REPORT

Hydrogeological Assessment

Boyington Pit #3, 4499 to 4589 Concession 7, Uxbridge, Ontario

Submitted to:

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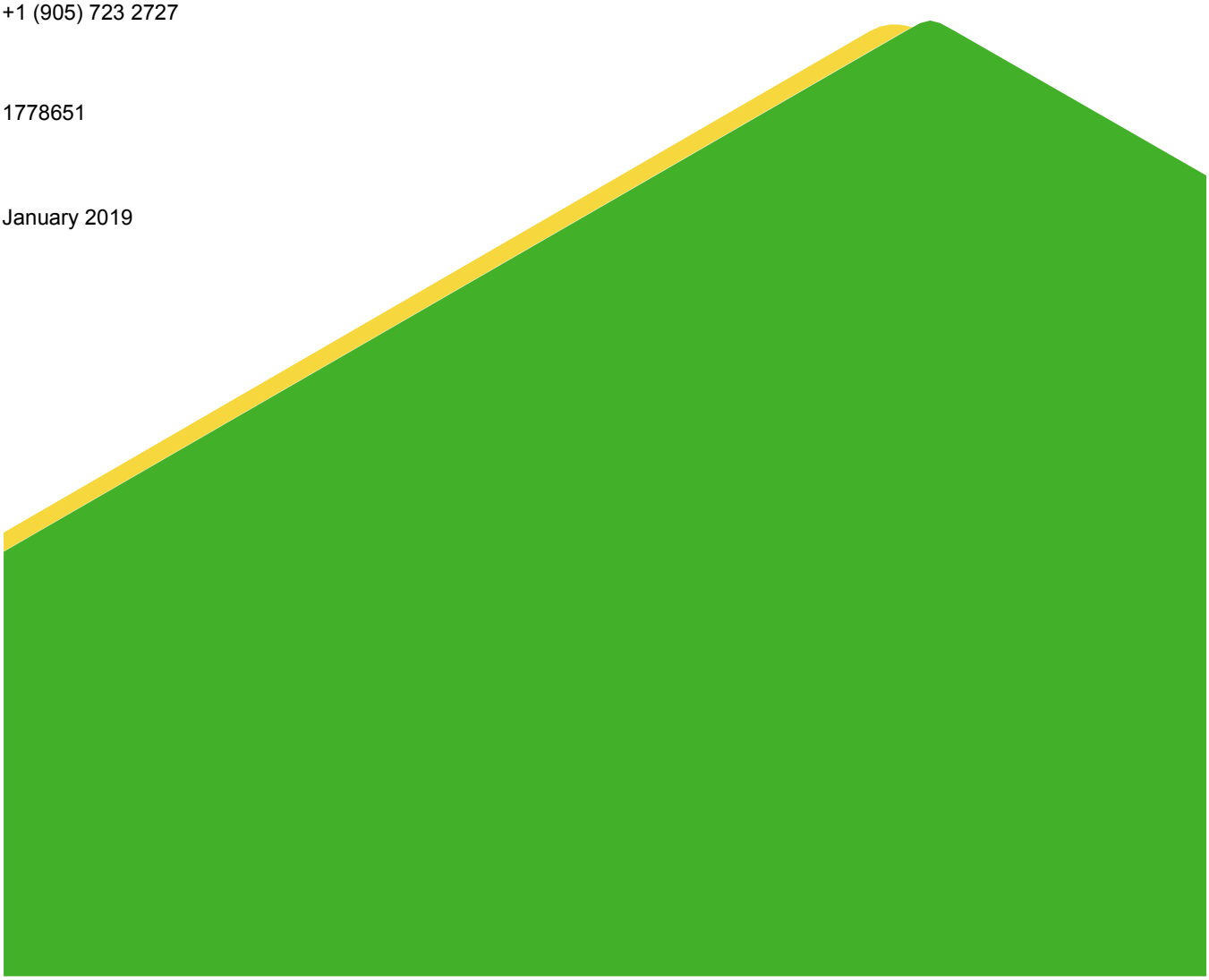

Distribution List

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1.0 EXISTING CONDITIONS

1.1 Introduction and Background

Golder Associates Ltd. (“Golder”) was retained by The Miller Group (“Miller”) to assist with the redevelopment of a portion of the property located at 4499 to 4589 Concession Road 7 in Uxbridge, Ontario (the “Site” or “Study Area”). The Site location, which is part of Miller’s larger property that is licensed under the *Aggregate Resource Act*, is provided as Figure 1.

Miller intends to remove the Site from the aggregate license and redevelop the property with a 44,000 square foot enclosed warehouse building and associated yard area for construction equipment storage.

To support the redevelopment Golder completed this hydrogeological assessment that included a review of existing reports and available information in the public domain pertaining to groundwater conditions at the Site and in the immediate vicinity; advanced six monitoring wells to evaluate groundwater conditions at the property; completed single well response testing and collected baseline groundwater quality samples from four monitoring wells; and, completed a private well survey within a 500 metre (“m”) radius of the Site boundaries. This report was completed following the reporting requirements outlined in the “*Hydrogeological Assessment Submissions, Conservation Authority Guidelines for Development Applications*”, dated June 2013 and was prepared to address the following provincial policy:

- Designated Policy 4.8d of the Lake Simcoe Protection Plan;
- Land Use Policy (LUP-12) of the South Georgian Bay Lake Simcoe Source Protection Plan;
- Water Policy 2.2 of the Provincial Policy Statement;
- Section 45 – Stormwater Management of the Oak Ridges Moraine Conservation Plan; and,
- Water Resource Systems Policy 4.2.1 of the Growth Plan for the Greater Golden Horseshoe.

Authorization to proceed with this investigation was received from Mr. George Antoniuk of Miller on April 26, 2017. The contact information for the property owner is:

Site Owner / Client	Address	Contact Information
Client: The Miller Group Owner: Miller Paving Limited	505 Miller Avenue, P.O. Box 4080, Markham, Ontario L3R 9R8	Mr. George Antoniuk Office: (905) 475-1724 Email: George.Antoniuk@millergroup.ca

The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location, elevation, or if the project is not initiated within eighteen months of the date of the report, Golder should be given an opportunity to confirm that the recommendations and findings are still valid. In addition, this report should be read in conjunction with the "Important Information and Limitations of This Report" included in Appendix A. The reader’s attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

1.2 Site Location and Description

The Site is located at 4499 to 4589 Concession Road 7 in Uxbridge, Ontario and is known as Miller's Boyington #3 aggregate pit. The details of the Site are as follows:

Municipal Address	4499-4589 Concession Road 7, Uxbridge, Ontario
Property Identification Number	26839-0008(LT)
Legal Description	Part of Lot 18 and 19 and Part of Lot 20, Concession 7, Town of Uxbridge, Regional Municipality of Durham

1.3 Topography and Drainage

The Site is generally at-grade with Concession Road 7 to the west and Reid Road to the south. An asphalt plant, parking areas, and construction yards are located in the central to southern portions of the Site. The topography slopes downward to the north and east where the Site was previously used as an aggregate pit.

Based on a review of the Uxbridge Brook Watershed Study, summarized in the Uxbridge Brook Watershed Plan (Lake Simcoe Regional Conservation Authority ("LSRCA"), 1997), it is understood that the Site is located within the Uxbridge Brook Watershed. The watershed is defined by unique hydrology and hydrogeology and is characterized as having extremely low runoff volumes and high groundwater infiltration capability resulting from a high distribution of sandy and sandy loam soils (Oak Ridges Moraine and Peterborough Drumlin Fields). The LSRCA reports that under normal dry summer conditions, 10 to 20% of a rainfall event remains as run-off while the rest is infiltrated from the surface to groundwater.

Currently, surface water run-off is generally to the north and east towards to low lying areas of the previously used aggregate pit.

The proposed Site alteration will include importing approximately 1,039,000 cubic metres of fill material to raise the existing ground surface elevation up to a maximum of 15 m to the north and east of the existing asphalt plant. A new slope will be created to the north and east at a 1% grade. At the base of the new slope drainage swales will be constructed. Surface water drainage is still anticipated to be north to east across the Site. The existing conditions and proposed grading plan and drainage areas are provided in Appendix B.

1.4 Physiography

The Site is located within a regional kame moraine physiographic feature identified as the Oak Ridges Moraine (Physiography of Southern Ontario, Chapman and Putman, 2007; OGS MRD228; 1:50,000, 2007). The Oak Ridges Moraine is bounded at this location with the South Slope physiographic feature to the south, the Peterborough Drumlin Field to the immediate north, and the Schomberg Clay Plains to the east.

Three regional aquifers underlie the Site and are understood to flow in a north-eastern direction toward the Urban Uxbridge Area and Wagner's Lake. Many farms, rural homes and several municipal supply wells rely on the upper aquifer as a source of water. The water supply for the Urban Uxbridge Area is also supplied by capture zones delineated for the supply of two drilled wells (Municipal Supply Wells MW6 and MW7) which are four kilometres downgradient of the Site.

1.5 Geology and Soils

The surficial geology aspects of the general Site area are presented in the following publication:

- Chapman, L.J., and Putnam, D.F., 2007, "*The Physiography of Southern Ontario*", Ontario Geological Survey.

Physiographic mapping in the area according to the above noted reference indicates that the Site lies within the physiographic region of southern Ontario known as the Oak Ridges Moraine. Overburden materials in this region tend to consist of gravel and sand with minor till deposits.

The Ontario Geological Survey, Ministry of Northern Development and Mines, Map 2544, Bedrock Geology of Ontario, Southern Sheet (OGS, 1991), indicates that the overburden materials are underlain by upper Ordovician shale, limestone, dolostone, and siltstone of the Georgian Bay Formation at the Site and surrounding area.

1.6 Borehole Drilling

The initial field work for this hydrogeological assessment was carried out between October 12 and 24, 2017 and consisted of drilling four boreholes (i.e., MW17-1 to MW17-4). Two additional boreholes were advanced between October 29 and November 2, 2018 following a meeting between Golder, Miller, and GHD Group ("GHD") on August 31, 2018. The borehole locations are provided on Figure 2. The Record of Borehole sheets are provided as Appendix C.

Boreholes MW17-1 to MW17-4 were drilled using a track mounted Mobile B57 drill rig and boreholes MW18-1 and MW18-2 were drilled using a truck mounted Mobile B60 drill rig. Each drill rig was operated by Landshark Drilling ("Landshark"). Boreholes were advanced using mud rotary techniques. Standard penetration testing ("SPT") and sampling were carried out at regular intervals of depth in all boreholes using conventional 38 millimetre ("mm") internal diameter split spoon sampling equipment driven by an automatic hammer. The results of the *in-situ* field tests (i.e., SPT "N"-values) are presented on the Record of Borehole sheets.

The subsurface soil conditions encountered in the boreholes are presented in the Record of Borehole sheets. Grain size analysis was completed for select samples with the gradations provided in Appendix B. The following is a summary of the subsurface soil conditions encountered at the Site.

Boreholes were advanced to depths ranging between 18.7 (MW17-2) and 55.3 (MW17-1) metres below ground surface ("mbgs"). In general, the subsurface conditions encountered during the drilling program are consistent with geological conditions of the Oak Ridges Moraine region described above. Overburden materials at each of the four boreholes consisted of a layer or layers of sand with some to trace amounts of gravel. A layer of sandy silt to silt was noted between 17.1 and 22.4 mbgs at borehole MW17-1. Bedrock was not encountered in any borehole during drilling and is expected to be at depths greater than 55 m in the vicinity of the Site.

1.7 Monitoring Well Installation

A groundwater monitoring well was installed in each of the boreholes upon completion of the drilling program. Each monitoring well was used for water level measurement. Monitoring wells MW17-2 to MW17-4 and MW18-1 and MW18-2 were completed such that the well screen was installed to intersect the water table. Monitoring well locations are provided on Figure 2.

Each monitoring well was constructed using threaded 50 mm diameter, Schedule 40, polyvinyl chloride ("PVC") well screens and riser pipe. The annulus surrounding the screened portion of the well and an approximate 0.3 m

portion of the riser pipe above the slotted pipe was filled with silica filter sand. All monitoring wells were completed above ground surface with protective steel monuments. The riser pipes were sealed with a J-plug. Following drilling each monitoring well was developed.

The construction details of the monitoring wells are presented on the Record of Borehole sheets in Appendix C.

1.8 Private Well Surveys

A voluntary door-to-door private water well survey was carried out in the Study Area on November 9, 2017. The purposes of the well survey were to assess the location of existing groundwater users and private wells; to assess the aquifers being utilized in the vicinity of the Site; to document existing well conditions based on information supplied by the well owners; to obtain information on the willingness of well owners to participate in potential future monitoring activities; and, to assist to assess the potential impacts of the Site alteration activities on local groundwater users.

Well owners were asked to complete a domestic water well survey form which requested basic information on water use, well construction, existing well conditions, and historical problems. If the survey form was not completed in-person during the initial attempt to contact the well owner, a second attempt was made. If the survey form was not completed in-person following the second attempt, a letter explaining the purpose of the well survey was left at the door with the survey form with instructions for the well owner to complete and return the form to Golder. A summary of the information obtained from the well owners, including information such as well depth, well type, age of the well, well usage, and any past reported quantity or quality issues is provided in Table D-1, Appendix D.

A total of 22 properties were included in the well survey, as shown on Figure D-1 in Appendix D, with the following results:

- Well surveys were completed at 12 properties including 747 Wagg Road, 4934, 4900, 4589, 4529, 4499, 4369, 4300 Concession Road 7, and 721, 739, 751, and 761 Reid Road. Three properties, 4589, 4529, and 4499 Concession Road 7 share one water supply well;
- Survey forms and a letter were left at nine properties including 4940, 4843, 4766, 4279, and 4260 Concession Road 7 and 729, 747, and 753 Reid Road after two unsuccessful attempts to contact the well owner/residents. No response has been received to date; and,
- No well currently exists at 4200 Concession Road 7; however, the property owner is planning to install a well for domestic use after redevelopment of the property.

The wells identified through the well survey are summarized as follows:

- One dug well and 18 drilled wells, including:
  - One dug well based on information provided by the well owner at the property located at 747 Wagg Road; and,
  - Eighteen drilled wells, based on either visual observation made by Golder staff in the field, or by completing the well survey forms at 4934, 4940, 4900, 4843, 4830, 4766, 4589, 4369, 4300, 4279, and 4260 Concession Road 7 and 721, 729, 739, 747, 751, 753, and 761 Reid Road.

Of the 14 properties where respondents reported that a well was present, only one property (721 Reid Road) reported water quality issues (sulphur-type odour). The well survey responses are summarized in Table D-1, Appendix D.

1.9 Hydrogeology

1.9.1 Groundwater Conditions

Groundwater depths were measured at the 17-series monitoring wells on select days between October 20 and November 2, 2017 and from all six monitoring wells on November 7, 2018. The depths to groundwater measured at these wells, and measured in a single visit, ranged from approximately 17.3 to 48.1 mbgs, and groundwater elevations ranged from approximately 313.6 metres above sea level ("masl") to 315.9 masl. The recorded water levels reflect the groundwater conditions on the dates they were measured, and seasonal fluctuations should be expected. Groundwater measurements are summarized in the following table.

Table 1: Summary of Groundwater Measurements

Monitoring Well ID	Ground Surface Elevation (masl)	Groundwater Measurements					
		20-Oct-17	23-Oct-17	24-Oct-17	31-Oct-17	2-Nov-17	8-Nov-18
		mbgs (masl)	mbgs (masl)	mbgs (masl)	mbgs (masl)	mbgs (masl)	mbgs (masl)
MW17-1	362.7	52.6 (310.1)	48.1 (314.6)	48.2 (314.5)	48.4 (314.3)	48.4 (314.4)	48.1 (314.6)
MW17-2	329.7	16.2 (313.4)	16.1 (313.5)	16.1 (313.5)	16.1 (313.5)	16.1 (313.5)	15.7 (313.9)
MW17-3	331.0	- [1]	- [1]	- [1]	17.5 (313.5)	17.4 (313.5)	17.3 (313.6)
MW17-4	333.8	17.8 (316.0)	18.1 (315.8)	18.1 (315.8)	18.1 (315.7)	18.1 (315.8)	18.0 (315.9)
MW18-1	349.8	- [1]	- [1]	- [1]	- [1]	- [1]	Not recorded
MW18-2	333.3	- [1]	- [1]	- [1]	- [1]	- [1]	19.7 (313.7)

Notes:
[1] indicates that groundwater monitoring well was not installed at this time
masl metres above sea level
mbgs metres below ground surface

Groundwater elevations at the monitoring well locations on November 8, 2018 are presented in Figure 3. As shown, flow direction of groundwater encountered at the Site is northwesterly.

1.9.2 Hydraulic Testing

To estimate the bulk hydraulic conductivity of the soil materials adjacent to the screen intervals at monitoring wells, single well response tests was carried out at monitoring wells MW17-1, MW17-3, and MW17-4.

The tests were carried out by rapidly purging a known volume of water with a dedicated Waterra® tube and foot valve and monitoring the subsequent water level recovery. The Bouwer and Rice (1976) method was applied to rising head test data, using the unconfined solution. The data was analyzed using the AQTESOLV for Windows

version 4.50 Professional software. A summary of the single-well response test data and the AQTESOLV printout are attached in Appendix D. A summary of the hydraulic conductivity estimates is provided in the table below.

Table 2: Summary of Hydraulic Conductivity Estimates

Location	Description Soil at Screen Interval	Applied Method of Analysis	Sand Pack Interval (mbgs)	Estimated Hydraulic Conductivity (K) (cm/s)	Estimated Infiltration Rate (mm/hr)	Design Infiltration Rate (assume SCF of 2.5) (mm/hr)
MW17-1	(SM) Silty Sand; to, (SP) Sand	Bouwer and Rice (1976); unconfined solution	51.2 to 54.9	1.0×10^{-3}	7.5×10^{1}	3.0×10^{1}
MW17-3	(SP) Sand; to, (SP) Gravelly Sand	Bouwer and Rice (1976); unconfined solution	14.7 to 18.3	1.5×10^{-4}	1.3×10^{1}	5.2×10^{0}
MW17-4	(SP) Sand; to, (SM) Silty Sand	Bouwer and Rice (1976); unconfined solution	16.2 to 19.8	2.8×10^{-4}	3.3×10^{1}	1.3×10^{1}

Notes:
mbgs metres below ground surface
cm/s centimetres per second
mm/hr millimetres per hour
SCF safety correction factor

As summarized in the table above, tested silty sand to sandy silt soils have a calculated hydraulic conductivity of approximately 1.0×10^{-3} to 2.8×10^{-4} cm/s. Based on the resulting K values, the corresponding infiltration rate (mm/hr) was estimated using the relationship presented in the *Low Impact Development Stormwater Management Planning and Design Guide* (TRCA and CVCA, 2010) to range from approximately 5.2 mm/hr to 30 mm/hr using the Bouwer and Rice (1976) method.

1.9.3 Soil Infiltration Conditions

Soil infiltration rate testing was carried out to provide hydraulic conductivity of surficial soils (K_{fs}) in November of 2017, using a Guelph Permeameter (Model 2800K1). Infiltration rate tests were conducted in the unsaturated zone using a Guelph Permeameter within the footprint of the first nine proposed infiltration galleries as provided on Figure 5.

The Guelph Permeameter was operated in accordance with the instructions outlined in the 2800K1 Guelph Permeameter manual (Soilmosture Equipment Corp., 2012) using a single head method. At each of the testing locations, the Guelph Permeameter was installed in a hand-augured hole in unsaturated ground conditions.

Once the outflow of water at the depth of installation reached a steady-state flow rate, the field-saturated hydraulic conductivity, K_{fs}, of the soil was estimated using following equation (Elrick et. al., 1989):

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

Where: C_1 = shape factor
Q_1 = flow rate (cm^3/s)
H_1 = water column height (cm)
a = well radius (cm)
α* = alpha factor ($0.15\ cm^{-1}$)

The field data and analysis of the infiltration rate testing are presented in Appendix D. Based on the resulting K_{fs} (cm/s), the corresponding infiltration rates (mm/hr) were estimated using the approximate relationship presented in the *Low Impact Development Stormwater Management Planning and Design Guide* (TRCA and CVCA, 2010). A Safety Correction Factor was applied, using the same guide to provide a Design Infiltration Rate. A summary of the infiltration rate testing results is presented in the table below.

Table 3: Summary of Infiltration Rate Testing Results

Location	Approximate Location UTM (Zone 17T)		Soil Description	Approx. Test Depth (mbgs)	Estimated Field-Saturated Hydraulic Conductivity (K_{fs}) (cm/s)	Estimated Infiltration Rate (mm/hr)	Applied Safety Correction Factor (SCF)[1]	Calculated Design Infiltration Rate (mm/hr)
	Easting	Northing						
Infiltration Basin 1	652146	4881211	(SP/GP) Sand and Gravel	1.16	7×10^{-3}	140	2.5	55
Infiltration Basin 2	652221	4881238	(SP/GP) Sand and Gravel	1.25	6×10^{-3}	130	2.5	53
Infiltration Basin 3	652280	4881262	(SM) Silty Sand, some gravel	1.02	7×10^{-3}	140	2.5	55
Infiltration Basin 4	452339	4881285	(SP/GW) Coarse Sand, some gravel	1.12	8×10^{-4}	73	2.5	29
Infiltration Basin 5	462418	4881318	(SP/GW) Coarse Sand, some gravel	1.11	7×10^{-3}	140	2.5	55
Infiltration Basin 6	652493	4881346	(SP/GW) Coarse Sand, some gravel	1.06	1×10^{-2}	150	2.5	60
Infiltration Basin 7	652788	4881035	(SP) Coarse Sand, trace gravel	1.16	6×10^{-4}	69	2.5	28
Infiltration Basin 8	652765	4881096	(SP/GP) Coarse sand and gravel	1.26	3×10^{-3}	110	2.5	44
Infiltration Basin 9	652714	4881178	(SP/GW) Coarse and, some gravel	1.16	2×10^{-4}	57	2.5	23
Infiltration Basin 11	652679	4881293	(SP/GP) Coarse sand and gravel	0.19	4.00E-02	150	2.5	60
Infiltration Basin 11	652679	4881293	(SP) Fine sand, trace silt	1.22	1.00E-02	240	2.5	96

Notes:
mbgs metres below ground surface
cm/s centimetres per second
mm/hr millimetres per hour
SCF safety correction factor

As summarized in the table above, the tested sands at the locations corresponding to Infiltration Basin 1 through Infiltration Basin 11 have calculated design infiltration rates of approximately 23 mm/hr to 96 mm/hr.

1.10 Water Quality

Groundwater was sampled at monitoring wells at locations MW17-1 through MW17-4 on November 2, 2017. Wells at these locations were screened in silty sand, gravelly sand to sand. Samples were tested for metals, inorganics, volatile organic compounds ("VOCs"), petroleum hydrocarbons fractions 1 through 4 ("PHCs"), and polychlorinated biphenyls ("PCBs") by Maxxam Analytics Inc. ("Maxxam"). The results were compared with the Provincial Water Quality Objectives (PWQO, 1999) and the Ontario Drinking Water Standards (ODWS, 2002). The laboratory certificate of analysis is provided in Appendix D. Parameters that were above the ODWS are summarized in the following table.

Table 4: Summary of Groundwater Results

Parameter	Units	ODWS	MW17-1	MW17-2	MW17-3	MW17-4
Hardness	mg/L	80 – 100	**75**	**220**	**110**	**110**
Dissolved Sodium	µg/L	20,000	**54,000**	11,000	**40,000**	**34,000**

Notes:
Bold and shaded values indicate an exceedance of the ODWS
mg/L milligrams per litre
µg/L microgram per litre
ODWS Ontario Drinking Water Standards

As summarized in the table above, groundwater sampled at al test locations do not meet ODWS criteria for hardness and three locations, MW17-1, MW17-3, and MW17-4, exceeded the dissolved sodium criteria of 20,000 µg/L. It should be noted that sodium and hardness criteria under the ODWS are 'aesthetic objectives' and the exceedances are not considered health related. The elevated hardness concentrations in groundwater is consistent with surrounding water well users implementing water softeners as documented in the private water well survey summarized in Table D-1, Appendix D.

Dissolved molybdenum was detected at 51 µg/L at test location MW17-4 which is above the average concentration from wells MW17-1, MW17-2, and MW17-3 (11 µg/L). The elevated molybdenum concentration at MW17-4 may be attributed to sediment/silt introduced during sample collection.

1.11 Groundwater Use

Water well records were obtained from the Ontario Ministry of the Environment and Climate Change ("MOECC"), and provided in Appendix D. Based on a review of the records, twenty-six nearby groundwater wells were identified within 500 m of the property. A map indicating the reported locations of the wells is provided in Appendix D, as Figure D-1. Twenty-two of these wells are reported for domestic water supply, and three are reported for stock use. The nearby wells are summarized in the following table.

Table 5: Nearby Groundwater Wells

Well Identification	Reported Date of Construction (month-year)	Well Use Type	Location		Approximate Ground Surface Elevation (masl)	Reported Groundwater Elevation (masl)
			Easting	Northing		
1909052	Apr-1988	Domestic	653611	4881226	341.4	288.4
4605638	Sep-1973	Domestic	653463	4881171	345.0	296.5
4605125	Jun-1972	Domestic	653263	4881041	345.6	304.8
4605496	Jun-1973	Domestic	653213	4880831	349.6	305.4
1907118	Nov-1984	Domestic	653213	4881021	345.6	291.0
4604940	Mar-1971	Domestic	653048	4881041	345.3	290.4
1911765	Jan-1993	Domestic	652888	4880256	351.1	311.8
4604087	Jun-1969	Domestic	652862	4880921	345.9	306.6
4604975	Nov-1971	Domestic	652613	4880872	350.5	284.4
4603014	Dec-1964	Domestic	652547	4882081	339.9	307.6
1907293	Apr-1985		652463	4880972	357.2	323.7
4605891	May-1974	Domestic	652459	4880788	361.8	302.4
1907004	Jul-1984	Domestic	652263	4880642	362.1	322.5
4603011	Apr-1955	Stock	652261	4880981	355.7	310.6
4604257	Nov-1969	Domestic	652213	4880672	363.9	306.3
4603012	Apr-1956	Stock	652121	4880961	355.7	308.5
4602981	May-1967	Domestic	652059	4880336	360.0	301.2
4605490	May-1973	Domestic	651963	4881492	344.4	313.9
7109734	Jul-2008	-	651937	4881528	342.6	342.6
4606268	Aug-1975	Domestic	651934	4880395	358.4	315.7
1906275	Nov-1981	Domestic	651913	4879922	360.0	307.9
1905023	May-1978	Domestic	651863	4881772	340.8	294.5
4605553	Oct-1973	Domestic	651753	4881622	343.8	279.5
1913409	Sep-1997	Domestic	651652	4881324	344.7	301.4
4606426	Jan-1976	Domestic	651613	4881802	339.5	292.9
1905594	Oct-1979	Domestic	651563	4880022	351.4	314.8
4605134	Jun-1972	Domestic	651463	4881742	344.4	299.9

Notes:
masl metres above sea level

Water well records infer that the water taking for domestic and stock use draw from an aquifer ranging in elevation from approximately 284 to 342 masl within the underlying overburden. Three general cross-sections designated A-A', B-B', and C-C', are provided in Appendix D, based on the MOECC water well records.

The four monitoring wells installed at the Site are screened between 307 and 318 masl.

1.11.1 Groundwater Summary

Water supply wells for domestic and stock use and within 500 m of the Site are generally utilizing an aquifer ranging from 284 to 342 masl within the underlying overburden. Groundwater encountered as part of this investigation was found to range from approximately 312.6 to 314.7 masl. The four monitoring wells installed at the Site were screened between 307 and 318 masl. Groundwater levels were determined to flow in a generally north-westward direction.

The estimated hydraulic conductivity of the generally silty sand units was calculated to range from 1.0×10^{-3} to 2.8×10^{-4} cm/s at depths between 14.7 to 54.9 mbgs in silty sand to sandy gravel soils. Hydraulic conductivities of near-surface sandy gravel soils, measured using permeameter testing and ranging in depth from 1.0 metres below ground level ("mbgl") and 1.2 mbgl, were calculated to range from approximately 3.0×10^{-5} to 1.1×10^{-2} cm/s.

Concentrations of dissolved sodium and hardness parameters were reported to be above the aesthetic objective under the ODWS at test locations MW17-1, MW17-2 (sodium only), MW17-3, and MW17-4.

2.0 HYDROLOGIC WATER BALANCE

A water balance assessment was carried out to assess the potential hydrogeological impacts of the proposed development with respect to post-development infiltration rates, including potential impacts to groundwater-dependent resources in general accordance with *Stormwater Management Criteria, Version 1.0* (TRCA, 2012).

To estimate current and post-development water balances on the Site, Golder has prepared a water balance assessment for the existing and proposed land uses, with and without the use of stormwater management ("SWM") measures for comparison.

2.1 Methods

The water balance assessment was based on meteorological data obtained from Environment Canada ("EC") from the Port Perry NONQUON Station (ID 6156682) from 1984-2005, information on current and proposed land uses as provided to Golder, and existing soil types as identified through the subsurface investigation activities at the Site.

Water balance calculations are based on the following equation, which is described in more detail below:

$$P = S + ET + R + I$$

Where:

P = precipitation;

S = change in soil water storage;

ET = evapotranspiration;

R = surface runoff; and

I = infiltration (groundwater recharge).

Precipitation data obtained from EC for the Port Perry Station indicate a mean annual precipitation (“P”) of 874 millimetres per year (“mm/yr”).

Short-term or seasonal changes in soil water storage (“S”) are anticipated to occur on an annual basis as demonstrated by the typically dry conditions in the summer months and the wet conditions in the winter and spring. Long-term changes (e.g., year-to-year) in soil water storage are considered to be negligible in this assessment.

Evapotranspiration (“ET”) refers to water lost to the atmosphere from vegetated surfaces. The term combines evaporation (i.e., water lost from soil or water surfaces) and transpiration (i.e., water lost from plants and trees). Potential ET refers to the loss of water from a vegetated surface to the atmosphere under conditions of an unlimited water supply. The actual rate of ET is typically less than the potential rate under dry conditions (e.g., during the summer months when there is a moisture deficit). The mean annual potential ET for the Study Area is approximately 604 mm/yr based on data provided by EC.

The mean annual water surplus is the difference between P and the actual ET. The water surplus represents the total amount of water available for either surface runoff (“R”) or groundwater infiltration (“I”) on an annual basis. On a monthly basis, surplus water remains after actual evapotranspiration has been removed from the sum of rainfall and snow-melt, and maximum soil or snow pack storage is exceeded. Maximum soil storage is quantified using a water holding capacity (“WHC”) specific to the soil type and land use.

Infiltration rates were estimated using the method presented in the MOECC *Stormwater Management Planning and Design (“SWM”) Manual* (MOECC, 2003). There are three main factors that determine the percent infiltration of the water surplus: topography, soil type and ground cover. The sum of the fractions representing these three factors establishes the approximate annual percentage of surplus which can be infiltrated in an area with a sufficient downward groundwater gradient. Although none are present on the Site, wetlands and water bodies are assumed to have an upward or negligible downward gradient, resulting in all surpluses being contained in these areas, which provide increased evaporation and typically limited infiltration.

Land use at the Site under existing conditions was identified from the Skelton, Brumwell & Associates Inc. (“Skelton Brumwell”) design drawings. Land use at the Site under post-development conditions was based on the Draft Site Plan provided to Golder. These plans are provided in Appendix B.

The land use data were compiled to estimate the total area of each land use within the Site boundary. Data and information from this investigation were used with Table 3.1: Hydrologic Cycle Component Values, from the *SWM Manual* (MOECC, 2003), to identify appropriate WHCs and to sum an infiltration factor for each land use.

2.2 Water Balance Parameters

Based on the hydraulic conductivity values (Section 1.9.3) as well as the results of subsurface investigation activities at the Site, the pre-development surficial soil types were identified as sandy loam. Based on the U.S. Bureau of Soils classification system and the results of the grain size distribution testing of selected soil samples, the soils were modelled as Sandy Loam in this assessment.

Based on available topography and the grading plan for the Site, a topography factor of 0.1, representing hilly land, was applied for the pre-and post-development conditions. The sandy loam was considered to be medium combinations of sand and loam and was assigned a soils factor of 0.4. Tree-covered areas in the pre-development and post-development scenarios were assigned a cover factor of 0.2, representing woodland.

Grass-covered areas were assigned a cover factor of 0.1. In the pre-development scenario areas of no vegetation were assigned a cover factor of 0. For impervious surfaces (e.g., buildings and paved areas), no infiltration factor was applied.

The water balance analysis was developed under the following assumptions:

- WHCs were chosen based on Table 3.1 in the *SWM Manual* (MOECC, 2003), corresponding to existing soil types, existing land uses and proposed post-development conditions;
  - Soil Group B or C – Sandy loam or Silt Loam:
    - Extraction (Sandy Loam): 75 mm WHC and 0.5 infiltration factor (existing condition);
    - Gravel fill (Silt Loam): 125 mm WHC and 0.3 infiltration factor (proposed condition);
    - Grassed (Pasture and Shrubs, Sandy Loam): 150 mm WHC and 0.6 infiltration factor (existing and post-development condition);
    - Treed Area (Mature Forest, Sandy Loam): 300 mm WHC and 0.7 infiltration factor (existing and proposed condition);
  - Impervious Areas (i.e., roads): Surplus assumed as 90% of precipitation and null (i.e., 0%) infiltration factor (MOECC, 2003); and
  - Roofs (Buildings): Surplus assumed as 90% of precipitation and null (i.e., 0%) infiltration factor.
- Net surplus was estimated by multiplying the estimated monthly surplus (millimetre/month) for the assumed WHC by the associated drainage area. Annual evapotranspiration and surplus values were obtained from the meteorological data from the Port Perry Station based on the WHC assigned to each land use area.
- Some of the WHC values noted above do not match Table 3.1 exactly but were selected to match available meteorological data from the Port Perry Station.
- Runoff was calculated as the difference between surplus and infiltration.
- Slope for existing and proposed conditions were assumed based on initial design contours from Skelton Brumwell which are provided in Appendix E.
- For the proposed conditions, the nature of the extraction fill is assumed to be a different type of soil imported from off-Site. The exact nature of the new fill, and the potential vegetation, have yet to be determined. For the purposes of this report it is assumed Silt Loam will be used as the soil type for the excavation fill. Further calculations may need to be provided after the detailed design stage.

2.3 Water Balance Results

2.3.1 Existing Conditions

The existing condition is shown in Figure 4. Table 2.1 presents the results of the average annual water balance at the 34-hectare (“ha”) Site under existing conditions.

Table 6: Existing Conditions Average Annual Water Balance Results

Land Use	Area (m^2)	Precipitation (P) (mm)	Surplus (S) (mm)	Surplus (S) (m^3/yr)	Infiltration (I) (m^3/yr)	Runoff (R) (m^3/yr)	Infiltration within Pit (m^3/yr)
Extraction Area	195,320	874	351	68,560	34,280	34,280	34,280
Grassed (Sandy Loam)	52,603	874	303	15,940	9,560	6,380	6,380
Treed (Sandy Loam)	55,239	874	274	15,140	10,590	4,550	4,550
Buildings	1,509	874	787	1,190	0	1,190	1,190
Roads	35,694	874	787	28,080	0	28,080	28,080
Total	**340,360**	**-**	**-**	**128,910**	**54,430**	**74,480**	**74,480**

The total estimated average annual pre-development conditions runoff from the Site is 74,480 m^3 and estimated average annual infiltration is 54,430 m^3. Golder assumes that the excess runoff from the site (i.e. 74,480 m^3/yr) reports north and east from the Site, to the lands owned by Miller which were previously used as an aggregate pit from where it may infiltrate.

2.3.2 Proposed Conditions

The proposed condition is based on the Draft Site Plan prepared by Skelton-Brumwell dated July 2016 (Appendix B). The following table presents the results of the average annual water balance at the 34 ha Site under proposed (no additional water management features) conditions.

Table 7: Proposed Condition Average Annual Water Balance Results

Land Use	Area (m^2)	Precipitation (P) (mm)	Surplus (mm)	Surplus (S) (m^3/yr)	Infiltration (I) (m^3/yr)	Runoff (R) (m^3/yr)	Infiltration within Pit (m^3/yr)
Gravel (Fill)	227,181	874	316	71,790	21,540	50,250	50,250
Grassed (Sandy Loam)	51,885	874	303	15,720	9,430	6,290	6,290
Treed (Sandy Loam)	31,366	874	274	8,590	6,020	2,570	2,570
Buildings	5,146	874	787	4,050	0	4,050	4,050
Roads	24,787	874	787	19,500	0	19,500	19,500
Total	**340,360**	**-**	**-**	**119,650**	**36,990**	**82,660**	**82,660**
Change %	**N/A**			**-7%**	**-32%**	**11%**	**11%**

In the proposed condition, the total estimated average annual runoff from the Site is 82,660 m^3 and the estimated average annual infiltration is 36,990 m^3. Infiltration decreased by 32% and runoff increased by 11% compared to existing conditions. Golder assumes that the excess runoff from the site (i.e. 82,6600 m^3/yr) reports north and

east from the Site, to the lands owned by the client which were previously used as an aggregate pit from where it may infiltrate.

2.4 Stormwater Management Features

The LSRCA and TRCA promotes the use of infiltration systems to support the natural hydrologic cycle for stormwater runoff from development sites (TRCA and CVCA, 2010). This helps to maintain groundwater recharge, provides additional water quality treatment and reduces the volume of runoff from the site. This section assesses the potential benefits derived from low impact development ("LID") features as mitigation measures for continued infiltration and additional water quality assistance.

We understand that an infiltration basin system is proposed on the Site to infiltrate runoff from the drainage areas moving northeast across the Site. This infiltration system has been assessed in the sections below. Performance of individual facilities will vary depending on Site specific context and facility design parameters.

The shallow groundwater flow direction at the Site in November 2017 is inferred to be towards the northwest. The measured water table elevations on October 20, 2017 and November 2, 2017 are summarized in Table 1.1 in Section 1.9, and water levels for November 2, 2017 are shown spatially on Figure 3. The elevation of the water table on this date ranged from 312.6 to 314.7 masl, or from depths of 17.1 to 49.3 mbgs. The water table was within the sand and gravel unit during all monitoring events. The recorded water levels reflect the groundwater conditions on the dates they were measured, and seasonal fluctuations should be expected.

2.4.1 Storm Frequency Analysis

A storm frequency analysis was developed for precipitation and rainfall at the Port Perry Station (ID 6156682) for the period of record (i.e. 1984-2007). Approximately 80.1% of rainfall events are equal to or less than 10 mm. The annual rainfall volume, associated with events equal or lower than 10 mm, corresponds to approximately 75.1% of the total rainfall volume and 61.4% of the total precipitation volume.

The LSRCA Technical Guidelines for Stormwater Management (2016) section 2.2.2.1 states that redevelopments that create 0.5 or more hectares of new and/or fully reconstructed impervious surfaces shall capture and retain/treat on site the runoff from a 25 mm rainfall event. Approximately 97.5% of rainfall events are equal to or less than 25 mm, and the annual rainfall volume associated with these events accounts for approximately 96.9% of the total rainfall volume and 79.2% of the total precipitation volume.

The infiltration basins have been conceptually assessed based on capture and infiltration of runoff from the 10 mm storm event and the 25 mm storm event (the last one according to LSRCA, 2016 guidelines). Part of the storm events greater than the 10 mm or 25 mm storms, respectively, are assumed to overflow from the infiltration basins to the north and east of the Site towards the lands owned by the clients which were previously used as an aggregate pit from where water may infiltrate.

2.4.2 Stormwater Management

This study is limited to an estimate of the potential increase in infiltration associated with the runoff from Drainage Areas 1-11 to the infiltration basins. It is assumed the preliminary proposed design includes the capture of runoff from Drainage Areas 1-11 to the infiltration basins seen in Figure 5. At this point, it is also assumed the runoff from Drainage Area 12 will flow off-Site. The following results assume that Skelton Brumwell will design the infiltration basins to capture the 10 mm and 25 mm storm events, respectively. The following table summarizes the average annual surplus, infiltration, and runoff volumes assuming infiltration basins in Drainage Area 12 are incorporated to capture the runoff from Drainage Areas 1-11 identified in Figure 5. The following is a conservative

approach which does not take into account the upstream flows that may infiltrate before entering the stormwater management features. The runoff is also likely over estimated.

