mg/L	0.00008	<0.00008	0	20	93	90	110	75	70	130
Beryllium (total)	EMS0035-NOV23	mg/L	0.000007	<0.000007	12	20	98	90	110	88	70	130
Boron (total)	EMS0035-NOV23	mg/L	0.002	<0.002	10	20	107	90	110	96	70	130
Bismuth (total)	EMS0035-NOV23	mg/L	0.00001	<0.00001	ND	20	97	90	110	83	70	130
Calcium (total)	EMS0035-NOV23	mg/L	0.01	<0.01	3	20	105	90	110	127	70	130
Cadmium (total)	EMS0035-NOV23	mg/L	0.000003	<0.000003	0	20	99	90	110	99	70	130
Cobalt (total)	EMS0035-NOV23	mg/L	0.000004	<0.000004	0	20	99	90	110	94	70	130
Chromium (total)	EMS0035-NOV23	mg/L	0.00008	<0.00008	0	20	101	90	110	105	70	130
Copper (total)	EMS0035-NOV23	mg/L	0.0002	<0.0002	2	20	98	90	110	97	70	130
Iron (total)	EMS0035-NOV23	mg/L	0.007	<0.007	0	20	102	90	110	100	70	130
Potassium (total)	EMS0035-NOV23	mg/L	0.009	<0.009	2	20	103	90	110	111	70	130
Magnesium (total)	EMS0035-NOV23	mg/L	0.001	<0.001	1	20	107	90	110	89	70	130
Manganese (total)	EMS0035-NOV23	mg/L	0.00001	<0.00001	1	20	96	90	110	78	70	130
Molybdenum (total)	EMS0035-NOV23	mg/L	0.00004	<0.00004	5	20	96	90	110	96	70	130
Sodium (total)	EMS0035-NOV23	mg/L	0.01	<0.01	1	20	105	90	110	95	70	130
Nickel (total)	EMS0035-NOV23	mg/L	0.0001	<0.0001	7	20	94	90	110	86	70	130
Lead (total)	EMS0035-NOV23	mg/L	0.00009	<0.00009	ND	20	98	90	110	88	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	EMS0035-NOV23	mg/L	0.003	<0.003	ND	20	103	90	110	NV	70	130
Antimony (total)	EMS0035-NOV23	mg/L	0.0009	<0.0009	ND	20	97	90	110	97	70	130
Selenium (total)	EMS0035-NOV23	mg/L	0.00004	<0.00004	ND	20	100	90	110	92	70	130
Silicon (total)	EMS0035-NOV23	mg/L	0.02	<0.02	1	20	102	90	110	NV	70	130
Tin (total)	EMS0035-NOV23	mg/L	0.00006	<0.00006	ND	20	101	90	110	NV	70	130
Strontium (total)	EMS0035-NOV23	mg/L	0.00008	<0.00008	1	20	99	90	110	82	70	130
Titanium (total)	EMS0035-NOV23	mg/L	0.00007	<0.00005	ND	20	98	90	110	NV	70	130
Thallium (total)	EMS0035-NOV23	mg/L	0.000005	<0.000005	0	20	98	90	110	88	70	130
Uranium (total)	EMS0035-NOV23	mg/L	0.000002	2e-006	5	20	98	90	110	89	70	130
Vanadium (total)	EMS0035-NOV23	mg/L	0.00001	<0.00001	16	20	97	90	110	98	70	130
Zinc (total)	EMS0035-NOV23	mg/L	0.002	<0.002	5	20	101	90	110	97	70	130

QC SUMMARY

Microbiology

Method: SM 9215A | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Heterotrophic Plate Count (HPC)	BAC9064-NOV23	cfu/1mL	-	ACCEPTED	ACCEPTED							
E. Coli	BAC9064-NOV23	cfu/100mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9064-NOV23	cfu/100mL	-	ACCEPTED	ACCEPTED							

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0114-NOV23	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0052-NOV23	mg/L	0.002	<0.002	ND	10	109	80	120	96	75	125

Sulphide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-008

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0090-NOV23	mg/L	0.02	<0.02	ND	20	105	80	120	NA	75	125

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0223-NOV23	mg/L	2	< 2	1	10	95	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0041-NOV23	mg/L	0.05	<0.05	ND	10	108	90	110	107	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0102-NOV23	NTU	0.10	< 0.10	0	10	99	90	110	NA		

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.

Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.

"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS Environment, Health & Safety

Request for Laboratory Services and CHAIN OF CUSTODY

- Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 011390

Page ______ of ______

Laboratory Information Section - Lab use only

Received By: no

Received Date: 11 / 02 / 23 (mm/dd/yy)

Received Time: 17 : 10 (hr : min)

Received By (signature):

Custody Seal Present: Yes ☐ No ☒

Custody Seal Intact: Yes ☐ No ☒

Cooling Agent Present: Yes ☒ No ☐ Type: ICE

Temperature Upon Receipt (°C) 6 , 6 , 6

LAB LIMS #: CA14079-NOV23

REPORT INFORMATION

Company: DM WILLS

Contact: RALF BOLVIN

Address: 150 JAMESON DRIVE
PETERBOROUGH, ON

Phone: 705-868-1691

Fax:

Email: rbolvin@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)

Company:

Contact:

Address:

Phone:

Email: accounts@dmwills.com

Quotation #:

P.O. #: 11056

Project #: 11056

Site Location/ID:

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

Regulation 153/04:

☐ Table 1 ☐ Res/Park Soil Texture:

☐ Table 2 ☐ Ind/Com ☐ Coarse

☐ Table 3 ☐ Agri/Other ☐ Medium

☐ Table ______ ☐ Fine

Other Regulations:

☐ Reg 347/558 (3 Day min TAT)

☐ PWQO ☐ MMER

☐ CCME ☑ Other: ODWS

☐ MISA

Sewer By-Law:

☐ Sanitary

☐ Storm

Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

						M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)							TCLP	
	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN,Hg pH,(B(HWS),EC,SAR–soil) (Cl, Na-water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd,Cr,Co,Cu,Pb,Mo,Ni, Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs Total ☐ Aroclor ☐	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other						Sewer Use: Specify pkg:	Water Characterization Pkg General ☐ Extended ☑	Specify TCLP tests ☐M&I ☐VOC ☐PCB ☐B(a)P ☐ABN ☐Ignit.	COMMENTS:
1	11056WellA377796-1hr	Nov 2/23	10:20AM	13	GW	N																			X		
2	11056 Well A377796_6hr	Nov 2/23	3:20Am	13	GW	N																			X		
3																											
4																											
5																											
6																											
7																											
8																											
9																											
10																											
11																											
12																											

Observations/Comments/Special Instructions

Sampled By (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 11 / 02 / 23 (mm/dd/yy)

Relinquished by (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 11 / 02 / 23 (mm/dd/yy)

Pink Copy - Client

Yellow & White Copy - SGS

Revision #: 1.2
Date of Issue: 09 Sept, 2019

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

FINAL REPORT

CA14296-NOV23 R1

11056

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

CA14296-NOV23 R1

First Page

CLIENT DETAILS

Client	D.M. Wills -Peterborough
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada
Contact	Ralf Bolvin
Telephone	705-868-1691
Facsimile	705-741-3568
Email	rbolvin@dmwills.com
Project	11056
Order Number	
Samples	Ground Water (2)

LABORATORY DETAILS

Project Specialist	Maarit Wolfe, Hon.B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2000
Facsimile	705-652-6365
Email	Maarit.Wolfe@sgs.com
SGS Reference	CA14296-NOV23
Received	11/08/2023
Approved	11/15/2023
Report Number	CA14296-NOV23 R1
Date Reported	11/15/2023

COMMENTS

MAC - Maximum Acceptable Concentration

AO/OG - Aesthetic Objective / Operational Guideline

NR - Not reportable under applicable Provincial drinking water regulations as per client.

Temperature of Sample upon Receipt: 5 degrees C

Cooling Agent Present: Yes

Custody Seal Present: Yes

Chain of Custody Number: 036655

SIGNATORIES

Maarit Wolfe, Hon.B.Sc

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Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056-WellA377 799_1hr	11056-WellA377 799_6hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	08/11/2023	08/11/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
General Chemistry						
UV Transmittance	%T				96.7	97.1
Alkalinity	mg/L as CaCO3	2	500		198	198
Bicarbonate	mg/L as CaCO3	2			198	198
Carbonate	mg/L as CaCO3	2			< 2	< 2
OH	mg/L as CaCO3	2			< 2	< 2
Colour	TCU	3	5		4	3
Conductivity	uS/cm	2			397	409
Total Suspended Solids	mg/L	2			2	< 2
Turbidity	NTU	0.10	5	1	0.80	0.55
Organic Nitrogen	mg/L	0.05	0.15		< 0.05	< 0.05
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			< 0.05	< 0.05
Ammonia+Ammonium (N)	as N mg/L	0.04			< 0.04	< 0.04
Dissolved Organic Carbon	mg/L	1	5		1	1
Total Organic Carbon	mg/L	1			< 1	1

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Sample Number	7	8
Sample Name	11056-WellA377 799_1hr	11056-WellA377 799_6hr
Sample Matrix	Ground Water	Ground Water
Sample Date	08/11/2023	08/11/2023

Metals and Inorganics

Parameter	Units	RL	L1	L2	Result	Result
Fluoride	mg/L	0.06		1.5	< 0.06	< 0.06
Bromide	mg/L	0.3			< 0.3	< 0.3
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	1.84	1.62
Sulphate	mg/L	2	500		7	8
Sulphide	mg/L	0.02			< 0.02	< 0.02
Hardness	mg/L as CaCO3	0.05	100		220	225
Aluminum (total)	mg/L	0.001	0.1		0.007	0.003
Arsenic (total)	mg/L	0.0002		0.01	< 0.0002	< 0.0002
Boron (total)	mg/L	0.002		5	0.015	0.015
Barium (total)	mg/L	0.00008		1	0.00993	0.00982
Beryllium (total)	mg/L	0.000007			< 0.000007	< 0.000007
Bismuth (total)	mg/L	0.00001			< 0.00001	< 0.00001
Cobalt (total)	mg/L	0.000004			0.000105	0.000031
Calcium (total)	mg/L	0.01			82.1	83.9
Cadmium (total)	mg/L	0.000003		0.005	< 0.000003	< 0.000003
Copper (total)	mg/L	0.0002	1		0.0009	0.0006
Chromium (total)	mg/L	0.00008		0.05	0.00073	0.00049
Iron (total)	mg/L	0.007	0.3		0.074	0.026
Potassium (total)	mg/L	0.009			0.373	0.361
Magnesium (total)	mg/L	0.001			3.61	3.82

Client: D.M. Wills -Peterborough

Project: 11056

Project Manager: Ralf Bolvin

Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056-WellA377 799_1hr	11056-WellA377 799_6hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	08/11/2023	08/11/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Manganese (total)	mg/L	0.00001	0.05		0.00835	0.00197
Molybdenum (total)	mg/L	0.00004			0.00018	0.00009
Nickel (total)	mg/L	0.0001			0.0005	0.0002
Sodium (total)	mg/L	0.01	200	20	1.54	1.61
Phosphorus (total)	mg/L	0.003			< 0.003	< 0.003
Lead (total)	mg/L	0.00009		0.01	0.00011	< 0.00009
Silicon (total)	mg/L	0.02			4.28	4.34
Silver (total)	mg/L	0.00005			< 0.00005	< 0.00005
Strontium (total)	mg/L	0.00008			0.137	0.140
Thallium (total)	mg/L	0.000005			< 0.000005	< 0.000005
Tin (total)	mg/L	0.00006			< 0.00006	< 0.00006
Titanium (total)	mg/L	0.00007			0.00018	< 0.00007
Antimony (total)	mg/L	0.0009		0.006	< 0.0009	< 0.0009
Selenium (total)	mg/L	0.00004		0.05	0.00015	0.00012
Uranium (total)	mg/L	0.000002		0.02	0.000186	0.000177
Vanadium (total)	mg/L	0.00001			0.00027	0.00027
Zinc (total)	mg/L	0.002	5		< 0.002	< 0.002

FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	11056-WellA377 799_1hr	11056-WellA377 799_6hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	08/11/2023	08/11/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Microbiology						
Total Coliform	cfu/100mL	0		0	6	2
E. Coli	cfu/100mL	0		0	0	0
Heterotrophic Plate Count (HPC)	cfu/1mL	0			640	115
Other (ORP)						
pH	No unit	0.05	8.5		8.15	8.09
Chloride	mg/L	1	250		2	3
Mercury (total)	mg/L	0.00001			< 0.00001	< 0.00001
Phenols						
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
11056-WellA377799_1hr					
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	6		0
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	220	100	
11056-WellA377799_6hr					
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	2		0
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	225	100	

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0252-NOV23	mg/L as CaCO3	2	< 2	2	20	94	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0112-NOV23	mg/L	0.04	<0.04	1	10	96	90	110	97	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5030-NOV23	mg/L	1	<1	ND	20	102	80	120	109	75	125
Sulphate	DIO5030-NOV23	mg/L	2	<2	ND	20	104	80	120	108	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bromide	DIO0361-NOV23	mg/L	0.3	<0.3	ND	20	97	90	110	91	75	125
Nitrite (as N)	DIO0361-NOV23	mg/L	0.03	<0.03	ND	20	99	90	110	101	75	125
Nitrate (as N)	DIO0361-NOV23	mg/L	0.06	<0.06	ND	20	102	90	110	99	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0113-NOV23	mg/L	1	<1	2	20	103	90	110	96	75	125
Total Organic Carbon	SKA0113-NOV23	mg/L	1	<1	2	20	103	90	110	96	75	125

Carbonate/Bicarbonate

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Carbonate	EWL0252-NOV23	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0252-NOV23	mg/L as CaCO3	2	< 2	2	10	NA	90	110	NA		
OH	EWL0252-NOV23	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

QC SUMMARY

Colour

Method: SM 2120 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0304-NOV23	TCU	3	< 3	0	10	105	80	120	NA		

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0252-NOV23	uS/cm	2	4	0	20	100	90	110	NA		

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0261-NOV23	mg/L	0.06	<0.06	0	10	103	90	110	NV	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0019-NOV23	mg/L	0.00001	< 0.00001	3	20	98	80	120	98	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0100-NOV23	mg/L	0.00005	<0.00005	ND	20	106	90	110	78	70	130
Aluminum (total)	EMS0100-NOV23	mg/L	0.001	<0.001	19	20	100	90	110	83	70	130
Arsenic (total)	EMS0100-NOV23	mg/L	0.0002	<0.0002	4	20	107	90	110	103	70	130
Barium (total)	EMS0100-NOV23	mg/L	0.00008	<0.00008	2	20	102	90	110	96	70	130
Beryllium (total)	EMS0100-NOV23	mg/L	0.000007	<0.000007	ND	20	92	90	110	94	70	130
Boron (total)	EMS0100-NOV23	mg/L	0.002	<0.002	1	20	97	90	110	94	70	130
Bismuth (total)	EMS0100-NOV23	mg/L	0.00001	<0.00001	ND	20	106	90	110	86	70	130
Calcium (total)	EMS0100-NOV23	mg/L	0.01	<0.01	4	20	100	90	110	80	70	130
Cadmium (total)	EMS0100-NOV23	mg/L	0.000003	<0.000003	ND	20	108	90	110	94	70	130
Cobalt (total)	EMS0100-NOV23	mg/L	0.000004	<0.000004	10	20	100	90	110	94	70	130
Chromium (total)	EMS0100-NOV23	mg/L	0.00008	<0.00008	ND	20	104	90	110	90	70	130
Copper (total)	EMS0100-NOV23	mg/L	0.0002	<0.0002	1	20	102	90	110	94	70	130
Iron (total)	EMS0100-NOV23	mg/L	0.007	<0.007	1	20	106	90	110	75	70	130
Potassium (total)	EMS0100-NOV23	mg/L	0.009	<0.009	1	20	99	90	110	88	70	130
Magnesium (total)	EMS0100-NOV23	mg/L	0.001	<0.001	1	20	101	90	110	89	70	130
Manganese (total)	EMS0100-NOV23	mg/L	0.00001	<0.00001	2	20	99	90	110	97	70	130
Molybdenum (total)	EMS0100-NOV23	mg/L	0.00004	<0.00004	2	20	100	90	110	90	70	130
Sodium (total)	EMS0100-NOV23	mg/L	0.01	<0.01	1	20	101	90	110	91	70	130
Nickel (total)	EMS0100-NOV23	mg/L	0.0001	<0.0001	12	20	105	90	110	95	70	130
Lead (total)	EMS0100-NOV23	mg/L	0.00009	<0.00009	ND	20	105	90	110	93	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	EMS0100-NOV23	mg/L	0.003	<0.003	2	20	101	90	110	NV	70	130
Antimony (total)	EMS0100-NOV23	mg/L	0.0009	<0.0009	ND	20	103	90	110	94	70	130
Selenium (total)	EMS0100-NOV23	mg/L	0.00004	<0.00004	ND	20	102	90	110	111	70	130
Silicon (total)	EMS0100-NOV23	mg/L	0.02	<0.02	0	20	99	90	110	NV	70	130
Tin (total)	EMS0100-NOV23	mg/L	0.00006	<0.00006	ND	20	97	90	110	NV	70	130
Strontium (total)	EMS0100-NOV23	mg/L	0.00008	<0.00008	2	20	98	90	110	92	70	130
Titanium (total)	EMS0100-NOV23	mg/L	0.00007	<0.00005	3	20	96	90	110	NV	70	130
Thallium (total)	EMS0100-NOV23	mg/L	0.000005	<0.000005	ND	20	105	90	110	93	70	130
Uranium (total)	EMS0100-NOV23	mg/L	0.000002	2e-006	1	20	92	90	110	101	70	130
Vanadium (total)	EMS0100-NOV23	mg/L	0.00001	<0.00001	6	20	102	90	110	105	70	130
Zinc (total)	EMS0100-NOV23	mg/L	0.002	<0.002	ND	20	104	90	110	110	70	130

QC SUMMARY

Microbiology

Method: SM 9215A | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Heterotrophic Plate Count (HPC)	BAC9164-NOV23	cfu/1mL	-	ACCEPTED	ACCEPTED							
E. Coli	BAC9164-NOV23	cfu/100mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9164-NOV23	cfu/100mL	-	ACCEPTED	ACCEPTED							

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0252-NOV23	No unit	0.05	NA	1		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0107-NOV23	mg/L	0.002	<0.002	ND	10	99	80	120	NV	75	125

Sulphide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-008

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0114-NOV23	mg/L	0.02	<0.02	ND	20	116	80	120	NA	75	125

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0346-NOV23	mg/L	2	< 2	0	10	97	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA5051-NOV23	mg/L	0.05	<0.05	3	10	100	90	110	90	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0243-NOV23	NTU	0.10	< 0.10	0	10	100	90	110	NA		

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Request for Laboratory Services and CHAIN OF CUSTODY

No: 036655

Page_____ of_____

Laboratory Information Section - Lab use only

Received By: ____________

Received By (signature): Ne

Received Date: 11 / 08 / 23 (mm/dd/yy)

Received Time: 17 : 05 (hr : min)

Custody Seal Present: Yes ☐ No ☒

Custody Seal Intact: Yes ☐ No ☒

Cooling Agent Present: Yes ☒ No ☐ Type: ICE

Temperature Upon Receipt (°C) 5.5.5

LAB LIMS #: CA14296-NOV23

REPORT INFORMATION

Company: DM WILLS
Contact: RALF BOLVIN
Address: 150 JAMESON DRIVE
PETERBOROUGH, ON
Phone: 705-868-1691
Fax:
Email: rbolvin@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email: accounts@dmwills.com

Quotation #:
P.O. #: 11056
Project #: 11056
Site Location/ID:

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table ____ Appx. ____
Soil Volume ☐ <350m3 ☐ >350m3

☐ O.Reg 406/19

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☑ ODWS Not Reportable *See note

Sewer By-Law:
☐ Sanitary
☐ Storm
Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

M & I: Metals & Inorganics incl CrVI, CN,Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water); Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI; ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn

SVOC: PAHs only; SVOCs all incl PAHs, ABNs, CPs

PCB: PCBs Total ☐ Aroclor ☐

PHC: F1-F4 + BTEX; F1-F4 only no BTEX

VOC: VOCs all incl BTEX; BTEX only

Pest: Pesticides Organochlorine or specify other

Other (please specify): Sewer Use: Specify pkg:; Water Characterization Pkg General ☐ Extended ☑

SPLP Specify tests: ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN

TCLP Specify tests: ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics	Full Metals Suite	ICP Metals only	PAHs only	SVOCs	PCBs	F1-F4 + BTEX	F1-F4 only	VOCs	BTEX only	Pesticides	Other	Other	Other	Other	Sewer Use	Water Characterization Pkg	SPLP	TCLP	COMMENTS:
1	11056 Well A377799-1hr	10:20AM	11/08/23	13	GW	N																	X			
2	11056 Well A377799-6hr	3:20PM	11/08/23	13	GW	N																	X			
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 11 / 08 / 23 (mm/dd/yy)

Relinquished by (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 11 / 08 / 23 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.7
Date of Issue: 07 JUNE 2023

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

FINAL REPORT

CA15268-SEP24 R---

11056

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	D.M. Wills -Peterborough	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Ralf Bolvin	Telephone	2165
Telephone	705-868-1691	Facsimile	705-652-6365
Facsimile	705-741-3568	Email	jill.campbell@sgs.com
Email	rbolvin@dmwills.com	SGS Reference	CA15268-SEP24
Project	11056	Received	09/27/2024
Order Number		Approved	10/01/2024
Samples	Ground Water (7)	Report Number	CA15268-SEP24 R---
		Date Reported	10/01/2024

COMMENTS

Temperature of Sample upon Receipt: 8 degrees C

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

Jill Campbell

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FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

			Sample Number	5	6	7	8	9	10	11
			Sample Name	BH110-22	BH107-22	A377799	A377796	DUP-01	BH101-22	A377795
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	27/09/2024	27/09/2024	27/09/2024	27/09/2024	27/09/2024	27/09/2024	27/09/2024
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics										
Nitrite (as N)	as N mg/L	0.03	1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06	10	4.81	0.17	1.82	0.09	0.09	8.67	1.18
Nitrate + Nitrite (as N)	as N mg/L	0.06		4.81	0.17	1.82	0.09	0.09	8.67	1.18

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate + Nitrite (as N)	DIO0631-SEP24	mg/L	0.06	<0.06	NA		NA			NA		
Nitrite (as N)	DIO0631-SEP24	mg/L	0.03	<0.03	ND	20	101	90	110	104	75	125
Nitrate (as N)	DIO0631-SEP24	mg/L	0.06	<0.06	1	20	100	90	110	103	75	125

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

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LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
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Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

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SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS Environment, Health & Safety

Request for Laboratory Services and CHAIN OF CUSTODY

- Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 011396

Page ______ of ______

Laboratory Information Section - Lab use only

Received By: SEP 27 2024

Received By (signature):

Received Date: ___/___/___ (mm/dd/yy)

Received Time: 15:50 (hr : min)

Custody Seal Present: Yes ☐ No ☐

Custody Seal Intact: Yes ☐ No ☐

Cooling Agent Present: Yes ☐ No ☐ Type:

Temperature Upon Receipt (°C) 7,8,10

LAB LIMS #: Sep 15268 AK

REPORT INFORMATION

Company: DM WILLS

Contact: RALF BOLVIN

Address: 150 JAMESON DR
PETERBOROUGH, ON

Phone: 705-868-1691

Fax:

Email: rbolvin@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)

Company:

Contact:

Address:

Phone:

Email: accounts@dmwills.com

Quotation #:

P.O. #: 11056

Project #: 11056

Site Location/ID:

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

Regulation 153/04:

☐ Table 1 ☐ Res/Park Soil Texture:

☐ Table 2 ☐ Ind/Com ☐ Coarse

☐ Table 3 ☐ Agri/Other ☐ Medium

☐ Table ______ ☐ Fine

Other Regulations:

☐ Reg 347/558 (3 Day min TAT)

☐ PWQO ☐ MMER

☐ CCME ☑ Other: ODWS

☐ MISA

Sewer By-Law:

☐ Sanitary

☐ Storm

Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☑ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)							TCLP	COMMENTS:
						Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN,Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd,Cr,Co,Cu,Pb,Mo,Ni, Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs Total ☐ Aroclor ☐	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other	NITRATES					Sewer Use: Specify pkg:	Water Characterization Pkg General ☐ Extended ☐	Specify TCLP tests ☐M&I ☐VOC ☐PCB ☐B(a)P ☐ABN ☐Ignit.	
1	BH110-22	Sept 27/24	AM	2	GW													X								
2	BH107-22																	X								
3	A377799																	X								
4	A377796																	X								
5	DUP-01		↓															X								
6	BH101-22		PM															X								
7	A377795	↓	PM	↓	↓													X								
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 09 27 24 (mm/dd/yy) Pink Copy - Client

Relinquished by (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 09 27 24 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.2
Date of Issue: 09 Sept, 2019

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

FINAL REPORT

CA14459-SEP24 R1

11056

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

First Page

CLIENT DETAILS

Client	D.M. Wills -Peterborough
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada
Contact	Ralf Bolvin
Telephone	705-868-1691
Facsimile	705-741-3568
Email	rbolvin@dmwills.com
Project	11056
Order Number	
Samples	Ground Water (2)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA14459-SEP24
Received	09/11/2024
Approved	09/18/2024
Report Number	CA14459-SEP24 R1
Date Reported	09/18/2024

COMMENTS

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.

