

February 1, 2018

Reference No. 086822

Mr. David Parks Director of Planning, Development & Tourism County of Simcoe 1110 Highway 26 Midhurst, ON L0L 1X0 Mr. Brent Spagnol, MCIP, RPP Director of Planning Services and By-Law Enforcement Township of Springwater 2231 Nursery Road Minesing, ON L9X 1A8

Mr. Chris Hibberd Director, Planning Services Nottawasaga Valley Conservation Authority 8195 8th Line Utopia, ON L0M 1T0

Dear Sirs:

Re: County of Simcoe Environmental Resource Recovery Centre Updated Hydrogeological Assessment Ministry of Municipal Affairs File #: 43-OP-169096

The County of Simcoe (County) continues to pursue the development of the proposed Environmental Resource Recovery Centre (ERRC) located at 2976 Horseshoe Valley Road West (Site) in the Township of Springwater (Township). In support of the ERRC, applications for Amendments to the Official Plan and Zoning By-Law were submitted to Township Planning staff on November 18, 2016. In addition to these Amendments, a number of supporting studies were also submitted, including a DRAFT Updated Hydrogeological Assessment Report (December 6, 2017).

As part of the One Window Provincial Planning Service, a copy of the draft Hydrogeological Assessment Report was circulated to the Ministry of Municipal Affairs and partner ministries including: Ministry of Natural Resources and Forestry, Ministry of the Environment and Climate Change (MOECC), Ministry of Tourism, Culture and Sport, Ministry of Transportation and Ministry of Agriculture, Food and Rural Affairs. The draft FCR was also circulated to Ainley & Associates Limited for review on behalf of the Township.

GHD are pleased to provide the enclosed final Updated Hydrogeological Assessment Report, which contains supplementary groundwater and surface water monitoring data, and addresses regulatory agency review comments. The review comments and responses have also been summarized in the attached table, providing an overview of the revisions made in the Updated Hydrogeological Assessment Report. In addition, the County has met with the Risk Management Official for the City of Barrie who confirmed that the proposed ERRC adequately addresses Source Protection.





Should you require any additional information or clarification please do not hesitate to contact the undersigned.

Sincerely,

GHD

Brin Darry

Brian Dermody, P. Eng.

Philip Smart M.Sc., P.Geo.

BD/jlm/2

Encl.

Comment No.	Submitted By	Date Submitted	Document	Comment	Response	Action
20	Terraprobe Inc. (Ainley Group)	January 24, 2017	Hydrogeological Assessment	In general the Hydrogeological Assessment conducted by GHD has used generally accepted professional practices during their assessment review and interpretation of the hydrogeological conditions at the site	Acknowledged.	No further action required.
21	Terraprobe Inc. (Ainley Group)	January 24, 2017	Hydrogeological Assessment	Terraprobe agrees with the GHD conclusion that a PTTW or an EASR posting from the MOECC will not be required for water takings relating to construction activities at the site.	Acknowledged.	No further action required.
22	Terraprobe Inc. (Ainley Group)	January 24, 2017	Hydrogeological Assessment Facility Characteristics Report	Terraprobe agrees with the GHD conclusion that the deep water table and sandy soils have the potential to facilitate the infiltration of all collected storm water post development. Implementation of infiltration measures for the post development condition will be required.	Details of the proposed stormwater management system, including potential infiltration measures will be developed as part of the detailed design for the MMF in support of the Site Plan Approval and Environmental Compliance Approval. This will also include consideration for using stormwater to support the proposed fire protection systems. Further consideration will be given to using this water to supplement process water requirements during the development of the detailed design for the OPF. Amendments to the Site Plan and Environmental Compliance Approval will be submitted as required for the other second to the supplement of the detailed design for the OPF.	Complete the detailed design for the of MMF, including the stormwater management system. Complete the detailed design for the OPF, including potential modifications to the stormwater management system to allow for the use of water for processing operations or fire protection.
23	Terraprobe Inc. (Ainley Group)	January 24, 2017	Hydrogeological Assessment Facility Characteristics Report	The water demand of ERRC facility, and therefore the water taking of the proposed supply well, should be further evaluated to demine an estimated daily flow volume. If the water requirement does exceed 50,000 L/day, then a Category 3 PTTW for long term water takings will be required for the facility.	Details of the required water demand of the ERRC will be developed as part of the detailed design for the MMF and the OPF in support of the Site Plan Approval and Environmental Compliance Approval. If it is determined that more than 50,000 litres of water will be required per day, then a Permit to Take Water (PTTW) application will be submitted to the Ministry of the Environment and Climate Change.	Complete the detailed design for the Administrative Facility, MMF, and OPF, including the potable water requirements. Apply for a PTTW if required.
24	Terraprobe Inc. (Ainley Group)	January 24, 2017	Hydrogeological Assessment	Seasonal groundwater level monitoring has not been undertaken to confirm the seasonal ground water levels and flow direction. If the new ground water levels and flow direction are substantially different then what has been found to date (i.e. the water table is much shallower then has been observed to date), the conclusions and recommendations of the report may have to be revaluated. GHD has indicated that this will be undertaken, but was not included as part of the report reviewed.	Additional groundwater level monitoring was undertaken in 2017 to confirm the seasonal groundwater levels and flow direction. The Amended Hydrogeological Assessment Report has been revised to reflect the additional monitoring.	No further action required.
25	Terraprobe Inc. (Ainley Group)	January 24, 2017	Hydrogeological Assessment Facility Characteristics Report	The unevaluated wetland near the northeast portion of the Site will constrain storm water management options in that vicinity. Additional evaluation of the wetland area should be undertaken to ensure that drainage patterns are maintained to provide similar hydrologic contributions to this feature.	Additional evaluation of the wetland will be undertaken during the stormwater management design to ensure drainage patterns are maintained to provide similar hydrologic contributions to this feature.	Complete the detailed design for the of MMF, including the stormwater management system. Complete the detailed design for the OPF, including potential modifications to the stormwater management system.
26	Nottawasaga Valley Conservation Authority	March 2, 2017	Hydrogeological Assessment	The site is located within a significant groundwater recharge area. Please include this classification within the report. Further advise on how the proposed development may impact groundwater quality and the associated risk management measures required to manage and/or prevent potential groundwater contamination from the ERRC.	The classification of the Site as a low to medium vulnerability significant groundwater recharge area (SGRA) will be added to the Hydrogeological Assessment Report. The MOECC has indicated that they are satisfied that the activities associated with the proposed land use are not subject to threat policies in the South Georgian Bay Lake Simcoe Source Protection Plan. In addition, the County met with the Risk Management Official for the City of Barrie who confirmed that the proposed ERRC adequately addressed Source Protection. The risk management measures required to manage and/or prevent potential groundwater contamination from the ERRC will be developed as part of the detailed design for the MMF in support of	Complete the detailed design for the of MMF, including risk management measures for the protection of groundwater. Complete the detailed design for the OPF, including risk management measures for the protection of groundwater.
27	Nottawasaga Valley Conservation Authority	March 2, 2017	Hydrogeological Assessment	The report indicates in Section 4.4 that chromium and lead were present in the water sample from monitoring well MW2 16. Please advise on the source of chromium and lead.	the Site Plan Approval and ECA. - The concentration of chromium and lead from Monitoring Well MW-16 are only slightly above the ODWS maximum acceptable concentration and the sample collected was slightly turbid. Based on a confirmatory sample taken at Monitoring Well MW-16 on June 9, 2017, the chromium (total) concentration was not detected above the reportable detection limit of 0.005 mg/L, and the lead (total) concentration was not detected above the reportable detection limit of 0.0005 mg/L. The sample had a total suspended solid (TSS) concentration of 170 mg/L indicating a relatively low amount of sediment was contained in the sample. Based on the results, the elevated concentrations of chromium and lead obtained from the sample.	No further action required.
28	Nottawasaga Valley Conservation Authority	March 2, 2017	Hydrogeological Assessment	Although outside of the scope of the report, nitrate loading calculations will be required for the septic system(s) to service the site. This comment can be addressed to the satisfaction of the appropriate approval authority at the site plan stage of the planning process.	GHD confirms that the nitrate loading calculations are outside the scope of the current study, but will be completed as part of the detailed design and site servicing. The nitrate loading will be addressed to the satisfaction of the appropriate approval authority at the site plan stage of the planning process.	Complete the detailed design for the of MMF, including the wastewater system, and submit the Site Plan application for approval. Complete the detailed design for the OPF and submit an amended Site Plan for approval.
29	Nottawasaga Valley Conservation Authority	March 2, 2017	Hydrogeological Assessment	Ongoing groundwater level monitoring is strongly encouraged to capture high water table elevations. Upon receipt of data, confirm the sites flow direction as being in a westerly direction. This comment can be addressed at the site plan stage of the planning process.	Additional groundwater level monitoring was undertaken in 2017 to confirm the seasonal groundwater levels and flow direction. The Amended Hydrogeological Assessment Report has been revised to reflect the additional monitoring.	No further action required.
30	Ministry of Municipal Affairs and Partner Ministries (MNRF, MOECC, MTCS, MTO, OMAFRA)	April 7, 2017	Hydrogeological Assessment	Source Protection Plan - MOECC staff are satisfied that the activities associated with the proposed land use are not subject to threat policies in the South Georgian Bay Lake Simcoe Source Protection Plan. In addition, it appears that the amendment to permit the ERRC is consistent with the adopted Simcoe County OPA No. 1 - Source Protection Conformity. Surface Water/Groundwater Protection - MOECC staff are satisfied that neither wetland nor downstream surface water tributaries will be impaired, provided that erosion and sediment control measures identified in the mitigation plan are implemented during the construction stage and for long-term site management. The "Hydrological Assessment" prepared by GHD (dated November 2016) notes that construction activities will be limited to slab on grade construction with trenching for utilities installation. Considering the depth of the water table and the length of the utilities trenches, a registration via the Environmental Activity and Sector Registry (EASR) for construction dewatering or Permit to Take Water (PTTW) may be required.	The depths of the building slabs and utility trenches relative to the water table, as well as the potential need for registration via the Environmental Activity and Sector Registry (EASR) for construction dewatering or Permit to Take Water (PTTW), will be determined during the detailed design.	Complete the detailed design for the of MMF, including the potential need for registration via the EASR or a PTTW application. Complete the detailed design for the OPF, including updates to the EASR or PTTW.
56	Ministry of Municipal Affairs and Partner Ministries (MNRF, MOECC, MTCS, MTO, OMAERA)	April 7, 2017	Hydrogeological Assessment	Source Protection Plan - MOECC staff are satisfied that the activities associated with the proposed land use are not subject to threat policies in the South Georgian Bay Lake Simcoe Source Protection Plan. In addition, it appears that the amendment to permit the ERRC is consistent with the adopted Simcoe County OPA No. 1 - Source Protection Conformity	Acknowledged.	No further action required.





Updated Hydrogeological Assessment

Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road West Springwater, Ontario

County of Simcoe

GHD | 111 Brunel Road Suite 200 Mississauga Ontario L4Z 1X3 Canada 086822|Report No 16 | February 1 2018



Executive Summary

This Updated Hydrogeological Assessment Report supersedes the previous Hydrogeological Assessment Report (November 15, 2016) submitted for the proposed Environmental Resource Recovery Centre development. This Report provides the updated groundwater monitoring for the Site, which was completed in November 2017, and contains all previous hydrogeological investigation and monitoring data. The hydrogeological interpretations and conclusions presented in this Updated Report supersede and override the understanding of the Site stated in previous reports. It is noted, however, that the updated groundwater level monitoring data presented herein does not significantly alter the previous interpretation of the Site.

A Hydrogeological Assessment was undertaken for County of Simcoe in support of a proposed Environmental Resource Recovery Centre (ERRC) development at 2976 Horseshoe Valley Road West, in Springwater, Ontario (Site). The proposed development includes an organics processing facility, materials management facility, truck servicing facility, administrative building with public education space, and associated roads and paved surfaces. The objective of this assessment was to:

- Assess current groundwater conditions, including quantification of potential impacts to the local groundwater regime (quality and quantity), and groundwater supply for the development.
- Identify hydrologically-sensitive features for recharge/discharge function protection (i.e., wetlands and/or watercourses).
- A water balance analysis to estimate the groundwater recharge potential at the Site, under predevelopment and proposed post development conditions.
- Determine the requirement and options for groundwater control during construction and required approvals.

The Site is located in rural area and is designated as a County Forest. There are several small rural residential communities in the vicinity of the Site, and the surrounding area consists of agricultural lands, with farmhouses, barns and ancillary buildings. Adjacent properties are serviced with individual water supply wells and septic systems.

A wetland (not evaluated) is situated within the northeast corner of the Site. A watercourse originates in this area and flows to Matheson Creek, which is situated approximately 700 metres (m) to the east of the Site.

The Site is underlain by a glaciofluvial sand deposit. The hydraulic conductivity (K_h) of the sand is 2.4 x 10⁻³ cm/s, which is medium to high and indicates the fine to medium textured glaciofluvial deposit behaves as an aquifer.

The water table was encountered at depths of more than 10 mBGS across the ERCC footprint area Groundwater levels fluctuate in the range of 0.5 to 0.8 metres seasonally, generally decreasing through the late summer fall and winter months, and recovering during the spring freshet and early summer months. Based on the seasonal groundwater level measurements, groundwater flow direction is to the northwest.



Construction activities are not anticipated to require groundwater takings based on the deep water table. It is anticipated that the excavations would be relatively small, such that, a construction EASR for groundwater seepage and stormwater management would not be required.

The ERRC facility will require a water supply well for maintenance and washroom facilities, and it is expected that the water usage would be much less than the amount that would require a Ministry of the Environment and Climate Change (MOECC) Permit To Take Water (PTTW) of 50,000 Litres per day (L/day). The water supply well is not anticipated to interfere with private wells in the area, based on the low takings and because the area of influence would be small and close to the supply well.

The amount of impervious surfaces (roofs, roads) is anticipated to increase from the existing predevelopment condition to the post development condition. Based on the water balance, it is anticipated that there will be a net increase of the Site runoff with an annual water surplus of approximately 14,700 m³. The deep water table, and the presence of sandy soils, which have moderate to high infiltration potential will facilitate the infiltration of collected water post development.

The potential wetland near the northeast portion of the Site provides recharge to the underlying sand aquifer during the spring freshet, based on the observed mini-piezometer and surface water levels within the wetland area. Drainage patterns will need to be maintained to provide similar hydrologic contributions to this surface water feature.

Development of the Site is not anticipated to have an adverse impact on groundwater or surface water, given appropriate stormwater and natural environment mitigation construction methods are implemented.



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1. Introduction

GHD Limited (GHD) was retained by the County of Simcoe to undertake a Hydrogeological Assessment for a proposed Environmental Resource Recovery Centre (ERRC) development located at 2976 Horseshoe Valley Road West, in Springwater, Ontario (herein referred to as the Property or Site) (**Figure 1.1**).

This Updated Hydrogeological Assessment Report supersedes the previous Hydrogeological Assessment Report (November 15, 2016) submitted for the proposed Environmental Resource Recovery Centre development. This Report provides the updated groundwater monitoring for the Site, which was completed in November 2017, and contains all previous hydrogeological investigation and monitoring data. The hydrogeological interpretations and conclusions presented in this Updated Report supersede and override the understanding of the Site stated in previous reports. It is noted, however, that the updated groundwater level monitoring data presented herein does not significantly alter the previous interpretation of the Site.

The Site is situated on the north side of Horseshoe Valley Road West, approximately 3 kilometers west of Highway 400. The Site is rectangular in shape and is described as Lot 2, Concession 1 in the Township of Springwater, County of Simcoe. The Site is approximately 84 hectares (ha) in size and the land use designation is Greenlands in the County of Simcoe Official Plan (County of Simcoe Official Plan, Schedule 5.1). The Site is identified as the Freele County Forest Tract in the Township of Springwater and is covered by a forest area with the exception of a small access road/trail.

The Site is proposed to be redeveloped as a co-located Organics Processing Facility (OPF) and Materials Management Facility (MMF) and is anticipated to consist of these facilities and a truck servicing facility, administrative building with public education space, and associated roads and paved surfaces. Additional details are provided in the Facility Characteristics Report (GHD, November 2016). The development footprint is centrally located and is anticipated to occupy approximately 4.5 ha within the 84 hectares of the Site (**Figure 1.2**).

The proposed OPF and MMF buildings will be serviced by a groundwater supply well and individual septic system. The buildings will be surrounded by paved parking and driveway areas. The access to the facility will be the existing unpaved road/trail that will be upgraded to include heavy-duty asphalt pavement to accommodate waste collection vehicles.

The objective of this hydrogeological assessment is to characterize the current geological and hydrogeological conditions and includes:

- 1. Assessment of current groundwater conditions, including quantification of potential impacts to the local groundwater regime (quality and quantity), and groundwater supply for the development.
- 2. Hydrologically-sensitive features for recharge/discharge function protection (i.e., wetlands and/or watercourses).



- 3. Completion of a water balance analysis to estimate the groundwater recharge potential at the Site, under pre-development and proposed post development conditions.
- 4. The requirement and options for groundwater control during construction and required approvals.

2. Background

2.1 Site Description

The Site is located in rural area and is designated as a County Forest (**Figure 2.1**). There are several small residential communities in the area, which include Apto, located approximately 2 kilometres (km) to the west of the Site, Anten Mills approximately 4 km to the west, and Craighurst located approximately 4 km to the east of the Site. Small residential subdivisions are present on Fox Farm Road and Ohara Lane south of the Site, and there are several farmhouses, barns and ancillary buildings in proximity to Site. The Site is not serviced with any utilities (water, waste water and power), and residential properties in the vicinity of the Site are serviced with individual water supply wells and septic systems.

The Site is bounded to the north by Rainbow Valley Road East and to the south by Horseshoe Valley Road West. The Site can be accessed from either road, and has a connecting trail that runs roughly north-south through the middle of the Site, which bends to the west at the north end. The surrounding area to the west of the Site consists of agricultural lands, with farmhouses, barns and ancillary buildings. Lands to the north, east and south of the Site are largely forested, and a Hydro transmission line corridor crosses the southeast corner of the Site. A small cemetery (Apto Cemetery) is located adjacent to the southwest corner of the Site.

The closest farmhouses relative to the ERRC footprint area are situated more than 300 metres to the northwest on Rainbow Valley Road, and 500 metres to the southwest on Horseshoe Valley Road. A residential property is also located in the forested area approximately 300 metres to the east of the ERRC footprint.

The topography slopes from west to east across the Site toward Matheson Creek. The topography ranges from an elevation of 265 metres above mean sea level (mAMSL) near the west side of the Site to 245 mAMSL on the east boundary. At the north end of the Site, the topography is relatively flat at an elevation of approximately 240 (mAMSL), which is coincident with a wetland area.

The Site is located in the Matheson Creek watershed (**Figure 2.2**). Matheson Creek is situated approximately 700 metres (m) to the east of the Site. The watershed divide between the Matheson Creek and the Nottawasaga River is situated approximately 2 km to the west of the Site.

The Site is situated within the Nottawasaga Valley Conservation Authority (NVCA) watershed, and portions of the Site are within the NVCA regulated area. The property is currently designated as Greenlands, and a wetland feature (not evaluated) is located on the northeast corner of the Site (**Figure 2.3**).



Two tributaries of Matheson Creek are mapped on the Site, as identified by the Natural Heritage Information Center (NHIC) and NVCA mapping resources. One watercourse originates at the wetland area near the northeast corner of the Site, and the second watercourse crosses the south portion of the Site. This south watercourse could not be located during site visits and investigations completed at the Site.

2.2 Regional Setting

The Site is not located within any Wellhead Protection Areas or Highly Vulnerable Aquifer Areas, but is located within a Significant Groundwater Recharge Area (SGRA) within the Nottawasaga Valley Source Protection region (SGBLS, 2015).

The Site is located in the Simcoe Uplands physiographic region (Chapman and Putnam 1984), which is characterized by a drumlinized till plain and sand plain (**Figure 2.4**). The topography on the till plain is generally undulating within an elevation range of approximately 240 to 260 metres above mean sea level (mAMSL). Matheson Creek is steeply incised into the sand plain at an elevation of 220 mAMSL.

Overburden underlying the Site is approximately 120 metres (m) thick, and is generally described as a thick sequence of Pleistocene glacial deposits overlying limestone and shale bedrock of the Middle Ordovician, Simcoe Group Formations (OGS, 1991).

Regional surficial geology mapping of the area indicates that the Site and surrounding lands are underlain by sandy deposits and foreshore basinal deposits (sand and silt) (**Figure 2.5**). The surficial geology and general stratigraphic framework for the Site and surrounding area consists of the following deposits:

- Surficial Soil Topsoil
- Glaciofluvial Sand
- Glaciolacustrine Foreshore Deposits Sand and Silt
- Bedrock Limestone, Shale

The location of recorded Ministry of Environment and Climate Change (MOECC) water wells within 500 m of the Site is presented on **Figure 2.6**, and a summary of the records is presented in **Appendix F** (MOECC Water Well Record Formation Report, Individual Well Records). The compilation of well records was obtained from the MOECC Water Well Information System, without revision or omission, as such, some records are not necessarily for wells within the study area.

Based on review of the well records, the majority of wells reported in the immediate vicinity of the Site consist of domestic water supply wells. The wells are typically 6 to 5-inch diameter drilled wells completed to depths of 30 to 43 metres below ground surface (mBGS) and screened within sand. The records indicate sand was often encountered throughout the well depth, with some intervening layers of clay and sand. The water table was typically found at depths of about 27 mBGS, based on static water levels reported in the wells records. Pumping rates recommended by the driller ranged from 27 to 45 Litres per minute (L/min), with one well (#7214502) that had a recommended rate of 350 L/min.



Review of the water well record information indicates that the overburden is primarily comprised of fine to medium textured sand deposits which extend to depths of more than 50 mBGS. The hydrostratigraphy consists of the following units:

- Aquifer (Unconfined) fine to medium textured sand
- Aquitard limestone, shale bedrock

In general, the sandy overburden forms a thick unconfined aquifer overlying bedrock.

3. Methodology

Cognizant of the objectives of the project, the following activities were undertaken:

- Borehole advancement and installation of monitoring wells in selected boreholes to facilitate the collection of groundwater levels to determine groundwater flow conditions.
- Installation of three (3) mini-piezometers within the wetland area to the northeast of the Site to assess the form and function of the wetland, and groundwater surface water interactions.
- Groundwater level monitoring to determine groundwater flow direction and seasonal fluctuations of the groundwater table.
- Guelph Permeameter testing to determine the hydraulic conductivity of the unsaturated surficial soils. This preliminary infiltration testing provides soil parameters for storm water management recommendations. Additional testing will be required to support any proposed LID storm water management options during detailed design.
- Aquifer testing (single well response tests) to determine hydraulic conductivity and groundwater flux of the water bearing deposits.
- Groundwater level monitoring to determine seasonal fluctuations of the groundwater table.
- Collection of groundwater samples to assess the groundwater quality with respect to Ontario Drinking Water Standards.
- Surface water monitoring of a tributary of Matheson Creek at Rainbow Valley Road East, and of Matheson Creek at Horseshoe Valley Road West.

The investigative activities listed above were completed concurrently with a geotechnical investigation (GHD 2016b). The investigative locations are shown on **Figure 3.1**. The details of these investigations are summarized in the following sections, and the field investigation methodology and protocols are provided in **Appendix A**.

3.1 Borehole Advancement/Monitoring Well Installations

Drilling activities were initially completed in August 2016, eight boreholes were advanced by Profile Drilling Inc., utilizing a track-mounted rotary drill rig equipped with hollow stem augers, and under the full time supervision of a GHD field technician. In addition, an ecologist was present and directed drill crews with respect to access (paths) and drill sites to avoid sensitive features, and the NVCA was notified of drilling activities and locations.



GHD undertook an additional geotechnical drilling program from December 19, 2016 to January 6, 2017 (GHD, 2017). The investigation consisted of the advancement of an additional fifteen (15) boreholes and the instrumentation of one (1) of these boreholes as a monitoring well, MW15-16.

Boreholes were advanced to depths up to 30.2 metres below ground surface (mBGS). Soil samples were collected using a 50 mm outside diameter split spoon sampler. Representative samples were collected at 0.75 metre intervals to 3.6 mBGS, and at 1.5 m intervals thereafter to the termination depth of drilling.

Monitoring wells were installed in five of the boreholes to depths ranging from 14.9 to 30.2 mBGS. The borehole and monitoring well locations are shown on **Figure 3.1**, and the completion details for the monitoring wells and boreholes are provided on **Table 3.1**. Stratigraphic and Instrumentation logs for the monitoring wells and selected boreholes are provided in **Appendix B.1**.

All monitoring wells were instrumented with a 3 m (10-foot) long, 50 mm (2-inch) inside diameter, No. 10 slot, Schedule 40 PVC screen, and a riser pipe of required length. A silica sand pack was placed in the annular space between the PVC screen/riser pipe and the borehole, from the bottom of the well screen to at least 0.60 m above the top of the well screen. Bentonite seal was placed above the sand pack to within 0.30 m of the ground surface. A protective monument casing with a concrete collar was placed around each of the monitoring wells upon completion. The drilling and monitoring well installation methods and procedures are discussed in **Appendix A**

Groundwater levels measured subsequent to the completion of the monitoring well installations are presented on the Stratigraphic and Instrumentation logs in **Appendix B.1**. Groundwater levels were allowed to stabilize for at least 24 hours following well installation before a groundwater level was recorded.

Grain size analyses, consisting of sieve and hydrometer testing, were carried out on selected samples collected from the drilled boreholes. The results of these tests are summarized in **Table 3.2**, and the grain size distribution test results are presented in **Appendix B.2**.

3.2 Guelph Permeameter Testing

In-situ permeability testing was undertaken using a Guelph Permeameter (GP) in accordance with ASTM D5126 to provide infiltration parameters and assist in the development of stormwater management options. The Guelph Permeameter determines the field saturated hydraulic conductivity in the vadose zone above the water table. The testing was completed at three (3) locations within the proposed development area (GP1-16), downgradient of the footprint (GP2-16) and within the wetland area (GP3-16) (**Figure 3.1**).

The boreholes for the infiltration tests were hand augered to depths of 0.5 to 0.7 mBGS. The Guelph permeameter tests were completed in the native sand soils.

The field permeameter test consisted of the following activities:

- Excavation of a cylindrical borehole to the interval to be tested.
- Placement of the permeameter in the borehole and filling of the borehole with water.



• Initiation of the permeameter and setting of the desired head and monitoring the rate of decline of the water level in the reservoir until steady state conditions.

The hydraulic conductivity measured in the unsaturated (vadose) zone is referred to as the "field-saturated" hydraulic conductivity (K*fs*) (Reynolds, 1986). The Guelph Permeameter method measures the steady-state flow rate (Q) necessary to maintain a constant depth of water (H) in an uncased borehole. K*fs* is then calculated from Q and H using the analytical solutions presented in **Appendix C** (after Reynolds et al., 1985).

The test results are discussed in Section 4.0.

3.3 Single Well Response Tests

In-situ hydraulic response testing, referred to as single well response tests (SWRT), were completed on selected monitoring wells to estimate the horizontal hydraulic conductivity of the water bearing deposits underlying the Site.

Single well response tests involve the injection or removal of a known volume of water into/from the well and measuring the water level response in the well until it returns to static conditions (i.e., falling/rising head test). The results of the hydraulic testing were analyzed using the Bouwer and Rice (1976) and Hvorslev (1951) solutions for unconfined conditions using the software package AQTESOLV[™]. These solutions were used to determine the horizontal hydraulic conductivity of the geologic deposits within the immediate vicinity of the screened interval of each monitoring well. The SWRT methodology is presented in **Appendix A.** The results of the testing are presented in **Appendix D** and discussed in Section 4.0.

3.4 Groundwater Level Monitoring

Groundwater level monitoring was undertaken from August 2016 to November 2017 to assess seasonal groundwater level fluctuations. Manual groundwater level measurements were collected bi-monthly using a water level meter at all wells (from August 2016 to February 2017), and electronic water level dataloggers were installed selected monitoring wells as well as in each of the minipiezometers for continuous water level measurements (from August 2016 to November 2017). The dataloggers provide a detailed record of the response of groundwater to climatic conditions throughout the year.

Manual measurements were collected using a Solinst water level meter, and electronic data loggers (Solinst Model 3001 – Levelogger Edge) were installed in monitoring wells MW1-16 to MW4-16 to continuously record water levels. A Solinst baralogger was used (suspended in air in one of the monitoring wells) to correct the water level data for atmospheric pressure.

Groundwater level measurements obtained from the monitoring wells are summarized in **Table 3.3a** and **Table 3.3b** Measurements with respect to metres above mean sea level (mAMSL) are presented in **Table 3.3a**, and groundwater levels measured in metre below ground surface (mBGS) are presented in **Table 3.3b**. The groundwater elevation hydrographs are presented in **Appendix E**.



3.4.1 Mini-piezometer Installation

Three (3) mini-piezometers, MP1-16 to MP3-16 were installed within the wetland area on the northeast portion of the Site (**Figure 3.1**). The piezometers were installed using a manual slide hammer until refusal, which is generally about 1 to 2 mBGS. The piezometers consist of a 20 mm diameter (3/4-inch) pipe and stainless steel well point. The installation details for the minipiezometers are provided in **Table 3.1**.

The mini-piezometers are used to determine the vertical gradient between groundwater and surface water. Data loggers (Solinst Leveloggers) are installed in the mini-piezometers to continuously record shallow groundwater levels inside the mini-piezometer and surface water levels outside the piezometer at adjacent staff gauge locations to provide a detailed record of groundwater-surface interactions, and the response of groundwater to climatic conditions throughout the seasons.

3.5 Groundwater Quality

Groundwater samples were collected in August 2016 from monitoring wells MW1-16 to MW4-16 and analyzed for general chemistry and metal parameters (Ontario Drinking Water Standards, MOE, 2003; revised June 2006) to determine baseline conditions and characterize the groundwater quality (**Table 3.4**). A follow-up water quality sample was collected from monitoring well MW2-16 on June 9, 2017 to assess elevated concentrations of chromium and lead detected in the initial August 2016 sampling event.

A water quality sample was also collected from monitoring well MW15-16 on November 21, 2017 to provide a baseline water quality sample from this well, which was installed subsequent to the initial sampling event.

Prior to sampling, the wells were developed to ensure that the sample collected was representative of groundwater quality. Purging of the well was considered to be complete when three consistent field measurement readings of pH, conductivity, and temperature had been obtained after each well volume removed.

The groundwater samples were submitted under chain of custody procedures to Maxxam Analytics Laboratories (Maxxam) of Mississauga, Ontario a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited analytical laboratory. The groundwater quality analytical results are discussed in **Section 4.0**.

3.6 Surface Water Flow

A surface water monitoring program was undertaken to characterize the baseflow in a tributary of Matheson Creek (SW1-16) at Rainbow Valley Road and of Matheson Creek at Horseshoe Valley Road (SW2-16). The monitoring locations were determined based on accessibility, stream sensitivity (potential aquatic habitat), stream transect characteristics, and the potential for groundwater discharge.

Stream flow measurements are collected manually using a Valeport Electromagnetic Flow Meter, and continuously using a Solinst Levelogger Edge (Edge). Measurements are collected on a



monthly basis, during a non-storm event and immediately following a major storm event (minimum of three days following rainfall event) (**Appendix G**).

Flows at each location have been measured in compliance with the Ontario Stream Assessment Protocol (MNR, 2010), and is calculated by the two methods identified by Ministry of Natural Resources, the Mean Method (mean velocities taken at the panel sides) and the Mid Method (panel width is the sum of half the distance to either adjacent velocity measurement). The average result from the two methods was used.

4. Geology and Hydrogeology

The following sections provide a detailed description of the geology and hydrogeology of the Site, based on the results of the investigations completed and on the available background information. Hydrostratigraphic cross sections referenced as A-A', and B-B' across the Site are shown on **Figures 4.1** and **4.2**. The cross-section locations are shown on **Figure 3.1**.

4.1 Site Geology

Based on observations during the installation of the monitoring wells and advancement of boreholes, the following surficial materials and geologic deposits underlie the Site (see **Figures 4.1** and **4.2**):

- Topsoil (0 to 0.3 mBGS) topsoil with organics
- Fill (0 to 1.5 mBGS) re-worked native soil, sand some silt to silty sand
- Sand (0.3 to 30 mBGS) glaciofluvial deposits consisting of sand, sandy silt to silty sand.

All boreholes encountered a thin surficial layer of topsoil at the ground surface, which varied in thickness between 25 mm and 35 mm. In some areas fill was encountered comprised of re-worked native soils, mainly consisting of sand some silt to silty sand trace gravel. Fill was locally encountered underlying the topsoil, and extended generally to 0.5 to 1.5 mBGS. The fill has moist to very moist conditions, and the Standard Penetration Test (SPT) 'N' values ranged between 10 to 20 blows per 0.3 m of penetration, indicating a compact state.

The topsoil and fill is underlain by a fine to medium textured glaciofluvial deposit, comprised of sand, sandy silt to silty sand with some thin and discontinuous layers of silt and silty clay. In general the sand deposit is very moist and loose near surface and becomes moist and very dense with increasing depth. The sand deposit is brown to greyish brown, and moist. SPT 'N' values varied between 8 to in excess of 100 blows per 300 mm of penetration, indicating a compact to very dense condition.

The sand deposit was encountered in all of the boreholes and monitoring wells advanced extending to depths ranging between 0.3 mBGS and 30.2 mBGS (termination depth of borehole). Based on the grain size analyses, the sand deposit typically contains 84 to 96 percent sand and 4 to 16 percent silt (**Table 3.2**).



Discontinuous layers of silt and clayey silt are present within the sand. A silt layer was encountered in BH1-16 from approximately 6 to 8 mBGS, and in MW1-16 from approximately 21 to 30 mBGS. A fine textured compact native clayey silty layer was also encountered in BH8-16 at a depth of approximately 3 to 4.5 mBGS.

No boreholes advanced during the drilling activities encountered bedrock.

4.2 Site Hydrogeology

4.2.1 Hydrostratigraphic Units

Hydrostratigraphic profiles are presented on **Figures 4.1 and 4.2** and the primary aquifer/aquitard units underlying the Site include the following:

Fill – Based on the borehole investigations the fill and shallow native sand and silty sand soils are unsaturated over the Site. During 'wet' seasonal conditions the shallow soils form 'perched' conditions, and support infiltration and recharge to the deeper unconfined aquifer.

Sand Aquifer (Unconfined) - The sand, silty sand to sandy silt forms an unconfined aquifer

Although not encountered during the drilling activities, the bedrock forms an underlying aquitard.

4.2.2 Unsaturated Properties

Guelph Permeameter Tests were completed on the unsaturated sand deposits. The field saturated hydraulic conductivity (K_{fs}) is 7.1 x 10⁻⁴ cm/s (geomean) (**Figures C.1 to C.3**). The corresponding infiltration rate is 78 mm/hr, which converts to a percolation time of 8 min/cm. The field saturated hydraulic conductivity indicates the sand provides medium to high infiltration and recharge conditions.