Table 8: Water Balance Results for Proposed Conditions with Mitigation

Targeted Storm	Area (m^2)	Surplus (S) (m^3/yr)	Infiltration (I) (m^3/yr)	Runoff (R) (m^3/yr)	Infiltration within Pit (m^3/yr)
10 mm Storm	340,360	119,340	77,110	42,230[1]	42,230
Change %	**N/A**	**-7%**	**42%**	**-43%**	
25 mm Storm	340,360	119,340	88,920	30,420[1]	30,420
Change %	**N/A**	**-7%**	**63%**	**-59%**	

Notes:
[1]Infiltration in the LID infiltration basins works under the assumption that all the runoff (surplus minus the infiltration in each respective drainage area) from Drainage Areas 1-11 is captured.

In the proposed condition with SWM features, targeted to the 10 mm storm, the total estimated average annual runoff from the Site is approximately 42,230 m^3 and the estimated average annual infiltration is approximately 77,110 m^3. Infiltration increased by 42% and runoff decreased by 43% in comparison with existing conditions. If the infiltration basins were designed to capture 25 mm storms, the annual infiltration would be 88,920 m^3. This is a 63% increase from existing infiltration conditions, and a 59% decrease from existing runoff conditions. These results should be viewed as potential reduction in infiltration if the LIDs were designed to capture the target storm events. The excess runoff from the infiltration basis will overflow to the north and east from the Site, towards the lands owned by the client which were previously used as an aggregate pit from where it may infiltrate.

Table 9 presents the overall results of the water balance and comparison of four scenarios: (1) existing; (2) proposed; (3) proposed with water management features for 10 mm storm; and (4) proposed with water management features for 25 mm storm. The following table considers the entire footprint of the proposed development (i.e. property boundary) for potential infiltration.

Table 9: Comparison of Existing and Proposed Infiltration (without LID, with LID targeting 10 mm storm, and with LID targeting the 25 mm storm)

Drainage Point	Infiltration (m^3/yr)						
	Existing Development	Proposed Development	Change (%)	Proposed Development with SWM (10mm Storm)	Change (%)	Proposed Development with SWM (25mm Storm)	Change (%)
Property Area (Total)	54,430	36,990	-32%	77,110	+42%	88,900	+63%

Infiltration from existing to proposed conditions (without LID) decreased by 32%; whereas, the proposed conditions with SWM features increased the infiltration by 42% from the existing conditions when targeting 10 mm storms and by 63% from existing conditions when targeting 25 mm storms. It is likely that the SWM features will additionally assist in increasing the water quality.

3.0 DISCUSSION

The current aggregate Site is located in Uxbridge, Ontario within a larger Miller property. The redevelopment of this property includes a fill development of the current excavated pit within the Site. The maintenance of recharge rates in an area of high hydraulic conductivity soils may be of little environmental significance in the context of groundwater recharge within the Uxbridge Brook sub-watershed. Nevertheless, SWM should be considered to enhance post-development infiltration rates and to achieve both quantity and enhanced stormwater quality control for stormwater. The selection of SWM was done in consultation with the project civil engineer as part of the overall stormwater management design for the Site by Skelton Brumwell.

Based on the water balance assessment, the development of the 34 ha Site without use of SWM is expected to result in a 17,400 m^3/year (32%) decrease in post-development infiltration rates. With the considered water management measure, the Site development will result in average annual post-development infiltration rate that is 42% higher than existing conditions (if the 10 mm storm is targeted) and 63% higher than existing conditions (if the 25 mm storm is targeted).

The results presented herein are based on the Proposed Post-Fill Plan prepared by Skelton Brumwell and dated July 2016 (Appendix B). The detailed design of the proposed water management strategies should consider the groundwater levels, impervious areas within the Site, and the infiltration rates presented in Section 1.9.3.

Given the subsurface conditions present, the following is recommended:

- Clean water runoff, such as roof runoff, should be used for infiltration purposes; and,
- The unused domestic water wells and, when no longer required, the monitoring wells, should be decommissioned by a licensed water well contractor in accordance with applicable legislation.

The implementation of the infiltration basin SWM features and the bio-retention strips will assist to mitigate against reductions in groundwater recharge/groundwater withdrawal resulting from the development. The predominant till soils (i.e., non-aquifer) at the Site are not inferred to represent a significant recharge area for any groundwater users that may remain in the area. Therefore, with the implementation of the above recommendations, no significant quantity impact to local groundwater users is expected. No groundwater-dependent natural heritage features have been identified in the vicinity of the Site. Some precipitation from any impervious areas may infiltrate through the proposed SWM features. This infiltration is not expected to significantly degrade the groundwater quality at the Site, although stormwater from roads may have increased concentrations of one or more of reduced metals, oil and grease, and road salt. With the exception of road salt, these materials quickly become immobile in the shallow subsurface.

4.0 CLOSURE

We trust that this hydrogeological assessment reports meet with your immediate needs at this time. If you have any questions, please do not hesitate to contact the undersigned.

5.0 REFERENCES

LSRCA (2016). *LSRCA Technical Guidelines for Stormwater Management Submissions*. Lake Simcoe Regional Conservation Authority

MOECC, M. o. (2003). *Stormwater Management Planning and Design Manual.* Ontario.

TRCA and CVCA, T. a. (2010). *Low Impact Development Stormwater Management Planning and Design Guide, Version 1.0 (TRCA and CVCA, 2010).*

TRCA, T. a. (2012). *Stormwater Management Criteria, Version 1.0.*

Signature Page

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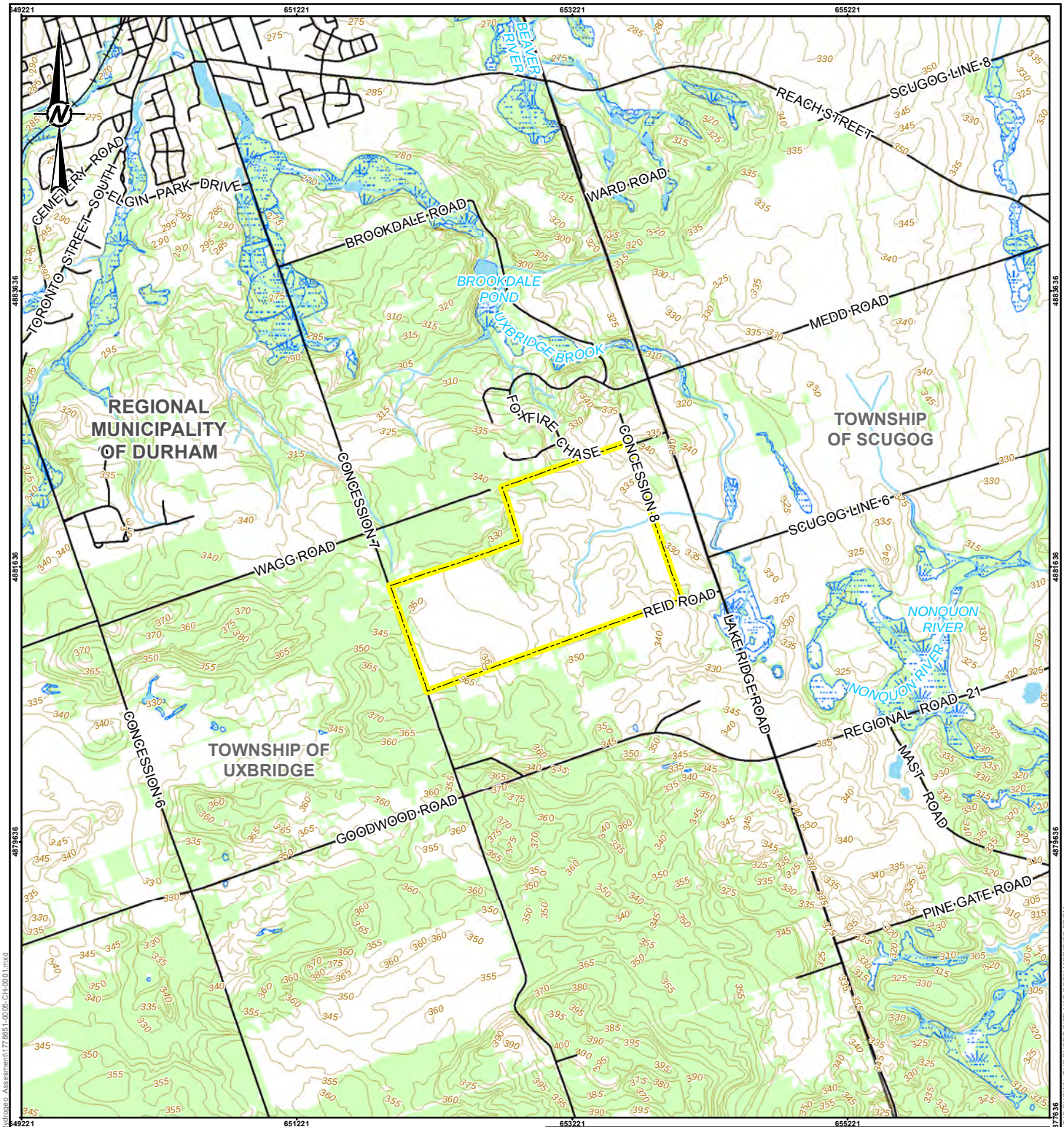
FIGURES



LEGEND

- CONTOURS (M)
- RAILWAY
- ROAD
- WATERCOURSE
- SITE BOUNDARY
- MUNICIPAL BOUNDARY
- WATERBODY
- WETLAND
- WOODED AREA

0 1,000 2,000

1:40,000 METRES

NOTE(S)

1. SITE BOUNDARY AND TEST LOCATIONS OBTAINED FROM SURVEY BY J.D BARNES LTD.

REFERENCE(S)

BASE DATA - MNR LIO, OBTAINED 2017
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2018
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
THE MILLER GROUP

PROJECT
HYDROGEOLOGICAL ASSESSMENT,
BOYINGTON PIT #3,
4499-4589 CONCESSION ROAD 7, UXBRIDGE, ONTARIO

TITLE
KEY PLAN

CONSULTANT
GOLDER

YYYY-MM-DD	2019-01-15
DESIGNED	JT
PREPARED	JT
REVIEWED	ZK
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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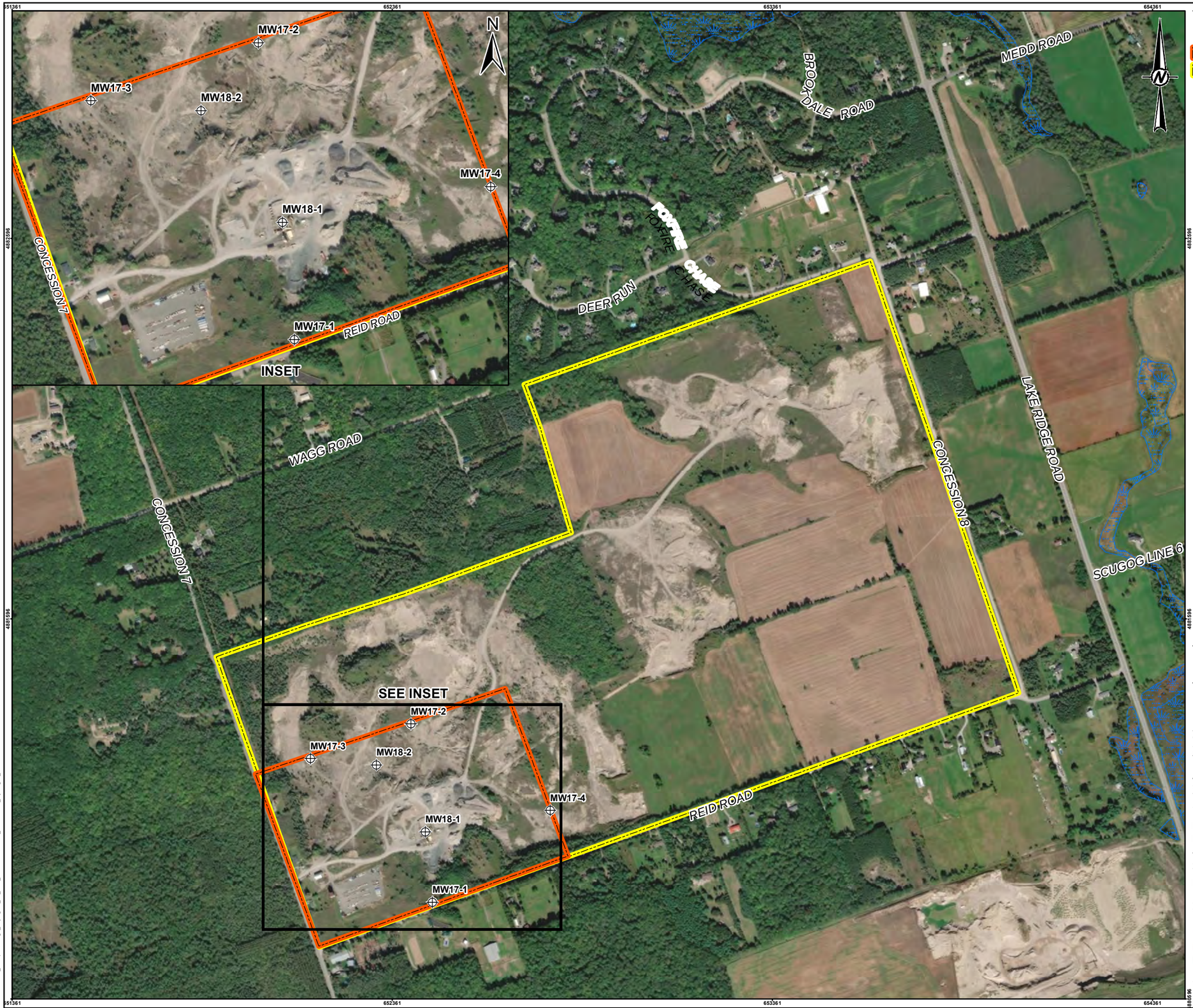

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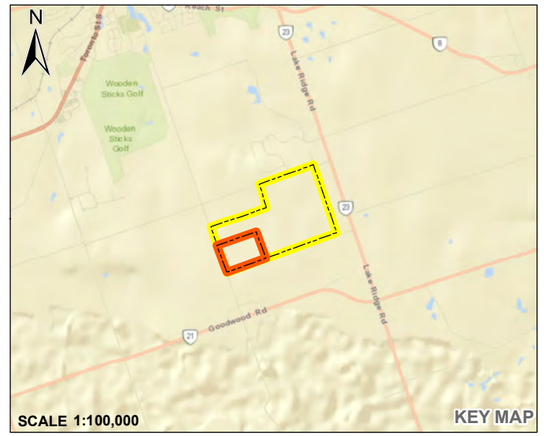
- SITE BOUNDARY
- SITE BOUNDARY
- WETLAND



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INSET SCALE

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NOTE(S)

1. SITE BOUNDARY AND TEST LOCATIONS OBTAINED FROM SURVEY BY J.D BARNES LTD.

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SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
THE MILLER GROUP

PROJECT
HYDROGEOLOGICAL ASSESSMENT,
BOYINGTON PIT #3,
4499-4589 CONCESSION ROAD 7, UXBRIDGE, ONTARIO

TITLE
MONITORING WELL LOCATION PLAN

CONSULTANT
GOLDER

YYYY-MM-DD	2019-01-15
DESIGNED	JT
PREPARED	JT
REVIEWED	CP
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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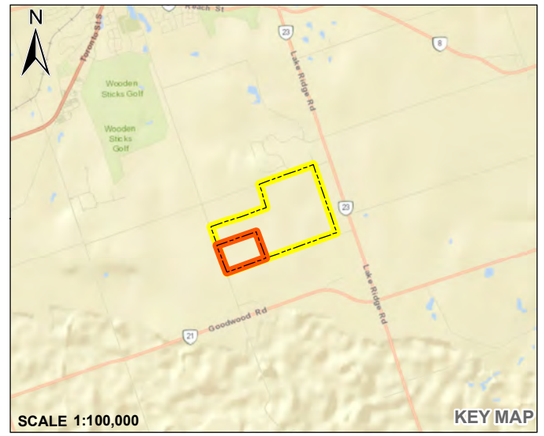
651361
652361
653361
654361
4852596
4851596

MW17-2 (313.90)
MW17-3 (313.60)
MW18-2 (313.66)
MW17-4 (315.90)
MW18-1
MW17-1 (314.64)
314
315
N
CONCESSION 7
REID ROAD
INSET
WAGG ROAD
BROOKDALE ROAD
MEDD ROAD
FOXFIRE CHASE
DEER RUN
LAKE RIDGE ROAD
CONCESSION 6
SCUGOG LINE 6
SEE INSET

LEGEND

- MONITORING WELL LOCATION
- INFERRED GROUNDWATER FLOW DIRECTION
- GROUNDWATER CONTOURS (MASL)
- SITE BOUNDARY
- PROPERTY BOUNDARY
- WETLAND
- 314.54 GROUNDWATER ELEVATION (MASL)



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INSET SCALE
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NOTE(S)
1. SITE BOUNDARY AND TEST LOCATIONS OBTAINED FROM SURVEY BY J.D BARNES LTD.
2. WATER LEVELS MEASURED ON NOVEMBER 8, 2018.

REFERENCE(S)
BASE DATA - MNR LIO, OBTAINED 2017
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PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
THE MILLER GROUP

PROJECT
HYDROGEOLOGICAL ASSESSMENT,
BOYINGTON PIT #3,
4499-4589 CONCESSION ROAD 7, UXBRIDGE, ONTARIO

TITLE
INFERRED GROUNDWATER FLOW DIRECTION

CONSULTANT
GOLDER

YYYY-MM-DD	2019-01-15
DESIGNED	JT
PREPARED	JT / RRD
REVIEWED	CP
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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MILLER PAVING LIMITED
CLASS 'A' PIT
LICENCE No. 6578

M3
(170.2 ha)

M3-1
(13.4 ha)

M5-1
(12.6 ha)

DA-1
DA-2
DA-3
DA-4
DA-5
DA-6

Concession Road 7

345.4 m
N 19°40'00" W

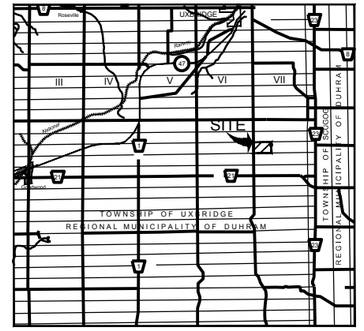
465.47 m
N 19°21'50" W

1957.60 m
N 70°01'00" E

Reid Road

HOUSE
HOUSE
HOUSE
SCALE HOUSE
CORRUGATED METAL SHOP
BLOCK GARAGE
SILO
ROAD CONSTRUCTION EQUIPMENT OUTDOOR STORAGE AREA
ASPHALT PLANT

LOT 18, CONCESSION 7
GEOGRAPHIC TOWNSHIP OF UXBRIDGE
REGIONAL MUNICIPALITY OF DURHAM



- Property Boundary
- Internal Road
- Wooded Areas
- Overhead Hydro Lines
- Underground Gas Line
- Underground Bell Line
- Existing Post & Wire Fence
- Existing Building / Concrete Pad / Equipment Storage / Processing Area
- Contours (5.0 m) (345)
- Contours (1.0 m) (344)
- Pit Entrance / Exit
- Stockpiled Material
- Natural Drainage
- Zoning Limits
- Zoning (M3-1, M5-1)
- Existing Drainage
- Proposed Fill Importation Boundary
- Existing Site Drainage
- Existing Pit Entrance Gate

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N
Site North
True North

REFERENCE(S)
Baseplan provided by Skelton Brumwell & Associates Inc., Project No. 10-2412, Drawing No. 2412-1 of 9

CLIENT
MILLER PAVING LIMITED

PROJECT
HYDROGEOLOGICAL ASSESSMENT, BOYINGTON PIT #3

CONSULTANT
GOLDER

YYYY-MM-DD	2018-02-22
DESIGNED	PJM
PREPARED	PJM
REVIEWED	TL
APPROVED	####

TITLE
EXISITNG CONDITIONS AND WATER BALANCE DRAINAGE AREAS

PROJECT NO.	PHASE	REV.	FIGURE
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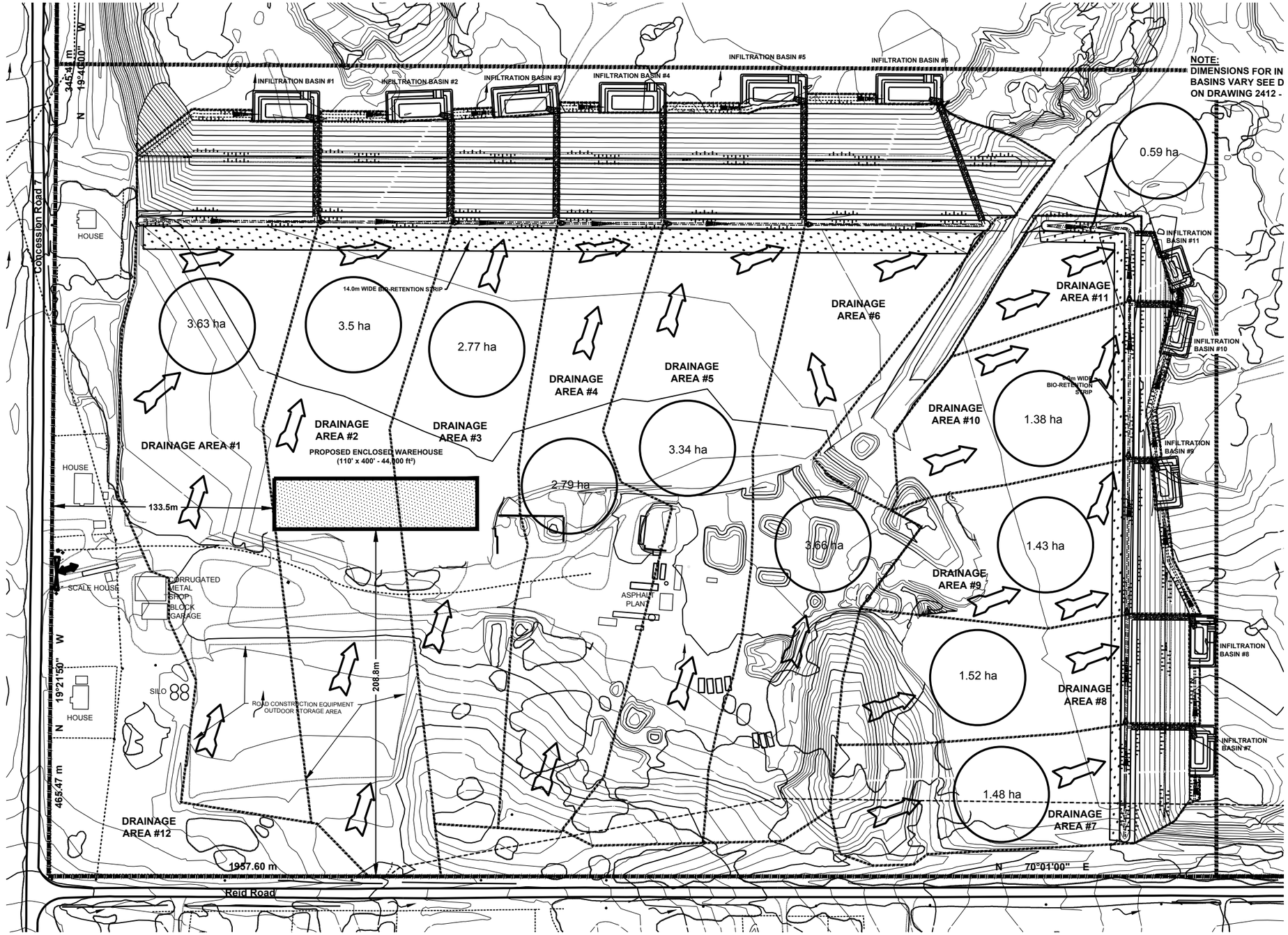
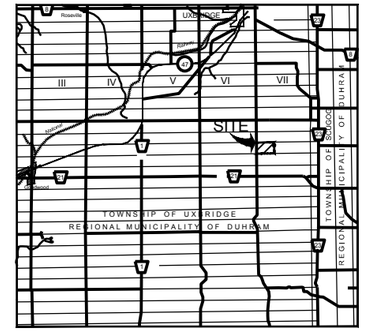
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm 0



LOT 18, CONCESSION 7
GEOGRAPHIC TOWNSHIP OF UXBRIDGE
REGIONAL MUNICIPALITY OF DURHAM



- Property Boundary
- Proposed Fill Importation Boundary
- Internal Road
- Wooded Areas
- Overhead Hydro Lines
- Underground Gas Line
- Underground Bell Line
- Existing Post & Wire Fence
- Existing Building / Concrete Pad / Equipment Storage / Processing Area
- Contours (5.0 m)
- Contours (1.0 m)
- Pit Entrance / Exit
- Gate
- Stockpiled Material
- Natural Drainage
- 1.0% Proposed Fill Slope Grade
- Bank Slope
- Drainage Areas
- Proposed Drainage Direction
- 0.5 ha Drainage Area
- Proposed Rip Rap Channel
- Bio-Retention Strip (Grasses/ Sedges)

0 50 100
1:2,500 METRES

N
Site North
True North

REFERENCE(S)
Baseplan provided by Skelton Brumwell & Associates Inc., Project No. 10-2412, Drawing No. 2412-1 of 9

CLIENT
MILLER PAVING LIMITED

CONSULTANT
GOLDER

YYYY-MM-DD	2018-02-22
DESIGNED	PJM
PREPARED	PJM
REVIEWED	TL
APPROVED	####

PROJECT
HYDROGEOLOGICAL ASSESSMENT, BOYINGTON PIT #3

TITLE
PROPOSED POST-FILL WATER BALANCE DRAINAGE AREAS

PROJECT NO.	PHASE	REV.	FIGURE
1778651	1000	A	5

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

25 mm

0

APPENDIX A

Limitations

GOLDER

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

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

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

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

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

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

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

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

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

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

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

APPENDIX B

Plans and Concepts

2412 - 1 of 9

LOT 18, CONCESSION 7
GEOGRAPHIC TOWNSHIP OF UXBRIDGE
REGIONAL MUNICIPALITY OF DURHAM

25 0 25 50 75 metres
Scale 1:1250

N
Site North
True North

MILLER PAVING LIMITED
CLASS 'A' PIT
LICENCE No. 6578

M3
(170.2 ha)

M3-1
(13.4 ha)

M5-1
(12.6 ha)

Concession Road 7

345.41 m
N 19°40'00" W

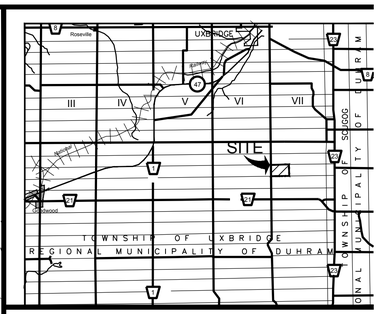
465.47 m
N 19°21'50" W

1957.60 m
N 70°01'00" E

Reid Road

HOUSE
HOUSE
HOUSE
HOUSE

SCALE HOUSE
CORRUGATED METAL SHOP
BLOCK GARAGE
SILO
ROAD CONSTRUCTION EQUIPMENT OUTDOOR STORAGE AREA
ASPHALT PLANT



KEY MAP
N.T.S.

LEGEND

- Property Boundary
- Internal Road
- Wooded Areas
- O/H — Overhead Hydro Lines
- GAS — Underground Gas Line
- B — Underground Bell Line
- X — Existing Post & Wire Fence
- Existing Building / Concrete Pad / Equipment Storage / Processing Area
- 345 — Contours (5.0 m)
- 344 — Contours (1.0 m)
- Pit Entrance / Exit
- Stockpiled Material
- Natural Drainage
- Zoning Limits
- M3-1 / M5-1 — Zoning
- Existing Drainage
- Proposed Fill Importation Boundary
- Existing Pit Entrance Gate

SCHEDULE OF REVISIONS

NO.	DATE	DESCRIPTION	CHECKE

MILLER PAVING LIMITED
BOYINGTON PIT #3

FILL IMPORTATION UNDER SITE PLAN CONTROL
4419 CONCESSION ROAD 7
TOWNSHIP OF UXBRIDGE

EXISTING CONDITIONS AND
PRE - FILLING DRAINAGE PATTERNS

PROJECT NO.	10 - 2412	DRWG NO.	2412 - 1 of 9
DATE:	JULY 2016	SCALE:	1:1250
DRAWN:	MJB	CHECKED:	APPROVED:

Skelton Brumwell & Associates Inc.
ENGINEERING PLANNING ENVIRONMENTAL CONSULTANTS
93 BELL FARM ROAD, SUITE 107
BARRIE, ONTARIO L4M 5G1
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TOLL FREE (877) 726-1141

LOT 18, CONCESSION 7
GEOGRAPHIC TOWNSHIP OF UXBRIDGE
REGIONAL MUNICIPALITY OF DURHAM

25 0 25 50 75 metres

Scale 1:1250

N — Site North

N — True North

2412 - 2 of 9

NOTES:

1. TOTAL FILL VOLUME OF ENVELOPES #1 AND #2 = 1,039,000 m³.
2. DIMENSIONS FOR INFILTRATION BASINS VARY SEE DETAILS ON DRAWING 2412 - 8 OF 9

PROPOSED NORTH RIP RAP CHANNELS FOR DRAINAGE AREAS 1A ,1B, 2A, 2B, 3A, 3B - 1.5 m BOTTOM WIDTH, 0.5 m DEPTH, 2:1 SIDE SLOPES. RIP RAP MEDIAN SIZE TO BE 0.2 m (8"). RIP RAP TO BE PLACED TO 0.3 m THICKNESS.

CONSTRUCT STILLING BASIN AT DOWNSTREAM END OF EACH RIP RAP CHANNEL. STILLING BASIN TO BE 1.5 m WIDE x 3.0 m LONG x 0.5 m DEEP, FILLED WITH 0.2 m RIP RAP STONE. PLACE ADDITIONAL 0.2 m RIP RAP STONE BLOCKS ON TOP OF STILLING BASIN. SEE DETAILS DRAWING 2412 - 4 OF 7.

INFILTRATION BASIN #1
INFILTRATION BASIN #2
INFILTRATION BASIN #3
INFILTRATION BASIN #4
INFILTRATION BASIN #5
INFILTRATION BASIN #6
INTERIM DRAINAGE SWALE

CHANNEL SLOPE = 26.4%
CHANNEL SLOPE = 25.8%
CHANNEL SLOPE = 27.2%
CHANNEL SLOPE = 27.1%
CHANNEL SLOPE = 27.5%
CHANNEL SLOPE = 23.5%

Concession Road 7
N 19°40'00" W 345.44 m
HOUSE

PROPOSED PERIMETER DRAINAGE SWALE, 1.0 m DEPTH, 0.3% INVERT SLOPE, 3:1 SIDE SLOPES AND 1.0 m BOTTOM WIDTH. DRAINAGE SWALE TO BE REINSTATED WITH TOPSOIL AND SOD.

14.0m WIDE BIO-RETENTION STRIP

ROCK FLOW CHECK DAM PER OPSD 219.211. PLACE A ROCK CHECK DAM APPROXIMATELY 1.0 m EAST OF EACH RIP RAP DRAINAGE CHANNELS (TYPICAL). SEE DETAIL DRAWING 2412 - 7 OF 7.

FILL ENVELOPE #1
PROPOSED GRAVEL SURFACE TREATMENT FOR IMPORTED FILL AREA TO FACILITATE OUTDOOR CONSTRUCTION EQUIPMENT STORAGE
LIFT #1 ELEVATION = 339 masl ±
LIFT #2 ELEVATION = 349 masl ±

PROPOSED ENCLOSED WAREHOUSE (110' x 400' - 44,000 ft²)

133.5m
208.8m

HOUSE
SCALE HOUSE
CORRUGATED METAL SHOP
BLOCK GARAGE
SILO
HOUSE
ASPHALT PLANT
ROAD CONSTRUCTION EQUIPMENT OUTDOOR STORAGE AREA

N 19°21'50" W 465.47 m

1957.60 m

N 70°01'00" E

Reid Road

HOUSE

PROPOSED NORTHEAST RIP RAP CHANNEL FOR DRAINAGE AREA 6 - 0.5 m BOTTOM WIDTH, 0.5 m DEPTH, 2:1 SIDE SLOPES. RIP RAP MEDIAN SIZE TO BE 0.15 m (6"). RIP RAP TO BE PLACED TO 0.225 m THICKNESS.

CONSTRUCT STILLING BASIN AT DOWNSTREAM END OF RIP RAP CHANNEL. STILLING BASIN TO BE 0.5 m WIDE x 3.0 m LONG x 0.5 m DEEP, FILLED WITH 0.15 m RIP RAP STONE. PLACE ADDITIONAL 0.15 m RIP RAP STONE BLOCKS ON TOP OF STILLING BASIN. SEE DETAILS DRAWING 2412 - 6 OF 7.

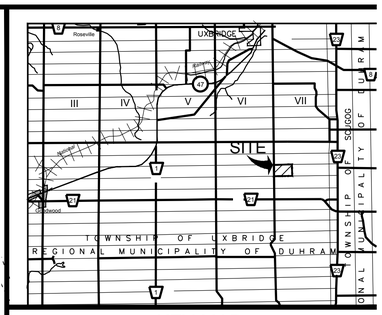
INFILTRATION BASIN #11
CHANNEL SLOPE = 10.1%
INTERIM DRAINAGE SWALE
CHANNEL SLOPE = 23.2%
INFILTRATION BASIN #10
6.0m WIDE BIO-RETENTION STRIP
ROCK FLOW CHECK DAM PER OPSD 219.211. PLACE A ROCK CHECK DAM APPROXIMATELY 1.0 m NORTH OF EACH RIP RAP DRAINAGE CHANNEL (TYPICAL). SEE DETAIL DRAWING 2412 - 7 OF 7.
INFILTRATION BASIN #9
CHANNEL SLOPE = 21.4%

FILL ENVELOPE #2
PROPOSED GRAVEL SURFACE TREATMENT FOR IMPORTED FILL AREA TO FACILITATE OUTDOOR CONSTRUCTION EQUIPMENT STORAGE
LIFT #1 ELEVATION = 341 masl ±
LIFT #2 ELEVATION = 346 masl ±

PROPOSED EAST RIP RAP CHANNELS FOR DRAINAGE AREAS 4A, 4B, 5A, 5B - 1.0 m BOTTOM WIDTH, 0.5 m DEPTH, 2:1 SIDE SLOPES. RIP RAP MEDIAN SIZE TO BE 0.2 m (8"). RIP RAP TO BE PLACED TO 0.3 m THICKNESS.

CONSTRUCT STILLING BASIN AT DOWNSTREAM END OF EACH RIP RAP CHANNEL. STILLING BASIN TO BE 1.0 m WIDE x 3.0 m LONG x 0.5 m DEEP, FILLED WITH 0.2 m RIP RAP STONE. PLACE ADDITIONAL 0.2 m RIP RAP STONE BLOCKS ON TOP OF STILLING BASIN. SEE DETAILS DRAWING 2412 - 5 OF 7.

CHANNEL SLOPE = 26.4%
INFILTRATION BASIN #8
INTERIM DRAINAGE SWALE
PROPOSED PERIMETER DRAINAGE SWALE, 1.0 m DEPTH, 0.3% INVERT SLOPE, 3:1 SIDE SLOPES , AND 1.0 m BOTTOM WIDTH. DRAINAGE SWALE TO BE REINSTATED WITH TOPSOIL AND SOD.
CHANNEL SLOPE = 26.1%
INFILTRATION BASIN #7



KEY MAP
N.T.S.