Temperature of Sample upon Receipt: 10 degrees C
Cooling Agent Present: yes
Custody Seal Present: no

Chain of Custody Number:039486

SIGNATORIES

Brad Moore Hon. B.Sc

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FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395881_1 hr	A395881_6 hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	11/09/2024	11/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
General Chemistry						
UV Transmittance	%T				91.2	91.2
Alkalinity	mg/L as CaCO3	2	500		169	170
Bicarbonate	mg/L as CaCO3	2			169	170
Carbonate	mg/L as CaCO3	2			< 2	< 2
OH	mg/L as CaCO3	2			< 2	< 2
Colour	TCU	3	5		5	6
Conductivity	uS/cm	2			360	359
Total Suspended Solids	mg/L	2			4	2
Turbidity	NTU	0.10	5	1	2.0	1.4
Organic Nitrogen	mg/L	0.05	0.15		< 0.05	< 0.05
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			0.17	0.19
Ammonia+Ammonium (N)	as N mg/L	0.04			0.18	0.18
Dissolved Organic Carbon	mg/L	1	5		1	1
Total Organic Carbon	mg/L	1			1	1

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395881_1 hr	A395881_6 hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	11/09/2024	11/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics						
Fluoride	mg/L	0.06		1.5	0.11	0.12
Bromide	mg/L	0.3			< 0.3	< 0.3
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	< 0.06	< 0.06
Sulphate	mg/L	2	500		22	22
Sulphide	mg/L	0.02			< 0.02	< 0.02
Hardness	mg/L as CaCO3	0.05	100		187	191
Aluminum (total)	mg/L	0.001	0.1		0.001	< 0.001
Arsenic (total)	mg/L	0.0002		0.01	0.0003	0.0002
Boron (total)	mg/L	0.002		5	0.011	0.009
Barium (total)	mg/L	0.00008		1	0.150	0.151
Beryllium (total)	mg/L	0.000007			< 0.000007	< 0.000007
Bismuth (total)	mg/L	0.00001			< 0.00001	< 0.00001
Cobalt (total)	mg/L	0.000004			0.000012	0.000008
Calcium (total)	mg/L	0.01			49.9	51.2
Cadmium (total)	mg/L	0.000003		0.005	< 0.000003	< 0.000003
Copper (total)	mg/L	0.001	1		< 0.001	< 0.001
Chromium (total)	mg/L	0.00008		0.05	0.00010	< 0.00008
Iron (total)	mg/L	0.007	0.3		0.438	0.398
Potassium (total)	mg/L	0.009			0.818	0.824
Magnesium (total)	mg/L	0.001			15.2	15.2
Manganese (total)	mg/L	0.00001	0.05		0.00981	0.00946

FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395881_1 hr	A395881_6 hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	11/09/2024	11/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Molybdenum (total)	mg/L	0.0004			< 0.0004	< 0.0004
Nickel (total)	mg/L	0.0001			< 0.0001	< 0.0001
Sodium (total)	mg/L	0.01	200	20	3.82	3.59
Phosphorus (total)	mg/L	0.003			0.008	0.011
Lead (total)	mg/L	0.00009		0.01	0.00013	< 0.00009
Silicon (total)	mg/L	0.02			11.5	10.9
Silver (total)	mg/L	0.00005			< 0.00005	< 0.00005
Strontium (total)	mg/L	0.00008			0.353	0.354
Thallium (total)	mg/L	0.000005			< 0.000005	< 0.000005
Tin (total)	mg/L	0.00006			< 0.00006	< 0.00006
Titanium (total)	mg/L	0.0001			< 0.0001	< 0.0001
Antimony (total)	mg/L	0.0009		0.006	< 0.0009	< 0.0009
Selenium (total)	mg/L	0.00004		0.05	< 0.00004	< 0.00004
Uranium (total)	mg/L	0.000002		0.02	0.000012	0.000014
Vanadium (total)	mg/L	0.00001			0.00003	0.00003
Zinc (total)	mg/L	0.002	5		< 0.002	< 0.002
Cation sum	meq/L	-9999			3.97	4.03
Anion Sum	meq/L	-9999			3.86	3.89
Anion-Cation Balance	% difference	-9999			1.46	1.72
Ion Ratio	none	-9999			1.03	1.03
Total Dissolved Solids (calculated)	mg/L	-9999			194	196
Conductivity (calculated)	uS/cm	-9999			391	396

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395881_1 hr	A395881_6 hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	11/09/2024	11/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Langeliers Index 4° C	@ 4° C	-9999			-0.11	-0.25
Saturation pH 4°C	pHs @ 4°C	-9999			8.01	8.00
Microbiology						
Total Coliform	cfu/100mL	0		0	1	1
E. Coli	cfu/100mL	0		0	0	0
Heterotrophic Plate Count (HPC)	cfu/1mL	0			2	6
Other (ORP)						
pH	No unit	0.05	8.5		7.90	7.75
Chloride	mg/L	1	250		< 1	< 1
Mercury (total)	mg/L	0.00001			< 0.00001	< 0.00001
Phenols						
4AAP-Phenolics	mg/L	0.002			0.002	< 0.002

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
A395881_1 hr					
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	1		0
Turbidity	SM 2130	NTU	2.0		1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	187	100	
Iron	SM 3030/EPA 200.8	mg/L	0.438	0.3	
A395881_6 hr					
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	1		0
Colour	SM 2120	TCU	6	5	
Turbidity	SM 2130	NTU	1.4		1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	191	100	
Iron	SM 3030/EPA 200.8	mg/L	0.398	0.3	

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0237-SEP24	mg/L as CaCO3	2	< 2	0	20	104	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0117-SEP24	mg/L	0.04	<0.04	2	10	98	90	110	101	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO8015-SEP24	mg/L	1	<1	ND	20	98	80	120	99	75	125
Sulphate	DIO8015-SEP24	mg/L	2	<2	ND	20	106	80	120	102	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bromide	DIO0243-SEP24	mg/L	0.3	<0.3	ND	20	93	90	110	76	75	125
Nitrite (as N)	DIO0243-SEP24	mg/L	0.03	<0.03	6	20	96	90	110	93	75	125
Nitrate (as N)	DIO0243-SEP24	mg/L	0.06	<0.06	0	20	97	90	110	NV	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Dissolved Organic Carbon	SKA0116-SEP24	mg/L	1	<1	7	20	98	90	110	99	75	125
Total Organic Carbon	SKA0116-SEP24	mg/L	1	<1	7	20	98	90	110	99	75	125

Carbonate/Bicarbonate

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Carbonate	EWL0237-SEP24	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0237-SEP24	mg/L as CaCO3	2	< 2	0	10	NA	90	110	NA		
OH	EWL0237-SEP24	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

QC SUMMARY

Colour

Method: SM 2120 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0321-SEP24	TCU	3	< 3	2	10	105	80	120	NA		

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0237-SEP24	uS/cm	2	2	0	20	100	90	110	NA		

Fluoride by Specific Ion Electrode

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0297-SEP24	mg/L	0.06	<0.06	0	10	101	90	110	99	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0020-SEP24	mg/L	0.00001	< 0.00001	ND	20	115	80	120	125	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0139-SEP24	mg/L	0.00005	<0.00005	ND	20	97	90	110	75	70	130
Aluminum (total)	EMS0139-SEP24	mg/L	0.001	<0.001	ND	20	91	90	110	114	70	130
Arsenic (total)	EMS0139-SEP24	mg/L	0.0002	<0.0002	ND	20	101	90	110	100	70	130
Barium (total)	EMS0139-SEP24	mg/L	0.00008	<0.00008	ND	20	101	90	110	104	70	130
Beryllium (total)	EMS0139-SEP24	mg/L	0.000007	<0.000007	ND	20	102	90	110	100	70	130
Boron (total)	EMS0139-SEP24	mg/L	0.002	<0.002	8	20	99	90	110	101	70	130
Bismuth (total)	EMS0139-SEP24	mg/L	0.00001	<0.00001	ND	20	97	90	110	70	70	130
Calcium (total)	EMS0139-SEP24	mg/L	0.01	<0.01	14	20	100	90	110	101	70	130
Cadmium (total)	EMS0139-SEP24	mg/L	0.000003	<0.000003	ND	20	98	90	110	101	70	130
Cobalt (total)	EMS0139-SEP24	mg/L	0.000004	<0.000004	ND	20	102	90	110	99	70	130
Chromium (total)	EMS0139-SEP24	mg/L	0.00008	<0.00008	ND	20	98	90	110	97	70	130
Copper (total)	EMS0139-SEP24	mg/L	0.001	<0.001	ND	20	101	90	110	99	70	130
Iron (total)	EMS0139-SEP24	mg/L	0.007	<0.007	ND	20	103	90	110	100	70	130
Potassium (total)	EMS0139-SEP24	mg/L	0.009	<0.009	6	20	100	90	110	97	70	130
Magnesium (total)	EMS0139-SEP24	mg/L	0.001	<0.001	10	20	99	90	110	96	70	130
Manganese (total)	EMS0139-SEP24	mg/L	0.00001	<0.00001	ND	20	102	90	110	103	70	130
Molybdenum (total)	EMS0139-SEP24	mg/L	0.0004	<0.0004	ND	20	101	90	110	94	70	130
Sodium (total)	EMS0139-SEP24	mg/L	0.01	<0.01	6	20	100	90	110	100	70	130
Nickel (total)	EMS0139-SEP24	mg/L	0.0001	<0.0001	ND	20	100	90	110	102	70	130
Lead (total)	EMS0139-SEP24	mg/L	0.00009	<0.00009	ND	20	100	90	110	99	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	EMS0139-SEP24	mg/L	0.003	<0.003	ND	20	98	90	110	NV	70	130
Antimony (total)	EMS0139-SEP24	mg/L	0.0009	<0.0009	ND	20	107	90	110	125	70	130
Selenium (total)	EMS0139-SEP24	mg/L	0.00004	<0.00004	ND	20	99	90	110	91	70	130
Silicon (total)	EMS0139-SEP24	mg/L	0.02	<0.02	ND	20	103	90	110	NV	70	130
Tin (total)	EMS0139-SEP24	mg/L	0.00006	<0.00006	ND	20	101	90	110	NV	70	130
Strontium (total)	EMS0139-SEP24	mg/L	0.00008	<0.00008	7	20	101	90	110	101	70	130
Titanium (total)	EMS0139-SEP24	mg/L	0.0001	<0.0001	ND	20	99	90	110	NV	70	130
Thallium (total)	EMS0139-SEP24	mg/L	0.000005	<0.000005	ND	20	97	90	110	84	70	130
Uranium (total)	EMS0139-SEP24	mg/L	0.000002	<0.000002	ND	20	99	90	110	101	70	130
Vanadium (total)	EMS0139-SEP24	mg/L	0.00001	<0.00001	ND	20	102	90	110	104	70	130
Zinc (total)	EMS0139-SEP24	mg/L	0.002	<0.002	ND	20	94	90	110	94	70	130