4.2.3 Flow Direction and Gradients

The groundwater elevation contours for monitoring wells screened within the sand aquifer are presented on **Figure 4.3a** using the September 30, 2016 water elevation data. The water table ranges in elevation from approximately 236.1 to 233.3 mAMSL within the ERRC footprint area of the Site (**Table 3.3a**). Based on the groundwater level measurements, groundwater flow is in a northwesterly direction.

The average horizontal groundwater gradient across the footprint area is approximately 0.01 metres per metre (m/m), based on the difference in groundwater level elevations perpendicular to groundwater flow between MW1-16 and MW2-16 (236.1 - 233.33 mAMSL / 300 m = 0.01).

The depth to watertable is presented on **Figure 4.4**. The water table within the ERRC footprint area is present within the sand deposit at depths ranging from 9.3 to 25.8 mBGS (**Table 3.3a**).

Review of the groundwater level hydrographs in **Appendix E** indicates that groundwater levels declined steadily from August 2016 to March 2017. Groundwater levels in MW2-16 and MW3-16 decreased approximately 0.8 metres over this period, and the groundwater levels observed in MW1-16 and MW4-16 decreased approximately 0.5 metres. Subsequent to the decline,



groundwater levels recovered to about the same level from March to May 2017 during the spring freshet. Groundwater levels continued to increase slightly through the spring, and then flattened during the summer period (July/August), then began to decrease during the fall period November (see **Appendix E - Figure E1**).

The groundwater elevation contours for monitoring wells screened within the sand aquifer are presented on **Figure 4.3b**, using the May 31, 2017 water elevation data. The water table ranges in elevation from approximately 237.7 to 233.1 mAMSL across the Site (**Table 3.3a**).

The groundwater elevation contours for monitoring wells screened within the sand aquifer are also presented on **Figure 4.3c**, using the November 21, 2017 water elevation data. The water table ranges in elevation from approximately 236.27 to 233.34 mAMSL across the Site (**Table 3.3a**).

Based on the seasonal groundwater level measurements, groundwater flow direction is to the northwest. Groundwater flow is also anticipated to be to the southeast toward Matheson Creek, based on the deeply incised stream valley (220 mAMSL).

4.2.4 Saturated Hydraulic Properties

The fine to medium textured glaciofluvial deposit forms an unconfined aquifer underlying the Site. A summary of the hydraulic properties is presented in **Table 4.1.** Based on the results from the SWRTs, the geometric mean hydraulic conductivity (K_h) is 2.4 x 10⁻³ cm/s, which is representative of the sand deposit. The groundwater flux (per square metre) in the deposit can be estimated using the following relationship:

q = Ki

where:

q = groundwater flux (per square metre)

K = hydraulic conductivity (2.4 x10⁻⁵ m/s)

i = hydraulic gradient (0.01 m/m)

Therefore the estimated groundwater flux in the glaciofluvial deposit is estimated to be 2.8×10^{-7} m/s, per square metre (2.4×10^{-5} m/s x 0.01 m/m = 2.4×10^{-7} m/s). The flow rate per square metre of aquifer is approximately 0.14 L/min (2.4×10^{-7} m/s x 60 sec/minute x 1,000 L/m³ = 0.014 L/min). Based on this, the hydraulic conductivity and flow rate is relatively high.

4.2.5 Groundwater-Surface Water Interaction

The water table is at a depth of about 8 to 10 metres below the wetland feature on the north portion of the Site (**Figure 4.4**). Based on the monitoring during the spring freshet the wetland is recharged by snowmelt, surface water runoff and/or precipitation events, and gradually lose water throughout the year and recharges the aquifer. The wetland is dry in the summer and throughout the majority of the year.

Based on review of the mini-piezometer and surface water hydrographs (**Appendix E**), the minipiezometers were dry at depths ranging from 0.1 to 0.8 mBGS, and the wetlands were also dry at



the mini-piezometer locations from August 2016 through to March 2017. Subsequently during the spring freshet in March 2017, the mini-piezometer water levels increased to approximately 0.1 to 0.3 m above ground surface, corresponding to the recharge and increase in the surface water levels at the piezometers of approximately 0.3 m.

The surface water levels within the wetland area typically range from approximately 241.5 to 242.5 mAMSL at MP1-16 to MP3-16 (**Appendix E**). These surface water levels observed within the wetland area are well above the groundwater table at the Site, which is generally below an elevation of 236 mAMSL, based on the monitoring well data.

The wetland provides recharge to the underlying sand aquifer during the spring freshet, based on the observed mini-piezometer and surface water levels within the wetland area.

4.2.6 Surface Water Monitoring

The surface water monitoring indicated that the surface water feature at SW1 was dry from July 2016 to December 2017. Subsequently there was flow during the winter period and spring freshet from January to May 2017, ranging from 0.5 to 13.7 litres per second (lps).

The flow at SW2 from July 2016 to May 2017 ranged from 172.9 to 1,459.2 lps. The lowest flow was observed in July 2016 and the highest in May 2017.

4.3 Water Taking Evaluation

Construction Water Takings

Conceptually, the ERRC buildings will be constructed with slab on grade foundations, with no below ground structures (basement). Below grade excavations would be required for services (water, septic). Given the water table beneath the Site is more than 9 mBGS, dewatering for the construction of the building and installation of services is not anticipated to be required.

Any water accumulations into excavations from precipitation or surface runoff is anticipated to be very minor, and well below the amount that would require an MOECC Environmental Activity and Sector Registry (EASR) (O. Reg. 63/16) of 50,000 L/day.

Operational Water Takings

The ERRC facility will require a groundwater supply well to service the buildings for maintenance and washroom facilities. The water supply well would likely be screened in the sand aquifer at a depth of approximately 30 mBGS, similar to other domestic water supply wells in the vicinity of the Site.

The results from the single well response tests were utilized to determine the hydraulic properties (hydraulic conductivity, transmissivity) and conditions to provide the basis for estimating the area of influence for the water supply well, based on a water taking of 10,000 L/day. The area of influence was determined using analytical methods for an unconfined aquifer, using the Neuman (1972, 1973b, 1975a) analytical method. The equation can be used to predict the drawdown and area of influence, using the following equations:



EQUATION AND PARAMETERS

$$h_{o} - h = \frac{Q}{4\pi T} W(u_{b}, \eta)$$
 (1) $u_{b} = \frac{r^{2}S_{y}}{4Tt}$ (2) $\eta = \frac{r^{2}}{b^{2}}$ (3)

where:

 $h_0 - h = drawdown$

Q = constant pumping rate

 $W(u_b, n)$ = well function for an unconfined aquifer with delayed yield response

T = transmissivity

r = distance from pumping well

 S_y = specific yield

 $u_{\text{b}} = dimensionless$

t = time after the start of pumping

b = aquifer thickness

For these estimations, the following was assumed:

- The aquifer is horizontal, confined top and bottom, infinite in horizontal extent, of constant thickness, and homogeneous and isotropic.
- That there is only one pumping well.
- The pumping rate is constant with time.
- Well diameter is infinitely small.
- The well penetrates the entire aquifer.
- Hydraulic head in the aquifer is uniform throughout prior to pumping.
- Flow is radial to wells.

The analytical model input parameters and estimated water taking rate are presented on **Figure 4.5.** The apparent transmissivity of the sand is estimated to be 16.5 m²/day, based on the hydraulic conductivity of 2.4×10^{-5} m/s (geomean) for the sand, and saturated thickness of 8 m (2.4 $\times 10^{-5}$ m/s x 86,400 s/day x 8 m = 16.5 m²/day). An assumed specific yield of 0.3 (dimensionless) was used based on the unconfined nature of the sand deposit.

Using the analytical model, the groundwater taking is predicted to result in an area of influence of less than 20 m from the water supply well, based on a maximum water taking of up to 10 cubic metres per day (m^{3} /day), which is 10,000 L/day or a pumping rate of approximately 7 litres per minute (L/min). The predicted Area of Influence is presented on **Figure 4.6** and represents the radial distance to where there would be little if any effect on the water table.

Using the above methodology and assuming a maximum water taking of up to 50,000 L/day, the area of influence would be less than 30 metres from the water supply well. The water supply well area of influence is anticipated to be small and close to the well.



4.4 Groundwater Quality

Groundwater quality samples (unfiltered) were collected from each of the monitoring wells (MW1-16 to MW4-16) for laboratory analysis of general chemistry and metal parameters listed in the Ministry of the Environment and Climate Chance (MOECC) Ontario Drinking Water Standards (ODWS) to determine baseline groundwater quality. Results from the laboratory analyses are presented in **Table 4.5** and the laboratory analytical report is provided in **Appendix H**.

The majority of parameters had concentrations below the MOECC ODWS for health-related parameters, with the exception of chromium (total) and lead (total) for the sample collected at MW2-16. The concentration of chromium (total) was 0.058 mg/L, which was marginally above the ODWS criteria of 0.05 mg/L, and the concentration of lead (total) was 0.011 mg/L, which was also marginally above the ODWS criteria of 0.01 mg/L. The sample also had a total suspended solid (TSS) concentration of 3,000 mg/L indicating a relatively high amount of sediment was present in the sample.

A confirmatory groundwater sample was collected from monitoring well MW2-16 on June 9, 2017. Review of **Table 4.5** indicates the chromium (total) concentration was below the reportable detection limit of 0.005 mg/L, and the lead (total) concentration was below the reportable detection limit for lead of 0.0005 mg/L. The sample had a total suspended solid (TSS) concentration of 170 mg/L indicating a relatively low amount of sediment was contained in the sample. Based on the results, the elevated concentrations of chromium and lead obtained from the sample collected on August 22, 2016 are biased high due to the elevated sediment content in the sample.

The sodium concentration for the sample collected from MW1 -16 was 33 mg/L, which is above the ODWS criteria of 20 mg/L for persons on a sodium restricted diet.

The hardness of the water ranges from 140 to 260 mg/L (expressed as milligrams of calcium carbonate per litre), which is below the ideal range for water hardness of 80 to 100 mg/L. Hardness is an aesthetic, not health related, parameter. The sample turbidity ranged from 6.7 to 23 Nephelometric Turbidity Units (NTU) for three of the samples analyzed, which is above the aesthetic objective of 5 NTU. The concentration of organic nitrogen ranged from 0.16 to 0.36 mg/L, which exceeds the ODWS aesthetic criteria of 0.15 mg/L.

A few metal (total) parameters (aluminum, iron and manganese) had concentrations above the operational guideline and aesthetic criteria.

Water supply well treatment will be needed to address the elevated concentrations to ensure it is safe for use as a potable water supply.

4.5 Water Balance

A water balance was undertaken to determine the amount of surplus water potentially generated as a result of the development (increase in impermeable surfaces). This was then used to assist in the evaluation of options to manage the surplus.

The water balance was estimated using the most recent version of the water balance model developed by Meteorological Service of Canada (MSC, see Johnstone and Louie, 2008). The new



MSC's water balance method accounts for snow accumulation and melt (degree-day method of USACE, 1956), potential evapotranspiration (Thornthwaite and Mather, 1955), soil storage (Phillips, 1976), actual evapotranspiration, and moisture deficit and surplus. The MSC program calculated a 'water surplus' as the final product, which is the total water available in a given month to run off as surface overland flow and/or infiltrate to the ground and recharge the groundwater table. The MSC water balance model runs with continuous daily precipitation and air temperature data. The use of daily data allowed for more accurate modelling of snowmelt and snow storage, which are of particular importance in Canadian climate (Johnstone and Louie, 1983).

Daily air temperature and precipitation data from Environment Canada's Shanty Bay weather station (Climate ID: 6117684), for the period from January 2000 to February 2015, was inputted into the water balance model. Any missing data during this period (when the weather station has been out of service) was filled in with data observed at the Environment Canada's Coldwater Warminster (ID: 6111769), Barrie Landfill (ID: 6110556), and Barrie-Oro (ID: 6117700) weather stations.

The Site's latitude, longitude, and an estimate of the water holding capacity of the soil was also input to the model. The water holding capacity has been estimated based on soil and land use characteristics of the study area under Existing and Proposed conditions. Currently, the area of proposed development consists of 100% pervious (heavily forested area). Once the area has been developed, it is assumed that the proposed facility footprint will encompass approximately 4.5 ha, which is approximately 5% of the total Site. The assumption is due to the unknown configuration of the facility footprint. The soils underlying the Site are described as sand to sandy silty, with a low runoff potential and high infiltration. The water holding capacity was determined from tables provided in the Ontario's Stormwater Management Planning and Design Manual (MOE, 2003b), which relate water holding capacity to soil type and land use.

4.5.1 Water Balance Calculations

The water balance calculations for existing and proposed conditions are presented in **Table 4.3** to **4.10**. Water surplus is the total water available in a given month to run off as surface overland flow and/or infiltrate to the ground and recharge the groundwater table. Based on the water balance calculations, it is estimated that there will be an increase in the amount of water surplus from existing conditions to the proposed conditions of approximately 14,700 cubic metres (m³) annually.

The water surplus of 14,700 m³ is determined by subtracting the existing conditions precipitation surplus total of 4,900 m³ (**Table 4.4**) from the proposed conditions precipitation surplus total of 19,600 m³ (**Table 4.5**) (19,573 m³ – 4,865 m³ = 14,708 m³). The increase in the surplus is due to the increase in potential surface runoff, caused by the increase in impervious area and decrease in permeable surfaces for infiltration.

In addition to addressing the increase in peak flow and volume, storm water management controls should concentrate on enhancing infiltration within the developed area to maintain the hydrological conditions of the downstream surface water features (adjacent wetland areas)

4.5.2 Stormwater Management Options

Under the proposed development, the amount of runoff would increase as a result of the increase in impervious area and decrease in permeable surfaces. Additional measures would need to be



considered to promote evapotranspiration and infiltration on-Site and reduce runoff. Due to the soil conditions and existing Site conditions, it is encouraged that proposed stormwater management system infiltrate runoff for all storm event (up-to an including the 100-year storm event).

Stormwater management options that would address evapotranspiration and infiltration issues and reduce the amount of potential runoff to existing conditions are presented in **Table 4.6** and discussed in the following sections.

The stormwater management options would maintain existing drainage patterns and, most importantly, provide similar hydrologic contributions to maintain the downstream surface water features. It is important to allow additional runoff to replicate the slow contribution of groundwater and slowly compensate for the loss in infiltration that would have ultimately recharged the deep aquifer. By working at a treatment train approach, the below conceptual stormwater management options would also minimize the potential for slope erosion, and reduce water quality loadings.

The conceptual stormwater management options would be constructed as per Ministry of Environment and Climate Change (MOECC, 2003) and TRCA guidelines (CVC & TRCA, 2010) and additional construction measures could be required to meet guidelines. These options include:

- Reduction of grading to 0.5 1.0% slope in landscape areas to allow for additional evapotranspiration and infiltration.
- Scarification, or tilling of the soil to a depth of approximately 300 mm, would enhance evapotranspiration and infiltration within the landscaped areas to overcome soil compaction that occurs during construction.
- Directing excess surface runoff the facility footprint to vegetated filter strips located along the
 outer border of the facility footprint. The vegetated filter strip will be approximate 3 to 5 metres
 (m) in width, remain unmaintained and shallow sloped, to promote absorption of surface runoff
 and allow for infiltration and evapotranspiration. Overflow would be directed to an enhanced
 vegetated swale surrounding the facility footprint.
- The vegetated enhanced swales will be shallow (less than 1.0% slope), heavily vegetated and fitted with rock check dams allow for ponding within the swales, further enhancing infiltration storage and evapotranspiration.
- The vegetated enhanced swale will then discharge into a conceptual stormwater management pond (SWMP). The conceptual SWMP would be sized to capture all rainfall events, up-to and including the 100-year storm event. Since the underlying soil conditions consist of highly infiltrative soils (sand to sandy silt) and that existing land conditions consist of heavily forested area, pre-development peak flows are assumed to be minimal. Also due to the Facility's vicinity to a wetland area, it is encouraged to maintain the hydrological conditions of the downstream surface water features. Therefore, the SWMP is sized to capture the majority of rainfall events (excluding events greater than the 100-year storm event and large concurrent storm events) and infiltrate the captured runoff. The SWMP would also be sized to address quantity (maintain peak flows to existing conditions levels) and quality (Enhance Protection Levels) controls for the runoff from the facility footprint. The stormwater management pond would be designed as per Ministry of Environment and Climate Change (MOECC) guidelines, with a permanent pool that



would encourage evapotranspiration. Any overflow from the SWMP, which is possible during rainfall events greater than a 100-year storm event and large concurrent rainfall events, would discharge to a drainage ditch along the access road and discharge to the existing drainage ditch along Horseshoe Valley Road West and ultimately to Matheson Creek.

5. Development Constraints

The proposed development consists of the ERRC organic processing facility, associated roads and paved surfaces and stormwater management pond.

There are no surface water features on the Site, with the exception of a wetland area in the northeast portion of the Site.

Construction Water Takings

It is anticipated that there will be no groundwater seepage into construction excavations, and water accumulations into the excavations will be from precipitation and surface runoff. These accumulations are anticipated to be very small and will be below MOECC permit requirements.

Operational Water Takings

The ERRC facility water supply well is not anticipated to interfere with private wells in the area, as the water demand is low and the maximum area of influence is less than 30 metres from the well. Based on this, the area of influence will not extend beyond the property boundaries.

Stormwater Management

The amount of impervious surfaces (roofs, roads) is anticipated to increase from the existing predevelopment condition to the post development condition. The volume of evapotranspiration and infiltration decreases and the runoff increases as a result of the increase in impervious area and impermeable surfaces (roads/driveways, roofs). Based on the water balance, there is a predicted net increase of the Site runoff with an annual water surplus of 14,700 m³.

Re-development of the Site is anticipated to increase the runoff from the Site, and as such mitigation methods will be required to address stormwater runoff and compensate for the loss of infiltration.

Surface water flow and shallow infiltration is anticipated to be directed toward stormwater management features located on the Site. Verification of appropriate infiltration measures that would control surface water runoff (quantity and quality) and maintain ground water recharge and function on the Site are addressed through the stormwater management plan.

Surface Water Features

The wetland on the northeast portion of the Site may constrain stormwater management options, as surface drainage patterns would need to be maintained to provide similar hydrologic contributions to this feature.



The form and function of the potential wetland area will be assessed based on seasonal monitoring, but it is anticipated that potential impacts on groundwater/surface water interactions is low, based on the deep water table (more than 8 m) below the wetland.

5.1 Mitigation

The stormwater management features and erosion and sediment controls should be designed to control surface water flow and promote infiltration and evapotranspiration. Given appropriate stormwater and natural environment mitigation construction methods are implemented redevelopment of the Site is not anticipated to have an adverse impact on the groundwater or local hydrologic features.

Recommended efforts to mitigate impacts to the potential wetland feature include:

- Installation of appropriate erosion and sediment controls and maintenance for the duration of all construction activities and minimum vegetation establishment periods.
- Minimization of any disturbance to vegetation adjacent to the potential wetland.

6. Summary and Conclusions

Based on the results of the hydrogeological investigation and monitoring undertaken to date, the following summary and conclusions are provided:

- 1. The development area is primarily underlain by a fine to medium glaciofluvial deposit, which comprises an unconfined sand aquifer. The site is located within a groundwater recharge area.
- 2. The groundwater table is encountered over the majority of the ERRC area at depths of more than 10 mBGS. The water table elevations range from approximately 233 to 237 mAMSL. Based on the seasonal groundwater level measurements, groundwater flow direction is to the northwest. Groundwater levels fluctuate in the range of 0.5 to 0.8 metres seasonally, generally decreasing through the late summer fall and winter months, and recover during the spring freshet and early summer months.
- 3. The hydraulic conductivity (K_h) of the sand is 2.4 x 10⁻³ cm/s (geomean), which is relatively high and indicates the medium textured glaciofluvial deposit behaves as an aquifer.
- 4. The infiltration rate within the shallow native sand soils (less than 0.7 mBGS) is 78 millimetres per hour (mm/hr), which converts to a percolation time of 8 minutes per centimeter (min/cm). The native sand provides medium to high infiltration and recharge conditions.
- 5. Construction activities will likely not require groundwater takings based on the deep water table beneath the Site. It is anticipated that there will be no groundwater seepage into construction excavations, and that the excavations would be relatively small, such that, a construction EASR for groundwater seepage and stormwater management would not be required.



- 6. A water supply well for the ERRC facility maintenance and washroom facilities is not anticipated to interfere with private wells in the area, because water usage would be minimal, and the area of influence would be small and close to the well.
- 7. Overall, the groundwater is of good quality however, some metals had concentrations above their respective criteria based on operational guideline and aesthetic considerations. Water supply well treatment will be needed to address the elevated concentrations to ensure it is safe for use as a potable water supply.
- 8. The amount of impervious surfaces (roofs, roads) is anticipated to increase from the existing pre-development condition to the post development condition. Based on the water balance, there is a predicted net increase of the Site runoff with an annual water surplus of approximately 14,700 m³.
- 9. It is anticipated that infiltration of collected water post development can be facilitated based on the deep water table, and the presence of sandy soils, which have high infiltration potential.
- 10. The potential wetland on the northeast portion of the Site provides recharge to the deeper underlying sand aquifer during the spring freshet, based on the observed mini-piezometer and surface water levels within the wetland area. Drainage patterns need to be maintained to provide similar hydrologic contributions to this feature.
- 11. Development of the Site is not anticipated to have an adverse impact on groundwater or surface water, given appropriate stormwater and natural environment mitigation construction methods are implemented.



7. References

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MNR NRVIS, 2015. Produced by GHD under license from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016; Site Location Map; Inset Map: ESRI Data & Maps 2008 Data Distribution Application (DDA)

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MNR NRVIS, 2015. Produced by GHD under license from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016; Surficial Geology; Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release - Data 128.



MNR NRVIS, 2015. Produced by GHD under license from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016; MOECC Water Well Records; WWIS, 2016. Ontario Ministry of the Environment and Climate Change (Accessed January 2016).

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All of Which is Respectfully Submitted,

GHD

IONAL GE PROFESS PHILIP J. SMART PRACTISING MEMBER 0286 G ONTARIO

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Thomas Guoth, P. Eng.

Figures



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ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER UPDATED HYDROGEOLOGICAL ASSESSMENT

SITE LOCATION

FIGURE 1.1

Nov 30, 2017

86822



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2017





ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER UPDATED HYDROGEOLOGICAL ASSESSMENT

SITE PLAN

FIGURE 1.2

86822 Nov 30, 2017



Source: Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2017.





ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER UPDATED HYDROGEOLOGICAL ASSESSMENT

LAND USE (AERIAL IMAGE)

86822 Nov 30, 2017

FIGURE 2.1



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2017;



GHD

ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER UPDATED HYDROGEOLOGICAL ASSESSMENT

SURFACE WATER FEATURES

FIGURE 2.2

Nov 30, 2017

86822



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2017



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WETLANDS

ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER UPDATED HYDROGEOLOGICAL ASSESSMENT

86822 Nov 30, 2017

GIS File: Q:\GIS\PROJECTS\86000s\86822\Layouts\016\86822-00(016)GIS-WA005.mxd

FIGURE 2.3


Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2017 Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 228.



ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER UPDATED HYDROGEOLOGICAL ASSESSMENT

86822 Nov 30, 2017

FIGURE 2.4

PHYSIOGRAPHY

GIS File: Q:\GIS\PROJECTS\86000s\86822\Layouts\016\86822-00(016)GIS-WA006.mxd



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2017; Ontario Geological Survey 2003. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release---Data 128.



ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER UPDATED HYDROGEOLOGICAL ASSESSMENT

SURFICIAL GEOLOGY

FIGURE 2.5

Nov 30, 2017

86822



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2017; WWIS, 2016. Ontario Ministry of the Environment and Climate Change (Accessed January 2016);



ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER UPDATED HYDROGEOLOGICAL ASSESSMENT

MOECC WATER WELL RECORDS

Nov 30, 2017

FIGURE 2.6

86822





INVESTIGATIVE LOCATIONS

Nov 30, 2017

CAD File: P:\drawings\86000s\86822\86822-REPORT\86822-03(016)\86822-03(016)GN\86822-03(016)GN\86822-03(016)GN

FIGURE 3.1





CROSS SECTION A-A'

FIGURE 4.1

Nov 30, 2017



CROSS SECTION B-B'



COUNTY OF SIMCOE 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER, ONTARIO UPDATED HYDROGEOLOGICAL ASSESSMENT ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) 86822-03 Nov 30, 2017

FIGURE 4.2

CAD File: P:\drawings\86000s\86822\86822-REPORT\86822-03(016)\86822-03(016)GN\86822-03(016)GN-WA001.DWG





GROUNDWATER ELEVATION CONTOURS (SEPT. 30, 2016)

86822-03 Nov 28, 2017

FIGURE 4.3a





GROUNDWATER ELEVATION CONTOURS (JULY 30, 2017)

86822-03 Nov 30, 2017

FIGURE 4.3b

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GROUNDWATER ELEVATION CONTOURS (NOV. 21, 2017)

86822-03 Nov 30, 2017

CAD File: P:\drawings\86000s\86822\86822-REPORT\86822-03(016)\86822-03(016)GN\86822-03(016)GN\86822-03(016)GN

FIGURE 4.3c



2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER, ONTARIO UPDATED HYDROGEOLOGICAL ASSESSMENT ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) DEPTH TO GROUNDWATER CONTOURS (SEPT. 30, 2016) 86822-03 Nov 30, 2017

FIGURE 4.4



COUNTY OF SIMCOE

ANALYTICAL MODEL INPUT PARAMETERS HYDROGEOLOGICAL ASSESSMENT ERRC County of Simcoe







Tables

GHD | Updated Hydrogeological Assessment | 086822 (16)

Table 3.1

Monitoring Well Completion Details Hydrogeological Investigation Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road, Springwater County of Simcoe

		Ground	Top of Riser	of Riser Total Depth		Screened Interval				Sandpack Interval			_	
			Elevation	Elevation	Drilled	(m	BGS)	(m A	MSL)	(m	BGS)	(m A	MSL)	•
Well ID	Easting	Northing	(m AMSL)	(m AMSL)	(m BGS)	Тор	Bottom	Тор	Bottom	Тор	Bottom	Тор	Bottom	Screened Material
MONITORING WELL	<u>s</u>													
MW1-16	597082	4929846	259.10	260.00	30.18	27.50	30.49	231.60	228.61	24.39	30.49	234.71	228.61	Silt
MW2-16	597357	4929736	252.45	253.35	21.95	18.30	21.64	234.15	230.81	18.30	21.34	234.15	231.11	Silty Sand, Sand
MW3-16	597335	4929954	246.14	246.99	14.88	11.90	14.88	234.24	231.26	11.40	14.88	234.74	231.26	Sand
MW4-16	597126	4930077	242.86	243.67	15.09	12.00	15.09	230.86	227.77	11.59	15.09	231.27	227.77	Silty Sand, Sand
MW15-16	597665	4929831	247.33	248.11	18.90	15.24	18.29	232.09	229.04	14.32	18.29	233.01	229.04	Sand
GEOTECHNICAL BO	REHOLES													
BH01-16	597160	4929730	260.66	-	7.90	-	-	-	-	-		-	-	-
BH02-16	597107	4929893	255.98	-	8.08	-	-	-	-	-	-	-	-	-
BH03-16	597135	4929929	254.46	-	7.93	-	-	-	-	-		-	-	-
BH04-16	597197	4929991	246.73	-	8.23	-	-	-	-	-	-	-	-	-
BH05-16	597274	4929801	253.57	-	8.23	-	-	-	-	-	-	-	-	-
BH06-16	597757	4929369	243.44	-	5.18	-	-	-	-	-	-	-	-	-
BH07-16	597525	4929694	247.11	-	5.18	-	-	-	-	-	-	-	-	-
BH08-16	597419	4929840	252.71	-	5.18	-	-	-	-	-	-	-	-	-
BH09-16	597200	4929758	261.83	-	5.18	-	-	-	-	-	-	-	-	-
BH10-16	597208	4929805	258.92	-	8.23	-	-	-	-	-	-	-	-	-
BH11-16	597238	4929777	258.26	-	8.23	-	-	-	-	-	-	-	-	-
BH12-16	597270	4929704	255.99	-	8.23	-	-	-	-	-	-	-	-	-
BH13-16	597264	4929863	252.15	-	8.23	-	-	-	-	-	-	-	-	-
BH14-16	597378	4929733	251.83	-	8.23	-	-	-	-	-	-	-	-	-
BH15-16	597321	4929732	253.47	-	8.23	-	-	-	-	-	-	-	-	-
BH16-16	597305	4929875	251.43	-	8.23	-	-	-	-	-	-	-	-	-
BH17-16	597338	4929816	252.81	-	8.20	-	-	-	-	-	-	-	-	-
BH18-16	597369	4929754	252.26	-	8.20	-	-	-	-	-	-	-	-	-
BH19-16	597332	4929888	249.99	-	5.18	-	-	-	-	-	-	-	-	-
BH20-16	597393	4929795	253.23	-	5.18	-	-	-	-	-	-	-	-	-
BH21-16	597467	4929779	249.75	-	5.18	-	-	-	-	-	-	-	-	-
BH22-16	597606	4929573	244.89	-	5.18	-	-	-	-	-	-	-	-	-
MINIPIEZOMETERS														
MP1-16	596946	4930266	241.80	243.24	1.45	-	-	-	-	-	-	-	-	-
MP1-16SG	596946	4930266	-	242.92	-	-	-	-	-	-	-	-	-	-
MP2-16	597053	4930176	241.71	242.72	1.31	-	-	-	-	-	-	-	-	-
MP2-16SG	597053	4930176	-	242.74	-	-	-	-	-	-	-	-	-	-
MP3-16	597233	4930122	241.71	243.60	0.56	-	-	-	-	-	-	-	-	-
MP3-16SG	597233	4930122	241.71	243.60	-	-	-	-	-	-	-	-	-	-
SW1-16	597515	4930648	239.01	239.24	-	-	-	-	-	-	-	-	-	-
SW2-16	598360	4929514	216.62	218.58	-	-	-	-	-	-	-	-	-	-

Notes:

BM Station: 00819798284 at 244.394 Surveying locations are based on a steel rod with brass cap bench mark on the east side of Hwy 27, 8.6km South of Junction of Hwy 27 and 92 in Elmvale, 9.6km North of the Junction of Hwy 26 and 27 at Midhurst, 0.4km South of Flos Township concession 3 and 18.1m East of Centerline of hwy 27

Table 3.2

Sample Key Updated Hydrogeological Assessment Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road, Springwater County of Simcoe

Test Pit No. Depth (m)			Perc	ent		d ₁₀ (mm)	Description	Approximated Hydraulic Conductivity
	-	Gravel	Sand	Silt	Clay	_		(cm/sec) ¹
BH1-16	5.6 - 5.9 m	0	84	16		-	Sand, Some Silt	10 ⁻³ - 10 ⁻⁵
BH4-16	0.9 - 1.2 m	0	85	15		-	Sand, Some Silt	10 ⁻³ - 10 ⁻⁵
BH7-16	3.2 - 3.5 m	0	85	15		-	Sand, Some Silt	10 ⁻³ - 10 ⁻⁵
BH8-16	0.9 - 1.2 m	0	96	4		-	Sand, Trace Silt	10 ⁻³ - 10 ⁻⁵
BH22-16	1.7 - 2.0	0	88		12	-	Sand, some silt	10 ⁻¹ - 10 ⁻³
MW15-16	3.2 - 3.5	7	66	18	8	0.0035	Sand, Some Silt, Trace Clay and Gravel	1.23 x 10⁻⁵
							Geometric Mean ³	1.9 x 10 ⁻⁴
BH10-16	2.4 - 2.7	0	25	47	28	-	Silt Clayey, Sandy	<10 ⁻⁶
BH20-16	2.4 - 2.7	0	10	47	43	-	Silty Clay, Trace to Some Sand	<10 ⁻⁶

Note: 1) Hydraulic conductivity estimated by Supplementary Guidelines to Ontario Building Code 1997, Table 2

2) Estimated D₁₀ based on projected clay fraction grain size curve

3) For Sand with some silt material

Table 3.3a

Summary of Groundwater Levels (m AMSL) Updated Hydrogeological Assessment Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road, Springwater County of Simcoe

	MW1-16	MW2-15	MW3-16	MW4-16	MW15-16
Ground Elevation (mAMSL)	259.10	252.45	246.14	242.86	247.330
Reference Elevation (mAMSL) ⁽¹⁾	260.00	253.35	246.99	243.67	248.110
20-Jul-2016	-	-	-	-	-
19-Aug-2016	-	236.16	235.69	-	-
22-Aug-2016	-	235.65	-	233.60	-
23-Aug-2016	233.20	236.29	-	233.61	-
23-Aug-2016	-	-	-	-	-
30-Sep-2016	233.26	236.07	235.46	233.52	-
30-Nov-2016	233.15	235.82	235.22	233.38	-
30-Jan-2017	232.93	235.55	235.00	233.21	235.48
27-Feb-2017	232.86	235.51	234.96	233.15	235.85
28-Mar-2017	232.85	235.58	235.02	233.17	236.19
3-May-2017	232.90	235.92	235.48	233.38	237.41
31-May-2017	233.06	236.35	235.91	233.54	237.68
9-Jun-2017	-	236.44	-	-	237.45
21-Nov-2017	233.34	236.19	235.57	233.63	236.27

Notes:

- ⁽¹⁾ Reference elevation taken from top of riser pipe.
- mAMSL metres Above Mean Sea Level
- mBGS metres Below Ground Surface.
- mBTOR metres Below Top of Riser.

Elevations referenced with respect to a geodetic benchmark - Steel rod with brass cap bench mark on east site of highway 27, 8.6 km south of the junction of highway 27 and 92 in Elmvale, 9.6 km North of the juntions of highway 26 and 27 at Midhurst, 0.4 km south of Flos Town

Table 3.3b

Summary of Groundwater Levels (m BGS) Updated Hydrogeological Assessment Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road, Springwater County of Simcoe

	MW1-16	MW2-15	MW3-16	MW4-16	MW15-16
Ground Elevation (mAMSL)	259.10	252.45	246.14	242.86	247.330
Reference Elevation (mAMSL) ⁽¹⁾	260.00	253.35	246.99	243.67	248.110
20-Jul-2016	-	-	-	-	-
19-Aug-2016	-	16.29	10.45	-	-
22-Aug-2016	-	16.80	-	9.27	-
23-Aug-2016	25.90	16.16	-	9.26	-
23-Aug-2016	-	-	-	-	-
30-Sep-2016	25.84	16.38	10.68	9.35	-
30-Nov-2016	25.95	16.63	10.92	9.49	-
30-Jan-2017	26.17	16.90	11.15	9.65	11.86
27-Feb-2017	26.24	16.94	11.19	9.71	11.48
28-Mar-2017	26.25	16.87	11.13	9.69	11.15
<i>3-May-2017</i>	26.20	16.53	10.66	9.48	9.92
<i>31-May-2017</i>	26.04	16.10	10.23	9.32	9.66
9-Jun-2017	-	16.01	-	-	9.88
21-Nov-2017	25.76	16.26	10.58	9.23	11.07

Notes:	
(1)	Reference elevation taken from top of riser pipe.
mAMSL	metres Above Mean Sea Level
mBGS	metres Below Ground Surface.
mBTOR	metres Below Top of Riser.
	Elevations referenced with respect to a geodetic benchmark - Steel rod with brass cap bench mark on east site of highway 27, 8.6 km south of

with brass cap bench mark on east site of highway 27, 8.6 km south of the junction of highway 27 and 92 in Elmvale, 9.6 km North of the juntions of highway 26 and 27 at Midhurst, 0.4 km south of Flos Town concession 3 rd and 18.1m east of centerline of highway 27. Benchmark

Table 3.4

Sample Key Hydrogeological Assessment Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road, Springwater County of Simcoe

				Ontario Drinking Water Standards (Table 2)					
Sample	Sample Type	Sample ID ⁽¹⁾	Sample Date	Inorganics	Dissolved Metals	Metals	Semi-Volatiles	Volatiles	
MW01	Groundwater	GW-86882-082316-SA-MW01	23-Aug-16	\checkmark	\checkmark	\checkmark	-	-	
MW02	Groundwater	GW-86882-082216-SA-MW02	22-Aug-16	\checkmark	\checkmark	\checkmark	-	-	
MW03	Groundwater	GW-86882-081916-SA-MW03	19-Aug-16	\checkmark	\checkmark	\checkmark	-	-	
MW04	Groundwater	GW-86882-082216-SA-MW04	22-Aug-16	\checkmark	\checkmark	\checkmark	-	-	
MW02	Groundwater	GW-86882-060917-SH-001	9-Jun-17	\checkmark	\checkmark	\checkmark	-	-	
MW15	Groundwater	GW-86882-112417-SH-001	21-Nov-17	\checkmark	\checkmark	\checkmark	-	-	

Notes:

(1)

Complete Sample Identification for GW-076877-BF-200614. GW stands for groundwater; next 6 digits (076885) are GHD project number; next 6 digits represent the date (mm/dd/yy); next two characters are initials of field technician; next digits signify sample number.