LEGEND

- Property Boundary
- Fill Envelope Limit
- Proposed Fill Importation Boundary
- Internal Road
- Wooded Areas
- O/H — Overhead Hydro Lines
- GAS — Underground Gas Line
- B — Underground Bell Line
- X — Existing Post & Wire Fence
- Existing Building / Concrete Pad / Equipment Storage / Processing Area
- 345 — Contours (5.0 m)
- 344 — Contours (1.0 m)
- Pit Entrance / Exit
- Stockpiled Material
- Natural Drainage
- 1.0% — Proposed Fill Slope Grade
- Bank Slope
- Rip Rap Channel
- F2 — Fill Direction/Sequence of Filling
- Proposed Silt Controls
- Bio-Retention Strip (Grasses/ Sedges)

SCHEDULE OF REVISIONS

NO.	DATE	DESCRIPTION	CHECKE

MILLER PAVING LIMITED
BOYINGTON PIT #3
FILL IMPORTATION UNDER SITE PLAN CONTROL

4419 CONCESSION ROAD 7
TOWNSHIP OF UXBRIDGE

POST FILLING DRAINAGE SYSTEMS AND ENVELOPES

PROJECT NO.	10 - 2412	DRWG NO.	2412 - 2 of 9
DATE:	JULY 2016	SCALE:	1:1250
DRAWN:	MJB	CHECKED:	APPROVED:

Skelton Brumwell & Associates Inc.
ENGINEERING PLANNING ENVIRONMENTAL CONSULTANTS
93 BELL FARM ROAD, SUITE 107
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FAX (705) 726-0331
TOLL FREE (877) 726-1141

APPENDIX C

Record of Boreholes Gradations

PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-1

SHEET 1 OF 6

BORING DATE: October 12, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		326.74							
0	Mud Rotary 200 mm Hollow Stem Augers	(SP) SAND, some to trace silt, trace gravel; brown; non-cohesive, moist, very loose to compact (NATIVE)		0.00	1	SS	4				Bentonite Seal
1					2	SS	23				8 60
2					3	SS	16				
					4	SS	27				
3					5	SS	14				
4					6	SS	9				
5					7	SS	20				
					8	SS	24				Grout
6				320.64							
		(SP) SAND, some to trace gravel; grey; non-cohesive, moist, very dense to compact		6.10	9	SS	53				
7											
8					10	SS	43				
9											
					11	SS	31				
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-1

SHEET 2 OF 6

BORING DATE: October 12, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Mud Rotary 200 mm Hollow Stem Augers	(SP) SAND, some to trace gravel; grey; non-cohesive, moist, very dense to compact									
11					12	SS	57				
12											
13					13	SS	68				
14					14	SS	44				
15					15	SS	30				Grout 0 90
16											
17		(ML) sandy SILT; grey/light brown; non-cohesive, wet to moist, compact to very dense		309.67 17.07	16	SS	28				
18											
19					17	SS	24				
20					18	SS	59				0 90
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-1

SHEET 3 OF 6

BORING DATE: October 12, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20	Mud Rotary 200 mm Hollow Stem Augers	(ML) sandy SILT; grey/light brown; non-cohesive, wet to moist, compact to very dense			18	SS	59				0 90
21											
					19	SS	60				
22											
				304.36							
		(SM) SILTY SAND; grey; non-cohesive, moist to wet, very dense		22.38							
23					20	SS	58				
24											
					21	SS	50				
25											Grout
26					22	SS	50				
				299.92							
		(SP) SAND, some to trace silt; grey; non-cohesive, moist, very dense		26.82							
27					23	SS	50				
28											
29					24	SS	60				
30		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

GTA-BHS 001 S:\CLIENTS\MILLER_GROUP\UXBRIDGE_BOYINGTON_PIT_3\02_DATA\GINT\UXBRIDGE-1778651.GPJ GAL-MIS.GDT 1/14/19

PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-1

SHEET 4 OF 6

BORING DATE: October 12, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
30	Mud Rotary 200 mm Hollow Stem Augers	(SP) SAND, some to trace silt; grey; non-cohesive, moist, very dense			25	SS	72				
31				295.35 31.39							
		(SP) SAND; grey; non-cohesive, moist, very dense									
32					26	SS	50				
33											
					27	SS	98				
34											
35					28	SS	65				Grout
36											
					29	SS	57				
37											
38		- Trace gravel at a depth of 38.1 m - 38.4 m			30	SS	100				
39											
					31	SS	50				
40		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

GTA-BHS 001 S:\CLIENTS\MILLER_GROUP\UXBRIDGE_BOYINGTON_PIT_3\02_DATA\GINT\UXBRIDGE-1778651.GPJ GAL-MIS.GDT 1/14/19

PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-1

SHEET 5 OF 6

BORING DATE: October 12, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
40	Mud Rotary; 200 mm Hollow Stem Augers	(SP) SAND; grey; non-cohesive, moist, very dense									
41					32	SS	50				
42											
		- Some gravel at a depth of 42.7 m to 44.5 m			33	SS	56				
43											
44					34	SS	67				
45				281.50 / 45.24							Grout
		(SP) SAND, trace silt; grey; non-cohesive, moist, very dense			35	SS	60				
46											
47											
					36	SS	98				2 73
48											
49					37	SS	25				
				276.93 / 49.81							Bentonite Seal
50		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-1

SHEET 6 OF 6

BORING DATE: October 12, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
50		*--- CONTINUED FROM PREVIOUS PAGE ---*									
	Mud Rotary / 200 mm Hollow Stem Augers	(SP) gravelly SAND; grey; non-cohesive, moist, very dense			38	SS	92				Bentonite Seal
51				275.41							
		(SM) SILTY SAND; grey; non-cohesive, moist to wet, very dense		51.33							
52					39	SS	72				
				274.01							
		(SP) SAND, some silt; grey; non-cohesive, moist to wet, very dense		52.73							
53											Silica Sand Filter and Screen
					40	SS	60				
54											
55					41	SS	102				
				271.44							
		END OF BOREHOLE		55.30							
56		Note: 1. Water level measured at a depth of 49.3 m below ground surface (Elev. 313.4 m asl), Nov. 2/18.									
57											
58											
59											
60											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-2

SHEET 1 OF 2

BORING DATE: October 17, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○; 20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		329.70							
0	B-57 Track-Mount Mobile 200 mm Hollow Stem Augers	(SP) SAND, some gravel, some to trace silt; brown; non-cohesive, moist, loose to very dense		0.00	1	SS	10				
1					2	SS	34				
2					3	SS	21				
3					4	SS	40				Bentonite Seal
4		- Trace wet stiff clay seams at 3.4 m			5	SS	16				
5					6	SS	72				
6		(SP) SAND, trace to some gravel; brown to grey/brown; non-cohesive, moist, very dense		325.13 4.57	7	SS	77				
7					8	SS	53				
8					9	SS	48				Grout
9					10	SS	70				
10					11	SS	66				
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-2

SHEET 2 OF 2

BORING DATE: October 17, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	B-57 Track-Mount Mobile, 200 mm Hollow Stem Augers	(SP) SAND, trace to some gravel; brown to grey/brown; non-cohesive, moist, very dense									
11					12	SS	60				Grout
12		- Soft moist sandy silt layer with some clay at a depth of 12.5 m - 12.7 m			13	SS	12				
13											Bentonite Seal
14					14	SS	54				
15											
16					15	SS	24				
				313.39							
		(SP) gravelly SAND; grey; non-cohesive, wet, dense to very dense		16.31							
17					16	SS	39				Silica Sand Filter and Screen
18											
					17	SS	85				12 81
				310.95							
		END OF BOREHOLE		18.75							
19		Note: 1. Water level measured at a depth of 17.1 m below ground surface (Elev. 312.6 m asl), Nov. 2/18.									
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-3

SHEET 1 OF 3

BORING DATE: October 24, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		331.01							
0	B-57 Track-Mount Mobile; 108 mm I.D and 200 mm O.D Hollow Stem Augers	(SP) gravelly SAND with SILT; brown; non-cohesive, moist, loose to very dense		0.00	1	SS	14				Bentonite Seal
1					2	SS	63				
2					3	SS	25				0 2
					4	SS	26				
		-Trace of clay at a depth of 2.7 m									
3				327.96							
		(SP) SAND; grey; non-cohesive, moist, dense		3.05	5	SS	49				
4					6	SS	40				
					7	SS	39				
5		- Trace of silt at a depth of 5.3 m - 8.1 m		325.64							
		(SP) SAND; brown; non-cohesive, moist, very dense		5.37	8	SS	50				Grout
6					9	SS	50				
7											
					10	SS	84				
8											
9					11	SS	92				
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-3

SHEET 2 OF 3

BORING DATE: October 24, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	B-57 Track-Mount Mobile; 108 mm I.D and 200 mm O.D Hollow Stem Augers	(SP) SAND; brown; non-cohesive, moist, very dense									
11					12	SS	78				
12		- Trace of silt at a depth of 12.2 m - Grey color at a depth of 12.2 m - 15.7 m			13	SS	75				Grout
13											
14					14	SS	92				
15					15	SS	100				Bentonite Seal
		(SP) SAND; brown; non-cohesive to cohesive, wet, very dense		315.31 15.70							
16											
17					16	SS	57				
18		(SP) SILTY SAND; brown; cohesive, wet, very dense		312.87 18.14							Silica Sand Filter and Screen
19					17	SS	46				
20					18	SS	54				
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-3

SHEET 3 OF 3

BORING DATE: October 24, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		(SP) SILTY SAND; brown; cohesive, wet, very dense		310.74	18	SS	54				
		END OF BOREHOLE		20.27							
		NOTES: 1. Groundwater level measured at a depth of about 17.5 m below ground surface upon completion of drilling. 2. Water level measured at a depth of 18.4 m below ground surface (Elev. 312.6 m asl), Nov. 2/18.									
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-4

SHEET 1 OF 3

BORING DATE: October 19, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		333.84							
0	B-57 Track-Mount Mobile, 200 mm Hollow Stem Augers	(SP) SAND, some to trace silt, trace gravel; brown; non-cohesive, moist, compact		0.00	1	SS	13				Sand
1					2	SS	16				
				332.32							
		(CL) SILTY CLAY, some gravel; grey; cohesive, w>PL, stiff		1.52							
				332.01	3	SS	9				
2		(SM) SILTY SAND; grey; non-cohesive, moist, loose to compact		1.83							
					4	SS	23				
3				330.79							
		(SP) SAND, trace silt; grey; non-cohesive, moist, compact to dense		3.05	5	SS	31				
4					6	SS	26				
					7	SS	51				
5											Bentonite Seal
					8	SS	45				
6											
					9	SS	32				
7											
					10	SS	43				0 55
8				325.31							
		(ML) sandy SILT; grey; non-cohesive, wet, dense		8.53							
9					11	SS	31				
10											
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-4

SHEET 2 OF 3

BORING DATE: October 19, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
	B-57 Track-Mount Mobile 200 mm Hollow Stem Augers	(ML) sandy SILT, some gravel; brown/grey (TILL-LIKE); non-cohesive, moist, very dense		323.79 10.06							
11					12	SS	94				
12					13	SS	50				
13											
14					14	SS	50				Bentonite Seal
15					15	SS	50				
16				317.38 16.46							
		(SP) SAND, trace gravel; grey; non-cohesive, moist to wet at 18.4 m, very dense			16	SS	60				
17											
18					17	SS	95				
19											Silica Sand Filter and Screen
20					18	SS	86				
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW17-4

SHEET 3 OF 3

BORING DATE: October 19, 2017

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20		*--- CONTINUED FROM PREVIOUS PAGE ---*									
20	B-57 Track-Mount Mobile 200 mm Hollow Stem Augers	(SP) SAND, trace gravel; grey; non-cohesive, moist to wet at 18.4 m, very dense			18	SS	86				Silica Sand Filter and Screen
21				312.35	19	SS	72				0 92
		END OF BOREHOLE		21.49							
22		Note: 1. Water level measured at a depth of 19.1 m below ground surface (Elev. 314.7 m asl), Nov. 2/18.									
23											
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AVR

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW18-1

SHEET 1 OF 4

BORING DATE: October 29, 2018

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		349.76							
0	Mud Rotary 200 mm Hollow Stem Augers	gravelly SAND, trace silt; brown; non-cohesive, moist, compact to dense (NATIVE)		0.00	1	SS	12				
1											
2											
3					2	SS	10				
4											
5											Grout
6					3	SS	45				
7											
8											
9				340.62							
		sandy SILT to SILTY SAND, trace to some gravel; brown; non-cohesive, moist, dense to very dense (NATIVE)		9.14	4	SS	59				
10											
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW18-1

SHEET 2 OF 4

BORING DATE: October 29, 2018

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Mud Rotary 200 mm Hollow Stem Augers	sandy SILT to SILTY SAND, trace to some gravel; brown; non-cohesive, moist, dense to very dense (NATIVE)									
11											
12											
13											
14											
15					5	SS	45				Grout
16											
17											
18											
19											
20		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW18-1

SHEET 3 OF 4

BORING DATE: October 29, 2018

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20	Mud Rotary 200 mm Hollow Stem Augers	sandy SILT to SILTY SAND, trace to some gravel; brown; non-cohesive, moist, dense to very dense (NATIVE)									
21					6	SS	50				
22											
23											
24											
25											Grout
26											
27											
28											
29											
30		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED:

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PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW18-1

SHEET 4 OF 4

BORING DATE: October 29, 2018

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
30		*--- CONTINUED FROM PREVIOUS PAGE ---*									
	Mud Rotary 200 mm Hollow Stem Augers	sandy SILT to SILTY SAND, trace to some gravel; brown; non-cohesive, moist, dense to very dense (NATIVE)		319.28							
		SAND to gravelly SAND, trace silt; brown; non-cohesive, very dense (NATIVE)		30.48	7	SS	50				Grout
31											
32											Slow Release Bentonite
33											
34											#2 Sand
35					8	SS	80				Screen
36											
37					9	SS	82				
				312.57							
		END OF BOREHOLE		37.19							
38											
39											
40											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED:

GTA-BHS 001 S:\CLIENTS\MILLER_GROUP\UXBRIDGE_BOYINGTON_PIT_3\02_DATA\GINT\UXBRIDGE-1778651.GPJ GAL-MIS.GDT 1/14/19

PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW18-2

SHEET 1 OF 3

BORING DATE: November 1, 2018

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		333.31							
0	Mud Rotary 200 mm Hollow Stem Augers	sandy SILT, trace gravel; light brown; cohesive, w<PL, firm		0.00	1	SS	8				
				332.70							
		SAND, some gravel, trace non-plastic fines; brown; non-cohesive, moist, loose to very dense		0.61							
1											
2											
3											
4											
5											Bentonite
6					2	SS	32				
7											
8											
9											
10											
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: GC

CHECKED:

GTA-BHS 001 S:\CLIENTS\MILLER_GROUP\UXBRIDGE_BOYINGTON_PIT_3\02_DATA\GINT\UXBRIDGE-1778651.GPJ GAL-MIS.GDT 1/14/19

PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW18-2

SHEET 2 OF 3

BORING DATE: November 1, 2018

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp ⊖W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Mud Rotary 200 mm Hollow Stem Augers	SAND, some gravel, trace non-plastic fines; brown; non-cohesive, moist, loose to very dense									
11											
12											
					3	SS	40				
13											
14											Bentonite
15											
16											
17											
18				315.02							Sand
		gravelly SAND; brown; non-cohesive, moist, very dense		18.29	4	SS	50				
19											Screen
20		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: GC

CHECKED:

GTA-BHS 001 S:\CLIENTS\MILLER_GROUP\UXBRIDGE_BOYINGTON_PIT_3\02_DATA\GINT\UXBRIDGE-1778651.GPJ GAL-MIS.GDT 1/14/19

PROJECT: 1778651

LOCATION: N ; E

RECORD OF BOREHOLE: MW18-2

SHEET 3 OF 3

BORING DATE: November 1, 2018

DATUM:

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20		*--- CONTINUED FROM PREVIOUS PAGE ---*									
20	Mud Rotary / 200 mm Hollow Stem Augers	gravelly SAND; brown; non-cohesive, moist, very dense									Screen
21				311.97							
21		SAND, some gravel; grey; non-cohesive, wet, loose		21.34	5	SS	2				
22		END OF BOREHOLE		311.36 21.95							
23											
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: GC

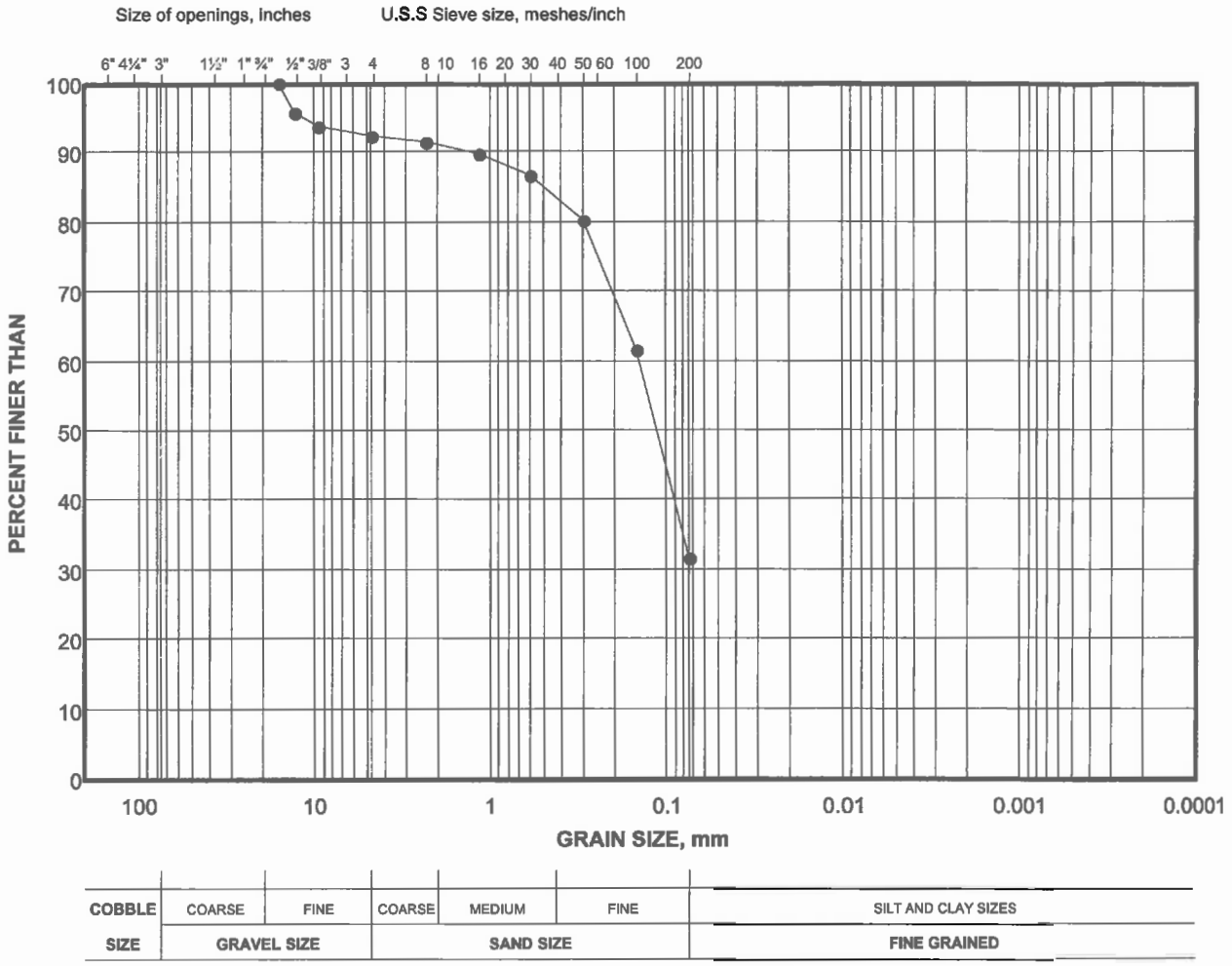
CHECKED:

GTA-BHS 001 S:\CLIENTS\MILLER_GROUP\UXBRIDGE_BOYINGTON_PIT_3\02_DATA\GINT\UXBRIDGE-1778651.GPJ GAL-MIS.GDT 1/14/19

GRAIN SIZE DISTRIBUTION

MTO LS-602

FIGURE



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-1	2	

Project Number: 1778651

Checked By: _____

Golder Associates

Date: 28-Feb-18

SOIL SIEVE ANALYSIS

Initial weight of dry sample = 194.1(g)

COARSE SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
26.5mm	0.00	0.00	26.50	100.0
19.0mm	0.00	0.00	19.00	100.0
16mm	0.00	0.00	16.00	100.0
13.2mm	8.00	4.12	13.20	95.9
9.5mm	11.90	2.01	9.50	93.9
4.75mm	14.90	1.55	4.75	92.3
PAN	178.90	92.32	0.00	0.0

HYDROMETER BACK SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
2.36mm	1.80	0.93	2.36	91.4
1.18mm	5.10	1.70	1.18	89.7
600µm	10.80	2.94	0.60	86.8
300µm	23.40	6.50	0.30	80.3
150µm	59.70	18.73	0.15	61.5
75µm	117.40	29.78	0.08	31.7

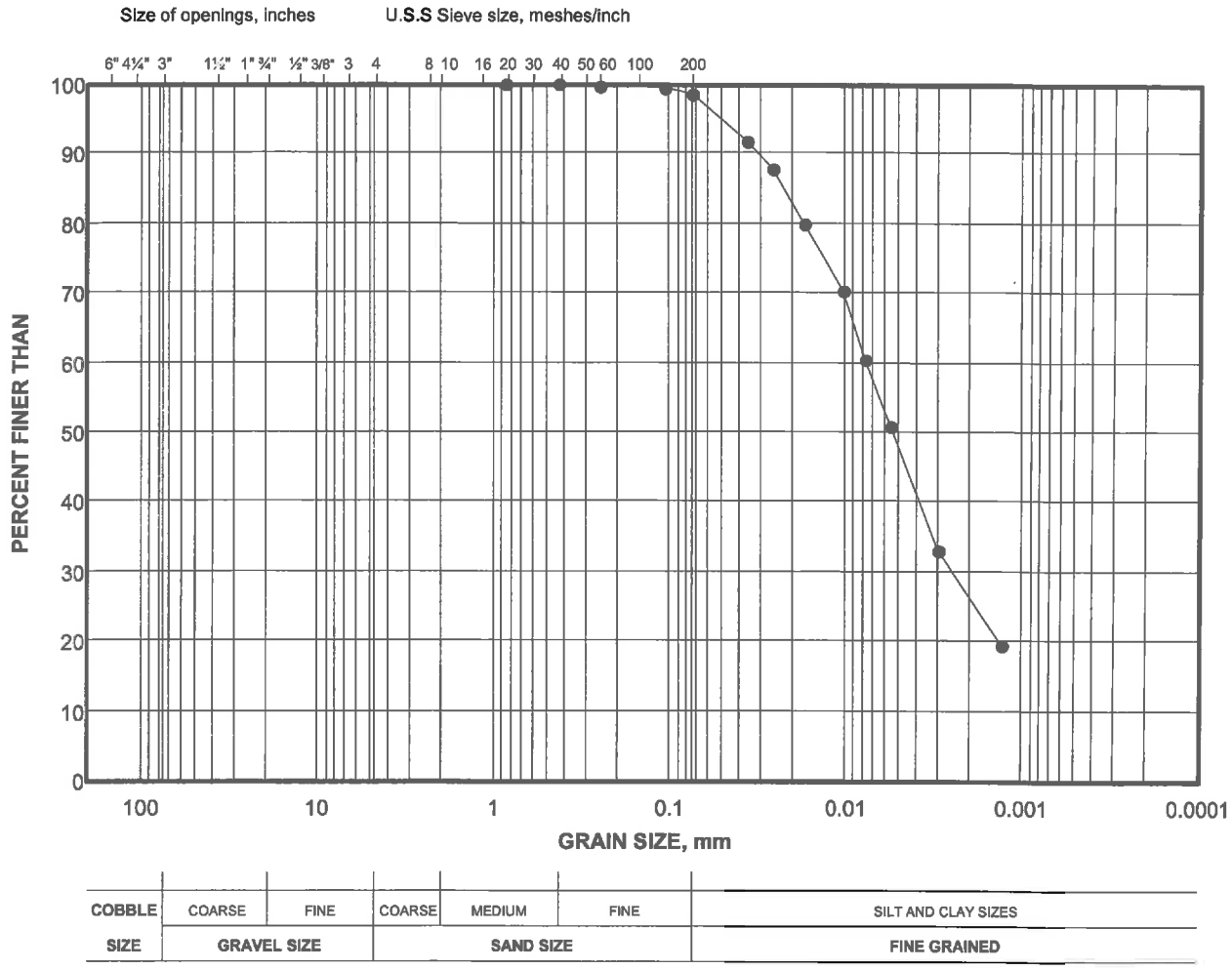
Project Number	1778651	Depth	
Project Task	1000	Units	Metric
Borehole Number	17-1	Testing Date	28/02/2018 8:28:55 AM
Sample Number	2	Tested By	Sieve - LB
Checked By		LabID	18-572

Golder Associates

GRAIN SIZE DISTRIBUTION

MTO LS-702

FIGURE



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-3	3A	

Project Number: 1778651

Checked By: QC

Golder Associates

Date: 28-Feb-18

SOIL SIEVE AND HYDROMETER ANALYSIS

Initial weight of dry sample = 242.5(g)
Weight measured for back sieving = 50.75(g)
Weight of Sample for Hydrometer = 50.75(g)

COARSE SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
150mm	0.00	0.00	150.00	100.0
125mm	0.00	0.00	125.00	100.0
75mm	0.00	0.00	75.00	100.0
63mm	0.00	0.00	63.00	100.0
53mm	0.00	0.00	53.00	100.0
37.5mm	0.00	0.00	37.50	100.0
26.5mm	0.00	0.00	26.50	100.0
19.0mm	0.00	0.00	19.00	100.0
13.2mm	0.00	0.00	13.20	100.0
9.5mm	0.00	0.00	9.50	100.0
4.75mm	0.00	0.00	4.75	100.0
2.00mm	0.05	0.02	2.00	100.0
PAN	242.09	99.98	0.00	0.0

HYDROMETER BACK SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
850µm	0.01	0.02	0.85	100.0
425µm	0.05	0.08	0.43	99.9
250µm	0.11	0.12	0.25	99.8
106µm	0.32	0.41	0.11	99.4
75µm	0.65	0.65	0.08	98.7

HYDROMETER

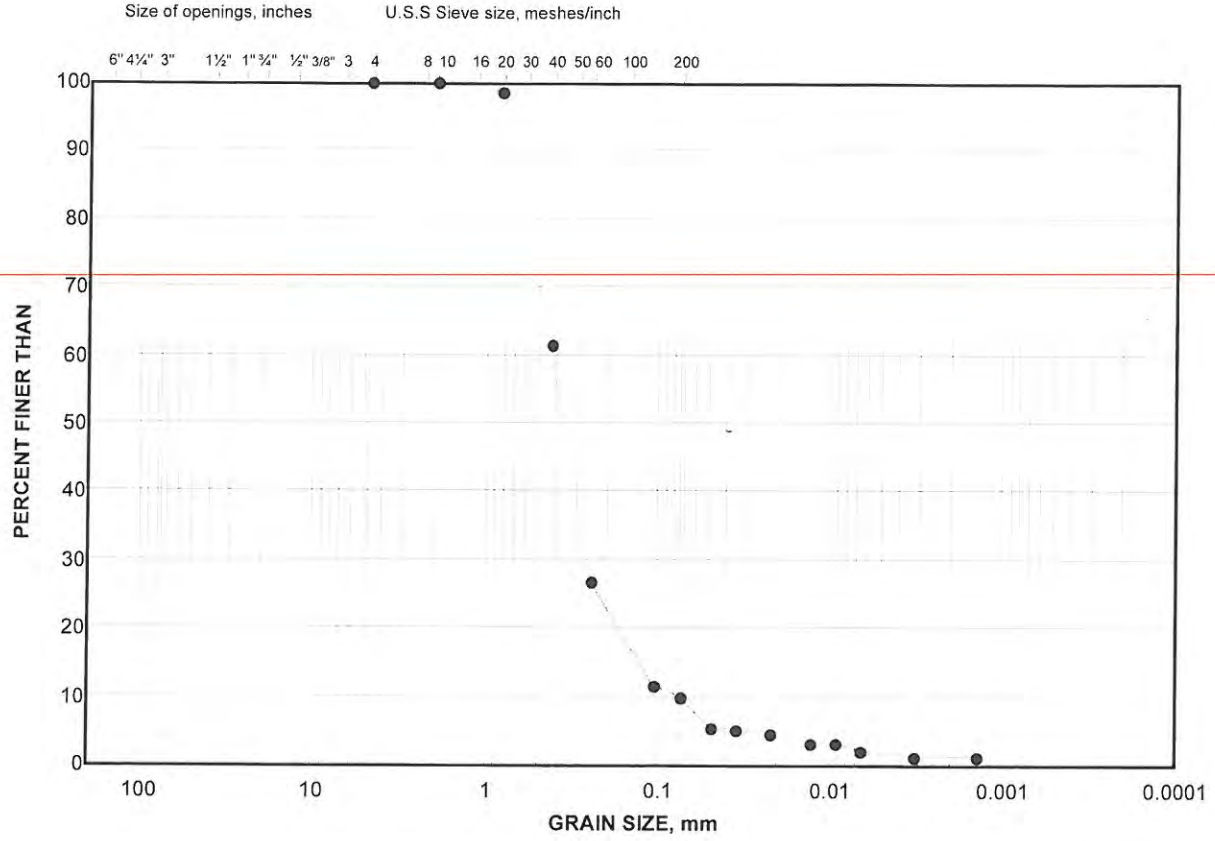
	DATE (MM\DD\YYYY)	TIME (HH:MM:SS)
Started :	26/02/2018	8:48:00 AM
Finished :	27/02/2018	8:29:00 AM

Elapsed Time (min)	HYDROMETER READING	DEFLOCCULANT CORRECTION	WATER TEMP (°C)	CORRECTED HYDROMETER READING	PARTICLE SIZE (mm)	% PASSING	PLOT
1.00	52.00	5.0	22.5	47.00	0.0359	91.7	True
2.00	50.00	5.0	22.5	45.00	0.0259	87.8	True
5.00	46.00	5.0	22.5	41.00	0.0171	80.0	True
15.00	41.00	5.0	22.5	36.00	0.0103	70.2	True
30.00	36.00	5.0	22.4	31.00	0.0077	60.5	True
60.00	31.00	5.0	22.3	26.00	0.0056	50.7	True
250.00	22.00	5.0	22.0	17.00	0.0030	33.2	True
1421.00	15.00	5.0	22.4	10.00	0.0013	19.5	True

Project Number	1778651	Depth	
Project Task	1000	Units	Metric
Borehole Number	17-3	Testing Date	28/02/2018 8:30:45 AM
Sample Number	3A	Tested By	Sieve - LB, Hydrometer - RC
Checked By		LabID	18-573

GRAIN SIZE DISTRIBUTION

MTO LS-702



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-1	15	

Project Number: 1778651(2000)

Checked By: JT

Golder Associates

Date: 02-Feb-18

SOIL SIEVE AND HYDROMETER ANALYSIS

Initial weight of dry sample = 370.89(g)
Weight measured for back sieving = 99.12(g)
Weight of Sample for Hydrometer = 99.12(g)

COARSE SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
150mm	0.00	0.00	150.00	100.0
125mm	0.00	0.00	125.00	100.0
75mm	0.00	0.00	75.00	100.0
63mm	0.00	0.00	63.00	100.0
53mm	0.00	0.00	53.00	100.0
37.5mm	0.00	0.00	37.50	100.0
26.5mm	0.00	0.00	26.50	100.0
19.0mm	0.00	0.00	19.00	100.0
13.2mm	0.00	0.00	13.20	100.0
9.5mm	0.00	0.00	9.50	100.0
4.75mm	0.00	0.00	4.75	100.0
2.00mm	0.38	0.10	2.00	99.9
PAN	370.11	99.90	0.00	0.0

HYDROMETER BACK SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
850µm	1.17	1.18	0.85	98.7
425µm	37.91	37.03	0.43	61.7
250µm	72.68	35.04	0.25	26.7
106µm	87.62	15.06	0.11	11.6
75µm	89.22	1.61	0.08	10.0

HYDROMETER

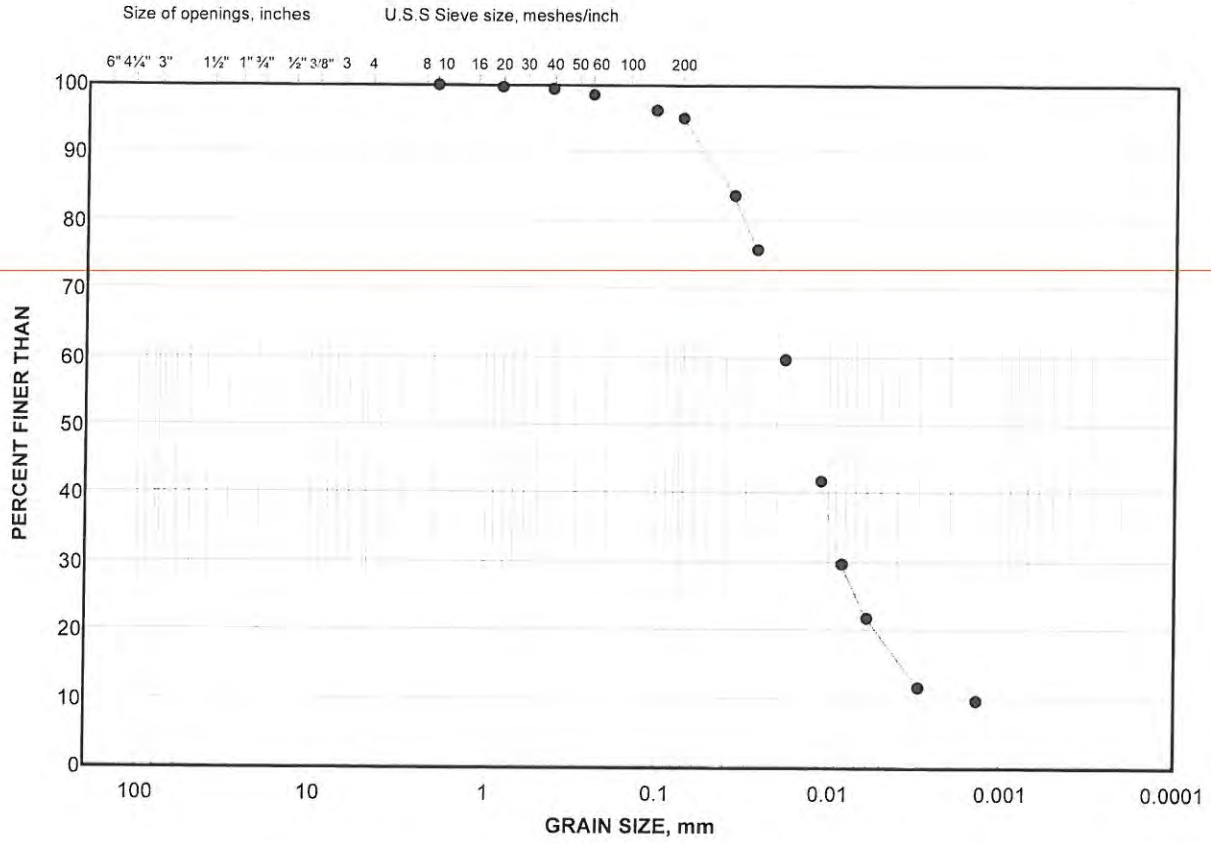
	DATE (MM\DD\YYYY)	TIME (HH:MM:SS)
Started :	2/1/2018	9:28:00 AM
Finished :	2/2/2018	8:31:00 AM

Elapsed Time (min)	HYDROMETER READING	DEFLOCCULANT CORRECTION	WATER TEMP (°C)	CORRECTED HYDROMETER READING	PARTICLE SIZE (mm)	% PASSING	PLOT
1.00	10.50	5.0	23.1	5.50	0.0496	5.5	True
2.00	10.00	5.0	23.1	5.00	0.0351	5.0	True
5.00	9.50	5.0	23.1	4.50	0.0223	4.5	True
15.00	8.00	5.0	22.9	3.00	0.0130	3.0	True
30.00	8.00	5.0	22.9	3.00	0.0092	3.0	True
60.00	7.00	5.0	22.7	2.00	0.0066	2.0	True
250.00	6.00	5.0	22.3	1.00	0.0032	1.0	True
1383.00	6.00	5.0	21.5	1.00	0.0014	1.0	True

Project Number	1778651(2000)	Depth Units	Metric
Project Task	1000	Testing Date	2/2/2018 4:15:48 PM
Borehole Number	17-1	Tested By	Sieve - RC, Hydrometer - RC
Sample Number	15	LabID	18-341
Checked By	JT		

GRAIN SIZE DISTRIBUTION
MTO LS-702

FIGURE



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-1	18	

Project Number: 1778651(2000)

Checked By: JT

Golder Associates

Date: 02-Feb-18

SOIL SIEVE AND HYDROMETER ANALYSIS

Initial weight of dry sample = 333.46(g)
Weight measured for back sieving = 49.56(g)
Weight of Sample for Hydrometer = 49.56(g)

COARSE SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
150mm	0.00	0.00	150.00	100.0
125mm	0.00	0.00	125.00	100.0
75mm	0.00	0.00	75.00	100.0
63mm	0.00	0.00	63.00	100.0
53mm	0.00	0.00	53.00	100.0
37.5mm	0.00	0.00	37.50	100.0
26.5mm	0.00	0.00	26.50	100.0
19.0mm	0.00	0.00	19.00	100.0
13.2mm	0.00	0.00	13.20	100.0
9.5mm	0.00	0.00	9.50	100.0
4.75mm	0.00	0.00	4.75	100.0
2.00mm	0.05	0.01	2.00	100.0
PAN	333.41	99.99	0.00	0.0

HYDROMETER BACK SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
850µm	0.16	0.32	0.85	99.7
425µm	0.32	0.32	0.43	99.4
250µm	0.76	0.89	0.25	98.5
106µm	1.87	2.24	0.11	96.2
75µm	2.38	1.03	0.08	95.2

HYDROMETER

	DATE (MM\DD\YYYY)	TIME (HH:MM:SS)
Started :	2/1/2018	10:02:00 AM
Finished :	2/2/2018	8:35:00 AM

Elapsed Time (min)	HYDROMETER READING	DEFLOCCULANT CORRECTION	WATER TEMP (°C)	CORRECTED HYDROMETER READING	PARTICLE SIZE (mm)	% PASSING	PLOT
1.00	47.00	5.0	23.6	42.00	0.0373	83.9	True
2.00	43.00	5.0	23.6	38.00	0.0274	75.9	True
5.00	35.00	5.0	23.6	30.00	0.0186	59.9	True
15.00	26.00	5.0	23.4	21.00	0.0115	42.0	True
30.00	20.00	5.0	23.2	15.00	0.0085	30.0	True
60.00	16.00	5.0	22.9	11.00	0.0062	22.0	True
250.00	11.00	5.0	22.5	6.00	0.0031	12.0	True
1353.00	10.00	5.0	21.7	5.00	0.0014	10.0	True

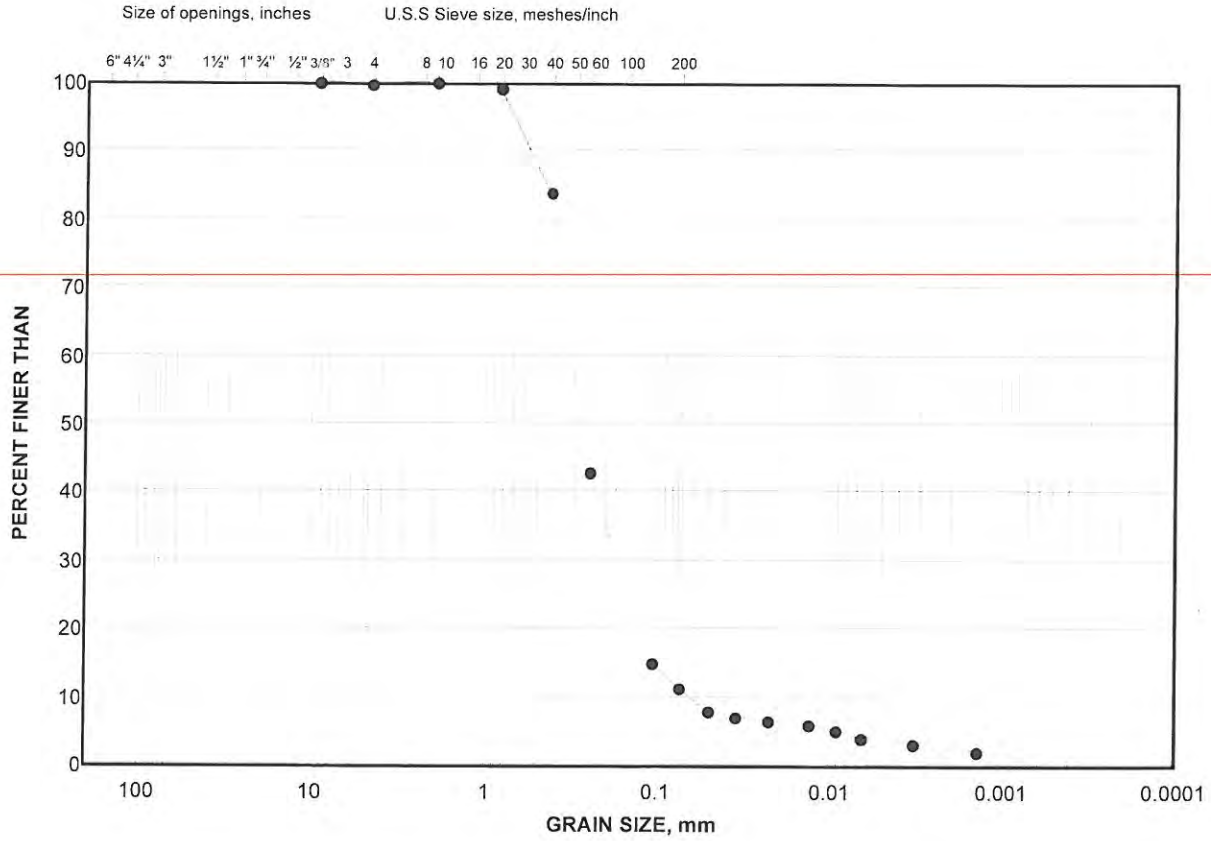
Project Number	1778651(2000)	Depth	
Project Task	1000	Units	Metric
Borehole Number	17-1	Testing Date	2/2/2018 4:28:00 PM
Sample Number	18	Tested By	Sieve - RC, Hydrometer - RC/LB
Checked By	J	LabID	18-342

Golder Associates

GRAIN SIZE DISTRIBUTION

MTO LS-702

FIGURE



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-4	18	

Project Number: 1778651(2000)

Checked By: JT

Golder Associates

Date: 02-Feb-18

SOIL SIEVE AND HYDROMETER ANALYSIS

Initial weight of dry sample = 433.36(g)
Weight measured for back sieving = 99.06(g)
Weight of Sample for Hydrometer = 99.06(g)

COARSE SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
150mm	0.00	0.00	150.00	100.0
125mm	0.00	0.00	125.00	100.0
75mm	0.00	0.00	75.00	100.0
63mm	0.00	0.00	63.00	100.0
53mm	0.00	0.00	53.00	100.0
37.5mm	0.00	0.00	37.50	100.0
26.5mm	0.00	0.00	26.50	100.0
19.0mm	0.00	0.00	19.00	100.0
13.2mm	0.00	0.00	13.20	100.0
9.5mm	0.00	0.00	9.50	100.0
4.75mm	0.70	0.16	4.75	99.8
2.00mm	0.57	-0.03	2.00	99.9
PAN	431.39	99.87	0.00	0.0

HYDROMETER BACK SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
850µm	0.68	0.69	0.85	99.2
425µm	15.81	15.25	0.43	83.9
250µm	56.47	40.99	0.25	42.9
106µm	84.14	27.90	0.11	15.0
75µm	87.94	3.83	0.08	11.2

HYDROMETER

	DATE (MM\DD\YYYY)	TIME (HH:MM:SS)
Started :	2/1/2018	9:10:00 AM
Finished :	2/2/2018	8:29:00 AM