QC SUMMARY

Microbiology

Method: SM 9215A | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Heterotrophic Plate Count (HPC)	BAC9202-SEP24	cfu/1mL	-	ACCEPTED	ACCEPTED							
E. Coli	BAC9202-SEP24	cfu/100mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9202-SEP24	cfu/100mL	-	ACCEPTED	ACCEPTED							

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0237-SEP24	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0112-SEP24	mg/L	0.002	<0.002	ND	10	104	80	120	89	75	125

Sulphide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-008

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0108-SEP24	mg/L	0.02	<0.02	ND	20	96	80	120	NA	75	125

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0246-SEP24	mg/L	2	< 2	0	10	92	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0138-SEP24	mg/L	0.05	<0.05	ND	10	98	90	110	79	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0256-SEP24	NTU	0.10	< 0.10	0	10	100	90	110	NA		

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY

No: 039486

Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Page_____ of_____

Laboratory Information Section - Lab use only

Received By: Siri Romard
Received By (signature):
Received Date: 09 / 11 / 24 (mm/dd/yy)
Received Time: 18 : 00 (hr : min)
Custody Seal Present: Yes ☐ No ☒
Custody Seal Intact: Yes ☐ No ☒
Cooling Agent Present: Yes ☑ No ☐ Type: ICE
Temperature Upon Receipt (°C) 11 , 8 , 10
LAB LIMS #: Sep 14459 AK

REPORT INFORMATION

Company: DM WILLS
Contact: RALF BOLVIN
Address: 150 JAMESON DR.
PETERBOROUGH, ON
Phone: 705-868-1691
Fax:
Email: rbolvin@dmwills.com
+ costic@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email: accounts@dmwills.com

Quotation #:
P.O. #: 11056
Project #: 11056
Site Location/ID:

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table ____ Appx. ____
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☑ ODWS Not Reportable *See note

Sewer By-Law:
☐ Sanitary
☐ Storm
Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)						SPLP	TCLP	COMMENTS:
						Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN, Hg pH,(B(HWS),EC,SAR–soil) (Cl, Na-water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs ☐ Total ☐ Aroclor	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other					Sewer Use: Specify pkg:	Water Characterization Pkg ☐ General ☑ Extended	Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	
1	A395881_1hr	Sept 11/24	~~9:26am~~ 10:26Am	14	GW	N																	X			
2	A395881_6hr	Sept 11/24	3:26PM	14	GW	N																	X			
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 09 / 11 / 24 (mm/dd/yy)
Relinquished by (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 09 / 11 / 24 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.7
Date of Issue: 07 JUNE 2023

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

FINAL REPORT

CA14338-SEP24 R1

11056

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

First Page

CLIENT DETAILS

Client	D.M. Wills -Peterborough
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada
Contact	Ralf Bolvin
Telephone	705-868-1691
Facsimile	705-741-3568
Email	rbolvin@dmwills.com
Project	11056
Order Number	
Samples	Ground Water (2)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA14338-SEP24
Received	09/10/2024
Approved	09/17/2024
Report Number	CA14338-SEP24 R1
Date Reported	09/17/2024

COMMENTS

MAC - Maximum Acceptable Concentration

AO/OG - Aesthetic Objective / Operational Guideline

NR - Not reportable under applicable Provincial drinking water regulations as per client.

Temperature of Sample upon Receipt: 5 degrees C

Cooling Agent Present: Yes

Custody Seal Present: Yes

Chain of Custody Number: 039485

raised RL for tag#8 NO2 due to SM

NH3 > TKN due to sample matrix

SIGNATORIES

Brad Moore Hon. B.Sc

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FINAL REPORT

CA14338-SEP24 R1

Client: D.M. Wills -Peterborough

Project: 11056

Project Manager: Ralf Bolvin

Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395882-1hr	A395882-7hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	09/09/2024	09/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
General Chemistry						
UV Transmittance	%T				60.7	65.2
Alkalinity	mg/L as CaCO3	2	500		324	292
Bicarbonate	mg/L as CaCO3	2			324	292
Carbonate	mg/L as CaCO3	2			< 2	< 2
OH	mg/L as CaCO3	2			< 2	< 2
Colour	TCU	3	5		8	8
Conductivity	uS/cm	2			1960	2280
Total Suspended Solids	mg/L	2			26	21
Turbidity	NTU	0.10	5	1	39	16
Organic Nitrogen	mg/L	0.05	0.15		< 0.05	< 0.05
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			1.43	2.16
Ammonia+Ammonium (N)	as N mg/L	0.04			2.41	2.62
Dissolved Organic Carbon	mg/L	1	5		4	4
Total Organic Carbon	mg/L	1			4	4

FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395882-1hr	A395882-7hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	09/09/2024	09/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics						
Fluoride	mg/L	0.06		1.5	0.37	0.35
Bromide	mg/L	0.3			6.1	7.7
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.3↑
Nitrate (as N)	as N mg/L	0.06		10	< 0.06	< 0.06
Sulphate	mg/L	2	500		< 2	< 2
Sulphide	mg/L	0.02			< 0.02	< 0.02
Hardness	mg/L as CaCO3	0.05	100		422	513
Aluminum (total)	mg/L	0.001	0.1		0.085	0.045
Arsenic (total)	mg/L	0.0002		0.01	0.0003	0.0003
Boron (total)	mg/L	0.002		5	0.250	0.259
Barium (total)	mg/L	0.00008		1	0.573	0.752
Beryllium (total)	mg/L	0.000007			< 0.000007	< 0.000007
Bismuth (total)	mg/L	0.00001			< 0.00001	< 0.00001
Cobalt (total)	mg/L	0.000004			0.000213	0.000130
Calcium (total)	mg/L	0.01			94.7	116
Cadmium (total)	mg/L	0.000003		0.005	0.000003	0.000004
Copper (total)	mg/L	0.001	1		0.003	0.001
Chromium (total)	mg/L	0.00008		0.05	0.00053	0.00047
Iron (total)	mg/L	0.007	0.3		4.31	1.77
Potassium (total)	mg/L	0.009			5.57	6.34
Magnesium (total)	mg/L	0.001			45.1	54.6
Manganese (total)	mg/L	0.00001	0.05		0.0730	0.0447

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395882-1hr	A395882-7hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	09/09/2024	09/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Molybdenum (total)	mg/L	0.0004			0.0049	0.0052
Nickel (total)	mg/L	0.0001			0.0006	0.0004
Sodium (total)	mg/L	0.01	200	20	224	261
Phosphorus (total)	mg/L	0.003			0.054	0.054
Lead (total)	mg/L	0.00009		0.01	0.00050	0.00011
Silicon (total)	mg/L	0.02			5.81	5.96
Silver (total)	mg/L	0.00005			< 0.00005	< 0.00005
Strontium (total)	mg/L	0.00008			4.68	6.02
Thallium (total)	mg/L	0.000005			< 0.000005	< 0.000005
Tin (total)	mg/L	0.00006			0.00015	< 0.00006
Titanium (total)	mg/L	0.0001			0.0054	0.0035
Antimony (total)	mg/L	0.0009		0.006	< 0.0009	< 0.0009
Selenium (total)	mg/L	0.00004		0.05	0.00007	0.00005
Uranium (total)	mg/L	0.000002		0.02	0.000012	0.000007
Vanadium (total)	mg/L	0.00001			0.00027	0.00022
Zinc (total)	mg/L	0.002	5		0.003	< 0.002
Cation sum	meq/L	-9999			18.80	22.17
Anion Sum	meq/L	-9999			19.87	22.26
Anion-Cation Balance	% difference	-9999			-2.76	-0.20
Ion Ratio	none	-9999			0.95	1.00
Total Dissolved Solids (calculated)	mg/L	-9999			1036	1192
Conductivity (calculated)	uS/cm	-9999			1933	2221

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395882-1hr	A395882-7hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	09/09/2024	09/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Langeliers Index 4° C	@ 4° C	-9999			0.48	0.44
Saturation pH 4°C	pHs @ 4°C	-9999			7.52	7.49
Microbiology						
Total Coliform	cfu/100mL	0		0	1	3
E. Coli	cfu/100mL	0		0	1	0
Heterotrophic Plate Count (HPC)	cfu/1mL	0			6900	5200
Other (ORP)						
pH	No unit	0.05	8.5		8.00	7.93
Chloride	mg/L	1	250		470	580
Mercury (total)	mg/L	0.00001			< 0.00001	< 0.00001
Phenols						
4AAP-Phenolics	mg/L	0.002			0.002	0.003

FINAL REPORT

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
A395882-1hr					
E.Coli	OMOE MICROMFDC-E3407A	cfu/100mL	1		0
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	1		0
Colour	SM 2120	TCU	8	5	
Turbidity	SM 2130	NTU	39	5	1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	422	100	
Iron	SM 3030/EPA 200.8	mg/L	4.31	0.3	
Manganese	SM 3030/EPA 200.8	mg/L	0.0730	0.05	
Sodium	SM 3030/EPA 200.8	mg/L	224	200	20
Chloride	US EPA 325.2	mg/L	470	250	
A395882-7hr					
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	3		0
Colour	SM 2120	TCU	8	5	
Turbidity	SM 2130	NTU	16	5	1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	513	100	
Iron	SM 3030/EPA 200.8	mg/L	1.77	0.3	
Sodium	SM 3030/EPA 200.8	mg/L	261	200	20
Chloride	US EPA 325.2	mg/L	580	250	

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0177-SEP24	mg/L as CaCO3	2	< 2	0	20	98	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0090-SEP24	mg/L	0.04	<0.04	1	10	100	90	110	95	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO8007-SEP24	mg/L	1	<1	ND	20	96	80	120	100	75	125
Sulphate	DIO8007-SEP24	mg/L	2	<2	3	20	102	80	120	97	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bromide	DIO0183-SEP24	mg/L	0.3	<0.3	1	20	98	90	110	NV	75	125
Nitrate (as N)	DIO0183-SEP24	mg/L	0.06	<0.06	ND	20	97	90	110	100	75	125
Bromide	DIO0187-SEP24	mg/L	0.3	<0.3	0	20	100	90	110	NV	75	125
Nitrite (as N)	DIO0187-SEP24	mg/L	0.03	<0.03	ND	20	97	90	110	78	75	125
Nitrate (as N)	DIO0187-SEP24	mg/L	0.06	<0.06	ND	20	98	90	110	99	75	125
Nitrite (as N)	DIO0197-SEP24	mg/L	0.03	<0.03	ND	20	97	90	110	99	75	125

FINAL REPORT

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0088-SEP24	mg/L	1	<1	0	20	91	90	110	98	75	125
Total Organic Carbon	SKA0088-SEP24	mg/L	1	<1	0	20	91	90	110	98	75	125

Carbonate/Bicarbonate

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Carbonate	EWL0177-SEP24	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0177-SEP24	mg/L as CaCO3	2	< 2	0	10	NA	90	110	NA		
OH	EWL0177-SEP24	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

FINAL REPORT

QC SUMMARY

Colour

Method: SM 2120 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0321-SEP24	TCU	3	< 3	2	10	105	80	120	NA		

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0177-SEP24	uS/cm	2	< 2	0	20	99	90	110	NA		

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0190-SEP24	mg/L	0.06	<0.06	0	10	100	90	110	96	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0015-SEP24	mg/L	0.00001	< 0.00001	ND	20	86	80	120	129	70	130