Summary of Hydraulic Conductivity Hydrogeological Assessment Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road, Springwater County of Simcoe

			Hydraulic Cor	ductivity (m/s)	Hydraulic Con	ductivity (cm/s)		
Borehole ID	Geologic Unit (Screened):	Depth (mBGS)	Falling	Rising	Falling	Rising	Method	
MW1-16	Silt	30.5	4.7E-06 9.9E-06	1.40E-06 1.94E-06	4.7E-04 9.9E-04	1.40E-04 1.94E-04	Bouwer-Rice Hvorslev	
MW2-16	Silty Sand, Sand	21.3	2.0E-05 1.4E-06	1.56E-05 1.11E-06	2.0E-03 1.4E-04	1.56E-03 1.11E-04	Bouwer-Rice Hvorslev	
MW3-16	Sand	14.9		1.13E-04 1.44E-04 3.11E-04 4.30E-04 1.21E-04 1.62E-04	- - - - -	1.13E-02 1.44E-02 3.11E-02 4.30E-02 1.21E-02 1.62E-02	Bouwer-Rice Hvorslev Bouwer-Rice Hvorslev Bouwer-Rice Hvorslev	
MW4-16	Silty Sand, Sand	15.1	3.8E-05 5.0E-05 3.8E-05 4.9E-05	4.53E-05 5.92E-05 4.20E-05 5.59E-05	3.8E-03 5.0E-03 3.8E-03 4.9E-03	4.53E-03 5.92E-03 4.20E-03 5.59E-03	Bouwer-Rice Hvorslev Bouwer-Rice Hvorslev	
MW15-16	Sand	18.9	-	4.91E-06 6.07E-06	-	4.91E-04 6.07E-04	Bouwer-Rice Hvorslev	
	Ge	ometric Mean (m/s)		2.43E-05		2.43E-03		

Summary of Groundwater Analytical Results (ODWS) Hydrogeological Assessment Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road, Springwater County of Simcoe

Sample Location:			MW01	MW02	MW03	MW04	MW02	MW15-16
Sample ID:			GW-86882-082316-SA-	GW-86882-082216-SA	- GW-86882-081916-SA	- GW-86882-082216-SA-	GW-086822-060917-	GW-086822-112117-SH-001
Sample Date:			MW01 8/22/2016	MW02 8/22/2016	MVV03 8/22/2016	MW04 8/22/2016	SH-001 6/9/2017	11/21/2017
Cample Date.		Parameter Limits	0/22/2010	0/22/2010	0/22/2010	0/22/2010	0/3/2011	11/21/2011
Parameters	Units	ODWS						
Inorganics								
Ammonia-N	mg/L	-	0.12	0.13	(ND < 0.050)	(ND < 0.050)	(ND < 0.050)	(ND < 0.050)
Color Tatal dissolved calida (TDS)	100	5 (AO)	(ND < 2)	(IND < 2)	(ND < 2)	(ND < 2)	9	(ND < 2)
Total dissolved solids (TDS)	mg/L	500 (AO)	328 (ND < 0.10)	300 (ND = 0.10)	330 (ND < 0.10)	214 (ND < 0.10)	234	240 (ND < 0.10)
Hardnoss	mg/L	80-100 (OC)	(ND < 0.10)	(ND < 0.10)	(ND < 0.10)	(ND < 0.10)	250	210
Total kieldahl nitrogen (TKN)	ma/l	-	0.48	0.82	0.17	0.16	0.26	0.20
Dissolved organic carbon (DOC)	ma/l	-	0.40	1.0	29	23	11	-
Nitrogen, organic	ma/L	0.15 (AO)	0.36	0.69	0.17	0.16	0.26	0.20
pH. field	s.u.	6.5-8.5 (OG)	7.71	7.56	7.30	7.97	6.59	7.59
pH, lab	s.u.	6.5-8.5 (OG)	8.05	7.96	7.88	7.98	7.99	7.96
Phosphorus	mg/L	- ` `	3.8	2.4	0.13	1.9	0.11	1.1
Sulfate (dissolved)	mg/L	500 (AO)	31	12	20	23	5.1	8.7
Sulfide	mg/L	0.05 (AO)	(ND < 0.020)	(ND < 0.020)	(ND < 0.020)	(ND < 0.020)	(ND < 0.020)	(ND < 0.020)
Turbidity	NTU	5.0 (AO)	15	23	6.7	4.2	120	-
Alkalinity, bicarbonate (calculated)	mg/L	-	200	240	270	130	200	240
Alkalinity, carbonate (calculated)	mg/L	-	2.1	2.0	1.9	1.2	1.9	2.0
Alkalinity, total (as CaCO3)	mg/L	30-500 (AO)	200	240	270	130	200	240
%difference/ion balance	%	-	3.30	1.44	2.13	1.34	13.1	7.43
Chloride (dissolved)	mg/L	250 (AO)	7.6	2.8	3.5	2.2	1.4	(ND < 1.0)
Hydroxide (as CaCO3)	mg/L	-	(ND < 1.0)	(ND < 1.0)	(ND < 1.0)	(ND < 1.0)	(ND < 1.0)	-
Nitrate (as N)	mg/L	10.0 (MAC)	0.80	1.54	(ND < 0.10)	0.12	0.42	0.68
Nitrite (as N)	mg/L	1.0 (MAC)	0.019	0.012	(ND < 0.010)	(ND < 0.010)	(ND < 0.010)	(ND < 0.010)
Nitrite/Nitrate	mg/L	10.0 (MAC)	0.81 (ND + 0.010)	1.56 (ND + 0.010)	(ND < 0.10)	0.12 (ND +0.010)	0.42 (ND + 0.010)	(ND - 0.010)
Temperature field	nig/∟ Dog C	-	(ND < 0.010)	(ND < 0.010)	(IND < 0.010)	(ND < 0.010)	(ND < 0.010)	(ND < 0.010)
Total suspended solids (TSS)	Deg C	15 (AO)	2000	3000	300	9.03	9.10	1400
Un-ionized ammonia	ma/L		2000	0.0010	(ND < 0.0005)	(ND < 0.00084)	(ND < 0.0005)	(ND < 0.0005)
	mg/L		0.0014	0.0010	(112 < 0.0000)		(112 (0.0000)	(112 < 0.0000)
Total Metals						_		
Aluminum	mg/L	0.10 (OG)	16	22	4.4	5	(ND < 0.005)	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
Antimony	mg/L	0.006 (OG)	(ND < 0.0005)	(ND < 0.0005)	(ND < 0.0005)	(ND < 0.0005)	(ND < 0.0005)	(ND < 0.0005)
Arsenic	mg/L	0.025 (OG)	0.0035	0.003	(ND < 0.001)	(ND < 0.001)	(ND < 0.001)	0.0023
Bandlium	mg/L	1.0 (IVIAC)	0.22	0.01	(ND < 0.0005)	(ND < 0.0005)	(ND < 0.005)	0.29
Beron	mg/L	- 5.0 (IMAC)	0.00059	0.00079	(ND < 0.0005)	(ND < 0.0003)	(ND < 0.0003)	0.00065
Cadmium	ma/l	0.005 (MAC)	(ND < 0.001)	(ND < 0.001)	(ND < 0.001)	(ND < 0.001)	(ND < 0.001)	(ND < 0.0001)
Chromium	ma/l	0.05 (MAC)	0.022	0.058	0.0085	0.009	(ND < 0.0001)	0.036
Cobalt	ma/L	-	0.011	0.022	0.0042	0.0043	(ND < 0.0005)	0.012
Copper	ma/L	1.0 (AO)	0.034	0.055	0.014	0.014	(ND < 0.001)	0.034
Iron	mg/L	0.30 (AO)	25	39	6.5	8.2	0.35	28
Lead	mg/L	0.01 (MAC)	0.0088	0.011	0.0023	0.0033	(ND < 0.0005)	0.0093
Manganese	mg/L	0.05 (AO)	1.3	1.7	0.26	0.36	0.17	0.93
Molybdenum	mg/L	-	0.011	0.034	0.0024	0.0015	0.021	0.0022
Nickel	mg/L	-	0.019	0.034	0.0084	0.0067	(ND < 0.001)	0.021
Phosphorus	mg/L	-	6.5	2.2	0.12	2	(ND < 0.1)	0.97
Selenium	mg/L	0.01 (MAC)	(ND < 0.002)	(ND < 0.002)	(ND < 0.002)	(ND < 0.002)	(ND < 0.002)	(ND < 0.002)
Silver	mg/L	-	(ND < 0.0001)	(ND < 0.0001)	(ND < 0.0001)	(ND < 0.0001)	(ND < 0.0001)	(ND < 0.0001)
Sodium	mg/L	20 (AO)	33	9.3	10	9.1	7.1	4.7
Ihallium	mg/L	-	0.00021	0.00038	0.000088	0.000078	(ND < 0.00005)	0.00025
Iungsten	mg/L	-	(ND < 0.001)	0.031	(ND < 0.001)	(ND < 0.001)	(ND < 0.001)	(ND < 0.001)

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Summary of Groundwater Analytical Results (ODWS) Hydrogeological Assessment Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road, Springwater County of Simcoe

Sample Location:			MW01	MW02	MW03	MW04	MW02	MW15-16
Sample ID:			GW-86882-082316-SA MW01	- GW-86882-082216-SA- MW02	GW-86882-081916-SA MW03	- GW-86882-082216-SA- MW04	GW-086822-060917- SH-001	GW-086822-112117-SH-001
Sample Date:			8/22/2016	8/22/2016	8/22/2016	8/22/2016	6/9/2017	11/21/2017
_		Parameter Limits						
Parameters	Units	ODWS						
Uranium	mg/L	0.02 (MAC)	0.0031	0.0014	0.0029	0.0025	0.00011	0.0011
Vanadium	mg/L		0.038	0.051	0.0093	0.011	(ND < 0.0005)	0.043
Zinc	mg/L	5.0 (AO)	0.051	0.079	0.02	0.017	(ND < 0.005)	0.074
Zirconium	mg/L	-	0.0082	0.0092	0.0015	0.0016	(ND < 0.001)	0.0041
Dissolved Metals								
Aluminum (dissolved)	mg/L	0.10	-	-	-	-	0.95	(ND < 0.005)
Antimony (dissolved)	mg/L	0.006	-	-	-	-	0.0011	(ND < 0.0005)
Arsenic (dissolved)	mg/L	0.025	-	-	-	-	(ND < 0.001)	(ND < 0.001)
Barium (dissolved)	mg/L	1.0	-	-	-	-	0.048	0.031
Beryllium (dissolved)	mg/L	-	-	-	-	-	(ND < 0.0005)	(ND < 0.0005)
Boron (dissolved)	mg/L	5.0	-	-	-	-	0.021	(ND < 0.01)
Cadmium (dissolved)	mg/L	0.005	-	-	-	-	(ND < 0.0001)	(ND < 0.0001)
Calcium (dissolved)	mg/L	-	50	72	82	42	77	60
Chromium (dissolved)	mg/L	0.05	-	-	-	-	(ND < 0.005)	(ND < 0.005)
Cobalt (dissolved)	mg/L	-	-	-	-	-	0.0015	(ND < 0.0005)
Copper (dissolved)	mg/L	1.0	-	-	-	-	0.0035	(ND < 0.001)
Iron (dissolved)	mg/L	0.30	-	-	-		2	(ND < 0.1)
Magnesium (dissolved)	mg/L	-	10	13	13	8	14	(ND < 0.0005)
Lead (dissolved)	mg/L	0.01	-	-	-	-	0.0011	14
Manganese (dissolved)	mg/L	0.05	-	-	-	-	0.26	0.0051
Molybdenum (dissolved)	mg/L	-	-	-	-	-	0.015	0.00061
Nickel (dissolved)	mg/L	-	-	-	-	-	0.0028	(ND < 0.001)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	0.16	(ND < 0.1)
Potassium (dissolved)	mg/L	-	2.6	2.4	2.1	1.4	2.6	1.4
Selenium (dissolved)	mg/L	0.01	-	-	-	-	(ND < 0.002)	(ND < 0.002)
Silver (dissolved)	mg/L	-	-	-	-	-	(ND < 0.0001)	(ND < 0.0001)
Sodium (dissolved)	mg/L	20 (AO)	29	7	9.6	8.2	6.7	2.7
Thallium (dissolved)	mg/L	-	-	-	-	-	(ND < 0.00005)	(ND < 0.00005)
Tungsten (dissolved)	mg/L	-	-	-	-	-	(ND < 0.001)	(ND < 0.001)
Uranium (dissolved)	mg/L	0.02	-	-	-	-	0.00018	0.00039
Vanadium (dissolved)	mg/L	-	-	-	-	-	0.0023	0.00078
Zinc (dissolved)	mg/L	5.0	-	-	-	-	0.12	(ND < 0.005)
Zirconium (dissolved)	mg/L	-	-	-	-	-	(ND < 0.001)	(ND < 0.001)

Footnotes:

ND Not detect
0.151 Parameter

Not detected at the associated reporting limit. Parameter Exceeds Ontario Drinking Water Standards, Table 2 (ODWS, PIBS-4449e01) Page 2 of 2

Land Type Annual Averages Proposed ERRC Simcoe County Springwater, Ontario

10poon

Month	Temperature (°C)	Precipitation (mm)	Rainfall (mm)	Snowmelt (mm)	Potential Evapotranspiration (mm)	Actual Evapotranspiration (mm)	Water Surplus (mm)
January	-7.5	85	19	28	1	1	44
February	-7.1	88	19	21	1	1	36
March	-1.4	61	31	98	8	8	121
April	6	76	68	69	32	32	107
May	12.9	81	81	0	78	78	19
June	17.8	92	92	0	112	112	8
July	20.4	83	83	0	131	130	0
August	19.7	77	77	0	117	109	0
September	16.1	83	83	0	81	77	0
October	9.3	89	89	0	41	41	0
November	3.2	89	73	11	14	14	19
December	-3.1	97	36	23	3	3	39
Total		1001	751	250	619	606	395

Sandy Silt

					Potential	Actual	
Month	Temperature	Precipitation	Rainfall	Snowmelt	Evapotranspiration	Evapotranspiration	Water Surplus
	(°C)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
January	-7.5	85	19	28	1	1	45
February	-7.1	88	19	21	1	1	38
March	-1.4	61	31	98	8	8	121
April	6	76	68	69	32	32	106
May	12.9	81	81	0	78	78	19
June	17.8	92	92	0	112	111	8
July	20.4	83	83	0	131	119	0
August	19.7	77	77	0	117	91	0
September	16.1	83	83	0	81	69	0
October	9.3	89	89	0	41	41	5
November	3.2	89	73	11	14	14	37
December	-3.1	97	36	23	3	3	53
Total		1001	751	250	619	568	433

Land Type Annual Averages Proposed ERRC Simcoe County Springwater, Ontario

Impervious Area (Hard-Packed Gravel)

Month	Temperature (°C)	Precipitation (mm)	Rainfall (mm)	Snowmelt (mm)	Potential Evapotranspiration (mm)	Actual Evapotranspiration (mm)	Water Surplus (mm)
January	-7.5	85	19	28	1	1	46
February	-7.1	88	19	21	1	1	39
March	-1.4	61	31	98	8	8	120
April	6	76	68	69	32	32	106
May	12.9	81	81	0	78	66	19
June	17.8	92	92	0	112	83	11
July	20.4	83	83	0	131	86	0
August	19.7	77	77	0	117	77	0
September	16.1	83	83	0	81	68	10
October	9.3	89	89	0	41	40	44
November	3.2	89	73	11	14	14	69
December	-3.1	97	36	23	3	3	56
Total		1001	751	250	619	479	520

Existing Conditions Water Balance Proposed ERRC Simcoe County Springwater, Ontario

Detail	Units	Impervious Area	Existing Pervious Cover	Total
Input Information				
Land Type ¹	%	0	100	100
Area ²	ha	0.00	4.49	4.49
Soil Type		Sandy Silt	Sandy Silt	
Hydrologic Soil Group		AB	AB	
Pervious Infiltration Factor				
Topography		-	0.2	
Soil		-	0.4	
Land Type		-	0.15	
TOTAL		0	0.75	
Average Annual Depth ¹				
Precipitation	(mm)	1001	1001	
Evapotranspiration	(mm)	479	568	
Output Information				
Annual Rainfall Volume	(m ³)	0	44,989	44,989
Annual Evapotranspiration Volume	(m ³)	0	25,528	25,528
Precipitation Surplus	(m ³)	0	19,461	19,461
Annual Groundwater Recharge Volume ²	(m ³)	0	14,596	14,596
Annual Runoff Volume	(m ³)	0	4,865	4,865

Notes:

1. This amount was proportionally modified to represent average annual conditions using the Shanty Bay weather station (Climate ID: 6117684) Climate Normals data.

Proposed Uncontrolled Conditions Water Balance Proposed ERRC Simcoe County Springwater, Ontario

Detail	Units	Impervious	Urban Lawn	Total
Input Information				
Land Type ¹	%	89	11	100
Total Área	ha	4.00	0.49	4.49
Underlying Soil Type		Sandy Silt	Topsoil	
Hydrologic Soil Group		AB	BC	
Pervious Infiltration Factor				
Topography		-	0.3	
Soil		-	0.3	
Land Type		-	-	
TOTAL		0	0.6	
Average Annual Depth ²				
Precipitation	(mm)	1001	1001	
Evapotranspiration	(mm)	479	606	493
Output Information				
Annual Rainfall Volume	(m ³)	40,040	4,949	44,989
Annual Evapotranspiration Volume	(m ³)	19,160	2,996	22,156
Surplus	(m ³)	20,880	1,953	22,833
Annual Groundwater Recharge Volume ³	(m ³)	2,088	1,172	3,260
Annual Runoff Volume	(m ³)	18,792	781	19,573
Notoo				
Notes:				
 Land Area Assumptions: a) Total Imperivious Area: 				
Land Trees	Total Area (ha)			

Land Type		Total Area (na)	% Impervious	i otal imp. Area (na)
	ERRC	4.49	89	4.00
Total		4.49	89.00	4.00

Notes:

1. This amount was proportionally modified to represent average annual conditions using the Shanty Bay weather station (Climate ID: 6117684) Climate Normals data.

Proposed Conditions Water Balance Additional Infiltration and Evaporation Measures Proposed ERRC Simcoe County Springwater, Ontario

Additional Evaporative Lossess

Stormwater Management Pond		
Surface area of permanent pool ¹		2,467 m ²
Excess evaporation from permanent pool ²	_	137 mm
Total evaporative losses per year		338 m ³
Enhanced Vegetated Swales		
Approx. Length of Swale		525 m
Approx. Ponding within Swale Length		50 % of swale length
Average Surface area at permanent pool ³		394 m ²
Annual average total lake evaporation ¹	_	137 mm
Total evaporative losses per year		54 m ³
	Total	392 m ³
Additional Infiltration Lossess		
Stormwater Management Pond - Infiltration Chamber		
Area of Infiltraiton Gallery		380 m ²
Total Available Volume 4		380 m ³
Void Ratio ⁵		40%
Volume of water		152 m ³
Hydraulic Conductivity of native soil ⁶		1.07E-06 m/s
Infiltration Rate ⁷		18.8 mm/hr
Time to infiltrate water in trench	_	2.21 days
Total infiltration losses per year ⁸		22,885 m ³
Enhanced Swales		
Total surface area of water		394 m ²
Volume of water in swale		66 m ³
Hydraulic Conductivity of Topsoil ⁶		1.00E-08 m/s
Infiltration Rate ⁷		5.4 mm/hr
Time to infiltrate water	_	3.86 days
Total infiltration losses per year ⁹		1,174 m ³
	Total	24,060 m ³

Notes:

1. As per MOE Standards, assumed water to remain at permanent pool elevation for majority of time.

2. Taken from long term lake evaporation monitoring conducted in southern ontario (630mm/year). The lake evaporation total was reduced by the amount of evapotranspiration allowed for in the water balance calculations in order not to double count evaporative losses.

3. Assumptions on dimensions of Enhanced Swale

Depth of Check Dam = 0.50 m Bottom Width = 0.50 m Side Slope = 2.00 H:1V

4. Assumptions on dimensions of clear stone bedding Depth of bedding = 1.00 m

5. TRCA, 2010

- 6. GHD, 2016
- 7. Using equation within Figure C1 in Appendix C of the TRCA Low impact Planning and Design Guide, with Safety Correction Factor of 2.5

Proposed Conditions Water Balance Additional Infiltration and Evaporation Measures Proposed ERRC Simcoe County Springwater, Ontario

8. Assumed that the stormwater management pond will infiltrate all runoff up to and including the 100-year storm event Therefore all average rainfall amounts between May to October from Shanty Bay weather station (Climate ID: 6117684) will infiltrate via the proposed stormwater management pond.

Amount of Rainfall = 509 mm

9. Average # of days per year w/ rainfall, during May to October and no snowfall, according to Climate Normals

for Shanty Bay weather station (Climate ID: 6117684)

Days with precip.= 69 days Amount of Rainfall = 509 mm

Summary of Calculations Proposed ERRC Simcoe County Springwater, Ontario

Deteile	Precipitation	Evapotranspiration	Infiltration	Runoff
Details	(m ³)	(m ³)	(m ³)	(m ³)
Pre-development	<u> </u>			
Existing Conditions	44,989	25,528	14,596	4,865
Percentage of Annual Precipitation		57%	32%	11%
Post-development				
Proposed Conditions (uncontrolled)	44,989	22,156	3,260	19,573
Percentage of Annual Precipitation		49%	7%	44%
Additional Infiltration and Evapotranspiration Measures				
Additional Measures				
Low-Impact Development (LID) Measures		392	24,060	
Proposed Conditions (controlled) ¹	44,989	22,548	22,441	0
Percentage of Annual Precipitation		50%	50%	0%
Pre- to Post-development Difference				
Proposed Conditions (uncontrolled)	0	-3,372	-11,336	14,708
Percentage Change		-7%	-25%	33%
Proposed Conditions (controlled)	0	-2,980	7,845	-4,865
Percentage Change		-7%	17%	-11%
Total volume of water losses per year =	44 989	m ³		

Total volume of water losses per year =	44,989 m°
Percentage of Annual Precipitation lost via water losses =	100%
Proposed Conditions Runoff Coefficient 2 =	0.75
Rainfall Amount =	5.00 mm
Runoff Volume (25 m Storm Event) =	169 m ³
Total Volume of Infiltration Galleries =	218 m ³

Notes:

1. The proposed stomwater management pond is sized to store, infiltrate all surface runoff from the proposed Facility, up to and including the 100-year storm. event

2. Runoff Coefficient for hard-packed gravel parking lot

Appendices

Appendix A Field Investigation Methodology and Protocols

Appendix A Field Investigation Methodology and Protocols

1. Borehole Advancement/Monitoring Well Installation

1.1 Field Activities

Prior to initiating the subsurface investigation activities, all applicable utility companies (gas, telephone, network cables, pipelines and sewers) were contacted through Ontario One-Call.

1.2 Health and Safety

A Site-specific Health and Safety Plan (HASP) outlining specific job tasks and their related hazards was prepared and implemented by GHD prior to initiating field activities. The HASP presents the visually observed Site conditions and identifies potential physical hazards to field personnel. All GHD field and project staff working on and/or visiting the site were required to sign the HASP to document their knowledge of the potential hazards while on-site.

All drilling activities were conducted under Level D Personal Protective Equipment (PPE), which consisted of protective gloves, hard hats, safety glasses, safety boots and reflective vests at all times.

1.3 Borehole Drilling

The drilling work was carried out utilizing a track-mounted drill rig supplied and operated by Profile Drilling Inc., specialist drilling contractors (Ministry of the Environment and Climate Change Licensed Well Drillers), under the full-time supervision of GHD technical representatives.

Twenty seven (27) were advanced as part of the Hydrogeological Assessment, between 5.10 and 30 mBGS (metres below ground surface) between August 5, 2016 to January 6, 2017. The boreholes were advanced by Profile Drilling Inc. (Profile) using a drill rig equipped with hollow-stem augers. The boreholes were advanced to depths ranging from 5.18 and 30.2 mBGS.

Boreholes were advanced using hollow stem auger drilling methods and soil samples were collected every 0.75 metres to the final depth of investigation in all boreholes using a 50 mm outside diameter split spoon sampler. Prior to use and between each borehole location, the drilling and sampling equipment was thoroughly cleaned using Alconox® soap and potable water rinse.

The soil was logged using the Unified Soil Classification System (USGS), making special note of any visual or olfactory evidence of potential impacts.

1.4 Monitoring Well Installations

Monitoring wells were installed in five (5) selected boreholes by the licensed water well drillers consistent with Regulation 903 – Wells. GHD technical staff supervised the monitoring well construction and well development to ensure conformance with GHD's Standard Operating Procedures.

The monitoring wells were typically constructed with 2-inch (~50 mm) Schedule 40 PVC screen and casing. The screen length used for the monitoring wells was 3.0 metres on average and pre-slotted (No. 10 slot). The annular space between the monitoring well screen and surrounding geological formation were backfilled with No. 3 grade silica sand to an average height of 0.6 metres above the top of the

screen. The remaining annular space was backfilled with bentonite. Some monitoring wells were installed with minor alteration to the above installation details, due to the specific conditions encountered.

To complete the instrumentation, an expandable J-plug was installed on the riser style casing to cover the top of the riser pipe to protect against debris falling into the well and surface runoff infiltration. All wells were with an above-ground steel monument casing (4-inch x 4-inch). Each groundwater monitoring well was instrumented with dedicated sampling equipment consisting of polyethylene tubing and Waterra foot valves for monitoring well development and installation.

The wells will be decommissioned in accordance with Regulation 903, when it is determined that they are no longer required for monitoring.

1.5 Monitoring Well Development

Subsequent to the monitoring well installation, each well was developed to ensure hydraulic connection with the screened hydrostratigraphic unit. A hydraulic connection ensures that groundwater levels and samples are representative of the subsurface condition. Development also aids in achieving low-turbidity samples.

The wells were developed using dedicated 5/8" (~16 mm) diameter polyethylene tubing with a Waterra foot valve. Well development activities were undertaken until purged water was clear. In cases where a well was purged dry before sufficient development, the well water level was allowed to recover before continuing.

1.6 Surveying

Subsequent to installation, all wells and boreholes were surveyed for vertical and lateral control, and for water table elevation reference, using a geodetic benchmark¹ to tie in vertical elevations relative to metres above mean sea level (mAMSL) at the Site. The ground surface and top of riser pipe elevation of each of well were surveyed with respect to this benchmark.

2. Water Level Measurements

The measurement of groundwater levels in monitoring wells was required during the hydrogeological investigation in order to determine the presence and depth of groundwater. Water level measurements were used to determine: hydraulic head, hydraulic gradients and the direction of groundwater flow.

Since many decisions concerning the vertical and horizontal flow of groundwater through various types of geologic conditions depend on groundwater/fluid measurements, the accuracy of the measurements made at an appropriate level of precision is very important. Typically, the precision required is 1 mm, and the equipment employed had measurement resolution at this level.

Manual groundwater level measurements were measured using a Solinst water level meter. Measurements were obtained by lowering the electrode, attached to a graduated polyethylene tape,

¹ Benchmark station: 00819798284, Elevation 244.394 mAMSL (locations are based on a steel rod with brass cap bench mark on the east side of Hwy 27, 8.6km South of Junction of Hwy 27 and 92 in Elmvale, 9.6km North of the Junction of Hwy 26 and 27 at Midhurst, 0.4km South of Flos Township concession 3 and 18.1m East of Centerline of hwy 27) was used as a reference point for surveying purposes.

slowly into the well until the indicator sounded. To ensure accuracy, all fluid level readings were doublechecked in the field when recorded.

In order to provide reliable data, each round of water level measurements was collected over as short a period of time as possible. Barometric pressure can affect groundwater levels and, therefore, observation of significant weather changes during the period of water level measurements was noted. Rainfall events and groundwater pumping can also affect groundwater level measurements. Personnel collecting water level data noted if any of these controls are in effect during the groundwater level collection period.

3. Groundwater Sampling

Prior to initiating groundwater sample collection, the wells were purged of the standing stagnant groundwater volume using a dedicated Waterra foot valve and polyethylene tubing. Purging was performed until the water in the well was representative of the actual conditions in the hydrostratigraphic unit. Stabilization was achieved by the removal of at least three times the volume of standing water in the well. Purging was considered complete once purged groundwater field parameters including conductivity, temperature and pH were stable. Stabilization was achieved when field measurements for conductivity and temperature were within a range of plus or minus 10 percent of the average for the last three readings and field measurements for pH were within a range of plus or minus 0.1 pH unit of the average for the last three three readings.

The wells were purged using dedicated inertial pumps. In the event of a slowly recharging well, the well was pumped dry to ensure all standing water was removed from the sand pack and then allowed to recover prior to sample collection.

In the event of a well with groundwater that contains a high amount of silt or sediment after well development, a 0.75"x36" PVC water bailer was used to collect the water.

Water samples were collected directly from the dedicated tubing or bailer to laboratory supplied sample containers. Samples were relinquished to Maxxam Laboratories in Mississauga, Ontario under Chain of Custody protocols. The samples were analyzed for Ontario Drinking Water Standards (ODWS) and Provincial Water Quality Objectives (PWQO) criteria.

4. Single Well Response Tests

Single well response tests (SWRT) were completed at five (5) monitoring well installations to determine the hydraulic conductivity of the screened geologic formation. The SWRT consisted of falling head tests (slug tests), and rising head tests (recovery rests) as described in the sections below.

4.1 Falling Head Test (Slug Test)

The slug test involves causing a sudden change in water level in a well and measuring the water level response within that well. Water level change may be induced by suddenly injecting or emplacing a known quantity or "slug" into the well. The slug can water or solid (stainless steel, polyvinyl chloride). A detailed description of the procedure is provided, as follows:

- i) The static water level was determined prior to any testing of the well.
- ii) A datalogger, programmed to measure water pressure at an appropriate interval (e.g., 5 seconds), was installed in the well at a known depth.

- iii) A slug of known dimensions was set in place just above the static water level.
- iv) The slug was then released instantaneously until it was completely submerged in the water column.
- v) After the initial positive displacement of the water column, water levels were monitored manually.
- vi) When the water level reached approximately 90 percent of the original observed (static) water level, the slug was then rapidly removed from the water column to initiate a "rising-head" test.

4.2 Rising Head Test (Recovery Test)

The recovery test also involves causing a sudden change in water level in a well and measuring the water level response within that well. Water level change may be induced by suddenly removing a known quantity or "slug" out of the well. The slug is usually a stainless steel or polyvinyl chloride rod.

Recovery tests were carried out after the slug tests described above. Water level monitoring continued until the water level was within 10 percent of the original static level.

5. Guelph Permeameter Tests

The Guelph Permeameter (GP) is a well-known borehole permeameter technique. Guelph permeameter measurements are carried out in the vadose zone above the water table, where the soil is unsaturated. Steady flow produces a small inner saturated zone adjacent to the well, encased within a larger outer wetted, but unsaturated volume. As a consequence, combined saturated-unsaturated flow occurs.

The GP method measures the steady -state rate necessary to maintain a constant depth of water in an uncased cylindrical borehole above the water table. The field saturated hydraulic conductivity is calculated using an approximate analytical solution. A summary of field procedures is presented below:

- Excavate (hand dig) through fill material to expose native soil if necessary.
- Excavate a cylindrical borehole to the desired depth in the material to be tested.
- Fill the permeameter with water and place over the borehole.
- Start the permeameter by raising the air-inlet tube out of the outlet port.
- Set the desired H level by adjusting the height of the air-inlet tube.
- Monitor the rate of fall of the liquid surface in the reservoir until a steady rate, r, is attained.

The hydraulic conductivity measured in the unsaturated (vadose) zone is referred to as the "field-saturated" hydraulic conductivity (K*fs*) (after Reynolds et al., 1986). The Guelph Permeameter method measures the steady-state flow rate (Q) necessary to maintain a constant depth of water (H) in an uncased borehole. K*fs* is then calculated from Q and H using analytical solutions.

