PROJECT NO. 9550

REPORT TO

3043 SIXTH LINE INC.

ON

HYDROGEOLOGICAL ASSESSMENT

3043 SIXTH LINE, OAKVILLE, ONTARIO

CONDUCTED BY:

S2S Environmental Inc.

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NOVEMBER 13, 2020

EXECUTIVE SUMMARY

S2S Environmental Inc. (S2S) was retained by 3043 Sixth Line Inc. (the Client) to prepare a Hydrogeological Assessment for the multi-tenant residential property located at 3043 Sixth Line, Oakville, Ontario (Subject Property). At the time of the site visit, the Subject Property was occupied by a split-level (single-storey in the northeast portion and two-storey in the remaining portions) multi-tenant residential building with a dug-out basement beneath the kitchen of the building (Subject Building) and had a total area of approximately 310 m^2 (3,337 ft^2). The Subject Property had a reportedly total area of approximately 0.3 hectares (0.8 acres).

The objective of the Hydrogeological Assessment was to characterize hydrogeological conditions at the Subject Property, to estimate potential dewatering requirements during construction and after completion of the proposed development, to identify and assess potential short and long-term impacts of the proposed development on groundwater conditions in the area, and recommend mitigation measures, if there will be potential for impact to occur. The key results of the Hydrogeological Assessment are summarized below:

- The primary hydro-stratigraphic unit on the Subject Property is a fractured shale bedrock;
- Based on the test data collected over a 24-hour aquifer test, the hydraulic conductivity at the Subject Property is 9.94×10^{-8} m/s;
- The design infiltration rate should be 18 mm/hour, provided that the infiltration system is placed at a maximum depth of 0.5 m below ground surface;
- The groundwater quality was compliant with the Halton Region Wastewater By-Law No. 02-03, Section 5 – Storm Sewer Requirements and Table 1 "Limits for Sanitary Sewers and Combined Sewers Discharge" with exception of Total Suspended Solid (1,200 mg/L vs. 350 mg/L);
- The proposed development would encompass the construction of two basement/underground parking levels to a maximum depth of 6.0 m below ground surface (assumed floor elevation of 164.86 m above mean sea level (m asl));
- Seasonally high groundwater elevations at the Subject Property would be approximately 167.15 m asl (m asl), that is in the range of approximately 3.5 m to 4.5 m below the current ground surface;
- Construction dewatering will be in the range of 7,789 L/day to 36,683 L/day. The calculated discharge rates are under 50,000 L/day and will not require registration with the Environmental Activity and Sector Registry (EASR); and
- Long term dewatering for the proposed development will be in the range of 8,149 to 12,223 L/day and will not require a PTTW (volume less than 50,000 L/day).

TABLE OF CONTENTS

Page No.

APPENDICES

1.0 INTRODUCTION

S2S Environmental Inc. (S2S) was requested by 3043 Sixth Line Inc. (the Client) to prepare a Hydrogeological Assessment for the property located at 3043 Sixth Line, Oakville, Ontario, (Subject Property) with Property Identification Number (PIN) 24929-5379 (LT). At the time of the site visit, the Subject Property was occupied by a split-level (single-storey in the northeast portion and two-storey in the remaining portions) multi-tenant residential building with a dug-out basement beneath the kitchen of the building (Subject Building) and had a total area of approximately 310 m^2 (3,337 ft^2). The Subject Property had a reportedly total area of approximately 0.3 hectares (0.8 acres).

S2S understands that this Hydrogeological Assessment was requested as part of the Client's due diligence purposes for the requirements of an application for a proposed mixed-residential and commercial development at the Subject Property, and the application will be submitted to the Town of Oakville (the Town) for this regard.

2.0 SCOPE OF WORK

The objective of the work plan for the Hydrogeological Assessment was to characterize hydrogeological conditions at the Subject Property, to estimate potential dewatering requirements during construction and after completion of the proposed development, to identify and assess potential short and long-term impacts of the proposed development on groundwater conditions in the area, and recommend mitigation measures, if there will be potential for impact to occur.

The scope of work included the following tasks:

- Assess the hydrogeological conditions through secondary source information, on-site subsurface investigations including boreholes and groundwater monitoring wells completed by Groundwork Drilling Inc of Etobicoke (Groundwork Drilling), Ontario;
- Initial drilling of five boreholes (BH1 to BH5) on the Subject Property, all five of which were completed as groundwater monitoring wells (BH1 to BH5);
- Completion of one pump test in the installed monitoring well in BH5;
- Interpretation of field data and assessment of anticipated groundwater seepage into the proposed excavation and dewatering requirements;
- Completion of shallow boreholes (IH1 and IH2) to conduct infiltration tests;
- Assessment of infiltration capacity of soils at the Subject Property; and
- An assessment of the impact of the proposed development on the hydrogeological conditions in the adjacent areas.

Please see Drawing No. 1 in Appendix A for locations of the monitoring wells (BH1 to BH5) and infiltration boreholes (i.e. IH1 and IH2).

3.0 SITE DESCRIPTION

3.1 Site Location

The Subject Property is located at 3043 Sixth Line, Oakville, Ontario. At the time of the site visit, the Subject Property consisted of a single, two-story residential structure. There was vehicular access from an asphalt-paved driveway off Sixth Line on the Subject Property. Pedestrian access to the Subject Property was provided from the vehicular driveway. The Subject Property had a total area of approximately 0.3 hectares (0.7 acres).

A site location plan is shown as Drawing No. 1 in Appendix A.

3.2 Site Topography and Drainage

The ground surface at the Subject Property was visually observed to be generally flat but sloped downward at the north end to the adjacent property. The ground elevations at each borehole/monitoring wells were surveyed using an *Emlid RTK GNSS Receiver* which assesses the vertical elevations of the boreholes relative to a geodetic reference point. The ground elevations at the Subject Property range approximately from 170.4 metres above sea level (m asl) in the northwestern portion of the property (BH2) to 171.2 m asl in the southeastern portion of the property (BH4).

Surface water at the Subject Property is assumed to drain into on-site landscaped areas, off-site catch basins and north towards an unnamed tributary of the Sixteen Mile Creek, situated approximately 20 m to the north of the Subject Property.

3.3 Site Geology and Hydrogeology

Based on the review of available surficial geological and hydrogeological information for the area, the Subject Property area is predominately "clay to silt-textured till derived from glaciolacustrine deposits or shale" (OGS Surficial Geology of Southern Ontario, 2010). Bedrock is represented by shale, limestone, dolostone, and siltstone of the Queenston Formation (OGS Bedrock Geology of Ontario, 2019).

The Subject Property is situated in the Sixteen Mile Creek watershed. General inferred groundwater flow direction is northwest towards an unnamed tributary of the Sixteen Mile Creek, located approximately 20 m north of the Subject Property. Based on the Ministry of the Environment, Conservation and Parks (MECP) well record data for the wider area, the groundwater table in the area is assumed to be at a depth of approximately 1.5 m below ground surface (bgs) (refer to MECP Well Record, Appendix B).

3.4 Site Stratigraphy

Groundwork Drilling completed five (5) boreholes at the Subject Property all of which were completed as monitoring wells (BH1 and BH5). Drilling was conducted on October 13 to 15,

2020. Groundwater testing and sampling was completed October 20, 2020. The location of the boreholes and monitoring wells are shown on Drawing No. 1 in Appendix A, and borehole logs are included in Appendix C. Based on a review of the available soil data for the Subject Property, the following site stratigraphy was determined for the property:

Anthropogenic Fill

A thin layer of asphalt was present in borehole BH4. Beneath the asphalt, a 0.3 m thick layer of loose sand and gravel fill was present.

Overburden

A layer of topsoil (0.05 to 0.2 m thick) was present at the ground surface in BH1 to BH3 and BH5. Native deposits at the Subject Property are represented mainly by silts and clay and trace sand gravel. Native silts are encountered at approximately 0.3 m bgs and extend to a maximum depth 2.5 m bgs (BH4).

Bedrock

Bedrock at the Subject Property is represented by shale, limestone, dolostone and siltstone from the Queenston Formation. Weathered, red shale was encountered from depths of approximately 1.7 m (BH2) to 9.8 m bgs (maximum extent, BH1 to BH5) at the Subject Property.

3.5 Groundwater Elevations

A groundwater monitoring event was completed for the five newly-installed monitoring wells (BH1 to BH5) on October 20, 2020. Groundwater was observed in three monitoring wells (BH1, BH2 and BH5) ranging from depths of 4.2 metres below ground surface (m bgs) in BH2 to 4.5 metres in BH1, indicating that groundwater table at the Subject Property is at an elevation from 166.16 m asl in BH1 to 166.65 in BH5. Monitoring wells installed in BH3 and BH4 were dry during the groundwater monitoring event on October 20, 2020. The groundwater monitoring event was completed in the dry season, and water levels may be an estimated 0.5 m higher in the wet season for a seasonal high of 167.15 m asl (BH5). Groundwater monitoring well details are in Table 1. Groundwater elevations are presented in Table 2.

