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Hydrogeology Study Report

Proposed Residential Development
Country Club Estates of Wellington
Part of Lots 1, 2 and 3, Concession LS and Part of Lot 1, Concession NWSWL
Wellington Township, Prince Edward County

Report for 22380052 Ontario Ltd.

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1. Introduction

This report presents the results of a hydrogeologic study completed for a proposed residential and commercial development located on Part of Lots 1, 2 and 3 of Concession LS and Part of Lot 1 of Concession NWSWL of Wellington Township in Prince Edward County (herein referred to as the Site). Reference is made to the previous report: “Proposed Residential Development, Country Club Estates of Wellington, Part of Lots 1, 2 and 3, Concession LS and Part of Lot 1, Concession NWSWL, Wellington Township, Prince Edward County” (the “Report”) prepared by GHD Limited, dated March 9, 2018. Information has since been provided on adjacent properties to the east that flag potential concerns relative to the groundwater that warranted further investigation.

2. Background Information

The Site is located on the east and west sides of Belleville Street (County Road No. 2), north of the community of Wellington. The Site encompasses a total area of approximately 105 hectares (ha); with about 18 ha located on the east side of County Road No. 2, and the remaining 87 ha located on the west side of County Road No. 2. The work was conducted at the request of 22380052 Ontario Ltd (the Client).

The development is identified as Country Club Estates of Wellington, and is intended to include single family residential lots, medium density townhouse lots, a high density apartment complex, several parks, lots for future development and a golf course. The development is to be municipally serviced. There are no privately serviced water wells or septic beds currently or proposed for the Site.

A hydrogeological report was completed in March 2018 regarding the proposed development and the presence of waste disposal sites (WDS) within 500m of the development. Based on the information available and the inferred shallow and deeper groundwater flow directions the potential for impact from the WDS's was considered low. Since that time an adjacent property owner indicated impacts to the property to the west of the proposed development. The impact appears to be related to VOC's from the municipal WDS to the north. In order to assess potential impacts to the proposed developed additional work was completed that included installing monitoring wells, evaluating groundwater flow direction and testing the groundwater.

3. Scope of Investigation

In order to address potential concerns relative to information provided on adjacent properties, the following additional work scope was as follows:

1. Perform a subsurface exploration program to tap into shallow groundwater sources and install monitoring wells focusing on the property limits between the proposed development and identified off site concerns.



2. Utilize the monitoring wells to facilitate the monitoring of groundwater levels, establish groundwater gradients and to sample the existing groundwater sources for volatile organic compounds (VOCs) and landfill leachate indicator parameters.
3. Evaluate the reported groundwater results and assess the suitability of the planned development, with regards to the potential water quality impacts caused by areas of potential concern within 500 meters of the study area.

4. Methodology

For the groundwater monitoring program, a total of twelve (12) monitoring wells were installed on site using air percussion drilling methods on May 7 and 8, 2018. Monitoring wells were installed in each of the boreholes. The monitoring well locations are shown on the Monitoring Well Location Plan, Figure 1. Detailed logs of the subsurface conditions encountered during the drilling program are included in Appendix A. GHD collected groundwater samples and measured groundwater levels from the onsite monitors on May 11, 2018.

The samples were collected into laboratory prepared bottles wearing fresh nitrile gloves for each sample utilizing low flow sampling techniques. The samples were analyzed for volatile organic compounds (VOCs). The samples were kept cool until delivery to SGS Laboratories located in Lakefield, an accredited laboratory with the Canadian Association for Laboratory Accreditation (CALA) for the parameters tested. The Laboratory Certificates of Analysis are located in Appendix B.

5. Subsurface Exploration

5.1 Monitoring Well Installation

The subsurface stratigraphy was investigated by drilling a total of twelve (12) boreholes on site using air percussion drilling methods on May 7 and 8, 2018. The soils encountered generally consisted of surficial topsoil material with an underlying thin layer of clayey silt that graded to weathered, fractured limestone bedrock. The limestone bedrock was observed to become more competent below approximately 2 to 3 metres in depth.

Two separate water seepage zones were encountered during the subsurface exploration program, identified as:

1. Shallow water zone tapping surficial infiltration into the upper fractured and weathered portion of the limestone, and
2. Deeper water zone tapping discrete water bearing fracture network in the underlying limestone bedrock.



Four (4) of the locations, BH-1, BH-3, BH-6 and BH-8 were selected to have monitors installed to tap both the shallow water sources and deeper water sources in the limestone bedrock. The monitoring wells were differentiated with the suffix S, i.e. BH-1S, for the shallow monitoring well and D, i.e. BH-1D, for the deeper monitoring well. Details of the subsurface conditions encountered are presented graphically in Appendix A.

It should be noted that the boundaries between the strata have been inferred from the borehole observations. They generally represent a transition from one soil type to another, and should not be inferred to represent an exact plane of geological change. Further, conditions may vary between and beyond the boreholes.

5.2 Groundwater

Water seepage was present within the silty clay and sand till within all the boreholes except BH-6. Monitoring wells were installed in four of the boreholes in order to facilitate monitoring of water levels. The wells were screened to intersect water where seepage was occurring. A summary of the monitoring well details including water seepage depth is provided in Table 4.2:

Table 4.2 Summary of Monitoring Well Information

Location	Depth of Well (m)	Pipe Stick Up (m)	Well Screen Interval ¹ (m)	Water Seepage Depth ² (m)
BH-1S	1.2	0.8	0.5 – 1.2	~0.6
BH-2D	4.3	0.8	2.7 – 4.3	~4.0
BH-2	4.0	0.8	2.5 – 4.0	~3.2
BH-3S	2.3	0.9	1.7 – 2.3	~2.1
BH-3D	5.6	0.9	4.1 - 5.6	~4.3
BH-4	3.5	0.9	3.5 – 2.0	~2.4
BH-5	6.4	0.8	6.4 – 4.9	~5.6
BH-6S	2.9	0.8	2.9 – 1.4	~1.8 - 2.4
BH-6D	6.4	0.8	6.4 – 4.9	~5.5
BH-7	2.9	0.9	2.9 – 1.4	~2.3
BH-8S	1.4	0.8	1.4 – 0.9	~1.2
BH-8D	3.2	0.8	3.2 – 1.7	~2.4

Notes: m = metres; ¹Effective well screen includes 10-slot screen. NR = Indications of seepage not observed during the drilling activities.

²Water seepage depth is the estimated depth where water was encountered during the drilling activities

Groundwater potentiometric water levels were measured on May 11, 2018 and the data is summarized in Table 4.3. Monitoring well elevations were provided by the client based on site survey information obtained on May 24, 2018.



Table 4.3 Potentiometric Water Level Summary

Location	Ground Elevation* (masl)	Water Level (mbgs)		GW Elevation (masl) (May 11, 2018 only)
		May 9, 2018	May 11, 2018	
BH-1S	85.52	0.45	0.34	85.18
BH-1D	85.51	0.88	1.42	84.09
BH-2	87.22	1.43	1.59	85.63
BH-3S	88.46	2.12	2.15	86.31
BH-3D	88.51	2.40	2.54	85.97
BH-4	90.80	2.39	3.15	87.65
BH-5	90.86	2.96	3.08	87.78
BH-6S	91.09	0.75	0.84	90.25
BH-6D	91.09	1.88	3.06	88.03
BH-7	93.66	0.72	0.71	92.95
BH-8S	91.28	0.44	0.76	90.52
BH-8D	91.29	0.71	0.76	90.53

Notes: mbgs = metres below ground surface; masl = metres above sea level; GW = groundwater; *Elevations interpolated from MNR's Ontario base mapping contours. The elevations provided are for the purposes of evaluating groundwater elevation and flow direction and should not be relied upon as a legal survey or topographic elevation survey.

Based upon the water level data collected and the topography of the Site, the shallow groundwater flow direction mimics the surficial contours directed toward Lake Ontario to the south. It should be noted that the water levels presented in this report represent potentiometric surface elevations and do not indicate that there is a water table as shallow as the water levels indicated in Table 4.3. Seepage zones were deeper than the measured water levels and water will not be encountered unless the water zones are excavated into. The groundwater gradient interpreted from the fracture network in the limestone was 0.01 across the Site.

It is GHD's opinion that the shallow aquifer at the Site is directly associated with surficial infiltration impact and would be anticipated to be encountered within the first 2 metres of surface within the weathered and fractured surficial limestone bedrock. It is expected that once competent limestone bedrock is encountered groundwater seepage will be encountered at depths ranging from 3.2 to 6.4 m. It should be noted that shallow groundwater levels are transient and tend to fluctuate with the seasons, periods of precipitation and temperature.