FINAL REPORT

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0090-SEP24	mg/L	0.00005	<0.00005	ND	20	101	90	110	89	70	130
Aluminum (total)	EMS0090-SEP24	mg/L	0.001	<0.001	16	20	108	90	110	102	70	130
Arsenic (total)	EMS0090-SEP24	mg/L	0.0002	<0.0002	ND	20	103	90	110	101	70	130
Barium (total)	EMS0090-SEP24	mg/L	0.00008	<0.00008	2	20	103	90	110	97	70	130
Beryllium (total)	EMS0090-SEP24	mg/L	0.000007	<0.000007	ND	20	103	90	110	97	70	130
Boron (total)	EMS0090-SEP24	mg/L	0.002	<0.002	0	20	100	90	110	90	70	130
Bismuth (total)	EMS0090-SEP24	mg/L	0.00001	<0.00001	ND	20	99	90	110	80	70	130
Calcium (total)	EMS0090-SEP24	mg/L	0.01	<0.01	5	20	101	90	110	97	70	130
Cadmium (total)	EMS0090-SEP24	mg/L	0.000003	<0.000003	ND	20	100	90	110	104	70	130
Cobalt (total)	EMS0090-SEP24	mg/L	0.000004	<0.000004	3	20	102	90	110	92	70	130
Chromium (total)	EMS0090-SEP24	mg/L	0.00008	<0.00008	3	20	103	90	110	95	70	130
Copper (total)	EMS0090-SEP24	mg/L	0.001	<0.001	ND	20	103	90	110	91	70	130
Iron (total)	EMS0090-SEP24	mg/L	0.007	<0.007	3	20	107	90	110	75	70	130
Potassium (total)	EMS0090-SEP24	mg/L	0.009	<0.009	4	20	104	90	110	98	70	130
Magnesium (total)	EMS0090-SEP24	mg/L	0.001	<0.001	5	20	105	90	110	97	70	130
Manganese (total)	EMS0090-SEP24	mg/L	0.00001	<0.00001	2	20	106	90	110	96	70	130
Molybdenum (total)	EMS0090-SEP24	mg/L	0.0004	<0.0004	3	20	103	90	110	96	70	130
Sodium (total)	EMS0090-SEP24	mg/L	0.01	<0.01	5	20	105	90	110	99	70	130
Nickel (total)	EMS0090-SEP24	mg/L	0.0001	<0.0001	ND	20	104	90	110	99	70	130
Lead (total)	EMS0090-SEP24	mg/L	0.00009	<0.00009	ND	20	102	90	110	95	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	EMS0090-SEP24	mg/L	0.003	<0.003	ND	20	102	90	110	NV	70	130
Antimony (total)	EMS0090-SEP24	mg/L	0.0009	<0.0009	ND	20	110	90	110	128	70	130
Selenium (total)	EMS0090-SEP24	mg/L	0.00004	<0.00004	ND	20	103	90	110	108	70	130
Silicon (total)	EMS0090-SEP24	mg/L	0.02	<0.02	2	20	100	90	110	NV	70	130
Tin (total)	EMS0090-SEP24	mg/L	0.00006	<0.00006	ND	20	103	90	110	NV	70	130
Strontium (total)	EMS0090-SEP24	mg/L	0.00008	<0.00008	3	20	105	90	110	95	70	130
Titanium (total)	EMS0090-SEP24	mg/L	0.0001	<0.0001	4	20	108	90	110	NV	70	130
Thallium (total)	EMS0090-SEP24	mg/L	0.000005	<0.000005	ND	20	99	90	110	94	70	130
Uranium (total)	EMS0090-SEP24	mg/L	0.000002	<0.000002	ND	20	101	90	110	98	70	130
Vanadium (total)	EMS0090-SEP24	mg/L	0.00001	<0.00001	6	20	103	90	110	104	70	130
Zinc (total)	EMS0090-SEP24	mg/L	0.002	<0.002	ND	20	101	90	110	105	70	130

QC SUMMARY

Microbiology

Method: OMOE MICROMFDC-E3407A | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9135-SEP24	cfu/100mL	-	ACCEPTED	ACCEPTED							
Heterotrophic Plate Count (HPC)	BAC9135-SEP24	cfu/1mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9135-SEP24	cfu/100mL	-	ACCEPTED	ACCEPTED							

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0177-SEP24	No unit	0.05	NA	0		100			NA		

FINAL REPORT

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0097-SEP24	mg/L	0.002	<0.002	4	10	100	80	120	79	75	125

Sulphide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-008

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0093-SEP24	mg/L	0.02	<0.02	ND	20	99	80	120	NA	75	125

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0180-SEP24	mg/L	2	< 2	0	10	96	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0103-SEP24	mg/L	0.05	<0.05	1	10	99	90	110	94	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0188-SEP24	NTU	0.10	< 0.10	0	10	100	90	110	NA		

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY

No: 039485

Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Page____ of____

Laboratory Information Section - Lab use only

Received By: Katelyn Medland

Received By (signature): Km

Received Date: 09 10 24 (mm/dd/yy)

Received Time: 08 25 (hr : min)

Custody Seal Present: Yes ☑ No ☐

Custody Seal Intact: Yes ☑ No ☐

Cooling Agent Present: Yes ☑ No ☐ Type: ice

Temperature Upon Receipt (°C) 3 , 5 , 6

LAB LIMS #: CA 14338 - Sep24

REPORT INFORMATION

Company: DM WILLS

Contact: RALF BOLVIN

Address: 150 JAMESON DRIVE
PETERBOROUGH, ON

Phone: 705-868-1691

Fax:

Email: rbolvin@dmwills.com
Costic@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)

Company:

Contact:

Address:

Phone:

Email: accounts@dmwills.com

Quotation #:

P.O. #: 11056

Project #: 11056

Site Location/ID:

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19

☐ Table 1 ☐ Res/Park Soil Texture:

☐ Table 2 ☐ Ind/Com ☐ Coarse

☐ Table 3 ☐ Agri/Other ☐ Medium/Fine

☐ Table ____ Appx. ____

Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:

☐ Reg 347/558 (3 Day min TAT)

☐ PWQO ☐ MMER

☐ CCME ☐ Other:

☐ MISA

☑ ODWS Not Reportable *See note

Sewer By-Law:

☐ Sanitary

☐ Storm

Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

M & I: Field Filtered (Y/N); Metals & Inorganics incl CrVI, CN,Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water); Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI; ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn

SVOC: PAHs only; SVOCs all incl PAHs, ABNs, CPs

PCB: PCBs ☐ Total ☐ Aroclor

PHC: F1-F4 + BTEX; F1-F4 only no BTEX

VOC: VOCs all incl BTEX; BTEX only

Pest: Pesticides Organochlorine or specify other

Other (please specify): Sewer Use: Specify pkg:; Water Characterization Pkg ☐ General ☑ Extended

SPLP Specify tests: ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN

TCLP Specify tests: ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics	Full Metals Suite	ICP Metals only	PAHs only	SVOCs	PCBs	F1-F4 + BTEX	F1-F4 only	VOCs	BTEX only	Pesticides					Sewer Use	Water Characterization Pkg	SPLP	TCLP	COMMENTS:
1	A395882-1hr	Sept9/24	11:13AM	13	GW	N																	X			
2	A395882-7hr	Sept9/24	5:13PM	13	GW	N																	X			
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 09 09 24 (mm/dd/yy) Pink Copy - Client

Relinquished by (NAME): Ralf BOLVIN Signature: Date: 09 10 24 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.7

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

FINAL REPORT

CA15109-SEP24 R1

11056

Prepared for

D.M. Wills -Peterborough

FINAL REPORT

First Page

CLIENT DETAILS

Client	D.M. Wills -Peterborough
Address	150 Jameson Drive Peterborough, ON K9J 0B9. Canada
Contact	Ralf Bolvin
Telephone	705-868-1691
Facsimile	705-741-3568
Email	rbolvin@dmwills.com
Project	11056
Order Number	
Samples	Ground Water (2)

LABORATORY DETAILS

Project Specialist	Jill Campbell, B.Sc.,GISAS
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	2165
Facsimile	705-652-6365
Email	jill.campbell@sgs.com
SGS Reference	CA15109-SEP24
Received	09/11/2024
Approved	09/17/2024
Report Number	CA15109-SEP24 R1
Date Reported	09/17/2024

COMMENTS

MAC - Maximum Acceptable Concentration

AO/OG - Aesthetic Objective / Operational Guideline

NR - Not reportable under applicable Provincial drinking water regulations as per client.

Temperature of Sample upon Receipt: 6 degrees C

Cooling Agent Present: yes

Custody Seal Present: yes

Chain of Custody Number: 039487

NO2 RL raised due to sample matrix

NH3 > TKN due to sample matrix

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

Jill Campbell

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FINAL REPORT

CA15109-SEP24 R1

Client: D.M. Wills -Peterborough

Project: 11056

Project Manager: Ralf Bolvin

Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395883_1hr	A395883_7hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	10/09/2024	10/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
General Chemistry						
UV Transmittance	%T				44.8	58.3
Alkalinity	mg/L as CaCO3	2	500		273	295
Bicarbonate	mg/L as CaCO3	2			273	295
Carbonate	mg/L as CaCO3	2			< 2	< 2
OH	mg/L as CaCO3	2			< 2	< 2
Colour	TCU	3	5		8	8
Conductivity	uS/cm	2			2190	2430
Total Suspended Solids	mg/L	2			45	13
Turbidity	NTU	0.10	5	1	65	37
Organic Nitrogen	mg/L	0.05	0.15		< 0.05	< 0.05
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			1.62	1.47
Ammonia+Ammonium (N)	as N mg/L	0.04			3.72	3.76
Dissolved Organic Carbon	mg/L	1	5		5	5
Total Organic Carbon	mg/L	1			5	5

FINAL REPORT

Client: D.M. Wills -Peterborough
Project: 11056
Project Manager: Ralf Bolvin
Samplers: Chris Ostic

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395883_1hr	A395883_7hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	10/09/2024	10/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics						
Fluoride	mg/L	0.06		1.5	0.23	0.23
Bromide	mg/L	0.3			7.3	8.1
Nitrite (as N)	as N mg/L	0.03		1	< 0.3↑	< 0.3↑
Nitrate (as N)	as N mg/L	0.06		10	< 0.06	< 0.06
Sulphate	mg/L	2	500		< 2	< 2
Sulphide	mg/L	0.02			< 0.02	< 0.02
Hardness	mg/L as CaCO3	0.05	100		595	642
Aluminum (total)	mg/L	0.001	0.1		0.167	0.059
Arsenic (total)	mg/L	0.0002		0.01	0.0024	0.0016
Boron (total)	mg/L	0.002		5	0.156	0.181
Barium (total)	mg/L	0.00008		1	0.468	0.525
Beryllium (total)	mg/L	0.000007			0.000018	< 0.000007
Bismuth (total)	mg/L	0.00001			< 0.00001	< 0.00001
Cobalt (total)	mg/L	0.000004			0.000295	0.000107
Calcium (total)	mg/L	0.01			144	156
Cadmium (total)	mg/L	0.000003		0.005	0.000016	0.000007
Copper (total)	mg/L	0.001	1		0.002	< 0.001
Chromium (total)	mg/L	0.00008		0.05	0.00059	0.00031
Iron (total)	mg/L	0.007	0.3		8.42	3.88
Potassium (total)	mg/L	0.009			3.83	4.22
Magnesium (total)	mg/L	0.001			57.0	61.6
Manganese (total)	mg/L	0.00001	0.05		0.185	0.132