Table 1 Groundwater Monitoring Well Characteristics

Groundwater Monitoring Well	Elevation of Riser (m asl)	Elevation of Ground Surface (m asl)	Top of Screen Elevation (m asl)	Bottom of Screen Elevation (m asl)
BH1	171.50	170.666	167.40	164.35
BH2	171.23	170.399	165.52	162.47
BH3	170.87	171.024	170.08	168.58
BH4	171.11	171.223	169.58	166.53
BH5	171.84	170.999	166.11	161.61

Table 2 Groundwater Elevation Data

Groundwater Monitoring Well	Depth to Water (m bgs) Oct 15-20	Water Table Elevation (m asl) Oct 15-20	Depth to Water (m bgs) Oct 20-20	Water Table Elevation (m asl) Oct 20-20
BH1	4.50	166.16	4.50	166.16
BH2	4.20	166.20	4.20	166.20
BH3	Dry	N/A	Dry	N/A
BH4	Dry	N/A	Dry	N/A
BH5	4.35	166.65	4.35	166.65

N/A: Not Applicable.

The horizontal hydraulic gradient for the Subject Property, based on groundwater levels measured on October 20, 2020, was approximately 0.0075 (calculated from groundwater elevations in BH1 and BH5).

3.6 Groundwater Quality

On October 20, 2020, S2S collected a groundwater sample from the monitoring well in BH5 and submitted the samples for analysis to Bureau Veritas Inc. (BV Labs) of Mississauga, Ontario. The analysis was conducted for chemical parameters specified by the Halton Region Sewer by-law. The results were compared to the following criteria and are in Appendix E:

- Halton Region By-Law No. 02-03 Section 4 – Sanitary Sewer Requirements and associated Table 1 – Limits for Sanitary Sewers and Combined Sewers Discharge; and
- Halton Region By-Law No. 02-03 Section 5 – Storm Sewer Requirements

Detected concentrations of analyzed parameters in the groundwater sample collected on October 20, 2020 are in compliance with the Halton Region By-Law 02-03 Section 5, Storm Sewer Requirements. The concentrations of analyzed parameters in the groundwater sample are also in compliance with Table 1, Limits for Sanitary Sewers and Combined Sewers Discharge with the exception of Total Suspended Solids (1,200 mg/L) which exceeded the by-law limit of 350 mg/L. Results and Certificate of Analysis are presented in Appendix E.

4.0 ANALYSIS AND EVALUATION

4.1 Proposed Development

Based on a review of background information available to-date, the Subject Property will be re-developed with an eight-story mixed use residential/commercial building and a four-storey residential building based upon architectural drawings provided by the Client (Gren Weis Architect and Associates, September 2019). The proposed development will include a two level basement/underground parking constructed at an assumed elevation of 164.86 m asl.

4.2 Hydraulic Conductivity Testing

The hydraulic properties of the onsite deposits were determined by completion of a pump and recovery test in monitoring well BH5 by S2S on October 19, 2020. The well was pumped using a submersible pump for the pump test. A Solinst Level logger was installed in the well to record (30-second intervals) water table drawdown and recovery over a 24-hour period. The pump (60-minute period) and recovery test (24 hours) were conducted in BH5. Manual water levels measurements were taken for quality control purposes during the pump and recovery periods. The data logger pumping test data is included in Appendix D.

Hydraulic conductivity was determined based on the data logger pumping test and recovery test data using the Aquifer Test© program. The result is presented in Table 3 below. Pumping and recovery test data is shown in Appendix D.

Table 3 Hydraulic Conductivity

Analysis	Hydraulic Conductivity (m/s)
	BH5
Pump Test (Cooper-Jacob Analysis)	9.94×10^{-8}

The length of the screened area is present in a fractured shale bedrock (as shown in the Borehole Logs, in Appendix C). Based on the observed site stratigraphy and the value of hydraulic conductivity for the calculations of dewatering requirements is assumed to be in the order of 10^{-8} m/s and the calculated hydraulic conductivity value (9.94×10^{-8} m/s) was utilised in the dewatering calculation.

4.3 Infiltrometer Testing

Two shallow boreholes were hand-augered on October 19, 2020 for infiltration testing using a Guelph Permeameter:

- IH1 was drilled on the western side of the Subject Property to a depth of 0.5 m bgs. Two infiltration trials were conducted for a respective duration of 5 and 6 minutes. The

soil stratigraphy was generally described as sandy silt; and

- IH2 was drilled on the south-eastern side of the Subject Property to a depth of 0.4 m bgs, and two infiltration trials were conducted for a respective duration of 14 and 25 minutes. The soil stratigraphy was generally described as sandy silt.

The infiltration test data is included in Appendix D.

Hydraulic conductivity is calculated using equations derived from Zhang et al. (1998). The formulas used are provided below:

$$K_{fs} = \frac{C_1 + Q_1}{2\pi H_1^2 + \pi\alpha^2 C_1 + 2\pi\frac{H_1}{\alpha^*}}$$

$$C_1 = \left(\frac{H_1/\alpha}{2.074 + -0.093(H_1/\alpha)}\right)^{0.754}$$

$$Q_1 = R_1 \times 35.22$$

K_{fs} = Soil Saturated Hydraulic Conductivity (cm/min)
H_1 = Water Head Height (cm)
R_1 = Steady State Rate of Water Level Change (cm/min)
α = Borehole radius (cm)
α^*= 0.12 (cm^{-1}); constant value used to represent most structured soils from clays through loams, also includes unstructured medium and fine sands.

The average K_{fs} value obtained from the infiltration test performed at IH1 ranged from 1.3×10^{-4} cm/s to 2.6×10^{-4} cm/s, converted to an infiltration rate of between 50.0 and 52.7 mm/hour. Using a correction factor of 2.5, the infiltration rate corrects to a minimum of 20 mm/hour.

The average K_{fs} value obtained from the infiltration test performed at IH2 ranged from 2.1×10^{-4} cm/s to 4.1×10^{-4} cm/s, converted to an infiltration rate of between 56.6 and 67.6 mm/hour. Using a correction factor of 3.5, the infiltration rate corrects to a minimum of 17.5 mm/hour. Note: a higher safety factor was utilised for IH2 than for IH1 in order to increase the precision of the recommended infiltration rate compared to IH1.

With consideration of the data presented for each infiltration hole above, it is recommended that a conservative infiltration rate of 18 mm/hour should be utilised in the stormwater design.

5.0 GROUNDWATER CONTROL REQUIREMENTS

5.1 Dewatering Estimates

5.1.1 Construction Dewatering

It is assumed that the spread or strip foundation will be constructed at depth of 6.0 m bgs (164.86 m asl) for the construction of two underground levels based upon architectural drawings provided by the Client (Gren Weis Architect and Associates, September 2019). It is recommended that groundwater levels be lowered during the construction period to approximately 1.0 m below the proposed depth of the foundation level (163.86 m asl). Lowering water levels to this elevation is intended to provide a stable working base for construction. This would entail lowering the water level to 7.0 m bgs. On October 20, 2020, groundwater at the site was found at approximately 4.2 m bgs (166.2 m asl) in the central portion of the property (BH2), at 4.5 m bgs (166.16) in the northwestern portion of the property (BH1) and at a depth of 4.4 m bgs (166.7 m asl) in southeastern portion of the property (BH5). It is estimated that high seasonal water table could be approximately 0.5 m higher at an elevation of 3.9 m bgs (167.15 m asl) in BH2.

The anticipated daily average construction dewatering estimate for the development is 7,789 L/day (5.41 L/min). The worst-case input data (high seasonal water table, high hydraulic conductivity value) were used for calculations (refer to Appendix F for Dewatering Calculations). By applying a safety factor of 1.5, the total daily groundwater seepage into excavation will be approximately 11,683 L/day (8.11 L/min).

This daily volume does not consider precipitation into the excavation. Considering 10 mm rain into the excavation for the total area of 2,500 m^2 the volume of precipitation will be 25,000 L/day. Then the total daily discharge volume during construction (groundwater seepage and accumulated precipitation) will be in the range from an average daily flow rate of 7,789 L/day to a peak flow rate of 36,683 L/day (25.47 L/min).

The short-term dewatering system must be designed to conform to the requirements laid out in the Halton Region Sewer By-Law. Groundwater chemistry results are in Appendix E.

5.1.2 Long Term Dewatering

It is assumed that the spread or strip foundation will be constructed at a depth of 6.0 m bgs (164.86 m asl) for the construction of two underground levels based upon architectural drawings provided by the Client (Gren Weis Architect and Associates, September 2019).

For long term dewatering estimate, it is assumed that water table will be maintained below 6.5 m bgs. The anticipated long-term dewatering estimate for the development is a daily average flow rate of 8,149 L/day (5.66 L/min) (refer to Appendix F for Dewatering Calculations). The worst-case input data were used for the calculation. By applying safety factor of 1.5, the peak daily flow of groundwater seepage volume will be approximately 12,223 L/day (8.49 L/min).

For most of the year the daily seepage volume will be likely lower, as the seasonal high groundwater table elevation was used for the calculations.

The long-term dewatering system must be designed to conform to the requirements laid out in the Halton Region Sewer By-Law. Groundwater chemistry results are in Appendix E.