6. Water Quality Data

Each of the monitors were sampled using low flow sampling techniques for the parameters of volatile organic compounds (VOCs) and landfill indicator parameters. Monitor BH-3S was purged dry during the sampling event and did not have adequate recovery for sampling. Monitor BH-4 did not have adequate volume after the VOC sampling to collect a sample for the suite of landfill monitoring parameters. The results of the chemical analyses are presented on Tables 6.1 and 6.2, and are compared to MOECC Table 7 Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition (“Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, April 15, 2011), for all types of Property use.



Table 6.1: Water Quality Summary – May 2018

Parameter	Monitoring Well Identification											MOECC Table 7 ⁽¹⁾
	BH-1S 05/11/18	BH-1D 05/11/18	BH-2 05/11/18	BH-3D 05/11/18	BH-4 05/11/18	BH-5 05/11/18	BH-6S 05/11/18	BH-6D 05/11/18	BH-7 05/11/18	BH-8S 05/11/18	BH-8D 05/11/18	
Acetone	< 30	< 30	< 30	< 30	< 30	< 30	< 30	39	< 30	< 30	< 30	100,000
Bromomethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.89
Carbon tetrachloride	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2
Chlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	140
Chloroform	< 0.5	< 0.5	< 0.5	< 0.5	1.1	< 0.5	1.9	2.1	1.2	5.1	< 0.5	2
1,2-Dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	150
1,3-Dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7,600
1,4-Dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
Dichlorodifluoromethane	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	3,500
1,1-Dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	11
1,2-Dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
1,1-Dichloroethylene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
trans-1,2-Dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.6
cis-1,2-Dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.6
1,2-Dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.58
cis-1,3-Dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---
trans-1,3-Dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---
1,3-dichloropropene (total)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
Ethylenedibromide	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2
n-Hexane	< 1	1.3	< 1	< 1	1.6	< 1	< 1	2.6	< 1	< 1	< 1	5
Methyl ethyl ketone	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	21,000
Methyl Isobutyl Ketone	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	5,200
Methyl-t-butyl Ether	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	15
Methylene Chloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	26
Styrene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	43
Tetrachloroethylene (perchloroethylene)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5



Parameter	Monitoring Well Identification											MOECC Table 7 ⁽¹⁾
	BH-1S 05/11/18	BH-1D 05/11/18	BH-2 05/11/18	BH-3D 05/11/18	BH-4 05/11/18	BH-5 05/11/18	BH-6S 05/11/18	BH-6D 05/11/18	BH-7 05/11/18	BH-8S 05/11/18	BH-8D 05/11/18	
1,1,1,2-Tetrachloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.1
1,1,2,2-Tetrachloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
1,1,1-Trichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	23
1,1,2-Trichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
Trichloroethylene	< 0.5	< 0.5	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
Trichlorofluoromethane	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	2,000
Vinyl Chloride	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5
BTEX (VOCs)	***	***	***	***	***	***	***	***	***	***	***	
Benzene	< 0.5	< 0.5	< 0.5	2.5	1.3	< 0.5	< 0.5	38.5	< 0.5	< 0.5	< 0.5	0.5
Ethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	2.5	< 0.5	< 0.5	< 0.5	54
Toluene	< 0.5	2.2	< 0.5	9.3	4.7	0.6	< 0.5	81.2	0.9	< 0.5	1.8	320
Xylene (total)	< 0.5	5.9	< 0.5	9.0	13.0	1.6	0.6	48.0	0.9	< 0.5	3.7	72
m/p-xylene	< 0.5	4.6	< 0.5	6.8	10.2	1.2	0.6	37.1	0.7	< 0.5	2.9	---
o-xylene	< 0.5	1.3	< 0.5	2.2	2.8	< 0.5	< 0.5	10.9	< 0.5	< 0.5	0.8	---
THMs (VOCs)	***	***	***	***	***	***	***	***	***	***	***	
Bromodichloromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8	< 0.5	67,000
Bromoform	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Dibromochloromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	65,000

Notes: all values in ug/l (ppb), unless otherwise noted. (<) denotes less than laboratory detection limits

(1) Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition. Soil, Ground Water and Sediment Standards for All Types of Property Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011.

Bold – Indicates parameter that exceeds MOECC Table 7 Subsurface criteria



Table 6.2: Water Quality Summary (Landfill Monitoring Suite) – May 2018

Parameter	Monitoring Well Identification											MOECC Table 7 ⁽¹⁾
	BH-1S 05/11/18	BH-1D 05/11/18	BH-2 05/11/18	BH-3D 05/11/18	BH-5 05/11/18	BH-5 05/11/18 Duplicate	BH-6S 05/11/18	BH-6D 05/11/18	BH-7 05/11/18	BH-8S 05/11/18	BH-8D 05/11/18	
Alkalinity	216	200	217	199	246	240	220	264	239	186	208	---
Colour	3	<3	<3	3	<3	<3	3	3	3	4	3	---
Conductivity (µmhos/cm)	478	485	518	545	549	544	509	793	507	412	496	NA
pH	7.96	8.11	8.87	8.04	7.90	7.79	7.98	8.09	7.96	8.00	7.88	5< - >9
Turbidity (NTU)	0.78	0.73	0.32	0.73	0.71	0.34	0.12	0.67	0.63	0.45	0.52	---
Organic Nitrogen	0.74	0.71	0.10	0.50	0.09	0.14	0.74	0.51	0.50	0.46	0.62	---
TKN	0.75	0.91	0.11	0.73	0.12	0.16	0.77	1.41	0.54	0.48	0.64	---
Ammonia + Ammonium	<0.04	0.20	<0.04	0.23	<0.04	<0.04	<0.04	0.90	0.04	<0.04	<0.04	---
Dissolved Organic Carbon	2	2	2	2	2	1	2	4	2	2	2	---
Chloride	9.0	15	19	37	4.6	4.6	4.9	69	4.7	4.8	3.4	---
Fluoride	0.11	0.20	0.09	0.19	0.11	0.10	0.13	0.32	0.13	0.14	0.10	---
Nitrite	0.006	0.006	<0.003	<0.003	0.066	0.063	<0.003	0.004	<0.003	0.005	<0.003	---
Nitrate	5.85	6.04	5.85	6.27	3.00	2.98	8.70	0.310	5.24	5.23	10.3	---
Sulphate	10	18	16	18	45	46	19	80	18	20	17	---
Hardness	240	207	280	229	287	290	274	244	270	193	273	---
Aluminum	0.003	0.004	0.002	0.004	0.002	0.003	0.002	0.007	0.003	0.001	0.002	---
Arsenic	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0002	<0.0002	<0.0002	1.5
Boron	0.015	0.034	0.019	0.049	0.020	0.023	0.018	0.126	0.020	0.007	0.020	36
Barium	0.0275	0.0630	0.0732	0.0523	0.101	0.108	0.0596	0.0490	0.0619	0.0469	0.0569	23
Calcium	89.3	74.6	102	80.8	92.3	93.4	96.5	68.6	97.5	67.7	98.0	---
Cadmium	0.000006	0.000007	0.000009	0.000009	0.000007	0.000004	0.000005	0.000016	0.000004	0.000006	0.000005	2.1
Copper	0.00038	0.00251	0.00070	0.00161	0.00043	0.00039	0.00096	0.00271	0.00153	0.00028	0.00099	0.052

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Parameter	Monitoring Well Identification											MOECC Table 7 ⁽¹⁾
	BH-1S 05/11/18	BH-1D 05/11/18	BH-2 05/11/18	BH-3D 05/11/18	BH-5 05/11/18	BH-5 05/11/18 Duplicate	BH-6S 05/11/18	BH-6D 05/11/18	BH-7 05/11/18	BH-8S 05/11/18	BH-8D 05/11/18	
Chromium	0.00016	0.00016	0.00012	0.00016	<0.00003	<0.00003	0.00005	0.00016	0.00009	0.00009	0.00028	0.64
Iron	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	---
Potassium	0.877	2.50	0.891	4.36	1.86	1.87	0.963	12.2	1.83	0.123	2.54	---
Magnesium	4.24	5.15	6.45	6.59	13.7	13.9	8.12	17.7	6.42	5.74	7.00	---
Manganese	0.00072	0.111	0.0017	0.0383	0.0189	0.01881	0.0292	0.0117	0.0749	0.0276	0.0428	---
Sodium	3.93	21.0	9.73	22.0	3.13	3.23	6.23	68.4	12.6	10.8	4.85	---
Phosphorus	<0.003	0.010	<0.003	<0.003	<0.003	<0.003	0.003	0.004	0.010	<0.003	0.003	---
Lead	<0.00001	0.00025	0.00005	0.00006	0.00005	0.00005	0.00019	0.00010	0.00005	<0.00001	0.00007	0.02
Antimony	0.0003	0.0004	0.0003	0.0004	0.0003	0.0003	0.0004	0.0009	0.0004	0.0002	0.0004	16
Selenium	0.00033	0.00043	0.00060	0.00041	0.00016	0.00018	0.00080	0.00019	0.0047	0.00071	0.00065	0.05
Uranium	0.000465	0.000737	0.000661	0.000659	0.00252	0.00270	0.000846	0.000435	0.000932	0.00041	0.000519	0.33
Zinc	<0.002	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	0.89
Total Dissolved Solids	253	262	290	294	311	310	276	475	290	226	268	---

Notes: all values in ug/l (ppb), unless otherwise noted. (<) denotes less than laboratory detection limits

(2) Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition. Soil, Ground Water and Sediment Standards for All Types of Property Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011.