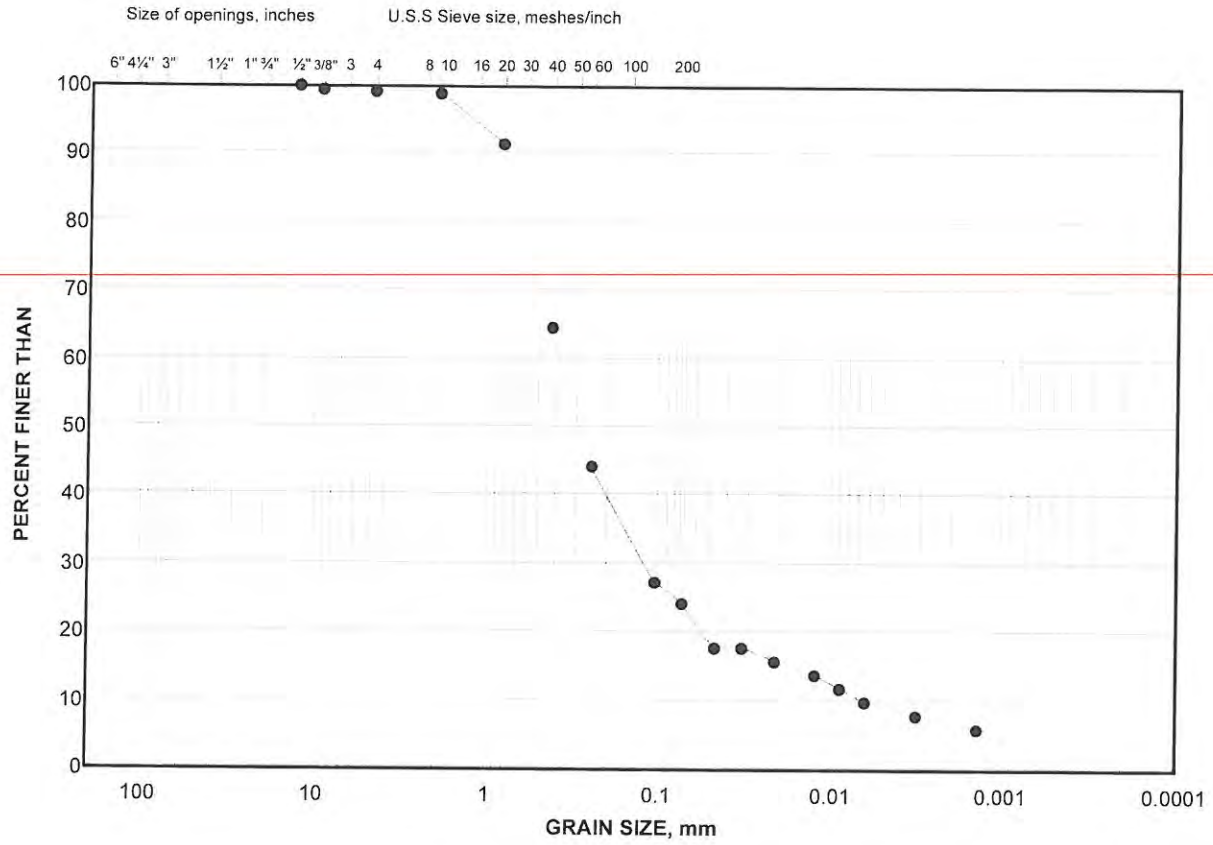
Elapsed Time (min)	HYDROMETER READING	DEFLOCCULANT CORRECTION	WATER TEMP (°C)	CORRECTED HYDROMETER READING	PARTICLE SIZE (mm)	% PASSING	PLOT
1.00	10.00	2.0	22.6	8.00	0.0500	8.0	True
2.00	9.00	2.0	22.6	7.00	0.0356	7.0	True
5.00	8.50	2.0	22.6	6.50	0.0226	6.5	True
15.00	8.00	2.0	22.6	6.00	0.0131	6.0	True
30.00	7.00	2.0	22.5	5.00	0.0093	5.0	True
60.00	6.00	2.0	22.4	4.00	0.0066	4.0	True
250.00	5.00	2.0	22.1	3.00	0.0033	3.0	True
1399.00	5.00	3.0	21.5	2.00	0.0014	2.0	True

Project Number	1778651(2000)	Depth	
Project Task	1000	Units	Metric
Borehole Number	17-4	Testing Date	2/2/2018 5:04:28 PM
Sample Number	18	Tested By	Sieve - RC, Hydrometer - RC/LB
Checked By		LabID	18-346

Golder Associates

GRAIN SIZE DISTRIBUTION
MTO LS-702

FIGURE



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-1	36	

Project Number: 1778651(2000)

Checked By: JT

Golder Associates

Date: 02-Feb-18

SOIL SIEVE AND HYDROMETER ANALYSIS

Initial weight of dry sample = 363.35(g)
Weight measured for back sieving = 49.58(g)
Weight of Sample for Hydrometer = 49.58(g)

COARSE SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
150mm	0.00	0.00	150.00	100.0
125mm	0.00	0.00	125.00	100.0
75mm	0.00	0.00	75.00	100.0
63mm	0.00	0.00	63.00	100.0
53mm	0.00	0.00	53.00	100.0
37.5mm	0.00	0.00	37.50	100.0
26.5mm	0.00	0.00	26.50	100.0
19.0mm	0.00	0.00	19.00	100.0
13.2mm	0.00	0.00	13.20	100.0
9.5mm	1.67	0.46	9.50	99.5
4.75mm	2.94	0.35	4.75	99.2
2.00mm	4.07	0.31	2.00	98.9
PAN	359.19	98.88	0.00	0.0

HYDROMETER BACK SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
850µm	3.66	7.30	0.85	91.6
425µm	17.10	26.80	0.43	64.8
250µm	27.34	20.42	0.25	44.4
106µm	35.90	17.07	0.11	27.3
75µm	37.45	3.09	0.08	24.2

HYDROMETER

	DATE (MM\DD\YYYY)	TIME (HH:MM:SS)
Started :	2/1/2018	9:41:00 AM
Finished :	2/2/2018	8:32:00 AM

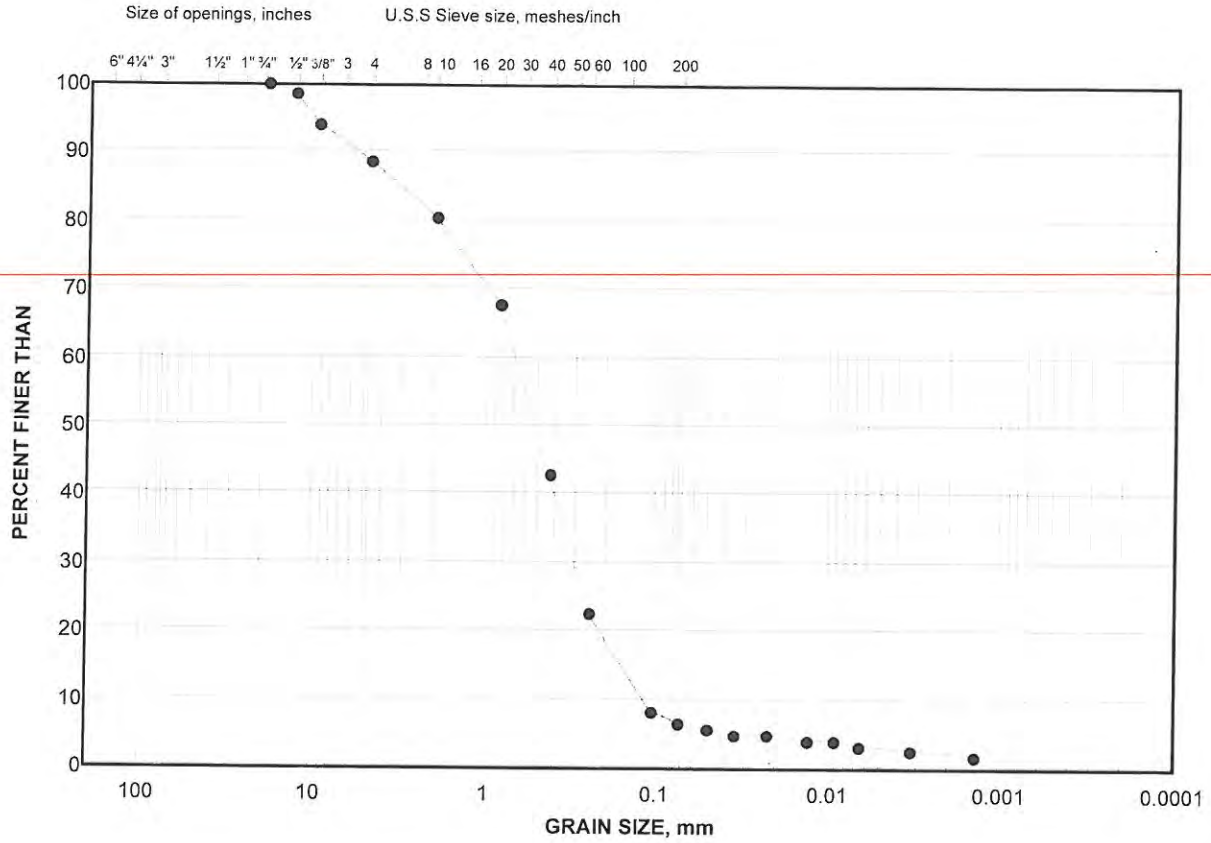
Elapsed Time (min)	HYDROMETER READING	DEFLOCCULANT CORRECTION	WATER TEMP (°C)	CORRECTED HYDROMETER READING	PARTICLE SIZE (mm)	% PASSING	PLOT
1.00	14.00	5.0	24.1	9.00	0.0479	17.8	True
2.00	14.00	5.0	24.1	9.00	0.0339	17.8	True
5.00	13.00	5.0	24.1	8.00	0.0216	15.8	True
15.00	12.00	5.0	23.9	7.00	0.0126	13.8	True
30.00	11.00	5.0	23.6	6.00	0.0090	11.9	True
60.00	10.00	5.0	23.3	5.00	0.0064	9.9	True
250.00	9.00	5.0	22.4	4.00	0.0032	7.9	True
1371.00	8.00	5.0	21.4	3.00	0.0014	5.9	True

Project Number	1778651(2000)	Depth	
Project Task	1000	Units	Metric
Borehole Number	17-1	Testing Date	2/2/2018 4:34:15 PM
Sample Number	36	Tested By	Sieve - RC, Hydrometer - RC/LB
Checked By		LabID	18-343

GRAIN SIZE DISTRIBUTION

MTO LS-702

FIGURE



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-2	17	

Project Number: 1778651(2000)

Checked By: JT

Golder Associates

Date: 02-Feb-18

SOIL SIEVE AND HYDROMETER ANALYSIS

Initial weight of dry sample = 494.27(g)
Weight measured for back sieving = 99.02(g)
Weight of Sample for Hydrometer = 99.02(g)

COARSE SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
150mm	0.00	0.00	150.00	100.0
125mm	0.00	0.00	125.00	100.0
75mm	0.00	0.00	75.00	100.0
63mm	0.00	0.00	63.00	100.0
53mm	0.00	0.00	53.00	100.0
37.5mm	0.00	0.00	37.50	100.0
26.5mm	0.00	0.00	26.50	100.0
19.0mm	0.00	0.00	19.00	100.0
13.2mm	7.39	1.50	13.20	98.5
9.5mm	28.44	4.26	9.50	94.2
4.75mm	55.32	5.44	4.75	88.8
2.00mm	97.09	8.45	2.00	80.4
PAN	396.28	80.35	0.00	0.0

HYDROMETER BACK SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
850µm	15.39	12.49	0.85	67.9
425µm	46.30	25.08	0.43	42.8
250µm	71.01	20.05	0.25	22.7
106µm	88.85	14.48	0.11	8.2
75µm	91.11	1.83	0.08	6.4

HYDROMETER

	DATE (MM\DD\YYYY)	TIME (HH:MM:SS)
Started :	2/1/2018	9:17:00 AM
Finished :	2/2/2018	8:30:00 AM

Elapsed Time (min)	HYDROMETER READING	DEFLOCCULANT CORRECTION	WATER TEMP (°C)	CORRECTED HYDROMETER READING	PARTICLE SIZE (mm)	% PASSING	PLOT
1.00	9.00	2.0	23.1	7.00	0.0500	5.6	True
2.00	8.00	2.0	23.1	6.00	0.0355	4.8	True
5.00	8.00	2.0	23.1	6.00	0.0225	4.8	True
15.00	7.00	2.0	23.0	5.00	0.0131	4.0	True
30.00	7.00	2.0	22.9	5.00	0.0093	4.0	True
60.00	6.00	2.0	22.8	4.00	0.0066	3.2	True
250.00	5.00	2.0	22.2	3.00	0.0033	2.4	True
1393.00	5.00	3.0	21.5	2.00	0.0014	1.6	True

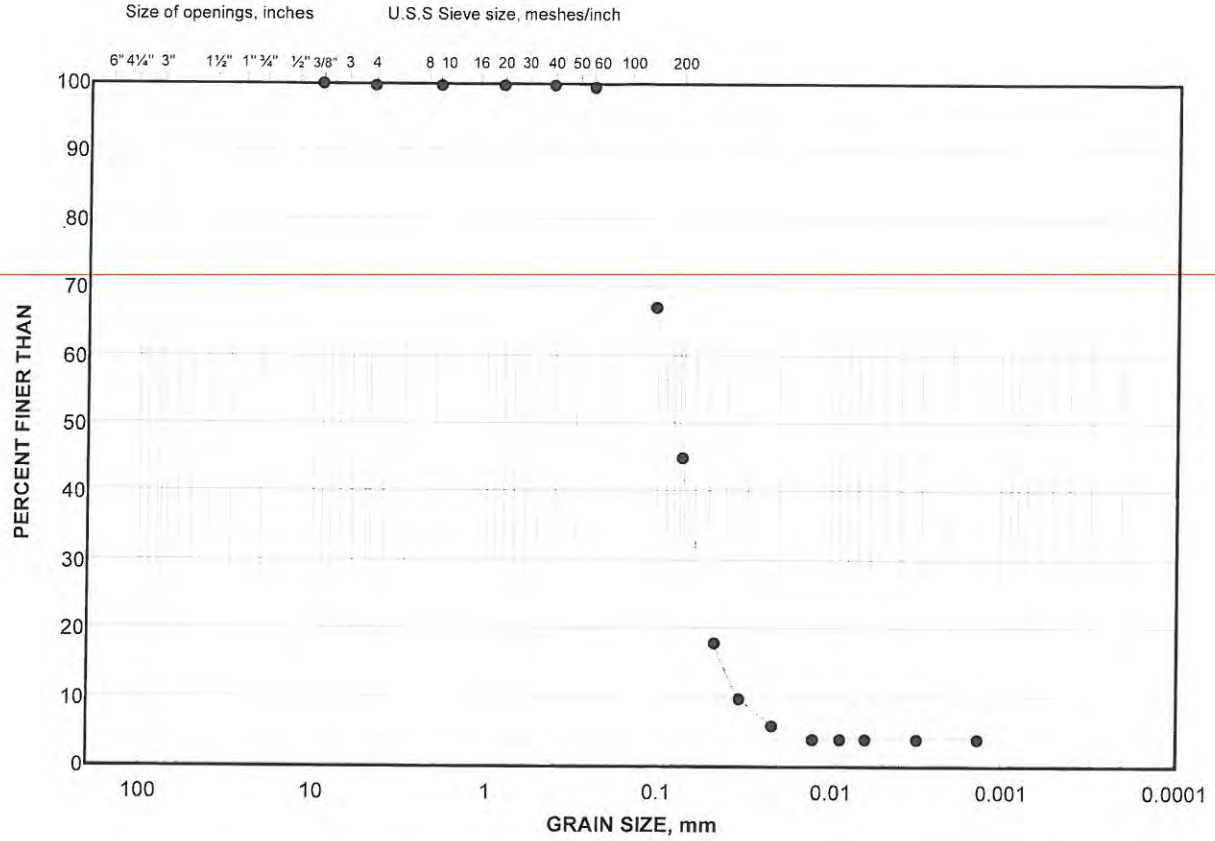
Project Number	1778651(2000)	Depth	
Project Task	1000	Units	Metric
Borehole Number	17-2	Testing Date	2/2/2018 4:40:36 PM
Sample Number	17	Tested By	Sieve - RC, Hydrometer - RC/LB
Checked By		LabID	18-344

Golder Associates

GRAIN SIZE DISTRIBUTION

MTO LS-702

FIGURE



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	17-4	10	

Project Number: 1778651(2000)

Checked By: JT

Golder Associates

Date: 02-Feb-18

SOIL SIEVE AND HYDROMETER ANALYSIS

Initial weight of dry sample = 215.62(g)
Weight measured for back sieving = 49.52(g)
Weight of Sample for Hydrometer = 49.52(g)

COARSE SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
150mm	0.00	0.00	150.00	100.0
125mm	0.00	0.00	125.00	100.0
75mm	0.00	0.00	75.00	100.0
63mm	0.00	0.00	63.00	100.0
53mm	0.00	0.00	53.00	100.0
37.5mm	0.00	0.00	37.50	100.0
26.5mm	0.00	0.00	26.50	100.0
19.0mm	0.00	0.00	19.00	100.0
13.2mm	0.00	0.00	13.20	100.0
9.5mm	0.00	0.00	9.50	100.0
4.75mm	0.34	0.16	4.75	99.8
2.00mm	0.40	0.03	2.00	99.8
PAN	214.87	99.81	0.00	0.0

HYDROMETER BACK SIEVING

SIEVE	CUM. MASS RETAINED (g)	% RETAINED	PARTICLE SIZE(mm)	% PASSING
850µm	0.00	0.00	0.85	99.8
425µm	0.02	0.04	0.43	99.8
250µm	0.20	0.36	0.25	99.4
106µm	16.24	32.33	0.11	67.1
75µm	27.16	22.01	0.08	45.1

HYDROMETER

	DATE (MM\DD\YYYY)	TIME (HH:MM:SS)
Started :	2/1/2018	9:51:00 AM
Finished :	2/2/2018	8:33:00 AM

Elapsed Time (min)	HYDROMETER READING	DEFLOCCULANT CORRECTION	WATER TEMP (°C)	CORRECTED HYDROMETER READING	PARTICLE SIZE (mm)	% PASSING	PLOT
1.00	14.00	5.0	24.1	9.00	0.0479	18.0	True
2.00	10.00	5.0	24.1	5.00	0.0347	10.0	True
5.00	8.00	5.0	24.1	3.00	0.0222	6.0	True
15.00	7.00	5.0	24.1	2.00	0.0129	4.0	True
30.00	7.00	5.0	24.1	2.00	0.0091	4.0	True
60.00	7.00	5.0	24.1	2.00	0.0064	4.0	True
250.00	7.00	5.0	24.1	2.00	0.0032	4.0	True
1362.00	7.00	5.0	24.1	2.00	0.0014	4.0	True

Project Number	1778651(2000)	Depth	
Project Task	1000	Units	Metric
Borehole Number	17-4	Testing Date	2/2/2018 4:47:43 PM
Sample Number	10	Tested By	Sieve - RC, Hydrometer - RC/LB
Checked By	JT	LabID	18-345

Golder Associates

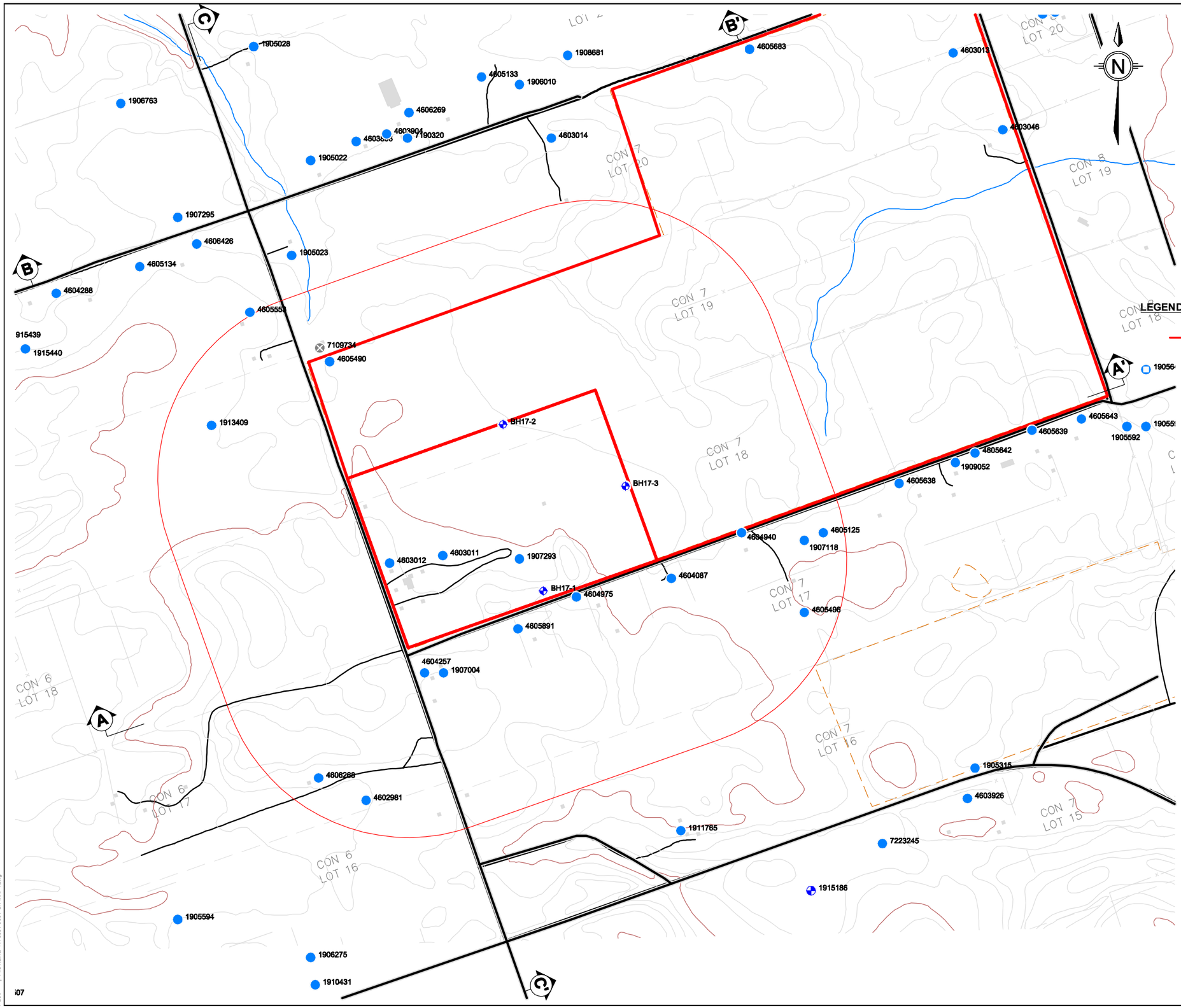
APPENDIX D

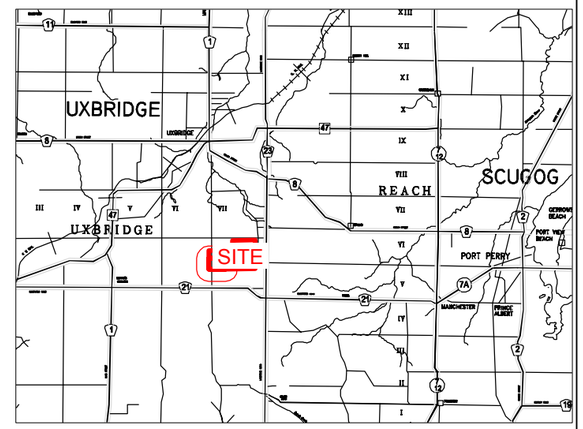
MOECC Water Well Records

Private Well Survey Results

Rising Head Test Analysis

Infiltration Testing and Analysis





LEGEND:

- Property Line
- Shallow Dug or Bored <10 m
- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well
- Line of Section

REFERENCES:

1. MAPPING BASED ON GEOGRAPHYNETWORK.ca
2. MOECC WATER WELL DATABASE, QUEEN'S PRINTER 2017

0 200 400 600 m
1:10000

CLIENT
MILLER GROUP

PROJECT
BOYINGTON PIT 3

TITLE

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-30
PREPARED	JPR
DESIGN	
REVIEW	####
APPROVED	####

PROJECT No.	Phase	Rev.	Figure
####	-	01	1

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

25mm

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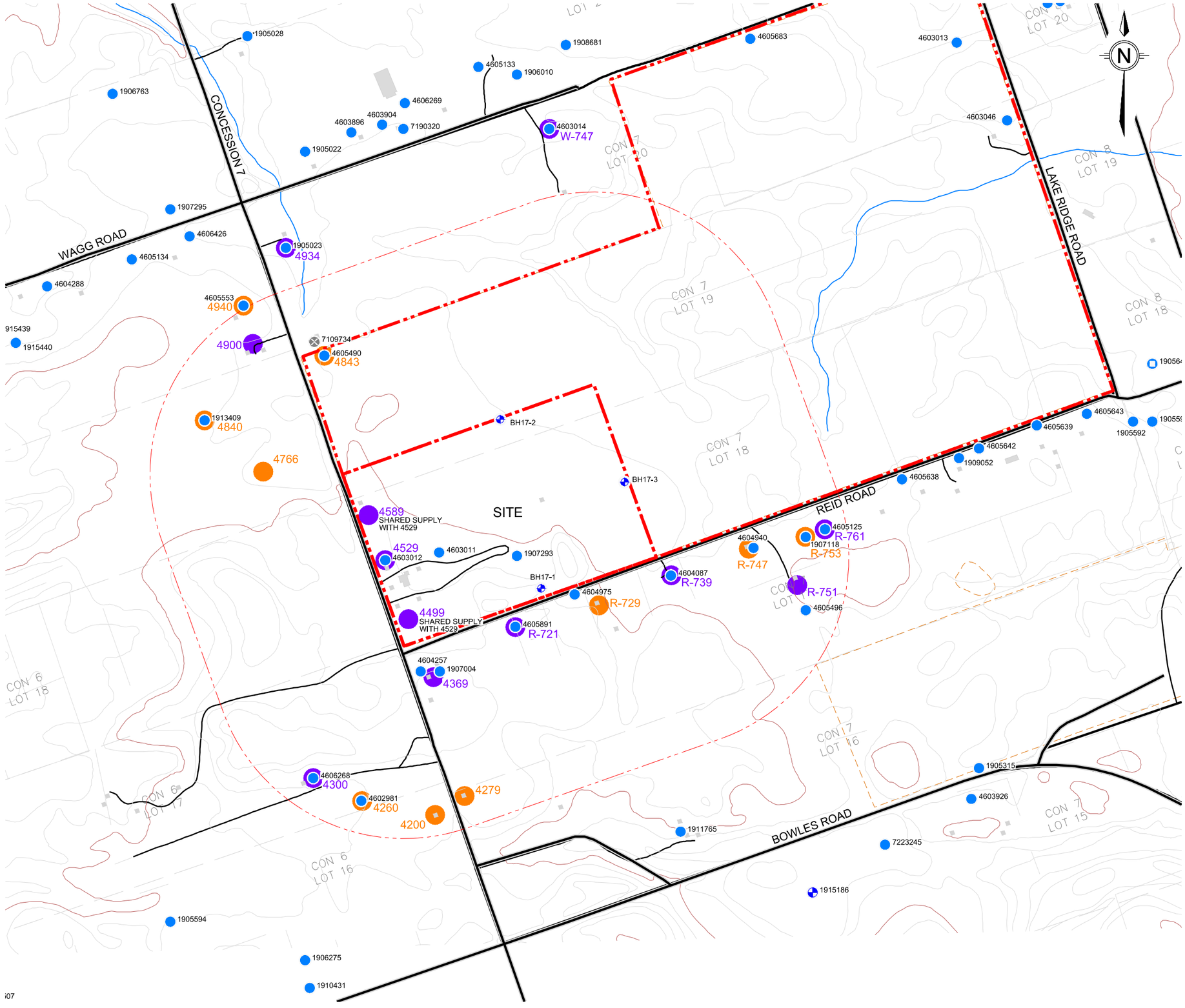

LEGEND:

- Property Line
- 500 m Offset from Site Boundary

MOECC Recorded Wells

- Shallow Dug or Bored <10 m
- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well

Water Well Field Reconnaissance Form

- Water Well Information Provided
- Property Visited & Form Left, No Well Information

REFERENCES:

1. MAPPING BASED ON GEOGRAPHYNETWORK.ca
2. MOECC WATER WELL DATABASE, QUEEN'S PRINTER 2017

0 200 400 600 m

1:10000

CLIENT
THE MILLER GROUP

PROJECT
HYDROGEOLOGICAL ASSESSMENT,
BOYINGTON PIT #3,
4499-4589 CONCESSION ROAD 7, UXBRIDGE, ONTARIO

TITLE
RECORDED WELL LOCATION MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2018-04-11
PREPARED	JPR
DESIGN	JPR
REVIEW	CMP
APPROVED	----

PROJECT No.	CONTROL	Rev.	FIGURE
1778651	0005	----	4

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

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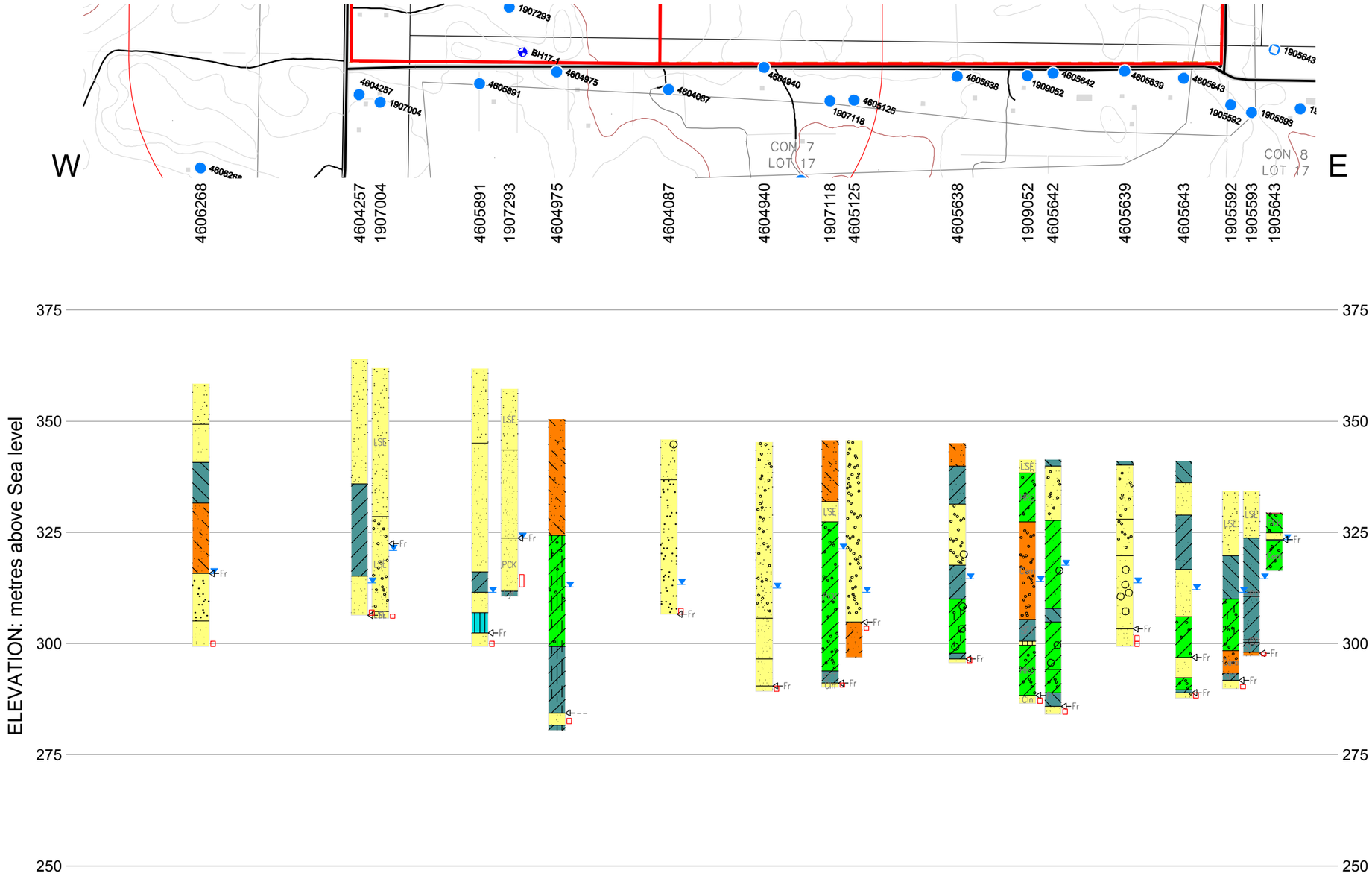

PLAN LEGEND

- Shallow Dug or Bored <10 m
- Sandpoint
- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well
- Drilled Bedrock Well
- Municipal / Public Supply
- Test Pit
- With SP
- Dewatering Well
- Dewatering Point
- Test Borehole
- Monitoring Well
- Record of Abandonment
- Information Unrecorded

SOIL PATTERN LEGEND AND GENERIC SHADING

- Unoxidized Clay Blue, Grey White, or Undefined
- Oxidized Clay Brown, Red, Yellow
- Silt
- Sand
- Gravel
- Stones, Pebbles
- Boulder
- Till
- Shale
- Limestone
- Crystalline Rock
- Unknown
- Peat/loam
- Sands & Gravels
- Granular Till
- Silt
- Silt Clayey
- Clay
- Till
- Limestones
- Shales
- Precambrian

SECTION WELL SYMBOLS

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

NOTES:

Ministry of Environment Water Well Information System, Queen's Printer.
Location and elevations of field verified wells are subject to revision.

Boundaries between soil strata have been determined only at well and test well locations. Between the wells and test wells, boundaries are not proven but are assumed from geological evidence.

0 200 400 600 m

1:10000

Plotted 11x17" Tabloid

Projection is UTM NAD 83 Zone 17

CLIENT
MILLER GROUP

PROJECT
BOYINGTON PIT 3

TITLE
SECTION A - A'

CONSULTANT
Golder Associates

YYYY-MM-DD	####
PREPARED	####
DESIGN	####
REVIEW	####
APPROVED	####

PROJECT No. #### #### Rev. #### #####

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

25 mm

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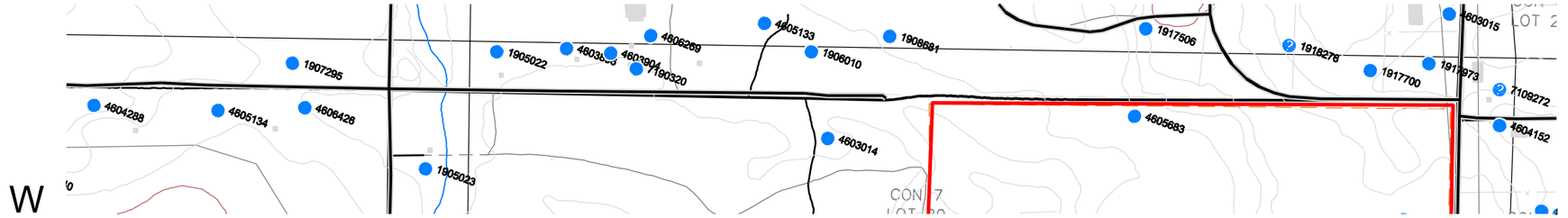

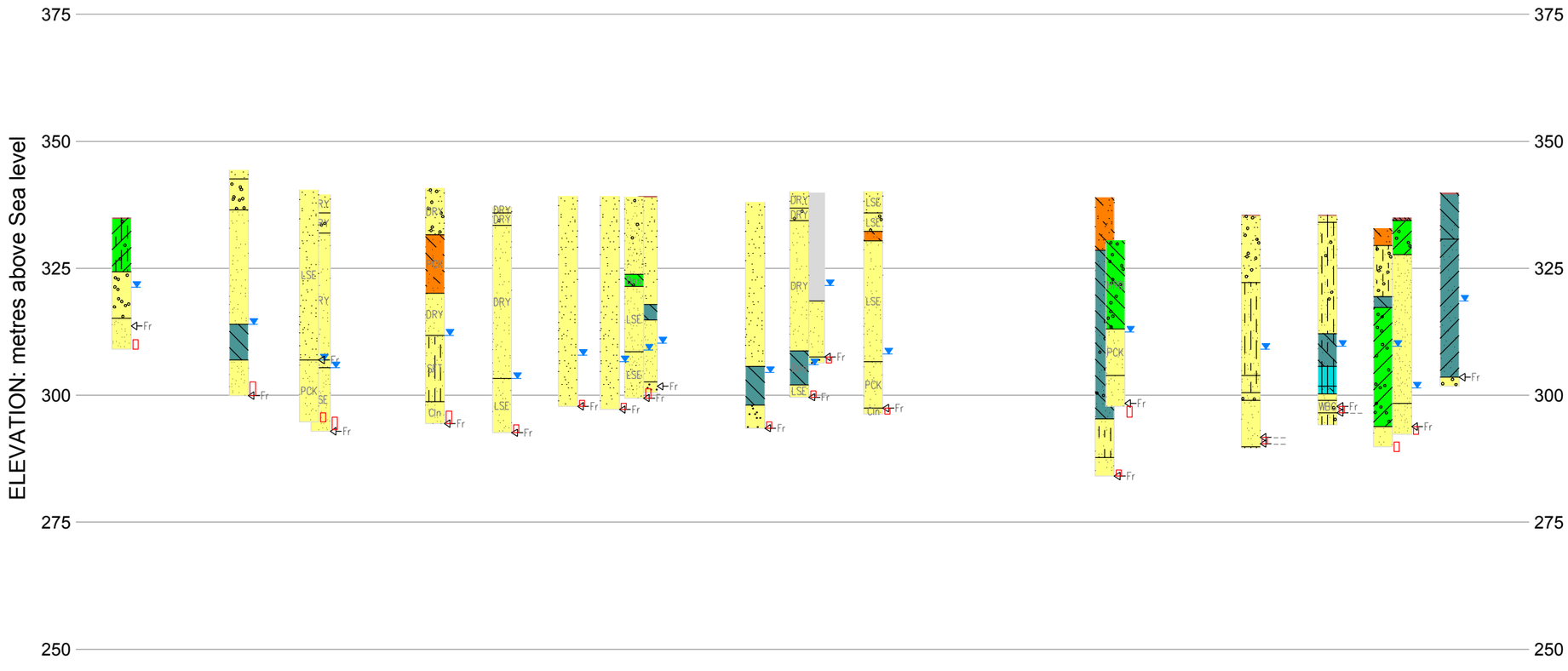

PLAN LEGEND

- Shallow Dug or Bored <10 m
- Sandpoint
- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well
- Drilled Bedrock Well
- Municipal / Public Supply
- Test Pit
- With SP
- Dewatering Well
- Dewatering Point
- Test Borehole
- Monitoring Well
- Record of Abandonment
- Information Unrecorded

SOIL PATTERN LEGEND AND GENERIC SHADING

- Unoxidized Clay Blue, Grey White, or Undefined
- Oxidized Clay Brown, Red, Yellow
- Silt
- Sand
- Gravel
- Stones, Pebbles
- Boulder
- Till
- Shale
- Limestone
- Crystalline Rock
- Unknown
- Peat/loam
- Sands & Gravels
- Granular Till
- Silt
- Silt Clayey
- Clay
- Till
- Limestones
- Shales
- Precambrian

SECTION WELL SYMBOLS

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

NOTES:

Ministry of Environment Water Well Information System, Queen's Printer.
Location and elevations of field verified wells are subject to revision.

Boundaries between soil strata have been determined only at well and test well locations. Between the wells and test wells, boundaries are not proven but are assumed from geological evidence.