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395883_1hr	A395883_7hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	10/09/2024	10/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Molybdenum (total)	mg/L	0.0004			0.0039	0.0048
Nickel (total)	mg/L	0.0001			0.0008	0.0002
Sodium (total)	mg/L	0.01	200	20	218	242
Phosphorus (total)	mg/L	0.003			0.155	0.131
Lead (total)	mg/L	0.00009		0.01	0.00433	< 0.00009
Silicon (total)	mg/L	0.02			6.89	6.82
Silver (total)	mg/L	0.00005			< 0.00005	< 0.00005
Strontium (total)	mg/L	0.00008			4.12	4.68
Thallium (total)	mg/L	0.000005			< 0.000005	< 0.000005
Tin (total)	mg/L	0.00006			< 0.00006	< 0.00006
Titanium (total)	mg/L	0.0001			0.0075	0.0074
Antimony (total)	mg/L	0.0009		0.006	< 0.0009	< 0.0009
Selenium (total)	mg/L	0.00004		0.05	0.00005	< 0.00004
Uranium (total)	mg/L	0.000002		0.02	0.000037	0.000005
Vanadium (total)	mg/L	0.00001			0.00046	0.00020
Zinc (total)	mg/L	0.002	5		0.003	< 0.002
Cation sum	meq/L	-9999			22.28	24.03
Anion Sum	meq/L	-9999			21.65	23.74
Anion-Cation Balance	% difference	-9999			1.44	0.59
Ion Ratio	none	-9999			1.03	1.01
Total Dissolved Solids (calculated)	mg/L	-9999			1158	1270
Conductivity (calculated)	uS/cm	-9999			2196	2389

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8
				Sample Name	A395883_1hr	A395883_7hr
				Sample Matrix	Ground Water	Ground Water
				Sample Date	10/09/2024	10/09/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Langeliers Index 4° C	@ 4° C	-9999			0.37	0.37
Saturation pH 4°C	pHs @ 4°C	-9999			7.42	7.36
Microbiology						
Total Coliform	cfu/100mL	0		0	620	17
E. Coli	cfu/100mL	0		0	40	0
Heterotrophic Plate Count (HPC)	cfu/1mL	0			4000	125
Other (ORP)						
pH	No unit	0.05	8.5		7.79	7.73
Chloride	mg/L	1	250		570	630
Mercury (total)	mg/L	0.00001			< 0.00001	< 0.00001
Phenols						
4AAP-Phenolics	mg/L	0.002			0.027	0.016

FINAL REPORT

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
A395883_1hr					
E.Coli	OMOE MICROMFDC-E3407A	cfu/100mL	40		0
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	620		0
Colour	SM 2120	TCU	8	5	
Turbidity	SM 2130	NTU	65	5	1
Aluminum	SM 3030/EPA 200.8	mg/L	0.167	0.1	
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	595	100	
Iron	SM 3030/EPA 200.8	mg/L	8.42	0.3	
Manganese	SM 3030/EPA 200.8	mg/L	0.185	0.05	
Sodium	SM 3030/EPA 200.8	mg/L	218	200	20
Chloride	US EPA 325.2	mg/L	570	250	
A395883_7hr					
Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	17		0
Colour	SM 2120	TCU	8	5	
Turbidity	SM 2130	NTU	37	5	1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	642	100	
Iron	SM 3030/EPA 200.8	mg/L	3.88	0.3	
Manganese	SM 3030/EPA 200.8	mg/L	0.132	0.05	
Sodium	SM 3030/EPA 200.8	mg/L	242	200	20
Chloride	US EPA 325.2	mg/L	630	250	

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0197-SEP24	mg/L as CaCO3	2	< 2	1	20	106	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0106-SEP24	mg/L	0.04	<0.04	3	10	100	90	110	101	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO8008-SEP24	mg/L	1	<1	0	20	98	80	120	82	75	125
Sulphate	DIO8011-SEP24	mg/L	2	<2	ND	20	104	80	120	101	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 I Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bromide	DIO0204-SEP24	mg/L	0.3	<0.3	ND	20	98	90	110	84	75	125
Nitrate (as N)	DIO0204-SEP24	mg/L	0.06	<0.06	ND	20	97	90	110	97	75	125
Bromide	DIO0206-SEP24	mg/L	0.3	<0.3	1	20	98	90	110	NV	75	125
Nitrate (as N)	DIO0206-SEP24	mg/L	0.06	<0.06	ND	20	97	90	110	101	75	125
Nitrite (as N)	DIO0239-SEP24	mg/L	0.03	<0.03	ND	20	97	90	110	102	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0104-SEP24	mg/L	1	<1	1	20	91	90	110	108	75	125
Total Organic Carbon	SKA0104-SEP24	mg/L	1	<1	1	20	91	90	110	108	75	125

Carbonate/Bicarbonate

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Carbonate	EWL0197-SEP24	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0197-SEP24	mg/L as CaCO3	2	< 2	1	10	NA	90	110	NA		
OH	EWL0197-SEP24	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

QC SUMMARY

Colour

Method: SM 2120 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0321-SEP24	TCU	3	< 3	2	10	105	80	120	NA		

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0197-SEP24	uS/cm	2	< 2	0	20	99	90	110	NA		

Fluoride by Specific Ion Electrode

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0215-SEP24	mg/L	0.06	<0.06	2	10	97	90	110	115	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0017-SEP24	mg/L	0.00001	< 0.00001	ND	20	100	80	120	129	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0096-SEP24	mg/L	0.00005	<0.00005	ND	20	95	90	110	71	70	130
Aluminum (total)	EMS0096-SEP24	mg/L	0.001	<0.001	1	20	103	90	110	100	70	130
Arsenic (total)	EMS0096-SEP24	mg/L	0.0002	<0.0002	4	20	98	90	110	92	70	130
Barium (total)	EMS0096-SEP24	mg/L	0.00008	<0.00008	1	20	98	90	110	90	70	130
Beryllium (total)	EMS0096-SEP24	mg/L	0.000007	<0.000007	ND	20	103	90	110	97	70	130
Boron (total)	EMS0096-SEP24	mg/L	0.002	<0.002	4	20	103	90	110	97	70	130
Bismuth (total)	EMS0096-SEP24	mg/L	0.00001	<0.00001	ND	20	96	90	110	76	70	130
Calcium (total)	EMS0096-SEP24	mg/L	0.01	<0.01	1	20	105	90	110	102	70	130
Cadmium (total)	EMS0096-SEP24	mg/L	0.000003	<0.000003	0	20	101	90	110	102	70	130
Cobalt (total)	EMS0096-SEP24	mg/L	0.000004	<0.000004	ND	20	98	90	110	90	70	130
Chromium (total)	EMS0096-SEP24	mg/L	0.00008	<0.00008	ND	20	102	90	110	97	70	130
Copper (total)	EMS0096-SEP24	mg/L	0.001	<0.001	1	20	101	90	110	97	70	130
Iron (total)	EMS0096-SEP24	mg/L	0.007	<0.007	ND	20	108	90	110	100	70	130
Potassium (total)	EMS0096-SEP24	mg/L	0.009	<0.009	0	20	102	90	110	93	70	130
Magnesium (total)	EMS0096-SEP24	mg/L	0.001	<0.001	0	20	106	90	110	100	70	130
Manganese (total)	EMS0096-SEP24	mg/L	0.00001	<0.00001	1	20	100	90	110	92	70	130
Sodium (total)	EMS0096-SEP24	mg/L	0.01	<0.01	0	20	107	90	110	99	70	130
Nickel (total)	EMS0096-SEP24	mg/L	0.0001	<0.0001	3	20	100	90	110	84	70	130
Lead (total)	EMS0096-SEP24	mg/L	0.00009	<0.00009	ND	20	104	90	110	92	70	130
Phosphorus (total)	EMS0096-SEP24	mg/L	0.003	<0.003	ND	20	106	90	110	NV	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Antimony (total)	EMS0096-SEP24	mg/L	0.0009	<0.0009	ND	20	103	90	110	97	70	130
Selenium (total)	EMS0096-SEP24	mg/L	0.00004	<0.00004	5	20	101	90	110	87	70	130
Silicon (total)	EMS0096-SEP24	mg/L	0.02	<0.02	0	20	106	90	110	NV	70	130
Tin (total)	EMS0096-SEP24	mg/L	0.00006	<0.00006	ND	20	108	90	110	NV	70	130
Strontium (total)	EMS0096-SEP24	mg/L	0.00008	<0.00008	2	20	100	90	110	94	70	130
Titanium (total)	EMS0096-SEP24	mg/L	0.0001	<0.0001	ND	20	106	90	110	NV	70	130
Thallium (total)	EMS0096-SEP24	mg/L	0.000005	<0.000005	ND	20	96	90	110	90	70	130
Uranium (total)	EMS0096-SEP24	mg/L	0.000002	<0.000002	3	20	97	90	110	89	70	130
Vanadium (total)	EMS0096-SEP24	mg/L	0.00001	<0.00001	6	20	101	90	110	91	70	130
Zinc (total)	EMS0096-SEP24	mg/L	0.002	<0.002	5	20	100	90	110	90	70	130
Molybdenum (total)	EMS0134-SEP24	mg/L	0.0004	<0.0004	1	20	105	90	110	76	70	130

QC SUMMARY

Microbiology

Method: OMOE MICROMFDC-E3407A | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9170-SEP24	cfu/100mL	-	ACCEPTED	ACCEPTED							
Heterotrophic Plate Count (HPC)	BAC9170-SEP24	cfu/1mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9170-SEP24	cfu/100mL	-	ACCEPTED	ACCEPTED							

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0197-SEP24	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0112-SEP24	mg/L	0.002	<0.002	ND	10	104	80	120	89	75	125
4AAP-Phenolics	SKA0124-SEP24	mg/L	0.002	<0.002	ND	10	106	80	120	100	75	125

Sulphide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-008

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0108-SEP24	mg/L	0.02	<0.02	ND	20	96	80	120	NA	75	125

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0210-SEP24	mg/L	2	< 2	2	10	93	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0103-SEP24	mg/L	0.05	<0.05	1	10	99	90	110	94	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0217-SEP24	NTU	0.10	< 0.10	ND	10	100	90	110	NA		

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.

Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.

"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Request for Laboratory Services and CHAIN OF CUSTODY

No: 039487

Page ____ of ____

Laboratory Information Section - Lab use only

Received By: Siri Romard.
Received By (signature): Siri Romard.
Received Date: 09/10/24 (mm/dd/yy)
Received Time: 18:25 (hr : min)
Custody Seal Present: Yes ☐ No ☒
Custody Seal Intact: Yes ☐ No ☒
Cooling Agent Present: Yes ☒ No ☐ Type: ICE
Temperature Upon Receipt (°C) 8, 6, 5
LAB LIMS #: Sep 15109. MC

REPORT INFORMATION

Company: DM WILLS
Contact: RALF BOLVIN
Address: 150 JAMESON DRIVE, PETERBOROUGH, ON
Phone: 705-868-1691
Fax:
Email: rbolvin@dmwills.com + costic@dmwills.com

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email: accounts@dmwills.com

Quotation #:
P.O. #: 11056
Project #: 11056
Site Location/ID:

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table ____ Appx. ____
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☑ ODWS Not Reportable *See note

Sewer By-Law:
☐ Sanitary
☐ Storm
Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

						M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)						SPLP	TCLP	
	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN,Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs Total ☐ Aroclor ☐	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other					Sewer Use: Specify pkg:	Water Characterization Pkg General ☐ Extended ☑	Specify tests ☐Metals ☐VOC ☐1,4-Dioxane ☐OCP ☐ABN	Specify tests ☐M&I ☐VOC ☐PCB ☐B(a)P ☐ABN ☐Ignit.	COMMENTS:
1	A395883_1hr	Sept 10/24	10:22AM	14	GW	N																	X			
2	A395883_7hr	Sept 10/24	4:22PM	14	GW	N																	X			
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 09/10/24 (mm/dd/yy)
Relinquished by (NAME): CHRIS OSTIC Signature: Chris Ostic Date: 09/10/24 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.7
Date of Issue: 07 JUNE 2023

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Appendix I

Water Balance

🟦 DEVELOPED CATCHMENT DIRECTED TO INFILTRATION FACILITY

🟨 DEVELOPED CATCHMENT NOT DIRECTED TO INFILTRATION FACILITY

🟩 UNDISTURBED CATCHMENT

LEGEND

▬	DRAINAGE BOUNDARY
0.25 1 | 90	DRAINAGE AREA ID/RUN-OFF COEFFICIENT
⇨	OVERLAND FLOW DIRECTION

NOTE: THIS PLAN IS FOR STORM DRAINAGE AREAS ONLY

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION OBTAINED FROM TOPOGRAPHIC BASE PLAN OF 5868 COUNTY ROAD 65 MUNICIPALITY OF PORT HOPE BY IBW SURVEYORS DATED JULY 22, 2022