Bold – Indicates parameter that exceeds MOECC Table 7 Subsurface criteria



Based on the results of the chemical testing, the analyses indicate the majority of parameters meet the MOECC Table 7 criteria with the chemical results indicating the following parameters exceeded the MOECC criteria:

- Chloroform (BH-6D and BH-8S);
- Trichloroethylene (BH-2); and
- Benzene (BH-3D, BH-4 and BH-6D).

Chloroform is one of the trihalomethanes regularly found as a by-product of the chlorination of water and wastewater. A central drainage divide across the Site separates drainage directed toward the drainage swale (BH-8S) and off site toward BH-6D. With the recreational use (golf course) around BH-6D, the groundwater concern would be minimal. Additional monitors may need to be installed toward Belleville Street in order to address a migrating concern toward the proposed residential properties to the south.

Trichloroethylene was a contaminate of concern identified at the adjacent property. The reported level detected in BH-2 is marginally above the MOECC criteria / detection limit and was the only monitoring well to have detected trichloroethylene. No other parameters were reported above their detection limit at BH-2. At this stage, it appears to be isolated and not a trended concern from the results of the chemical testing.

The BTEX parameter group was also identified as contaminants of concern for the adjacent property. Results above the MOECC criteria were reported from monitoring wells tapping into the deeper competent limestone bedrock for Benzene only with detectable levels of the remaining parameters below the Table 7 SCS. The highest results were obtained from BH6-D located along the north west property boundary in the area of the proposed golf course. BH8-D located to the east, towards the proposed residential homes, is inferred to be hydraulically up gradient and was reported with non-detectable levels of Benzene. The chemical results from the shallow monitoring well, BH-6S, reported benzene levels below the detection limit.

The chemical results for the suite of landfill indicator parameters were compared with the MOECC Table 7 Site Condition Standards (SCS). No exceedances were reported however in general, chemical results the suite of parameters indicate that monitor BH-6D may be impacted by the landfill due to elevated conductivity, sodium, chloride and sulphate, that can be indicative of landfill monitoring target constituents for potential leachate plumes.



7. Summary and Recommendations

Based on the information obtained during the subsurface exploration program two different water formations were encountered, a shallow formation within the interface of the overburden and weather bedrock and a deeper formation within more competent bedrock. The results of the chemical testing indicate VOC's present in the deeper water formation with levels of trichloroethylene and benzene reported at levels that exceeded the MOECC criteria.

The chemical results indicate that the parameters exceeding the MOECC criteria are not associated with the shallow water source associated with the fractured and weathered surficial limestone layer but within the deeper tapped water source from the fracture network in the competent limestone. An assessment of the depth of footings and the need for a sump system should be completed to assess potential pathways however based on the observations during the subsurface exploration and the reported chemical results, the elevated parameters are present in the deeper water zone and the shallow water zone may act as a protective confining zone reducing the potential for an adverse effect on the proposed development.

7.1 Signatures

The following signatures are provided of GHD staff that prepared and conducted the Groundwater Monitoring. Mr. Nyle McIlveen, a Qualified Person within the meaning of the Environmental Protection Act and associated Regulation 153/04, has provided his opinion based on the information provided in this report.

Following the References section of this report is the Statement of Limitations. These limitations are an integral part of this report. Should questions arise regarding any aspect of our report, please contact our office.

Sincerely,

GHD

Steven Gagne, H.B.Sc.

Nyle McIlveen, P.Eng.

/pb



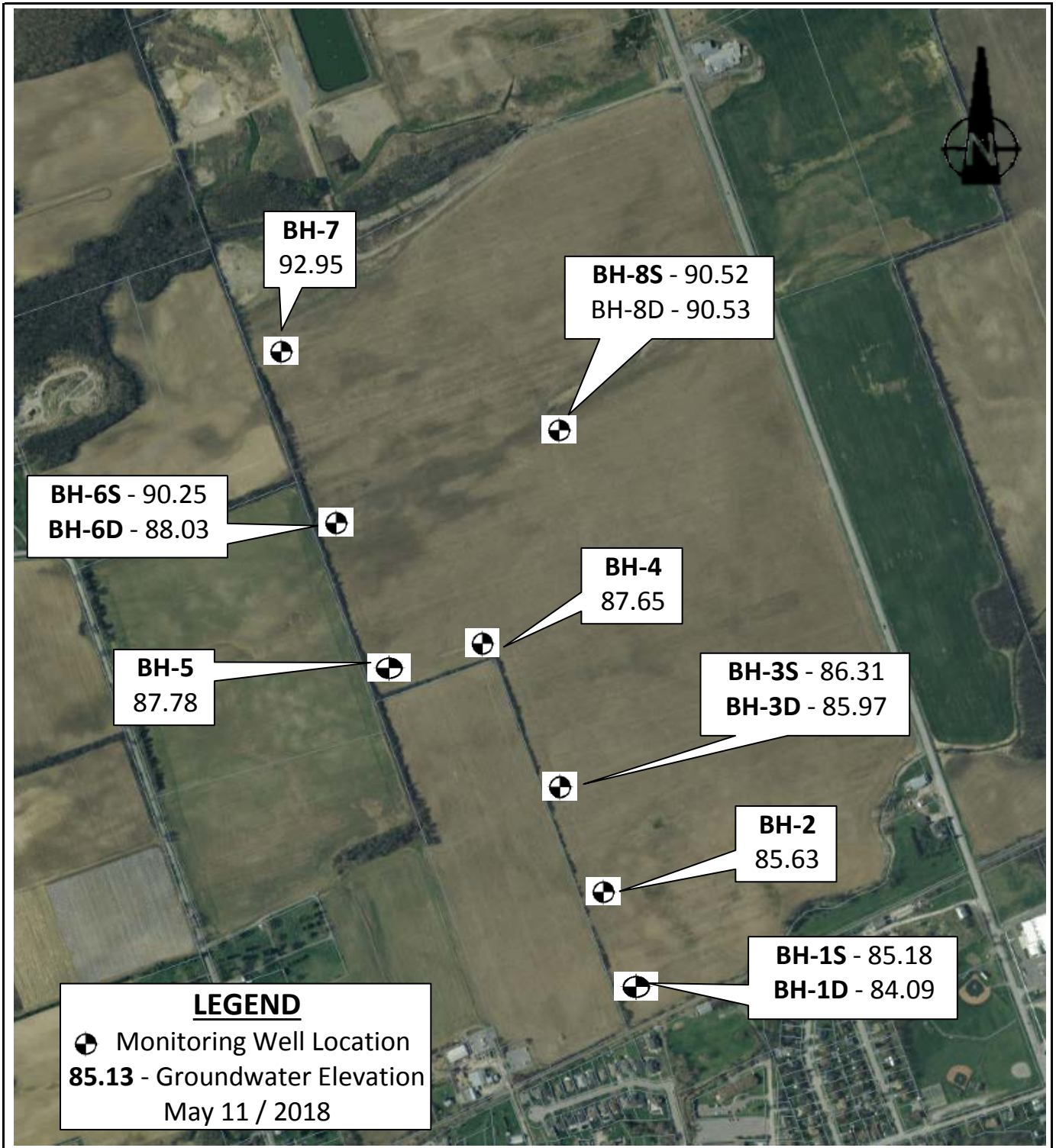
8. Statement of Limitations

This report is intended solely for 22380052 Ontario Ltd. in monitoring the groundwater at Part Lots 1, 2 and 3, Concession LS and Part of Lot 1, Concession NWSWL, Wellington Township, Prince Edward County, Ontario and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. Client shall defend, indemnify and hold GHD harmless from any liability arising from or related to 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 all supporting drawings and appendices.