0 200 400 600 m

1:10000

Plotted 11x17" Tabloid

Projection is UTM NAD 83 Zone 17

CLIENT
MILLER GROUP

PROJECT
BOYINGTON PIT 3

TITLE
SECTION B - B'

CONSULTANT
Golder Associates

YYYY-MM-DD	####
PREPARED	####
DESIGN	####
REVIEW	####
APPROVED	####

PROJECT No. #### #### Rev. #### SBB

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

25 mm

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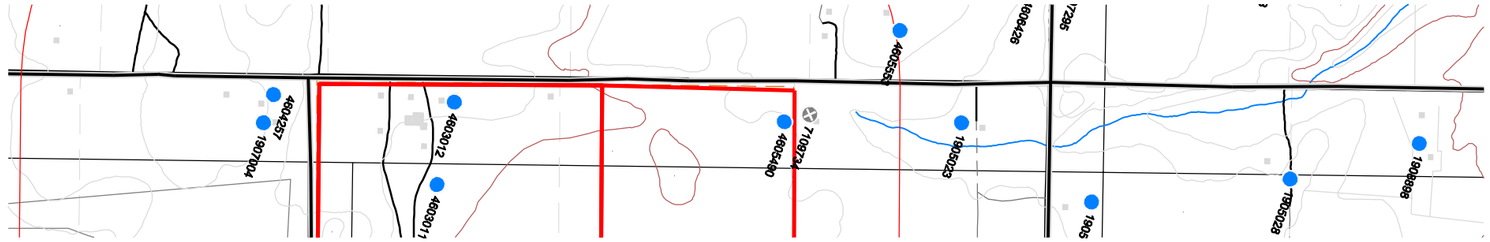


S

N

1907004 4604257 | 4603011 4603012 | 4605490 | 4605553 | 1905023 | 4606426 | 1907295 1905022 | 1905028 | 1908898

ELEVATION: metres above Sea level

375
350
325
300
275
250

PLAN LEGEND

- Shallow Dug or Bored <10 m
- Sandpoint
- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well
- Drilled Bedrock Well
- Municipal / Public Supply
- Test Pit
- With SP
- Dewatering Well
- Dewatering Point
- Test Borehole
- Monitoring Well
- Record of Abandonment
- Information Unrecorded

SOIL PATTERN LEGEND AND GENERIC SHADING

- Unoxidized Clay Blue, Grey White, or Undefined
- Oxidized Clay Brown, Red, Yellow
- Silt
- Sand
- Gravel
- Stones, Pebbles
- Boulder
- Till
- Shale
- Limestone
- Crystalline Rock
- Unknown
- Peat/loam
- Sands & Gravels
- Granular Till
- Silt
- Silt Clayey
- Clay
- Till
- Limestones
- Shales
- Precambrian

SECTION WELL SYMBOLS

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

NOTES:

Ministry of Environment Water Well Information System, Queen's Printer.
Location and elevations of field verified wells are subject to revision.

Boundaries between soil strata have been determined only at well and test well locations. Between the wells and test wells, boundaries are not proven but are assumed from geological evidence.

0 200 400 600 m

1:10000

Plotted 11x17" Tabloid

Projection is UTM NAD 83 Zone 17

CLIENT
MILLER GROUP

PROJECT
BOYINGTON PIT 3

TITLE
SECTION C - C'

CONSULTANT

Golder Associates

YYYY-MM-DD	####
PREPARED	####
DESIGN	####
REVIEW	####
APPROVED	####

PROJECT No. #### | #### | Rev. #### | SCC

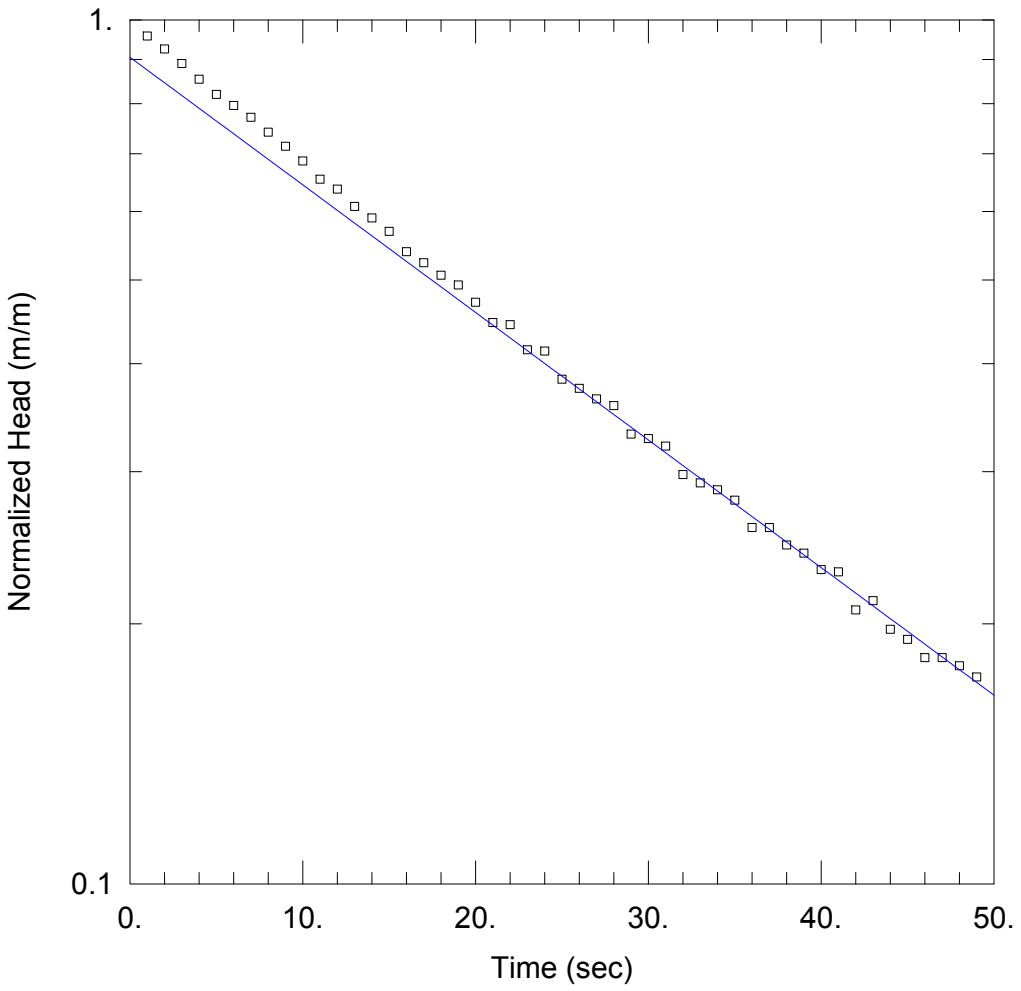
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm

Path: ---- | File Name: 1778651-0001-CH-MAP1.dwg

TABLE D-1
SUMMARY OF PRIVATE WATER WELL SURVEY RESULTS
The Miller Group, 4499 to 4589 Concession Road 7, Uxbridge, Ontario

House Number	Street Name	Well on the Property (Y/N)	Municipal Supply? (Y/N)	Well Used as a Potable Source? (Y/N)	Well Depth (m)	Well Type	Age (Years)	Well Usage	Well Capacity (gpm)	Reported Quantity/Quality Issues	Notes
747	Wagg Road	Y	N	Y	-	Dug	79	Domestic	-	None reported. Tested 7 years ago, no issues	
721	Reid Road	Y	N	Y	55	Drilled	35	Domestic/Livestock	16	Lower quality 5 years ago. Sulphur-type odour	Uses water softener and treats with UV system
739	Reid Road	Y	N	Y	24	Drilled	>20	Domestic	-	None reported. Tested 3 years ago, no issues	Uses water softener
751	Reid Road	Y	N	Y	55	Drilled	>8	Domestic/Livestock	-	None reported. Tested 2 to 3 years ago, no issues	
761	Reid Road	Y	N	Y	>30	Drilled	>33	Domestic	-		Uses water softener and reverse-osmosis treatment
4200	Concession 7	N	N	N	-	-	-	-	-		Planning to drill well for domestic use
4260	Concession 7	Y	N	Y	-	Drilled	>10	Domestic	-		No interview conducted. Visual observations made.
4300	Concession 7	Y	N	Y	51	Drilled	-	Domestic/Commercial	-		
4369	Concession 7	Y	N	Y	38	Drilled	>34	Domestic/Livestock	-		
4529	Concession 7	Y	N	Y	>61	Drilled	>59	Domestic	-	None reported. Tested every 6 months	Uses water softener and sediment filter
4843	Concession 7	Y	N	Y	-	Drilled	-	Domestic	-		No interview conducted. Information from MOECC well record A062888
4900	Concession 7	Y	N	Y	64	Drilled	46	Domestic	-	None reported. Tested in 1972, no issues	Uses water softener and sediment filter
4939	Concession 7	Y	N	Y	-	Drilled	-	Domestic	-	None reported. Tested 5 years ago, no issues	Uses water softener, UV treatment, and sediment filter



SINGLE WELL RESPONSE TEST

Data Set: C:\Users\pmenkveld\Desktop\1778651_\MW17-1_RHT_v2.aqt
Date: 03/12/18 Time: 16:41:42

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: The Miller Group
Project: 1778651
Location: 13536 McCowan Road
Test Well: MW17-1
Test Date: 6-Nov-17

AQUIFER DATA

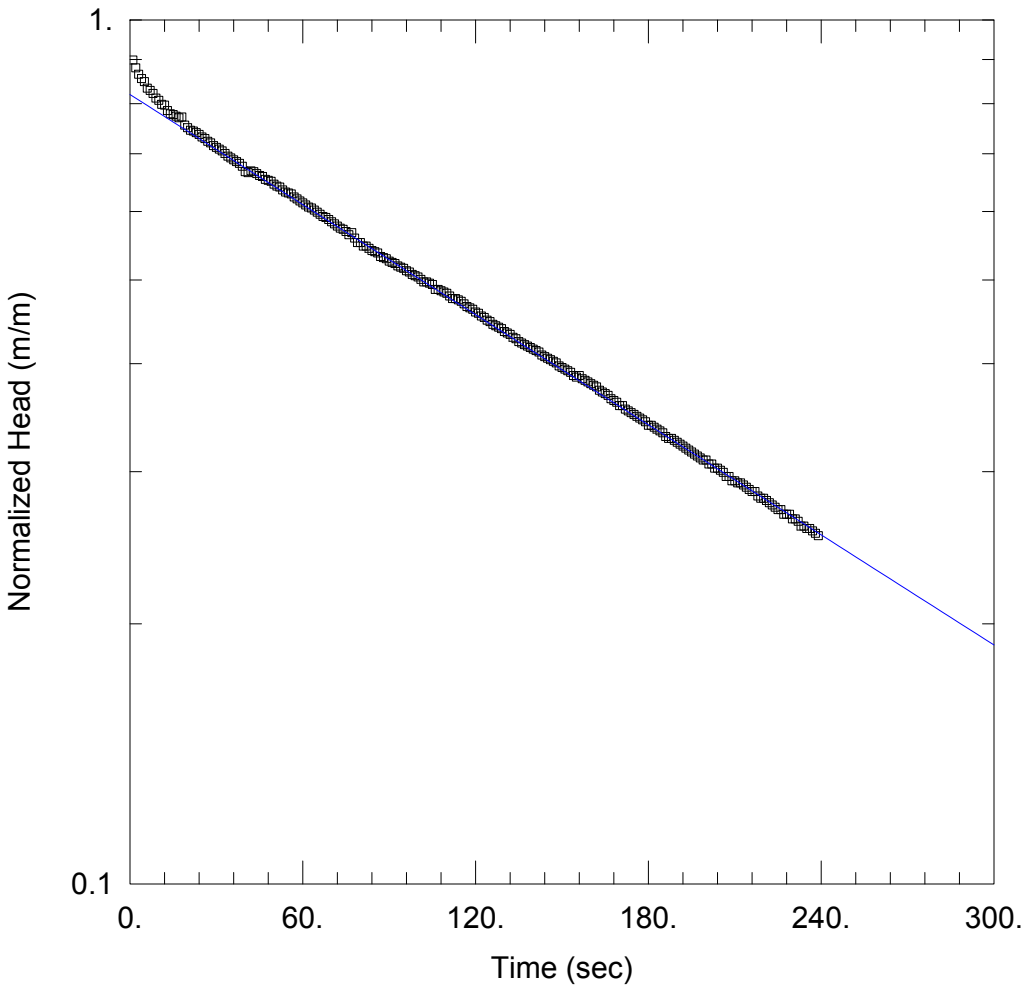
Saturated Thickness: 6.434 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW17-1)

Initial Displacement: -0.766 m
Total Well Penetration Depth: 6.44 m
Casing Radius: 0.0254 m
Static Water Column Height: 6.434 m
Screen Length: 3.05 m
Well Radius: 0.127 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.015E-5 m/sec
y0 = -0.6934 m



SINGLE WELL RESPONSE TEST

Data Set: C:\Users\pmenkveld\Desktop\1778651_\MW17-3_RHT.aqt
Date: 03/12/18 Time: 16:40:49

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: The Miller Group
Project: 1778651
Location: 13536 McCowan Road
Test Well: MW17-3
Test Date: 6-Nov-17

AQUIFER DATA

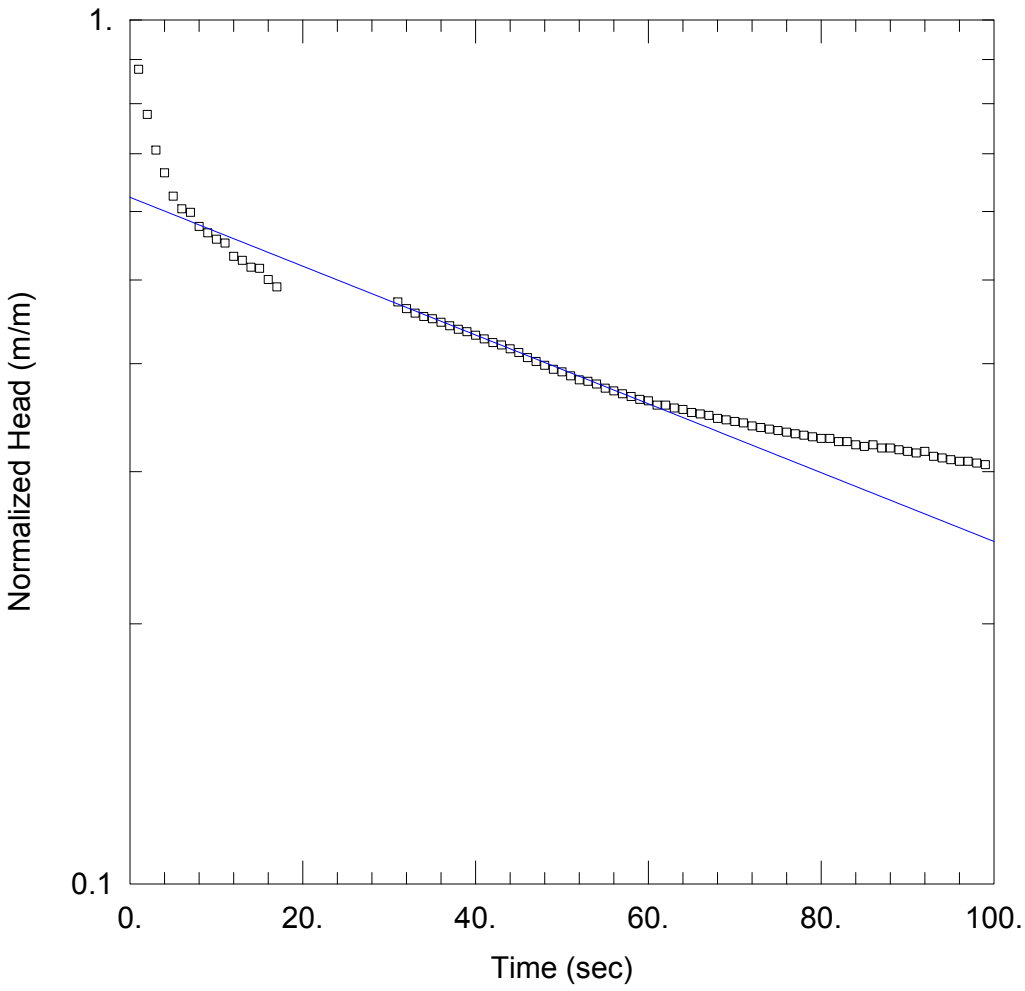
Saturated Thickness: 2.212 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW17-3)

Initial Displacement: -0.601 m
Total Well Penetration Depth: 2.212 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.212 m
Screen Length: 2.212 m
Well Radius: 0.127 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.499E-6 m/sec
y0 = -0.4927 m



SINGLE WELL RESPONSE TEST

Data Set: C:\Users\pmenkveld\Desktop\1778651_\MW17-4_RHT_v2.aqt
Date: 03/12/18 Time: 16:47:39

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: The Miller Group
Project: 1778651
Location: 13536 McCowan Road
Test Well: MW17-4
Test Date: 6-Nov-17

AQUIFER DATA

Saturated Thickness: 2.212 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW17-4)

Initial Displacement: -0.723 m
Total Well Penetration Depth: 2.212 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.212 m
Screen Length: 2.212 m
Well Radius: 0.127 m

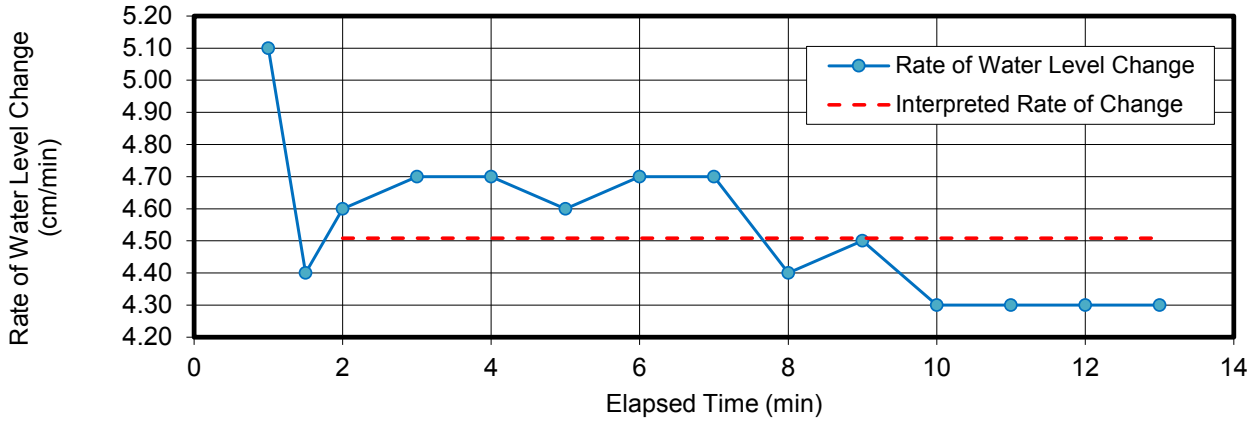
SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.812E-6 m/sec
y0 = -0.4506 m

Constant Head Permeameter Test Report - Infiltration Basin 1

Approximate Location:
Approximate Depth Tested: **1.16 mbgl**

Rate of Water Level Change vs. Time



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	13.20	-	-
1.0	18.30	5.10	5.10
1.5	20.50	2.20	4.40
2.0	22.80	2.30	4.60
3.0	27.50	4.70	4.70
4.0	32.20	4.70	4.70
5.0	36.80	4.60	4.60
6.0	41.50	4.70	4.70
7.0	46.20	4.70	4.70
8.0	50.60	4.40	4.40
9.0	55.10	4.50	4.50
10.0	59.40	4.30	4.30
11.0	63.70	4.30	4.30
12.0	68.00	4.30	4.30
13.0	72.30	4.30	4.30

=input data

Soil Type 4 - (SP/GP) Sand and gravel

Interpreted Rate of:

Water Level Change (R_1) = 7.5.E-02 cm/s

Steady Intake Water Rate (Q_1) = 2.6E+00 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 6 cm

Shape factor for H_1/a = (C_1) = 0.912 -

Soil Type Coefficient α^* = 0.36 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **7E-03** cm/s

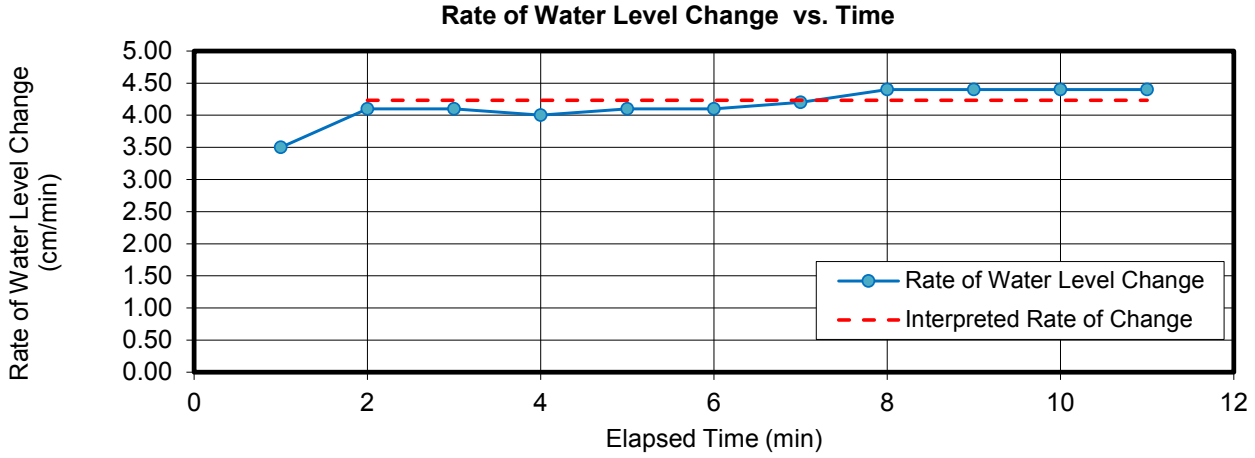
DATE: 28 November, 2017
PROJECT: 1778651

Golder Associates

DRAWN: DA
REVIEW: zk

Constant Head Permeameter Test Report - Infiltration Basin 2

Approximate Location:
Approximate Depth Tested: 1.25 mbgl



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	12.50	-	-
1.0	16.00	3.50	3.50
2.0	20.10	4.10	4.10
3.0	24.20	4.10	4.10
4.0	28.20	4.00	4.00
5.0	32.30	4.10	4.10
6.0	36.40	4.10	4.10
7.0	40.60	4.20	4.20
8.0	45.00	4.40	4.40
9.0	49.40	4.40	4.40
10.0	53.80	4.40	4.40
11.0	58.20	4.40	4.40

=input data

Soil Type 4 - (SP/GP) Sand and gravel

Interpreted Rate of:

Water Level Change (R_1) = 7.1.E-02 cm/s

Steady Intake Water Rate (Q_1) = 2.5E+00 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 6 cm

Shape factor for H_1/a = (C_1) = 0.912 -

Soil Type Coefficient α^* = 0.36 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **6E-03** cm/s

DATE: 28 November, 2017
PROJECT: 1778651

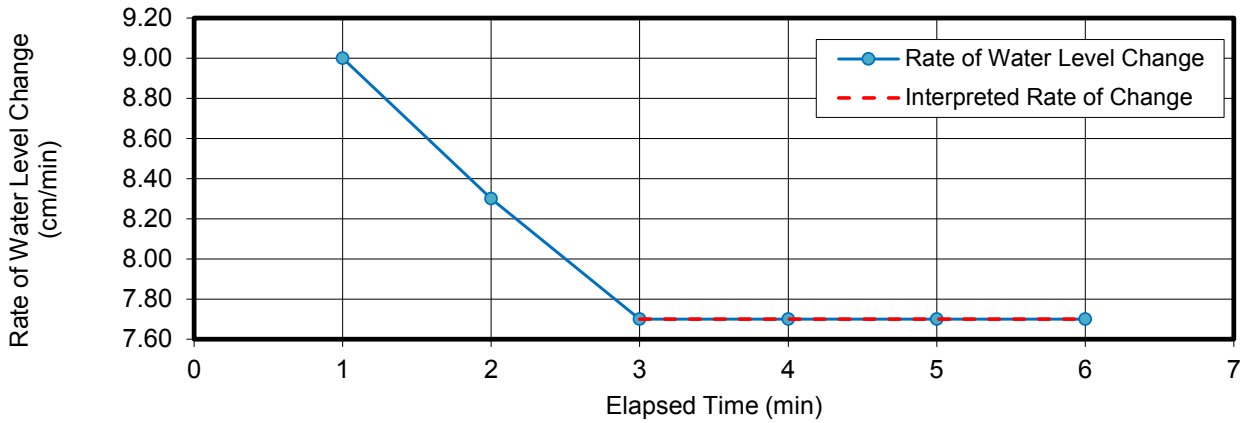
Golder Associates

DRAWN: DA
REVIEW: zk

Constant Head Permeameter Test Report - Infiltration Basin 3

Approximate Location:
Approximate Depth Tested: **1.02 mbgl**

Rate of Water Level Change vs. Time



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	25.00	-	-
1.0	34.00	9.00	9.00
2.0	42.30	8.30	8.30
3.0	50.00	7.70	7.70
4.0	57.70	7.70	7.70
5.0	65.40	7.70	7.70
6.0	73.10	7.70	7.70

=input data

Soil Type 3 - Silty sand, some gravel

Interpreted Rate of:

Water Level Change (R_1) = 1.3.E-01 cm/s

Steady Intake Water Rate (Q_1) = 4.5E+00 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 6 cm

Shape factor for H_1/a = (C_1) = 0.912 -

Soil Type Coefficient α^* = 0.12 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **7E-03** cm/s

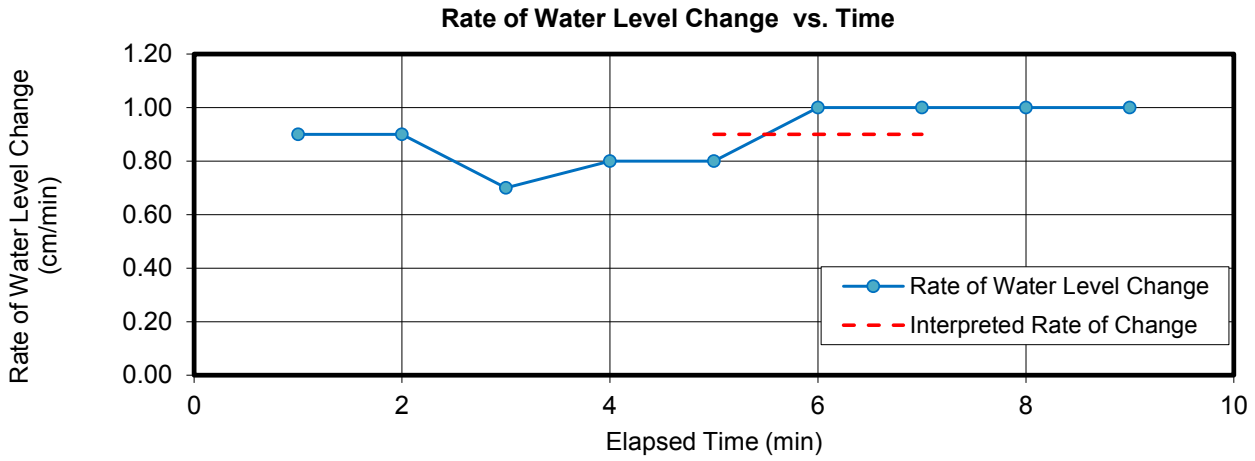
DATE: 28 November, 2017
PROJECT: 1778651

Golder Associates

DRAWN: DA
REVIEW: zk

Constant Head Permeameter Test Report - Infiltration Basin 4

Approximate Location:
Approximate Depth Tested: **1.12 mbgl**



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	6.50	-	-
1.0	7.40	0.90	0.90
2.0	8.30	0.90	0.90
3.0	9.00	0.70	0.70
4.0	9.80	0.80	0.80
5.0	10.60	0.80	0.80
6.0	11.60	1.00	1.00
7.0	12.60	1.00	1.00
8.0	13.60	1.00	1.00
9.0	14.60	1.00	1.00

=input data

Soil Type 3 - (SP/GW) Coarse sand, some gravel

Interpreted Rate of:

Water Level Change (R_1) = 1.5.E-02 cm/s

Steady Intake Water Rate (Q_1) = 5.3E-01 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 6 cm

Shape factor for H_1/a = (C_1) = 0.912 -

Soil Type Coefficient α^* = 0.12 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **8E-04** cm/s

DATE: 28 November, 2017

PROJECT: 1778651

Golder Associates

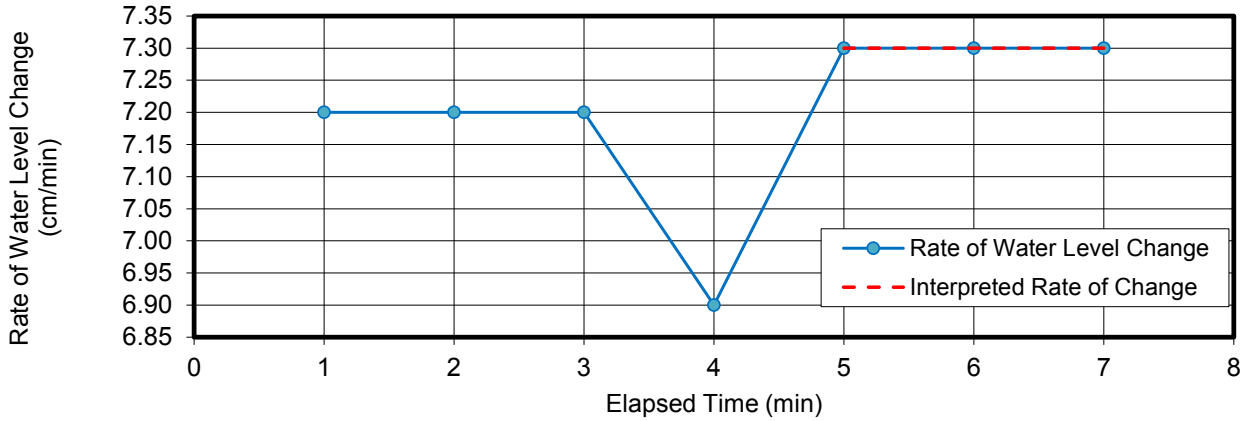
DRAWN: DA

REVIEW: zk

Constant Head Permeameter Test Report - Infiltration Basin 5

Approximate Location:
Approximate Depth Tested: **1.11 mbgl**

Rate of Water Level Change vs. Time



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	17.00	-	-
1.0	24.20	7.20	7.20
2.0	31.40	7.20	7.20
3.0	38.60	7.20	7.20
4.0	45.50	6.90	6.90
5.0	52.80	7.30	7.30
6.0	60.10	7.30	7.30
7.0	67.40	7.30	7.30

=input data

Soil Type 3 - (SP/GW) Coarse sand, some gravel

Interpreted Rate of:

Water Level Change (R_1) = 1.2.E-01 cm/s

Steady Intake Water Rate (Q_1) = 4.3E+00 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 6 cm

Shape factor for H_1/a = (C_1) = 0.912 -

Soil Type Coefficient α^* = 0.12 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **7E-03** cm/s

DATE: 28 November, 2017
PROJECT: 1778651

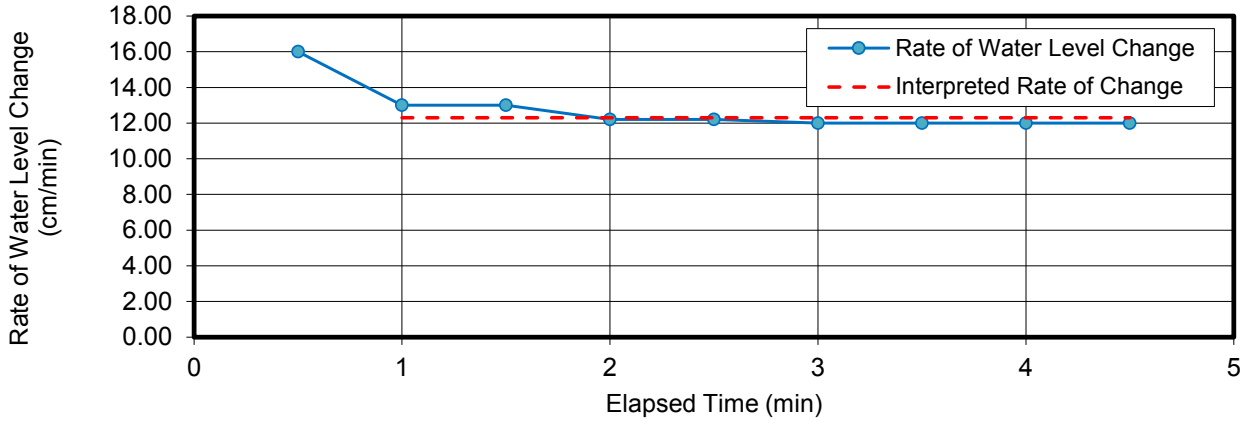
Golder Associates

DRAWN: DA
REVIEW: zk

Constant Head Permeameter Test Report - Infiltration Basin 6

Approximate Location:
Approximate Depth Tested: **1.06 mbgl**

Rate of Water Level Change vs. Time



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	18.00	-	-
0.5	26.00	8.00	16.00
1.0	32.50	6.50	13.00
1.5	39.00	6.50	13.00
2.0	45.10	6.10	12.20
2.5	51.20	6.10	12.20
3.0	57.20	6.00	12.00
3.5	63.20	6.00	12.00
4.0	69.20	6.00	12.00
4.5	75.20	6.00	12.00

=input data

Soil Type 3 - (SP/GW) Coarse sand, some gravel

Interpreted Rate of:

Water Level Change (R_1) = 2.1.E-01 cm/s

Steady Intake Water Rate (Q_1) = 7.2E+00 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 4 cm

Shape factor for H_1/a = (C_1) = 0.686 -

Soil Type Coefficient α^* = 0.12 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **1E-02** cm/s

DATE: 28 November, 2017
PROJECT: 1778651

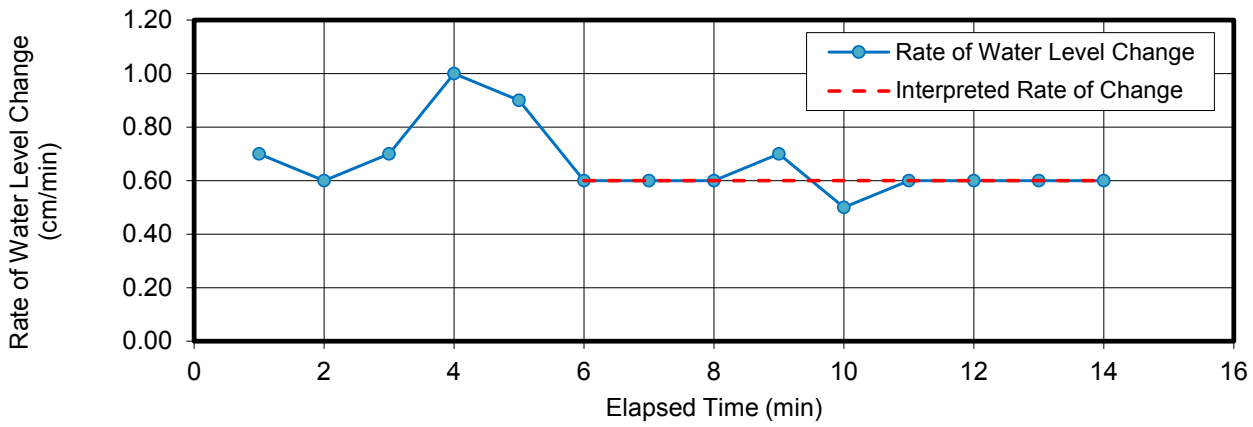
Golder Associates

DRAWN: DA
REVIEW: zk

Constant Head Permeameter Test Report - Infiltration Basin 7

Approximate Location:
Approximate Depth Tested: **1.16 mbgl**

Rate of Water Level Change vs. Time



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	5.50	-	-
1.0	6.20	0.70	0.70
2.0	6.80	0.60	0.60
3.0	7.50	0.70	0.70
4.0	8.50	1.00	1.00
5.0	9.40	0.90	0.90
6.0	10.00	0.60	0.60
7.0	10.60	0.60	0.60
8.0	11.20	0.60	0.60
9.0	11.90	0.70	0.70
10.0	12.40	0.50	0.50
11.0	13.00	0.60	0.60
12.0	13.60	0.60	0.60
13.0	14.20	0.60	0.60
14.0	14.80	0.60	0.60

=input data

Soil Type 3 - (SP) Coarse sand, trace gravel

Interpreted Rate of:

Water Level Change (R_1) = 1.0.E-02 cm/s

Steady Intake Water Rate (Q_1) = 3.5E-01 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 6 cm

Shape factor for H_1/a = (C_1) = 0.912 -

Soil Type Coefficient α^* = 0.12 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **6E-04** cm/s

DATE: 28 November, 2017
PROJECT: 1778651

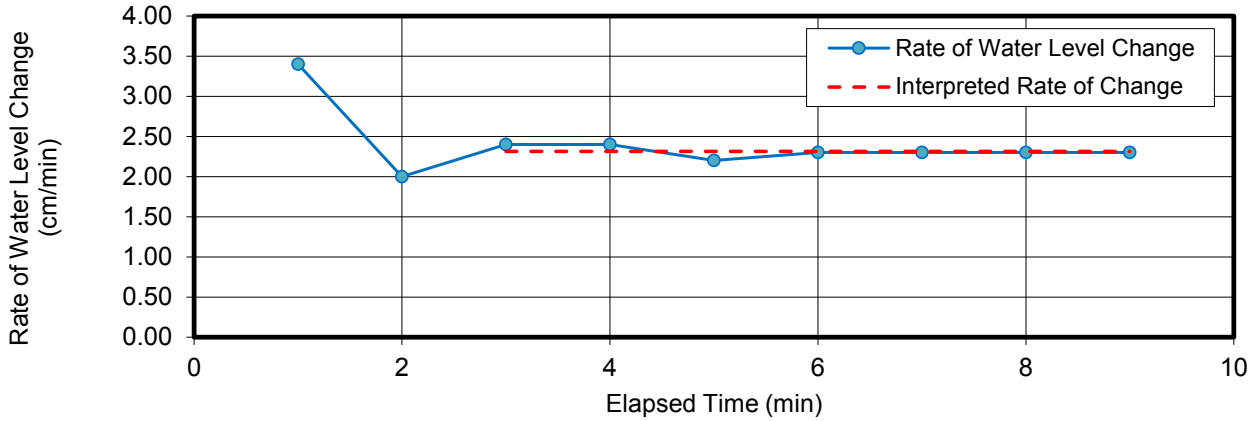
Golder Associates

DRAWN: DA
REVIEW: zk

Constant Head Permeameter Test Report - Infiltration Basin 8

Approximate Location:
Approximate Depth Tested: **1.26 mbgl**

Rate of Water Level Change vs. Time



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	13.00	-	-
1.0	16.40	3.40	3.40
2.0	18.40	2.00	2.00
3.0	20.80	2.40	2.40
4.0	23.20	2.40	2.40
5.0	25.40	2.20	2.20
6.0	27.70	2.30	2.30
7.0	30.00	2.30	2.30
8.0	32.30	2.30	2.30
9.0	34.60	2.30	2.30

=input data

Soil Type 4 - (SP/GP) Sand and gravel

Interpreted Rate of:

Water Level Change (R_1) = 3.9.E-02 cm/s

Steady Intake Water Rate (Q_1) = 1.4E+00 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 6 cm

Shape factor for H_1/a = (C_1) = 0.912 -

Soil Type Coefficient α^* = 0.36 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **3E-03** cm/s

DATE: 28 November, 2017

PROJECT: 1778651

Golder Associates

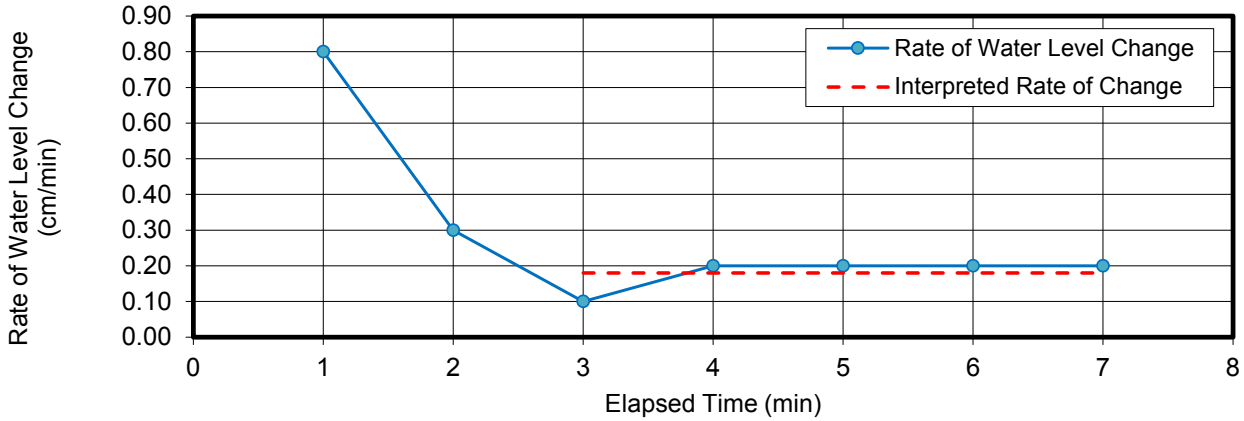
DRAWN: DA

REVIEW: zk

Constant Head Permeameter Test Report - Infiltration Basin 9

Approximate Location:
Approximate Depth Tested: **1.16 mbgl**

Rate of Water Level Change vs. Time



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0	0.60	-	-
1.0	1.40	0.80	0.80
2.0	1.70	0.30	0.30
3.0	1.80	0.10	0.10
4.0	2.00	0.20	0.20
5.0	2.20	0.20	0.20
6.0	2.40	0.20	0.20
7.0	2.60	0.20	0.20

=input data

Soil Type 3 - (SP) Course Sand, some gravel, some silt

Interpreted Rate of:

Water Level Change (R_1) = 3.0.E-03 cm/s

Steady Intake Water Rate (Q_1) = 1.1E-01 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 6 cm

Shape factor for H_1/a = (C_1) = 0.912 -

Soil Type Coefficient α^* = 0.12 cm^{-1}

Single Head Analysis

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

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **2E-04** cm/s

DATE: 28 November, 2017
PROJECT: 1778651

Golder Associates

DRAWN: DA
REVIEW: zk

Maxxam
A Bureau Veritas Group Company

Your Project #: 1778651
Your C.O.C. #: 636857-03-01

Attention: Chris Pons

Golder Associates Ltd
215 Shields Court
Unit # 1
Markham, ON
Canada L3R 8V2

Report Date: 2018/02/26
Report #: R5018116
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B7O7808
Received: 2017/11/03, 14:55

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	5	N/A	2017/11/09	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	5	N/A	2017/11/09	CAM SOP-00102	APHA 4500-CO2 D
1,3-Dichloropropene Sum	5	N/A	2017/11/10		EPA 8260C m
Chloride by Automated Colourimetry	5	N/A	2017/11/09	CAM SOP-00463	EPA 325.2 m
Conductivity	5	N/A	2017/11/09	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	4	N/A	2017/11/08	CAM SOP-00446	SM 23 5310 B m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2017/11/09	CAM SOP-00446	SM 23 5310 B m
Petroleum Hydrocarbons F2-F4 in Water (2)	5	2017/11/08	2017/11/09	CAM SOP-00316	CCME PHC-CWS m
Hardness (calculated as CaCO3)	5	N/A	2017/11/09	CAM SOP 00102/00408/00447	SM 2340 B
Mercury	5	2017/11/09	2017/11/09	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	5	N/A	2017/11/09	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	5	N/A	2017/11/09		
Anion and Cation Sum	5	N/A	2017/11/09		
Total Ammonia-N	5	N/A	2017/11/09	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (3)	5	N/A	2017/11/09	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Polychlorinated Biphenyl in Water	4	2017/11/08	2017/11/09	CAM SOP-00309	EPA 8082A m
pH	5	N/A	2017/11/09	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	5	N/A	2017/11/09	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	5	N/A	2017/11/09		
Sat. pH and Langelier Index (@ 4C)	5	N/A	2017/11/09		
Sulphate by Automated Colourimetry	5	N/A	2017/11/09	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	5	N/A	2017/11/09		
Total Kjeldahl Nitrogen in Water	5	2017/11/08	2017/11/09	CAM SOP-00938	OMOE E3516 m
Volatile Organic Compounds and F1 PHCs	5	N/A	2017/11/09	CAM SOP-00230	EPA 8260C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Your Project #: 1778651
Your C.O.C. #: 636857-03-01

Attention: Chris Pons

Golder Associates Ltd
215 Shields Court
Unit # 1
Markham, ON
Canada L3R 8V2

Report Date: 2018/02/26
Report #: R5018116
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B7O7808
Received: 2017/11/03, 14:55

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing.