The analytical solution input parameters include the following:

- Reservoir cross sectional area
- Water height
- Borehole radius
- Soil texture
- Steady state rate of water level change

Appendix B Stratigraphic Logs and Grain Size Analyses

Appendix B.1 Selected Stratigraphic and Instrumentation Logs
	REFEREN	ICE No.	:	086822								ENCLOSURE No.: 1
		6			BOREHOLE No	.:_	E	3H01	-16		В	BOREHOLE REPORT
		6			ELEVATION:		260	.66 m	1			Page: <u>1</u> of <u>1</u>
	CLIENT:		Cou	nty of Simcoe							LE	EGEND
	PROJECT	:	Geo Envi	itechnical Investigati	on e Recovery Centre (ER	RC)					\square	SS - SPLIT SPOON
	LOCATIO	N:	2976	6 Horseshoe Valley	Road West, Springwate	er						ST - SHELBY TUBE
	DESCRIBI	ED BY:	S. A	Indreou	CHECKED BY:		F. Ger	gis				RC - ROCK CORE
	DATE (ST	ART):	5 Au	ugust 2016	DATE (FINISH):	5 Augu	st 20	16		Ţ	- WATER LEVEL
ł		, -		~		, _	-					
	Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL AN	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) \triangle Field Sensitivity (S) \Box Lab \bigcirc Water content (%) $\underset{W_{p} \text{ W}_{i}}{\overset{\blacksquare}{}}$ Atterberg limits (%) $\overset{\blacksquare}{}$ "N" Value (blows / 12 in30 cm)
	Feet Metres	260.66		GROUN	D SURFACE			%			N	10 20 30 40 50 60 70 80 90
		260.63		TOPSOIL : 25 mm NATIVE : SAND, some silt, f	ine grained well	\mathbb{N}	SS-1	50	3	1-0-1-1	1	
	2 - 0.76 3 - 1.0 4	259.90		Graded, trace grav moist, very loose SANDY SILT, trac gravel, grey, moist	e to some clay and		SS-2	50	3	1-4-6-8	10	
	6 <u>-</u> 7 <u>-</u> 2.0				· · ·	X	SS-3	100	5	4-21-13-12	34	
	8 -+ 2.29 8 -+ 9 -+ 10 3 0	258.37		SAND, fine graine gravel, trace grani moist, dense	d, well graded, trace tic cobbles, brown,	X	SS-4	83	3	7-14-15-14	29	
							SS-5	83	4	6-13-21-27	34	
	13 + 4.0 14 + 4.1 15 + 4.1 15 + 4.1			becoming very de	nse		55-6	87	8	27-34-38-48	72	
	17 <u>+</u> 5.0 17 <u>+</u> 18 <u>+</u> 19 <u>+</u> 6 0											
	$\begin{array}{c} 20 \\ -1 \\ 0 \\ 1 \\ 22 \\ -1 \\ -1 \\ 22 \\ -1 \\ -1 \\ -1 $	254.56		SILT, some sand, moist, very dense	trace gravel, brown,	X	SS-7	100	5	16-50	50	
L.G.D.I 8/11/1/	$\begin{array}{c} 23 \\ 24 \\ 25 \\ 26 \\ 26 \\ 8 \\ 0 \end{array}$	252.76		granitic cobbles		X	SS-8	100	9	16-50/ 125mm	100	
	27 28 29			END OF BOREHO NOTE : End of Borehole a	DLE: t 7.90 m bgs							
86822-12.GP	30 + 9.0 31 + 32 + 32			Borehole was dry Borehole backfiller medium to the top bgs denotes 'below	upon completion d with enviroplug v ground surface'							
H+WELL (33 <u>+</u> 10.0 34 <u>+</u>											
IH GKAPI	35 – 36 – 11.0											
20 101	37 -											
	38 <u>+</u> 39 -											
-							-					

REFERENCE No.: 086822	<u> </u>							ENCLOSURE No.: 2
GHD	BOREHOLE No.	:	В	H02	-16		В	OREHOLE REPORT
CIID	ELEVATION:		255.	98 m	1			Page: <u>1</u> of <u>1</u>
CLIENT: County of Simcoe							LE	GEND
PROJECT: Environmental Resour	ce Recovery Centre (ERF	RC)					\boxtimes	SS - SPLIT SPOON
LOCATION:2976 Horseshoe Valle	y Road West, Springwate	r						GS - GRAB SAMPLE
DESCRIBED BY: <u>S. Andreou</u>	CHECKED BY:	F	. Gerg	is				RC - ROCK CORE
DATE (START): 5 August 2016	_ DATE (FINISH)	: _5	Augus	st 20'	16		Ŧ	
Depth (m) BGS (m) BGS Stratigraphy	RIPTION OF ND BEDROCK	State	I ype and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Snear test (Cu) \bigtriangleup Field Sensitivity (S) \Box Lab \bigcirc Water content (%) $\overset{\blacksquare}{\overset{\blacksquare}{\overset{\blacksquare}}}$ Atterberg limits (%) $\overset{\bullet}{\overset{\blacksquare}{\overset{\blacksquare}}}$ "N" Value (blows / 12 in30 cm)
Feet Metres 255.98 GROU	ND SURFACE m /	+		%			N	10 20 30 40 50 60 70 80 90
1 - NATIVE : 2 - SAND and SILT 3 - 0.76 255.22 rootlets, grey, m	trace to some gravel, pist, compact		SS-1	75	3	1-6-6-8	12	
4	ce gravel, brown, moist, t		SS-2	83	10	3-14-21-23	35	
			SS-3	42	10	9-12-13-19	25	
		E s	SS-4	71	5	7-20-27-40	47	•
11 3.35 252.63 12 SAND, trace silt brown, moist, de	and gravel, layered, nse		SS-5	75	7	10-19-28-33	47	
13 4.0 14 251.41 15 4.57 16 5.0 17 18 19 19	TY SAND, brown,	۶ ۲	SS-6	83	4	12-27-36-50	63	
$\begin{array}{c} 20 & & 6.0 \\ 21 & \\ 22 & \\ 23 & \\ 24 & \end{array}$		5	SS-7	83	2	7-22-32-42	54	
25		5	SS-8	94	14	22-32-50	82	0
$\begin{array}{c} 27 \\ 28 \\ 29 \\ 30 \\ 30 \\ 31 \\ 32 \\ 33 \\ 34 \\ 35 \\ 36 \\ 38 \\ 38 \\ 38 \\ 38 \\ 38 \\ 38 \\ 38 \\ 38$	IOLE: at 8.08 m bgs v upon completion ed with enviroplug p ow ground surface'							
5 John								

REFE	RENCE	No.:		086822								ENCLOSURE No.: 3
		G			BOREHOLE No	.:_		BH03	8-16		В	OREHOLE REPORT
		9	שי		ELEVATION:		254	1.46 m	า			Page: <u>1</u> of <u>1</u>
CLIEN	т:		Cour	nty of Simcoe							LE	GEND
PROJE	ECT:		Geot Envi	technical Investigati ronmental Resource	on e Recovery Centre (ER	RC)					\square	SS - SPLIT SPOON
LOCA			2976	Horseshoe Valley	Road West, Springwate	er						ST - SHELBY TUBE GS - GRAB SAMPLE
DESC	RIBED B	BY: _	S. Ai	ndreou	CHECKED BY:		F. Ger	gis			Ī	RC - ROCK CORE
DATE	(START):	8 Au	gust 2016	DATE (FINISH)	: _	8 Aug	ust 20	16		Ť	- WATER LEVEL
												-
Depth	Elevation	(m) BGS	Stratigraphy	DESCR SOIL AN	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) △ Field Sensitivity (S) □ Lab ○ Water content (%) Image: Atterberg limits (%) ● "N" Value (blows / 12 in30 cm)
Feet Me	tres 254.	.46	1 PERS	GROUN	D SURFACE			%			N	10 20 30 40 50 60 70 80 90
	.76 253	.70		NATIVE : SAND and SILT, to rootlets, grev, mois	race to some gravel,		SS-1	62	9	1-2-3-7	5	
	1.0			SAND, trace silt, c silt layers, brown, dense	ccasional sand and moist, compact to		SS-2	50	10	5-6-6-8	12	
	2.0						SS-3	58	8	4-5-10-15	15	
	3.0					X	SS-4	71	3	6-18-21-25	39	
	5.0						SS-5	100	9	8-19-25-30	44	
	4.0 5.0					X	SS-6	87	13	10-20-28-32	48	
$ \begin{array}{c} 18 \\ 19 \\ 20 \\ 21 \\ 22 \\ 22 \\ -21 \\ 22 \\ -21 \\ 22 \\ -21 \\ $	5.0			becoming very der	nse	X	SS-7	75	12	11-25-27-33	52	
23	7.0 3.0 246	.53 –				X	SS-8	50	9	17-50	50	
				END OF BOREHO	<u>DLE</u> :							
$\begin{array}{c} 28 \\ -29 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -$	9.0 0.0 1.0			NOTE : End of Borehole a Borehole was dry Borehole backfiller medium to the top bgs denotes 'below	t 7.93 m bgs upon completion d with enviroplug v ground surface'							
37												

JG WITH GRAPH+WELL 086822-12.GPJ INSPEC_SOL

REFEREN	NCE NO.		086822								ENCLOSURE NO.: 4
	G	HD		BOREHOLE No.	:_	E	3H04	-16		B	OREHOLE REPORT
				ELEVATION:		240	./3 11				Page: <u>1</u> of <u>1</u>
CLIENT: PROJECT		Cou Geo Envi	nty of Simcoe technical Investigati ronmental Resource	on Recovery Centre (ERF	RC)					<u>LE(</u>	<u>GEND</u> SS - SPLIT SPOON
LOCATIO	N:	2976	6 Horseshoe Vallev	Road West, Springwate	r						ST - SHELBY TUBE
DESCRIP		<u> </u>	ndroou			E Corr	nio				GS - GRAB SAMPLE
DESCRID		<u> </u>				F. Gei	<u>JIS</u>			Ţ	- WATER LEVEL
DATE (ST	ART): _	8 Au	igust 2016	DATE (FINISH):	_	8 Augu	st 20'	16			
Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL ANI	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) \triangle Field Sensitivity (S) \Box Lab \bigcirc Water content (%) $\overset{\blacksquare}{}$ Atterberg limits (%) $\overset{\blacksquare}{}$ "N" Value (blows / 12 in30 cm)
Feet Metres	246.73		GROUN	D SURFACE			%			N	10 20 30 40 50 60 70 80 90
0 <u> </u>	246.70		TOPSOIL with org NATIVE : SAND, some silt, t	anics : 25 mm /	X	SS-1	50	5	2-3-4-4	7	
3 <u>-</u> 1.0 4 <u>-</u>			brown, damp, loos	e	X	SS-2	50	1	1-3-2-3	5 (
6 – 7 – 2.0			occasional sand a	nd silt layers, moist	X	SS-3	71	3	2-4-5-6	9	
8 <u>-</u> 9 <u>-</u> 10 <u>-</u> 30			becoming dense		$\left \right $	SS-4	83	3	5-12-19-21	31	
10					X	SS-5	92	3	8-18-19-22	37	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$					X	SS-6	92	7	10-18-22-31	40	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			trace clay and grav and silt layers, bro	vel, occasional sand wn, moist, very dense		SS-7	71	19	11-26-32-38	58	
25	238 50		some silt, trace gra	avel, greyish brown	X	SS-8	100	2	12-25-36-50	61	0 •
이 -·· 는 8.23 표 28			END OF BOREHO	LE:							
≝ 29 +											
30 <u>+</u> 9.0			End of Borehole at	8.23 m bgs							
) 31 – 1 1 – 1 1 – 1 1 – 1			Borehole was dry Borehole backfilled	upon completion I with enviroplug							
80 32 − - 10 0			medium to the top	, oround surface'							
≝ ³³ – 10.0 ¥ 34 – 1			595 GENORES DEION	giouna sunaoe							
Hdg 35 —											
ä ≝ 36 – 11.0											
37 –											
_୪ 39 —											

REFEREN	ICE No.:		086822								ENCLOSURE No.: 5
	G	HD		BOREHOLE No.	:_	E	3H05	-16		В	OREHOLE REPORT
				ELEVATION:		253	.57 m	1			Page: <u>1</u> of <u>1</u>
CLIENT:		Cou	nty of Simcoe							LE	GEND
PROJECT	:	Geo Envi	ironmental Resourc	ion e Recovery Centre (ERF	RC)					\boxtimes	SS - SPLIT SPOON
LOCATIO	N:	297	6 Horseshoe Valley	Road West, Springwate	r						ST - SHELBY TUBE GS - GRAB SAMPLE
DESCRIBI	ED BY:	S. A	ndreou	CHECKED BY:		F. Ger	gis			Ī	RC - ROCK CORE
DATE (ST	ART):	9 Au	ugust 2016	DATE (FINISH)	:	9 Augu	st 20	16		Ť	- WATER LEVEL
Depth	Elevation (m) BGS	Stratigraphy	DESCF SOIL AN	RIPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	$\begin{array}{llllllllllllllllllllllllllllllllllll$
Feet Metres	253.57		GROUN	ID SURFACE			%			N	10 20 30 40 50 60 70 80 90
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	252.81		NATIVE : SAND, some silt, 1 brown, damp to dr	janics : 25 mm / trace to some gravel, ry, loose /		SS-1	58	7	1-2-3-7	5	
3 <u>1</u> 1.0 4 <u>1</u> 5 <u>1</u>			SILTY CLAY, trac stiff to very stiff	e gravel, grey, moist,		SS-2	87	2	3-13-8-7	21	
6 – 2.0 7 – 2.13	251.44		SAND, fine graine	d, some silt, brown,	X	SS-3	50	22	5-7-9-10	16	
8 9 10 3.0			moist, dense			SS-4	75	5	6-15-18-14	33	
			auger grinding		X	SS-5	67	5	11-16-10-11	26	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			occasional sansy	silt layers, varved		SS-6	83	8	10-18-27-37	45	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			some silt, trace gr very dense	avel, brown, moist,	X	SS-7	100	4	13-24-32-40	56	
25	245.64 245.34		SILT, some clay, t ∖grey, moist, very c	race sand and gravel, lense /		SS-8	92	18	10-30-43-50, 125mm	73	
29 + 9.0 30 + + 1 31 + + + 1 32 + + + 1 33 + + + 1 10.0 34 + +			END OF BOREHO NOTE : End of Borehole a Borehole was dry Borehole backfille medium to the top bgs denotes 'below	DLE: t 8.23 m bgs upon completion d with enviroplug w ground surface'							
35											
38 – 39 –											

REFEREN	ICE NO.		086822								ENCLOSURE NO.: 6
	6	HD		BOREHOLE No.	:_	E	3H06	-16		В	OREHOLE REPORT
				ELEVATION:		243	.44 m				Page: <u>1</u> of <u>1</u>
CLIENT:		Cour Geo	nty of Simcoe technical Investigatio	on						LE	GEND
PROJECT	:	Envi	ronmental Resource	Recovery Centre (ERF	RC)						SS - SPLIT SPOON ST - SHELBY TUBE
LOCATION		2976	S Horseshoe Valley	Road West, Springwate	r	5.0					GS - GRAB SAMPLE
DESCRIBI		<u> </u>	ugust 2016	DATE (FINISH)	. —	12 Aug	<u>)is</u> st 2(016		Ţ	- WATER LEVEL
	<u>, ((())</u>	127				12 / 109	00120				
Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL ANI	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) △ Field Sensitivity (S) □ Lab ○ Water content (%) \mathbf{W}_{p} w, Atterberg limits (%) ● "N" Value (blows / 12 in30 cm)
Feet Metres	243.44	manan	GROUN	D SURFACE			%			Ν	10 20 30 40 50 60 70 80 90
			SILTY SAND, som and rootlets, browr compact	e gravel, trace topsoil a, damp to moist,		SS-1	62	6	7-11-9-9	20	
$\begin{array}{c} 3 \\ 4 \\ - \\ 5 \\ - \\ 15 \\ - \\ 152 \end{array}$	241.92				X	SS-2	67	8	3-6-8-7	14	
6 <u>-</u> 2.0 7 <u>-</u> 2.0			SILTY SAND TILL, moist, compact	, some gravel, brown,		SS-3	62	5	7-13-14-12	27	
8 — <u>–</u> – 9 —			becoming dense		X	SS-4	75	6	10-19-20-24	39	
			auger refusal, very	dense	M	SS-5	100	6	50/ 75mm	100	
$ \begin{array}{c} 12 \\ -13 \\ -14 \\$					×	SS-6	100		6/125mm	100	
$15 - \frac{1}{10} - \frac{1}$						SS-7	83	5	16-41-45-49	86	○ ●
17 <u>-</u> 5.18 18 <u>-</u>	238.26		END OF BOREHC	DLE:							
$ \begin{array}{c} 19 \\ 20 \\ \\ 21 \\ 22 \\ \\ 23 \\ \\ 7.0 \end{array} $			NOTE : End of Borehole at Borehole was dry of Borehole backfilled medium to the top bgs denotes 'below	5.18 m bgs upon completion I with enviroplug v ground surface'							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$											
26 – 8.0 27 – 8.0											
1 29											
31											
8 32 											
34											
30 -11.0 37 -											
<u> 39 —</u>											

								ENCLOSURE NO.: 7
GHD	BOREHOLE No.:		E	<u>8H07</u>	'-16		В	OREHOLE REPORT
	ELEVATION:		247	.11 m	1			Page: <u>1</u> of <u>1</u>
CLIENT: County of Simcoe Geotechnical Investiga	tion						<u>LE(</u>	GEND
		0)						ST - SHELBY TUBE
	/ Road West, Springwater							GS - GRAB SAMPLE
DESCRIBED BY: <u>S. Andreou</u>	CHECKED BY:		F. Gerg	İS			⊥L ▼	- WATER LEVEL
DATE (START): <u>12 August 2016</u>	_ DATE (FINISH):	_	12 Aug	ust 20	016			
DESC Stratigraphy VH TIOS	RIPTION OF ND BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	$ \begin{array}{c c} Shear test (Cu) & \bigtriangleup \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$
Feet Metres 247.11 GROU	ND SURFACE			%			N	10 20 30 40 50 60 70 80 90
1 - 0.46 246.65 RE-WORKED N/ SAND and SILT, some topsoil, browned	ATIVE : trace gravel, trace to wn, damp to moist,	M	SS-1	67	4	2-6-4-6	10	
3 - 1.0 4 - SAND, some silt, brown to greyish	trace gravel, reddish brown, loose	X	SS-2	71	8	1-3-4-5	7	
		M	SS-3	71	9	2-4-6-7	10	
		X	SS-4	67	6	2-4-4-6	8	
		\square	SS-5	92	10	1-3-5-7	8	
$\begin{vmatrix} 13 & -4.0 \\ 14$	compact		SS-6	79	3	1-4-11-14	15	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			SS-7		8	7-12-15-18	27	
	IOLE:							
19	at 5.18 m bos							
21 Borehole was dry Borehole backfille medium to the to	v upon completion ed with enviroplug p							
23 - 7.0 bgs denotes 'belo	ow ground surface'							
31								
38 [−] _−								
g <u>39</u>								

	REFEREN	ICE NO.	·	086822								ENCLUSURE NO 0
		G	HD		BOREHOLE No	:	I	3H08	-16		B	OREHOLE REPORT
					ELEVATION:		252	.71 m	1			Page: <u>1</u> of <u>1</u>
	CLIENT: PROJECT	:	Cou Geo Envi	nty of Simcoe technical Investigation ronmental Resource	on Recovery Centre (ER	RC)					<u>LE(</u>	<mark>GEND</mark> SS - SPLIT SPOON ST - SHELBY TUBE
	LOCATIO	N:	2976	6 Horseshoe Valley	Road West, Springwate	r						GS - GRAB SAMPLE
	DESCRIB	ED BY:	<u>S. A</u>	ndreou	CHECKED BY:		F. Ger	gis			⊥L ▼	- WATER LEVEL
	DATE (ST	ART): _	12 A	lugust 2016	DATE (FINISH)	: _	12 Aug	ust 20)16			
	Depth	levation n) BGS	atigraphy	DESCR SOIL ANI	IPTION OF D BEDROCK	State	/pe and umber	scovery	oisture	Blows per 6 in. / 15 cm	netraion Index	$\begin{array}{llllllllllllllllllllllllllllllllllll$
		шр	Str				ĻΖ	Å	≥o	or RQD	Ъ	 "N" Value (blows / 12 in30 cm)
Fe 0	eet Metres	252.71	XXX					%			N	10 20 30 40 50 60 70 80 90
1	 0.76	251.95		SAND, some silt, t topsoil, light brown	, moist, loose	X	SS-1	62	5	2-2-4-3	7	
4	· 1.0 ·			SAND, some silt, t brown, moist, loos	race gravel, light e	Å	SS-2	42	5	2-2-2-2	4	
5 6 7	2.0						SS-3	58	5	1-1-2-2	3	
8 9 1(249.81	717	CLAYEY SILT, sor	ne sand, trace gravel.		SS-4	67	4	2-2-1-2	3	
12 12 13 14	1 2 3 4.0 4			grey, moist, stiff			SS-5	54	21	3-6-7-10	13	
16 16 17	5 - 4.57 6 - 5.0 7 - 5.18	248.14 247.53		SANDY SILT TILL gravel, grey, moist	, some clay, trace , compact	X	SS-6	96	8	8-9-11-13	20	
18	3 — [- 9 — [-			END OF BOREHO	<u>)LE</u> :							
20 2 ⁷ 23	$1 + \frac{1}{2}$			NOTE : End of Borehole at Borehole was dry of Borehole backfilled	5.18 m bgs upon completion with enviroplug							
23 24 24 24	$3 \xrightarrow{-1}{-1} 7.0$ 4 $\xrightarrow{-1}{-1}$			bgs denotes 'belov	v ground surface'							
25 26	$5 - \frac{1}{2}$ $3 - \frac{1}{2} - 8.0$											
ອ 27 28 29	7											
	9 <u>-</u>											
12.GP	o 9.0											
86822- 5 5	1 — <u>1</u> + 2 —1											
33 JELL	310.0											
V+Hd 34	4											
40 H 36	o 611 ∩											
	7 -											
SOIL LO SOIL LO	3 - 9 - 											

REFERENCE No.: 0868							ENCLOSURE No.: 1
CHD	BOREHOLE No.:	В	H09-	16	_	B	OREHOLE REPORT
GHD	ELEVATION:	261.8	83 m				Page: <u>1</u> of <u>1</u>
CLIENT: County of Sin	mcoe					LEC	GEND
PROJECT: Environment	I Investigation al Resource Recovery Centre (ERRC	;)				\square	SS - SPLIT SPOON
LOCATION: 2976 Horses	hoe Valley Road West, Springwater						ST - SHELBY TUBE GS - GRAB SAMPLE
DESCRIBED BY: O. Sabeeh	CHECKED BY:	S. Shah	angiar	n			RC - ROCK CORE
DATE (START): <u>5 January 20</u>	DATE (FINISH):	5 Janua	ry 201	7		Ţ	- WATER LEVEL
Depth Elevation (m) BGS Stratigraphy	DESCRIPTION OF	Type and Number	Recovery	Content Content	ows per 6 in. / 15 cm or RQD	Penetraion Index	$\begin{array}{llllllllllllllllllllllllllllllllllll$
Feet Metres 261.83	GROUND SURFACE		%			N	10 20 30 40 50 60 70 80 90
1 – NATIV SAND,	E : some silt, rootlets, dark brown,	\$5-1	33	12	1-1-2-3	3	
2 - 0.76 3 - 1.0 4 - 1.0 SAND,	very loose trace silt, brown, moist, loose	SS-2	50	7	1-4-4-5	8	
		SS-3	58	3	1-3-4-5	7	
8 – – very lo	ose	SS-4	63	3	1-1-2-3	3	•
11	silt, loose	SS-5	58	8 2	2-4-5-4	9	
13 - 4:0 257.87 SAND 14 - 15 - 15 - 15	Y SILT TILL, trace gravel, grey, very dense						
16 - 5.0 17 - 5.18 256.65	X	SS-6	75	6 6-1	14-36-50/ 76mm	50	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$:						
21 End of 22 Boreho 23 7.0 Boreho	Borehole at 5.18 m bgs ble was dry upon completion ble backfilled with enviroplug						
24	notes 'below ground surface'						
29 - 9.0							
32							
36 <u>-</u> 11.0							
$\frac{1}{20} \frac{39}{40} = 12.0$							
46 <u>-</u> 14.0							

_	REFEREN	ICE No.		086822								ENGLOSURE NO.: 2
		G	HD		BOREHOLE No	.:_		BH10	-16		В	OREHOLE REPORT
		X			ELEVATION:		258	8.92 m	1			Page: <u>1</u> of <u>1</u>
	CLIENT: PROJECT LOCATION	: N:	Cou Geo Envi	nty of Simcoe technical Investigati ironmental Resource 6 Horseshoe Valley	on e Recovery Centre (ER Road West, Springwate	RC) er						GEND SS - SPLIT SPOON ST - SHELBY TUBE GS - GRAB SAMPLE
	DESCRIBI	ED BY:	<u>0.</u> S	abeeh	CHECKED BY:		S. Sha	hangi	an			RC - ROCK CORE
	DATE (ST	ART):	5 Ja	nuary 2017	DATE (FINISH)	: _	5 Janu	ary 20	017		Ţ	- WATER LEVEL
F												
	Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL AN	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion	$ \begin{array}{c c} \text{Shear test (Cu)} & \bigtriangleup \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$
F	eet Metres	258.92		GROUN	D SURFACE	~	001	%	11	2222	N	
	2 <u>-</u> 3 <u>-</u> 0.76	258.16		FILL: SAND, trace to so rootlets, dark brow	me silt, topsoil with n to brown, loose		00.0	33		2-3-3-2	0	
	4			SILTY CLAY, sand	dy, brown, moist, firm	Å	SS-2	50	8	1-2-3-4	5	
	6 7 2.0					X	SS-3	63	9	3-3-5-4	8	
1	8 <u>-</u> 2.29 9 <u>-</u> 10 <u>-</u> 3.0	256.63		CLAYEY SILT, tra some sand, rootle stiff	ce gravel, trace to ts, grey, moist, very	X	SS-4	75	11	3-8-8-6	16	
1				becoming firm		X	SS-5	67	13	3-3-3-4	6	
1	13 - 4.0 14 - 4.57 15 - 4.57 16 - 5.0 17 - 5.0	254.35		SANDY SILT TILL moist, dense	, trace gravel, grey,	X	SS-6	75	7	7-16-27-41	43	
	18 — 19 — 20 — 6.0		• •	damp to moist, ve	ry dense							
	21 <u>+</u> 22 + 22 +		• •			X	SS-7	83	11	10-27-31-34	58	•
	23 77.00 24	251.92		SAND, some silt to dense	o silty, grey, damp,							
2	26 <u> </u>	250.69				X	SS-8	75	3	12-13-24-18	37	
	$\begin{array}{c} 30 \\ 29 \\ 30 \\ 31 \\ 32 \\ 32 \\ 33 \\ 33 \\ 34 \\ 35 \\ 36 \\ 36 \\ 36 \\ 37 \\ 38 \\ 39 \\ 39 \\ 39 \\ 31 \\ 38 \\ 39 \\ 30 \\ 31 \\ 31 \\ 31 \\ 31 \\ 31 \\ 31 \\ 31 \\ 32 \\ 31 \\ 31 \\ 31 \\ 32 \\ 31 \\ 31 \\ 31 \\ 31 \\ 31 \\ 31 \\ 31 \\ 31$			END OF BOREHO NOTE : End of Borehole a Borehole was dry Borehole backfille medium to the top bgs denotes 'below	DLE: t 8.23 m bgs upon completion d with enviroplug v ground surface'							

_	REFEREN	ICE NO.		086822								
		6	HD		BOREHOLE No.	:	E	3H11	-16		B	OREHOLE REPORT
		/			ELEVATION:		258	.26 m	1			Page: <u>1</u> of <u>1</u>
	CLIENT: PROJECT LOCATIO	: N:	Cour Geo Envi	nty of Simcoe technical Investigatii ronmental Resource 6 Horseshoe Valley	on Recovery Centre (ERF Road West, Springwate	RC) er						GEND SS - SPLIT SPOON ST - SHELBY TUBE GS - GRAB SAMPLE
	DESCRIBI	ED BY:	0. S	abeeh	CHECKED BY:		S. Sha	hangi	an		Ū	RC - ROCK CORE
	DATE (ST	ART): _	6 Ja	nuary 2017	DATE (FINISH)	:	6 Janu	ary 20)17		Ţ	- WATER LEVEL
	Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL ANI	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) △ Field Sensitivity (S) □ Lab ○ Water content (%) ↓ Atterberg limits (%) ● "N" Value (blows / 12 in30 cm)
Fe	eet Metres	258.26		GROUN	D SURFACE			%			N	10 20 30 40 50 60 70 80 90
1		257.50		FILL : SAND, trace silt ar brown, moist, loose	nd rootlets, dark		SS-1	33	9	1-3-2-2	5	
4	1.0 			NATIVE: SAND, trace silt, b	rown, moist, loose	Å	SS-2	67	6	2-3-4-3	7	
6 7	2.0			very loose		Å	SS-3	83	9	1-1-2-1	3	
8 9				silty, loose		M	SS-4	83	11	1-3-5-8	8	
				some clay and silt, moist, very stiff	trace gravel, grey,		SS-5	83	17	4-8-11-15	19	
15 16 17 17	6 + 4.57 6 + 5.0 7 + 5.0	253.69		SAND to SANDY S damp, dense	SILT, trace silt, brown,	X	SS-6	83	4	9-17-31-42	48	
19 20 21 22 23) +++ 6.0) +++++ 2 ++++ 3 +++ 7.0			grey, moist, very d	ense	X	SS-7	75	10	9-22-36-50	58	
24 26 27	6 6 8.0 7 8.23	250.03				X	SS-8	75	4	10-39-50/ 76mm	89	
SOIL LOG WITH GRAPH+WELL 086822-12.GPJ INSPEC_SOLGDI 8/11/1/ 37 2 3 4 4 4 5 4 4 9 5 8 2 2 9 5 5 7 5 2 5 5 5 5 7 34 4 4 5 4 5 4 5 4 5 5 5 5 5 5 5 5 5 5 5	9.0 2.1 3.1 4.1 5.1 5.1 5.1 5.1 5.1 5.1 5.1 5			END OF BOREHC NOTE : End of Borehole at Borehole was dry to Borehole backfilled medium to the top bgs denotes 'below	8.23 m bgs upon completion I with enviroplug I ground surface'							

G	HD		BOREHOLE No.	:	E	3H12	2-16		В	ORFHOLE REPORT		
0	9		ELEVATION: 255.99 m						BOREHOLE REPORT			
			ELEVATION:		255	.99 m	1			Page: <u>1</u> of <u>1</u>		
	Cou	nty of Simcoe							<u>LE</u>	GEND		
:	Envi	ironmental Resource	e Recovery Centre (ERI	RC)					\boxtimes	SS - SPLIT SPOON		
N:	2976	6 Horseshoe Valley	Road West, Springwate	r						GS - GRAB SAMPLE		
ED BY:	0. S	abeeh	CHECKED BY:		S. Shal	nangia	an		Ī	RC - ROCK CORE		
ART): _	21 C	December 2016	DATE (FINISH)	: _	21 Dec	embe	er 2010	6	Ţ	- WATER LEVEL		
Elevation (m) BGS	Stratigraphy	DESCR SOIL AN	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	$ \begin{array}{llllllllllllllllllllllllllllllllllll$		
255.99	~~~	GROUN	D SURFACE			%			N	10 20 30 40 50 60 70 80 90		
		FILL : SAND, some silt, t	race topsoil and	X	SS-1	0	13	0-0-0-1	0			
255.23	ŤŤ	brown, very moist, NATIVE :	very loose	\mathbb{N}	SS-2	50	24	1-3-5-8	8			
254.47		SANDY SILT, trac moist, loose SILTY SAND, trac	e clay, dark brown,	X	SS-3	83	9	5-7-6-8	13			
253.70		√compact SAND, trace silt, b donso	rown, damp, very	X	SS-4	83		10-24-33-50	57			
		uense			SS-5	78	5	8-26-40-50/	66			
		very dense			SS-6	92	3	125mm 13-25-22-19	47			
					00 7							
					55-7	92	1	14-30-36-50	66			
247.76				X	SS-8	92	2	9-22-35-42	57			
		NOTE : End of Borehole a Borehole was dry bgs denotes 'below	t 8.23 m bgs upon completion v ground surface'									
	 	Geo Image: Second state s	Geotechnical Investigati Environmental Resource 2976 Horseshoe Valley ED BY: <u>O. Sabeeh</u> ART): <u>21 December 2016</u> <u>Certification</u> <u>21 December 2016</u> <u>Certification</u> <u>255.99</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u> <u>Catter</u> <u>255.23</u>	Geotechnical Investigation Environmental Resource Recovery Centre (ERI At: 2976 Horseshoe Valley Road West, Springwate ED BY: O. Sabeeh CHECKED BY: ART): 21 December 2016 DATE (FINISH) DESCRIPTION OF SOIL AND BEDROCK DESCRIPTION OF SOIL AND BEDROCK 255.99 GROUND SURFACE FILL: SAND, some silt, trace topsoil and rootlets, trace organics, dark brown to brown, wery moist, very loose 255.70 SILTY SAND, trace gravel, grey, moist, compact SAND, SAND, trace silt, brown, damp, very dense SAND, trace silt, brown, damp, very dense 247.76 END OF BOREHOLE: NOTE : End of Borehole at 8.23 m bgs Borehole was dry upon completion bgs denotes 'below ground surface'	Ceotechnical Investigation Environmental Resource Recovery Centre (ERRC) 4: 2976 Horseshoe Valley Road West, Springwater ED BY: O. Sabeeh CHECKED BY: ART): 21 December 2016 DATE (FINISH): ART): 21 December 2016 DATE (FINISH): QUID: Solit AND BEDROCK QUID: 255.99 GROUND SURFACE FILL: SAND, some silt, trace topsoil and rootlets, trace organics, dark brown to brown, very moist, very loose NATIVE : 254.47 SANDY SILT, trace clay, dark brown, moist, loose SILTY SAND, trace gravel, grey, moist, compact, solution to brown, very mess, very dense 247.76 END OF BOREHOLE: NOTE : 247.76 End OF BOREHOLE: NOTE : 247.76 End of Borehole at 8.23 m bgs Borehole was dry upon completion bgs denotes 'below ground surface'	Geotechnical Investigation Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road West, Springwater ED BY: <u>0. Sabeeh</u> <u>CHECKED BY: <u>S. Shaf</u> ART]: <u>21 December 2016</u> DATE (FINISH): <u>21 Dec</u> <u>900</u> <u>910</u> <u>910</u> <u>900</u> <u>910</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>910</u> <u>900</u> <u>900</u> <u>910</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> <u>900</u> </u>	Geotechnical Investigation Environmental Resource Recovery Centre (ERRC) 2976 Horseshoe Valley Road West, Springwater ED BY: <u>0. Sabeeh</u> CHECKED BY: <u>S. Shahangi</u> ART): <u>21 December 2016</u> DATE (FINISH): <u>21 December</u> <u>21 December 2016</u> DATE (FINISH): <u>21 December</u> <u>21 December 2016</u> DESCRIPTION OF <u>30 AC</u> <u>255.99</u> <u>GROUND SURFACE</u> % SAND, some sit, trace topsoil and rootlets, trace organics, dark brown to <u>10 Drown, very moist, very loose</u> NATIVE: <u>254.47</u> SANDY SLT, trace clay, dark brown, moist, loose SILTY SAND, trace gravel, grey, moist, <u>253.70</u> <u>SAND, trace sit, brown, damp, very</u> <u>247.76</u> <u>END OF BOREHOLE</u> : NOTE : End of Borehole at 8.23 m bgs Borehole was dry upon completion bgs denotes below ground surface' Sand Sorehole was dry upon completion bgs denotes below ground surface'	Geotechnical Investigation Environmental Resource Recovery Centre (ERRC) * 2976 Horseshoe Valley Road West, Springwater ED BY: 0. Sabeeh CHECKED BY: _S. Shahangian ART): _21 December 2016 DATE (FINISH): _21 December 2011	Geotechnical Investigation Environmental Resource Recovery Centre (ERRC) * 2976 Horseshoe Valley Road West, Springwater ED BY: 0. Sabeeh CHECKED BY: S. Shahangian ART): 21 December 2016 DATE (FINISH): 21 December 2016	Geotechnical Investigation Environmental Resource Recovery Centre (ERRC) at 2976 Horseshoe Valley Road West, Springwater ED BY: 0. Sabeeh CHECKED BY: S. Shahangian ART): 21 December 2016 DESCRIPTION OF SOIL AND BEDROCK at the second secon		