The conclusions and recommendations made in this report are in accordance with our present understanding of the project, the current site use, surface and subsurface conditions, and are based on available information, a site reconnaissance on the date set out in the report, records review and interviews with appropriate people and the work scope approved by the Client and described in the report and should not be construed as a legal opinion. Therefore, our liability is limited to interpreting accurately the information made available to us and assessing the property information investigated during this Phase One ESA. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of environmental 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 responsibility of such third parties.

If conditions at the Property change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Enclosures



2238052 Ontario Ltd., Hydrogeological Investigation
 Country Club Estates of Wellington
 Part of Lots 1, 2 and 3, Concession LS and Part of Lot 1, Concession NWSW
 Monitoring Well Location Plan

PROJECT NO.
 11156025-02
 DATE
 18-05-29

FIGURE NO. 1

Appendix A

Soils Exploration Data



BOREHOLE No.: BH-1D
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

LEGEND

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

LOGGED BY: PB DATE: 8 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

NOTES: _____

UTM: 17T 311547E 4869859N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	RQD CONE	COMMENTS	
	ft	m								w _p	w _L	Field	Lab	Field	Lab				
		0.0		GROUND SURFACE		%	%	ppm	N	10	20	30	40	50	60	70	80	90	
		0.18		TOPSOIL Dark Brown Silty Topsoil with Organics															
1				LIMESTONE Fractured/Weathered Limestone	1				32										
2																			Seepage at 0.6 m
3		1.0																	
4		1.22		LIMESTONE															Water Level - 1.42m on May 11, 2018
5																			
6		2.0																	
7																			
8																			
9																			
10		3.0																	Water Encountered at 2.7m
11																			
12																			
13		4.0																	Water Bearing Fracture at 4.0m
14		4.27		END OF BOREHOLE															
15																			
16		5.0																	
17																			
18																			
19		6.0																	
20																			
21																			

BOREHOLE LOG ENVIRO 11156025-02, HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



BOREHOLE No.: BH-1S
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

LOGGED BY: PB DATE: 8 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

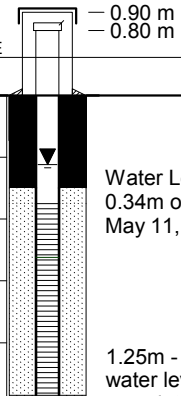
NOTES: _____

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: 17T 311547E 4869859N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	RQD CONE	Field Lab	COMMENTS	
	ft	m								w _p	w _L	U _c	U _L	U ₁₀	U ₂₀					
	0.0			GROUND SURFACE		%	%	ppm	N	10	20	30	40	50	60	70	80	90		
		0.30		TOPSOIL Dark Brown Silty Topsoil with Organics																
1				LIMESTONE Fractured/Weathered Limestone Seepage at 0.6 m																
2																				
3		1.0																		
4																				
5		1.48		END OF BOREHOLE																
6																				
7		2.0																		
8																				
9																				
10		3.0																		
11																				
12																				
13		4.0																		
14																				
15		5.0																		
16																				
17																				
18																				
19		6.0																		
20																				
21																				



Water Level - 0.34m on May 11, 2018

1.25m - Depth of water level upon completion of well installation

BOREHOLE LOG ENVIRO 11156025-02. HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



BOREHOLE No.: BH-2
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

LOGGED BY: PB DATE: 8 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

NOTES: _____

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: 17T 311513E 4869949N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	RQD CONE	Field / Lab	COMMENTS	
	ft	m								w _p	w _L	U _C	U _L	U ₁₀₀	U ₂₀₀					
		0.0		GROUND SURFACE		%	%	ppm	N	10	20	30	40	50	60	70	80	90		
		0.53		TOPSOIL Dark Brown Silty Topsoil with Organics	1				7											
		1.0		LIMESTONE Fractured/Weathered Limestone																
		1.37		LIMESTONE																
		2.0																		
		3.0																		
		4.0																		
		4.04		END OF BOREHOLE																



Water Level - 1.59m on May 11, 2018

2.23m - Depth of water level upon completion of well installation

Clay Seam at 2.3 m

Water bearing Fractures at 2.8 to 3.1 m

BOREHOLE LOG ENVIRO 11156025-02. HYDROG BOREHOLE LOGS. SK.GPJ GEOLOGIC.GDT 30/5/18



BOREHOLE No.: BH-3S
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

LEGEND

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

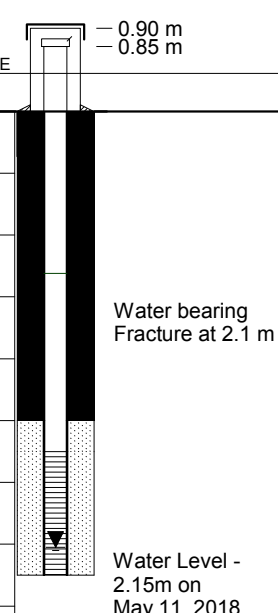
LOGGED BY: PB DATE: 8 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

NOTES: _____

UTM: 17T 311499E 4870022N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	RQD CONE	Field Lab	COMMENTS
	ft	m								w _p	w _L	U _c	U _L	U ₁₀₀	U ₂₀₀				
	0.0			GROUND SURFACE															
		0.46		TOPSOIL Dark Brown Silty Topsoil with Organics		%	%	ppm	N	10	20	30	40	50	60	70	80	90	
1																			
2				LIMESTONE Fractured/Weathered Limestone															
3		1.0																	
4																			
5																			
6		2.0																	
7																			
8		2.29		END OF BOREHOLE															
9																			
10		3.0																	
11																			
12																			
13		4.0																	
14																			
15																			
16		5.0																	
17																			
18																			
19		6.0																	
20																			
21																			



BOREHOLE LOG ENVIRO 11156025-02. HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



BOREHOLE No.: BH-4
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

LEGEND

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

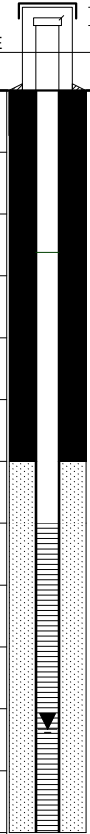
LOGGED BY: PB DATE: 8 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

NOTES: _____

UTM: 17T 311413E 4870223N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	RQD CONE	COMMENTS	
	ft	m								w _p	w _L	U _c	U _L	Field	Lab				
	0.0			GROUND SURFACE		%	%	ppm	N	10	20	30	40	50	60	70	80	90	
		0.30		TOPSOIL Dark Brown Silty Topsoil with Organics	1				7										
1				LIMESTONE Fractured/Weathered Limestone															
2																			
3		1.0																	
4																			
5		1.52		LIMESTONE															
6																			
7		2.0																	
8																			
9																			
10		3.0																	
11																			
12		3.66		END OF BOREHOLE															
13		4.0																	
14																			
15																			
16		5.0																	
17																			
18																			
19		6.0																	
20																			
21																			



Water Level - 3.15m on May 11, 2018
 3.24m - Depth of water level upon completion of well installation

BOREHOLE LOG ENVIRO 11156025-02, HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



BOREHOLE No.: BH-5
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

LEGEND

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

LOGGED BY: PB DATE: 8 May 2018

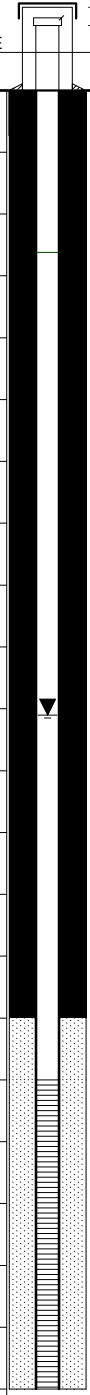
DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

NOTES: _____

UTM: 17T 311220E 4870257N

BOREHOLE LOG ENVIRO 11156025-02, HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	RQD CONE	Field Lab	COMMENTS	
	ft	m								w _p	w _L	U _C	U _L	U ₂₀	U ₁₀					
		0.0		GROUND SURFACE		%	%	ppm	N	10	20	30	40	50	60	70	80	90		
		0.61		TOPSOIL Dark Brown Silty Topsoil with Organics	1				10	*										
		1.0		LIMESTONE Fractured/Weathered Limestone																
		1.22		LIMESTONE																
		2.0																		
		3.0																		
		4.0																		
		5.0																		
		6.0																		
		6.40		END OF BOREHOLE																