5.2 Potential Impacts

5.2.1 Short Term Discharge of Groundwater

The anticipated construction dewatering daily average estimate for the Subject Property is 7,789 L/day (5.41 L/min) for the foundation excavation. This volume does not included precipitation into the excavation.

Calculated radius of influence was approximately 3.0 m from the edge of the excavation. Considering the volume of pumped groundwater, short period of dewatering, and the radius of influence, the impact of construction dewatering on the groundwater conditions in the area is considered negligible. Due to low discharge rate (5.41 L/min) and presumed good water quality, discharged water will have minor impact on the Town's sewage works.

5.2.2 Long Term Discharge of Groundwater

A groundwater dewatering system or footing waterproofing is required for the proposed development. The estimated average daily flow of groundwater seepage into the drainage system will be approximately 8,149 L/day (5.66 L/min). The long-term dewatering combined with decrease of infiltration due to increase of impermeable area will have impact on the groundwater conditions in the area. Therefore, implementation of Low Impact Development (LID) measures are recommended.

Due to a low discharge rate (5.66 L/min) and good water quality, discharging will have minor impact on the Town's sewage works (assumed storm sewer). As the seasonal high water table was used for the calculation, it is likely that for most of the year groundwater seepage volume into drainage system will be lower.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations of this report are summarized below:

- The primary hydro-stratigraphic unit on the Subject Property is a fractured shale bedrock extending from approximately 2.4 to greater than 9.8 m bgs (maximum extent of boreholes). Borehole Logs completed by S2S are presented in Appendix C;
- Shallow groundwater was encountered at Subject Property in the three of the five monitoring wells (BH1, BH2 and BH5) during the monitoring event held on October 20, 2020. Based on the completed groundwater observations, the groundwater table at

the Subject Property is expected to be below the elevation of 166.65 m asl (4.4 m bgs) (collected at BH5). Groundwater observations were completed in the dry season with seasonally low groundwater elevations. Assuming that the seasonal fluctuation is up to 0.5 m, seasonally high groundwater elevations at the Subject Property would be at approximately 167.15 m asl in BH5, that is approximately 3.9 m below the current ground surface;

- Based on the topography in the adjacent area, distance to the tributary of the Sixteen Mile Creek and measured groundwater elevations, the inferred groundwater flow direction is towards the northwest;
- Based on the pump test data the hydraulic conductivity is in the range of 9.94×10^{-8} m/s in the fractured shale bedrock;
- Groundwater was sampled in the monitoring well BH5 at the Subject Property for storm and sanitary sewer requirements (Sections 4 and 5 and Table 1, Halton Region By-Law 02-03). Results and Certificate of Analysis are found in Appendix E. Sample results indicate that the groundwater met criteria for Halton Storm Sewer and Sanitary sewer criteria (Table 1) with the exception of the Total Suspended Solids (1,200 mg/L vs 350 mg/L)
- Completed infiltration tests indicate an infiltration capacity of 50 to 68 mm/hr with a suggested design infiltration capacity of 18 mm/hr;
- Water-taking during construction dewatering will be approximately 7,789 L/day of groundwater seepage. Considering 10 mm rain into excavation, the peak flow of discharge will be approximately 36,683 L/day and discharge of this water will not require an EASR (volume of groundwater is less than 50,000 L/day);
- The water which is expected to accumulate in the excavation area during the proposed construction will be groundwater seepage and precipitation; therefore, with implementation of sediment control measures, the water quality will likely allow discharge to the Halton Region sewer system;
- Long term drainage system (perimeter drainage and sub-slab drainage system) will be required as estimated long term dewatering will be approximately 8,149 to 12,223 L/day. Discharge of this water will not require an MECP permit (volume of groundwater is less than 50,000 L/day);
- Due to estimated daily volumes of dewatering, the potential impacts of short term and long-term dewatering on groundwater in the area will be minor. Potential impacts to Halton Region sewer system will be minor due to estimated volumes and good groundwater quality; and
- The proposed development will increase impermeable area on the Subject Property, thus decreasing volume of infiltrated precipitations. Although this impact is expected to be minor, nevertheless, implementation of sustainable design measures is recommended.

7.0 REFERENCES

Gren Weis Architect and Associates. (2019, September 19). "Sixth on the Green" – Apartment Building, Oakville, Ontario.

Ministry of the Environment, Conservation and Parks (MECP). *Map: Well Records.* Accessed November, 2020.

Ontario Geological Survey (OGS). (2019). Bedrock Geology of Southern Ontario.

Ontario Geological Survey (OGS). (2010). Surficial Geology of Southern Ontario.

Powers, J. P., Corwin, A. B., Schmall, P. C., & Kaeck, W. E. (2007). *Construction dewatering and groundwater control: new methods and applications*. John Wiley & Sons.

Toronto Region Conservation Authority (TRCA). (2012). Stormwater Management Criteria.

Zhang, Z. F., Groenevelt, P. H., & Parkin, G. W. (1998). The well-shape factor for the measurement of soil hydraulic properties using the Guelph Permeameter. *Soil and Tillage Research*, *49*(3), 219-221.

8.0 CLOSURE

This report has been prepared for the sole benefit of 3043 Sixth Line Inc. (the Client).

The report may not be relied upon by any other person or entity without the express written consent of S2S Environmental Inc. (S2S) and the Client. Any use that a party makes of this report, or any reliance on decisions made based on it, is the responsibility of such parties. S2S accepts no responsibility for damages, if any, suffered by any party as a result of decisions made or actions based on this report.

S2S makes no other representation whatsoever, including those concerning the legal significance of its findings or as to the other legal matters addressed incidentally in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time; thus, the Client should review such issues with appropriate legal counsel.

No other warranty or representation, either expressed or implied, is included or intended in this report.

Should any conditions at the site be encountered which differ from those at the borehole locations and/or additional site information become available, S2S requests that this information be brought to its attention so that it may re-assess the conclusions presented herein. It should also be noted that current environmental Regulations, Guidelines, Policies, Standards, Protocols and Objectives are subject to change, and such changes, when put into effect, could alter the conclusions and recommendations noted throughout this report.

Respectfully submitted,

S2S ENVIRONMENTAL INC.

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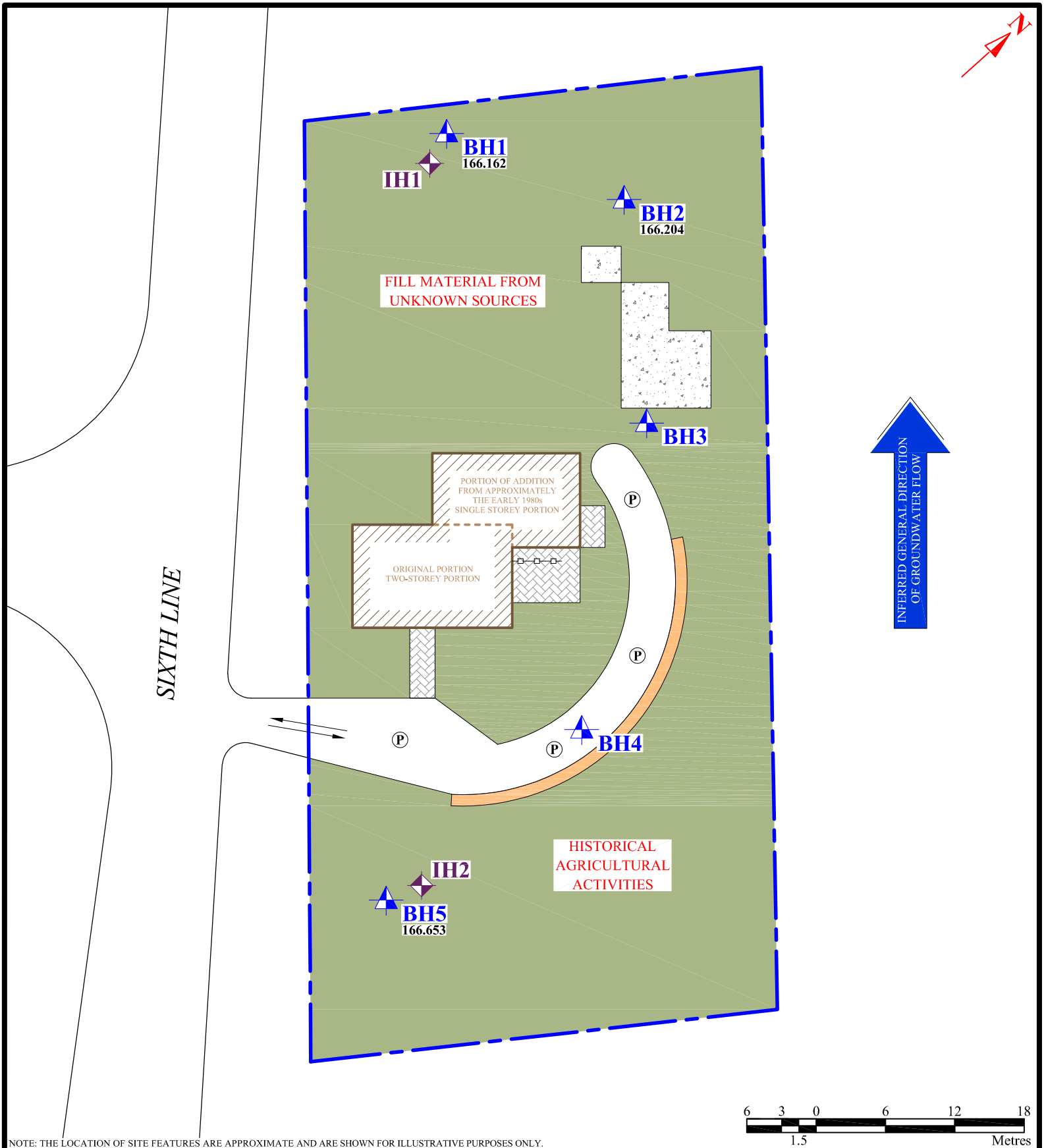
APPENDIX A

DRAWING



NOTE: THE LOCATION OF SITE FEATURES ARE APPROXIMATE AND ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY.