_	REFEREN	NCE NO.		086822								
		G	HD		BOREHOLE No.	:_	E	3H13	8-16		В	BOREHOLE REPORT
					ELEVATION:		252	.15 m	1			Page: <u>1</u> of <u>1</u>
	CLIENT: PROJECT LOCATIO	 Г: N:	Cou Geo Envi 2976	nty of Simcoe technical Investigati ronmental Resource 6 Horseshoe Valley	on e Recovery Centre (ERF Road West, Springwate	RC) r						EGEND SS - SPLIT SPOON ST - SHELBY TUBE GS - GRAB SAMPLE
	DESCRIB	ED BY:	0. S	abeeh	CHECKED BY:		S. Sha	hangi	an		∐ Ţ	RC - ROCK CORE - WATER LEVEL
	DATE (ST	ART):	3 Ja	nuary 2017	DATE (FINISH):	_	3 Janu	ary 20	017			
	Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL AN	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) \triangle Field Sensitivity (S) \Box Lab Water content (%) $H \rightarrow Atterberg limits (%)$ \bullet "N" Value (blows / 12 in30 cm)
F	eet Metres	252.15		GROUN	D SURFACE			%			N	10 20 30 40 50 60 70 80 90
	,	251.69		FILL: SAND and SILT, to dark brown, moist, NATIVE : SILTY SAND, trac gravel, brown, moi	e to some clay, trace		SS-1A SS-2	58 58	6	1-2-3-2	5	
6	3 <u>-</u> , <u>-</u> 2.0			0		X	SS-3	75	8	1-2-1-1	3	
{ (3 – – 9 – – 0 – – 303	249 10		trace gravel, brow	n, moist, compact	X	SS-4	75	6	6-8-9-7	17	
1 1 1 1	0 1 3.00 1 1 4.0 3 1 4.0 4 1 4.0 5 1	243.10		SAND, trace silt, ti seam, brown, dam dense	ace gravel, clayey silt p to moist, compact to		SS-5	67	20	7-5-9-17	14	
1 1 1 2	$ \begin{array}{c} 6 \\ 7 \\ 7 \\ 8 \\ 9 \\ 0 \\ - \\ 6.0 \end{array} $						SS-6	67	5	15-16-22-30	38	
2 2 2 2 2 2	1			silty grov moist y	ioni donco		SS-7	100	2	15-19-26-40	45	
2 2 2	6 – 8.0 7 – 8.23 8 –	243.92				X	SS-8	100	8	10-29-38-42	67	
SOIL LOG WITH GRAPH+WELL 086822-12.GPJ INSPEC_SOLGUI 8/11/1/	9 9.0 1			NOTE : End of Borehole a Borehole was dry Borehole backfilled medium to the top bgs denotes 'below	t 8.23 m bgs upon completion d with enviroplug v ground surface'							

	CE No.:		086822								ENCLOSURE No.: 6
	G	HD		BOREHOLE No.	:	E	3H14	-16		В	OREHOLE REPORT
				ELEVATION:		251	.83 m	1			Page: <u>1</u> of <u>1</u>
CLIENT: _ PROJECT:	:	Cour Geot Envi	nty of Simcoe technical Investigati ronmental Resource	on Recovery Centre (ERF	RC)					<u>LE</u> 	GEND SS - SPLIT SPOON ST - SHELBY TUBE
LOCATION	N:	2976	Horseshoe Valley	Road West, Springwate	r						GS - GRAB SAMPLE
DESCRIBE	ED BY:	0. S	abeeh	CHECKED BY:		S. Sha	hangi	an		Ш	
DATE (STA	ART):	21 D	ecember 2016	DATE (FINISH):	_	22 Dec	embe	r 201	6	Ŧ	
Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL ANI	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	$ \begin{array}{llllllllllllllllllllllllllllllllllll$
Feet Metres	251.83		GROUN	D SURFACE			%			N	10 20 30 40 50 60 70 80 90
$ \begin{array}{c} $	251.07		FILL : SAND, trace to so and rootlets, trace	ne silt, trace topsoil organics, dark brown	X	SS-1	75	12	1-1-1-2	2	
$\begin{array}{c} 3 \\ 4 \\ 5 \end{array}$			\to reddish brown, v NATIVE : SAND, trace silt, d	very moist, very loose / ark brown, moist,	X	SS-2	92	7	2-3-3-3	6	
6 <u>-</u> 7 <u>-</u> 2.0			loose brown, very loose		X	SS-3	92	8	1-2-1-2	3	
8 9 10 3.0			brown to grov		X	SS-4	83	5	2-2-3-3	5	
11 – 12 – 13 – 3,96	247 87		blown to grey		X	SS-5	100	3	1-2-4-3	6	
13 4.0 14 15 16 5.0 17	241.01		SANDY SILT, trac compact	e gravel, grey, moist,	X	SS-6	100	11	3-6-9-17	15	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	246.33		SAND, trace silt, b dense	rown, damp, very		SS-7	75	4	11-22-28-29	50	
$\begin{array}{c} 22 \\ 23 \\ -1 \\ 24 \\ -1 \\ 25 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -$											
26 <u>8.0</u> 27 <u>8.23</u> 28 <u></u>	243.60			N E.	Д	SS-8	100	3	11-20-29-30	49	
29 ++++ 9.0 30 ++++++ 9.0 31 +++++++ 10.0			NOTE : End of Borehole at Borehole was dry i bas denotes 'below	8.23 m bgs upon completion y ground surface'							
05 33 10.0 34			U U	0							
≅ 36 - 11.0 37 - 11.0 38 - 11.0											
≥ 46 <u>-</u> 14.0 8 47 <u>-</u>											

				000022								
		G	HD		BOREHOLE No.	:_	E	BH15	5-16		В	OREHOLE REPORT
		×			ELEVATION:		253	.47 m	1			Page: <u>1</u> of <u>1</u>
	CLIENT:		Cou	nty of Simcoe	<u></u>						LE	GEND
	PROJECT	:	Envi	ronmental Resource	e Recovery Centre (ERR	RC)					\boxtimes	SS - SPLIT SPOON
	LOCATION	N:	2976	6 Horseshoe Valley	Road West, Springwate	r						GS - GRAB SAMPLE
	DESCRIB	ED BY:	0. S	abeeh	CHECKED BY:		S. Shal	nangi	an			RC - ROCK CORE
	DATE (ST	ART): _	19 D	ecember 2016	DATE (FINISH):	_	19 Dec	embe	er 2010	6	Ţ	- WATER LEVEL
	Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL AN	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) \triangle Field Sensitivity (S) \Box Lab \bigcirc Water content (%) \blacksquare Atterberg limits (%) \blacksquare "N" Value (blows / 12 in30 cm)
F	eet Metres	253.47	\sim	GROUN	D SURFACE			%			N	10 20 30 40 50 60 70 80 90
1				FILL : SAND and SILT, to	race topsoil and	X	SS-1	0	13	0-0-0-4	0	
3		252.71	ĬĨ	MATIVE:		X	SS-2	42	26	1-4-4-8	8	
6	2.0	054.40		moist, loose	Y SAND, dark grey,	\square	SS-3	50	9	3-3-5-8	8	
8 9 1	3 - 2.29 3 - 4 3 - 4 3 - 4 3 - 4 3 - 4	251.16		SAND, trace silt, b	rown, moist, compact	X	SS-4	83	2	9-12-12-21	24	
1 1 1 1	0 0.0 1 2 3 4.0 4			dense		X	SS-5	100	1	9-15-21-35	36	
1 1 1 1	5			trace silt and grave moist, dense	əl, silt seam, grey,	X	SS-6A SS-6B	75	20 6	 13-23-25-20	 48	
2 2 2 2	$\begin{array}{c} 0 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$			very dense		X	SS-7	75	9	14-25-37-45	62	
2	5 + 8.0 7 + 8.23	245.24		gravelly, trace silt, dense	grey, moist, very	X	SS-8	83	1	16-32-33-41	65	
012 LOG WITH GRAPH+WELL 086822-12.GPJ INSPEC_SOLGDT 8/11/17 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5				END OF BOREHO	DLE: t 8.23 m bgs upon completion v ground surface'							

_			. 000022								
		G	HD	BOREHOLE No.	:_	E	3H16	-16		B	OREHOLE REPORT
				ELEVATION:		251	.43 m	1			Page: <u>1</u> of <u>1</u>
	CLIENT:		County of Simcoe	tion						<u>LEC</u>	GEND
	PROJECT	:	Environmental Resource	ce Recovery Centre (ERF	RC)					\boxtimes	SS - SPLIT SPOON
	LOCATIO	N:	2976 Horseshoe Valley	Road West, Springwate	r						GS - GRAB SAMPLE
	DESCRIB	ED BY:	O. Sabeeh	CHECKED BY:		S. Sha	nangia	an		Ū	RC - ROCK CORE
	DATE (ST	ART):	3 January 2017	_ DATE (FINISH):		3 Janua	ary 20)17		T	- WATER LEVEL
	Depth	Elevation (m) BGS	Stratigraphy Stratigraphy AN JIOS	RIPTION OF ID BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	
F	eet Metres	251.43	GROUI	ND SURFACE			%	04		N	10 20 30 40 50 60 70 80 90
1		250.67	FILL: SAND and SILT, with rootlets, dark	trace gravel, topsoil, brown to brown, moist, /		აა-1	33	21	1-1-1-1	2	
4	1.0		NATIVE:		Д	SS-2	58	12	2-2-2-4	4	
6	2.0		gravel, rootlets, b brown, moist, cor	rown, moist, very loose npact	\square	SS-3	42	11	1-9-9-5	18	
8			silty clay seam, b	rown, moist, loose	X	SS-4	42	21	2-4-5-9	9	
1(1) 1:) 3.0 1		compact			SS-5	42	7	3-3-13-12	16	
1: 14 11 11 11 11 11 11	3 - 4.0 4 - 4.0 5 - 5.0 5 - 5.0 5 - 4.0 5 - 5.0 5 - 4.0 5 - 5.0 5 - 4.0 5 - 5.0 5 - 4.0 5 - 4.0	245.93	dense SAND, trace silt, damp, dense	silt pockets, brown,	X	SS-6	67	14	10-17-20-36	37	
2(2) 2) 2) 2) 2)	$\begin{array}{c} 0 & -1 \\ 0 & -1 \\ 2 & -1 \\ 3 & -1 \\ 3 & -1 \\ 4 & -1 \end{array}$				X	SS-7	83	13	7-17-27-36	44	
2: 2: 2:	5	243.20	damp, very dense	9	X	SS-8	83	1	12-22-31-43	53 (
OIL LOG WITH GRAPH+WELL 086822-12.GPJ INSPEC_SOL.GDI 8/11/17	3 9.0 1 9.0 2 10.0 4 5 11.0 7 12.0 1 3 12.0 1 3 12.0 1 3 12.0 1 3 12.0 1 3 12.0 1 3		END OF BOREH NOTE : End of Borehole a Borehole was dry Borehole backfille medium to the top bgs denotes 'belo	OLE: at 8.23 m bgs y upon completion ad with enviroplug ow ground surface'							

REFERENCE No.: 086822								ENCLOSURE No.: 9
GHD	BOREHOLE No	.:_	E	3H17	′-16		B	OREHOLE REPORT
	ELEVATION:		252	.81 m	า			Page: <u>1</u> of <u>1</u>
CLIENT: County of Simcoe							<u>LE(</u>	GEND
PROJECT: Environmental Resource	e Recovery Centre (ERI	RC)					\boxtimes	SS - SPLIT SPOON
LOCATION:2976 Horseshoe Valley	Road West, Springwate	er						GS - GRAB SAMPLE
DESCRIBED BY: <u>O. Sabeeh</u>	CHECKED BY:		S. Sha	hangi	an		Ī	RC - ROCK CORE
DATE (START): _ 4 January 2017	DATE (FINISH)	: _	4 Janu	ary 20	017		Ŧ	- WATER LEVEL
Depth Elevation (m) BGS Stratigraphy	RIPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) △ Field Sensitivity (S) □ Lab ○ Water content (%) ↓ Atterberg limits (%) ● "N" Value (blows / 12 in30 cm)
Feet Metres 252.81 GROUN	ID SURFACE	~	<u>SS-1</u>	% 67	7	1-2-1-2	N 3	10 20 30 40 50 60 70 80 90
1 FILL: 2 0.76 3 10	opsoil, with rootlets, wn, moist, very loose		00-1	75	7	0.0.0.0		
A SAND, trace silt, I	orown, damp, loose		33-2	75		2-2-2-3	4	
6 – 2.0 7 – 2.29 250.52	otlets, grey	X	SS-3	75	13	2-2-4-4	6	•
8 - 249.76 SANDY CLAYEY	SILT, grey, moist, stiff	X	SS-4	67	17	2-6-6-9	12	
SILTY CLAY, son grey, very moist, v	ne sand, trace gravel, very stiff	X	SS-5	79	26	5-7-9-13	16	
13 450 248.85 SANDY SILT, trac 14	ce gravel, grey, moist,							
		X	SS-6	25	5	6-50/ 203mm	50	
$ \begin{bmatrix} 18 \\ 19 \\ 20 \\ \hline \end{bmatrix} \begin{bmatrix} 6.0 \end{bmatrix} $								
21 6.25 246.56 SAND, trace silt, t 22 brown to grey, da	race gravel, trace clay, mp, very dense	-	SS-7	67	18	5-22-45-50/ 127mm	58	C .
26 - 8.0 27 - 8.23 244.58	lamp, dense	X	SS-8	83	2	8-21-19-33	40	
28 – E 29 – E 0.0	<u>OLE</u> :							
30 – 9.0 31 – E End of Borehole a	it 8.23 m bgs							
Borehole was dar Borehole backfille	np upon completion d with enviroplug							
33 - 10.0 34 - bas denotes 'belo	w ground surface'							
39 <u>12.0</u>								

_	REFEREN	CE No.:		086822								ENCLOSURE No.: 10
		G			BOREHOLE No	.:_	E	3H18	-16		В	OREHOLE REPORT
					ELEVATION:		252	.26 m	1			Page: <u>1</u> of <u>1</u>
			Cou Geo	nty of Simcoe technical Investigat	on 2 Rocovery Contro (EP)							GEND SS - SPLIT SPOON
			297	6 Horseshoe Vallev	Road West Springwate	er						ST - SHELBY TUBE
	DESCRIBE	• ED BY:	0. 5	Sabeeh	CHECKED BY:	,	S. Sha	hangi	an			GS - GRAB SAMPLE RC - ROCK CORE
	DATE (ST	ART):	19 E	December 2016	DATE (FINISH)	:	19 Dec	embe	er 201	6	Ţ	- WATER LEVEL
┟												
	Depth	Elevation (m) BGS	Stratigraphy	DESCF SOIL AN	LIPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	$ \begin{array}{llllllllllllllllllllllllllllllllllll$
	Feet Metres	252.26		GROUN	D SURFACE		00 4	%		EQU	N	10 20 30 40 50 60 70 80 90
	$ \begin{array}{c} 1 \\ 2 \\ 2 \\ 2 \\ 1 \\ 2 \\ 1 \\ 2 \\ 1 \\ 0.76 \end{array} $	251.50	$\bigotimes_{i=1}^{i}$	FILL : SAND and SILT, t rootlets, trace orga	race topsoil and anics, dark brown,		55-1	100	28	50/ 75mm		
	3 <u> </u>			NATIVE :	/	X	SS-2	42	16	3-6-7-10	13	
	5 <u>1.52</u> 6 <u>2.0</u> 7 <u>2.0</u>	250.74		SILI, some sand, rootlets, brownish CLAYEY SILT, tra	trace clay, trace grey, moist, compact / ce to some sand, grey,	\mathbb{Z}	SS-3	50	19	8-11-17-23	28	
	8 <u>-</u> 2.29 9 <u>-</u> 3.0	249.97		\moist, very stiff SAND, some silt, ↑ moist, dense	race gravel, grey,	\mathbb{A}	SS-4	67	4	15-16-14-18	30	
	10 <u>-</u> 3.0 11 <u>-</u> 12 <u>-</u>			brown			SS-5	79	1	9-14-25-37	39 (
	13 + 4.0 14 + 4.1 15 + 5.0 17 + 5.0 18 + 1 19 + 0.0					X	SS-6	100	2	11-22-26-30	48	
	$\begin{array}{c} 20 & -6.0 \\ 21 & -2. \\ 22 & -2. \\ 23 & -2. \\ 24 & -2. \\ -7.0 \\ 24 & -2. \end{array}$					X	SS-7	83	3	8-15-21-28	36	
	24 25 26 27 27 8.23	244.03		very dense		X	SS-8	100		15-27-33-40	60	
טור בטפ עווה פתאדה+עבוב טעטעב-וב.פרט וועסרבט_סטר.פטו פווגוו רטפעביובט_סטר.פטו פווגוו	$\begin{array}{c} 28 \\ 29 \\ 30 \\ 31 \\ 32 \\ 33 \\ 33 \\ 33 \\ 34 \\ 35 \\ 36 \\ 36 \\ 39 \\ 40 \\ 41 \\ 42 \\ 43 \\ 41 \\ 42 \\ 43 \\ 44 \\ 45 \\ 46 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41$			END OF BOREH(NOTE : End of Borehole a Borehole was dry Borehole backfille medium to the top bgs denotes 'below	DLE: t 8.23 m bgs upon completion d with enviroplug w ground surface'							

REFERENCE No.: 086822								ENCLOSURE No.: 11
GHD	BOREHOLE No.	:	E	3H19	-16		B	OREHOLE REPORT
	ELEVATION:		249	.99 m	1			Page: <u>1</u> of <u>1</u>
CLIENT: County of Simcoe							LE	GEND
Geotechnical Investigat PROJECT: Environmental Resource	ion e Recovery Centre (ERI	RC)					\boxtimes	SS - SPLIT SPOON
LOCATION: 2976 Horseshoe Valley	Road West, Springwate	er						ST - SHELBY TUBE GS - GRAB SAMPLE
DESCRIBED BY: O. Sabeeh	CHECKED BY:		S. Sha	hangi	an			RC - ROCK CORE
DATE (START): <u>3 January 2017</u>	DATE (FINISH)	: _	3 Janu	ary 20	017		Ţ	- WATER LEVEL
Depth Elevation BGS WN BGS Stratigraphy	RIPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	$ \begin{array}{c c} Shear test (Cu) & \bigtriangleup \ \ Field \\ Sensitivity (S) & \Box \ \ Lab \\ \bigcirc \ \ Water content (\%) \\ \underset{W_{p} \ W_{l}}{\overset{H}{}} \ \ Atterberg \ limits (\%) \\ \hline \bullet \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$
Feet Metres 249.99 GROUN	ID SURFACE		00 4	%	10	1010	N	10 20 30 40 50 60 70 80 90
FILL: SAND and SILT, 1 2 0.76 249.23 Ark brown, moist	opsoil, with rootlets, , very loose		55-1	/5	19	1-2-1-2	3	
3 1.0 NATIVE: 4 SILTY CLAY to C 5 1.52 248.47	LAYEY SILT, trace	X	SS-2	33	25	24-15-5-6	20	
6 – 2.0 7 – 2.0 8 – 2.0	ILTY SAND, trace ist, compact	X	SS-3	33	7	9-8-8-6	16	
9 – 10 – 3.0		Å	SS-4	67	7	8-11-13-16	24	
		Д	SS-5	83	7	7-14-13-15	27	
13 - 4.0° 246.03 SAND, trace silt, i 14 - 4	prown, damp, very							
15 - 5.0 17 - 5.18 244.81		X	SS-6	96	1	22-27-41-40	68	p • • •
18 <u>END OF BOREH</u>	<u>DLE</u> :							
20 6.0 NOTE : 21 End of Borehole as 22 Borehole was dry	tt 5.18 m bgs upon completion							
23 7.0 Bolenoide backnine 24 medium to the top 25 bgs denotes 'belo	w ground surface'							
$ \begin{array}{c} 26 & \\ 27 & \\ 28 & \\ \end{array} $								
29 <u>-</u> 9.0 30 <u>-</u> 9.0								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$								
≤ 3611.0								

REFEREN	ICE NO.		086822								ENCLOSURE NO.: 12
	6			BOREHOLE No.	:_	E	3H20	-16		B	OREHOLE REPORT
				ELEVATION:		253	.23 m	1			Page: <u>1</u> of <u>1</u>
CLIENT: PROJECT		Cou Geo Envi	nty of Simcoe technical Investigati ironmental Resource	on e Recovery Centre (ERF	RC)					LEC	<u>GEND</u> SS - SPLIT SPOON
LOCATIO	N:	297	6 Horseshoe Valley	Road West, Springwate	r						ST - SHELBY TUBE
DESCRIB	ED BY:	0. S	Sabeeh	CHECKED BY:		S. Sha	nangi	an			RC - ROCK CORE
DATE (ST	ART):	4 Ja	nuary 2017	DATE (FINISH):		4 Janua	ary 20)17		Ţ	- WATER LEVEL
Depth	Elevation (m) BGS	Stratigraphy	DESCR SOIL AN	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) \triangle Field Sensitivity (S) \Box Lab \bigcirc Water content (%) \blacksquare Atterberg limits (%) \blacksquare "N" Value (blows / 12 in30 cm)
Feet Metres	253.23		GROUN	D SURFACE		00 1	%	5		N	10 20 30 40 50 60 70 80 90
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	252.47		FILL: SAND, trace silt, tr rootlets, dark brow loose NATIVE: SAND, trace silt, d damp to moist, ver	race topsoil with n to brown, moist, very ark brown to brown, ry loose		SS-1 SS-2 SS-3	83 58 75	5 7 7	1-1-1-1 1-2-1-2 1-1-3-2	3	
7 <u>2.0</u> 8 <u>2.29</u>	250.94		CLAYEY SILT to S	SILTY CLAY, trace		00.4	07		0.0.0.5		
9 <u> </u>			sand, trace rootlet	s, grey, moist, firm	Å	55-4	67	26	2-3-3-5	6	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	249.27		SANDY SILT, trac moist, very dense END OF BOREHO NOTE : End of Borehole as Borehole was dry Borehole backfilled medium to the top bgs denotes 'below	e to some gravel, grey, DLE: t 5.18 m bgs upon completion d with enviroplug v ground surface'		SS-5 SS-6	75	33	3-3-5-6	8	

REFERENCE No.:	086822							ENCLOSURE No.: 13
GHD	BOREHOLE No	o.:_	E	3H21	-16		В	OREHOLE REPORT
GIIL	ELEVATION:		249	.75 m	1			Page: <u>1</u> of <u>1</u>
CLIENT: <u>Count</u> Geote PROJECT: <u>Enviro</u>	y of Simcoe chnical Investigation nmental Resource Recovery Centre (ER	RC)						GEND SS - SPLIT SPOON
LOCATION: 2976 H	Horseshoe Valley Road West, Springwat	er						GS - GRAB SAMPLE
DESCRIBED BY: O. Sal	beeh CHECKED BY	: _	S. Sha	hangi	an			RC - ROCK CORE
DATE (START): 22 Dec	cember 2016 DATE (FINISH	l): _	22 Dec	embe	er 201	6	Ť	- WATER LEVEL
			-			-		
Depth Elevation (m) BGS Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	Shear test (Cu) △ Field Sensitivity (S) □ Lab ○ Water content (%) ↓ Atterberg limits (%) ● "N" Value (blows / 12 in30 cm)
Feet Metres 249.75	GROUND SURFACE			%			N	10 20 30 40 50 60 70 80 90
$\begin{bmatrix} 1 \\ 2 \\ 3 \\ -1 \end{bmatrix} = 1.0$	SAND, trace to some silt, trace topsoil and rootlets, trace organics, dark brown to brown, moist, very loose	X	SS-1	83	7	1-2-1-1	3	
	trace rootlets, dark brown, very moist	\square	002	10		1-1-1-1		
$\begin{bmatrix} 6 & -\frac{1}{2} \\ 7 & -\frac{1}{2} & 2.0 \\ 8 & -\frac{1}{2} & 2.29 \end{bmatrix} 247.46$	POSSIBLE NATIVE: SANDY SILT/SILTY SAND, trace gravel, trace rootlets, dark brown, moist, loose	X	SS-3	50	13	1-2-4-4	6	
9 – 10 – 3.0	NATIVE : SAND, trace silt, brown, damp, compact dense	X	SS-4	83	3	2-3-7-10	10	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			SS-5	100	2	6-15-20-26	35	
16 <u>5.0</u> 17 <u>5.18</u> 244.57		X	SS-6	100	7	8-13-17-19	30	
	END OF BOREHOLE:							
20 - 0.0 21 - 22 - 22	NOTE : End of Borehole at 5.18 m bgs Borehole was dry upon completion							
23 — 7.0 24 — 25 — 7	medium to the top bgs denotes 'below ground surface'							
26 – 8.0 27 –								
33 – 10.0								
≤ 36 - -11.0								
₹ 46 <u>+</u> 14.0 8 47 <u>-</u>								
48								

		CL NU.	-	000022								
		G	HD		BOREHOLE No	.:_	E	3H22	-16		В	OREHOLE REPORT
		× ×			ELEVATION:		244	.89 m	l			Page: <u>1</u> of <u>1</u>
CLIEN PROJ LOCA	NT: JECT: ATION	: N:	Cou Geo Envi 2976	nty of Simcoe technical Investigatio ronmental Resource 6 Horseshoe Valley	on Recovery Centre (ERI Road West, Springwate	RC) er						GEND SS - SPLIT SPOON ST - SHELBY TUBE GS - GRAB SAMPLE
DESC	CRIBE	ED BY:	<u>0.</u> S	abeeh	CHECKED BY:		S. Sha	hangia	an		Ī	RC - ROCK CORE
DATE	E (ST/	ART):	4 Ja	nuary 2017	DATE (FINISH)	:	4 Janu	ary 20)17		Ţ	- WATER LEVEL
Depth		Elevation (m) BGS	Stratigraphy	DESCR SOIL ANI	IPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	$ \begin{array}{llllllllllllllllllllllllllllllllllll$
Feet Me	etres	244.89		GROUN	D SURFACE		00 1	%		4 5 4 4	N	10 20 30 40 50 60 70 80 90
	0.76	244.13		FILL: SAND and GRAVE _ dark brown to brow	EL, trace to some silt, /n, moist, loose		55-1	58	1	4-5-4-4	9	
	1.0			NATIVE: SAND, trace silt, b	rown, moist, loose		SS-2	83	6	3-3-4-5	7	
6	2.0					X	SS-3	100	3	2-10-12-15	22	
8 — 9 — 10 —	3.0					X	SS-4	100	7	5-12-16-22	28	
11 – 12 – 13 –	4.0			some silt to silts, tr moist, very dense	ace gravel, brown,	X	SS-5	100	5	16-22-28-30	50	
14 – 15 – 16 – 17 –	5.0 5.18	239.71				X	SS-6	100	7	11-22-35-36	57	
סור רספ אנוון פנאטאן-אפרר 188825-15.067 וואפרכי 201 11/11/1 11 רון	 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 			END OF BOREHO NOTE : End of Borehole at Borehole was dry to Borehole backfilled medium to the top bgs denotes 'below	5.18 m bgs upon completion with enviroplug ground surface'							

REFERENC	JE NO.:		086822						i		ENCI	_030	REI	NO				_
	G	HD		BOREHOLE N	o.:		MWC)1-16		E	3OF	REF	10	LE	R	EΡ	ORT	Г
				ELEVATION: _		25	9.10	m			F	Page:	_1	_ 0	f _:	3		
CLIENT:		Cou	nty of Simcoe			atel De				LE	GEN	₽						
PROJECT:		Reco	overy Centre (ERR	al Investigation - Enviro	nme	ental Re	sourc	e		\boxtimes	SS	- SF	PLIT	SPO	ON			
LOCATION	:	2976	6 Horseshoe Valley	Road West, Springwate	er						ST RC	- SH - R(HELE DCK	IY TL COR	JBE E			
DESCRIBE	D BY:	S. A	ndreou	CHECKED BY:		F. Ger	gis			Ţ		- W.	ATE	R LE	/EL			
DATE (STA	.RT): _	2 Au	igust 2016	DATE (FINISH)):	4 Augu	ist 20	16										
							1				1							
Depth	Elevation (m)	Stratigraphy	DESC SOIL A	RIPTION OF ND BEDROCK	State	Type and Number	Recovery TCR	Moisture Content	Blows pe 6 in. / 15 cm or RQD	Penetration Index / SCR	Shea Sen: W _p W ₁ (blov	ar test sitivity Water Atterb "N" Va ws / 12	(Cu) (S) conte erg lin lue 2 in3	ent (% nits (% C 0 cm)	△ □ %) 0.94 0.90	⊥ Fiel] Lab m— m—	d	7
Feet Metres 2	259.10 259.07			ND SURFACE			%			N	10 :	20 30	40 50	0 60 7	70 80	90		
			NATIVE :		Д	SS-1	62	6	1-2-2-3	4				0	31	m		
3 <u>-</u> 4 <u>-</u> 5 <u>-</u> 1.0			light reddish brow	n, dry to damp, loose		SS-2	21	10	1-2-4-5	6						-		
6 <u>-</u> 7 <u>-</u> 2.0			compact		X	SS-3	46	6	5-6-5-5	11						_		
7			fine grained, grey,	loose		SS-4	79	13	2-3-4-3	7								
10 <u>-</u> 3.0 11 <u>-</u> 12 <u>-</u>			some silt, trace to compact	some gravel, moist,		SS-5	100	4	9-12-16-18	28								
13 - 4.0 14			becoming dense		X	SS-6	92	5	3-16-22-23	38	0							
20 - 6.0 21 - 22 - 22 - 22 - 22 - 22 - 22 - 22 -	- - - - - - - -		very dense			SS-7	96	4	14-21-35-43	56	0							
23 - 7.0 24 - 25 - 26 - 26 - 27 - 28 - 28 - 28 - 28 - 28 - 28 - 28			thin dark bands, la	ayered	X	SS-8	100	3	19-34-39-44	73	0		-Bent	tonite	e E ro	out		
$ \begin{array}{c} 29 \\ 30 \\ 31 \\ 32 \\ 33 \\ 33 \\ 10.0 \end{array} $					X	SS-9	92	2	14-28-44-50/ 75mm	72	0							
34 – 35 – 36 – 37 – 38 – 38 –					X	SS-10	87	3	18-35-50/ 125mm	100	0							
$\begin{array}{c} 39 \\ 40 \\ 41 \\ 42 \\ 43 \\ 43 \\ 13.0 \end{array}$					X	SS-11	83	6	14-33-50/ 125mm	100	0							
44 45 46 14.0 47 48					X	SS-12	75	7	15-40-50/ 125mm	100								

SOIL LOG WITH GRAPH+WELL 086822.GPJ INSPEC SOL.GDT 14/9/16

REFEREN	ICE No.		086822								ENCLOS	SURE N	0.:	1	
	G	HD		BOREHOLE N	lo.:		MW	01-16	<u> </u>	E	BORE	HOI	_E F	₹EP	ORT
				ELEVATION:		25	59.10) m			Pag	e: <u>2</u>	of	_3	
CLIENT:		Cou	nty of Simcoe	al Investigation - Envir	onme	ntal R	sourc	<u>`</u>		<u>LE</u>	<u>GEND</u>				
PROJECT	:	Rec	overy Centre (ERR	C)							SS -	SPLIT S		1	
LOCATIO	N:	2976	6 Horseshoe Valley	Road West, Springwa	ter						RC -	ROCK (r Tubi CORE	=	
DESCRIB	ED BY:	<u>S.</u> A	ndreou	CHECKED BY	/:	F. Ger	gis			Ţ	-	WATER	LEVE	L	
DATE (ST	ART):	2 Aı	igust 2016	DATE (FINISH	H): _	4 Aug	ust 20	16							
								1			Shear te	est (Cu)		∧ Fiel	
Ę	ation	raphy	DESC	RIPTION OF	e	and ber	Kery	ture	Blows pe	SCF	Sensitiv O Wa	ity (S) ter conte	nt (%)		J
Del	Eleva (m	stratig	SOIL A	ND BEDROCK	Sta	Type Num	Seco	Mois	15 cm or RQD	eneti dex /	w _p w _l Atte	erberg lin Value	iits (%)		
Feet Metres	259 10	0 O	GROU	ND SURFACE			ш %				(blows /	12 in30	0 cm)	80 90	
50 -							,.						++-	++-	
51 — 52 —					Å	SS-13	3 75	1	15-42-50/ 100mm	100					
53 - 16.0												Bento		rout	
54 = 17					X	SS-14	37	2	30-50/	100	0				
56 - 17.0	ĺ								75mm				++	++-	
58 – 59 – 18.0)													+	
60 — 61 —					X	SS-15	62	4	18-41-50/	100	0				
62 - 19.0	•								75mm						
													\neq	++-	
$\begin{array}{c} 65 \\ 66 \\ - \end{array} 20.0 \end{array}$)				X	SS-16	50	2	19-50	50		•		<u> </u>	
67 — 68 —															
69 <u>-</u> 21.0)													\mathbf{A}	
71 - 21.54	237.56	Ш	SILT, trace sand a	and clay, greyish	- X	SS-17	67	18	21-33-50/ 100mm	100			++-		
	,		brown, moist, very	dense											
74 - 75 - 23 (•												#		
76					Å	SS-18	92	1	20-40-43-45	83					
78 –	>											#2 Gra	–23.78 anitic S	3 m 3and ∕	
						SS-19	83	3	25-45-50/	100		Bento			
82 - 25.0	•								125						-
													\pm	+	-
85 - 26.0	•		becoming wet			SS-20	83	15	18-32-24-50	56	0				
													\mathbf{A}		-
89 27.0)												\pm	\mathbf{X}	
90 <u>–</u> 91 <u>–</u>			trace sand and cla	ay, grey		SS-2	92	15	17-45-50	95	0				
92 — 28.0 93 —													\mp	\blacksquare	1 🗐
94														reen	
96 - 29.0	Í				X	SS-22	96	18	10-21-38-50	59					╡┛
98 -															