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.

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) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH814			FMH814		
Sampling Date						2017/11/02 16:00			2017/11/02 16:00		
COC Number						636857-03-01			636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-1	RDL	QC Batch	MW17-1 Lab-Dup	RDL	QC Batch
Calculated Parameters											
Anion Sum	me/L	-	-	-	-	4.56	N/A	5254445			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	-	140	1.0	5254443			
Calculated TDS	mg/L	-	-	500	-	250	1.0	5254441			
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	-	1.9	1.0	5254443			
Cation Sum	me/L	-	-	-	-	3.91	N/A	5254445			
Hardness (CaCO3)	mg/L	-	-	80:100	-	**75**	1.0	5254418			
Ion Balance (% Difference)	%	-	-	-	-	7.78	N/A	5254444			
Langelier Index (@ 20C)	N/A	-	-	-	-	0.193		5254439			
Langelier Index (@ 4C)	N/A	-	-	-	-	-0.0570		5254440			
Saturation pH (@ 20C)	N/A	-	-	-	-	7.95		5254439			
Saturation pH (@ 4C)	N/A	-	-	-	-	8.20		5254440			
Inorganics											
Total Ammonia-N	mg/L	-	-	-	-	0.11	0.050	5256052			
Conductivity	umho/cm	-	-	-	-	420	1.0	5256257			
Dissolved Organic Carbon	mg/L	-	-	5	-	1.4	0.50	5256093			
Orthophosphate (P)	mg/L	-	-	-	-	<0.010	0.010	5256354	<0.010	0.010	5256354
pH	pH	-	-	6.5:8.5	6.5:8.5	8.14		5256254			
Dissolved Sulphate (SO4)	mg/L	-	-	500	-	36	1.0	5256353	36	1.0	5256353
Alkalinity (Total as CaCO3)	mg/L	-	-	30:500	-	140	1.0	5256277			
Dissolved Chloride (Cl)	mg/L	-	-	250	-	33	1.0	5256350	33	1.0	5256350
Nitrite (N)	mg/L	1	-	-	-	0.023	0.010	5256244			
Nitrate (N)	mg/L	10	-	-	-	0.10	0.10	5256244			
Nitrate + Nitrite (N)	mg/L	10	-	-	-	0.12	0.10	5256244			
Metals											
Dissolved Aluminum (Al)	ug/L	-	-	100	-	8.6	5.0	5255842			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH814			FMH814		
Sampling Date						2017/11/02 16:00			2017/11/02 16:00		
COC Number						636857-03-01			636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-1	RDL	QC Batch	MW17-1 Lab-Dup	RDL	QC Batch
Dissolved Antimony (Sb)	ug/L	-	6	-	20	<0.50	0.50	5255842			
Dissolved Arsenic (As)	ug/L	-	25	-	100	<1.0	1.0	5255842			
Dissolved Barium (Ba)	ug/L	1000	-	-	-	32	2.0	5255842			
Dissolved Beryllium (Be)	ug/L	-	-	-	11	<0.50	0.50	5255842			
Dissolved Boron (B)	ug/L	-	5000	-	200	160	10	5255842			
Dissolved Cadmium (Cd)	ug/L	5	-	-	0.2	<0.10	0.10	5255842			
Dissolved Calcium (Ca)	ug/L	-	-	-	-	20000	200	5255842			
Dissolved Chromium (Cr)	ug/L	50	-	-	-	<5.0	5.0	5255842			
Dissolved Cobalt (Co)	ug/L	-	-	-	0.9	<0.50	0.50	5255842			
Dissolved Copper (Cu)	ug/L	-	-	1000	5	4.9	1.0	5255842			
Dissolved Iron (Fe)	ug/L	-	-	300	300	<100	100	5255842			
Dissolved Lead (Pb)	ug/L	10	-	-	5	<0.50	0.50	5255842			
Dissolved Magnesium (Mg)	ug/L	-	-	-	-	6300	50	5255842			
Dissolved Manganese (Mn)	ug/L	-	-	50	-	5.1	2.0	5255842			
Dissolved Molybdenum (Mo)	ug/L	-	-	-	40	4.3	0.50	5255842			
Dissolved Nickel (Ni)	ug/L	-	-	-	25	1.1	1.0	5255842			
Dissolved Phosphorus (P)	ug/L	-	-	-	-	<100	100	5255842			
Dissolved Potassium (K)	ug/L	-	-	-	-	1700	200	5255842			
Dissolved Selenium (Se)	ug/L	50	-	-	100	<2.0	2.0	5255842			
Dissolved Silicon (Si)	ug/L	-	-	-	-	4100	50	5255842			
Dissolved Silver (Ag)	ug/L	-	-	-	0.1	<0.10	0.10	5255842			
Dissolved Sodium (Na)	ug/L	20000	-	200000	-	**54000**	100	5255842			
Dissolved Strontium (Sr)	ug/L	-	-	-	-	630	1.0	5255842			
Dissolved Thallium (Tl)	ug/L	-	-	-	0.3	<0.050	0.050	5255842			
Dissolved Titanium (Ti)	ug/L	-	-	-	-	<5.0	5.0	5255842			
Dissolved Uranium (U)	ug/L	20	-	-	5	0.25	0.10	5255842			
Dissolved Vanadium (V)	ug/L	-	-	-	6	<0.50	0.50	5255842			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH814			FMH814		
Sampling Date						2017/11/02 16:00			2017/11/02 16:00		
COC Number						636857-03-01			636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-1	RDL	QC Batch	MW17-1 Lab-Dup	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	-	-	5000	30	<5.0	5.0	5255842			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH882	FMH919		
Sampling Date						2017/11/02 11:00	2017/11/02 14:00		
COC Number						636857-03-01	636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-2	MW17-3	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	-	-	-	-	5.31	4.49	N/A	5254445
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	-	210	150	1.0	5254443
Calculated TDS	mg/L	-	-	500	-	270	240	1.0	5254441
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	-	2.0	2.0	1.0	5254443
Cation Sum	me/L	-	-	-	-	4.84	4.00	N/A	5254445
Hardness (CaCO3)	mg/L	-	-	80:100	-	**220**	**110**	1.0	5254418
Ion Balance (% Difference)	%	-	-	-	-	4.64	5.83	N/A	5254444
Langelier Index (@ 20C)	N/A	-	-	-	-	0.748	0.434		5254439
Langelier Index (@ 4C)	N/A	-	-	-	-	0.499	0.184		5254440
Saturation pH (@ 20C)	N/A	-	-	-	-	7.26	7.72		5254439
Saturation pH (@ 4C)	N/A	-	-	-	-	7.51	7.97		5254440
Inorganics									
Total Ammonia-N	mg/L	-	-	-	-	<0.050	0.082	0.050	5256052
Conductivity	umho/cm	-	-	-	-	460	410	1.0	5256257
Dissolved Organic Carbon	mg/L	-	-	5	-	0.86	2.0	0.50	5256093
Orthophosphate (P)	mg/L	-	-	-	-	<0.010	<0.010	0.010	5256354
pH	pH	-	-	6.5:8.5	6.5:8.5	8.01	8.15		5256254
Dissolved Sulphate (SO4)	mg/L	-	-	500	-	25	19	1.0	5256353
Alkalinity (Total as CaCO3)	mg/L	-	-	30:500	-	210	160	1.0	5256277
Dissolved Chloride (Cl)	mg/L	-	-	250	-	15	34	1.0	5256350
Nitrite (N)	mg/L	1	-	-	-	<0.010	0.030	0.010	5256244
Nitrate (N)	mg/L	10	-	-	-	1.08	0.18	0.10	5256244
Nitrate + Nitrite (N)	mg/L	10	-	-	-	1.08	0.21	0.10	5256244
Metals									
Dissolved Aluminum (Al)	ug/L	-	-	100	-	6.7	13	5.0	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
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N/A = Not Applicable

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH882	FMH919		
Sampling Date						2017/11/02 11:00	2017/11/02 14:00		
COC Number						636857-03-01	636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-2	MW17-3	RDL	QC Batch
Dissolved Antimony (Sb)	ug/L	-	6	-	20	<0.50	<0.50	0.50	5255842
Dissolved Arsenic (As)	ug/L	-	25	-	100	<1.0	<1.0	1.0	5255842
Dissolved Barium (Ba)	ug/L	1000	-	-	-	65	28	2.0	5255842
Dissolved Beryllium (Be)	ug/L	-	-	-	11	<0.50	<0.50	0.50	5255842
Dissolved Boron (B)	ug/L	-	5000	-	200	27	110	10	5255842
Dissolved Cadmium (Cd)	ug/L	5	-	-	0.2	<0.10	<0.10	0.10	5255842
Dissolved Calcium (Ca)	ug/L	-	-	-	-	67000	31000	200	5255842
Dissolved Chromium (Cr)	ug/L	50	-	-	-	<5.0	<5.0	5.0	5255842
Dissolved Cobalt (Co)	ug/L	-	-	-	0.9	<0.50	<0.50	0.50	5255842
Dissolved Copper (Cu)	ug/L	-	-	1000	5	2.2	4.4	1.0	5255842
Dissolved Iron (Fe)	ug/L	-	-	300	300	<100	<100	100	5255842
Dissolved Lead (Pb)	ug/L	10	-	-	5	<0.50	<0.50	0.50	5255842
Dissolved Magnesium (Mg)	ug/L	-	-	-	-	12000	7700	50	5255842
Dissolved Manganese (Mn)	ug/L	-	-	50	-	3.2	7.8	2.0	5255842
Dissolved Molybdenum (Mo)	ug/L	-	-	-	40	14	16	0.50	5255842
Dissolved Nickel (Ni)	ug/L	-	-	-	25	<1.0	1.1	1.0	5255842
Dissolved Phosphorus (P)	ug/L	-	-	-	-	<100	<100	100	5255842
Dissolved Potassium (K)	ug/L	-	-	-	-	2500	3300	200	5255842
Dissolved Selenium (Se)	ug/L	50	-	-	100	<2.0	<2.0	2.0	5255842
Dissolved Silicon (Si)	ug/L	-	-	-	-	4100	4300	50	5255842
Dissolved Silver (Ag)	ug/L	-	-	-	0.1	<0.10	<0.10	0.10	5255842
Dissolved Sodium (Na)	ug/L	20000	-	200000	-	11000	**40000**	100	5255842
Dissolved Strontium (Sr)	ug/L	-	-	-	-	200	230	1.0	5255842
Dissolved Thallium (Tl)	ug/L	-	-	-	0.3	<0.050	<0.050	0.050	5255842
Dissolved Titanium (Ti)	ug/L	-	-	-	-	<5.0	<5.0	5.0	5255842
Dissolved Uranium (U)	ug/L	20	-	-	5	0.37	0.35	0.10	5255842
Dissolved Vanadium (V)	ug/L	-	-	-	6	<0.50	<0.50	0.50	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH882	FMH919		
Sampling Date						2017/11/02 11:00	2017/11/02 14:00		
COC Number						636857-03-01	636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-2	MW17-3	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	-	-	5000	30	<5.0	<5.0	5.0	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH919			FMH920		
Sampling Date						2017/11/02 14:00			2017/11/02 15:00		
COC Number						636857-03-01			636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-3 Lab-Dup	RDL	QC Batch	MW17-4	RDL	QC Batch
Calculated Parameters											
Anion Sum	me/L	-	-	-	-				4.30	N/A	5254445
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	-				150	1.0	5254443
Calculated TDS	mg/L	-	-	500	-				220	1.0	5254441
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	-				2.0	1.0	5254443
Cation Sum	me/L	-	-	-	-				3.77	N/A	5254445
Hardness (CaCO3)	mg/L	-	-	80:100	-				**110**	1.0	5254418
Ion Balance (% Difference)	%	-	-	-	-				6.54	N/A	5254444
Langelier Index (@ 20C)	N/A	-	-	-	-				0.437		5254439
Langelier Index (@ 4C)	N/A	-	-	-	-				0.187		5254440
Saturation pH (@ 20C)	N/A	-	-	-	-				7.71		5254439
Saturation pH (@ 4C)	N/A	-	-	-	-				7.96		5254440
Inorganics											
Total Ammonia-N	mg/L	-	-	-	-				0.097	0.050	5256052
Conductivity	umho/cm	-	-	-	-				390	1.0	5256257
Dissolved Organic Carbon	mg/L	-	-	5	-	1.9	0.50	5256093	1.3	0.50	5256093
Orthophosphate (P)	mg/L	-	-	-	-				<0.010	0.010	5256354
pH	pH	-	-	6.5:8.5	6.5:8.5				8.15		5256254
Dissolved Sulphate (SO4)	mg/L	-	-	500	-				19	1.0	5256353
Alkalinity (Total as CaCO3)	mg/L	-	-	30:500	-				150	1.0	5256277
Dissolved Chloride (Cl)	mg/L	-	-	250	-				29	1.0	5256350
Nitrite (N)	mg/L	1	-	-	-				0.065	0.010	5256244
Nitrate (N)	mg/L	10	-	-	-				<0.10	0.10	5256244
Nitrate + Nitrite (N)	mg/L	10	-	-	-				<0.10	0.10	5256244
Metals											
Dissolved Aluminum (Al)	ug/L	-	-	100	-				12	5.0	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH919			FMH920		
Sampling Date						2017/11/02 14:00			2017/11/02 15:00		
COC Number						636857-03-01			636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-3 Lab-Dup	RDL	QC Batch	MW17-4	RDL	QC Batch
Dissolved Antimony (Sb)	ug/L	-	6	-	20				<0.50	0.50	5255842
Dissolved Arsenic (As)	ug/L	-	25	-	100				<1.0	1.0	5255842
Dissolved Barium (Ba)	ug/L	1000	-	-	-				25	2.0	5255842
Dissolved Beryllium (Be)	ug/L	-	-	-	11				<0.50	0.50	5255842
Dissolved Boron (B)	ug/L	-	5000	-	200				94	10	5255842
Dissolved Cadmium (Cd)	ug/L	5	-	-	0.2				<0.10	0.10	5255842
Dissolved Calcium (Ca)	ug/L	-	-	-	-				31000	200	5255842
Dissolved Chromium (Cr)	ug/L	50	-	-	-				<5.0	5.0	5255842
Dissolved Cobalt (Co)	ug/L	-	-	-	0.9				<0.50	0.50	5255842
Dissolved Copper (Cu)	ug/L	-	-	1000	5				1.9	1.0	5255842
Dissolved Iron (Fe)	ug/L	-	-	300	300				<100	100	5255842
Dissolved Lead (Pb)	ug/L	10	-	-	5				<0.50	0.50	5255842
Dissolved Magnesium (Mg)	ug/L	-	-	-	-				7200	50	5255842
Dissolved Manganese (Mn)	ug/L	-	-	50	-				21	2.0	5255842
Dissolved Molybdenum (Mo)	ug/L	-	-	-	40				**51**	0.50	5255842
Dissolved Nickel (Ni)	ug/L	-	-	-	25				1.1	1.0	5255842
Dissolved Phosphorus (P)	ug/L	-	-	-	-				<100	100	5255842
Dissolved Potassium (K)	ug/L	-	-	-	-				4400	200	5255842
Dissolved Selenium (Se)	ug/L	50	-	-	100				<2.0	2.0	5255842
Dissolved Silicon (Si)	ug/L	-	-	-	-				2900	50	5255842
Dissolved Silver (Ag)	ug/L	-	-	-	0.1				<0.10	0.10	5255842
Dissolved Sodium (Na)	ug/L	20000	-	200000	-				**34000**	100	5255842
Dissolved Strontium (Sr)	ug/L	-	-	-	-				270	1.0	5255842
Dissolved Thallium (Tl)	ug/L	-	-	-	0.3				<0.050	0.050	5255842
Dissolved Titanium (Ti)	ug/L	-	-	-	-				<5.0	5.0	5255842
Dissolved Uranium (U)	ug/L	20	-	-	5				0.26	0.10	5255842
Dissolved Vanadium (V)	ug/L	-	-	-	6				<0.50	0.50	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH919			FMH920		
Sampling Date						2017/11/02 14:00			2017/11/02 15:00		
COC Number						636857-03-01			636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-3 Lab-Dup	RDL	QC Batch	MW17-4	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	-	-	5000	30				<5.0	5.0	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH921		
Sampling Date						2017/11/02 12:00		
COC Number						636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	DUP1	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	-	-	-	-	5.26	N/A	5254445
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	-	210	1.0	5254443
Calculated TDS	mg/L	-	-	500	-	270	1.0	5254441
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	-	2.2	1.0	5254443
Cation Sum	me/L	-	-	-	-	4.92	N/A	5254445
Hardness (CaCO3)	mg/L	-	-	80:100	-	**220**	1.0	5254418
Ion Balance (% Difference)	%	-	-	-	-	3.31	N/A	5254444
Langelier Index (@ 20C)	N/A	-	-	-	-	0.789		5254439
Langelier Index (@ 4C)	N/A	-	-	-	-	0.540		5254440
Saturation pH (@ 20C)	N/A	-	-	-	-	7.26		5254439
Saturation pH (@ 4C)	N/A	-	-	-	-	7.51		5254440
Inorganics								
Total Ammonia-N	mg/L	-	-	-	-	<0.050	0.050	5256052
Conductivity	umho/cm	-	-	-	-	440	1.0	5256257
Dissolved Organic Carbon	mg/L	-	-	5	-	0.77	0.50	5256093
Orthophosphate (P)	mg/L	-	-	-	-	<0.010	0.010	5256354
pH	pH	-	-	6.5:8.5	6.5:8.5	8.05		5256254
Dissolved Sulphate (SO4)	mg/L	-	-	500	-	27	1.0	5256353
Alkalinity (Total as CaCO3)	mg/L	-	-	30:500	-	210	1.0	5256277
Dissolved Chloride (Cl)	mg/L	-	-	250	-	14	1.0	5256350
Nitrite (N)	mg/L	1	-	-	-	<0.010	0.010	5256244
Nitrate (N)	mg/L	10	-	-	-	0.79	0.10	5256244
Nitrate + Nitrite (N)	mg/L	10	-	-	-	0.79	0.10	5256244
Metals								
Dissolved Aluminum (Al)	ug/L	-	-	100	-	9.6	5.0	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

N/A = Not Applicable

Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH921		
Sampling Date						2017/11/02 12:00		
COC Number						636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	DUP1	RDL	QC Batch
Dissolved Antimony (Sb)	ug/L	-	6	-	20	<0.50	0.50	5255842
Dissolved Arsenic (As)	ug/L	-	25	-	100	<1.0	1.0	5255842
Dissolved Barium (Ba)	ug/L	1000	-	-	-	65	2.0	5255842
Dissolved Beryllium (Be)	ug/L	-	-	-	11	<0.50	0.50	5255842
Dissolved Boron (B)	ug/L	-	5000	-	200	32	10	5255842
Dissolved Cadmium (Cd)	ug/L	5	-	-	0.2	<0.10	0.10	5255842
Dissolved Calcium (Ca)	ug/L	-	-	-	-	67000	200	5255842
Dissolved Chromium (Cr)	ug/L	50	-	-	-	<5.0	5.0	5255842
Dissolved Cobalt (Co)	ug/L	-	-	-	0.9	<0.50	0.50	5255842
Dissolved Copper (Cu)	ug/L	-	-	1000	5	3.3	1.0	5255842
Dissolved Iron (Fe)	ug/L	-	-	300	300	<100	100	5255842
Dissolved Lead (Pb)	ug/L	10	-	-	5	<0.50	0.50	5255842
Dissolved Magnesium (Mg)	ug/L	-	-	-	-	12000	50	5255842
Dissolved Manganese (Mn)	ug/L	-	-	50	-	2.6	2.0	5255842
Dissolved Molybdenum (Mo)	ug/L	-	-	-	40	17	0.50	5255842
Dissolved Nickel (Ni)	ug/L	-	-	-	25	<1.0	1.0	5255842
Dissolved Phosphorus (P)	ug/L	-	-	-	-	<100	100	5255842
Dissolved Potassium (K)	ug/L	-	-	-	-	2500	200	5255842
Dissolved Selenium (Se)	ug/L	50	-	-	100	<2.0	2.0	5255842
Dissolved Silicon (Si)	ug/L	-	-	-	-	4200	50	5255842
Dissolved Silver (Ag)	ug/L	-	-	-	0.1	<0.10	0.10	5255842
Dissolved Sodium (Na)	ug/L	20000	-	200000	-	12000	100	5255842
Dissolved Strontium (Sr)	ug/L	-	-	-	-	200	1.0	5255842
Dissolved Thallium (Tl)	ug/L	-	-	-	0.3	<0.050	0.050	5255842
Dissolved Titanium (Ti)	ug/L	-	-	-	-	<5.0	5.0	5255842
Dissolved Uranium (U)	ug/L	20	-	-	5	0.37	0.10	5255842
Dissolved Vanadium (V)	ug/L	-	-	-	6	<0.50	0.50	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively

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Criteria: Ontario Provincial Water Quality Objectives
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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RCAP - COMPREHENSIVE (WATER)

Maxxam ID						FMH921		
Sampling Date						2017/11/02 12:00		
COC Number						636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	DUP1	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	-	-	5000	30	<5.0	5.0	5255842

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

RESULTS OF ANALYSES OF WATER

Maxxam ID		FMH814	FMH882	FMH919	FMH920	FMH921		
Sampling Date		2017/11/02 16:00	2017/11/02 11:00	2017/11/02 14:00	2017/11/02 15:00	2017/11/02 12:00		
COC Number		636857-03-01	636857-03-01	636857-03-01	636857-03-01	636857-03-01		
	UNITS	MW17-1	MW17-2	MW17-3	MW17-4	DUP1	RDL	QC Batch
Inorganics								
Total Kjeldahl Nitrogen (TKN)	mg/L	0.23	0.27	0.55	0.20	0.16	0.10	5255484

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID				FMH814	FMH882	FMH919	FMH920	FMH920		
Sampling Date				2017/11/02 16:00	2017/11/02 11:00	2017/11/02 14:00	2017/11/02 15:00	2017/11/02 15:00		
COC Number				636857-03-01	636857-03-01	636857-03-01	636857-03-01	636857-03-01		
	UNITS	MAC	Criteria	MW17-1	MW17-2	MW17-3	MW17-4	MW17-4 Lab-Dup	RDL	QC Batch
Metals										
Mercury (Hg)	ug/L	1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	5256678

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
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Maxxam ID				FMH921		
Sampling Date				2017/11/02 12:00		
COC Number				636857-03-01		
	UNITS	MAC	Criteria	DUP1	RDL	QC Batch
Metals						
Mercury (Hg)	ug/L	1	0.2	<0.1	0.1	5256678

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
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Criteria: Ontario Provincial Water Quality Objectives
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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

O.REG 153 PCBS (WATER)

Maxxam ID				FMH882	FMH919	FMH920	FMH921		
Sampling Date				2017/11/02 11:00	2017/11/02 14:00	2017/11/02 15:00	2017/11/02 12:00		
COC Number				636857-03-01	636857-03-01	636857-03-01	636857-03-01		
	UNITS	IMC	Criteria	MW17-2	MW17-3	MW17-4	DUP1	RDL	QC Batch
PCBs									
Aroclor 1242	ug/L	-	0.001	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	0.05	5255612
Aroclor 1248	ug/L	-	0.001	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	0.05	5255612
Aroclor 1254	ug/L	-	0.001	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	0.05	5255612
Aroclor 1260	ug/L	-	0.001	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	0.05	5255612
Total PCB	ug/L	3	0.001	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	**<0.05 (1)**	0.05	5255612
Surrogate Recovery (%)									
Decachlorobiphenyl	%	-	-	96	96	86	99		5255612

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

IMC: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
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(1) RDL exceeds criteria

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID						FMH814	FMH882	FMH919	FMH920		
Sampling Date						2017/11/02 16:00	2017/11/02 11:00	2017/11/02 14:00	2017/11/02 15:00		
COC Number						636857-03-01	636857-03-01	636857-03-01	636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-1	MW17-2	MW17-3	MW17-4	RDL	QC Batch
Calculated Parameters											
1,3-Dichloropropene (cis+trans)	ug/L	-	-	-	-	<0.50	<0.50	<0.50	<0.50	0.50	5254338
Volatile Organics											
Acetone (2-Propanone)	ug/L	-	-	-	-	<10	<10	<10	<10	10	5254817
Benzene	ug/L	5	-	-	100	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Bromodichloromethane	ug/L	-	-	-	200	<0.50	<0.50	<0.50	<0.50	0.50	5254817
Bromoform	ug/L	-	-	-	60	<1.0	<1.0	<1.0	<1.0	1.0	5254817
Bromomethane	ug/L	-	-	-	0.9	<0.50	<0.50	<0.50	<0.50	0.50	5254817
Carbon Tetrachloride	ug/L	5	-	-	-	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Chlorobenzene	ug/L	80	-	-	15	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Chloroform	ug/L	-	-	-	-	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Dibromochloromethane	ug/L	-	-	-	40	<0.50	<0.50	<0.50	<0.50	0.50	5254817
1,2-Dichlorobenzene	ug/L	200	-	-	2.5	<0.50	<0.50	<0.50	<0.50	0.50	5254817
1,3-Dichlorobenzene	ug/L	-	-	-	2.5	<0.50	<0.50	<0.50	<0.50	0.50	5254817
1,4-Dichlorobenzene	ug/L	5	-	-	4	<0.50	<0.50	<0.50	<0.50	0.50	5254817
Dichlorodifluoromethane (FREON 12)	ug/L	-	-	-	-	<1.0	<1.0	<1.0	<1.0	1.0	5254817
1,1-Dichloroethane	ug/L	-	-	-	200	<0.20	<0.20	<0.20	<0.20	0.20	5254817
1,2-Dichloroethane	ug/L	-	5	-	100	<0.50	<0.50	<0.50	<0.50	0.50	5254817
1,1-Dichloroethylene	ug/L	14	-	-	40	<0.20	<0.20	<0.20	<0.20	0.20	5254817
cis-1,2-Dichloroethylene	ug/L	-	-	-	200	<0.50	<0.50	<0.50	<0.50	0.50	5254817
trans-1,2-Dichloroethylene	ug/L	-	-	-	200	<0.50	<0.50	<0.50	<0.50	0.50	5254817
1,2-Dichloropropane	ug/L	-	-	-	0.7	<0.20	<0.20	<0.20	<0.20	0.20	5254817
cis-1,3-Dichloropropene	ug/L	-	-	-	-	<0.30	<0.30	<0.30	<0.30	0.30	5254817
trans-1,3-Dichloropropene	ug/L	-	-	-	7	<0.40	<0.40	<0.40	<0.40	0.40	5254817
Ethylbenzene	ug/L	140	-	1.6	8	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Ethylene Dibromide	ug/L	-	-	-	5	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Hexane	ug/L	-	-	-	-	<1.0	<1.0	<1.0	<1.0	1.0	5254817
Methylene Chloride(Dichloromethane)	ug/L	50	-	-	100	<2.0	<2.0	<2.0	<2.0	2.0	5254817

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID						FMH814	FMH882	FMH919	FMH920		
Sampling Date						2017/11/02 16:00	2017/11/02 11:00	2017/11/02 14:00	2017/11/02 15:00		
COC Number						636857-03-01	636857-03-01	636857-03-01	636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	MW17-1	MW17-2	MW17-3	MW17-4	RDL	QC Batch
Methyl Ethyl Ketone (2-Butanone)	ug/L	-	-	-	400	<10	<10	<10	<10	10	5254817
Methyl Isobutyl Ketone	ug/L	-	-	-	-	<5.0	<5.0	<5.0	<5.0	5.0	5254817
Methyl t-butyl ether (MTBE)	ug/L	-	-	15	200	<0.50	<0.50	<0.50	<0.50	0.50	5254817
Styrene	ug/L	-	-	-	4	<0.50	<0.50	<0.50	<0.50	0.50	5254817
1,1,1,2-Tetrachloroethane	ug/L	-	-	-	20	<0.50	<0.50	<0.50	<0.50	0.50	5254817
1,1,2,2-Tetrachloroethane	ug/L	-	-	-	70	<0.50	<0.50	<0.50	<0.50	0.50	5254817
Tetrachloroethylene	ug/L	10	-	-	50	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Toluene	ug/L	60	-	-	0.8	<0.20	<0.20	<0.20	0.23	0.20	5254817
1,1,1-Trichloroethane	ug/L	-	-	-	10	<0.20	<0.20	<0.20	<0.20	0.20	5254817
1,1,2-Trichloroethane	ug/L	-	-	-	800	<0.50	<0.50	<0.50	<0.50	0.50	5254817
Trichloroethylene	ug/L	5	-	-	20	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Trichlorofluoromethane (FREON 11)	ug/L	-	-	-	-	<0.50	<0.50	<0.50	<0.50	0.50	5254817
Vinyl Chloride	ug/L	2	-	-	600	<0.20	<0.20	<0.20	<0.20	0.20	5254817
p+m-Xylene	ug/L	-	-	-	-	<0.20	<0.20	<0.20	<0.20	0.20	5254817
o-Xylene	ug/L	-	-	-	40	<0.20	<0.20	<0.20	<0.20	0.20	5254817
Total Xylenes	ug/L	90	-	20	-	<0.20	<0.20	<0.20	<0.20	0.20	5254817
F1 (C6-C10)	ug/L	-	-	-	-	<25	<25	<25	<25	25	5254817
F1 (C6-C10) - BTEX	ug/L	-	-	-	-	<25	<25	<25	<25	25	5254817
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/L	-	-	-	-	<100	<100	<100	<100	100	5256371
F3 (C16-C34 Hydrocarbons)	ug/L	-	-	-	-	<200	<200	<200	<200	200	5256371
F4 (C34-C50 Hydrocarbons)	ug/L	-	-	-	-	<200	<200	<200	<200	200	5256371
Reached Baseline at C50	ug/L	-	-	-	-	Yes	Yes	Yes	Yes		5256371
Surrogate Recovery (%)											
o-Terphenyl	%	-	-	-	-	101	89	92	88		5256371
4-Bromofluorobenzene	%	-	-	-	-	93	92	91	91		5254817
D4-1,2-Dichloroethane	%	-	-	-	-	107	107	107	105		5254817
D8-Toluene	%	-	-	-	-	93	94	94	94		5254817

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID						FMH921		
Sampling Date						2017/11/02 12:00		
COC Number						636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	DUP1	RDL	QC Batch
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/L	-	-	-	-	<0.50	0.50	5254338
Volatile Organics								
Acetone (2-Propanone)	ug/L	-	-	-	-	<10	10	5254817
Benzene	ug/L	5	-	-	100	<0.20	0.20	5254817
Bromodichloromethane	ug/L	-	-	-	200	<0.50	0.50	5254817
Bromoform	ug/L	-	-	-	60	<1.0	1.0	5254817
Bromomethane	ug/L	-	-	-	0.9	<0.50	0.50	5254817
Carbon Tetrachloride	ug/L	5	-	-	-	<0.20	0.20	5254817
Chlorobenzene	ug/L	80	-	-	15	<0.20	0.20	5254817
Chloroform	ug/L	-	-	-	-	<0.20	0.20	5254817
Dibromochloromethane	ug/L	-	-	-	40	<0.50	0.50	5254817
1,2-Dichlorobenzene	ug/L	200	-	-	2.5	<0.50	0.50	5254817
1,3-Dichlorobenzene	ug/L	-	-	-	2.5	<0.50	0.50	5254817
1,4-Dichlorobenzene	ug/L	5	-	-	4	<0.50	0.50	5254817
Dichlorodifluoromethane (FREON 12)	ug/L	-	-	-	-	<1.0	1.0	5254817
1,1-Dichloroethane	ug/L	-	-	-	200	<0.20	0.20	5254817
1,2-Dichloroethane	ug/L	-	5	-	100	<0.50	0.50	5254817
1,1-Dichloroethylene	ug/L	14	-	-	40	<0.20	0.20	5254817
cis-1,2-Dichloroethylene	ug/L	-	-	-	200	<0.50	0.50	5254817
trans-1,2-Dichloroethylene	ug/L	-	-	-	200	<0.50	0.50	5254817
1,2-Dichloropropane	ug/L	-	-	-	0.7	<0.20	0.20	5254817
cis-1,3-Dichloropropene	ug/L	-	-	-	-	<0.30	0.30	5254817
trans-1,3-Dichloropropene	ug/L	-	-	-	7	<0.40	0.40	5254817
Ethylbenzene	ug/L	140	-	1.6	8	<0.20	0.20	5254817
Ethylene Dibromide	ug/L	-	-	-	5	<0.20	0.20	5254817
Hexane	ug/L	-	-	-	-	<1.0	1.0	5254817

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
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O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID						FMH921		
Sampling Date						2017/11/02 12:00		
COC Number						636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	DUP1	RDL	QC Batch
Methylene Chloride(Dichloromethane)	ug/L	50	-	-	100	<2.0	2.0	5254817
Methyl Ethyl Ketone (2-Butanone)	ug/L	-	-	-	400	<10	10	5254817
Methyl Isobutyl Ketone	ug/L	-	-	-	-	<5.0	5.0	5254817
Methyl t-butyl ether (MTBE)	ug/L	-	-	15	200	<0.50	0.50	5254817
Styrene	ug/L	-	-	-	4	<0.50	0.50	5254817
1,1,1,2-Tetrachloroethane	ug/L	-	-	-	20	<0.50	0.50	5254817
1,1,2,2-Tetrachloroethane	ug/L	-	-	-	70	<0.50	0.50	5254817
Tetrachloroethylene	ug/L	10	-	-	50	<0.20	0.20	5254817
Toluene	ug/L	60	-	-	0.8	<0.20	0.20	5254817
1,1,1-Trichloroethane	ug/L	-	-	-	10	<0.20	0.20	5254817
1,1,2-Trichloroethane	ug/L	-	-	-	800	<0.50	0.50	5254817
Trichloroethylene	ug/L	5	-	-	20	<0.20	0.20	5254817
Trichlorofluoromethane (FREON 11)	ug/L	-	-	-	-	<0.50	0.50	5254817
Vinyl Chloride	ug/L	2	-	-	600	<0.20	0.20	5254817
p+m-Xylene	ug/L	-	-	-	-	<0.20	0.20	5254817
o-Xylene	ug/L	-	-	-	40	<0.20	0.20	5254817
Total Xylenes	ug/L	90	-	20	-	<0.20	0.20	5254817
F1 (C6-C10)	ug/L	-	-	-	-	<25	25	5254817
F1 (C6-C10) - BTEX	ug/L	-	-	-	-	<25	25	5254817
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/L	-	-	-	-	<100	100	5256371
F3 (C16-C34 Hydrocarbons)	ug/L	-	-	-	-	<200	200	5256371
F4 (C34-C50 Hydrocarbons)	ug/L	-	-	-	-	<200	200	5256371
Reached Baseline at C50	ug/L	-	-	-	-	Yes		5256371
Surrogate Recovery (%)								
o-Terphenyl	%	-	-	-	-	90		5256371
4-Bromofluorobenzene	%	-	-	-	-	92		5254817

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID						FMH921		
Sampling Date						2017/11/02 12:00		
COC Number						636857-03-01		
	UNITS	MAC	IMC	A/O	Criteria	DUP1	RDL	QC Batch
D4-1,2-Dichloroethane	%	-	-	-	-	108		5254817
D8-Toluene	%	-	-	-	-	94		5254817