LEGEND

- ASSUMED PROPERTY LINE
- SITE ACCESS
- WOODEN FENCE
- (P) ASPHALT PAVED PARKING AND DRIVEWAY
- APPROXIMATE LOCATION OF MONITORING WELL (S2S, 2020)
- 166.653 GROUNDWATER ELEVATION (m asl) MEASURED ON OCT. 20, 2020
- APPROXIMATE LOCATION OF INFILTRATION HOLES (S2S, 2020)
- SUBJECT BUILDING
- INTERLOCKING BRICK WALKWAY
- LANDSCAPED AREA
- CONCRETE PAVED AREA
- WOODEN RETAINING WALL

S2S Environmental Inc.

SCALE:
AS SHOWN

PROJECT NO:	SITE LOCATION:	DRAWING NO:
9550	3043 SIXTH LINE OAKVILLE, ONTARIO	1

SITE PLAN SHOWING LOCATIONS OF MONITORING WELLS AND INFILTRATION HOLES

DATE: NOV 3, 2020	DRAWN BY: YP

APPENDIX B

MECP WELL RECORD

Ontario Ministry of the Environment

Measurements recorded in: [x] Metric [ ] Imperial

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

A 093077

A093077

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
Timsin	Holdings Corp		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
8600 Dufferin St	York	Ont	L4K5P5	4167982420

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
3030 Sixth Line	Oakville	16	1

County/District/Municipality	City/Town/Village	Province	Postal Code
Halton	Oakville	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	602643	4814920		

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

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

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	1.52	Clay Fill	
1.52	3.35	Enviro Plug Med	0.06371290
3.35	4.57	Gravel	0.0222433

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.24	Steel	188	0	4.57

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
[x] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

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

Water Details

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

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

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	4.57	15.24

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

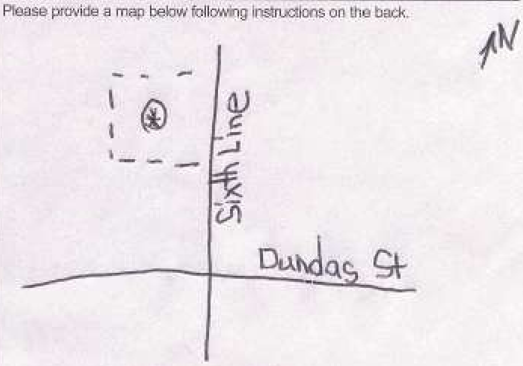
Well production (l/min / GPM)

Disinfected? [x] Yes [ ] No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	1.52		
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Hal Calvin Merklinger Well Drilling	7219

Business Address (Street Number/Name)	Municipality
4131-15th line RR#3 Cookstown	Simcoe

Province	Postal Code	Business E-mail Address
Ont	L0L1L0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
7054358791	Merklinger Calvin

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2837	Calvin Merklinger	20091203

Well owner's information package delivered	Date Package Delivered	Date Work Completed
[ ] Yes [x] No	20091105	20091105

Ministry Use Only

Audit No. Z107414

Received DEC 10 2009

0506E (12/2007)

Ministry's Copy

APPENDIX C

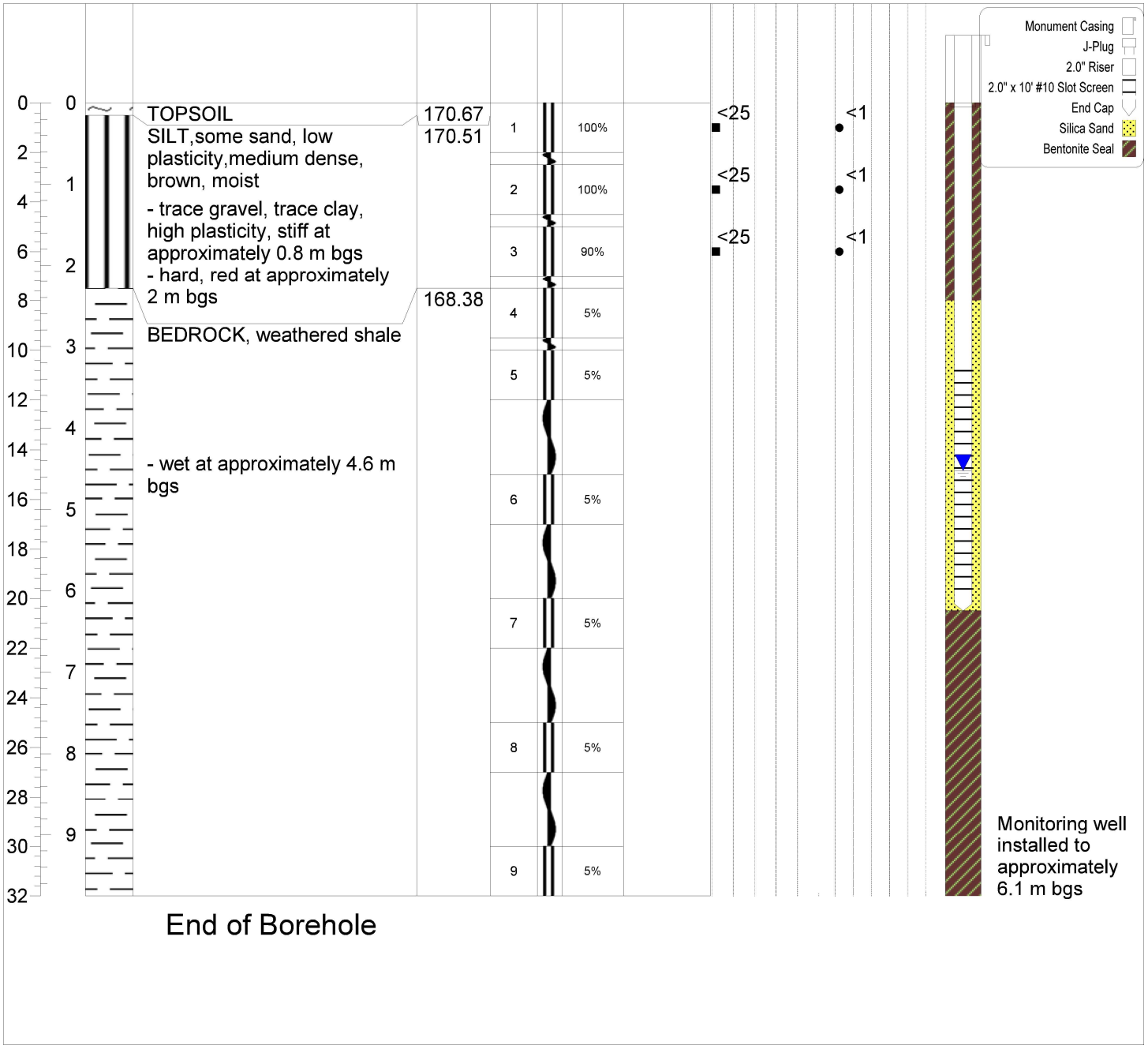
BOREHOLE AND MONITORING WELL LOGS

S2S Environmental Inc.

Project Number: 9550
Client: 3043 Sixth Line Inc.
Location: 3043 Sixth Line, Oakville
Drill Date: October 14, 2020

Log of Borehole: BH1

SUBSURFACE PROFILE					SAMPLE					
Depth (ft)	Depth (m)	Symbol	Description	Elevation (m)	Number	Type	Recovery	Laboratory Analyses	Hex (%LEL) / IBL (ppm) / Hex (ppm)	Well Completion Details



Drill Rig: Truck Mounted BOA5M2
Hole Size/Drill Method: 203mm/SSA
Easting: 602640.9 E
Northing: 4814980 N
Datum: Geodetic
Logged by: DWB
Checked by: RB
Sheet: 1 of 1

Notes: Monitoring well installed for Geotechnical, Hydrogeological and Environmental Investigation purposes.

S2S Environmental Inc.