PRELIMINARY
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY
3.	07 24/2024	REVISED AS PER 3RD SUB COMMENTS	CJ
2.	01 03/2024	REVISED AS PER UPDATED LOT LAYOUT	MH
1.	10 11/2023	REVISED AS PER 1ST SUBMISSION COMMENTS	MH

REVISIONS

5868 COUNTY 65 ROAD, PORT HOPE

POST–DEVELOPMENT STORM DRAINAGE PLAN

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6

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SCALE: 1:1000
DRAWN BY: M.J.H.
DESIGN BY: M.J.H.
CHECKED BY: D.D.M.
DATE: JAN 2023

PROJECT NO. 122049
DRAWING NO. SD–2

X:\STAFF\JOB FILES\122000\122049 5868 COUNTY RD 65\122049 DRAWINGS\122049 DRAWINGS CIVIL\122049 ENGINEERING DRAWINGS\122049-3D-SITE PLAN-1000.DWG

Monthly Water Budget Calculations

Sheet 1 of 4

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

CANADIAN CLIMATE NORMALS FOR 'OSHAWA WPCP (4996)' (1981-2010)

Climate ID = 6155878
Latitude = 43.87
Longitude = -78.83

Thornthwaite (1948) Inputs				Monthly Water Budget Analysis				
Month	Mean Temperature (°C)[1]	Total Precipitation (mm)[1]	Heat Index	PET (mm)	Daylight Correction Factor	Adjusted PET (mm)	Surplus (mm)	Deficit (mm)
January	-4.8	65.6	0.00	0.0	0.78	0.0	65.6	0.0
February	-3.6	56.6	0.00	0.0	0.88	0.0	56.6	0.0
March	0.4	54.2	0.02	1.4	1.00	1.4	52.8	0.0
April	6.6	72.7	1.52	29.3	1.12	32.9	43.4	0.0
May	12.3	78.9	3.91	60.1	1.23	73.9	18.8	0.0
June	17.6	73.9	6.72	86.2	1.28	110.7	0.0	36.8
July	20.6	73.1	8.53	106.0	1.26	133.1	0.0	60.0
August	20.0	77.4	8.16	102.6	1.16	119.1	0.0	41.7
September	15.9	94.0	5.76	77.1	1.04	80.3	16.9	0.0
October	9.5	70.1	2.64	45.2	0.92	41.4	24.9	0.0
November	4.2	84.8	0.77	17.8	0.80	14.4	67.0	0.0
December	-1.2	70.7	0.00	0.0	0.75	0.0	70.7	0.0
Totals		**872.0**	38.03			**607.3**	**416.6**	**138.6**
Thornthwaite Coefficient (α)			**1.100**	Total Water Surplus (mm)				**264.7**

Notes:

1. Temperature and Precipitation are taken from Canadian Climate Normals 1981-2010
2. Water budget adjusted for latitude and length of daylight
3. Potential Evapotranspiration (PET) is calculated based on the Thornthwaite 1948 equation
4. Total Water Surplus (Thornthwaite, 1948) is calculated as total precipitation minus adjusted evapotranspiration

Water Balance Calculations for Existing Conditions

Sheet 2 of 4

WILLS

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Catchment Parameters	EX-1	EX-2									**Total**
Drainage Area (m^2)	108400	138700									**247100**
Pervious Area (m^2)	108400	138700									**247100**
Impervious Area (m^2)	0	0									**0**
Evapotranspiration Factors											
Pervious PET Ratio	0.70	0.70									**0.70**
Impervious Evapotranspiration[3]	0.20	0.20									**0.00**
Infiltration Factors											
Topography Infiltration Factor	0.30	0.25									**0.27**
Soil Infiltration Factor	0.40	0.40									**0.40**
Land Cover Infiltration Factor	0.14	0.12									**0.13**
MOE Infiltration Factor	0.84	0.77									**0.80**
Actual Infiltration Factor	0.84	0.77									**0.80**
Run-Off Coefficient	0.16	0.23									**0.20**
Runoff from Impervious Surfaces	0.80	0.80									
Inputs (mm/yr)											
Precipitation	872.0	872.0									**872.0**
Run-On	0.0	0.0									**0.0**
Other Inputs	0.0	0.0									**0.0**
Total Inputs	872.0	872.0									**872.0**
Outputs (mm/yr)											
Precipitation Surplus	264.7	264.7									**264.7**
Net Surplus	264.7	264.7									**264.7**
Evapotranspiration	607.3	607.3									**607.3**
Infiltration	223.5	204.3									**212.7**
Infiltration Features[4]	0.0	0.0									**0.0**
Total Infiltration	**223.5**	**204.3**									**212.7**
Runoff Pervious Areas	41.2	60.5									**52.0**
Runoff Impervious Areas	0.0	0.0									**0.0**
Total Unadjusted Runoff	41.2	60.5									**52.0**
Total Adjusted Runoff[5]	**41.2**	**60.5**									**52.0**
Total Outputs	**872.0**	**872.0**									**872.0**
Inputs (m^3/yr)											
Precipitation	94,525	120,946									**215,471**
Run-On	0	0									**0**
Other Inputs	0	0									**0**
Total Inputs	**94,525**	**120,946**									**215,471**
Outputs (m^3/yr)											
Precipitation Surplus	28,697	36,718									**65,415**
Net Surplus	28,697	36,718									**65,415**
Evapotranspiration	65,828	84,228									**150,056**
Infiltration	24,228	28,333									**52,561**
Infiltration Features[4]	0	0									**0**
Total Infiltration	24,228	28,333									**52,561**
Runoff Pervious Areas	4,469	8,385									**12,854**
Runoff Impervious Areas	0	0									**0**
Total Unadjusted Runoff	4,469	8,385									**12,854**
Total Adjusted Runoff[5]	4,469	8,385									**12,854**
Total Outputs	**94,525**	**120,946**									**215,471**

Notes:

1. Water Balance Calculations area in based on methodology described in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013)
2. Annual Precipitation and Evapotranspiration values were determined using the Thornthwaite (1948) method for monthly water budget calculations
3. Evaporation from impervious areas was assumed to be 0% of Precipitation
4. Infiltration Features are calculated using daily Precipitation data and averaged over the number of years of available data. The entire Catchment is assumed to contribute with no infiltration occuring during months with a negative average temperature.
5. Total Adjusted Runoff is calculated as (Pervious Runoff + Impervious Runoff) - (Infiltration Features)

Water Balance Calculations for Proposed Conditions (38 Lots)

WILLS

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Catchment Parameters	PR-3A	PR-3B	PR-4	PR-5A	PR-5B	PR-9A	PR-9B	PR-9C	PR-9D	PR-11A	PR-11B	PR-12		**Total**
Drainage Area (m^2)	10100	4400	26100	39200	20500	10525	20700	4775	3800	81000	15100	10900		**247100**
Pervious Area (m^2)	8100	4100	24900	39200	20500	7800	16560	3600	3800	81000	15100	10900		**235560**
Impervious Area (m^2)	2000	300.0	1200	0	0	2725	4140	1175	0	0	0	0		**11540**
Evapotranspiration Factors														
Pervious PET Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70		**0.70**
Impervious Evapotranspiration[3]	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20		**0.20**
Infiltration Factors														
Topography Infiltration Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		**0.25**
Soil Infiltration Factor	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		**0.40**
Land Cover Infiltration Factor	0.10	0.10	0.10	0.18	0.10	0.10	0.10	0.10	0.10	0.16	0.10	0.10		**0.13**
MOE Infiltration Factor	0.75	0.75	0.75	0.83	0.75	0.75	0.75	0.75	0.75	0.81	0.75	0.75		**0.78**
Actual Infiltration Factor	0.75	0.75	0.75	0.83	0.75	0.75	0.75	0.75	0.75	0.81	0.75	0.75		**0.78**
Run-Off Coefficient	0.25	0.25	0.25	0.17	0.25	0.25	0.25	0.25	0.25	0.19	0.25	0.25		**0.22**
Runoff from Impervious Surfaces	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80		**0.80**
Inputs (mm/yr)														
Precipitation	872.0	872.0	872.0	872.0	872.0	872.0	872.0	872.0	872.0	872.0	872.0	872.0		**872.0**
Run-On	0.0	0.0	0.0	0.0	0.0	0.0	51.0	0.0	0.0	0.0	0.0	0.0		**4.3**
Other Inputs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		**0.0**
Total Inputs	872.0	872.0	872.0	872.0	872.0	872.0	923.0	872.0	872.0	872.0	872.0	872.0		**876.3**
Outputs (mm/yr)														
Precipitation Surplus	350.4	294.2	284.6	264.7	264.7	376.8	351.3	371.2	264.7	264.7	264.7	264.7		**284.9**
Net Surplus	350.4	294.2	284.6	264.7	264.7	376.8	371.9	371.2	264.7	264.7	264.7	264.7		**286.7**
Evapotranspiration	521.6	577.8	587.4	607.3	607.3	495.2	551.1	500.8	607.3	607.3	607.3	607.3		**589.6**
Infiltration	159.2	185.0	189.4	218.8	198.5	147.1	168.1	149.7	198.5	214.2	198.5	198.5		**198.4**
Infiltration Features[4]	191.2	0.0	0.0	0.0	0.0	177.8	178.9	210.5	0.0	0.0	0.0	0.0		**34.4**
Total Infiltration	**350.4**	**185.0**	**189.4**	**218.8**	**198.5**	**325.0**	**347.0**	**360.2**	**198.5**	**214.2**	**198.5**	**198.5**		**232.9**
Runoff Pervious Areas	66.2	66.2	66.2	45.9	66.2	66.2	66.2	66.2	66.2	50.5	66.2	66.2		**57.4**
Runoff Impervious Areas	697.6	697.6	697.6	0.0	0.0	697.6	697.6	697.6	0.0	0.0	0.0	0.0		**697.6**
Total Unadjusted Runoff	191.2	109.2	95.2	45.9	66.2	229.7	192.5	221.6	66.2	50.5	66.2	66.2		**87.3**
Total Adjusted Runoff[5]	0.0	109.2	95.2	45.9	66.2	51.9	13.6	11.1	66.2	50.5	66.2	66.2		**52.9**
Total Outputs	**872.0**	**872.0**	**872.0**	**872.0**	**872.0**	**872.0**	**911.7**	**872.0**	**872.0**	**872.0**	**872.0**	**872.0**		875.3
Inputs (m^3/yr)														
Precipitation	8,807	3,837	22,759	34,182	17,876	9,178	18,050	4,164	3,314	70,632	13,167	9,505		**215,471**
Run-On	0	0	0	0	0	0	1,056	0	0	0	0	0		**1,056**
Other Inputs	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Total Inputs	**8,807**	**3,837**	**22,759**	**34,182**	**17,876**	**9,178**	**19,106**	**4,164**	**3,314**	**70,632**	**13,167**	**9,505**		216,527
Outputs (m^3/yr)														
Precipitation Surplus	3,540	1,295	7,429	10,377	5,427	3,966	7,272	1,773	1,006	21,443	3,997	2,886		**70,410**
Net Surplus	3,540	1,295	7,429	10,377	5,427	3,966	7,697	1,773	1,006	21,443	3,997	2,886		**70,835**
Evapotranspiration	5,268	2,542	15,330	23,805	12,449	5,212	11,409	2,391	2,308	49,189	9,170	6,619		**145,692**
Infiltration	1,608	814	4,944	8,577	4,070	1,549	3,480	715	754	17,353	2,998	2,164		**49,027**
Infiltration Features[4]	1,931	0	0	0	0	1,871	3,703	1,005	0	0	0	0		**8,511**
Total Infiltration	3,540	814	4,944	8,577	4,070	3,420	7,184	1,720	754	17,353	2,998	2,164		**57,538**
Runoff Pervious Areas	536	271	1,648	1,800	1,357	516	1,096	238	251	4,090	999	721		**13,525**
Runoff Impervious Areas	1,395	209	837	0	0	1,901	2,888	820	0	0	0	0		**8,050**
Total Unadjusted Runoff	1,931	481	2,485	1,800	1,357	2,417	3,984	1,058	251	4,090	999	721		**21,575**
Total Adjusted Runoff[5]	0	481	2,485	1,800	1,357	546	281	53	251	4,090	999	721		**13,064**
Total Outputs	**8,807**	**3,837**	**22,759**	**34,182**	**17,876**	**9,178**	**18,873**	**4,164**	**3,314**	**70,632**	**13,167**	**9,505**		216,294