SOIL LOG WITH GRAPH+WELL 086822.GPJ INSPEC_SOL.GDT 14/9/16

	REFEREN	ICE No.	:	086822								ENC	CLOS	SURE	No.	:	1	
		G	HD		BOREHOLE N	o.:		MWG)1-16		E	80	RE	НС)LI	EF	REP	ORT
				Í	ELEVATION:		25	9.10	m				Page	e:	3	of	3	
	CLIENT:		Cou	inty of Simcoe	al Investigation - Enviro	nme	ental Re	sourc	e		<u>LE</u>	GEN	<u>ND</u>					
	PROJECT	:	Rec	overy Centre (ERR	C)				0		\boxtimes	SS		SPLI	T SP		-	
	LOCATIO	N:	297	6 Horseshoe Valley	Road West, Springwate	er						ST RC		SHEL ROCI	-BA K CC	TUBE DRE	=	
	DESCRIB	ED BY:	<u>S</u> . A	ndreou	CHECKED BY		F. Ger	gis			Ţ		- '	WAT	ER L	EVE	L	
	DATE (ST	ART):	2 Aı	ugust 2016	DATE (FINISH): _	4 Augi	ust 20	16									
		1					I					Sh	oor to	et (Ci			^ Field	1
	oth	, tion	raphy	DESC		e	and ber	е У	ure ent	Blows pe	SCR	Se	ensitivi Wa	ity (S) ter co	ntent	(%)		1
	Dep	LIOS Stratig		SOIL A	ND BEDROCK	Sta	ype Num	TC	<i>l</i> oist Cont	15 cm	enetr lex /	W _p V	Atte	erberg	limits	s (%)		
	Foot Motro	Feet Metres 259.10 GRO					<u>م</u>	20			(bl	ows /	12 in.	-30 c	m)	00.00		
		\$ 259.10		GROU	ND SURFACE		<u></u>	100	15	13-27-50-0	77				50 60			
	100	228.61														30.49	9 m_	
	102 - 31.0)			JLE:													
	104			End of Borehole a	t 30.18 m bgs													- -
	105 <u>-</u> 32.0)		50 mm diameter n	nonitoring well installed													
	107 <u>-</u> 108 - 22 (bgs denotes 'below	w ground surface'													
	109																	-
	111	•																
	112 <u>-</u> 113 <u>-</u>	1																
	114 — 115 — 35.0)																
	116																	- -
	118 36.0)																
	119- <u>-</u> 120- <u>-</u> -																	
	121 — 122 — 37.0	•														-		
	123																	
	125 - 38.0	þ														_		
	126 <u></u> 127 <u></u>																	-
9/10	128 - 39.0 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129 - 129)																
1 14/	130																	
our.G	132 40.0	,																
	135	1																
10.220	137)																-
	139																	
	140-+)																
L T T T T T T T T T T T T T T T T T T T	142— <u> </u>																	
	144 <u>4</u> 44.(•																
P C C C C																	+	-
2	147											\square						

SOIL LOG WITH GRAPH+WELL 086822.GPJ INSPEC_SOL.GDT 14/9/16

-	REFEREN	ICE NO.	:	086822								ENCLU	JSUR	= NO.:				
					BOREHOLE No).:		MWC)2-16		E	BOR	EH	DLE	R	EΡ	OR	T
		6	iHD		ELEVATION:		25	2.45	m		-	Pa	nge:	1	of _	2	•	
	CLIENT:		Cou Prel Rec	nty of Simcoe iminary Geotechnica	al Investigation - Enviror	าฑะ	ental Re	sourc	e		LE	<u>GEND</u>	SDI	T 9D0				
	LOCATIO	N:	2976	6 Horseshoe Valley	Road West, Springwate	er						ST	- SHE	LBY T	UBE			
	DESCRIB	ED BY:	S. A	ndreou	CHECKED BY:		F. Ger	ais				RC	- ROC	K COI	RE EVFI			
	DATE (ST	ART):	9 AL	igust 2016	DATE (FINISH)	:	9 Augu	ust 20 [.]	16				•••			-		
\mathbf{F}	, ,	, <u> </u>					0											
	Depth	Elevation (m)	Stratigraphy	DESC SOIL A	RIPTION OF ND BEDROCK	State	Type and Number	Recovery TCR	Moisture Content	Blows pe 6 in. / 15 cm or RQD	Penetration Index / SCR	Shear Sensit O W W _p W ₁ A	test (C tivity (S Vater co tterberg V" Value s / 12 in	u)) ontent (' g limits 30 cm	%) (%) 0.96 0.90	∆ Fiel □ Lab m— m—	d	
	Feet Metres	252.45		GROU	ND SURFACE			%			N	10 20	30 40	50 60	70 8	0 90		
	1 <u>-</u> 2 <u>-</u>	202.41		\TOPSOIL with org NATIVE : SAND, some silt, t	anics : 35 mm /		SS-1	50	5	1-3-3-4	6				0.31			
	$\begin{array}{c} 3 \\ 4 \\ 5 \\ 5 \\ 1 \\ 1 \\ 5 \end{array}$	250.93		rootlets, brown, me compact	bist, loose	X	SS-2	50	7	3-5-7-9	12							
	6 <u>-</u> 2.0			SAND and SILT, ti grey, moist, compa	ace clay and gravel, act	X	SS-3	50	9	6-11-15-14	26							
	8 9 10 3.Q	249.40		becoming loose		X	SS-4	100	4	5-3-4-11	7							
	10 <u>1</u> 3.05 11 <u>1</u> 12 <u>1</u>	2.0.10		SAND, some silt to damp, compact	o silty, brown, dry to	X	SS-5	83	1	6-13-11-14	24							
	13 4.0 14 4.57 15 4.57 16 5.0 17 18 10 18 10	247.88		becoming dense		X	SS-6	100	6	10-17-24-32	41	0						
	$ \begin{array}{c} 19 \\ 20 \\ -1 \\ 21 \\ 22 \\ -23 \\ -23 \\ -24 \\ -24 \\ -24 \\ -24 \\ -24 \\ -27 \\ -24 \\ -27$					X	SS-7	96	2	10-21-25-26	46	0						
	25 - 7.62 26 - 8.0 27 - 8.0 28 - 29 - 29 - 29	244.83		very dense		X	SS-8	100	2	16-35-40-50	75	0	B	entonit	e Gr	out		
0L.GUI 14/3/10	30 - 9.0 31 32 33 34)		coarse sand, very	dense	X	SS-9	100	2	12-27-30-36	57	0		•				
	35)		fine sand		X	SS-10	100	3	14-23-33-38	56	0		•				
KAPH+WELL U808	40 + 12.0 41 + 42 + 13.0 43 + 13.0 44 + 1)		layered/varved		X	SS-11	92	3	19-36-42-45	78	0						
	45)				X	SS-12	100	3	13-26-38-41	64	0						

REFEREN	NCE No.	:	086822								ENCLOSURE No.: 2
				BOREHOLE No	.:		MW)2-16		E	BOREHOLE REPORT
				ELEVATION:		25	2.45	m		_	Page: <u>2</u> of <u>2</u>
CLIENT: PROJECT	 T:	Cou Prel Rec	inty of Simcoe iminary Geotechnic overy Centre (ERR)	al Investigation - Enviror	nme	ental Re	sourc	e	I		GEND
LOCATIO	N:	297	6 Horseshoe Valley	Road West, Springwate	er						ST - SHELBY TUBE
DESCRIB	BED BY:	S. A	Indreou	CHECKED BY:		F. Ger	gis				RC - ROCK CORE - WATER LEVEL
DATE (ST	TART):	9 Aı	ugust 2016	DATE (FINISH)	:	9 Augu	ıst 20	16		Ŧ	
Depth	Elevation (m)	Stratigraphy	DESC SOIL A	RIPTION OF ND BEDROCK	State	Type and Number	Recovery TCR	Moisture Content	Blows pe 6 in. / 15 cm or RQD	Penetration Index / SCR	Shear test (Cu) \triangle Field Sensitivity (S) \Box Lab \bigcirc Water content (%) Image: Atterberg limits (%) $\bigvee_{P} W_{p}$ (blows / 12 in30 cm)
Feet Metre	s 252.45		GROU	ND SURFACE			%			Ν	10 20 30 40 50 60 70 80 90
50 51 52 16.0 53	0				X	SS-13	79	9	15-39-50/ 75mm	100	Bentonite Grout
55 - 16.9 56 - 17.0 57 - 17.0 58 - 17.0	235.53		SILTY SAND TILL moist, very dense	., gravelly, brown,		SS-14	92	8	25-36-50	86	
$\begin{array}{c} 39 & - & 18.0 \\ 60 & - & 18.6 \\ 61 & - & 18.6 \\ 62 & - & 19.0 \\ 63 & - & - \\ 64 & - & - \end{array}$	57 -			e clay and gravel, lense erved	-X	SS-15	100	10	8-28-34-50	62	Bentonite Pellets
65 – 19.8 66 – 20.0 67 – 68 – 61	2 232.63		SAND, trace silt, t	prown, wet, very dense	×	SS-16	100	15	22-50/ 50mm	100	Screen
$\begin{array}{c} 69 - 21.0 \\ 70 - 21.0 \\ 71 - 21.6 \\ 72 - 2129 \\ 73 - 229 \\ 73 - 229 \\ 73 - 229 \\ 73 - 229 \\ 73 - 200 \\ $	0 5 230.80 6 230.50		BOULDER/COBB	LES, very dense	-X	SS-17	50	17	10-23-30-50	53	21.34 m 21.65 m 21.65 m 21.95 m
73 - 1 - 23.0 76 - 1 - 23.0 77 - 1 - 24.0 80 - 1 - 25.0 81 - 1 - 25.0 84 - 1 - 25.0 84 - 1 - 25.0 86 - 1 - 25.0 87 - 1 - 25.0 87 - 1 - 25.0 88 - 1 - 25.0 89 - 1 - 1 - 25.0 90 - 1 - 1 - 25.0 90 - 1 - 1 - 25.0 91 - 1 - 25.0 90 - 1 - 1 - 25.0 91 - 1 - 25.0 90 - 1 - 1 - 25.0 90 - 1 - 1 - 25.0 90 - 1 - 1 - 25.0 91 - 1 - 25.0 90 - 1 - 1 - 25.0 90 - 1 - 1 - 25.0 91 -			END OF BOREH(NOTE : End of Borehole a Groundwater mea upon completion 50 mm diameter n at 21.34 m bgs Sand heaving end bgs bgs denotes 'below	DLE: t 21.95 m bgs sured at 17.38 m bgs nonitoring well installed ountered at 18.60 m w ground surface'							

SOIL LOG WITH GRAPH+WELL 086822.GPJ INSPEC SOL.GDT 14/9/16

REFERENCE N	o.: <u>08</u> 6	6822								ENCL	OSUF	E No	.: _		3	
	GHD	I	BOREHOLE No	o.:		MWO)3-16		E	BOR	REH	OL	Ε	RE	PO	RT
					24	6.14	m			P	age:	1	of	_2		
CLIENT:	County of S	Simcoe	votigation		ntel D-	00.125			LE	GEND)					
PROJECT:	Recovery (Centre (ERRC)	esugation - Enviror	ime	ental Re	sourc	e		\square	SS	- SPL	IT SI	200	N		
LOCATION:	2976 Horse	eshoe Valley Roa	d West, Springwate	er						ST RC	- SHI - RO	ELBY CK C		BE =		
DESCRIBED BY	: S. Andreou	1	CHECKED BY:		F. Ger	gis			Ţ		- WA	TER	LEV	'EL		
DATE (START):	10 August	2016	DATE (FINISH)	: _	10 Aug	ust 20	016									
Depth Elevation (m)	Stratigraphy	DESCRIP SOIL AND	TION OF BEDROCK	State	Type and Number	Recovery TCR	Moisture Content	Blows pe 6 in. / 15 cm or RQD	Penetration Index / SCR	Shea Sens W _p W _p W	ir test (itivity (Water o Atterbe 'N" Valu /s / 12 i	Cu) S) rg limi e n30	t (%) ts (% 0. cm)	△ F □ L) 94 m 85 m	Field _ab 1— [1— [T
Feet Metres 246.1	4	GROUND S	SURFACE			%			N	10 2	0 30 4	0 50 (60 7	0 80 9	90	
1 0.15 245.9		SOIL : 150 mm IVE :	/	M	SS-1	33	3	2-3-5-5	8	•						
2 <u></u> 3 <u></u> 1.0 4 <u></u>	SANI brow	D, some silt, trace n, damp to dry, loo	clay and gravel, ose		SS-2	71	3	4-4-5-5	9	0•						
$\begin{bmatrix} 5 & \\ 6 & \\ 7 & \\ 2.0 \\ 7 & \\ 2.0 \\ 243.8 \end{bmatrix}$					SS-3	50	3	3-4-4-5	8		Conc	rete/E	Envir	opluç		
	greyi	sh brown, moist, c	lense		SS-4	67	2	3-13-17-21	30					+		
	damp	o to dry		\square	SS-5	75	2	10-18-22-18	40	0						
12 — 13 — 4.0 14 —													4.	 27 m		
15 – 16 – 5.0					SS-6	94	16	7-17-26-37	43	0		•		+		
												+		+		
20 - 6.10 240.0	4 some	e gravel, trace silt,	brown, moist,	M	SS-7	100	19	14-28-33-50	61				•	_		
$22 - \frac{1}{2}$ 23 - 7.0	Very															
	damp	o to dry			SS-8	100	2	15-28-32-44	60							
27					00-0	100	2	10 20 02 44				sento		Grou		
29 <u>-</u> 30 <u>-</u> 9.0														+		
				Д	SS-9	100	2	13-33-44-48	77					2		
33 <u>-</u> 10.0													И	+		
	dens	e			SS-10	100	11	13-23-23-38	46				_ 10 8/10	.52 m /201€	;	
				Д	00-10	100		10 20 20 00			Be #2	enton Gra	ite F	ellets		
38 <u>-</u> 39 <u>-</u> 12 0																
§ 40 — 12.20 233.9 ⊣ 41 —	very	dense		X	SS-11	100	11	17-38-50/	100					\pm	Þ	
								75mm						\Rightarrow	台	
													S S	creer		
45 - 14.0					SS-12	100	17	1-5-50	55			-	Ŕ	\pm		
	6				SS-13	100	16	2-28-50/	100	0			14.	→ 88 m	Þ	
				-	-					· · · · · ·					<u> </u>	

SOIL LOG WITH GRAPH+WELL 086822.GPJ INSPEC SOL.GDT 14/9/16

REFERENCE No.:	086822								ENCL	JSURE	NO.: _	3	
GHI		BOREHOLE No).: _		MWO	3-16		E	BOR	EHO	LE	REP	ORT
		ELEVATION:		24	6.14	m			Pa	age: _2	of	_2_	
CLIENT: <u>Co</u> Pro PROJECT: <u>Re</u>	unty of Simcoe eliminary Geotechnica covery Centre (ERRC	al Investigation - Enviror	nme	ental Re	sourc	e			<mark>GEND</mark> SS ST	- SPLIT - SHEL		N BE	
LOCATION: 29	76 Horseshoe Valley	Road West, Springwate	er						RC	- ROCK	CORE		
DESCRIBED BY: <u>S.</u>	Andreou	CHECKED BY:		F. Ger	gis			Ţ		- WATE	RLEV	EL	
DATE (START): <u>10</u>	August 2016	DATE (FINISH)	:	10 Aug	just 20	016							
Depth Elevation (m) Stratigraphy	DESC SOIL A	RIPTION OF ND BEDROCK	State	Type and Number	Recovery TCR	Moisture Content	Blows pe 6 in. / 15 cm or RQD	Penetration Index / SCR	Shear Sensi O V W _p W ₁ A • "I (blows	r test (Cu tivity (S) Vater con Atterberg I N" Value s / 12 in) tent (%) imits (% 30 cm)	∆ Fiel □ Lab	t
Feet Metres 246.14	GROU	ND SURFACE			%			Ν	10 20	0 30 40 5	50 60 70	0 80 90	-
$\begin{array}{c} 50 & = 14.88 \\ 51 & = 52 \\ 53 & = 16.0 \\ 54 & = 55 \\ 56 & = 17.0 \\ 57 & = 58 \\ 59 & = 18.0 \\ 60 & = 66 \\ 61 & = 62 \\ 59 & = 18.0 \\ 60 & = 66 \\ 61 & = 62 \\ 66 & = 20.0 \\ 67 & = 68 \\ 69 & = 21.0 \\ 70 & = 16 \\ 68 & = 22.0 \\ 71 & = 72 \\ 72 & = 22.0 \\ 73 & = 66 \\ 77 & = 68 \\ 69 & = 21.0 \\ 70 & = 72 \\ 74 & = 72 \\ 74 & = 72 \\ 74 & = 72 \\ 74 & = 72 \\ 77 & = 72 \\ 74 & = 72 \\ 77 & = 72 \\ 78 & = 22.0 \\ 77 & = 72 \\ 74 & = 72 \\ 77 & = 72 \\ 78 & = 22.0 \\ 77 & = 72 \\ 78 & = 72 $	END OF BOREHO	DLE: t 14.88 m bgs sured at 10.52 m bgs nonitoring well installed v ground surface'					100mm				Image: App of the section of the s		

REFERENCE No.: 086822								ENCLOSURE No.: 4
CHD	BOREHOLE No).: ₋		MWC	4-16		E	BOREHOLE REPORT
dhb	ELEVATION:		24	2.86	m			Page: <u>1</u> of <u>2</u>
CLIENT: County of Simc	0e						<u>LE(</u>	GEND
PROJECT: Recovery Cent	re (ERRC)	ime	ental Re	sourc	e		\boxtimes	SS - SPLIT SPOON
LOCATION: 2976 Horsesho	e Valley Road West, Springwate	r						ST - SHELBY TUBE RC - ROCK CORE
DESCRIBED BY: O. Sabeeh	CHECKED BY:		F. Gerç	gis			Ţ	- WATER LEVEL
DATE (START):11 August 2016	DATE (FINISH):	_	11 Aug	ust 20	016			
Depth Elevation (m) Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery TCR	Moisture Content	Blows pe 6 in. / 15 cm or RQD	Penetration Index / SCR	
Feet Metres 242.86	GROUND SURFACE			%			N	
1 - FILL : 2 - 0.76 242 10 SAND, sc topsoil with	me silt, trace gravel, trace th rootlets, brown, damp to	Å	SS-1	30		2-3-5-4	8	
3 1.0 4 1.0 5 4 5 241 34 Monthly SILTY SA	se	X	SS-2	95		3-4-7-14	11	
$\begin{bmatrix} 3 \\ 6 \\ 7 \\ \end{bmatrix} = \begin{bmatrix} 1.52 \\ 241.54 \\ \end{bmatrix}$	ND/SANDY SILT, trace gravel,	М	SS-3	90		5-9-9-11	18	
8 dark brow 9 dark grav	n, moist, compact el, rock fragments, dense		SS-4	90		11-17-24-25	41	
			SS-5	90		12-24-25-29	49	
$\begin{array}{c} 12 \\ 13 \\ 14 \\ 15 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 19 \\ 19 \\ 19 \\ 19 \\ 19 \\ 19$	very dense	X	SS-6	90		10-30-38-48	68	
$ \begin{array}{c} 20 \\ 21 \\ 22 \\ 23 \\ 23 \\ 24 \\ 24 \\ 25 \\ 24 \\ 25 \\ 27 \\ 27 \\ 27 \\ 27 \\ 27 \\ 27 \\ 27 \\ 27$		X	SS-7	90		8-15-24-25	39	
26 - 8.0 27 - 28 - 29 - 9.0	ace to some silt, trace gravel, bist, dense	X	SS-8	90		7-14-24-25	38	Bentonite Grout
30 - 9.15 233.71 31 32 33 - 10.0 34	ND, tyrace gravel, brown, very nse	X	SS-9	50		19-23-24-26	47	
35 - 10.67 232.19 36 - 11.0 37 - 38 - 38 - 38 - 39 - 39 - 39 - 39 - 39	ne sand, trace gravel, grey, very aturated, very dense	X	SS-10	100		9-16-23-24	39	Bentonite Pellets #2 Granitic Sand
40 - 12.0 40 - 12.20 230.66 41 - 42 - 43 - 13.0 44 - 45 - 12.70 220 14	ND, trace gravel, grey, , loose	X	SS-11	100		1-2-2-4	4	• Screen
45 - 13.74 229.14 SAND, tra 46 - 14.0 saturated	ace silt and gravel, grey, , dense	M	SS-12	100		6-17-27-40	44	
48 very dens	e	\square	SS-13	100		3-13-28-42	41	

SOIL LOG WITH GRAPH+WELL 086822.GPJ INSPEC_SOL.GDT 14/9/16

	NO	086822								EINC	,LU3	URE	: INO.	·	4	
	GHD		BOREHOLE No).: _		MWO	4-16		E	SO	RE	НС	DLI	ER	EP	ORT
			ELEVATION:		24	2.86	m				Page	: _	2	of _	2	
CLIENT: PROJECT:	Count Prelim Recov	ty of Simcoe hinary Geotechnica very Centre (ERRC	ll Investigation - Enviror	nme	ental Re	sourc	e		<u>LE(</u>	<u>gen</u> SS	<u>ID</u> -	SPLI	T SP	OON		
LOCATION:	2976 I	Horseshoe Valley	Road West, Springwate	er						ST RC	- S	SHEI	LBY . K CC			
DESCRIBED B	Y: <u>O. Sa</u> l	beeh	CHECKED BY:		F. Ger	gis			Ţ		- \	NAT	ERL	EVEL		
DATE (START)	: <u>11 Au</u>	gust 2016	DATE (FINISH)	:	11 Aug	ust 20	016									
Depth Elevation	Stratigraphy	DESC SOIL AI	RIPTION OF ND BEDROCK	State	Type and Number	Recovery TCR	Moisture Content	Blows pe 6 in. / 15 cm or RQD	Penetration Index / SCR	She Sei ○ w _p w (blo	ear te nsitivi Wat Atte "N" \ ows /	st (Ci ty (S) er co rberg /alue 12 in.	u) ntent i limits 30 c	(%) \$ (%) m)	∆ Fielo ∃ Lab	1
Feet Metres 242	.86	GROUI	ND SURFACE			%			N	10	20 3	0 40	50 60		0 90	kaan a n aadu
50 15.09 227. 51 52 16.0 52 16.0 54 55 56 17.0 58 18.0 60 19.0 61 20.0 63 20.0 64 20.0 67 20.0 68 21.0 70 22.0 71 22.0 74 23.0 77 23.0 77 23.0 77 23.0 78 25.0 83 26.0 87 26.0 87 26.0 90 27.0 91 24.0 80 27.0 91 24.0 88 26.0 97 28.0 93 29.0 94 29.0 95 29.0 96 19.0 97 19.0 96 19.0 97 19.0	77	END OF BOREHC NOTE : End of Borehole at Borehole dry upon 50 mm diameter m at 15.09 m bgs bgs denotes 'belov	PLE: 15.09 m bgs completion ionitoring well installed v ground surface'												Image: Section of the sectio	

	REFERENCE No.: 086822											ENC	LOSU	RE N	lo.: _		1	5
					BOREHOLE No.	:_	N	/W1	5-16		В	OR	EH	OL	ΕF	٦F	P	ORT
		G	HU		ELEVATION:		247	.33 m	ı		_		Page:	_1	0	; _2	2	
	CLIENT:		Cou	nty of Simcoe							LE	GEN	D					
	PROJECT	:	Geo Envi	technical Investigati ironmental Resourc	ion e Recovery Centre (ERF	RC))				\boxtimes	SS	= - SF	PL I T :	SPOC	ЭN		
	LOCATIO	N:	2976	6 Horseshoe Valley	Road West, Springwate	r						ST	- SH			BE		
	DESCRIBI	ED BY:	o.s	Sabeeh	CHECKED BY:		S. Sha	hangi	an			RC	- Gr - R(CAD CCK	COR	-LC E		
	DATE (ST	ART):	22 D	December 2016	DATE (FINISH):		23 Dec	embe	er 201	6	Ţ		- W.	ATEF	R LEV	ΈL		
	Depth	Elevation (m) BGS	Stratigraphy	DESCF SOIL AN	RIPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetraion Index	She Ser ○ ₩ _P ₩ (blo	ear test isitivity Water Atterb "N" Va ws / 12	(Cu) (S) conte erg lir lue 2 in3	ent (% nits (% 0 cm)) 6) .76	Fiel Lab m— m—	d
	Feet Metres	247.33		GROUN	ID SURFACE			%			N	10	20 30	40 50	0 60 7	0 80	90	
	1	K		FILL : SAND, trace to so	me silt, trace topsoil	X	SS-1	71	9	2-1-1-1	2	• •			_Co	ncre	te	
	2 - 0.76 3 - 1.0 4	246.57	Ĩ	_ with rootlets, dark loose NATIVE :	brown, moist, very	X	SS-2	100	5	2-2-3-3	5	•						-
	5 — 6 — 7 — 2.0			SILTY SAND/SAN dark brown, moist	IDY SILT, trace gravel, , compact	X	SS-3	100	5	2-2-2-3	4							
	8 – 9 – 10 – 3.0			clay, grey, trace to gravel, grey, mois	o some sand, trace t, very stiff		SS-4A SS-4B	100	16 5	4-4-9-16 —	13 						-	-
	10 - 11 11 - 12 - 12			some gravel, dens	se	X	SS-5	100	5	10-14-16-24	30	0						-
	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			some gravel to gra	avelly	X	SS-6	100	5	13-20-19-25	39			•				
	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$						2											
	$\begin{array}{c} 21 &\\ 22 & -\\ 23 & - \end{array} 7.0$					X	SS-7	100	5	16-22-23-29	45	0		•			_	-
	24 – 25 – 7.62	239.71		SAND some silt t	o silt some gravel		,								_Ber _Ho	itonii Ieplu	te	-
	26 <u>-</u> 8.0 27 <u>-</u>			grey, moist, dense	; ;	Å	SS-8	100	7	13-22-22-28	44							-
.GDI 8/11/1/	$\begin{array}{c} 20 \\ 29 \\ 30 \\ 31 \\ 32 \\ 32 \\ 32 \\ 32 \\ 32 \\ 32 \\ 32$			very dense		X	SS-9	100	7	30-39-50/ 125mm	100	-0-						
GPJ INSPEC_SO	33 - 10.0 34 35 36 11.0 37					X	SS-10	100	7	18-26-27-29	53	-0-						
+WELL U80822-12	38 39 40 41 42 42 42 42 42 42 42 42 42 42			saturated, dense		X	SS-11	100	10	7-20-20-29	40			•				
G WITH GRAPH	$\begin{array}{c} 43 \\ 44 \\ 45 \\ 46 \\ 46 \\ 47 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41$					X	SS-12	75	9	15-23-23-35	6 46			•				
SULLOC	47												#	#2 Gr	anitic	∔3 r Sar	n 1d	

	REFERENCE No.:086822									ENC	LOSU	RE No	o.:	1	5
		Į	BOREHOLE No	:_	Ν	/W1	5-16		В	OR	EH	OLI	ER	EP	ORT
	GHD		ELEVATION:		247	.33 m	۱		-	F	Page:	_2	of	2	
CLIENT:	Сог	unty of Simcoe	1						LE	GEN	D				
PROJECT:	Geo Env	otechnical Investigat vironmental Resourc	ion e Recovery Centre (ER	RC)				\square	SS	= - SF	LIT S	POON	I	
	297	6 Horseshoe Valley	Road West, Springwate	er						ST	- SH			=	
DESCRIBED BY	: 0.8	Sabeeh	CHECKED BY:		S. Sha	hangi	an			RC	- RC	CK C	ORE	L	
DATE (START):	22 [December 2016	DATE (FINISH)	: _	23 Dec	embe	er 201	6	Ţ		- W/	ATER	LEVE	L	
Depth Elevation (m) BGS	Stratigraphy	DESCF SOIL AN	RIPTION OF D BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows pe 6 in. / 15 cm or RQD	Fenetraion Index	She Sen ○ ₩ _p w _l (blo	ar test sitivity Water Atterb "N" Val ws / 12	(Cu) (S) conter erg lim ue in30	nt (%) its (%) cm)	△ Fie □ Lal	ld >
Feet Metres 247.3	3	GROUN	ID SURFACE			%			N	10	20 30	40 50	60 70	80 90	
50		dense			SS-13	100	9	15-24-21-2	9 45			•			
56 - 17.0 57 - 58 - 59 - 18.0 60 - 18.20 - 18.0	4	very dense		X	SS-14	50	6	10-26-45-4	3 71						
$\begin{array}{c} 60 & - & 18.29 \\ 61 & - & \\ 62 & - & 18.90 \\ 62 & - & 18.90 \\ 62 & - & 18.90 \\ 62 & - & 18.90 \\ 62 & - & 62$	3	SILTY SAND, sor saturated, compa	ne gravel, grey, ct	X	SS-15	100	10	13-12-16-2	0 28	-0-	•		18.3 18.9	and m_	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		END OF BOREN NOTE : End of Borehole a Waterlevel at 16.6 completion 50 mm diameter r at 18.29 m bgs Water level at 11. installation bgs denotes 'belo	ULE: at 18.90 m bgs 5 m bgs upon nonitoring well installed 8 m bgs after well w ground surface'												

Appendix B.2 Grain Size Distribution Test Results



GRANULAR A - SIEVE ANALYSIS (PIT) (LS-602)

Client:			Lab no.:	G1310
Project/Site:	Proposed Organics Pr	rocessing and Material Managem	ent Project no.:	086822
Source:	BH1-16 SS2			
Sampled by:			Date sampled:	August 11, 2016
Sieve Size (mm)		Sample % Passing	OPSS 1010 Gradatio	on Specification
			Minimum %	- Maximum %
	26.5	100.0	100	-
	19.0	100.0	85	- 100
	13.2	100.0	65	- 90
	9.50	100.0	35	- 73
	1.180	100.0	15	- 40
	0.300	81.8	5	- 22
	0.075	15.5	2	- 8
100 90 80 70 60 50 50 40 30 20 10 0 0.01		1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8		0 10 20 30 40 50 60 70 80 80 90 100
Remarks:	Gravel 0%, Sand 84%	5 , Silt 16% (Sand, Some Silt)		
Performed by:	Riddhee	e Panchal Dat	e: August	23, 2016
Verified by:	Raj Kad	ia, C.E.T. Dat	te:	



GRANULAR A - SIEVE ANALYSIS (PIT) (LS-602)

Client:			Lab no.:	G1310
Project/Site: Propo	oosed Organics Pro	ocessing and Material Management	Project no.:	086822
Source: BH4-1	-16 SS2			
Sampled by:			Date sampled:	August 11, 2016
Sieve Size (mm)	:	Sample % Passing	OPSS 1010 Gradation	Specification
		Ī	Minimum %	- Maximum %
26	6.5	100.0	100	-
19.	9.0	100.0	85	- 100
13.	50	100.0	<u> </u>	- 90
9:3	75	100.0	35	- 55
1.18	180	96.1	15	- 40
0.30	300	75.4	5	- 22
0.07)75	14.5	2	- 8
				0 10 20 30 40 PERCENT RETAINED 50 0 70 0 10 10 10 10 10 10 10 10 10
Remarks: Grave	/el 0%, Sand 85% .	DIAMETER (mm)		
	, ,			
Performed by:	Riddhee I	Panchal Date:	August 2	23, 2016
Verified by:	Raj Kadia	a, C.E.T. Date:		


GRANULAR A - SIEVE ANALYSIS (PIT) (LS-602)

Client:			Lab no.:	G1310
Project/Site: Pro	roposed Organics Pr	ocessing and Material Management	Project no.:	086822
Source: BH	47-16 SS2			
Sampled by:			Date sampled:	August 11, 2016
Sieve Size (mm)		Sample % Passing	OPSS 1010 Gradation	Specification
			Minimum %	- Maximum %
:	26.5	100.0	100	•
	19.0	100.0	85	- 100
	9.50	100.0	50	- 73
	4.75	100.0	35	- 55
1	1.180	100.0	15	- 40
0	0.300	71.5	5	- 22
0	0.075	15.3	2	- 8
100 90 80 70 60 60 50	71			0 10 20 30 40 PERCEN
	15.3			60 RETAILED 70 LED 80 90 100
		DIAMETER (mm)		
Remarks: Gra	ravel 0%, Sand 85%	, Silt 15% (Sand, Some Silt)		
Performed by:	Riddhee	Panchal Date:	August 2	23, 2016
Verified by:	Raj Kadi	a, C.E.T. Date:		



GRANULAR A - SIEVE ANALYSIS (PIT) (LS-602)

Client:			Lab no.:	G1310
Project/Site:	Proposed Organics P	rocessing and Material Mana	gement Project no.:	086822
Source:	BH8-16 SS2			
Sampled by:			Date sampled:	August 11, 2016
Sieve Size (mm)		Sample % Passing	OPSS 1010 Gradat	tion Specification
			Minimum %	- Maximum %
	26.5	100.0	100	-
	19.0	100.0	85	- 100
	9.50	100.0	50	- 73
	4.75	100.0	35	- 55
	1.180	100.0	15	- 40
	0.300	69.2	5	- 22
	0.075	4.0	2	- 8
100 90 80 70 60 50 50 50 40 40 30 20 10 0.01		9.2 1.00.0 9.2 1.00.0 1.00		0 10 20 30 40 50 60 70 80 90 100
Remarks:	Gravel 0%, Sand 96%	5 , Silt 4% (Sand, Trace Silt)		
Performed by:	Riddhee	e Panchal	Date: Augu	ust 23, 2016
Verified by:	Raj Kad	ia, C.E.T.	Date:	



Client:	County of Simcoe		Lab No.:	G1447		_
Project, Site:	Supplementary Geotechnical Investiga Horseshoe Valley Road West, Springv	ation- (ERRC) 2976 water, ON	Project No.:	086822		_
Borehole No.	BH10-16		Sample No.:	SS4		
Depth:	2.4m - 2.7m		Enclosure:			_
100 90 80 70 60 50 40						0 10 20 50 50 60
30 20 10 0.001	0.01 0.1 p	1		10	100	70 80 90 100
		Sand		Gravel		
	Silty Clay Fi	ne Mediur	m Coarse	Fine C	oarse	
	Particle-Size Limi Soil Description	its as per USCS (ASTM Gravel (%)	D-2487) Sand (%)	Clay & S	Silt (%)	
	Silty Clayey, Sandy	0	25	75	5	
Remarks: <u>Si</u> G	It-size particles (0.074 to 0.002 mm): 47%, Cla ravel 0%, Sand 25%, Silt 47%, Clay 28%	y-size particles (<0.00)	2 mm): 28%			
Performed by:	Anwar Rehani		Date:	January 2	11, 2017	
Verified by:	Raj Kadia C.E.T		Date:	January 2	17, 2017	_



Clie	nt: County of Simcoe				Lab No.:	G1446	3		-						
Proj	ject, Site):	Supple Horses	mentary G hoe Valle	Geotechni y Road W	ical Inve ∕est, Sp	estigat pringwa	ion- (El ater, Ol	RRC) N	2976	Project No.:	08682	2		-
	Borehole	No.:			BH2	0-16					Sample No.:	SS4			
	Depth:				2.4m -	- 2.7m				_	Enclosure:				_
	100									-•	•			0	
	90													1	0
	80													2	0
	70														
	/0		4											3	0 7
Passing	60													41	0 Retaine
ercent	50	/	/											51	o ercent
Pe	40													6	د ۱
	30													7	0
	20													8	0
	10													9	0
	0 0.001			0.01		().1 Diar	neter (mr	n)	1		10		100 10	00
				*: Class					Sar	nd		G	ravel		
			31		Par	ticle-Size	Fine e Limits	e as per	USCS	Mediu (ASTN	um Coarse 1 D-2487)	Fine	Coarse		
			s	ioil Descri	ption			Gr	avel (%)	Sand (%)		Clay & Silt (%)		
			Silty Cla	y, Trace to	Some Sa	nd			0		10		90		
	<u> </u>							<u> </u>			<u> </u>	<u> </u>			1
Ren	narks:	Silt-s	size partic	les (0.074 t	to 0.002 m	nm): 47%	6, Clay-	size pa	rticles	(<0.0	02 mm): 43%				
		Grav	vel 0%, S	Sand 10%,	Silt 47%	, Clay 4	13%								-
Per	formed b	oy:			Anw	/ar Reh	ani				Date:	Ja	nuary 11, 20 <i>1</i>	17	- -
Veri	fied by:				Raj k	Kadia C	.E.T				Date:				-



Clie	ent:	County of Simcoe			Lab No.:	G1446		
Pro	ject, Site:	Supplementary Geotechnic Horseshoe Valley Road W	cal Investigati est. Springwa	on- (ERRC) 2976 ater. ON	Project No.:	086822		
	Borehole No.:	BH22	Sample No.:	SS3				
	Depth:	1.7m -	2.0m		Enclosure:			
	100				•			0
	00							10
	90							10
	80							20
	70			1				30
Passing	60							Retained
ercent	50							50 50
	40		<i>I</i>					60
	30							70
	20							80
	10							90
	0							100
	0.001	0.01	0.1 Dian	neter (mm) 1		10		100
		Silty Clay		Sand		Grave	ł	
		Parti	Fine icle-Size Limits	e Mediu as per USCS (ASTM	m Coarse D-2487)	Fine	Coarse	
		Soil Description		Gravel (%)	Sand (%)	Clay	& Silt (%)	
		Sand, Some Silt		0	88		12	
	<u> </u>				l	1		
Rei	marks:							
	Gra	vel 0%, Sand 88%, Silt 12%						
Per	formed by:	Anwa	ar Rehani		Date:	Janua	ry 11, 2017	
Ver	ified by:	Raj K	adia C.E.T		Date:	Janua	ry 16, 2017	



Clier	it:	County of Simcoe			Lab No.:	G1444		
Proje	ect, Site:	Supplementary Geotechnic Horseshoe Valley Road We	on- (ERRC) 2976 ater, ON	Project No.:	086822			
E	Borehole No.:	MW15	-16		Sample No.:	SS5		
C	Depth:	3.2m - 3	3.5m		Enclosure:			
1	00							٩ ا
	90							- 10
	80							20
	70							- 30
assing	60							etained
ercent P	50			/				ercent R
<u>م</u>	40							60
	30							70
	20							- 80
	10							90
	0.001	0.01	0.1 Dian	neter (mm)		10		100 100
		0.11. 01		Sand		Gravel		
		Siny Clay Parti	Fine cle-Size Limits	as per USCS (ASTM	m Coarse D-2487)	Fine	Coarse	
		Soil Description		Gravel (%)	Sand (%)	Clay &	& Silt (%)	
	Sa	and, Some Silt, Trace Clay and G	ravel	7	66		27	
	<u> </u>				Į	<u> </u>		1
Rem	arks: _{Silt-}	size particles (0.074 to 0.002 mn	ו): 19%, Clay-	size particles (<0.00	2 mm): 8%			
	Gra	avel 7%, Sand 66%, Silt 19%,	Clay 8%					
Perfo	ormed by:	Anwa	r Rehani		Date:	Januar	y 11, 2017	
Verif	erified by: Raj Kadia C.E.T				Date:	Januar	y 16, 2017	

Appendix C Infiltration Analyses



depth of infiltration test = 0.71 m BGS

soil description: SAND with silt

grain size analysis results (%)							
gravel	sand	silt & clay					
TBD	TBD	TBD					

hydraulic conductivity, field saturated⁽¹⁾ (K_{fs}) = 1.07E-03 *cm/s*



percolation time	=	(infiltration rate) ⁻¹ x (60 min/h) X (10 mm/cm)	min/cm
	=	7 min/cm	

Notes:

(1) see Figure C2 for calculation of K_{fs}

(2) Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997.
Supplementary Guidelines to Ontario Building Code 1997.
SG-6 Percolations Times and Soil Descriptions. Toronto, Ontario.