Project Number: 9550
Client: 3043 Sixth Line Inc.
Location: 3043 Sixth Line, Oakville
Drill Date: October 14, 2020

Log of Borehole: BH2

Depth (ft)	Depth (m)	Description	Elevation (m)	Number	Type	Recovery	Laboratory Analyses	Hex (%LEL) / IBL (ppm)	Hex (ppm)	Well Completion Details
0	0	TOPSOIL	170.40							Monument Casing
2		SILT, with sand, some organics, soft, brown, moist	170.17	1		56%		<25	<1	J-Plug
4	1	CLAY, with silt, some sand, trace gravel, stiff, brown, moist	169.64	2		70%		<25	<1	2.0" Riser
6	2	SILT, some sand, trace gravel, stiff moist	168.88	3		50%		<25	<1	2.0" x 10' #10 Slot Screen
8		BEDROCK, weathered red shale	168.72	4		50%		<25	<1	End Cap
10	3			5		<5%				Silica Sand
12										Bentonite Seal
14	4									
16				6		<5%				
18	5									
20	6	- wet at approximately 6.1 m bgs		7		<5%				
22										
24	7									
26	8			8		<5%				
28										
30	9			9		<5%				
32										

Monitoring well installed to approximately 7.6 m bgs

End of Borehole

Drill Rig: Truck Mounted BOA5M2
Hole Size/Drill Method: 203mm/SSA
Easting: 602655.4 E
Northing: 4814988 N
Datum: Geodetic
Logged by: DWB
Checked by: RB
Sheet: 1 of 1

Notes: Monitoring well installed for Geotechnical, Hydrogeological and Environmental Investigation purposes.

S2S Environmental Inc.

Project Number: 9550
Client: 3043 Sixth Line Inc.
Location: 3043 Sixth Line, Oakville
Drill Date: October 13, 2020

Log of Borehole: BH3

SUBSURFACE PROFILE					SAMPLE					
Depth (ft)	Depth (m)	Symbol	Description	Elevation (m)	Number	Type	Recovery	Laboratory Analyses	Hex (%LEL) 0–100 / IBL (ppm) / Hex (ppm) 0–500 / 0.01–1000	Well Completion Details
0	0		TOPSOIL	171.02	1		100%		<25 ■ <1 ●	Flush Mount Casing
2			SILT, some sand, soft, brown, moist	170.96						J-Plug
4	1				2		100%		<25 ■ <1 ●	2.0" Riser
6	2				3		80%		<25 ■ <1 ●	2.0" x 5' #10 Slot Screen
8			BEDROCK, weathered red shale	168.74	4		100%		<25 ■ <1 ●	End Cap
10	3		- soft shale at approximately 3 m bgs		5		0%			Silica Sand
12										Bentonite Seal
14	4				6		0%			
16	5									
18					7		0%			
20	6									
22										
24	7									
26	8				8		0%			
28										
30	9									
32										

Monitoring well installed to approximately 2.3 m bgs

End of Borehole

Drill Rig: Truck Mounted BOA5M2
Hole Size/Drill Method: 203mm/SSA
Easting: 602671.2 E
Northing: 4814977 N
Datum: Geodetic
Logged by: DWB
Checked by: RB
Sheet: 1 of 1

Notes: Monitoring well (BH3) dry on October 19 and October 20, 2020. Monitoring well installed for Geotechnical, Hydrogeological and Environmental Investigation purposes.

S2S Environmental Inc.

Project Number: 9550
Client: 3043 Sixth Line Inc.
Location: 3043 Sixth Line, Oakville
Drill Date: October 13, 2020

Log of Borehole: BH4

SUBSURFACE PROFILE					SAMPLE					
Depth (ft)	Depth (m)	Symbol	Description	Elevation (m)	Number	Type	Recovery	Laboratory Analyses	Hex (%LEL) / IBL (ppm) / Hex (ppm)	Well Completion Details
0	0		ASPHALT	171.22						
2			SAND AND GRAVEL, fill, medium density, moist	171.15	1		50%		<25 / <1	
4	1		SILT, some sand, trace gravel, stiff, moist	170.46	2		60%		<25 / <1	
6	2		- very stiff at approximately 2 m bgs		3		75%		<25 / <1	
8			BEDROCK, weathered red shale	168.78	4		<10%			
10	3				5		<10%			
12	4									
14										
16	5									
18										
20	6				6		5%			
22										
24	7									
26	8									
28										
30	9				7		0%			
32										

Hex (%LEL): 0 – 100
IBL (ppm)
Hex (ppm): 0 – 500
0.01 – 1000

Well Completion Details: Flush Mount Casing; J-Plug; 2.0" Riser; 2.0" x 10' #10 Slot Screen; End Cap; Silica Sand; Bentonite Seal

Monitoring well installed to approximately 4.6 m bgs

End of Borehole

Drill Rig: Truck Mounted BOA5M2
Hole Size/Drill Method: 203mm/SSA
Easting: 602687.5 E
Northing: 4814955 N
Datum: Geodetic
Logged by: DWB
Checked by: RB
Sheet: 1 of 1

Notes: Monitoring well (BH4) dry on October 19 and October 20, 2020. Monitoring well installed for Geotechnical, Hydrogeological and Environmental Investigation purposes.

S2S Environmental Inc.

Project Number: 9550
Client: 3043 Sixth Line Inc.
Location: 3043 Sixth Line, Oakville
Drill Date: October 15, 2020

Log of Borehole: BH5

SUBSURFACE PROFILE					SAMPLE					
Depth (ft)	Depth (m)	Symbol	Description	Elevation (m)	Number	Type	Recovery	Laboratory Analyses	Hex (%LEL) 0–100 / IBL (ppm) / Hex (ppm) 0–500 / 0.01–1000	Well Completion Details
0	0		TOPSOIL	171.00	1		50%		<25 / <1	Monument Casing, J-Plug, 2.0" Riser, 2.0" x 10' #10 Slot Screen, End Cap, Silica Sand, Bentonite Seal
2			SILT, with sand, some organics, soft, brown, moist	170.89						
4	1				2		75%		<25 / <1	
6	2				3		75%		<25 / <1	
8			BEDROCK, weathered red shale	168.71	4		25%			
10	3		- wet at approximately 3 m bgs		5		25%			
12	4									
14										
16	5				6		<5%			
18										
20	6				7		<5%			
22	7									
24										
26	8				8		0%			
28										
30	9				9		0%			
32										

Monitoring well installed to approximately 9.1 m bgs

End of Borehole

Drill Rig: Truck Mounted BOA5M2
Hole Size/Drill Method: 203mm/SSA
Easting: 602687.1 E
Northing: 4814933 N
Datum: Geodetic
Logged by: DWB
Checked by: RB
Sheet: 1 of 1

Notes: Monitoring well installed for Geotechnical, Hydrogeological and Environmental Investigation purposes.

APPENDIX D

FIELD INVESTIGATION DATA

S2S Environmental Inc.

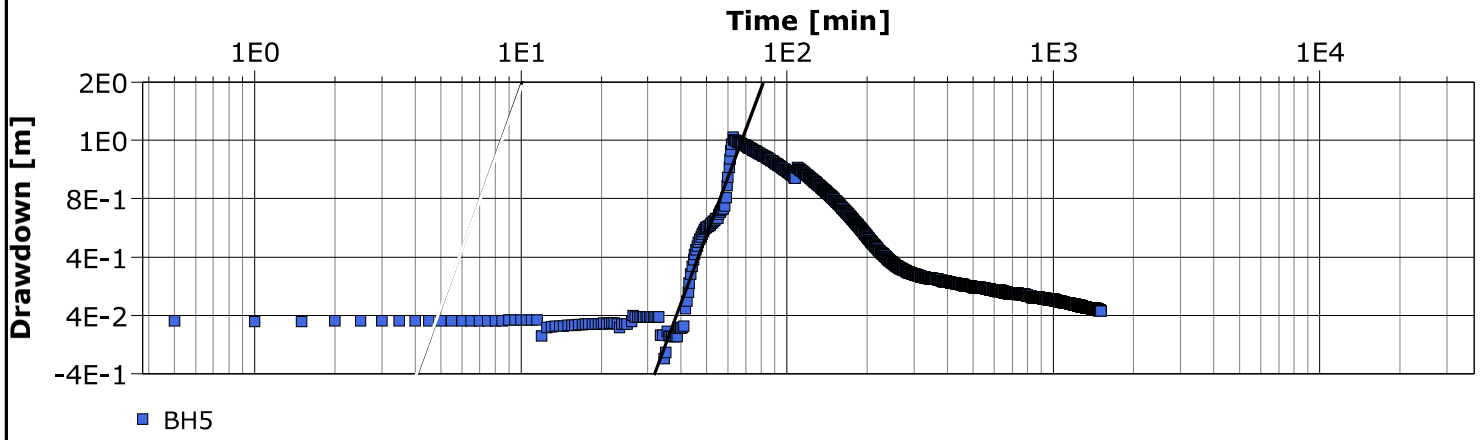
Pumping Test Analysis Report

Project: Hydrogeological Assessment

Number: 9550

Client: 3043 Sixth Line Inc.