BOREHOLE No.: BH-6D
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

LOGGED BY: PB DATE: 9 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

NOTES: _____

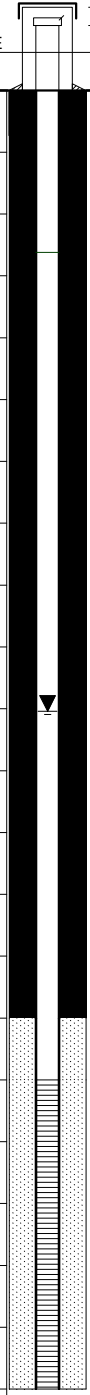
LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: 17T 311171E 4870405N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	RQD	Field / Lab	COMMENTS	
	ft	m								w _p	w _L	U _C	U _L	△	□					
	0.0			GROUND SURFACE		%	%	ppm	N	10	20	30	40	50	60	70	80	90		
		0.0		TOPSOIL Dark Brown Silty Topsoil with Organics	1				8	X										
		0.53		LIMESTONE Fractured/Weathered Limestone																
		1.0																		
		1.37		LIMESTONE																
		2.0																		
		3.0																		
		4.0																		
		5.0																		
		6.0																		
		6.40		END OF BOREHOLE																

BOREHOLE LOG ENVIRO 11156025-02, HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



Clay Seam at 2.3m
 Minimal Water at 2.6m
 Water Level - 3.06m on May 11, 2018
 Fracturing at 3.6m - No substantial water
 Fracturing at 4.2m - No substantial water
 Water Bearing Fracture at 5.5m



BOREHOLE No.: BH-6S
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

LOGGED BY: PB DATE: 9 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

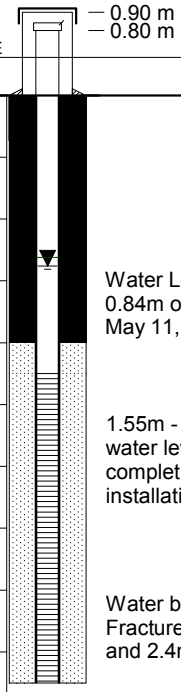
NOTES: _____

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: 17T 311171E 4870405N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)	Water content (%)	Atterberg limits (%)	"N" Value (blows / 12 in.-30 cm)	Field	Lab	COMMENTS	
	ft	m															
	0.0			GROUND SURFACE		%	%	ppm	N	10 20 30 40 50 60 70 80 90							
		0.46		TOPSOIL Dark Brown Silty Topsoil with Organics													
1				LIMESTONE Fractured/Weathered Limestone													
2																	
3		1.0															
4				LIMESTONE													
5		1.37															
6																	
7		2.0															
8																	
9																	
10		2.90		END OF BOREHOLE													
11																	
12																	
13		4.0															
14																	
15																	
16		5.0															
17																	
18																	
19		6.0															
20																	
21																	



BOREHOLE LOG ENVIRO 11156025-02. HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



BOREHOLE No.: BH-7
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

LOGGED BY: PB DATE: 9 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

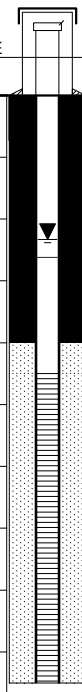
NOTES: _____

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

UTM: 17T 311071E 4870709N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	Field	Lab	COMMENTS	
	ft	m								w _p	w _L	U _c	U _L	△	□					
		0.0		GROUND SURFACE		%	%	ppm	N	10	20	30	40	50	60	70	80	90		
		0.46		TOPSOIL Dark Brown Silty Topsoil with Organics	1				4	×										
		1.0		LIMESTONE Fractured/Weathered Limestone																
		1.37		LIMESTONE																
		2.0																		
		2.90		END OF BOREHOLE																
		3.0																		
		4.0																		
		5.0																		
		6.0																		



Water Level - 0.71m on May 11, 2018
 Water level in open borehole on completion
 Clay Seams at 1.2 to 1.5m
 1.57m - Depth of water level upon completion of well installation
 Water bearing Fracture at 2.3m

BOREHOLE LOG ENVIRO 11156025-02. HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



BOREHOLE No.: BH-8D
ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

LOGGED BY: PB DATE: 9 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

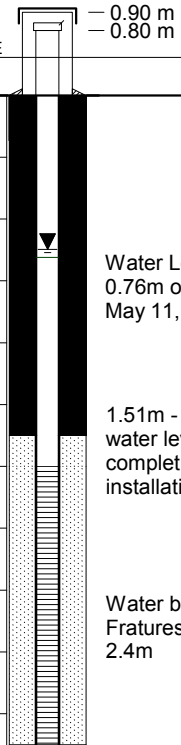
NOTES: _____

LEGEND

- ☒ SS - SPLIT SPOON
- ▨ AS - AUGER SAMPLE
- ▩ ST - SHELBY TUBE
- ▬ CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: 17T 311536E 4870641N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 12 in.-30 cm)	RQD	CONE	COMMENTS
	ft	m								w _p	w _L	U _C	U _L	Field	Lab				
		0.0		GROUND SURFACE		%	%	ppm	N	10	20	30	40	50	60	70	80	90	
		0.15	▨	TOPSOIL Dark Brown Silty Topsoil with Organics															
1			▨	SILTY CLAY Dark Grey - Brown Silty Clay, Moist, Firm	1				7	×									
2																			
3	1.0																		
4		1.07	▨	SAND AND GRAVEL Grey Sand and Gravel, Wet, Compact	2				10	×									
5		1.37	▨	LIMESTONE															
6			▨																
7	2.0		▨																
8			▨																
9			▨																
10	3.0		▨																
11		3.35	▨	END OF BOREHOLE															
12																			
13	4.0																		
14																			
15																			
16	5.0																		
17																			
18																			
19	6.0																		
20																			
21																			



BOREHOLE LOG ENVIRO 11156025-02, HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



BOREHOLE No.: BH-8S

ELEVATION: _____

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Kaitlin Group

PROJECT: Hydrogeologic Assessment Update, Wellington, ON

LOGGED BY: PB DATE: 9 May 2018

DRILLING COMPANY: GET Drilling METHOD: Solid Stem/Air Percussion

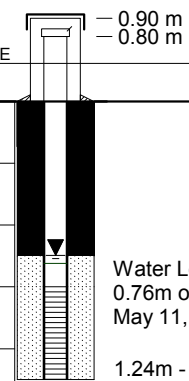
NOTES: _____

LEGEND

- ☒ SS - SPLIT SPOON
- ▨ AS - AUGER SAMPLE
- ▩ ST - SHELBY TUBE
- ▬ CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: 17T 311536E 4870641N

Depth	m Below Existing Grade		Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Vapours	Penetration Index	Shear test (Cu) Sensitivity (S) ○ Water content (%) w _p , w _L Atterberg limits (%) × "N" Value (blows / 12 in.-30 cm) ⊙	△ Field	COMMENTS
	ft	m									□ Lab	
	0.0			GROUND SURFACE		%	%	ppm	N	10 20 30 40 50 60 70 80 90		
	0.15		▨	TOPSOIL Dark Brown Silty Topsoil with Organics								
1			▨	SILTY CLAY Light Brown Silty Clay, Moist, Firm								
2												
3	1.0											
4		1.07	▨	SAND AND GRAVEL Grey Sand and Gravel, Wet, Compact								
5		1.37		END OF BOREHOLE								
6												
7	2.0											
8												
9												
10	3.0											
11												
12												
13	4.0											
14												
15												
16	5.0											
17												
18												
19	6.0											
20												
21												