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

TEST SUMMARY

Maxxam ID: FMH814
Sample ID: MW17-1
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5256277	N/A	2017/11/09	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5254443	N/A	2017/11/09	Automated Statchk
1,3-Dichloropropene Sum	CALC	5254338	N/A	2017/11/10	Automated Statchk
Chloride by Automated Colourimetry	KONE	5256350	N/A	2017/11/09	Alina Dobreanu
Conductivity	AT	5256257	N/A	2017/11/09	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5256093	N/A	2017/11/08	Anastasia Hamanov
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5256371	2017/11/08	2017/11/09	Barbara Wowk
Hardness (calculated as CaCO3)		5254418	N/A	2017/11/09	Automated Statchk
Mercury	CV/AA	5256678	2017/11/09	2017/11/09	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5255842	N/A	2017/11/09	Thao Nguyen
Ion Balance (% Difference)	CALC	5254444	N/A	2017/11/09	Automated Statchk
Anion and Cation Sum	CALC	5254445	N/A	2017/11/09	Automated Statchk
Total Ammonia-N	LACH/NH4	5256052	N/A	2017/11/09	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5256244	N/A	2017/11/09	Chandra Nandlal
pH	AT	5256254	N/A	2017/11/09	Surinder Rai
Orthophosphate	KONE	5256354	N/A	2017/11/09	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5254439	N/A	2017/11/09	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5254440	N/A	2017/11/09	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5256353	N/A	2017/11/09	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5254441	N/A	2017/11/09	Automated Statchk
Total Kjeldahl Nitrogen in Water	SKAL	5255484	2017/11/08	2017/11/09	Rajni Tyagi
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5254817	N/A	2017/11/09	Karen Hughes

Maxxam ID: FMH814 Dup
Sample ID: MW17-1
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5256350	N/A	2017/11/09	Alina Dobreanu
Orthophosphate	KONE	5256354	N/A	2017/11/09	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5256353	N/A	2017/11/09	Alina Dobreanu

Maxxam ID: FMH882
Sample ID: MW17-2
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5256277	N/A	2017/11/09	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5254443	N/A	2017/11/09	Automated Statchk
1,3-Dichloropropene Sum	CALC	5254338	N/A	2017/11/10	Automated Statchk
Chloride by Automated Colourimetry	KONE	5256350	N/A	2017/11/09	Alina Dobreanu
Conductivity	AT	5256257	N/A	2017/11/09	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5256093	N/A	2017/11/08	Anastasia Hamanov
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5256371	2017/11/08	2017/11/09	Barbara Wowk
Hardness (calculated as CaCO3)		5254418	N/A	2017/11/09	Automated Statchk

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

TEST SUMMARY

Maxxam ID: FMH882
Sample ID: MW17-2
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	5256678	2017/11/09	2017/11/09	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5255842	N/A	2017/11/09	Thao Nguyen
Ion Balance (% Difference)	CALC	5254444	N/A	2017/11/09	Automated Statchk
Anion and Cation Sum	CALC	5254445	N/A	2017/11/09	Automated Statchk
Total Ammonia-N	LACH/NH4	5256052	N/A	2017/11/09	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5256244	N/A	2017/11/09	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	5255612	2017/11/08	2017/11/09	Sarah Huang
pH	AT	5256254	N/A	2017/11/09	Surinder Rai
Orthophosphate	KONE	5256354	N/A	2017/11/09	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5254439	N/A	2017/11/09	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5254440	N/A	2017/11/09	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5256353	N/A	2017/11/09	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5254441	N/A	2017/11/09	Automated Statchk
Total Kjeldahl Nitrogen in Water	SKAL	5255484	2017/11/08	2017/11/09	Rajni Tyagi
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5254817	N/A	2017/11/09	Karen Hughes

Maxxam ID: FMH919
Sample ID: MW17-3
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5256277	N/A	2017/11/09	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5254443	N/A	2017/11/09	Automated Statchk
1,3-Dichloropropene Sum	CALC	5254338	N/A	2017/11/10	Automated Statchk
Chloride by Automated Colourimetry	KONE	5256350	N/A	2017/11/09	Alina Dobreanu
Conductivity	AT	5256257	N/A	2017/11/09	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5256093	N/A	2017/11/08	Anastasia Hamanov
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5256371	2017/11/08	2017/11/09	Barbara Wowk
Hardness (calculated as CaCO3)		5254418	N/A	2017/11/09	Automated Statchk
Mercury	CV/AA	5256678	2017/11/09	2017/11/09	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5255842	N/A	2017/11/09	Thao Nguyen
Ion Balance (% Difference)	CALC	5254444	N/A	2017/11/09	Automated Statchk
Anion and Cation Sum	CALC	5254445	N/A	2017/11/09	Automated Statchk
Total Ammonia-N	LACH/NH4	5256052	N/A	2017/11/09	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5256244	N/A	2017/11/09	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	5255612	2017/11/08	2017/11/09	Sarah Huang
pH	AT	5256254	N/A	2017/11/09	Surinder Rai
Orthophosphate	KONE	5256354	N/A	2017/11/09	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5254439	N/A	2017/11/09	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5254440	N/A	2017/11/09	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5256353	N/A	2017/11/09	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5254441	N/A	2017/11/09	Automated Statchk
Total Kjeldahl Nitrogen in Water	SKAL	5255484	2017/11/08	2017/11/09	Rajni Tyagi
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5254817	N/A	2017/11/09	Karen Hughes

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

TEST SUMMARY

Maxxam ID: FMH919 Dup
Sample ID: MW17-3
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5256093	N/A	2017/11/08	Anastasia Hamanov

Maxxam ID: FMH920
Sample ID: MW17-4
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5256277	N/A	2017/11/09	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5254443	N/A	2017/11/09	Automated Statchk
1,3-Dichloropropene Sum	CALC	5254338	N/A	2017/11/10	Automated Statchk
Chloride by Automated Colourimetry	KONE	5256350	N/A	2017/11/09	Alina Dobreanu
Conductivity	AT	5256257	N/A	2017/11/09	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5256093	N/A	2017/11/08	Anastasia Hamanov
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5256371	2017/11/08	2017/11/09	Barbara Wowk
Hardness (calculated as CaCO3)		5254418	N/A	2017/11/09	Automated Statchk
Mercury	CV/AA	5256678	2017/11/09	2017/11/09	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5255842	N/A	2017/11/09	Thao Nguyen
Ion Balance (% Difference)	CALC	5254444	N/A	2017/11/09	Automated Statchk
Anion and Cation Sum	CALC	5254445	N/A	2017/11/09	Automated Statchk
Total Ammonia-N	LACH/NH4	5256052	N/A	2017/11/09	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5256244	N/A	2017/11/09	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	5255612	2017/11/08	2017/11/09	Sarah Huang
pH	AT	5256254	N/A	2017/11/09	Surinder Rai
Orthophosphate	KONE	5256354	N/A	2017/11/09	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5254439	N/A	2017/11/09	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5254440	N/A	2017/11/09	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5256353	N/A	2017/11/09	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5254441	N/A	2017/11/09	Automated Statchk
Total Kjeldahl Nitrogen in Water	SKAL	5255484	2017/11/08	2017/11/09	Rajni Tyagi
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5254817	N/A	2017/11/09	Karen Hughes

Maxxam ID: FMH920 Dup
Sample ID: MW17-4
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	5256678	2017/11/09	2017/11/09	Ron Morrison

Maxxam ID: FMH921
Sample ID: DUP1
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5256277	N/A	2017/11/09	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5254443	N/A	2017/11/09	Automated Statchk
1,3-Dichloropropene Sum	CALC	5254338	N/A	2017/11/10	Automated Statchk

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

TEST SUMMARY

Maxxam ID: FMH921
Sample ID: DUP1
Matrix: Water

Collected: 2017/11/02
Shipped:
Received: 2017/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5256350	N/A	2017/11/09	Alina Dobreanu
Conductivity	AT	5256257	N/A	2017/11/09	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5256093	N/A	2017/11/09	Anastasia Hamanov
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5256371	2017/11/08	2017/11/09	Barbara Wowk
Hardness (calculated as CaCO3)		5254418	N/A	2017/11/09	Automated Statchk
Mercury	CV/AA	5256678	2017/11/09	2017/11/09	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5255842	N/A	2017/11/09	Thao Nguyen
Ion Balance (% Difference)	CALC	5254444	N/A	2017/11/09	Automated Statchk
Anion and Cation Sum	CALC	5254445	N/A	2017/11/09	Automated Statchk
Total Ammonia-N	LACH/NH4	5256052	N/A	2017/11/09	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5256244	N/A	2017/11/09	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	5255612	2017/11/08	2017/11/09	Sarah Huang
pH	AT	5256254	N/A	2017/11/09	Surinder Rai
Orthophosphate	KONE	5256354	N/A	2017/11/09	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5254439	N/A	2017/11/09	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5254440	N/A	2017/11/09	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5256353	N/A	2017/11/09	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5254441	N/A	2017/11/09	Automated Statchk
Total Kjeldahl Nitrogen in Water	SKAL	5255484	2017/11/08	2017/11/09	Rajni Tyagi
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5254817	N/A	2017/11/09	Karen Hughes

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

GENERAL COMMENTS

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

Package 1	8.3°C
Package 2	7.7°C

Revised report (2018/02/26): Additional criteria is included as requested.

Sample FMH814 [MW17-1] : PCB bottles received empty, PCB analysis not completed for this sample.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5254817	KH2	Matrix Spike	4-Bromofluorobenzene	2017/11/09		99	%	70 - 130
			D4-1,2-Dichloroethane	2017/11/09		105	%	70 - 130
			D8-Toluene	2017/11/09		99	%	70 - 130
			Acetone (2-Propanone)	2017/11/09		99	%	60 - 140
			Benzene	2017/11/09		100	%	70 - 130
			Bromodichloromethane	2017/11/09		96	%	70 - 130
			Bromoform	2017/11/09		97	%	70 - 130
			Bromomethane	2017/11/09		99	%	60 - 140
			Carbon Tetrachloride	2017/11/09		91	%	70 - 130
			Chlorobenzene	2017/11/09		97	%	70 - 130
			Chloroform	2017/11/09		99	%	70 - 130
			Dibromochloromethane	2017/11/09		99	%	70 - 130
			1,2-Dichlorobenzene	2017/11/09		95	%	70 - 130
			1,3-Dichlorobenzene	2017/11/09		98	%	70 - 130
			1,4-Dichlorobenzene	2017/11/09		101	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/11/09		89	%	60 - 140
			1,1-Dichloroethane	2017/11/09		105	%	70 - 130
			1,2-Dichloroethane	2017/11/09		100	%	70 - 130
			1,1-Dichloroethylene	2017/11/09		107	%	70 - 130
			cis-1,2-Dichloroethylene	2017/11/09		100	%	70 - 130
			trans-1,2-Dichloroethylene	2017/11/09		106	%	70 - 130
			1,2-Dichloropropane	2017/11/09		95	%	70 - 130
			cis-1,3-Dichloropropene	2017/11/09		84	%	70 - 130
			trans-1,3-Dichloropropene	2017/11/09		90	%	70 - 130
			Ethylbenzene	2017/11/09		90	%	70 - 130
			Ethylene Dibromide	2017/11/09		103	%	70 - 130
			Hexane	2017/11/09		101	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/11/09		109	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/11/09		97	%	60 - 140
			Methyl Isobutyl Ketone	2017/11/09		88	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/11/09		89	%	70 - 130
			Styrene	2017/11/09		85	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/11/09		102	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/11/09		106	%	70 - 130
			Tetrachloroethylene	2017/11/09		96	%	70 - 130
			Toluene	2017/11/09		91	%	70 - 130
			1,1,1-Trichloroethane	2017/11/09		92	%	70 - 130
			1,1,2-Trichloroethane	2017/11/09		103	%	70 - 130
			Trichloroethylene	2017/11/09		97	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/11/09		98	%	70 - 130
			Vinyl Chloride	2017/11/09		98	%	70 - 130
			p+m-Xylene	2017/11/09		89	%	70 - 130
			o-Xylene	2017/11/09		90	%	70 - 130
			F1 (C6-C10)	2017/11/09		91	%	60 - 140
5254817	KH2	Spiked Blank	4-Bromofluorobenzene	2017/11/09		99	%	70 - 130
			D4-1,2-Dichloroethane	2017/11/09		104	%	70 - 130
			D8-Toluene	2017/11/09		100	%	70 - 130
			Acetone (2-Propanone)	2017/11/09		103	%	60 - 140
			Benzene	2017/11/09		101	%	70 - 130
			Bromodichloromethane	2017/11/09		96	%	70 - 130
			Bromoform	2017/11/09		98	%	70 - 130
			Bromomethane	2017/11/09		99	%	60 - 140
			Carbon Tetrachloride	2017/11/09		94	%	70 - 130
			Chlorobenzene	2017/11/09		98	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chloroform	2017/11/09		100	%	70 - 130
			Dibromochloromethane	2017/11/09		100	%	70 - 130
			1,2-Dichlorobenzene	2017/11/09		97	%	70 - 130
			1,3-Dichlorobenzene	2017/11/09		101	%	70 - 130
			1,4-Dichlorobenzene	2017/11/09		104	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/11/09		92	%	60 - 140
			1,1-Dichloroethane	2017/11/09		107	%	70 - 130
			1,2-Dichloroethane	2017/11/09		101	%	70 - 130
			1,1-Dichloroethylene	2017/11/09		109	%	70 - 130
			cis-1,2-Dichloroethylene	2017/11/09		101	%	70 - 130
			trans-1,2-Dichloroethylene	2017/11/09		108	%	70 - 130
			1,2-Dichloropropane	2017/11/09		96	%	70 - 130
			cis-1,3-Dichloropropene	2017/11/09		83	%	70 - 130
			trans-1,3-Dichloropropene	2017/11/09		86	%	70 - 130
			Ethylbenzene	2017/11/09		92	%	70 - 130
			Ethylene Dibromide	2017/11/09		104	%	70 - 130
			Hexane	2017/11/09		103	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/11/09		110	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/11/09		98	%	60 - 140
			Methyl Isobutyl Ketone	2017/11/09		89	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/11/09		90	%	70 - 130
			Styrene	2017/11/09		87	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/11/09		104	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/11/09		106	%	70 - 130
			Tetrachloroethylene	2017/11/09		98	%	70 - 130
			Toluene	2017/11/09		92	%	70 - 130
			1,1,1-Trichloroethane	2017/11/09		95	%	70 - 130
			1,1,2-Trichloroethane	2017/11/09		104	%	70 - 130
			Trichloroethylene	2017/11/09		99	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/11/09		101	%	70 - 130
			Vinyl Chloride	2017/11/09		99	%	70 - 130
			p+m-Xylene	2017/11/09		91	%	70 - 130
			o-Xylene	2017/11/09		92	%	70 - 130
			F1 (C6-C10)	2017/11/09		93	%	60 - 140
5254817	KH2	Method Blank	4-Bromofluorobenzene	2017/11/09		92	%	70 - 130
			D4-1,2-Dichloroethane	2017/11/09		105	%	70 - 130
			D8-Toluene	2017/11/09		96	%	70 - 130
			Acetone (2-Propanone)	2017/11/09	<10		ug/L	
			Benzene	2017/11/09	<0.20		ug/L	
			Bromodichloromethane	2017/11/09	<0.50		ug/L	
			Bromoform	2017/11/09	<1.0		ug/L	
			Bromomethane	2017/11/09	<0.50		ug/L	
			Carbon Tetrachloride	2017/11/09	<0.20		ug/L	
			Chlorobenzene	2017/11/09	<0.20		ug/L	
			Chloroform	2017/11/09	<0.20		ug/L	
			Dibromochloromethane	2017/11/09	<0.50		ug/L	
			1,2-Dichlorobenzene	2017/11/09	<0.50		ug/L	
			1,3-Dichlorobenzene	2017/11/09	<0.50		ug/L	
			1,4-Dichlorobenzene	2017/11/09	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2017/11/09	<1.0		ug/L	
			1,1-Dichloroethane	2017/11/09	<0.20		ug/L	
			1,2-Dichloroethane	2017/11/09	<0.50		ug/L	
			1,1-Dichloroethylene	2017/11/09	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2017/11/09	<0.50		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			trans-1,2-Dichloroethylene	2017/11/09	<0.50		ug/L	
			1,2-Dichloropropane	2017/11/09	<0.20		ug/L	
			cis-1,3-Dichloropropene	2017/11/09	<0.30		ug/L	
			trans-1,3-Dichloropropene	2017/11/09	<0.40		ug/L	
			Ethylbenzene	2017/11/09	<0.20		ug/L	
			Ethylene Dibromide	2017/11/09	<0.20		ug/L	
			Hexane	2017/11/09	<1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2017/11/09	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2017/11/09	<10		ug/L	
			Methyl Isobutyl Ketone	2017/11/09	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2017/11/09	<0.50		ug/L	
			Styrene	2017/11/09	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2017/11/09	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2017/11/09	<0.50		ug/L	
			Tetrachloroethylene	2017/11/09	<0.20		ug/L	
			Toluene	2017/11/09	<0.20		ug/L	
			1,1,1-Trichloroethane	2017/11/09	<0.20		ug/L	
			1,1,2-Trichloroethane	2017/11/09	<0.50		ug/L	
			Trichloroethylene	2017/11/09	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2017/11/09	<0.50		ug/L	
			Vinyl Chloride	2017/11/09	<0.20		ug/L	
			p+m-Xylene	2017/11/09	<0.20		ug/L	
			o-Xylene	2017/11/09	<0.20		ug/L	
			Total Xylenes	2017/11/09	<0.20		ug/L	
			F1 (C6-C10)	2017/11/09	<25		ug/L	
			F1 (C6-C10) - BTEX	2017/11/09	<25		ug/L	
5254817	KH2	RPD	Acetone (2-Propanone)	2017/11/09	NC		%	30
			Benzene	2017/11/09	NC		%	30
			Bromodichloromethane	2017/11/09	NC		%	30
			Bromoform	2017/11/09	NC		%	30
			Bromomethane	2017/11/09	NC		%	30
			Carbon Tetrachloride	2017/11/09	NC		%	30
			Chlorobenzene	2017/11/09	NC		%	30
			Chloroform	2017/11/09	NC		%	30
			Dibromochloromethane	2017/11/09	NC		%	30
			1,2-Dichlorobenzene	2017/11/09	NC		%	30
			1,3-Dichlorobenzene	2017/11/09	NC		%	30
			1,4-Dichlorobenzene	2017/11/09	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2017/11/09	NC		%	30
			1,1-Dichloroethane	2017/11/09	NC		%	30
			1,2-Dichloroethane	2017/11/09	NC		%	30
			1,1-Dichloroethylene	2017/11/09	NC		%	30
			cis-1,2-Dichloroethylene	2017/11/09	NC		%	30
			trans-1,2-Dichloroethylene	2017/11/09	NC		%	30
			1,2-Dichloropropane	2017/11/09	NC		%	30
			cis-1,3-Dichloropropene	2017/11/09	NC		%	30
			trans-1,3-Dichloropropene	2017/11/09	NC		%	30
			Ethylbenzene	2017/11/09	NC		%	30
			Ethylene Dibromide	2017/11/09	NC		%	30
			Hexane	2017/11/09	NC		%	30
			Methylene Chloride(Dichloromethane)	2017/11/09	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2017/11/09	NC		%	30
			Methyl Isobutyl Ketone	2017/11/09	NC		%	30
			Methyl t-butyl ether (MTBE)	2017/11/09	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Styrene	2017/11/09	NC		%	30
			1,1,1,2-Tetrachloroethane	2017/11/09	NC		%	30
			1,1,2,2-Tetrachloroethane	2017/11/09	NC		%	30
			Tetrachloroethylene	2017/11/09	NC		%	30
			Toluene	2017/11/09	NC		%	30
			1,1,1-Trichloroethane	2017/11/09	NC		%	30
			1,1,2-Trichloroethane	2017/11/09	NC		%	30
			Trichloroethylene	2017/11/09	NC		%	30
			Trichlorofluoromethane (FREON 11)	2017/11/09	NC		%	30
			Vinyl Chloride	2017/11/09	NC		%	30
			p+m-Xylene	2017/11/09	NC		%	30
			o-Xylene	2017/11/09	NC		%	30
			Total Xylenes	2017/11/09	NC		%	30
			F1 (C6-C10)	2017/11/09	NC		%	30
			F1 (C6-C10) - BTEX	2017/11/09	NC		%	30
5255484	RTY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2017/11/09		93	%	80 - 120
5255484	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2017/11/09		100	%	80 - 120
5255484	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2017/11/09		101	%	80 - 120
5255484	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2017/11/09	<0.10		mg/L	
5255484	RTY	RPD	Total Kjeldahl Nitrogen (TKN)	2017/11/09	NC (1)		%	20
5255612	SHG	Matrix Spike	Decachlorobiphenyl	2017/11/09		102	%	60 - 130
			Aroclor 1260	2017/11/09		90	%	60 - 130
			Total PCB	2017/11/09		90	%	60 - 130
5255612	SHG	Spiked Blank	Decachlorobiphenyl	2017/11/09		100	%	60 - 130
			Aroclor 1260	2017/11/09		92	%	60 - 130
			Total PCB	2017/11/09		92	%	60 - 130
5255612	SHG	Method Blank	Decachlorobiphenyl	2017/11/09		106	%	60 - 130
			Aroclor 1242	2017/11/09	<0.05		ug/L	
			Aroclor 1248	2017/11/09	<0.05		ug/L	
			Aroclor 1254	2017/11/09	<0.05		ug/L	
			Aroclor 1260	2017/11/09	<0.05		ug/L	
			Total PCB	2017/11/09	<0.05		ug/L	
5255612	SHG	RPD	Aroclor 1242	2017/11/09	NC		%	30
			Aroclor 1248	2017/11/09	NC		%	30
			Aroclor 1254	2017/11/09	NC		%	30
			Aroclor 1260	2017/11/09	NC		%	30
			Total PCB	2017/11/09	NC		%	40
5255842	TNG	Matrix Spike	Dissolved Aluminum (Al)	2017/11/09		102	%	80 - 120
			Dissolved Antimony (Sb)	2017/11/09		102	%	80 - 120
			Dissolved Arsenic (As)	2017/11/09		101	%	80 - 120
			Dissolved Barium (Ba)	2017/11/09		99	%	80 - 120
			Dissolved Beryllium (Be)	2017/11/09		101	%	80 - 120
			Dissolved Boron (B)	2017/11/09		104	%	80 - 120
			Dissolved Cadmium (Cd)	2017/11/09		100	%	80 - 120
			Dissolved Calcium (Ca)	2017/11/09		NC	%	80 - 120
			Dissolved Chromium (Cr)	2017/11/09		98	%	80 - 120
			Dissolved Cobalt (Co)	2017/11/09		96	%	80 - 120
			Dissolved Copper (Cu)	2017/11/09		100	%	80 - 120
			Dissolved Iron (Fe)	2017/11/09		100	%	80 - 120
			Dissolved Lead (Pb)	2017/11/09		94	%	80 - 120
			Dissolved Magnesium (Mg)	2017/11/09		100	%	80 - 120
			Dissolved Manganese (Mn)	2017/11/09		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2017/11/09		101	%	80 - 120
			Dissolved Nickel (Ni)	2017/11/09		96	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Phosphorus (P)	2017/11/09		109	%	80 - 120
			Dissolved Potassium (K)	2017/11/09		100	%	80 - 120
			Dissolved Selenium (Se)	2017/11/09		103	%	80 - 120
			Dissolved Silicon (Si)	2017/11/09		99	%	80 - 120
			Dissolved Silver (Ag)	2017/11/09		95	%	80 - 120
			Dissolved Sodium (Na)	2017/11/09		NC	%	80 - 120
			Dissolved Strontium (Sr)	2017/11/09		95	%	80 - 120
			Dissolved Thallium (Tl)	2017/11/09		94	%	80 - 120
			Dissolved Titanium (Ti)	2017/11/09		99	%	80 - 120
			Dissolved Uranium (U)	2017/11/09		95	%	80 - 120
			Dissolved Vanadium (V)	2017/11/09		96	%	80 - 120
			Dissolved Zinc (Zn)	2017/11/09		95	%	80 - 120
5255842	TNG	Spiked Blank	Dissolved Aluminum (Al)	2017/11/09		102	%	80 - 120
			Dissolved Antimony (Sb)	2017/11/09		101	%	80 - 120
			Dissolved Arsenic (As)	2017/11/09		99	%	80 - 120
			Dissolved Barium (Ba)	2017/11/09		100	%	80 - 120
			Dissolved Beryllium (Be)	2017/11/09		101	%	80 - 120
			Dissolved Boron (B)	2017/11/09		103	%	80 - 120
			Dissolved Cadmium (Cd)	2017/11/09		99	%	80 - 120
			Dissolved Calcium (Ca)	2017/11/09		97	%	80 - 120
			Dissolved Chromium (Cr)	2017/11/09		97	%	80 - 120
			Dissolved Cobalt (Co)	2017/11/09		96	%	80 - 120
			Dissolved Copper (Cu)	2017/11/09		101	%	80 - 120
			Dissolved Iron (Fe)	2017/11/09		100	%	80 - 120
			Dissolved Lead (Pb)	2017/11/09		95	%	80 - 120
			Dissolved Magnesium (Mg)	2017/11/09		100	%	80 - 120
			Dissolved Manganese (Mn)	2017/11/09		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2017/11/09		99	%	80 - 120
			Dissolved Nickel (Ni)	2017/11/09		96	%	80 - 120
			Dissolved Phosphorus (P)	2017/11/09		115	%	80 - 120
			Dissolved Potassium (K)	2017/11/09		100	%	80 - 120
			Dissolved Selenium (Se)	2017/11/09		100	%	80 - 120
			Dissolved Silicon (Si)	2017/11/09		97	%	80 - 120
			Dissolved Silver (Ag)	2017/11/09		97	%	80 - 120
			Dissolved Sodium (Na)	2017/11/09		99	%	80 - 120
			Dissolved Strontium (Sr)	2017/11/09		95	%	80 - 120
			Dissolved Thallium (Tl)	2017/11/09		94	%	80 - 120
			Dissolved Titanium (Ti)	2017/11/09		97	%	80 - 120
			Dissolved Uranium (U)	2017/11/09		94	%	80 - 120
			Dissolved Vanadium (V)	2017/11/09		97	%	80 - 120
			Dissolved Zinc (Zn)	2017/11/09		98	%	80 - 120
5255842	TNG	Method Blank	Dissolved Aluminum (Al)	2017/11/09	<5.0		ug/L	
			Dissolved Antimony (Sb)	2017/11/09	<0.50		ug/L	
			Dissolved Arsenic (As)	2017/11/09	<1.0		ug/L	
			Dissolved Barium (Ba)	2017/11/09	<2.0		ug/L	
			Dissolved Beryllium (Be)	2017/11/09	<0.50		ug/L	
			Dissolved Boron (B)	2017/11/09	<10		ug/L	
			Dissolved Cadmium (Cd)	2017/11/09	<0.10		ug/L	
			Dissolved Calcium (Ca)	2017/11/09	<200		ug/L	
			Dissolved Chromium (Cr)	2017/11/09	<5.0		ug/L	
			Dissolved Cobalt (Co)	2017/11/09	<0.50		ug/L	
			Dissolved Copper (Cu)	2017/11/09	<1.0		ug/L	
			Dissolved Iron (Fe)	2017/11/09	<100		ug/L	
			Dissolved Lead (Pb)	2017/11/09	<0.50		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Magnesium (Mg)	2017/11/09	<50		ug/L	
			Dissolved Manganese (Mn)	2017/11/09	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2017/11/09	<0.50		ug/L	
			Dissolved Nickel (Ni)	2017/11/09	<1.0		ug/L	
			Dissolved Phosphorus (P)	2017/11/09	<100		ug/L	
			Dissolved Potassium (K)	2017/11/09	<200		ug/L	
			Dissolved Selenium (Se)	2017/11/09	<2.0		ug/L	
			Dissolved Silicon (Si)	2017/11/09	<50		ug/L	
			Dissolved Silver (Ag)	2017/11/09	<0.10		ug/L	
			Dissolved Sodium (Na)	2017/11/09	<100		ug/L	
			Dissolved Strontium (Sr)	2017/11/09	<1.0		ug/L	
			Dissolved Thallium (Tl)	2017/11/09	<0.050		ug/L	
			Dissolved Titanium (Ti)	2017/11/09	<5.0		ug/L	
			Dissolved Uranium (U)	2017/11/09	<0.10		ug/L	
			Dissolved Vanadium (V)	2017/11/09	<0.50		ug/L	
			Dissolved Zinc (Zn)	2017/11/09	<5.0		ug/L	
5255842	TNG	RPD	Dissolved Antimony (Sb)	2017/11/09	NC		%	20
			Dissolved Arsenic (As)	2017/11/09	NC		%	20
			Dissolved Barium (Ba)	2017/11/09	2.2		%	20
			Dissolved Beryllium (Be)	2017/11/09	NC		%	20
			Dissolved Boron (B)	2017/11/09	1.2		%	20
			Dissolved Cadmium (Cd)	2017/11/09	NC		%	20
			Dissolved Chromium (Cr)	2017/11/09	NC		%	20
			Dissolved Cobalt (Co)	2017/11/09	NC		%	20
			Dissolved Copper (Cu)	2017/11/09	NC		%	20
			Dissolved Lead (Pb)	2017/11/09	NC		%	20
			Dissolved Molybdenum (Mo)	2017/11/09	0.55		%	20
			Dissolved Nickel (Ni)	2017/11/09	NC		%	20
			Dissolved Selenium (Se)	2017/11/09	NC		%	20
			Dissolved Silver (Ag)	2017/11/09	NC		%	20
			Dissolved Sodium (Na)	2017/11/09	0.60		%	20
			Dissolved Thallium (Tl)	2017/11/09	NC		%	20
			Dissolved Uranium (U)	2017/11/09	2.3		%	20
			Dissolved Vanadium (V)	2017/11/09	NC		%	20
			Dissolved Zinc (Zn)	2017/11/09	NC		%	20
5256052	COP	Matrix Spike	Total Ammonia-N	2017/11/09		95	%	80 - 120
5256052	COP	Spiked Blank	Total Ammonia-N	2017/11/09		100	%	85 - 115
5256052	COP	Method Blank	Total Ammonia-N	2017/11/09	<0.050		mg/L	
5256052	COP	RPD	Total Ammonia-N	2017/11/09	12		%	20
5256093	AHA	Matrix Spike [FMH919-05]	Dissolved Organic Carbon	2017/11/08		95	%	80 - 120
5256093	AHA	Spiked Blank	Dissolved Organic Carbon	2017/11/08		99	%	80 - 120
5256093	AHA	Method Blank	Dissolved Organic Carbon	2017/11/08	<0.50		mg/L	
5256093	AHA	RPD [FMH919-05]	Dissolved Organic Carbon	2017/11/08	3.5		%	20
5256244	C_N	Matrix Spike	Nitrite (N)	2017/11/09		110	%	80 - 120
			Nitrate (N)	2017/11/09		108	%	80 - 120
5256244	C_N	Spiked Blank	Nitrite (N)	2017/11/09		103	%	80 - 120
			Nitrate (N)	2017/11/09		100	%	80 - 120
5256244	C_N	Method Blank	Nitrite (N)	2017/11/09	<0.010		mg/L	
			Nitrate (N)	2017/11/09	<0.10		mg/L	
5256244	C_N	RPD	Nitrite (N)	2017/11/09	NC		%	20
5256254	SAU	Spiked Blank	pH	2017/11/09		101	%	98 - 103
5256254	SAU	RPD	pH	2017/11/09	0.017		%	N/A
5256257	SAU	Spiked Blank	Conductivity	2017/11/09		99	%	85 - 115

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5256257	SAU	Method Blank	Conductivity	2017/11/09	<1.0		umho/cm	
5256257	SAU	RPD	Conductivity	2017/11/09	0.50		%	25
5256277	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2017/11/09		96	%	85 - 115
5256277	SAU	Method Blank	Alkalinity (Total as CaCO3)	2017/11/09	<1.0		mg/L	
5256277	SAU	RPD	Alkalinity (Total as CaCO3)	2017/11/09	1.1		%	20
5256350	ADB	Matrix Spike [FMH814-02]	Dissolved Chloride (Cl)	2017/11/09		NC	%	80 - 120
5256350	ADB	Spiked Blank	Dissolved Chloride (Cl)	2017/11/09		104	%	80 - 120
5256350	ADB	Method Blank	Dissolved Chloride (Cl)	2017/11/09	<1.0		mg/L	
5256350	ADB	RPD [FMH814-02]	Dissolved Chloride (Cl)	2017/11/09	0.33		%	20
5256353	ADB	Matrix Spike [FMH814-02]	Dissolved Sulphate (SO4)	2017/11/09		NC	%	75 - 125
5256353	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2017/11/09		106	%	80 - 120
5256353	ADB	Method Blank	Dissolved Sulphate (SO4)	2017/11/09	<1.0		mg/L	
5256353	ADB	RPD [FMH814-02]	Dissolved Sulphate (SO4)	2017/11/09	0.61		%	20
5256354	ADB	Matrix Spike [FMH814-02]	Orthophosphate (P)	2017/11/09		89	%	75 - 125
5256354	ADB	Spiked Blank	Orthophosphate (P)	2017/11/09		99	%	80 - 120
5256354	ADB	Method Blank	Orthophosphate (P)	2017/11/09	<0.010		mg/L	
5256354	ADB	RPD [FMH814-02]	Orthophosphate (P)	2017/11/09	NC		%	25
5256371	BWW	Matrix Spike	o-Terphenyl	2017/11/09		96	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/11/09		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/11/09		99	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/11/09		100	%	50 - 130
5256371	BWW	Spiked Blank	o-Terphenyl	2017/11/09		94	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/11/09		103	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2017/11/09		99	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2017/11/09		97	%	60 - 130
5256371	BWW	Method Blank	o-Terphenyl	2017/11/08		89	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/11/08	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2017/11/08	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2017/11/08	<200		ug/L	
5256371	BWW	RPD	F2 (C10-C16 Hydrocarbons)	2017/11/09	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2017/11/09	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/11/09	NC		%	30
5256678	RON	Matrix Spike [FMH920-07]	Mercury (Hg)	2017/11/09		104	%	75 - 125
5256678	RON	Spiked Blank	Mercury (Hg)	2017/11/09		91	%	80 - 120
5256678	RON	Method Blank	Mercury (Hg)	2017/11/09	<0.1		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5256678	RON	RPD [FMH920-07]	Mercury (Hg)	2017/11/09	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).

(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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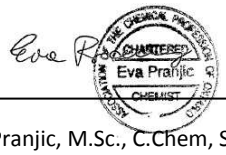
Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

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

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B7O7808
Report Date: 2018/02/26

Golder Associates Ltd
Client Project #: 1778651
Sampler Initials: MD

Exceedence Summary Table – ODWS (2002)

Result Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
MW17-1	FMH814-05	Dissolved Sodium (Na)	20000	54000	100	ug/L
MW17-3	FMH919-06	Dissolved Sodium (Na)	20000	40000	100	ug/L
MW17-4	FMH920-06	Dissolved Sodium (Na)	20000	34000	100	ug/L

The exceedence summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Exceedence Summary Table – Prov. Water Quality Obj.