Location: 3043 Sixth Line, Oakville	Pumping Test: Pumping Test	Pumping Well: BH5
Test Conducted by: FA/DWB		Test Date: 2020-10-19
Analysis Performed by: RB	Pump Test	Analysis Date: 2020-10-21
Aquifer Thickness: 5.00 m	Discharge Rate: 0.013833 [l/s]	



Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/s]	Hydraulic Conductivity [m/s]	Storage coefficient	Radial Distance to PW [m]	
BH5	4.97×10^{-7}	9.94×10^{-8}	5.00×10^{-1}	0.03	

S2S Environmental Inc.

Infiltration Test Data - IH1

3043 Sixth Line, Oakville, ON
October 19, 2020

Trial 1		Trial 2	
Time [min]	Water Level [cm]	Time [min]	Water Level [cm]
0.0	0	0.0	34
0.2	29	0.2	35.2
0.3	31	0.3	36.3
0.5	32.8	0.5	37.5
0.7	34.7	0.7	38.5
0.8	36.5	0.8	39.4
1.0	38.4	1.0	41
1.2	40.2	1.2	41.9
1.3	42	1.3	43.2
1.5	43.5	1.5	44.2
1.7	45.2	1.7	45.2
1.8	46.9	1.8	46.4
2.0	48.4	2.0	47.5
2.2	50	2.2	48.8
2.3	51.5	2.3	49.5
2.5	53	2.5	50.9
2.7	54.5	2.7	52
2.8	55.8	2.8	53.1
3.0	57.3	3.0	54.2
3.2	58.7	3.2	55.4
3.3	60.2	3.3	56.2
3.5	61.5	3.5	57.7
3.7	63	3.7	58.5
3.8	64.5	3.8	59.6
4.0	65.8	4.0	60.5
4.2	67	4.2	61.8
4.3	68.5	4.3	63
4.5	69.6	4.5	64
4.7	71.1	4.7	65.2
4.8	72.2	4.8	66.1
5.0	73.5	5.0	67.5
5.2	75	5.2	68.8
		5.3	69.5
		5.5	70.7
		5.7	71.8
		5.8	72.7
		6.0	74.4
		6.2	75.4

Infiltration Test Data - IH2

3043 Sixth Line, Oakville, ON
October 19, 2020

Trial 1		Trial 2	
Time [min]	Water Level [cm]	Time [min]	Water Level [cm]
0.0	18	0	13.5
0.2	18	1	13.5
0.3	18	2	13.5
0.5	18	3	13.5
1.0	18	4	13.5
1.5	18.4	5	13.5
2.0	18.7	8	14.5
2.5	18.9	13	15.6
3.0	19.1	16	16.7
4.0	19.9	19	17.8
5.0	20.3	20	18.7
6.0	20.6	22	19.9
7.0	21	25	20.9
8.0	22		
9.0	22.3		
10.0	22.8		
11.0	23		
12.0	23.6		
13.0	24.1		
14.0	24.4		

Infiltration Hole:	IH1			IH2		
Trial number:	Trial 1	Trial 2	AVG	Trial 1	Trial 2	AVG
K_{fs} (cm/sec):	1.6E-04	1.3E-04	1.5E-04	4.1E-04	2.1E-04	3.1E-04
Infiltration Rate (mm/hr):	52.7	49.8	51.3	67.6	56.6	62.1
Safety Factor:	2.5			3.5		
Corrected Infiltration Rate (mm/hr):	21.1	19.9	20.5	19.3	16.2	17.7

APPENDIX E

SANITARY AND STORM SEWER ANALYTICAL RESULTS

AND LABORATORY CERTIFICATE OF ANALYSIS

S2S Environmental Inc.

REPORT FILTERS	9550_Sewer
Received Date From	Oct 27, 2019
Received Date To	Oct 27, 2020
Projects	9550
Jobs	C0R5786
Samples	NYB216,NYG526
Analytes	Multiple
Criteria 1	Halton Sanitary Sewer
Criteria 2	Halton Storm Sewer

Site Location	3043 SIXTH LANE, OAKVILLE
Project #	9550
Site #	
PO #	PN20-9550.AC.05
COC#	797660-01-01
BV Labs Job #	C0R5786
Sample ID	BH5
BV Labs Sample ID	NYB216
Matrix	Water
Sampled By	DWB
Sampling Date	Oct 20, 2020
Sampling Time	12:48 PM

Report Group	*Parameter Name*	*Criteria 1*	*Criteria 2*	*Units*	*Result*	*DL*
	Total Animal/Vegetable Oil and Grease	150		mg/L	<0.50	0.5
	Total Oil & Grease			mg/L	<0.50	0.5
	Total Oil & Grease Mineral/Synthetic			mg/L	<0.50	0.5
Semi-Volatile Organics by GC-MS	Naphthalene	140		ug/L	<0.050	0.05
	Fluoride (F-)	10		mg/L	0.22	0.1
	pH	6.0:10.0	6.5:8.5	pH	7.83	N/A
	Dissolved Sulphate (SO4)	1500		mg/L	780	5
	Total Suspended Solids	350		mg/L	**1200**	10
	Total Kjeldahl Nitrogen (TKN)	100		mg/L	0.63	0.1
Elements by Atomic Spectroscopy	Mercury (Hg)	0.05		mg/L	<0.00010	0.0001
	Total Carbonaceous BOD	300		mg/L	<2	2
Elements by Atomic Spectroscopy	Total Aluminum (Al)	50		mg/L	1.1	0.1
Elements by Atomic Spectroscopy	Total Antimony (Sb)	5		mg/L	<0.02	0.02
Elements by Atomic Spectroscopy	Total Arsenic (As)	1		mg/L	<0.01	0.01
Elements by Atomic Spectroscopy	Total Beryllium (Be)	5		mg/L	<0.0005	0.0005
Elements by Atomic Spectroscopy	Total Cadmium (Cd)	1		mg/L	<0.002	0.002
Elements by Atomic Spectroscopy	Total Chromium (Cr)	3		mg/L	<0.01	0.01
Elements by Atomic Spectroscopy	Total Cobalt (Co)	5		mg/L	<0.002	0.002
Elements by Atomic Spectroscopy	Total Copper (Cu)	3		mg/L	0.02	0.01
Elements by Atomic Spectroscopy	Total Iron (Fe)	50		mg/L	1.4	0.02
Elements by Atomic Spectroscopy	Total Lead (Pb)	3		mg/L	<0.01	0.01
Elements by Atomic Spectroscopy	Total Manganese (Mn)	5		mg/L	0.11	0.001
Elements by Atomic Spectroscopy	Total Molybdenum (Mo)	5		mg/L	0.01	0.005
Elements by Atomic Spectroscopy	Total Nickel (Ni)	3		mg/L	<0.005	0.005
Elements by Atomic Spectroscopy	Total Phosphorus (P)	10		mg/L	0.06	0.05
Elements by Atomic Spectroscopy	Total Selenium (Se)	5		mg/L	<0.02	0.02
Elements by Atomic Spectroscopy	Total Silver (Ag)	5		mg/L	<0.01	0.01
Elements by Atomic Spectroscopy	Total Tin (Sn)	5		mg/L	<0.02	0.02
Elements by Atomic Spectroscopy	Total Titanium (Ti)	5		mg/L	0.016	0.005
Elements by Atomic Spectroscopy	Total Zinc (Zn)	3		mg/L	0.012	0.005
	Total Cyanide (CN)	2		mg/L	<0.0050	0.005
Volatile Organics by GC/MS	Benzene	10		ug/L	<0.40	0.4
Volatile Organics by GC/MS	Chloroform	40		ug/L	<0.40	0.4
Volatile Organics by GC/MS	1,4-Dichlorobenzene	80		ug/L	<0.80	0.8
Volatile Organics by GC/MS	Ethylbenzene	160		ug/L	<0.40	0.4
Volatile Organics by GC/MS	Methylene Chloride(Dichloromethane)	2000		ug/L	<4.0	4
Volatile Organics by GC/MS	Tetrachloroethylene	1000		ug/L	<0.40	0.4
Volatile Organics by GC/MS	Toluene	16		ug/L	<0.40	0.4
Volatile Organics by GC/MS	Trichloroethylene	400		ug/L	<0.40	0.4
Microbiology	Escherichia coli		200	CFU/100mL	<10	10
	Phenols-4AAP	1		mg/L	<0.0010	0.001

LEGEND	
"TBA"	To Be Announced
"N/A"	Not Applicable
Bold & Red	Exceedance
Red with White Text	Exceeds Both Criteria
Highlighted	DL > Criteria

Disclaimer: This is not an official certficate of analysis. For QC data and comments, please refer to the original reports issued by BV Labs.