Notes:

1. Water Balance Calculations area in based on methodology described in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013)
2. Annual Precipitation and Evapotranspiration values were determined using the Thornthwaite (1948) method for monthly water budget calculations
3. Evaporation from impervious areas was assumed to be 20% of Precipitation
4. Infiltration Features are calculated using daily Precipitation data and averaged over the number of years of available data. The entire Catchment is assumed to contribute with no infiltration occuring during months with a negative average temperature.
5. Total Adjusted Runoff is calculated as (Pervious Runoff + Impervious Runoff) - (Infiltration Features)

Water Balance Assessment (38 Lots)

Sheet 4 of 4

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Characteristic	Existing	Proposed No Mitigation	Change	Proposed With Mitigation	Change
Inputs (m^3/yr)					
Precipitation	215,471	215,471	0.0%	215,471	0.0%
Run-On	0	1,056	0.0%	1,056	0.0%
Other Inputs	0	0	0.0%	0	0.0%
Total Inputs	215,471	216,527	0.5%	216,527	0.5%
Outputs (m^3/yr)					
Precipitation Surplus	65,415	70,410	7.6%	70,410	7.6%
Net Surplus	65,415	70,835	8.3%	70,835	8.3%
Evapotranspiration	150,056	145,692	-2.9%	145,692	-2.9%
Infiltration	52,561	49,027	-6.7%	49,027	-6.7%
Infiltration Features	0	0	0.0%	8,511	0.0%
Total Infiltration	**52,561**	**49,027**	**-6.7%**	**57,538**	**9.5%**
Runoff Pervious Areas	12,854	13,525	5.2%	13,525	5.2%
Runoff Impervious Areas	0	8,050	0.0%	8,050	0.0%
Total Runoff	**12,854**	**21,575**	**67.8%**	**13,064**	**1.6%**
Total Outputs	215,471	216,294	0.4%	216,294	0.4%

Nitrate Dilution Calculations

Total Dilution Area	24.71	ha
No. of Lots	38	
Sewage Flow per Lot	1000	L/day
Total Daily Sewage Loading	38,000	L/day
Nitrate in Septic Effluent	40	mg/L
Background Nitrates	2.86	mg/L
Stormwater Effluent Nitrates	0	mg/L
Infiltration Rates		
Infiltration Rate (Clean Water)	185.0	mm/year
Infiltration Rate (Clean Water)	134,321	L/day
Infiltration Rate (Stormwater)	34.4	mm/year
Infiltration Rate (Stormwater)	23,318	L/day
Nitrate Concentrations		
Nitrate Loading - Development	1,520,000	mg/day
Nitrate Loading - Rainfall	384,157	mg/day
Nitrate Loading - Runoff	0	mg/day
Total Nitrate Loading	1,904,157	mg/day
Dilution - Development	38,000	L/day
Dilution - Groundwater Recharge	157,639	L/day
Total Dilution	195,639	L/day
Boundary Nitrate Concentration	**9.73**	**mg/L**

Infiltration Factor Calculations for EX-1

Sheet 1 of 1

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	0.48% Flat Land
Topography Infiltration Factor	**0.30**

Soils		
Hydrologic Soil Group[2]	A	Total
Soil Type	Brighton Sand	
Area (ha)	10.84	10.84
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture	6.04	0.10
Range		
Grass		
Woods		
Wetland	4.80	0.20
Bare Earth (>70% Rock)		
Impervious		
Total[3]	10.84	**0.14**

MOE Infiltration Factor	**0.84**
Actual Infiltration Factor	**0.84**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for EX-2	Sheet 1 of 1

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	2.22% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2] Soil Type	A Brighton Sand	Total
Area (ha)	13.87	13.87
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture	10.87	0.10
Range		
Grass		
Woods	3.00	0.20
Wetland		
Bare Earth (>70% Rock)		
Impervious		
Total[3]	13.87	**0.12**

MOE Infiltration Factor	**0.77**
Actual Infiltration Factor	**0.77**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-3A

Sheet 1 of 2

WILLS

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	2.00% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2] Soil Type	A Brighton Sand	Total
Area (ha)	1.01	1.01
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range		
Grass	0.81	0.10
Woods		
Wetland		
Bare Earth (>70% Rock)		
Impervious	0.20	
Total[3]	0.81	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Features for PR-3A

Sheet 2 of 2

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Infiltration Features Summary		
Total Storage Volume[1]	84.2	m^3
Contributing Area[2]	10100	m^2
Pervious Area	8100	m^2
Impervious Area	2000	m^2
Maximum Drawdown	24	hrs
Average Infiltration Volume[3]	**1957**	**m^3/yr**
	193.7	**mm/yr**

Notes:

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'OSHAWA WPCP' from 1981-2006

Infiltration Factor Calculations for PR-3B

Sheet 1 of 1

WILLS

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	0.99% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2]	A	Total
Soil Type	Brighton Sand	
Area (ha)	0.44	0.44
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range		
Grass	0.41	0.10
Woods		
Wetland		
Bare Earth (>70% Rock)		
Impervious	0.03	
Total[3]	0.41	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-4

Sheet 1 of 1

WILLS

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	1.55% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2] Soil Type	A Brighton Sand	Total
Area (ha)	2.61	2.61
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range		
Grass	2.49	0.10
Woods		
Wetland		
Bare Earth (>70% Rock)		
Impervious	0.12	
Total[3]	2.49	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-5A

Sheet 1 of 1

WILLS

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	0.70% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2] Soil Type	A Brighton Sand	Total
Area (ha)	3.92	3.92
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range	0.92	0.10
Grass		
Woods	3.00	0.20
Wetland		
Bare Earth (>70% Rock)		
Impervious		
Total[3]	3.92	**0.18**

MOE Infiltration Factor	**0.83**
Actual Infiltration Factor	**0.83**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-5B	Sheet 1 of 1

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	1.00% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2]	A	Total
Soil Type	Brighton Sand	
Area (ha)	2.05	2.05
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture Range Grass Woods Wetland Bare Earth (>70% Rock) Impervious	2.05	0.10
Total[3]	2.05	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-9A

Sheet 1 of 2

WILLS

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope	2.00%
Slope Description	Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2]	A	Total
Soil Type	Brighton Sand	
Area (ha)	1.05	1.05
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range		
Grass	0.78	0.10
Woods		
Wetland		
Bare Earth (>70% Rock)		
Impervious	0.27	
Total[3]	0.78	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Features for PR-9A

Sheet 2 of 2

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Infiltration Features Summary		
Total Storage Volume[1]	48.2	m^3
Contributing Area[2]	10525	m^2
Pervious Area	7800	m^2
Impervious Area	2725	m^2
Maximum Drawdown	24	hrs
Average Infiltration Volume[3]	**1871**	**m^3/yr**
	177.8	**mm/yr**

Notes:

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'OSHAWA WPCP' from 1981-2006

Infiltration Factor Calculations for PR-9B

Sheet 1 of 2

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	2.00% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils			
Hydrologic Soil Group[2]	A	A	Total
Soil Type	Brighton Sand	Brighton Sand	
Area (ha)	1.52	0.55	2.07
Soil Infiltration Factor	0.40	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range		
Grass	1.66	0.10
Woods		
Wetland		
Bare Earth (>70% Rock)		
Impervious	0.41	
Total[3]	1.66	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Features for PR-9B

Sheet 2 of 2

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Infiltration Features Summary		
Total Storage Volume[1]	120.4	m^3
Contributing Area[2]	20700	m^2
Pervious Area	16560	m^2
Impervious Area	4140	m^2
Maximum Drawdown	24	hrs
Average Infiltration Volume[3]	**3703**	**m^3/yr**
	178.9	**mm/yr**

Notes:

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'OSHAWA WPCP' from 1981-2006

Infiltration Factor Calculations for PR-9C	Sheet 1 of 2

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	2.00% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2] Soil Type	A Brighton Sand	Total
Area (ha)	0.48	0.48
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range		
Grass	0.36	0.10
Woods		
Wetland		
Bare Earth (>70% Rock)		
Impervious	0.12	
Total[3]	0.36	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Features for PR-9C

Sheet 2 of 2

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Infiltration Features Summary		
Total Storage Volume[1]	40.8	m^3
Contributing Area[2]	4775	m^2
Pervious Area	3600	m^2
Impervious Area	1175	m^2
Maximum Drawdown	24	hrs
Average Infiltration Volume[3]	**1005**	**m^3/yr**
	210.5	**mm/yr**

Notes:

1. Total Storage Volume from all Infiltration Features in the catchment

2. The entire catchment contributes flow to the Infiltration Features

3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.

4. Daily climate data is taken from Environment Canada Station 'OSHAWA WPCP' from 1981-2006

Infiltration Factor Calculations for PR-9D

Sheet 1 of 1

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	2.00% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2] Soil Type	A Brighton Sand	Total
Area (ha)	0.38	0.38
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture Range Grass Woods Wetland Bare Earth (>70% Rock) Impervious	0.38	0.10
Total[3]	0.38	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-11A

Sheet 1 of 1

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	0.77% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2] Soil Type	A Brighton Sand	Total
Area (ha)	8.10	8.10
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture	3.30	0.10
Range		
Grass		
Woods		
Wetland	4.80	0.20
Bare Earth (>70% Rock)		
Impervious		
Total[3]	8.10	**0.16**

MOE Infiltration Factor	**0.81**
Actual Infiltration Factor	**0.81**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-11B

Sheet 1 of 1

WILLS

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope	0.87%
Slope Description	Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2]	A	Total
Soil Type	Brighton Sand	
Area (ha)	1.51	1.51
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range		
Grass	1.51	0.10
Woods		
Wetland		
Bare Earth (>70% Rock)		
Impervious		
Total[3]	1.51	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-12

Sheet 1 of 1

Project No: 11056
Project Name: Osaca Whitepine Subdivision
Designed/Checked By: NN / CP
Date: 9-Aug-24

Topography	
Average Slope Slope Description	1.00% Flat/Rolling Land
Topography Infiltration Factor	**0.25**

Soils		
Hydrologic Soil Group[2] Soil Type	A Brighton Sand	Total
Area (ha)	1.09	1.09
Soil Infiltration Factor	0.40	**0.40**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range	1.09	0.10
Grass		
Woods		
Wetland		
Bare Earth (>70% Rock)		
Impervious		
Total[3]	1.09	**0.10**

MOE Infiltration Factor	**0.75**
Actual Infiltration Factor	**0.75**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Appendix J

Mass Balance Equation

Appendix K – D-5-4 Groundwater Impact Assessment: Mass Balance Equation

$$\mathbf{Q_tC_t = Q_eC_e + Q_iC_i}$$

Where Q_t = Total Volume ($Q_e + Q_i$)

Note: As per the requirements of D-5-4, the maximum volume of effluent allowed to be used as dilution water is 1000L/day/lot.

C_t = Total Concetration of nitrate at property boundary

Q_e = volume of septic effluent

C_e = Concentration of nitrate in effluent (40 mg/L)

Q_i = Volume of available dilution water

C_i = Concentration of nitrate in dilution water

In order to determine the concertation of the nitrate at the property boundary (C_t), the mass balance equation is rearranged to the following:

$$\boldsymbol{Ct = \frac{QeCe + QiCi}{Qt}}$$