COUNTY OF SIMCOE 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER, ONTARIO ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) GUELPH PERMEAMETER TEST RESULTS (GP01-16)

Figure C.1A



depth of infiltration test = 0.53 m BGS

soil description: SAND with silt

grain size analysis results (%)							
gravel	sand	silt & clay					
TBD	TBD	TBD					

hydraulic conductivity, field saturated⁽¹⁾ (K_{fs}) = 3.07E-04 *cm*/s



	=	10 min/cm	
percolation time	=	(infiltration rate) ⁻¹ x (60 min/h) X (10 mm/cm)	min/cm

Notes:

(1) see Figure C2 for calculation of K_{fs}

(2) Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997.
Supplementary Guidelines to Ontario Building Code 1997.
SG-6 Percolations Times and Soil Descriptions. Toronto, Ontario.



COUNTY OF SIMCOE 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER, ONTARIO ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) GUELPH PERMEAMETER TEST RESULTS (GP02-16)

Figure C.2A



depth of infiltration test = 0.49 m BGS

soil description: SAND with silt

grain size analysis results (%)							
gravel	sand	silt & clay					
TBD	TBD	TBD					

hydraulic conductivity, field saturated⁽¹⁾ (K_{fs}) = 1.07E-03 *cm/s*



	ercolation time	olation time =	(infiltration rate)	¹ x (60 min/h) X (10 mm/cm)	min/cm
= 7 min/cm		=		7 min/cm	

Notes:

(1) see Figure C2 for calculation of K_{fs}

(2) Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997.
Supplementary Guidelines to Ontario Building Code 1997.
SG-6 Percolations Times and Soil Descriptions. Toronto, Ontario.



COUNTY OF SIMCOE 2976 HORSESHOE VALLEY ROAD WEST, SPRINGWATER, ONTARIO ENVIRONMENTAL RESOURCE RECOVERY CENTRE (ERRC) GUELPH PERMEAMETER TEST RESULTS (GP03-16)

Figure C.3A

Appendix D Single Well Response Test Analyses

















































Appendix E Groundwater Level Hydrographs


Note: Levellogger for MW4-16 malfunctioned during monitoring 1) Level loggers are removed during the winters to avoid damage

GHD

County of Simcoe Environmental Resource Recovery Centre (ERRC)

Updated Hydrogeological Assessment

2976 Horseshoe Valley Road, Springwater

GROUNDWATER ELEVATION HYDROGRAPHS

Appendix E.1



Note: (1) Minipiezometer commonly dry Aug 2016 to Nov 2017

(2) Groundsurface of MP1 estimated

(3) No datalogger data available



County of Simcoe Environmental Resource Recovery Centre (ERRC) Updated Hydrogeological Assessment 2976 Horseshoe Valley Road, Springwater **MINIPIEZOMETER GROUNDWATER ELEVATION HYDROGRAPHS**

Appendix E.2a



Note: (1) Minipiezometer commonly dry Aug 2016 to Nov 2017

(2) No Data Logger data available

(3) MP2-16 data logger data unavailable



County of Simcoe Environmental Resource Recovery Centre (ERRC) Updated Hydrogeological Assessment 2976 Horseshoe Valley Road, Springwater MINIPIEZOMETER GROUNDWATER ELEVATION HYDROGRAPHS

Appendix E.2b



Note: (1) Minipiezometer commonly dry Aug 2016 to Nov 2017 (2) Water Levels are Dry, Datalogger data unavailable



County of Simcoe Environmental Resource Recovery Centre (ERRC) Updated Hydrogeological Assessment 2976 Horseshoe Valley Road, Springwater **MINIPIEZOMETER GROUNDWATER ELEVATION HYDROGRAPHS**

Appendix E.2c

Appendix F MOECC Well Records

Appendix F.1 Well Record Formation Report

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F4. Plugging and Sealing Record Annular space Abandonment Location of Well Heigh set at - bidges Material and type (bentonite slurry, neat cement slurry) etc. Volume Placed (cubic metres) O' 23' /O'' - Benseal O' 477' Holeplug Indiagram below show distances of well from road, lot line, and bu Indicate north by arrow. V1 59' Sand RD.18 Method of Construction Image: Conventional (conventional) Diamond Digging Rotary (conventional) Air percussion Jetting Other Water Use Image: Conventional (conventional) Public Supply Other	
From To Indicate ontry (contained only) for contained only) for contained only) for contained only) for contained only (contained only	ilding.
4/7' 59' Sand RD.18 4/7' 59' Sand H 1/15' 1/15' W Cable Tool Rotary (air) Diamond Digging Rotary (conventional) Air percussion Jetting Other Water Use Diving Image: Commercial Public Supply Other	
Method of Construction Image: Tight of the structure of the st	
Cable Tool Rotary (air) Diamond Digging Rotary (conventional) Air percussion Jetting Other Rotary (reverse) Boring Driving 6 Water Use Domestic Industrial Public Supply Other	
Water Use Domestic Industrial Public Supply Other	N. N.
Urrigation	517
Final Status of Well Addit No. Z 37293 2005 Water Supply Recharge well Unfinished Abandoned, (Other) Was the well owner's information package delivered? Date Delivered YYYY	MM [07] 0 MM [
Test Hole Abandoned, poor quality Replacement well Well Contractor/Technician Information Ministry Use Only	-
me of Well Contractor AVIDSON WELL DRILLING LIMITED Well Contractor's Licence No. Data Source Contractor 1737	}
Isiness Address (street name, number, city etc.) 147 WORTH ST. W. WINGHAM, ONT. NOG 2WO ame of Well Technician (last name, first name) Well Technician's Licence No. Remarks Well Record Number	MM [
TENTON Doug T2003 gnatere of Technician/Contractor Date Submitted YYYY	

P	Ont	ario	Ministry of the Environr	ment Well Tag	j Number (Pla	ce slicker and prin	t number below)	Regulation 903	Onta	Well F rio Water Res	Record	
Instruc	tions fo	or Complet	ina Form		A023'	714				page	of	
• For	use in t	he Province	of Ontario	only. This docume	ent is a perm	nanent lega l	document. Pl	ease retain for futur	e refe	erence.		
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Well O	wner's	Informatio	n and Locat	ion of Well Info	rmation	MON				LOI]
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RR#/Stre	et Numb	er/Name	A VITT	D. 18		City/Town/Vil	age E o R D	Site/Compa	rtmen	t/Block/Tract e	tc.	
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	Hole Dia	meter		Cons	truction Rec	ord		Tes	t of W	/ell Yield]
Depth	Network	Diameter	Inside	Motorial	Wall	Depth	Martine .	Pumping test method	Dra	aw Down	Recovery	
From	10		s diam	watenai	thickness	From	To	مەنى	min	Metres mir	Metres	
0	22			and the second	Casing	1		Pump intake set at - (metres)	Static Level			
0	43	6		Steel Fibreglass	all			Pumping rate -	1	. 1		1
	Mater D		- 6	Plastic Concrete	. 219	0	22	Duration of pumping	2	2		-
Water fou	ind	Kind of Water		Galvanized			-	hrs + min	~			
	n Fre	sh 🗌 Sulphu	7 "	Plastic Concrete	Sch.40	6'	33	Final water level end of pumping	-3	3		-
Gas	Sal	ty Mineral	s ~	Galvanized				Recommended pump	4	4		1
	1 1 🗌 Fre	sh 🗌 Sulphu		Steel Fibreglass				type. Shallow Deep]
Gas	Sal	ty 🗌 Mineral	s	Galvanized				depth. metres	5	5	-	4
	n 🗌 Fre	sh 🗌 Sulphu	r		Screen			Recommended pump	10	10	l l	
Gas	Sal	ity 🗌 Mineral	s Outside	Steel Fibreglass	Slot No.			litres/min)	15	15		-
After test	t of well yi	eld, water was	111 D	Plastic Concrete	10	33	43	(litres/min)	20	20		-
Clear	r and sedin	nent free		Galvanized	70			If pumping discontin- ued, give reason.	30	30		
Othe	r, specify_			No C	Casing or Scr	reen			40 50	40		╡.
Chlorina	ted 🗌 Ye	s 🗌 No		Open hole		-			60	60	-	1
	P	ugging and s	Sealing Recor	d 🗙 Annula	ar space 🔲 A	bandonment		Location	of We	11	·]
Depth se From	atat- Metra To	Material and	type (bentonite slu	ırry, neat cement slurry	/) etc. Volur (cubi	ne Placed ic metres)	In diagram below Indicate north by	v show distances of well fi v arrow.	om roa	ad, lot line, and b	building.	
0'	22	' 10"	- Bense	eal			A			- 1	1	
0'	31'	Hol	eplug			·	1 <u>.v</u>	81	5.1	8		
31'	43	' Sav	id y								<u>_</u>	
		•						1 7	5		+	1
			Method of C	onstruction	-					200'	2.1	
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	, (,,		Water	Use				and a second br>Second second br>Second second	1		SITE	10
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	ion		cipal		air conditioning		Audit No. 🕳	2700A Da	te Well	Completed YYYY	MM DD	1
	- Cu		Final Statu	us of Well	ΛL	loned (Other)	L Wee the well	JI ZJ4	të Deliv	2005	07 07	4
Conservation Water	vation wel	Abandone	weil ed, insufficient su	oply Dewatering			package delivere	ed? Yes No				
Test	Hole	Abandone	ed, poor quality	Replaceme	nt well			Ministry Us	e Onl	У		ר
Name of	Well Contr	actor	JINTACLOF/ CO		ell Contractor's	Licence No.	Data Source	Co	ntracto	or per co per	· .	1
DAU	DSON	WELLDA	TALING A	IMITEU	1737		Date Received		te of In	T337	MM DD	-
)47	Nor	TH ST.U	WINGH	AM, ONT.	Nog 2	ωo	NOV	2 T 2005 D		γγγγ		
Name of	Well Tech	nician (last nam	e, first name)	W	ell Technician's	Licence No.	Remarks	We	ell Reco	ord Number	,	1
Signature	of Tech	Cian/Contractor		Da	ate Submitted YYY	Y, MM DD			a de la compañía de l Compañía de la compañía de la compañí	· · · · · · · · ·	and the second sec	1
	C·K	Jouri das	m)	actor's Copy 🗔 M	2005	5 09 30	er's Copy	Cette I	ormul	e est disponibl	e en francais	_ s
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⑦ Ontario [™]	inistry of Well T a e Environment	ag Number (Place	sticker and print	number below)	Regulation 903	We Ontario Water	Resources Act
Instructions for Completing	Form	A0237	14			p	age of
 For use in the Province of All Sections must be comp Questions regarding comp All metre measurements Please print clearly in blue 	f Ontario only. This docun oleted in full to avoid delay leting this application can shall be reported to 1/10 or black ink only.	nent is a perma /s in processing be directed to t 0 th of a metre.	nent legal . Further in he Water V	document. Ple structions and Vell Managem	ease retain for future explanations are ava lent Coordinator at Ministry Use	e reference. ailable on the ba 416-235-6203 a Only	ack of this form.
Well Owner's Information a	nd Location of Well Inf	ormation				<u> </u>	
(ag- 1/ 1/ 1							
RR#/Street Number/Name Hwy.6/10 at Co GPS Reading NAD Zone	Easting Nor	rthing	ity/Town/Vill RocKF nit Make/Mo	age ORD odel Mode	Site/Compa of Operation: X Undi	ifferentiated	Averaged
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	avi Stance					Fro	om To
Brown Bedrock	ay stones		Har	d		9	'6 33'
	·····						,
Hole Diameter	Con	struction Recor	<u></u>	1	Tes	t of Well Yield	
Depth Metres Diameter	Inside	Wall	Depth	Metros	Pumping test method	Draw Down	Recovery
From To Gentimeters	diam Material	thickness	From	F † •		Time Water Leve	Time Water Level
0 21' 10		Casing			Pump intake set at -	Static	
0 33' 6"	Steel Fibredias	Casing			(metres) Pumping rate -	Level 1	1
		.219"	0'	21'	(litres/min)		
Water Record	Galvanized				buration of pumping	2	2
at Metres Kind of Water		s 5. h. 40	+2'	23'	Final water level end	3	3
Gas Salty Minerals		Serie			Becommended pump		
	Steel Fibreglas	35			type.	4	4
Gas Salty Minerals					Recommended pump	5	.5
	Galvanized	Screen			Recommended pump	10	10
Gas Salty Minerals	Outside Steel Fibreglas	s Slot No			rate. (litres/min)	15	15
Other:	diam Plastic Concrete		23'	33'	If flowing give rate -	20	20
Clear and sediment free	2' Galvanized	10	-		If pumping discontin-	30	30
Other, specify	No	Casing or Scre	ən		ded, give reason.	40	40
Chlorinated 🗌 Yes 🗌 No	Open hole					60	60
Plugging and Sea	ling Record M Annu	ular space 🗍 Aba	andonment		Location	of Well	
Depth set at - Metres Material and type	e (bentonite slurry, neat cement slur	rry) etc. Volume	Placed	In diagram below	v show distances of well fr	rom road, lot line,	and building.
0' 21' 10'' -	Benseal				arrow.		1
0 23' 6"-	Holeplug				and a second		ļ
22' 33' Sand					RD.1	8	
	· · · · · · · · · · · · · · · · · · ·				1		H
					1 175	200	W
Cable Tool	ethod of Construction		Digging		i Ø	200 y	Y
Rotary (conventional) Air perce Rotary (reverse) Boring	Ussion Jetting Driving		Other				6 TE
Domestic Industria	vvater USe	ipply	Other		1		> /
Stock Commer	cial X Not used	air conditioning		Audit No. 🔔	2700E Da	te Well Completed	
	Final Status of Well			Z	21223	ate Delivered	<u>67 07</u>
Water Supply Recharge we Supply Abandoned, i	ม Unfinishe insufficient supply Dewaterir	a L_ Abandor	iea, (Other)	vvas the well ov package delivere	d? Yes No		זיזיד ואואן DD
Test Hole Abandoned, p	poor quality Replacem	nent well			Ministry Us	e Only	
Name of Well Contractor		Well Contractor's Li	cence No.	Data Source	Cc	ontractor	~
DAJ 1050N WELL DRI	LLING LIMITED	1737		Date Received	үүүү мм ор Да	ate of Inspection	
147 NORTH ST. W.	WINEHAM, ONT	NOG 2	wo	NOV	2 1 2005		
Name of Well Technician (last name, fi	rst name)	Well Technician's L 72003	cence No.	Remarks		ell Record Numbe	r - San Ang Vitan
Signature of Technician/Contractor	i i i i i i i i i i i i i i i i i i i	Date Submitted YYYY	MM DD				
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		MINISTRY OF THE E	NVIRONMENT
$(\mathbf{ $	\ \ / /	The Ontario Water	Resources Act
	WA	VIEK MEL	
Ontario	1. PRINT ONLY IN S	PACES PROVIDED	4805898; <u>26,00X</u> 2014 10.5
COUNTY OR SHE	2. CHECK 🖄 CORRE	TOWNSHIP, BOROUGH: CITY, TOWN, FILLAGE	3 GCON., BLOCK, TRACT SURVEY PLATAT
A LIT A DI	<u>^</u>	760RAGH	ONTARCO DATE COMPLETED 48-53
		EAUERTO	N CEDAR BEACH. DAY 18 MC. O. G. YR. 4
- ((05000)			740 5 22 MAY 05, 1975 63 4
4605898 1	LI 64593 LO	G OF OVERBURDEN AND BEDRO	CK MATERIALS (SEE INSTRUCTIONS)
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION FROM TO
BROWN	CLAY	GRAUEL	1-1 ARD 0 18
GREY	CLAY	GRAUEL	14 ARD 18 52
GREY (FRAUEL		POROUS 52 53
		· · · · · · · · · · · · · · · · · · ·	
(31) NOUXA	105/11/1 1 1005	22/05/11/1006321/11/1	
41 WATER	R RECORD	51 CASING & OPEN HOLE I	RECORD SIZE(S) OF OPENING 31-33 DIAMETER 34-38 LENGTH 39-40
AT - FEET	AND OF WATER	INSIDE WALL DIAM MATERIAL THICKNESS INCHES INCHES FR	IDEPTH - FEET INCRES FEET INCRES FEET FEET INCRES FEET FEET INCRES FEET FEET INCRES FEET FEET FEET FEET FEET FEET FEET FE
45-3 2	ALTY 4 I MINERAL	511 2 GALVANIZED 12 188 C	> 405-3" FEET
15-18 1 🗆 F 2 🗌 S/	RESH ³ SULPHUR ¹⁹ ALTY ⁴ MINERAL	05 4 OPEN HOLE	20-23 DEPTH SET AT - FEET
20-23 1 🗇 F 2 🗋 S	RESH ³ 🗋 SULPHUR ²⁴ Alty ⁴ 🗋 Mineral	2 GALVANIZED GALVANIZED GALVANIZED GALVANIZED	FROM TO MATERIAL AND THE LEAD PACKER, ETC.)
25-28 1 🗆 F 2 🗆 S	RESH S SULPHUR 29	4 OPEN HOLE	27-30 18-21 22-25
30-33 1 [] F	RESH 3 SULPHUR 34 80	C GALVANIZED	26-29 30-33 80
	ALTY 4 MINERAL	E 11-14 DURATION OF PUMPING	
71 1 PUMP 2	BAILER UD2C	Э GPM 15-16 ИОИР МІНЯ	IN DIAGREEN BELOW SHOW DISTANCES OF WELL FROM ROAD AND
	VATER LEVEL 25 END OF WATER L PUMPING	EVELS DURING	LOT LINE INDICATE NORTH BY ARROW.
LOC TES	06	28 0 29-31 06 32-34 06 35-37	ATT THE
S GIVE RATE	3B-41 PUMP INTAKE	SET AT WATER AT END OF TEST 42	in a la EAUENTOU
RECOMMENDED PUMP 1	GPM C	D 43-45 RECOMMENDED 46-49	K. Smin Chever PARK
SO-53	DEEP SETTING	ECIFIC CAPACITY	The server and se
EINAI 54	WATER SUPPLY	5 🗌 ABANDONED, INSUFFICIENT SUPPLY	TAST VI
STATUS	2 OBSERVATION WE	LL 6 ABANDONED, POOR QUALITY 7 UNFINISHED	A A A A A A A A A A A A A A A A A A A
55-50	6 1 DOMESTIC	S COMMERCIAL	3 65
WATER	2 STOCK 3 IRRIGATION	6 MUNICIPAL 7 PUBLIC SUPPLY • COOLING OF AIR CONDITIONING	
USE ()		9 NOT USED	V_LOTIG LOTIS
57 METHOD	I CABLE TOOL	6 🗌 BORING NTIONAL) 7 🗍 DIAMOND	
	3 C ROTARY (REVERS 4 ROTARY (AIR)	E) 8 🗍 JETTING 9 🗌 DRIVING	
	5 AIR PERCUSSION		DRILLERS REMARKS:
NAME OF WELL CO	NTRACTOR BOANWA Y		2 SOURCE / 14/3 V40774
ADDRESS	27 (100011	WEST ANT LAE IPA	$\begin{array}{c} O & DATE OF INSPECTION \\ W & O & C & 78/94 \end{array}$ INSPECTOR $T.B$
NAME OF DRILLER	OR BORER		WWT VENTED- informed owner. P/J.R.
SIGNATURE OF CON		SUBMISSION DATE	ERP 222 - (TO / COS CO WILT R
P. 7. F.	sadiry	DAY 10 Mofline YR/4	FORM 7 07-091
MINISTRY	OF THE ENV	IRONMENT COPY	

UTM 19912 19919191919191 19 R 81919191919191 Elev. JAVRI 98 The Water-well Drillers Act, 1954 Basino 12 B RES **Department** of Mines Water-Well Record rnuter Township, Village, Town or City. Flos County of Territorial District..... Con..... treet and Number (if in Village, Town or City)..... Address . A. J. J. J. Ke Owner KSTON [195-7] Date completed ... (month) (year) **Pumping Test** Pipe and Casing Record Casing diameter(s) ...?. Pumping rate ... 3.0.0.9 Length(s) $\frac{100}{100}$ Type of screen L) (60 Pumping level 7 Water Record Well Log Depth(s) at which Kind of water No. of feet From То (fresh, salty, Overburden and Bedrock Record ater (s) ft. ft. water rises or sulphur) found 0 100 6 WAM For what purpose(s) is the water to be used? Location of Well Home & fam user garde In diagram below show distances of well from Is water clear or cloudy?...... road and lot line. Indicate north by arrow. Is well on upland, in valley, or on hillside? Drilling firm Address (J. D. medlurs Ont Name of Driller W· Address Licence Number...... ił I certify that the foregoing statements of fact are true 11957 Form 5 CSS.S8 y/set is directly

	ALC			-Q
UTM 17 2 596438 E	y			TESDURCA CONTRACTOR
5 R 4929 620 N The Ontario Water Reso	urces Commission	Act	MAY	1967
Elev. 5 R 018125 WATER WEL	L REC	ORD	57 _{ONT} N	699
Basin 22 I SINCOR	ownshin Village T	own or City	FLO S	COMMISSION
County of District Lot 3	ate completed	4	FEB.	1967
			month HELPS	year) 7014 -
		Bumping		
Casing and Screen Record	Static levei			
Total length of casing 76	Test-pumping ra	te T	2	G.P.M.
Type of screen Cook SLOT 16	Pumping level	4	481	
Length of screen	Duration of test]	oumping	I HR.	, ,
Depth to top of screen 76	Water clear or cl	oudy at end of	test CLE	AR1
Diameter of finished hole	Recommended I	oumping rate	5	G.P.M.
•	with pump settir	ng of 60	feet belo	w ground surface
Well Log		L	Wate	r Record
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Dung well	0	42		
HARD PAN	42	74		
		G		
COARIE SAND	77	80	14	MRESH
For what purpose(s) is the water to be used?		Location	of Well	1) C
FARM	In diagrai road and	m below show lot line. Ind	distances of we	arrow.
Is well on upland, in valley, or on hillside?		11		
Drilling or Boring Firm				
PT-CAMEROIT	. 1			γ
Address X K Market Contractions				
Liaman Number 2563		- 4	. 9	_
Name of Driller or Borer			- ///	ଁ ୬ ^୫ ଁ
Address Address				¥
Date April 12/67))	
(Signature of Licensed Drilling or Boring Contractor)			t	
Form 7 15M-60-4138		'1		
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			CSS.58	

	The Ontario Water Re	sources Commi	ssion Act	i je poslavna se na s Interna se na se
Water management in Ontario 1. PRINT ONLY I 2. CHECK 🕅 CO	N SPACES PROVIDED	57068	33-P 572216	con.
COUNTY OR DISTRICT	TOWNSHIP, BOROBON-CIT, TOWN, VILLAGE	w P ³	CON., BLOCK TRACE, SURVE	15 22 23 24 TC. LOT 25-27 LOT 25-27
IOWNER (SURNAME FIRST) 28-47	RHIM	IDHURSY		DATE COMPLETED 48-53
	NG 2 8 5 2 0	$\begin{array}{c} \text{RC} & \text{ELEVATION} \\ 4 & 0825 \\ 25 & 26 \end{array}$	RC. BASIN CODE	
GENERAL COLOUR MOST	LOG OF OVERBURDEN AND BED	ROCK MATERIALS	(SEE INSTRUCTIONS)	47
GREY SAND	CLDY BOULD	ERC 11	GENERAL DESCRIPTION	FROM TO
SAND		ERS HA		26 97
SILT				87 104
SAND				104 113
31 aa3920905113 ba	87 9 1 9/04 06 1	6/13/09		
$\begin{array}{c c} 32 \\ 10 \\ 14 \\ 15 \\ 21 \\ \hline \\ 41 \\ \hline \\ 14 \\ 21 \\ \hline \\ 21 \\ 21$		43		
WATER RECORD	INSIDE MATERIAL THICKNESS		(SLOT NO.)	33 DIAMETER 34-38 LENGTH 39-40 05.000 INCHES 03 FEET
0104 ¹⁰⁻¹³ 1 🕱 FRESH 3 🗌 SULPHUR ¹⁴ 2 🗋 SALTY 4 🗌 MINERAL	INCHES INCHES F		STAINLESSS	DEPTH TO TOP 41-44 80 OF SCREEN 41-44 80
15-18 1 🗍 FRESH 3 🗍 SULPHUR 2 🗋 SALTY 4 🗌 MINERAL		6	PLUGGING &	SEALING RECORD
20-23 1	17-18 1 □ STEEL 19 2 □ GALVANIZED 3 □ CONCRETE	20-23 D	FROM TO MATE	RIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
25-28 1 🗆 FRESH 3 🗌 SULPHUR ²⁹ 2 🗍 SALTY 4 🗍 MINERAL	4 OPEN HOLE 24-25 1 STEEL 26	27-30	18-21 22-25	
30-33 1 T FRESH 3 SULPHUR 34 2 SALTY 4 MINERAL	80 2 GALVANIZED 3 CONCRETE 4 OPEN HOLE		26-29 30-33 80	
	TE 11-14 DURATION OF PUMPING .		LOCATION ØF	WELL
STATIC EVEL PUMPING 25 WATE	GPM. HOURS	IN DIAGRA LOT LINE.	M BELOW SHOW DISTANCES OF INDICATE NORTH BY ABSOW.	WELL FROM ROAD AND
	5 30 MINUTES 45 MINUTES 60 MINUTES -28 29-31 32-34 332-37	DH	FLOS 7 2013	
C FLOWING, 38-41 PUMP INTAKE	SET AT WATER AT END OF TEST 42	<u>13</u> M		A
C GPM. RECOMMENDED PUMP TYPE RECOMMENDED PUMP - A	PEET CLEAR 2 CLOUDY	1	3	
	S FEET RYEOO7 GPM.	-	T SIL	R RN III
	5 ABANDONED, INSUFFICIENT SUPPLY			
STATUS 3 TEST HOLE OF WELL 4 RECHARGE WELL	7 UNFINISHED			76-58
		7	2	
	7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED	T Z	SI 4	OTI
METHOD 57 1 CABLE TOOL				
OF 3 ROTARY (CONVENT DRILLING 4 ROTARY (AIR)	FIONAL) 7 □ DIAMOND E) 8 □ JETTING ' 9 □ DRIVING			
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DANDIERSON DR	TILLIAIG 3326		1204	⁶³⁻⁶⁸ ⁸⁰
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	GPM. TYPE RECOMMENDED	FEET CLEAR	2 CLOUDY				1	
	DEEP SETTING		9 дрм.				15	
	2.0.7 GPM./FT. SPECIFI	C CAPACITY		1-1-	-		11	
FINAL STATUS	WATER SUPPLY	5 🗋 ABANDONED, INSUFF 6 🗋 ABANDONED, POOR	CIENT SUPPLY	1 June	-	/ V		
OF WELL	4 RECHARGE WELL	✓ □ UNFINISHED				11		
WATEP	2 STOCK	5 COMMERCIAL			N	,		
USE O/	4 IRRIGATION	/ ↓ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDIT	TIONING	Ver		11	111	
57		9 🗌 NOT L	JSED	· • • • • •		11	シ	
METHOD OF	2 ROTARY (CONVENTIO	6 LI BORING DNAL) 7 DIAMOND B LETTING				~		
DRILLING	4 ROTARY (AIR) 5 AIR PERCUSSION	9 DRIVING				1 '		
NAME OF WELL CON	TRACTOR	LICE	NCE NUMBER	DATA	58 CONTI	RACTOR A9-62 DATE	RECEIVED	63-68 80
ADDRESS	MMERS		2514			2514	100773	
RR RR	# 3 Bar	rje, Ont.				INSPECTOR		
Z A/.	BORER	LICEN	ICE NUMBER				P	h
SIGNATURE OF CONT	RACTOR	SUBMISSION DATE		DFFIC			14	
L penny	(ummus	DAY MO,	YR	U		<u></u> CS	S.58	
OWRC CO	JPY							

		M	INISTRY OF THE				12 1
		ATER	WEL	L R	ECORD	317	W VN
Ontario	1. PRINT ONLY IN 2. CHECK 🔀 CORI	SPACES PROVIDED RECT BOX WHERE APPLICA	BLE 11	57134	446 - 57016	260 15	
COUNTY OR DISTRICT	de	TOWNSHIP, BOROUG	H, CITY, NWN HELAGE	ر. 	CON., BLOCK, TRACT, SURVEY	DATE COMPLETED	LOT 25-2 00
21			1 MIBIAN 28550 5	ELEVATION	RC. BASIN CODE		<u>VR.</u> VR. Z
2			DEN AND BEDRC	26 CK MATERIAL	S (SEE INSTRUCTIONS)		
GENERAL COLOUR	MOST COMMON MATERIAL	ОТНЕ	R MATERIALS		GENERAL DESCRIPTION	DEPT	H - FEET TO
Brown	TODSOIL		· · · · · · · · · · · · · · · · · · ·			Ø	/
11	Sand			10	USE	/	19
11	/ 1	grovel	, stone	5 Pa	cked	19	73
	· · ·					23	98
r x	Clay	SIT				98	125
	Jand			- W.	2/	114	- 10 Y
			<u> </u>				
21	6621	011077		6001 100		h h h h h h h h h h h h h h h h h h h	<u></u>
41 WAT	TER RECORD	51 CASIN	G & OPEN HOLE	RECORD	SIZE (S) OF OPENING (SLOT NO.)	31-33 DIAMETER 34-38	LENGTH 3
MATER FOUND AT - FEET	KIND OF WATER	INSIDE MATERI INCHES	AL THICKNESS FF	DEPTH - FEET ROM TO	MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN	<u>41-44</u>
	SALTY 4 MINERAL	10-11 1 DISTEEL 2 GALVAN	NIZED 258 C	20/25	Johnson.	> 5 0/2	
2	J FRESH J J SULPHUR J SALTY 4 D MINERAL	4 OPEN 1 17-18 1 STEEL	HOLE	20.23	DEPTH SET AT - FEET	ATERIAL AND TYPE	MENT GROUT
20-23 1 []	FRESH 3 SULPHUR 24 SALTY 4 MINERAL	2 GALVA 3 GONCR	NIZED		FROM TO 10-13 14-17	LEAD	PACKER, ETC.)
25-28 1 🗌 2 🗍] FRESH 3 🗌 SULPHUR ²⁹] SALTY 4 🗌 MINERAL	24-25 1 STEEL 2 GALVA	26 NIZED	27-30	18-21 22-25	unen jac	
30-33 1] FRESH 3 [] SULPHUR ³⁴ ⁸		ETE		26-29 30-33 80		