Your P.O. #: PN20-9550.AC.05
Your Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your C.O.C. #: 797660-01-01

Attention: Rachel Baldwin

S2S Environmental Inc
1099 Kingston Rd
Suite 260
Pickering, ON
CANADA L1V 1B5

Report Date: 2020/10/27
Report #: R6386785
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0R5786
Received: 2020/10/20, 16:38

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonaceous BOD	1	2020/10/21	2020/10/26	CAM SOP-00427	SM 23 5210B m
Total Cyanide	1	2020/10/22	2020/10/22	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2020/10/21	2020/10/22	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2020/10/23	2020/10/23	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by Axial ICP	1	2020/10/23	2020/10/23	CAM SOP-00408	EPA 6010D m
E.coli, (CFU/100mL)	1	N/A	2020/10/20	CAM SOP-00552	MOE LSB E3371
Animal and Vegetable Oil and Grease	1	N/A	2020/10/22	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2020/10/22	2020/10/22	CAM SOP-00326	EPA1664B m,SM5520B m
PAH Compounds in Water by GC/MS (SIM)	1	2020/10/22	2020/10/23	CAM SOP-00318	EPA 8270D m
pH	1	2020/10/21	2020/10/22	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2020/10/22	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2020/10/22	CAM SOP-00464	EPA 375.4 m
Total Kjeldahl Nitrogen in Water	1	2020/10/21	2020/10/26	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (1)	1	2020/10/22	2020/10/22	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2020/10/21	2020/10/23	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2020/10/22	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Your P.O. #: PN20-9550.AC.05
Your Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your C.O.C. #: 797660-01-01

Attention: Rachel Baldwin

S2S Environmental Inc
1099 Kingston Rd
Suite 260
Pickering, ON
CANADA L1V 1B5

Report Date: 2020/10/27
Report #: R6386785
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0R5786
Received: 2020/10/20, 16:38

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Deepthi Shaji, Project Manager
Email: Deepthi.Shaji@bvlabs.com
Phone# (905)817-5700 Ext:7065843
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C0R5786
Report Date: 2020/10/27

S2S Environmental Inc
Client Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your P.O. #: PN20-9550.AC.05
Sampler Initials: DWB

HALTON SANITARY & COMBINED SEWER (2-03)

BV Labs ID		NYB216			NYB216		
Sampling Date		2020/10/20 12:48			2020/10/20 12:48		
COC Number		797660-01-01			797660-01-01		
	UNITS	BH5	RDL	QC Batch	BH5 Lab-Dup	RDL	QC Batch
Calculated Parameters							
Total Animal/Vegetable Oil and Grease	mg/L	<0.50	0.50	7009242			
Inorganics							
Total Carbonaceous BOD	mg/L	<2	2	7011907	<2	2	7011907
Fluoride (F-)	mg/L	0.22	0.10	7010867			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.63	0.10	7013331			
pH	pH	7.83		7010872			
Phenols-4AAP	mg/L	<0.0010	0.0010	7014013			
Total Suspended Solids	mg/L	1200	10	7012882			
Dissolved Sulphate (SO4)	mg/L	780	5.0	7012694			
Total Cyanide (CN)	mg/L	<0.0050	0.0050	7014163			
Petroleum Hydrocarbons							
Total Oil & Grease	mg/L	<0.50	0.50	7015248			
Total Oil & Grease Mineral/Synthetic	mg/L	<0.50	0.50	7015251			
Metals							
Total Aluminum (Al)	mg/L	1.1	0.1	7016514			
Total Antimony (Sb)	mg/L	<0.02	0.02	7016514			
Total Arsenic (As)	mg/L	<0.01	0.01	7016514			
Total Beryllium (Be)	mg/L	<0.0005	0.0005	7016514			
Total Cadmium (Cd)	mg/L	<0.002	0.002	7016514			
Total Chromium (Cr)	mg/L	<0.01	0.01	7016514			
Total Cobalt (Co)	mg/L	<0.002	0.002	7016514			
Total Copper (Cu)	mg/L	0.02	0.01	7016514			
Total Iron (Fe)	mg/L	1.4	0.02	7016514			
Total Lead (Pb)	mg/L	<0.01	0.01	7016514			
Total Manganese (Mn)	mg/L	0.11	0.001	7016514			
Mercury (Hg)	mg/L	<0.00010	0.00010	7016515			
Total Molybdenum (Mo)	mg/L	0.010	0.005	7016514			
Total Nickel (Ni)	mg/L	<0.005	0.005	7016514			
Total Phosphorus (P)	mg/L	0.06	0.05	7016514			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C0R5786
Report Date: 2020/10/27

S2S Environmental Inc
Client Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your P.O. #: PN20-9550.AC.05
Sampler Initials: DWB

HALTON SANITARY & COMBINED SEWER (2-03)

BV Labs ID		NYB216			NYB216		
Sampling Date		2020/10/20 12:48			2020/10/20 12:48		
COC Number		797660-01-01			797660-01-01		
	UNITS	BH5	RDL	QC Batch	BH5 Lab-Dup	RDL	QC Batch
Total Selenium (Se)	mg/L	<0.02	0.02	7016514			
Total Silver (Ag)	mg/L	<0.01	0.01	7016514			
Total Tin (Sn)	mg/L	<0.02	0.02	7016514			
Total Titanium (Ti)	mg/L	0.016	0.005	7016514			
Total Zinc (Zn)	mg/L	0.012	0.005	7016514			
Polyaromatic Hydrocarbons							
Naphthalene	ug/L	<0.050	0.050	7015081			
Volatile Organics							
Benzene	ug/L	<0.40	0.40	7011881			
Chloroform	ug/L	<0.40	0.40	7011881			
1,4-Dichlorobenzene	ug/L	<0.80	0.80	7011881			
Ethylbenzene	ug/L	<0.40	0.40	7011881			
Methylene Chloride(Dichloromethane)	ug/L	<4.0	4.0	7011881			
Tetrachloroethylene	ug/L	<0.40	0.40	7011881			
Toluene	ug/L	<0.40	0.40	7011881			
Trichloroethylene	ug/L	<0.40	0.40	7011881			
Surrogate Recovery (%)							
D10-Anthracene	%	127		7015081			
D14-Terphenyl (FS)	%	80		7015081			
D8-Acenaphthylene	%	103		7015081			
4-Bromofluorobenzene	%	87		7011881			
D4-1,2-Dichloroethane	%	98		7011881			
D8-Toluene	%	100		7011881			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C0R5786
Report Date: 2020/10/27

S2S Environmental Inc
Client Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your P.O. #: PN20-9550.AC.05
Sampler Initials: DWB

HALTON STORM SEWER BYLAW (2-03)

BV Labs ID		NYB216		
Sampling Date		2020/10/20 12:48		
COC Number		797660-01-01		
	UNITS	BH5	RDL	QC Batch
Microbiological				
Escherichia coli	CFU/100mL	<10	10	7010925

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: C0R5786
Report Date: 2020/10/27

S2S Environmental Inc
Client Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your P.O. #: PN20-9550.AC.05
Sampler Initials: DWB

TEST SUMMARY

BV Labs ID: NYB216
Sample ID: BH5
Matrix: Water

Collected: 2020/10/20
Shipped:
Received: 2020/10/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	7011907	2020/10/21	2020/10/26	Navjot Kaur Gill
Total Cyanide	SKAL/CN	7014163	2020/10/22	2020/10/22	Louise Harding
Fluoride	ISE	7010867	2020/10/21	2020/10/22	Surinder Rai
Mercury in Water by CVAA	CV/AA	7016515	2020/10/23	2020/10/23	Prempal Bhatti
Total Metals Analysis by Axial ICP	ICPX	7016514	2020/10/23	2020/10/23	Jolly John
E.coli, (CFU/100mL)	PL	7010925	N/A	2020/10/20	Sirimathie Aluthwala
Animal and Vegetable Oil and Grease	BAL	7009242	N/A	2020/10/22	Automated Statchk
Total Oil and Grease	BAL	7015248	2020/10/22	2020/10/22	Gurseerat singh gill
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7015081	2020/10/22	2020/10/23	Mitesh Raj
pH	AT	7010872	2020/10/21	2020/10/22	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7014013	N/A	2020/10/22	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	7012694	N/A	2020/10/22	Deonarine Ramnarine
Total Kjeldahl Nitrogen in Water	SKAL	7013331	2020/10/21	2020/10/26	Rajni Tyagi
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	7015251	2020/10/22	2020/10/22	Gurseerat singh gill
Total Suspended Solids	BAL	7012882	2020/10/21	2020/10/23	Shaneil Hall
Volatile Organic Compounds in Water	GC/MS	7011881	N/A	2020/10/22	Chandni Khawas

BV Labs ID: NYB216 Dup
Sample ID: BH5
Matrix: Water

Collected: 2020/10/20
Shipped:
Received: 2020/10/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	7011907	2020/10/21	2020/10/26	Navjot Kaur Gill

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BV Labs Job #: C0R5786
Report Date: 2020/10/27

S2S Environmental Inc
Client Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your P.O. #: PN20-9550.AC.05
Sampler Initials: DWB

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	9.0°C

Sample NYB216 [BH5] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: C0R5786
Report Date: 2020/10/27

QUALITY ASSURANCE REPORT

S2S Environmental Inc
Client Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your P.O. #: PN20-9550.AC.05
Sampler Initials: DWB