Result Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
MW17-4	FMH920-06	Dissolved Molybdenum (Mo)	40	51	0.50	ug/L

Detection Limit Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
MW17-2	FMH882-01	Aroclor 1242	0.001	<0.05	0.05	ug/L
MW17-2	FMH882-01	Aroclor 1248	0.001	<0.05	0.05	ug/L
MW17-2	FMH882-01	Aroclor 1254	0.001	<0.05	0.05	ug/L
MW17-2	FMH882-01	Aroclor 1260	0.001	<0.05	0.05	ug/L
MW17-2	FMH882-01	Total PCB	0.001	<0.05	0.05	ug/L
MW17-3	FMH919-01	Aroclor 1242	0.001	<0.05	0.05	ug/L
MW17-3	FMH919-01	Aroclor 1248	0.001	<0.05	0.05	ug/L
MW17-3	FMH919-01	Aroclor 1254	0.001	<0.05	0.05	ug/L
MW17-3	FMH919-01	Aroclor 1260	0.001	<0.05	0.05	ug/L
MW17-3	FMH919-01	Total PCB	0.001	<0.05	0.05	ug/L
MW17-4	FMH920-01	Aroclor 1242	0.001	<0.05	0.05	ug/L
MW17-4	FMH920-01	Aroclor 1248	0.001	<0.05	0.05	ug/L
MW17-4	FMH920-01	Aroclor 1254	0.001	<0.05	0.05	ug/L
MW17-4	FMH920-01	Aroclor 1260	0.001	<0.05	0.05	ug/L
MW17-4	FMH920-01	Total PCB	0.001	<0.05	0.05	ug/L
DUP1	FMH921-01	Aroclor 1242	0.001	<0.05	0.05	ug/L
DUP1	FMH921-01	Aroclor 1248	0.001	<0.05	0.05	ug/L
DUP1	FMH921-01	Aroclor 1254	0.001	<0.05	0.05	ug/L
DUP1	FMH921-01	Aroclor 1260	0.001	<0.05	0.05	ug/L
DUP1	FMH921-01	Total PCB	0.001	<0.05	0.05	ug/L

The exceedence summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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Your Project #: 1778651 (5000)
Your C.O.C. #: 691358-02-01

Attention: Chris Pons

Golder Associates Ltd
215 Shields Court
Unit # 1
Markham, ON
Canada L3R 8V2

Report Date: 2018/11/21
Report #: R5493273
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8T8844
Received: 2018/11/08, 11:49

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	1	N/A	2018/11/09	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2018/11/12	CAM SOP-00102	APHA 4500-CO2 D
1,3-Dichloropropene Sum	1	N/A	2018/11/13		EPA 8260C m
Chloride by Automated Colourimetry	1	N/A	2018/11/12	CAM SOP-00463	EPA 325.2 m
Conductivity	1	N/A	2018/11/09	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2018/11/12	CAM SOP-00446	SM 23 5310 B m
Petroleum Hydrocarbons F2-F4 in Water (2)	1	2018/11/12	2018/11/13	CAM SOP-00316	CCME PHC-CWS m
Hardness (calculated as CaCO3)	1	N/A	2018/11/14	CAM SOP 00102/00408/00447	SM 2340 B
Mercury	1	2018/11/13	2018/11/13	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	1	N/A	2018/11/14	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2018/11/14		
Anion and Cation Sum	1	N/A	2018/11/14		
Total Ammonia-N	1	N/A	2018/11/14	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (3)	1	N/A	2018/11/13	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Polychlorinated Biphenyl in Water	1	2018/11/12	2018/11/12	CAM SOP-00309	EPA 8082A m
pH	1	N/A	2018/11/09	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2018/11/12	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2018/11/14		
Sat. pH and Langelier Index (@ 4C)	1	N/A	2018/11/14		
Sulphate by Automated Colourimetry	1	N/A	2018/11/12	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2018/11/14		
Total Kjeldahl Nitrogen in Water	1	2018/11/12	2018/11/12	CAM SOP-00938	OMOE E3516 m
Volatile Organic Compounds and F1 PHCs	1	N/A	2018/11/12	CAM SOP-00230	EPA 8260C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using

Your Project #: 1778651 (5000)
Your C.O.C. #: 691358-02-01

Attention: Chris Pons

Golder Associates Ltd
215 Shields Court
Unit # 1
Markham, ON
Canada L3R 8V2

Report Date: 2018/11/21
Report #: R5493273
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8T8844
Received: 2018/11/08, 11:49

accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

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 Maxxam, 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) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829

==========

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Maxxam Job #: B8T8844
Report Date: 2018/11/21

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IGC505		
Sampling Date		2018/11/07 12:00		
COC Number		691358-02-01		
	UNITS	MW18-2	RDL	QC Batch
Calculated Parameters				
Anion Sum	me/L	4.76	N/A	5827281
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	180	1.0	5827280
Calculated TDS	mg/L	250	1.0	5827284
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.3	1.0	5827280
Cation Sum	me/L	4.66	N/A	5827281
Hardness (CaCO3)	mg/L	200	1.0	5827179
Ion Balance (% Difference)	%	1.02	N/A	5827180
Langelier Index (@ 20C)	N/A	0.518		5827282
Langelier Index (@ 4C)	N/A	0.269		5827283
Saturation pH (@ 20C)	N/A	7.37		5827282
Saturation pH (@ 4C)	N/A	7.62		5827283
Inorganics				
Total Ammonia-N	mg/L	0.29	0.050	5832984
Conductivity	umho/cm	440	1.0	5830552
Dissolved Organic Carbon	mg/L	1.4	0.50	5830640
Orthophosphate (P)	mg/L	<0.010	0.010	5830606
pH	pH	7.88		5830556
Dissolved Sulphate (SO4)	mg/L	17	1.0	5830605
Alkalinity (Total as CaCO3)	mg/L	180	1.0	5830538
Dissolved Chloride (Cl-)	mg/L	26	1.0	5830597
Nitrite (N)	mg/L	0.212	0.010	5830573
Nitrate (N)	mg/L	0.44	0.10	5830573
Nitrate + Nitrite (N)	mg/L	0.66	0.10	5830573
Metals				
Dissolved Aluminum (Al)	ug/L	5.3	5.0	5831272
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	5831272
Dissolved Arsenic (As)	ug/L	<1.0	1.0	5831272
Dissolved Barium (Ba)	ug/L	46	2.0	5831272
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	5831272
Dissolved Boron (B)	ug/L	53	10	5831272
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	5831272

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8T8844
Report Date: 2018/11/21

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IGC505		
Sampling Date		2018/11/07 12:00		
COC Number		691358-02-01		
	UNITS	MW18-2	RDL	QC Batch
Dissolved Calcium (Ca)	ug/L	60000	200	5831272
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	5831272
Dissolved Cobalt (Co)	ug/L	1.0	0.50	5831272
Dissolved Copper (Cu)	ug/L	<1.0	1.0	5831272
Dissolved Iron (Fe)	ug/L	<100	100	5831272
Dissolved Lead (Pb)	ug/L	<0.50	0.50	5831272
Dissolved Magnesium (Mg)	ug/L	13000	50	5831272
Dissolved Manganese (Mn)	ug/L	110	2.0	5831272
Dissolved Molybdenum (Mo)	ug/L	6.9	0.50	5831272
Dissolved Nickel (Ni)	ug/L	1.6	1.0	5831272
Dissolved Phosphorus (P)	ug/L	<100	100	5831272
Dissolved Potassium (K)	ug/L	3400	200	5831272
Dissolved Selenium (Se)	ug/L	<2.0	2.0	5831272
Dissolved Silicon (Si)	ug/L	4200	50	5831272
Dissolved Silver (Ag)	ug/L	<0.10	0.10	5831272
Dissolved Sodium (Na)	ug/L	12000	100	5831272
Dissolved Strontium (Sr)	ug/L	190	1.0	5831272
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	5831272
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	5831272
Dissolved Uranium (U)	ug/L	0.18	0.10	5831272
Dissolved Vanadium (V)	ug/L	<0.50	0.50	5831272
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	5831272

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8T8844
Report Date: 2018/11/21

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

RESULTS OF ANALYSES OF WATER

Maxxam ID		IGC505		
Sampling Date		2018/11/07 12:00		
COC Number		691358-02-01		
	UNITS	**MW18-2**	**RDL**	**QC Batch**
Inorganics				
Total Kjeldahl Nitrogen (TKN)	mg/L	0.46	0.10	5832889

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		IGC505	IGC505		
Sampling Date		2018/11/07 12:00	2018/11/07 12:00		
COC Number		691358-02-01	691358-02-01		
	UNITS	MW18-2	MW18-2 Lab-Dup	RDL	QC Batch
Metals					
Mercury (Hg)	ug/L	<0.1	<0.1	0.1	5833908

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

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Maxxam Job #: B8T8844
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Golder Associates Ltd
Client Project #: 1778651 (5000)
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O.REG 153 PCBS (WATER)

Maxxam ID		IGC505		
Sampling Date		2018/11/07 12:00		
COC Number		691358-02-01		
	UNITS	MW18-2	RDL	QC Batch
PCBs				
Aroclor 1242	ug/L	<0.05	0.05	5832145
Aroclor 1248	ug/L	<0.05	0.05	5832145
Aroclor 1254	ug/L	<0.05	0.05	5832145
Aroclor 1260	ug/L	<0.05	0.05	5832145
Total PCB	ug/L	<0.05	0.05	5832145
Surrogate Recovery (%)				
Decachlorobiphenyl	%	63		5832145

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8T8844
Report Date: 2018/11/21

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID		IGC505		
Sampling Date		2018/11/07 12:00		
COC Number		691358-02-01		
	UNITS	MW18-2	RDL	QC Batch
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	5827178
Volatile Organics				
Acetone (2-Propanone)	ug/L	<10	10	5830249
Benzene	ug/L	0.34	0.20	5830249
Bromodichloromethane	ug/L	<0.50	0.50	5830249
Bromoform	ug/L	<1.0	1.0	5830249
Bromomethane	ug/L	<0.50	0.50	5830249
Carbon Tetrachloride	ug/L	<0.20	0.20	5830249
Chlorobenzene	ug/L	<0.20	0.20	5830249
Chloroform	ug/L	<0.20	0.20	5830249
Dibromochloromethane	ug/L	<0.50	0.50	5830249
1,2-Dichlorobenzene	ug/L	<0.50	0.50	5830249
1,3-Dichlorobenzene	ug/L	<0.50	0.50	5830249
1,4-Dichlorobenzene	ug/L	<0.50	0.50	5830249
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	5830249
1,1-Dichloroethane	ug/L	<0.20	0.20	5830249
1,2-Dichloroethane	ug/L	<0.50	0.50	5830249
1,1-Dichloroethylene	ug/L	<0.20	0.20	5830249
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	5830249
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	5830249
1,2-Dichloropropane	ug/L	<0.20	0.20	5830249
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	5830249
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	5830249
Ethylbenzene	ug/L	<0.20	0.20	5830249
Ethylene Dibromide	ug/L	<0.20	0.20	5830249
Hexane	ug/L	<1.0	1.0	5830249
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	5830249
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	5830249
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	5830249
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	5830249
Styrene	ug/L	<0.50	0.50	5830249

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8T8844
Report Date: 2018/11/21

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID		IGC505		
Sampling Date		2018/11/07 12:00		
COC Number		691358-02-01		
	UNITS	MW18-2	RDL	QC Batch
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	5830249
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	5830249
Tetrachloroethylene	ug/L	<0.20	0.20	5830249
Toluene	ug/L	0.69	0.20	5830249
1,1,1-Trichloroethane	ug/L	<0.20	0.20	5830249
1,1,2-Trichloroethane	ug/L	<0.50	0.50	5830249
Trichloroethylene	ug/L	<0.20	0.20	5830249
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	5830249
Vinyl Chloride	ug/L	<0.20	0.20	5830249
p+m-Xylene	ug/L	0.28	0.20	5830249
o-Xylene	ug/L	<0.20	0.20	5830249
Total Xylenes	ug/L	0.28	0.20	5830249
F1 (C6-C10)	ug/L	<25	25	5830249
F1 (C6-C10) - BTEX	ug/L	<25	25	5830249
F2-F4 Hydrocarbons				
F2 (C10-C16 Hydrocarbons)	ug/L	<100	100	5832824
F3 (C16-C34 Hydrocarbons)	ug/L	<200	200	5832824
F4 (C34-C50 Hydrocarbons)	ug/L	<200	200	5832824
Reached Baseline at C50	ug/L	Yes		5832824
Surrogate Recovery (%)				
o-Terphenyl	%	88		5832824
4-Bromofluorobenzene	%	90		5830249
D4-1,2-Dichloroethane	%	105		5830249
D8-Toluene	%	96		5830249

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8T8844
Report Date: 2018/11/21

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

TEST SUMMARY

Maxxam ID: IGC505
Sample ID: MW18-2
Matrix: Water

Collected: 2018/11/07
Shipped:
Received: 2018/11/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5830538	N/A	2018/11/09	Neil Dassanayake
Carbonate, Bicarbonate and Hydroxide	CALC	5827280	N/A	2018/11/12	Automated Statchk
1,3-Dichloropropene Sum	CALC	5827178	N/A	2018/11/13	Automated Statchk
Chloride by Automated Colourimetry	KONE	5830597	N/A	2018/11/12	Deonarine Ramnarine
Conductivity	AT	5830552	N/A	2018/11/09	Neil Dassanayake
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5830640	N/A	2018/11/12	Nimarta Singh
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5832824	2018/11/12	2018/11/13	(Kent) Maolin Li
Hardness (calculated as CaCO3)		5827179	N/A	2018/11/14	Automated Statchk
Mercury	CV/AA	5833908	2018/11/13	2018/11/13	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5831272	N/A	2018/11/14	Thao Nguyen
Ion Balance (% Difference)	CALC	5827180	N/A	2018/11/14	Automated Statchk
Anion and Cation Sum	CALC	5827281	N/A	2018/11/14	Automated Statchk
Total Ammonia-N	LACH/NH4	5832984	N/A	2018/11/14	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5830573	N/A	2018/11/13	Chandra Nandlal
Polychlorinated Biphenyl in Water	GC/ECD	5832145	2018/11/12	2018/11/12	Svitlana Shaula
pH	AT	5830556	N/A	2018/11/09	Neil Dassanayake
Orthophosphate	KONE	5830606	N/A	2018/11/12	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5827282	N/A	2018/11/14	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5827283	N/A	2018/11/14	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5830605	N/A	2018/11/12	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5827284	N/A	2018/11/14	Automated Statchk
Total Kjeldahl Nitrogen in Water	SKAL	5832889	2018/11/12	2018/11/12	Rajni Tyagi
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5830249	N/A	2018/11/12	Xueming Jiang

Maxxam ID: IGC505 Dup
Sample ID: MW18-2
Matrix: Water

Collected: 2018/11/07
Shipped:
Received: 2018/11/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	5833908	2018/11/13	2018/11/13	Ron Morrison

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Maxxam Job #: B8T8844
Report Date: 2018/11/21

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

GENERAL COMMENTS

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

Package 1	1.3°C
Package 2	1.0°C

Revised report (2018/11/21): Split report as per client request .

Results relate only to the items tested.

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Maxxam Job #: B8T8844
Report Date: 2018/11/21

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

			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
5830249	4-Bromofluorobenzene	2018/11/12	98	70 - 130	99	70 - 130	91	%				
5830249	D4-1,2-Dichloroethane	2018/11/12	100	70 - 130	101	70 - 130	100	%				
5830249	D8-Toluene	2018/11/12	105	70 - 130	105	70 - 130	97	%				
5832145	Decachlorobiphenyl	2018/11/12	65	60 - 130	65	60 - 130	68	%				
5832824	o-Terphenyl	2018/11/13	98	60 - 130	94	60 - 130	95	%				
5830249	1,1,1,2-Tetrachloroethane	2018/11/12	103	70 - 130	98	70 - 130	<0.50	ug/L	NC	30		
5830249	1,1,1-Trichloroethane	2018/11/12	103	70 - 130	96	70 - 130	<0.20	ug/L	NC	30		
5830249	1,1,2,2-Tetrachloroethane	2018/11/12	99	70 - 130	98	70 - 130	<0.50	ug/L	NC	30		
5830249	1,1,2-Trichloroethane	2018/11/12	100	70 - 130	97	70 - 130	<0.50	ug/L	NC	30		
5830249	1,1-Dichloroethane	2018/11/12	102	70 - 130	96	70 - 130	<0.20	ug/L	NC	30		
5830249	1,1-Dichloroethylene	2018/11/12	102	70 - 130	96	70 - 130	<0.20	ug/L	NC	30		
5830249	1,2-Dichlorobenzene	2018/11/12	101	70 - 130	96	70 - 130	<0.50	ug/L	NC	30		
5830249	1,2-Dichloroethane	2018/11/12	99	70 - 130	96	70 - 130	<0.50	ug/L	NC	30		
5830249	1,2-Dichloropropane	2018/11/12	100	70 - 130	95	70 - 130	<0.20	ug/L	NC	30		
5830249	1,3-Dichlorobenzene	2018/11/12	103	70 - 130	97	70 - 130	<0.50	ug/L	NC	30		
5830249	1,4-Dichlorobenzene	2018/11/12	101	70 - 130	96	70 - 130	<0.50	ug/L	NC	30		
5830249	Acetone (2-Propanone)	2018/11/12	94	60 - 140	93	60 - 140	<10	ug/L	NC	30		
5830249	Benzene	2018/11/12	99	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
5830249	Bromodichloromethane	2018/11/12	101	70 - 130	96	70 - 130	<0.50	ug/L	NC	30		
5830249	Bromoform	2018/11/12	97	70 - 130	95	70 - 130	<1.0	ug/L	NC	30		
5830249	Bromomethane	2018/11/12	103	60 - 140	97	60 - 140	<0.50	ug/L	NC	30		
5830249	Carbon Tetrachloride	2018/11/12	103	70 - 130	96	70 - 130	<0.20	ug/L	NC	30		
5830249	Chlorobenzene	2018/11/12	99	70 - 130	95	70 - 130	<0.20	ug/L	NC	30		
5830249	Chloroform	2018/11/12	99	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
5830249	cis-1,2-Dichloroethylene	2018/11/12	101	70 - 130	95	70 - 130	<0.50	ug/L	NC	30		
5830249	cis-1,3-Dichloropropene	2018/11/12	90	70 - 130	88	70 - 130	<0.30	ug/L	NC	30		
5830249	Dibromochloromethane	2018/11/12	99	70 - 130	97	70 - 130	<0.50	ug/L	NC	30		
5830249	Dichlorodifluoromethane (FREON 12)	2018/11/12	120	60 - 140	113	60 - 140	<1.0	ug/L	NC	30		
5830249	Ethylbenzene	2018/11/12	98	70 - 130	93	70 - 130	<0.20	ug/L	NC	30		
5830249	Ethylene Dibromide	2018/11/12	97	70 - 130	96	70 - 130	<0.20	ug/L	NC	30		
5830249	F1 (C6-C10) - BTEX	2018/11/12					<25	ug/L	NC	30		

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Maxxam Job #: B8T8844
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QUALITY ASSURANCE REPORT(CONT'D)

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

			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
5830249	F1 (C6-C10)	2018/11/12	101	60 - 140	103	60 - 140	<25	ug/L	NC	30		
5830249	Hexane	2018/11/12	102	70 - 130	95	70 - 130	<1.0	ug/L	NC	30		
5830249	Methyl Ethyl Ketone (2-Butanone)	2018/11/12	91	60 - 140	92	60 - 140	<10	ug/L	NC	30		
5830249	Methyl Isobutyl Ketone	2018/11/12	90	70 - 130	90	70 - 130	<5.0	ug/L	NC	30		
5830249	Methyl t-butyl ether (MTBE)	2018/11/12	93	70 - 130	89	70 - 130	<0.50	ug/L	NC	30		
5830249	Methylene Chloride(Dichloromethane)	2018/11/12	92	70 - 130	88	70 - 130	<2.0	ug/L	NC	30		
5830249	o-Xylene	2018/11/12	98	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
5830249	p+m-Xylene	2018/11/12	94	70 - 130	90	70 - 130	<0.20	ug/L	NC	30		
5830249	Styrene	2018/11/12	99	70 - 130	96	70 - 130	<0.50	ug/L	NC	30		
5830249	Tetrachloroethylene	2018/11/12	106	70 - 130	100	70 - 130	<0.20	ug/L	NC	30		
5830249	Toluene	2018/11/12	100	70 - 130	96	70 - 130	<0.20	ug/L	7.7	30		
5830249	Total Xylenes	2018/11/12					<0.20	ug/L	NC	30		
5830249	trans-1,2-Dichloroethylene	2018/11/12	103	70 - 130	96	70 - 130	<0.50	ug/L	NC	30		
5830249	trans-1,3-Dichloropropene	2018/11/12	97	70 - 130	96	70 - 130	<0.40	ug/L	NC	30		
5830249	Trichloroethylene	2018/11/12	101	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
5830249	Trichlorofluoromethane (FREON 11)	2018/11/12	108	70 - 130	101	70 - 130	<0.50	ug/L	NC	30		
5830249	Vinyl Chloride	2018/11/12	111	70 - 130	104	70 - 130	<0.20	ug/L	NC	30		
5830538	Alkalinity (Total as CaCO3)	2018/11/09			94	85 - 115	<1.0	mg/L	1.2	20		
5830552	Conductivity	2018/11/09			100	85 - 115	<1.0	umho/cm	0.43	25		
5830556	pH	2018/11/09			101	98 - 103			1.5	N/A		
5830573	Nitrate (N)	2018/11/13	90	80 - 120	98	80 - 120	<0.10	mg/L	0.38	20		
5830573	Nitrite (N)	2018/11/13	103	80 - 120	103	80 - 120	<0.010	mg/L	NC	20		
5830597	Dissolved Chloride (Cl-)	2018/11/12	115	80 - 120	104	80 - 120	<1.0	mg/L	1.3	20		
5830605	Dissolved Sulphate (SO4)	2018/11/12	NC	75 - 125	105	80 - 120	<1.0	mg/L	0.99	20		
5830606	Orthophosphate (P)	2018/11/12	113	75 - 125	100	80 - 120	<0.010	mg/L	NC	25		
5830640	Dissolved Organic Carbon	2018/11/12	95	80 - 120	98	80 - 120	<0.50	mg/L	0.55	20		
5831272	Dissolved Aluminum (Al)	2018/11/14	108	80 - 120	100	80 - 120	<5.0	ug/L				
5831272	Dissolved Antimony (Sb)	2018/11/14	113	80 - 120	105	80 - 120	<0.50	ug/L	NC	20		
5831272	Dissolved Arsenic (As)	2018/11/14	104	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
5831272	Dissolved Barium (Ba)	2018/11/14	NC	80 - 120	101	80 - 120	<2.0	ug/L	0.62	20		

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QUALITY ASSURANCE REPORT(CONT'D)

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

			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
5831272	Dissolved Beryllium (Be)	2018/11/14	105	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
5831272	Dissolved Boron (B)	2018/11/14	105	80 - 120	102	80 - 120	<10	ug/L	5.2	20		
5831272	Dissolved Cadmium (Cd)	2018/11/14	103	80 - 120	102	80 - 120	<0.10	ug/L	NC	20		
5831272	Dissolved Calcium (Ca)	2018/11/14	NC	80 - 120	101	80 - 120	<200	ug/L				
5831272	Dissolved Chromium (Cr)	2018/11/14	102	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
5831272	Dissolved Cobalt (Co)	2018/11/14	101	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
5831272	Dissolved Copper (Cu)	2018/11/14	108	80 - 120	101	80 - 120	<1.0	ug/L	2.3	20		
5831272	Dissolved Iron (Fe)	2018/11/14	105	80 - 120	103	80 - 120	<100	ug/L				
5831272	Dissolved Lead (Pb)	2018/11/14	98	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
5831272	Dissolved Magnesium (Mg)	2018/11/14	NC	80 - 120	102	80 - 120	<50	ug/L				
5831272	Dissolved Manganese (Mn)	2018/11/14	102	80 - 120	98	80 - 120	<2.0	ug/L				
5831272	Dissolved Molybdenum (Mo)	2018/11/14	110	80 - 120	103	80 - 120	<0.50	ug/L	NC	20		
5831272	Dissolved Nickel (Ni)	2018/11/14	100	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
5831272	Dissolved Phosphorus (P)	2018/11/14	114	80 - 120	113	80 - 120	<100	ug/L				
5831272	Dissolved Potassium (K)	2018/11/14	106	80 - 120	102	80 - 120	<200	ug/L				
5831272	Dissolved Selenium (Se)	2018/11/14	104	80 - 120	104	80 - 120	<2.0	ug/L	NC	20		
5831272	Dissolved Silicon (Si)	2018/11/14	108	80 - 120	101	80 - 120	<50	ug/L				
5831272	Dissolved Silver (Ag)	2018/11/14	99	80 - 120	101	80 - 120	<0.10	ug/L	NC	20		
5831272	Dissolved Sodium (Na)	2018/11/14	NC	80 - 120	99	80 - 120	<100	ug/L	0.025	20		
5831272	Dissolved Strontium (Sr)	2018/11/14	NC	80 - 120	97	80 - 120	<1.0	ug/L				
5831272	Dissolved Thallium (Tl)	2018/11/14	96	80 - 120	97	80 - 120	<0.050	ug/L	NC	20		
5831272	Dissolved Titanium (Ti)	2018/11/14	107	80 - 120	101	80 - 120	<5.0	ug/L				
5831272	Dissolved Uranium (U)	2018/11/14	94	80 - 120	96	80 - 120	<0.10	ug/L	4.1	20		
5831272	Dissolved Vanadium (V)	2018/11/14	106	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
5831272	Dissolved Zinc (Zn)	2018/11/14	99	80 - 120	96	80 - 120	<5.0	ug/L	NC	20		
5832145	Aroclor 1242	2018/11/12					<0.05	ug/L	NC	30		
5832145	Aroclor 1248	2018/11/12					<0.05	ug/L	NC	30		
5832145	Aroclor 1254	2018/11/12					<0.05	ug/L	NC	30		
5832145	Aroclor 1260	2018/11/12	80	60 - 130	75	60 - 130	<0.05	ug/L	NC	30		
5832145	Total PCB	2018/11/12	80	60 - 130	75	60 - 130	<0.05	ug/L	NC	40		
5832824	F2 (C10-C16 Hydrocarbons)	2018/11/13	93	50 - 130	87	60 - 130	<100	ug/L	NC	30		

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B8T8844
Report Date: 2018/11/21

QUALITY ASSURANCE REPORT(CONT'D)

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

			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
5832824	F3 (C16-C34 Hydrocarbons)	2018/11/13	96	50 - 130	89	60 - 130	<200	ug/L	25	30		
5832824	F4 (C34-C50 Hydrocarbons)	2018/11/13	98	50 - 130	91	60 - 130	<200	ug/L	23	30		
5832889	Total Kjeldahl Nitrogen (TKN)	2018/11/12	106	80 - 120	103	80 - 120	<0.10	mg/L	18	20	102	80 - 120
5832984	Total Ammonia-N	2018/11/14	103	75 - 125	103	80 - 120	<0.050	mg/L	5.7	20		
5833908	Mercury (Hg)	2018/11/13	90	75 - 125	101	80 - 120	<0.1	ug/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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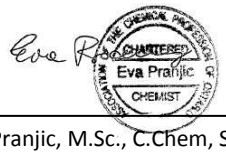
Maxxam Job #: B8T8844
Report Date: 2018/11/21

Golder Associates Ltd
Client Project #: 1778651 (5000)
Sampler Initials: AVR

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

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.maxxam.ca

08-Nov-18 11:49
Ema Gitej
B8T8844
MAF ENV-1415
Page 1 of 1
Bottle Order #: 591358
Project Manager: Ema Gitej
C#691358-02-01

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#25670 Golder Associates Ltd	Company Name:		Quotation #:	B80683
Attention:	Accounts Payable	Attention:	Chris Pons	P.O. #:	
Address:	215 Shields Court Unit # 1 Markham ON L3R 8V2	Address:		Project:	1778651 (5000)
				Project Name:	
Tel:	(905) 475-2625 Fax: (905) 475-5257	Tel:	(905) 431-3118 Fax:	Site #:	
Email:	AP_CustomerService@golder.com	Email:	cpons@golder.com	Sampled By:	AVR

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM 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 ☐ PWQO ☐ Other

Special Instructions

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

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 #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 PCBs (Water)	(RCAp) Comprehensive	Mercury	Total Kjeldahl Nitrogen in Water	O.Reg 153 VOCs by HS & F1-F4					# of Bottles	Comments
1		MW18-1	Nov 7/18	11:30am	GW	Y					X					5	
2		MW18-2	"	12pm	GW	Y	X	X	X	X	X					12	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
	18/11/07	5pm	Rick Patel Rick Patel	2018/11/08	11:49	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	12/1	Present	~	
		Intact	~	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S 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.MAXXAM.CA/TERMS.

* 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 HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

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

White: Maxxa Yellow: Client

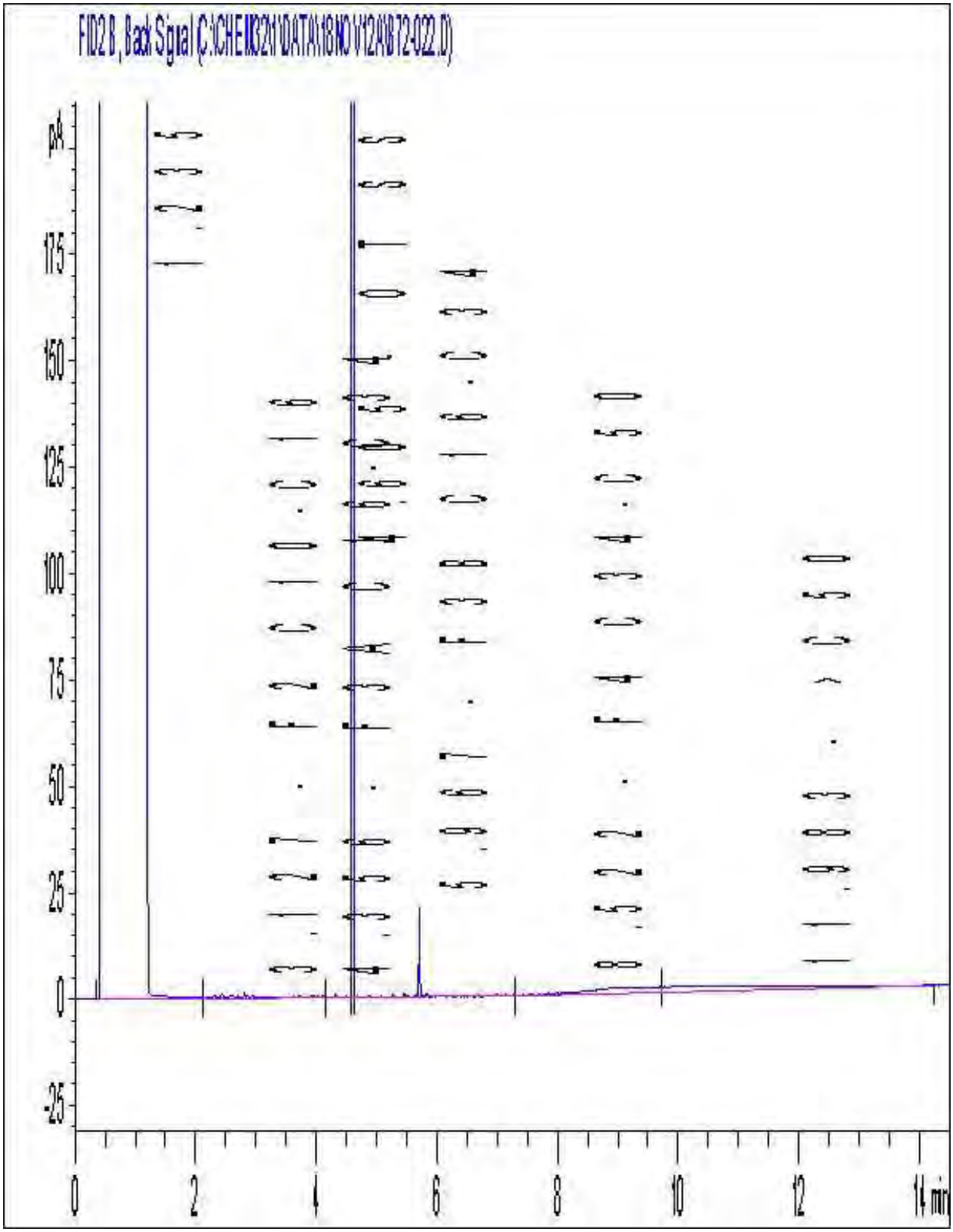
#36989 1/1/1

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B8T8844
Report Date: 2018/11/21
Maxxam Sample: IGC505

Golder Associates Ltd
Client Project #: 1778651 (5000)
Client ID: MW18-2

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

APPENDIX E

Pre- and Post-Drainage Features

2412 - 3 of 9

LOT 18, CONCESSION 7
GEOGRAPHIC TOWNSHIP OF UXBRIDGE
REGIONAL MUNICIPALITY OF DURHAM

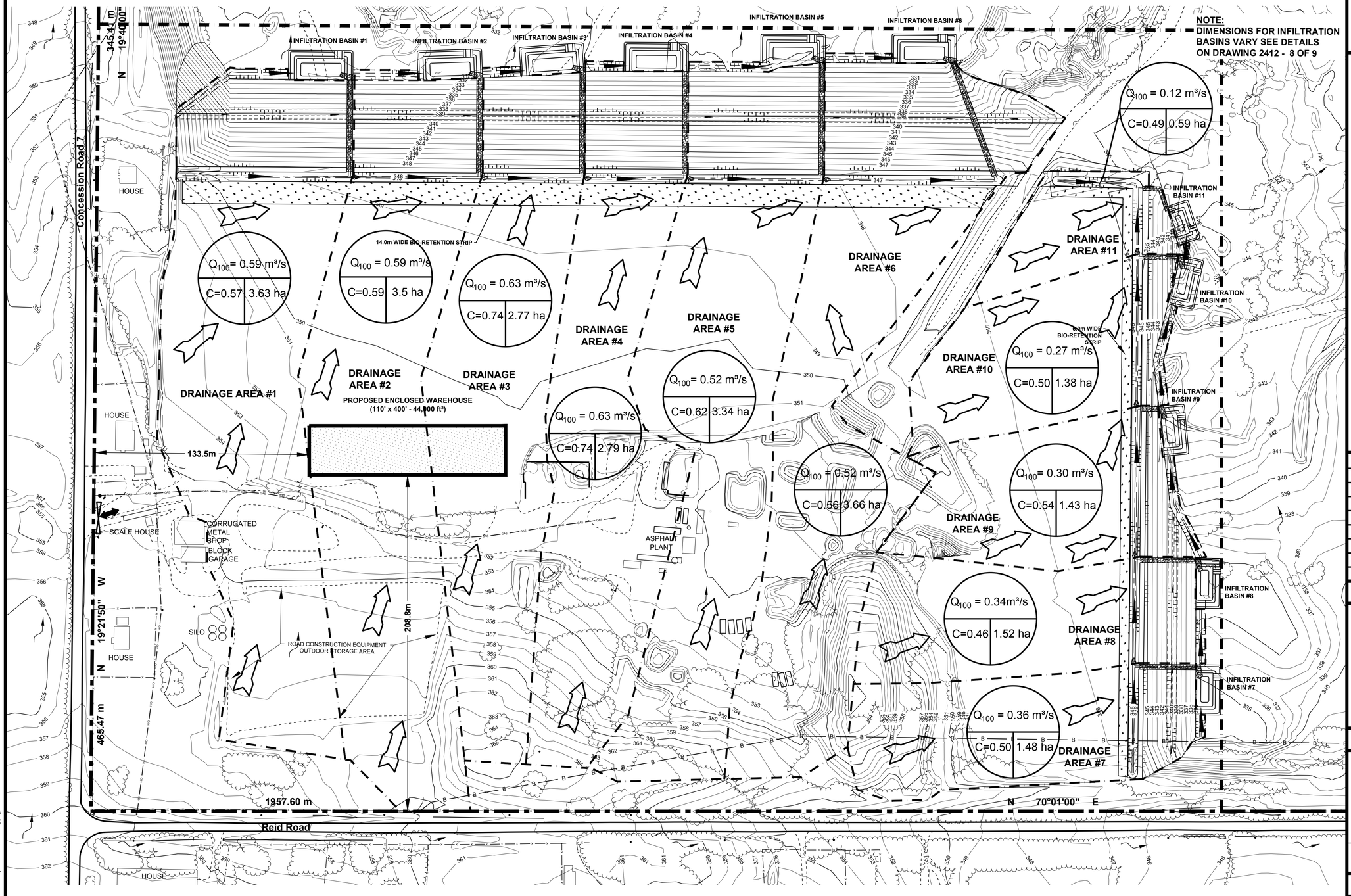
25 0 25 50 75 metres

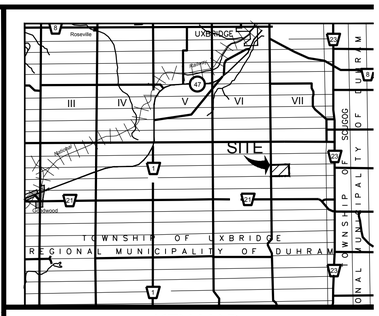
Scale 1:1250

N

Site North

True North





KEY MAP
N.T.S.

LEGEND

- Property Boundary
- Proposed Fill Importation Boundary
- Internal Road
- Wooded Areas
- Overhead Hydro Lines
- Underground Gas Line
- Underground Bell Line
- Existing Post & Wire Fence
- Existing Building / Concrete Pad / Equipment Storage / Processing Area
- Contours (5.0 m)
- Contours (1.0 m)
- Pit Entrance / Exit
- Gate
- Stockpiled Material
- Natural Drainage
- Proposed Fill Slope Grade
- Bank Slope
- Drainage Areas
- Proposed Drainage Direction
- 5 Year Storm Flow
- Runoff Coefficient
- Drainage Area
- Proposed Rip Rap Channel
- Bio-Retention Strip (Grasses/ Sedges)

SCHEDULE OF REVISIONS

NO.	DATE	DESCRIPTION	CHECKE

MILLER PAVING LIMITED
BOYINGTON PIT #3
FILL IMPORTATION UNDER SITE PLAN CONTROL

4419 CONCESSION ROAD 7
TOWNSHIP OF UXBRIDGE

POST FILLING DRAINAGE PATTERNS
MINOR DRAINAGE SYSTEM

PROJECT NO.	10 - 2412	DRWG NO.	2412 - 3 of 9
DATE:	JULY 2016	SCALE:	1:1250
DRAWN:	MJB	CHECKED:	APPROVED:

Skelton Brumwell & Associates Inc.
ENGINEERING PLANNING ENVIRONMENTAL CONSULTANTS
93 BELL FARM ROAD, SUITE 107
BARRIE, ONTARIO L4M 5G1
www.skeltonbrumwell.ca
TELEPHONE (705) 726-1141
FAX (705) 726-0331
TOLL FREE (877) 726-1141

2412 - 4 of 9

LOT 18, CONCESSION 7
GEOGRAPHIC TOWNSHIP OF UXBRIDGE
REGIONAL MUNICIPALITY OF DURHAM

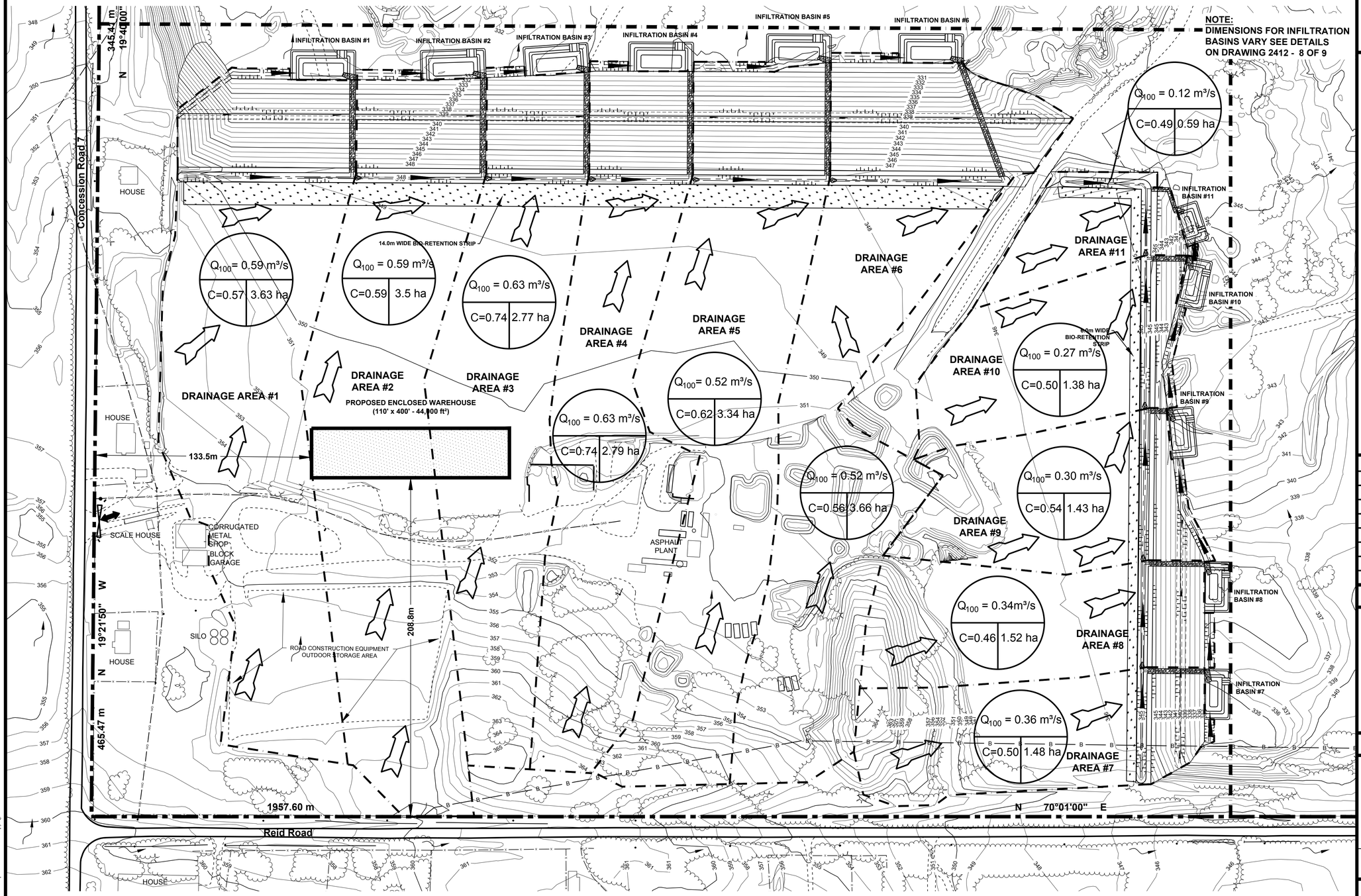
25 0 25 50 75 metres

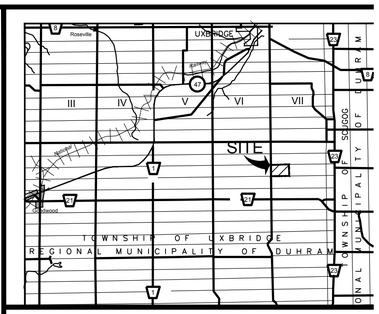
Scale 1:1250

N

Site North

True North





KEY MAP
N.T.S.

LEGEND

- Property Boundary
- Proposed Fill Importation Boundary
- Internal Road
- Wooded Areas
- O/H — O/H — Overhead Hydro Lines
- GAS — GAS — Underground Gas Line
- B — B — B — Underground Bell Line
- X — X — X — Existing Post & Wire Fence
- Existing Building / Concrete Pad / Equipment Storage / Processing Area
- 345 — Contours (5.0 m)
- 344 — Contours (1.0 m)
- Pit Entrance / Exit
- Gate
- Stockpiled Material
- Natural Drainage
- 1.0% — Proposed Fill Slope Grade
- Bank Slope
- Drainage Areas
- Proposed Drainage Direction
- Q_{100} = 0.07 m³/s / C=0.80 0.5 ha — 100 Year Storm Flow / Runoff Coefficient / Drainage Area
- Proposed Rip Rap Channel
- Bio-Retention Strip (Grasses/ Sedges)

SCHEDULE OF REVISIONS

NO.	DATE	DESCRIPTION	CHECKE

MILLER PAVING LIMITED
BOYINGTON PIT #3

FILL IMPORTATION UNDER SITE PLAN CONTROL
4419 CONCESSION ROAD 7
TOWNSHIP OF UXBRIDGE

POST FILLING DRAINAGE PATTERNS
MAJOR DRAINAGE SYSTEM

PROJECT NO.	10 - 2412	DRWG NO.	2412 - 4 of 9
DATE:	JULY 2016	SCALE:	1:1250
DRAWN:	MJB	CHECKED:	APPROVED:

Skelton Brumwell & ASSOCIATES INC
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