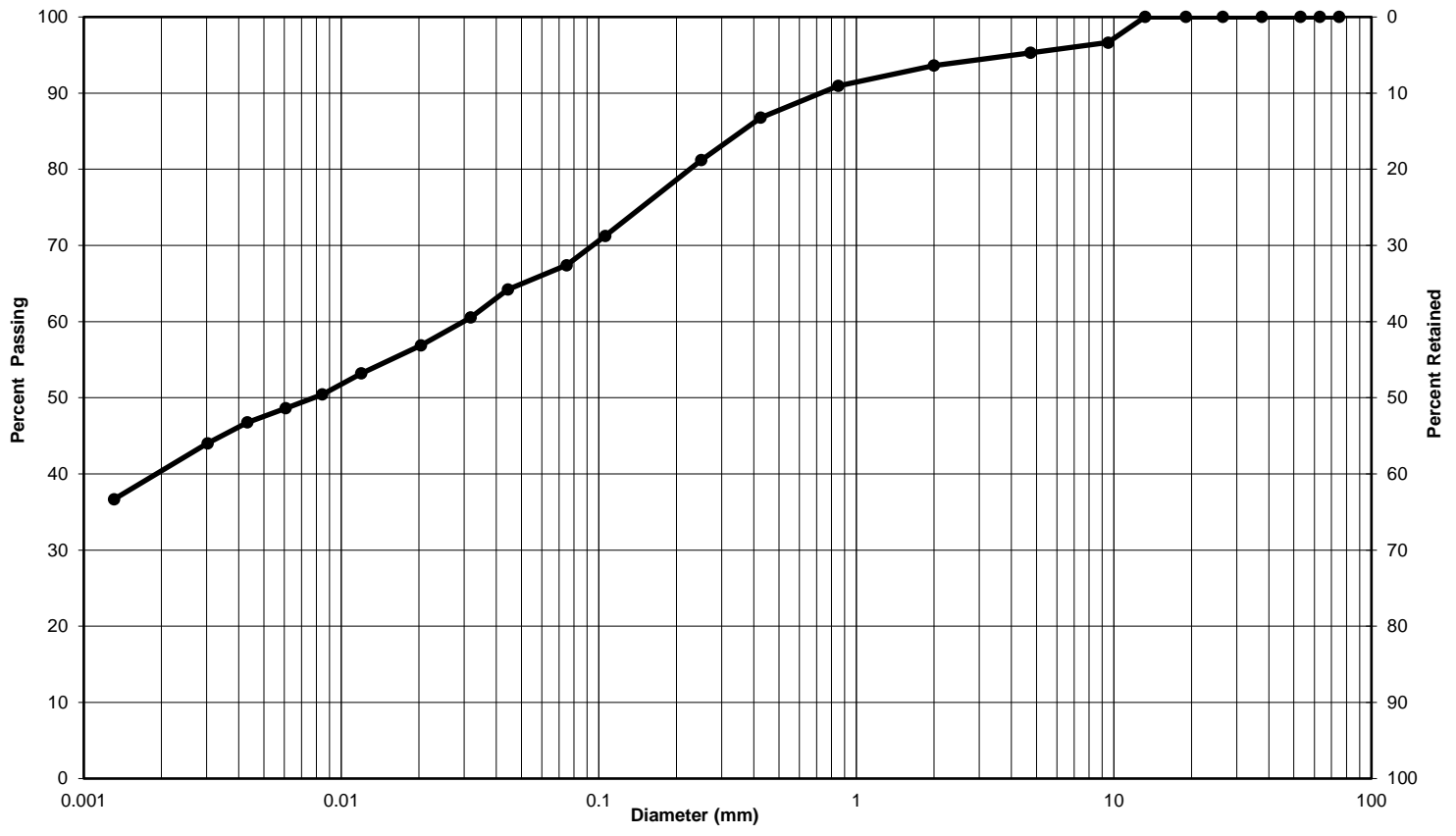
Water Level - 0.76m on May 11, 2018
1.24m - Depth of water level upon completion of well installation

BOREHOLE LOG ENVIRO 11156025-02, HYDROG BOREHOLE LOGS, SK.GPJ GEOLOGIC.GDT 30/5/18



Particle-Size Analysis of Soils (Geotechnical)
(USCS) (ASTM D422)

Client:	Kaitlin Group	Lab no.:	SS-18-35
Project/Site:	Hydrog, Belleville St., Wellington	Project no.:	11156025-02
Borehole no.:	BH-5	Sample no.:	SS-1
Depth:	0.5-2'	Enclosure:	A-13



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse

Unified Soil Classification System

Soil Description	Gravel	Sand	Clay & Silt
BH-5 SS-1	5	28	67

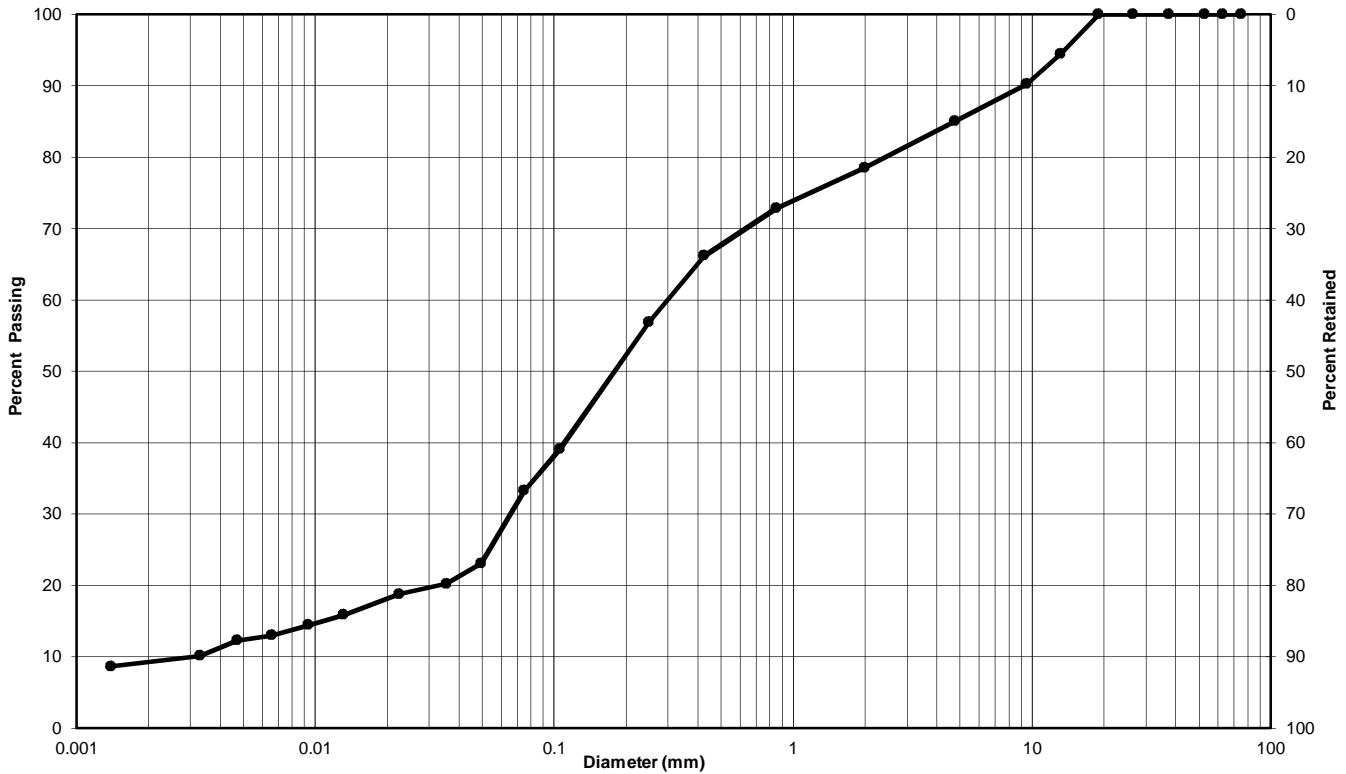
Remarks:

Performed by:	J. Sullivan	Date:	May 24, 2018
Verified by:	<i>J. Sullivan</i>	Date:	May 24, 2018



Particle-Size Analysis of Soils (Geotechnical)
(USCS) (ASTM D422)

Client:	Kaitlin Group	Lab no.:	SS-18-35
Project/Site:	Hydrog, Belleville St., Wellington	Project no.:	11156025-02
Borehole no.:	BH-8	Sample no.:	SS-2
Depth:	3.5-4.5'	Enclosure:	A-14



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel	Sand	Clay & Silt
BH-8 SS-2	15	52	33

Remarks: _____

Performed by:	J. Sullivan	Date:	May 24, 2018
Verified by:		Date:	May 24, 2018

Appendix B

Certificates of Chemical Analysis



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2H0
Phone: 705-652-2000 FAX: 705-652-6365

GHD
Attn : Steve Gagne

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Project : 11156025-02 Wellington

22-May-2018

Date Rec. : 15 May 2018
LR Report: CA15435-MAY18
Reference: 11156025-02 Wellington

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Date Extracted /Date Analyzed Digested	2: Date Analyzed	3: Analysis Completed Date	4: Analysis Completed Time	6: RDL	7: BH1S	8: BH1D	9: BH2	10: BH3D	11: BH4	12: BH5
Sample Date & Time						11-May-18	11-May-18	11-May-18	11-May-18	11-May-18	11-May-18
Temperature Upon Receipt [°C]	---	---	---	---	---	8.0	8.0	8.0	8.0	8.0	8.0
VOLATILE ORGANIC COMPOUNDS (VOCs)	***	***	***	***	***	***	***	***	***	***	***
Acetone [µg/L]	17-May-18	17-May-18	22-May-18	12:13	30	< 30	< 30	< 30	< 30	< 30	< 30
Bromomethane [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carbon tetrachloride [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chlorobenzene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.1	< 0.5
1,2-Dichlorobenzene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorodifluoromethane [µg/L]	17-May-18	17-May-18	22-May-18	12:13	2.0	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethane [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethylene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-Dichloroethene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,3-Dichloropropene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,3-Dichloropropene [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