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7011881	4-Bromofluorobenzene	2020/10/22	94	70 - 130	93	70 - 130	90	%				
7011881	D4-1,2-Dichloroethane	2020/10/22	103	70 - 130	99	70 - 130	100	%				
7011881	D8-Toluene	2020/10/22	104	70 - 130	107	70 - 130	99	%				
7015081	D10-Anthracene	2020/10/23	124	50 - 130	127	50 - 130	128	%				
7015081	D14-Terphenyl (FS)	2020/10/23	94	50 - 130	110	50 - 130	110	%				
7015081	D8-Acenaphthylene	2020/10/23	104	50 - 130	106	50 - 130	105	%				
7010867	Fluoride (F-)	2020/10/22	91	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
7010872	pH	2020/10/22			102	98 - 103			0.20	N/A		
7011881	1,4-Dichlorobenzene	2020/10/22	99	70 - 130	104	70 - 130	<0.40	ug/L				
7011881	Benzene	2020/10/22	90	70 - 130	91	70 - 130	<0.20	ug/L				
7011881	Chloroform	2020/10/22	91	70 - 130	92	70 - 130	<0.20	ug/L				
7011881	Ethylbenzene	2020/10/22	82	70 - 130	86	70 - 130	<0.20	ug/L				
7011881	Methylene Chloride(Dichloromethane)	2020/10/22	96	70 - 130	94	70 - 130	<2.0	ug/L				
7011881	Tetrachloroethylene	2020/10/22	81	70 - 130	85	70 - 130	<0.20	ug/L				
7011881	Toluene	2020/10/22	91	70 - 130	95	70 - 130	<0.20	ug/L				
7011881	Trichloroethylene	2020/10/22	90	70 - 130	91	70 - 130	<0.20	ug/L				
7011907	Total Carbonaceous BOD	2020/10/26					<2	mg/L	NC	30	95	85 - 115
7012694	Dissolved Sulphate (SO4)	2020/10/22	NC	75 - 125	103	80 - 120	<1.0	mg/L	0.92	20		
7012882	Total Suspended Solids	2020/10/23					<10	mg/L	NC	25	95	85 - 115
7013331	Total Kjeldahl Nitrogen (TKN)	2020/10/26	NC	80 - 120	94	80 - 120	<0.10	mg/L	3.2	20	93	80 - 120
7014013	Phenols-4AAP	2020/10/22	103	80 - 120	94	80 - 120	<0.0010	mg/L	NC	20		
7014163	Total Cyanide (CN)	2020/10/23	90	80 - 120	94	80 - 120	<0.0050	mg/L	NC	20		
7015081	Naphthalene	2020/10/23	110	50 - 130	99	50 - 130	<0.050	ug/L	NC	30		
7015248	Total Oil & Grease	2020/10/22			97	85 - 115	<0.50	mg/L	1.3	25		
7015251	Total Oil & Grease Mineral/Synthetic	2020/10/22			93	85 - 115	<0.50	mg/L	4.2	25		
7016514	Total Aluminum (Al)	2020/10/23	NC	80 - 120	102	80 - 120	<0.1	mg/L	2.4	20		
7016514	Total Antimony (Sb)	2020/10/23	104	80 - 120	99	80 - 120	<0.02	mg/L	NC	20		
7016514	Total Arsenic (As)	2020/10/23	106	80 - 120	100	80 - 120	<0.01	mg/L	NC	20		
7016514	Total Beryllium (Be)	2020/10/23	104	80 - 120	100	80 - 120	<0.0005	mg/L				
7016514	Total Cadmium (Cd)	2020/10/23	106	80 - 120	101	80 - 120	<0.002	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7016514	Total Chromium (Cr)	2020/10/23	101	80 - 120	98	80 - 120	<0.01	mg/L	NC	20		
7016514	Total Cobalt (Co)	2020/10/23	99	80 - 120	98	80 - 120	<0.002	mg/L	NC	20		
7016514	Total Copper (Cu)	2020/10/23	103	80 - 120	99	80 - 120	<0.01	mg/L	0.52	20		
7016514	Total Iron (Fe)	2020/10/23	NC	80 - 120	103	80 - 120	<0.02	mg/L				
7016514	Total Lead (Pb)	2020/10/23	98	80 - 120	99	80 - 120	<0.01	mg/L	NC	20		
7016514	Total Manganese (Mn)	2020/10/23	99	80 - 120	99	80 - 120	<0.001	mg/L	0.91	20		
7016514	Total Molybdenum (Mo)	2020/10/23	101	80 - 120	98	80 - 120	<0.005	mg/L	0.57	20		
7016514	Total Nickel (Ni)	2020/10/23	99	80 - 120	99	80 - 120	<0.005	mg/L	0.53	20		
7016514	Total Phosphorus (P)	2020/10/23	110	80 - 120	102	80 - 120	<0.05	mg/L	0.68	20		
7016514	Total Selenium (Se)	2020/10/23	108	80 - 120	101	80 - 120	<0.02	mg/L	NC	20		
7016514	Total Silver (Ag)	2020/10/23	96	80 - 120	94	80 - 120	<0.01	mg/L	NC	20		
7016514	Total Tin (Sn)	2020/10/23	99	80 - 120	99	80 - 120	<0.02	mg/L	NC	20		
7016514	Total Titanium (Ti)	2020/10/23	101	80 - 120	99	80 - 120	<0.005	mg/L	NC	20		
7016514	Total Zinc (Zn)	2020/10/23	100	80 - 120	99	80 - 120	<0.005	mg/L	0.040	20		
7016515	Mercury (Hg)	2020/10/23	97	75 - 125	98	80 - 120	<0.00010	mg/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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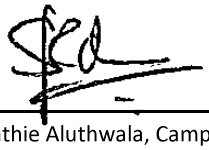
BV Labs Job #: C0R5786
Report Date: 2020/10/27

S2S Environmental Inc
Client Project #: 9550
Site Location: 3043 SIXTH LANE, OAKVILLE
Your P.O. #: PN20-9550.AC.05
Sampler Initials: DWB

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist



Sirimathie Aluthwala, Campobello Micro

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#12599 S2S Environmental Inc	Company Name:		Quotation #:	C01665	BV Labs Job #:	Bottle Order #: 797660
Attention:	INVOICES	Attention:	Rachel Baldwin	P.O. #:	PN20-9550.AC.05		
Address:	1099 Kingston Rd Suite 260	Address:		Project:	~~PN20-9550.AC.05~~ 9550	COC #:	Project Manager:
	Pickering ON L1V 1B5			Project Name:	3043 Sixth Line, Oakville	C#797660-01-01	Deepthi Shaji
Tel:	(416) 410-4333 Fax: (416) 410-4088	Tel:	(416) 410-4333 Fax:	Site #:			
Email:	invoices@s2se.com	Email:	rbaldwin@s2se.com	Sampled By:	DWB		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☒ Sanitary Sewer Bylaw
- ☐ Reg 558 ☒ Storm Sewer Bylaw
- ☐ MISA Municipality: Halton
- ☐ PWQO ☐ Reg 406 Table ___
- ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Halton Sanitary & Combined Sewer (2-03)	Halton Storm Sewer Bylaw (2-03)	# of Bottles	Comments
1		BH5	2020/10/20	12:48	GW	NO	X	Y	15	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ *(call lab for #)*

20-Oct-20 16:38
Deepthi Shaji
C0R5786
GK1 ENV-861

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Derek Bullock / Derek Bullock	20/10/20	15:45	[signature] Khalid Wuniah	20/10/20	1638	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	8 8 11 Ice	Present		
		Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

APPENDIX F

DEWATERING CALCULATIONS

Short-Term Dewatering Calculations (Powers, 2007):

$$Q = \frac{\pi K\ (H^2 - h^2)}{In(Ro/rw)}$$

Where:

Q	Pumping rate, m^3/sec
K	Hydraulic conductivity (fractured shale, 9.9×10^{-8} m/s)
H	Hydraulic head of the original water table, m (6.19 m)
h	Hydraulic head at maximum dewatering, m (3.00 m)
R_o	Radius of influence, m (3.0 + 28.2 = 31.2 m)
r_w	Equivalent radius of the well, m (28.2 m)

$$R_o = 3000\ (H\text{-}h)\ \sqrt{K}$$

$$r_w = \sqrt{(ab/\pi)}$$

ab Area of excavation, m^2 (2,500 m^2)

Calculated dewatering rate will be Q = 9.01×10^{-5} m^3/s (7,789 L/day), excluding any safety factor.

Long-Term Dewatering Calculations (Powers, 2007):

$$Q = \frac{\pi K\,(H^2 - h^2)}{In(Ro/rw)}$$

Where:

Q	Pumping rate, m^3/sec
K	Hydraulic conductivity (fractured shale, 9.9×10^{-8} m/s)
H	Hydraulic head of the original water table, m (6.19 m)
h	Hydraulic head at maximum dewatering, m (3.50 m)
R_o	Radius of influence, m (2.5 + 28.2 = 28.2 m)
r_w	Equivalent radius of the well, m (28.2 m)

$$R_o = 3000\,(H-h)\,\sqrt{K}$$

$$r_w = \sqrt{(ab/\pi)}$$

ab Area of excavation, m^2 (2,500 m^2)

Calculated dewatering rate will be Q = 9.43×10^{-5} m^3/s (8,149 L/day), excluding any safety factor.