OnLine LIMS

0001380090



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Project : 11156025-02 Wellington

LR Report : CA15435-MAY18

Analysis	1: Date Extracted /Date Analyzed Digested	2: Date Analyzed	3: Analysis Completed Date	4: Analysis Completed Time	6: RDL	7: BH1S	8: BH1D	9: BH2	10: BH3D	11: BH4	12: BH5
1,3-dichloropropene (total) [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylenedibromide [µg/L]	17-May-18	17-May-18	22-May-18	12:13	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
n-Hexane [µg/L]	17-May-18	17-May-18	22-May-18	12:14	1.0	< 1	1.3	< 1	< 1	1.6	< 1
Methyl ethyl ketone [µg/L]	17-May-18	17-May-18	22-May-18	12:14	20	< 20	< 20	< 20	< 20	< 20	< 20
Methyl Isobutyl Ketone [µg/L]	17-May-18	17-May-18	22-May-18	12:14	20	< 20	< 20	< 20	< 20	< 20	< 20
Methyl-t-butyl Ether [µg/L]	17-May-18	17-May-18	22-May-18	12:14	2.0	< 2	< 2	< 2	< 2	< 2	< 2
Methylene Chloride [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Styrene [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethylene (perchloroethylene) [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1-Trichloroethane [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	1.0	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane [µg/L]	17-May-18	17-May-18	22-May-18	12:14	5.0	< 5	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BTEX (VOCs)	***	***	***	***	***	***	***	***	***	***	***
Benzene [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	2.5	1.3	< 0.5
Ethylbenzene [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5
Toluene [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	2.2	< 0.5	9.3	4.7	0.6
Xylene (total) [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	5.9	< 0.5	9.0	13.0	1.6
m/p-xylene [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	4.6	< 0.5	6.8	10.2	1.2
o-xylene [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	1.3	< 0.5	2.2	2.8	< 0.5
THMs (VOCs)	***	***	***	***	***	***	***	***	***	***	***
Bromodichloromethane [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane [µg/L]	17-May-18	17-May-18	22-May-18	12:14	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
SURROGATES (VOCs)	***	***	***	***	***	***	***	***	***	***	***
Surr 1,2-Dichloroethane-d4 [Surr Rec %]	17-May-18	17-May-18	22-May-18	12:14		100	99	101	99	100	100
Surr 2-Bromo-1-Chloropropane [Surr Rec %]	17-May-18	17-May-18	22-May-18	12:14		91	91	93	91	92	90
Surr 4-Bromofluorobenzene [Surr Rec %]	17-May-18	17-May-18	22-May-18	12:14		94	94	93	95	92	92



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Project : 11156025-02 Wellington

LR Report : CA15435-MAY18

Analysis	13: BH6S	14: BH6D	15: BH7	16: BH8S	17: BH8D
Sample Date & Time	11-May-18	11-May-18	11-May-18	11-May-18	11-May-18
Temperature Upon Receipt [°C]	8.0	8.0	8.0	8.0	8.0
VOLATILE ORGANIC COMPOUNDS (VOCs)	***	***	***	***	***
Acetone [µg/L]	< 30	39	< 30	< 30	< 30
Bromomethane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carbon tetrachloride [µg/L]	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chlorobenzene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform [µg/L]	1.9	2.1	1.2	5.1	< 0.5
1,2-Dichlorobenzene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorodifluoromethane [µg/L]	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethylene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-Dichloroethene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,3-Dichloropropene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,3-Dichloropropene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-dichloropropene (total) [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylenedibromide [µg/L]	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
n-Hexane [µg/L]	< 1	2.6	< 1	< 1	< 1
Methyl ethyl ketone [µg/L]	< 20	< 20	< 20	< 20	< 20
Methyl Isobutyl Ketone [µg/L]	< 20	< 20	< 20	< 20	< 20
Methyl-t-butyl Ether [µg/L]	< 2	< 2	< 2	< 2	< 2
Methylene Chloride [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Styrene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethylene (perchloroethylene) [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1-Trichloroethane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane [µg/L]	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride [µg/L]	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Analysis	13: BH6S	14: BH6D	15: BH7	16: BH8S	17: BH8D
BTEX (VOCs)	***	***	***	***	***
Benzene [µg/L]	< 0.5	38.5	< 0.5	< 0.5	< 0.5
Ethylbenzene [µg/L]	< 0.5	2.5	< 0.5	< 0.5	< 0.5
Toluene [µg/L]	< 0.5	81.2	0.9	< 0.5	1.8
Xylene (total) [µg/L]	0.6	48.0	0.9	< 0.5	3.7
m/p-xylene [µg/L]	0.6	37.1	0.7	< 0.5	2.9
o-xylene [µg/L]	< 0.5	10.9	< 0.5	< 0.5	0.8
THMs (VOCs)	***	***	***	***	***
Bromodichloromethane [µg/L]	< 0.5	< 0.5	< 0.5	0.8	< 0.5
Bromoform [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane [µg/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
SURROGATES (VOCs)	***	***	***	***	***
Surr 1,2-Dichloroethane-d4 [Surr Rec %]	98	98	100	102	101
Surr 2-Bromo-1-Chloropropane [Surr Rec %]	90	90	89	89	94
Surr 4-Bromofluorobenzene [Surr Rec %]	92	97	92	90	93

Temperature of Sample upon Receipt: 8 degrees C

Cooling Agent Present: No

Custody Seal Present: No

Chain of Custody Number: 001678

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
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GHD

Attn : Steve Gagne

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Project : 11156025-02 Wellington

29-May-2018

Date Rec. : 15 May 2018
LR Report: CA15433-MAY18
Reference: 11156025-02 Wellington

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	7: NR BH1S	8: NR BH1D	9: NR BH2	10: NR BH3D	11: NR BH5	12: NR BH6S	13: NR BH6D	14: NR BH7
Sample Date & Time					11-May-18	11-May-18	11-May-18	11-May-18	11-May-18	11-May-18	11-May-18	11-May-18
Temperature Upon Receipt [°C]	---	---	---	---	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Alkalinity [mg/L as CaCO3]	16-May-18	08:24	20-May-18	20:39	216	200	217	199	246	220	264	239
Colour [TCU]	17-May-18	08:16	17-May-18	21:09	3	< 3	< 3	3	< 3	3	3	3
Conductivity [µS/cm]	16-May-18	08:24	20-May-18	20:39	478	485	518	545	549	509	793	507
pH [no unit]	16-May-18	08:24	20-May-18	20:39	7.96	8.11	7.87	8.04	7.90	7.98	8.09	7.96
Turbidity [NTU]	15-May-18	19:54	16-May-18	13:09	0.78	0.73	0.32	0.73	0.71	0.12	0.67	0.63
Organic Nitrogen [mg/L]	15-May-18	20:10	17-May-18	16:06	0.74	0.71	0.10	0.50	0.09	0.74	0.51	0.50
Total Kjeldahl Nitrogen [mg/L]	15-May-18	20:10	17-May-18	10:26	0.75	0.91	0.11	0.73	0.12	0.77	1.41	0.54
Ammonia+Ammonium (N) [mg/L]	15-May-18	20:00	17-May-18	16:06	< 0.04	0.20	< 0.04	0.23	< 0.04	< 0.04	0.90	0.04
Dissolved Organic Carbon [mg/L]	16-May-18	20:49	17-May-18	10:16	2	2	2	2	2	2	4	2
Chloride [mg/L]	18-May-18	20:09	22-May-18	13:38	9.0	15	19	37	4.6	4.9	69	4.7
Fluoride [mg/L]	16-May-18	13:48	18-May-18	09:30	0.11	0.20	0.09	0.19	0.11	0.13	0.32	0.13
Nitrite (as N) [mg/L]	17-May-18	23:36	22-May-18	12:56	0.006	0.006	0.003 <MDL	0.003 <MDL	0.066	0.003 <MDL	0.004	0.003 <MDL
Nitrate (as N) [mg/L]	17-May-18	23:36	22-May-18	12:56	5.85	6.04	5.85	6.27	3.00	8.70	0.310	5.24
Sulphate [mg/L]	18-May-18	20:09	22-May-18	13:38	10	18	16	18	45	19	80	18
Hardness [mg/L as CaCO3]	22-May-18	15:00	22-May-18	15:54	240	207	280	229	287	274	244	270
Aluminum (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.003	0.004	0.002	0.004	0.002	0.002	0.007	0.003
Arsenic (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	< 0.0002	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0006	0.0002
Boron (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.015	0.034	0.019	0.049	0.020	0.018	0.126	0.020
Barium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.0275	0.0630	0.0732	0.0523	0.101	0.0596	0.0490	0.0619

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Project : 11156025-02 Wellington

LR Report : CA15433-MAY18

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	7: NR BH1S	8: NR BH1D	9: NR BH2	10: NR BH3D	11: NR BH5	12: NR BH6S	13: NR BH6D	14: NR BH7
Calcium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	89.3	74.6	102	80.8	92.3	96.5	68.6	97.5
Cadmium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.000006	0.000007	0.000009	0.000009	0.000007	0.000005	0.000016	0.000004
Copper (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.00038	0.00251	0.00070	0.00161	0.00043	0.00096	0.00271	0.00153
Chromium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.00016	0.00016	0.00012	0.00016	< 0.00003	0.00005	0.00016	0.00009
Iron (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Potassium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.877	2.50	0.891	4.36	1.86	0.963	12.2	1.83
Magnesium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	4.24	5.15	6.45	6.59	13.7	8.12	17.7	6.42
Manganese (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.00072	0.111	0.0017	0.0383	0.0189	0.0292	0.0117	0.0749
Sodium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	3.93	21.0	9.73	22.0	3.13	6.23	68.4	12.6
Phosphorus (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	< 0.003	0.010	< 0.003	< 0.003	< 0.003	0.003	0.004	0.010
Lead (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	< 0.00001	0.00025	0.00005	0.00006	0.00005	0.00019	0.00010	0.00005
Antimony (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.0003	0.0004	0.0003	0.0004	0.0003	0.0004	0.0009	0.0004
Selenium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.00033	0.00043	0.00060	0.00041	0.00016	0.00080	0.00019	0.00047
Uranium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	0.000465	0.000737	0.000661	0.000659	0.00252	0.000846	0.000435	0.000932
Zinc (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:54	< 0.002	0.005	< 0.002	< 0.002	< 0.002	< 0.002	0.003	< 0.002
Cation sum [meq/L]		---	---	---	5.00	5.13	6.07	5.65	5.92	5.78	8.17	5.99
Anion Sum [meq/L]		---	---	---	4.87	4.89	5.30	5.49	6.03	5.07	8.89	5.36
Anion-Cation Balance [% difference]		---	---	---	1.31	2.43	6.78	1.37	-0.91	6.59	-4.23	5.55
Ion Ratio		---	---	---	1.03	1.05	1.15	1.03	0.98	1.14	0.92	1.12
Total Dissolved Solids (calculated) [mg/L]		---	---	---	253	262	290	294	311	276	475	290
Conductivity (calculated) [µS/cm]		---	---	---	493	501	568	557	597	542	853	568
Langelier's Index [@4°C]		---	---	---	0.30	0.33	0.26	0.29	0.30	0.36	0.37	0.37
Saturation pH [pHs @ 4°C]		---	---	---	7.66	7.78	7.61	7.75	7.60	7.62	7.72	7.59

Analysis	15: NR BH8S	16: NR BH8D
Sample Date & Time	11-May-18	11-May-18
Temperature Upon Receipt [°C]	8.0	8.0
Alkalinity [mg/L as CaCO ₃]	186	208
Colour [TCU]	4	3
Conductivity [µS/cm]	412	496
pH [no unit]	8.00	7.88
Turbidity [NTU]	0.45	0.52
Organic Nitrogen [mg/L]	0.46	0.62
Total Kjeldahl Nitrogen [mg/L]	0.48	0.64



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Analysis	15: NR BH8S	16: NR BH8D
Ammonia+Ammonium (N) [mg/L]	< 0.04	< 0.04
Dissolved Organic Carbon [mg/L]	2	2
Chloride [mg/L]	4.8	3.4
Fluoride [mg/L]	0.14	0.10
Nitrite (as N) [mg/L]	0.005	0.003 <MDL
Nitrate (as N) [mg/L]	5.23	10.3
Sulphate [mg/L]	20	17
Hardness [mg/L as CaCO3]	193	273
Aluminum (dissolved) [mg/L]	0.001	0.002
Arsenic (dissolved) [mg/L]	< 0.0002	< 0.0002
Boron (dissolved) [mg/L]	0.007	0.020
Barium (dissolved) [mg/L]	0.0469	0.0569
Calcium (dissolved) [mg/L]	67.7	98.0
Cadmium (dissolved) [mg/L]	0.000006	0.000005
Copper (dissolved) [mg/L]	0.00028	0.00099
Chromium (dissolved) [mg/L]	0.00009	0.00028
Iron (dissolved) [mg/L]	< 0.007	< 0.007
Potassium (dissolved) [mg/L]	0.123	2.54
Magnesium (dissolved) [mg/L]	5.74	7.00
Manganese (dissolved) [mg/L]	0.0276	0.0428
Sodium (dissolved) [mg/L]	10.8	4.85
Phosphorus (dissolved) [mg/L]	< 0.003	0.003
Lead (dissolved) [mg/L]	< 0.00001	0.00007
Antimony (dissolved) [mg/L]	0.0002	0.0004
Selenium (dissolved) [mg/L]	0.00071	0.00065
Uranium (dissolved) [mg/L]	0.000441	0.000519
Zinc (dissolved) [mg/L]	< 0.002	< 0.002
Cation sum [meq/L]	4.33	5.75
Anion Sum [meq/L]	4.35	4.77
Anion-Cation Balance [% difference]	-0.28	9.29
Ion Ratio	0.99	1.20
Total Dissolved Solids (calculated) [mg/L]	226	268
Conductivity (calculated) [µS/cm]	434	526
Langelier's Index [@4°C]	0.16	0.24
Saturation pH [pHs @ 4°C]	7.84	7.64



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Project : 11156025-02 Wellington

29-May-2018

GHD

Attn : Steve Gagne

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Date Rec. : 15 May 2018
LR Report: CA15436-MAY18
Reference: 11156025-02 Wellington

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	7: NR BH 5 Dup
Sample Date & Time					15-May-18
Temperature Upon Receipt [°C]	---	---	---	---	8.0
Alkalinity [mg/L as CaCO3]	16-May-18	08:24	20-May-18	20:40	240
Colour [TCU]	17-May-18	08:16	17-May-18	21:10	< 3
Conductivity [µS/cm]	16-May-18	08:24	20-May-18	20:40	544
pH [no unit]	16-May-18	08:24	20-May-18	20:40	7.79
Turbidity [NTU]	15-May-18	19:54	16-May-18	13:09	0.34
Organic Nitrogen [mg/L]	15-May-18	20:10	17-May-18	16:00	0.14
Total Kjeldahl Nitrogen [mg/L]	15-May-18	20:10	16-May-18	10:59	0.16
Ammonia+Ammonium (N) [mg/L]	16-May-18	16:40	17-May-18	16:00	< 0.04
Dissolved Organic Carbon [mg/L]	16-May-18	20:49	17-May-18	10:16	1
Chloride [mg/L]	19-May-18	00:19	22-May-18	13:39	4.6
Fluoride [mg/L]	16-May-18	13:48	18-May-18	09:30	0.10
Nitrite (as N) [mg/L]	19-May-18	09:36	22-May-18	13:47	0.063
Nitrate (as N) [mg/L]	19-May-18	09:36	22-May-18	13:47	2.98
Sulphate [mg/L]	19-May-18	00:19	22-May-18	13:39	46
Hardness [mg/L as CaCO3]	22-May-18	15:00	22-May-18	15:50	290
Aluminum (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.003
Arsenic (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	< 0.0002
Boron (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.023
Barium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.108
Calcium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	93.4
Cadmium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.000004
Copper (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.00039
Chromium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	< 0.00003
Iron (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	< 0.007
Potassium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	1.87
Magnesium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	13.9
Manganese (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.01881
Sodium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	3.23
Phosphorus (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	< 0.003

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Analysis	1:	2:	3:	4:	7:
	Analysis Start Date	Analysis Start Time	Analysis Completed Date	Analysis Completed Time	NR BH 5 Dup
Lead (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.00005
Antimony (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.0003
Selenium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.00018
Uranium (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	0.00270
Zinc (dissolved) [mg/L]	22-May-18	15:00	22-May-18	15:50	< 0.002
Cation sum [meq/L]	---	---	---	---	5.99
Anion Sum [meq/L]	---	---	---	---	5.93
Anion-Cation Balance [% difference]	---	---	---	---	0.56
Ion Ratio	---	---	---	---	1.01
Total Dissolved Solids (calculated) [mg/L]	---	---	---	---	310
Conductivity (calculated) [µS/cm]	---	---	---	---	596
Langelier's Index [@4°C]	---	---	---	---	0.18
Saturation pH [pHs @ 4°C]	---	---	---	---	7.61

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