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ntario	of the Environmer	it :		WAI	ER			NEU	JRL
NTARIO									_
UNTY OR D		I. PRINT ONLY IN SP	ACES PROVIDED	11	57244	421	57003		
	DISTRICT	. CHECK 🛛 CORREC	TOWNSHIP, BOROUGH, CIT	TY, TOWN, VILLAGE		CON	BLOCK, TRACT, SURVEY	ETC	LOT 25-27
	<u> </u>							DATE COMPLETED	4.53
			RR	2#2	PHELPS	TON	ONTARIO BASIN CODE	DAYMO	
21	, <u> </u>	البريما المسالم					31		
2	- 10	LO	G OF OVERBURDE	N AND BEDRO	CK MATERI	ALS (SEE	INSTRUCTIONS		
ENERAL (MOST DN NATERIAL	OTHER M	ATERIALS		GENE	RAL DESCRIPTION	FROM	4 TO
Be	OWN TO	PSOIL						C	<u>> </u>
RR.	JUN S	AND	STONES					1	31
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Be	jown SI	ano			M	EDIU	м	1(26 13
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<u> </u>	Ey CI	A	SAND	•					8 146
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				<u> </u>		701			
			IOTAL	DEPTH	/	10			
24		<u>_</u>	11.1.1.1.1.			1111			
32		╶╵╵╻╹╹╻╻╻							
41	WATER RE	CORD	51 CASING	& OPEN HOLE	RECORD		LOT NO) IDSLD	JI-JJ DIAMETER J	34-38 LENGTH 39
NATER FOR	UND KIND OF	WATER	INSIDE DIAM MATERIAL INCHES	WALL THICKNESS INCHES	DEPTH - FEET	CREI	HERIAL AND TYPE	OT JIN	CHES FE O TOP 41-44 EN
170	10-13 1 2 FRESH 2 3 SALTY	3 SULPHUR 4 MINERALS 6 GAS	10-11 1 DSTEEL 2 GALYANIZED	12 2	1	3-16	JOHNSON ST	AINLESS	7 FEET
(15-18 I FRESH Z SALTY	3 DSULPHUR 4 DMINERALS	5 3 CONCRETE 4 OPEN HOLE 5 PLASTIC	· 188 A	200E T	61		G & SEALING F	
	20-23 1 C FRESH	3 DSULPHUR 24 4 DMINERALS	17-18 1	19 D		FRO	M 10	MATERIAL AND TYPE	LEAD PACKER, ETC.)
	25-28 1 FRESH	6 0 GAS 3 0 SULPHUR 29	4 0 0 PEN HOLE 5 0 PLASTIC	26	2	7 - 30	18-21 22-25 K	PACKER	-quick_
	2 SALTY 30-33 1 FRESH	6 GAS	1 STEEL 2 GALVANIZEI 3 CONCRETE	D			26-29 30-33 BO	EL & CU	TTINGS
	2 🗌 SALTY	4 UMINERALS 6 Gas	5 D PLASTIC		<u>_</u>				
71 PUMP	PING TEST METHOD	10 PUMPING RATI		15-16 30 17-18 HOURS 30 NINS	ELINA	ILÉ	LOCATION		
	STATIC WATER L LEVEL PUMPI	EVEL 25 DF WATER L	EVELS DURING	PUMPING .		I DIAGRAM B OT LINE	ELOW SHOW DISTANC	RROW.	
EST	00 14	22-24 15 MINUTES	20 MINUTES 45 MINI 20 29-31	UTES 60 MINUTES		1 1	Ň	SHED	
	YO FEET	FEET 16 FE	ET 38FEET 44	END OF TEST		lwy 21			
		GPM					1		
2	SHALLOW DE	PUMP SETTING	165 FEET RATE	10 GPM				山)	XXX
50-53	3 				$\left \right $				TANT
F	FINAL	WATER SUPPLY	LL B ABANDONED I	INSUFFICIENT SUPPLY POOR QUALITY		T' Crus	2001	2 ERINA	AFTO
OF	F WELL] TEST HOLE] RECHARGE WELL	9 DEWATERING			441	22	HOUSE	CEMETE
	53-56 1 2	DOMESTIC D STOCK	S COMMERCIAL						
, v	USE 4			CONDITIONING NOT USED				0,000	
	57		 в [] ворі	NG		ARRIE		FEILL KUND	
м	OF	ROTARY (CONVEI	NTIONAL) 7 DIAM (E) 8 DIETT	ION D IN G					39640
CONS	STRUCTION	ROTARY (AIR)		ING OTHER	DRILLERS R	EMARKS		I	
NA	ME OF WELL CONTRAC	TOR	1	WELL CONTRACTOR		E	SE CONTRACTOR 53-	ATE RECEIVED	1089
1-1	JULE & B	UKERD	RILLINGLIN	1467		FINSPECTION		JAN 21	1303
0 18				1					
RACTOF	RR HI	BOXT.	JARRIE (WELL TECHNICIAN	S D REMAR	K 5	1		
ONTRACTOF	BRIAN B	BOXT.	BARRIE C	WELL TECHNICIAN LICENCE NUMBER TO226		WDE	: :		
CONTRACTOF	R R H I BRIAN B IGNATURE OF TECHNI BAIA'	BOX 7 ILIKER CIAN/CONTRACTOR IR, BIA	SUBMISSION DU	WELL TECHNICIAN LICENCE NUMBER TOZZO		WDE	: :	(CSS.ES

6	Ministr of the	ry State		λ/ΔΤ	The O	ntario Water Reso	urces Act	CO	RD
On	Enviro tario	nment	•	C			6	N	1 103
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cou	NTY OR DISTRICT		TOWNSHIP, BOROUGH CITY.	TOWN VILLAGE		(0	~ <u>3</u>		1
			C R	or du a			DATE COM	MONOV	YR 92
					ELEVATION	RC BASIN CODE	10		1V
	1 <u>-</u>					S (SEE INSTRUCTIONS)	······································		47
-		MOST				GENERAL DESCRIPTION		DEPTH	FEET
GE	NERAL COLOUR	CONNON MATERIAL						FROM	1
Н	SLACK	TOP SOIL	<i>e</i>			· · · · · · · · · · · · · · · · · · ·			6
	$\frac{120}{602}$	SHAVIJ	S R A	\sim				6	85
\vdash	31M		SAND	1)				85	96
$\left \right $	2602	CLAY	SIL					26	170
F		MEDIUNS	SAND					170	175
1	3RAL	CNAT	SIGT					175	190
		WATER	BEARING S	GAN.D				190	220
				<u></u>		1 1 2 1 4			
	31								
					FCORD	SIZE (S) OF OPENING	31-35 DIA	METER 34 33 L	75 80 ENGTH 39-40
w	ATER FOUND	KIND OF WATER	INSIDE MATERIAL	WALL D THICKNESS	EPTH - FEET	MATERIAL AND TYPE		DEPTH TO TOP	41-4* 30
F		FRESH 3 SULPHUR	10-11 1 STEEL	INCHES	1.0-16	5 STAINL	IESS.	OF SCREEN	0 FEET
ť		GAS FRESH CONTRACTOR A CONTR	6 - CONCRETE	·188 O	210	61 PLUG	GING & SEA	ALING RECO	RD
╞	20.23 : 0	FRESH SULPHUR	1. (8] DSTEEL 2 DGALVANIZED	9	20-23	DEPTH SET AT - FEET FROM TO	MATERIALA	ND TYPE LEAD PA	NT GROUT NCKER. ETC +
	2 25 28 1	SALTY GAS	3 CONCRETE 4 DOPEN HOLE 5 DPLASTIC			102-13 EAL-1*	CUTTI	N63 -11	ENSTRL
	30-23	SALTY	24-25 1 □ STEEL 2 □ GALVANIZED 3 □ CONCRETE	ũ .	27.10	26 29 30-33	K-1	PACKIE	ৎ
	2	FRESH 4 MINERALS SALTY GAS	4 DOPEN HOLE 5 DPLASTIC						
7			E 15-16 DURATION OF P			LOCATIO	N OF WE	LL	
	STATIC	WATER LEVEL 25 END OF WATER	LEVELS DURING		IN DI LOT U	AGRAM BELOW SHOW DIST INE INDICATE NORTH	ANCES OF WEL BY ARROW.	L FROM ROAD A	
		22:24 IS MINUTES	28 30 NINUTES 45 MINUTES	60 MINUTES -34 35-37		Court	74 10	22	/ N
	IF FLOWING	33 41 PUNP INTAKE	ET C FEET FEET FEET	EET FEET OF TEST 42	Inile	Craistert	>		
		GPM	FEET CLEAR	2 CLOUDY					
		DEEP SETTING	150 FEET PUMPING	25 GPM					
	50.51 	<u></u>	•						
	FINAL STATUS	Deservation wi	S 🗌 ABANDONED, INSU ELL S 🗌 ABANDONED POOT	IFFICIENT SUPPLY R QUALITY		60	3	~	
	OF WELL	TEST HOLE G RECHARGE WELL				M	4	م ب	
	WATER		5 COMMERCIAL 6 C MUNICIPAL 7 PUBLIC SUPPLY			A gin		5	•
	USE			DITIONING DT USED				X	
			5 🗋 BORING			DJERO JENA			
	METHOD OF	2 LE ROTARY (CONVE 3 C ROTARY (REVER	NTIONAL) 7 DIAMOND SE) 8 DIETTING)				4.0	~ • • • •
	CONSTRUCTIO	N 4 C ROTARY (AIR) 5 C AIR PERCUSSION			DRILLERS REMA	RKS		12	8430
ſ	NAME OF WELL C			L CONTRACTOR'S	DATA SCORCE	58 COLIRA 88 5	59-62 DATE RECE	JAN 1 5	1992
	ADDRESS	rg Well K	II-IIing I	821		POLITIN INSPE	TOP -	Vrin i J	
	NAME OF WELL	TH Sale	Lir LUM	LL TECHNICIAN'S					
	E LARR	TECHNICIAN/CONTRACTOR	165 7 SUBMISSION DATE	-2041	FICE			000	FC
	SIGNATORE OF	Hot	DAY 11_ MC	<u>01 yr.93</u>	õ			C33	(11 /06) 50011 5
	MINISTRY	OF THE ENVIRON	MENT COPY					FURM NO. 0506	(11/86) FURM 9

Ontario	Ministry of the Environment		, Th	e Ontario Wa WATER V	ter Resourd VELL RE(ces Act CORD
nt only in spaces provide ark correct box with a che	d. ckmark, where applicable.	11	5736248	Municipality 57003	Con.	22 23 24
ounty or District		Township/Borough/City/To	own/Village	Con block tract	survey, etc. Lo	25-27
SIHCDE		Address		Date	 ລ ຊ /	- or
		RR#2	I HELPSTON		bleted day m	onth year
2						
	LOG OF OVE	RBURDEN AND BEDRO	OCK MATERIALS (see instruc	tions)	Denth	- feet
eneral colour Mos	t common material	Other materials	Gene	ral description	From	То
SROWN T	OP DOIL					
SOUN	DAND	\overline{n}				7
RAY S	AND	CLAY/ST	DNES			92
RAY C	LAY	SANS			52	64
SROWN .	SANA	A			64	11
RAY .	SAND (LAY		· · · · · · · · · · · · · · · · · · ·	//	
	I OTAL LEP		feel			
		•				
						1 1 1
		SING & OPEN HOLE R	ECORD Sizes	of opening 31-33 Di	ameter 34-38 Leng	75 th 39-40
ater found Kind of	water linside diam	Material Wall	Depth - feet	No.) 14	5 inches	4 feet
$64^{10^{13}}$ ¹ Fresh ³ ² Salty ⁴	Sulphur 14 10-11 1 1	Gleel ¹² Galvanized	IFT 13-16 SS Mater	and type	Depth at top	51 SCreen 3 41-44
15-18 1 🗆 Fresh 🔏	Gas Sulphur 19 Minerals	Concrete Open hole Plastic		· WINLESS (
2 □ Salty 6 20-23 1 □ Fresh 3	Gas 17-18 1 0 Sulphur 24 2	Steel ¹⁹ Galvanized	20-23	Annular space	ALING HECOHD	ent
2 🗋 Salty 6	□ Minerals 3 □ □ Gas 4 □ ■ Sulphur 29	Concrete Open hole Plastic	From	To Material and	type (Cement grout, be	ntonite, etc.)
²⁵⁻²⁸ 1	Supplui 23 3 Minerals 24-25 1 Gas 2 2	Steel ²⁶ Galvanized	27-30	22-25 K	PACK	ER St.
30-33 1 □ Fresh 3 2 □ Satty	Sulphur 34 60 3 3 Minerals 4 1	Concrete Open hole	26-29	30-33 80	More r	The
	Gas 5	Plastic	L	I I I		
Pumpine test method 10 1 1 Horning 2 Bailer	Pumping rate 5 11-14 Du	15-16 Hours Mins	L In diagram below st	OCATION OF WELL	from road and lot	line
Static level Water level end of pumpin	g Water levels during 1	mping 2 🗆 Recovery	Indicate north by an	ow.		
11 58	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	582-34 58-37				
If flowing give rate 38-4	et feet feet Pump intake set at Wa	feet feet iter at enclosif test 42		T2 FT FROM	1	
GPM Recommended pump type	A feet Recommended 43-45 F	Clear Cloudy lecommended 46-49		HOUSE	W	
Shallow Deep	pump setting 67 feet	ump rate GPM				
INAL STATUS OF WE	LL 54			E		
Water supply Observation well	 ⁵ Abandoned, insufficient supply ⁶ Abandoned, poor quality 	 ⁹ D Unfinished ¹⁰ Replacement well 	• - WELL	Other	S	
 ³ Test hole ⁴ Recharge well 	 Abandoned (Other) Dewatering 			- Alexandre - Alex		LINE
	55-56	9 □ Not use				
2 Stock 3 Irrigation	6 D Municipal 7 D Public supply	10 🔲 Other				
4 📋 Industrial			/		11	-
	5 Air percussion	⁹ Driving	/		Hom	RD =
 ² [] Rotary (conventional) ³ [] Rotary (reverse) ⁴ [] Rotary (air) 	 Boring Diamond Jetting 	11 Other			228	071
			/			
Norms of Well Contractor	KED DRILLIATE	Well Contractor's Licence No.	Data 58 Contracto	467	SFP 1 Q 7	nm ⁶³⁻⁶⁸ *
Address R	JT RADAL		Date of inspection	Inspector		
KK#1 U	TI EARKIE	Well Technician's Licence No.	ı́́> Remarks			
vaprejor vveii recnniciąn						

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Ministry of Environment and Energy			WATER WE	ELL RECORD
Print only in spaces provided. Mark correct box with a checkmark, where applicable.		6712854	Municipality 617003	Con. CON 15 22 23 24
County or District	Township/Borough/City/Tow	m/Village	Con block tract s	urvey, etc. Lot 25-27
$\left \right \in \left \right = \left \right = \left \left \left \right = \left \left \left \right = \left \left \left \left \left \right = \left $	Address	, 	Date	ed 06 11 98
21	Northing	RC Elevation	RC Basin Code ii	day month year
	ERBURDEN AND BEDRO	24 25 26 OCK MATERIALS (see	30 31 nstructions)	47
General colour Most common material	Other materials		General description	Depth – feet
BR CLAY S	STONES			0 26"
CP / IMESTORIE				26" 70
GR LINESIOVE				
				÷"
/				
/		· · · · · · · · · · · · · · · · · · ·		
21				
31 <u>[</u>				
10 14 15 21 41 WATER RECORD 51 Inside		AS RECORD Depth - feet	Sizes of opening ^{31–33} Dian (Slot No.)	neter ^{34–38} Length ^{39–40}
at - feet	Material thickness inches	From To Tu U	Material and type	Depth at top of screen 30
2 □ Salty € □ Minerals 2 2 55 2 □ Salty € □ Gas 3 3 15-18 1 □ Freeh 3 □ Sulphur 19 /// 4 4	Galvanized Concrete Open hole			feet
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Plastic ·/OA	0 540 61 20-23 61	PLUGGING & SE	ALING RECORD
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Concrete Open hole Plastic	4.2" 70 De	pth set at – feet From To Material and ty; 10-13 14-17	be (Cement grout, bentonite, etc.)
2 [] Salty 6 [] Gas 2 [] 2 [] 2 [] 2 [] 2 [] 2 [] 2 [] 2 [Steel ²⁶ Galvanized	27-30	18-21 22-25	
30-33 1 □ Fresh 3 □ Sulphur 3 0 3 □ 4 □ Minerals 4 □ 2 □ Salty 6 □ Gas 5 □	Concrete Open hole Plastic		26-29 30-33 80	
Pumping test method 1 12 Pumping rate 11-14 Du	iration of pumping		LOCATION OF WELL	~
Static level water level end of pumping Water levels during 1 2 Pu	mping ² 🗌 Recovery	In diagram belo Indicate north b	w show distances of well fro y arrow.	m road and lot line.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\frac{36}{36}$	EL	21	N
If flowing give rate 38-41 Pump intake set at Wa	ater at end of test 42	5 4		,
Recommended pump type Recommended 43-45 Re pump setting	ecommended 46-49 mp rate	$ \begin{array}{c} \\ \\ \\ $	K	•
60-53	/0 GPM	00		
FINAL STATUS OF WELL 54 I < Water supply	ly ⁹ Unfinished ¹⁰ Replacement well		F1 -	1 is
 a Test hole 7 Abandoned (Other) 4 Recharge well 8 Dewatering 		LOTI	Cov	L
WATER USE 55-56 I ₽ Domestic 5 □ Commercial	9 🔲 Not used		ERIN-HALTO.	N HILLSBOUNDR
2 Stock 6 Municipal 3 Irrigation 7 Public supply 4 Industrial 8 Cooling & air conditioning	10 🗋 Other	LOT 32		
METHOD OF CONSTRUCTION 57				
I Cable tool 5 Air percussion 2 4Z Rotary (conventional) 6 Boring 3 Rotary (reverse) 7 Diamond	9 Driving 10 Digging 11 Other		•	192039
4 ☐ Rotary (air) 8 ☐ Jetting	· · · · · · · · · · · · · · · · · · ·		TWC 40	
Name of Well Contractor	Well Contractor's Licence No. 33/7	Data 58 C source	ontraceto 3 1 7 59-62 Da	te received 63-68 80
Address DDI HALLSRIDEII	Out	Date of inspection	Inspector	<u></u>
	Well Technician's Licence No.	Remarks	ſ	'SS F 50
Signature of Technician/Contractor	Submission date	WIN	đ.	
T. Viary	uay mo yr	<u> </u>		0506 (07/94) Front Form 9

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nt Below)

7 PINEHILL DRIVE	THEREAL	SPRINGWATER		
County/District/Municipality	City/Town/Village		Province	. Postal Code
UTM Coordinates Zone , Easting , Northing	Municipal Plan and Suble	ot Number	Officiario	LOLAKO
NAD 8 3 17 5 9 8 5 3 7 4 9 2 9 4 0 8				
Overburden and Bedrock Materials/Abandonment Sealing Rec	ord (see instructions on the	back of this form)		D
General Colour Most Common Material O	ther Materials	General Description	1	From To
Brown Sand				0' 10'
Circy Clay				10' 70'
Grey Silt				70' 120'
Grey Clay				120' 165'
(rrev Sand		fine		165 177'
	Sales in Second		1.0.000	Sector - Andrews
Annular Space		Results of W	ell Yield Testi	ng
Depth Set at (m/ft) Type of Sealant Used	Volume Placed	After test of well yield, water was:	Draw Down	n Recovery
material and Type)	(117/11-)	Other, specify	(min) (m/ft	(min) (m/ft)
0 20 17 Dags 5/8 Holepi	ug	If pumping discontinued, give reason:	Static 6.5	5 135
	· · · · · · · · · · · · · · · · · · ·		1	1 101
		Pump intake set at (m/ft)	2	2 1.211
		177		- 113.4
Method of Construction Well L	lse	Pumping rate (Vmin / GPM)	3	3 106.4
Cable Tool Diamond Public Comm	nercial Not used	Duration of putating	4	4 99.8
Rotary (Conventional) Getting Conventional Multic	Hole Monitoring	<u>3</u> hrs + min	5	5 93.8
Boring Digging Irrigation Coolin Industrial	ng & Air Conditioning	Final water level end of pumping (m/t)	10	10 69.1
Nother, specify Arr Rotary Other, specify		If flowing give rate (I/min / GPM)	15	15 521
Construction Record - Casing	Status of Well		20	20 4/0
Inside Open Hole OR Material Wall Depth (m/ft) Diameter (Galvanized, Fibreglass, Thickness	Water Supply	Recommended pump depth (m/ft)	25	25 715
(cm/in) Concrete, Plastic, Steel) (cm/in) Promi	Test Hole	Recommended pump rate	20	20 31.5
6 Steel 219 12 172	Dewatering Well	(I/min / GPM)	30	30 25,6
	Observation and/or Monitorion Hole	Well production (Amin / GPM)	40	40 18.3
	Alteration	20 + gpm Disinfected?	50	50 14.5
	Abandoned,	X Yes No	60	60 12.5
Construction Record - Screen	Insufficient Supply Abandoned, Poor	Map of W	ell Location	
Outside Material Diameter (Plastic Galvanized Steel) Slot No. Depth (m/ft)	Water Quality	Please provide a map below following	instructions on th	he back.
	specify			
5 Steel 6 172 177	Other, specify			1
		Horses	hoe Vall	ley Rel W
Water found at Depth Kind of Water: Ersch Ulaterted	Hole Diameter		17	T
(m/ft) Gas Other, specify	To (cm/in)		-2	te n
Water found at Depth Kind of Water: Fresh Untested		aro.	37	1 2
(m/ft) Gas Other, specify		His	22	18 N
(m/ft) Gas Other, specify		× (3	
Well Contractor and Well Technician Inform	ation		R	
Business Name of Well Contractor	Vell Contractor's Licence No.		- 10 A	
Business Address (Street Number/Name)	J 4 J J.	Comments: 20 FF PEOR	n House	2
P.O. Box 280	LEFROY	100 ft from	Road	a service and the service of the ser
Province Postal Code Business E-mail Address		Well owner's Data Package Delivery	ed be	nistry lies Only
Bus. Telephone No. (inc. area code) Name of Well Technician (Last Name	e, First Name)	information	Audit No	D. O C C C T
7054364359 JIM MOORE		delivered Date Work Completed	Z	123297
Well Technician's Licence No. Signature of Technician and/or Contractor D	ate Submitted		HE FE	B 0 9 2011
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BROWN BROWN BROWN BROWN BROWN	CUAY STONE SAND SAND SAND SAND	- Till	filo med. Cs. Med.			3.1 9.7 24.4 2.0	9.7 24.4 32.1 32.1 36.1 132.1
	Annular Space		Results of W	sll Yiel	d Testing		
Depth Set at (m/ft) From To $2W$	Type of Sealant Used (Material and Type) BENTONIR (MO	Volume Placed (m³/ft³) LT 380LTA	After test of well yield, water was: Clear and sand free Other, <i>specify</i> If pumping discontinued, give reason:	Dr Time <i>(min)</i> Static Level	aw Down Water Leve (m/ft) 3.64	R I Time (min)	ecovery Water Level (m/ft)
			Pump intake set at (m/ft)	1	14.102	2	

350 i/m Cable Tool Diamond Public Commercial Not used 4 Duration of pumping Domestic Rotary (Conventional) Jetting ____ Municipal Dewatering 16-44 5 hrs + RAmin 5 Rotary (Reverse) Driving Livestock Test Hole Monitoring Boring Final water level end of pumping (m/ft) Digging ____ Irrigation Cooling & Air Conditioning 10 10 16.92m Air percussion Industrial Other, specify Other, specify 16.61 15 15 f flowing give rate (IImin / GPM) **Construction Record - Casing** Status of Well 20 20 Inside Water Supply Open Hole OR Material Depth (*m*/*ft*) Wall Recommended pump depth (m/ft) Diameter (Galvanized, Fibreglass, Thickness Replacement Well 25 25 From То (cmlin) 6 M Concrete, Plastic, Steel) 16. (cmlin) Test Hole Recommended pump rate STEEL 31.7 16.70 Recharge Well 30 30 (Ilmin / GPM) Dewatering Well 1ft 113491 STEEL 12 40 40 31.7 Observation and/or Well production (Ilmin / GPM) Qe 1 3 I LIVE Monitoring Hole 50 50 Alteration Disinfected? (Construction) 60 60 Yes No Abandoned, Insufficient Supply **Construction Record - Screen** Map of Well Location Abandoned, Poor Outside Please provide a map below following instructions on the back. Depth (*m/ft*) Water Quality Material Diameter Slot No. (Plastic, Galvanized, Steel) Abandoned, other, (cmlin) From То specify STEEL 36.0 15 16 Other, *specify* Water Details Hole Diameter 400 m Water found at Depth Kind of Water: Fresh KUntested Depth (*m*/*ft*) Diameter Kmit Das From (cmlin) То HURSESHIC MARIEN MARIEN Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested Other, specify (m/ft) Gas Well Contractor and Well Technician, Information N Business Name of Well Contractor Well Contractor's Licence No. MATCh Weas Business Address (Street, Number/Name Municipality Comments: Province Business E-mail Address Postal Odde CR Well owner's Date Package Delivered Ministry Use Only information Bus Telephone No. (inc. area code), Mame of Well Technician (Last Name, First Name) Audit No. package delivered . Lon 828 Date Work Completed Well Technician's Licence No. Signature of Technician and or Contractor Date Submitted X Yes No © Queen's Printer for Ontario, 200 0506E (2007/12) Ministry's Copy

Appendix F.2 Individual Records

UTM 19912 19919191919191 19 R 81919191919191 Elev. ANRI ____ 98 The Water-well Drillers Act, 1954 Basino 12 B RES **Department** of Mines Water-Well Record rnuter Township, Village, Town or City. Flos County of Territorial District..... Con..... treet and Number (if in Village, Town or City)..... Address . A. J. J. J. Ke Owner KSTON [195-7] Date completed ... (month) (year) **Pumping Test** Pipe and Casing Record Casing diameter(s) ...?. Pumping rate ... 3.0.0.9 Length(s) $\frac{100}{100}$ Type of screen L) (60 Pumping level 7 Water Record Well Log Depth(s) at which Kind of water No. of feet From То (fresh, salty, Overburden and Bedrock Record ater (s) ft. ft. water rises or sulphur) found 0 100 6 WAM For what purpose(s) is the water to be used? Location of Well Home & fam user garde In diagram below show distances of well from Is water clear or cloudy?...... road and lot line. Indicate north by arrow. Is well on upland, in valley, or on hillside? Drilling firm Address (J. D. medlurs Ont Name of Driller W· Address Licence Number...... ił I certify that the foregoing statements of fact are true 11957 Form 5 CSS.S8 y/set is directly

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COUNTY OR DISTRICT	OF	TOWNSHIP, E	BOROUGH. CITY	Y. TOWN, VILLAGE	3	9 CON.	BLOCK, TRACT, SU	14 15 RVEY, ETC.		LOT 7 25-
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Water management in (Ontario 1. PRINT ONLY IN S 2. CHECK 🛛 CORRI	PACES PROVIDED		5709954	57003	CON	
COUNTY OR DISTRICT	20	TOWNSHIP, BOROUGH, CITY, TOWN	, VILLAGE	s g cor	10 14 N., BLOCK, TRACT, SURVE	15 Y, ETC.	22 23 24 LOT 25-27
OWNER (SURNAME FIRS	ST) 29.47	ADDRESS Office of	1 /		ton -	DATE COMPLETED	48-53
			helps	ton ont ELEVATION RC.	BASIN CODE	ДАУ <u>И</u> мо. <u>U</u>	YR 23
N		928818	4	855 5	22 M	AR 17, 197	5 246
GENERAL COLOUR	MOST		BEDRUCK	MATERIALS (SEE	INSTRUCTIONS)	DEPT	H – FEET
	COMMON MATERIAL				AL DESCRIPTION	FROM	то
I. brown	rand .	a sel las		pu		0	5
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41 WATER	RECORD (51 CASING & OPEN	HOLE RI		S) OF OPENING 31-	33 DIAMETER 34-38	LENGTH 39-40
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2 S/	ALTY 4 MINERAL	Z GALVANIZED	8 5.	175 0 A	anters tel	t 017:	5 FEET
2 🗍 SA 20-23		4 OPEN HOLE		20-23 DEPTH	SET AT - FEET		ECORD
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	RESH 3 🗌 SULPHUR ³⁴ BU ALTY 4 🗌 MINERAL	3 CONCRETE 4 OPEN HOLE		26	-29 30-33 80		
71 PUMPING TEST METHOD		11-14 DURATION OF PUMPING	0 17-18	L	OCATION OF	WELL	
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	22-24 15 MINUTES	30 MINUTES 29-31 29-31 29-31 29-31 20 RECOVERI 60 M 32-34	INUTES 35-37				
U IF FLOWING, CIVE PATE	FEET FEET	TAT WATER AT END OF TEST	3 _{FEET} 42				
	GPM.		LOUDY			3	
G SHALLOW		1/8 FEET RATE 1009	46-49 GPM.			15	
54	<u>Q</u> . <u>T</u> GPM./FT. SPECIFI	C CAPACITY		la		1.	
FINAL STATUS	1 WATER SUPPLY 2 OBSERVATION WELL 3 TEST HOLE	5 ABANDONED, INSUFFICIENT S 6 ABANDONED, POOR QUALITY		1 Jan	V		
OF WELL	4 RECHARGE WELL				1		
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USE O(4 🗆 INDUSTRIAL	8 COOLING OR AIR CONDITIONING 9 D NOT USED		Jean	∇I	111	
57 METHOD		6 🛛 BORING			11		
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			DRIL	ERS REMARKS:			
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	# 3 Ban	rie Ont.	Ō	DATE OF INSPECTION	INSPECTOR	<u>, v</u>	
NAME OF DRILLER OF	R BORER	LICENCE NUMBI		REMARKS:		P	$\int $
O SIGNATURE OF CONTR	RACTOR	SUBMISSION DATE					
- renny	TUMMANUS	DAYNOY	· O	·	C	\$\$.58 W	
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	DISTRICT	. CHECK 🛛 CORREC	TOWNSHIP, BOROUGH, CIT	TY, TOWN, VILLAGE		CON	BLOCK, TRACT, SURVEY	ETC	LOT 25-27
	<u> </u>							DATE COMPLETED	4.53
			RR	2#2	PHELPS	TON	ONTARIO BASIN CODE	DAYMO	
21	, <u> </u>	البينا المسا					31		
2	- 10	LO	G OF OVERBURDE	N AND BEDRO	CK MATERI	ALS (SEE	INSTRUCTIONS		
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Be	OWN TO	PSOIL						C	<u>> </u>
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41	WATER RE	CORD	51 CASING	& OPEN HOLE	RECORD		LOT NO) IDSLD	JI-JJ DIAMETER J	34-38 LENGTH 39
NATER FOR	UND KIND OF	WATER	INSIDE DIAM MATERIAL INCHES	WALL THICKNESS INCHES	DEPTH - FEET	CREI	HERIAL AND TYPE	OT JIN	CHES FE O TOP 41-44 EN
170	10-13 1 2 FRESH 2 3 SALTY	3 SULPHUR 4 MINERALS 6 GAS	10-11 1 DSTEEL 2 GALYANIZED	12 2	1	3-16	JOHNSON ST	AINLESS	7 FEET
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	20-23 1 C FRESH	3 DSULPHUR 24 4 DMINERALS	17-18 1	19 D		FRO	M 10	MATERIAL AND TYPE	LEAD PACKER, ETC.)
	25-28 1 FRESH	6 0 GAS 3 0 SULPHUR 29	4 0 0 PEN HOLE 5 0 PLASTIC	26	2	7 - 30	18-21 22-25 K	PACKER	-quick_
	2 SALTY 30-33 1 FRESH	6 GAS	1 STEEL 2 GALVANIZEI 3 CONCRETE	D			26-29 30-33 BO	EL & CU	TTINGS
	2 🗌 SALTY	4 UMINERALS 6 Gas	5 D PLASTIC		<u>_</u>				
71 PUMP	PING TEST METHOD	10 PUMPING RATI		15-16 30 17-18 HOURS 30 NINS	ELINA	ILÉ	LOCATION		
	STATIC WATER L LEVEL PUMPI	EVEL 25 DF WATER L	EVELS DURING	PUMPING .		I DIAGRAM B OT LINE	ELOW SHOW DISTANC	RROW.	
EST	00 14	22-24 15 MINUTES	20 MINUTES 45 MINI 20 29-31	UTES 60 MINUTES		1 1	Ň	SHED	
	YO FEET	FEET 16 FE	ET 38FEET 44	END OF TEST		lwy 21			
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2	SHALLOW DE	PUMP SETTING	165 FEET RATE	10 GPM				山)	XXX
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F	FINAL	WATER SUPPLY	LL B ABANDONED I	INSUFFICIENT SUPPLY POOR QUALITY		T' Crus	2001	2 ERINA	AFTO
OF	F WELL] TEST HOLE] RECHARGE WELL	9 DEWATERING			441	22	HOUSE	CEMETE
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Ontario	Ministry of the Environment		, Th	e Ontario Wa WATER V	ter Resourd VELL RE(ces Act CORD
nt only in spaces provide ark correct box with a che	d. ckmark, where applicable.	11	5736248	Municipality 5,7003	Con.	22 23 24
ounty or District		Township/Borough/City/To	own/Village	Con block tract	survey, etc. Lo	25-27
SIHCDE		Address		Date	 ລ ຊ /	- or
		RR#2	I HELPSTON		bleted day m	onth year
2						
	LOG OF OVE	RBURDEN AND BEDRO	OCK MATERIALS (see instruc	tions)	Denth	- feet
eneral colour Mos	t common material	Other materials	Gene	ral description	From	То
SROWN T	OP DOIL					
SOUN	DAND	\overline{n}				7
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	I OTAL LEP		feel			
		•				
						1 1 1
		SING & OPEN HOLE R	ECORD Sizes	of opening 31-33 Di	ameter 34-38 Leng	75 th 39-40
ater found Kind of	water linside diam	Material Wall	Depth - feet	No.) 14	5 inches	4 feet
$64^{10^{13}}$ ¹ Fresh ³ ² Salty ⁴	Sulphur 14 10-11 1 1	Gleel ¹² Galvanized	IFT 13-16 SS Mater	and type	Depth at top	51 SCreen 3 41-44
15-18 1 🗆 Fresh 🔏	Gas Sulphur 19 Minerals	Concrete Open hole Plastic		· WINLESS (
2 □ Salty 6 20-23 1 □ Fresh 3	Gas 17-18 1 0 Sulphur 24 2	Steel ¹⁹ Galvanized	20-23	Annular space	ALING HECOHD	ent
2 🗋 Salty 6	□ Minerals 3 □ □ Gas 4 □ ■ Sulphur 29	Concrete Open hole Plastic	From	To Material and	type (Cement grout, be	ntonite, etc.)
²⁵⁻²⁸ 1	Supplui 23 3 Minerals 24-25 1 Gas 2 2	Steel ²⁶ Galvanized	27-30	22-25 K	PACK	ER St.
30-33 1 □ Fresh 3 2 □ Satty	Sulphur 34 60 3 3 Minerals 4 1	Concrete Open hole	26-29	30-33 80	More r	The
	Gas 5	Plastic	L	I I I		
Pumpine test method 10 1 1 Horning 2 Bailer	Pumping rate 5 11-14 Du	15-16 Hours Mins	L In diagram below st	OCATION OF WELL	from road and lot	line
Static level Water level end of pumpin	g Water levels during 1	mping 2 🗆 Recovery	Indicate north by an	ow.		
11 58	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	582-34 58-37				
If flowing give rate 38-4	et feet feet Pump intake set at Wa	feet feet iter at enclosif test 42		T2 FT FROM	1	
GPM Recommended pump type	A feet Recommended 43-45 F	Clear Cloudy lecommended 46-49		HOUSE	W	
Shallow Deep	pump setting 67 feet	ump rate GPM				
INAL STATUS OF WE	LL 54			E		
Water supply Observation well	 ⁵ Abandoned, insufficient supply ⁶ Abandoned, poor quality 	 ⁹ Unfinished ¹⁰ Replacement well 	• - WELL	Other	S	
 ³ Test hole ⁴ Recharge well 	 Abandoned (Other) Dewatering 			- Alexandre - Alex		LINE
	55-56	9 □ Not use				
2 Stock 3 Irrigation	6 D Municipal 7 D Public supply	10 🔲 Other				
4 📋 Industrial			/		11	-
	5 Air percussion	⁹ Driving	/		Hom	RD =
 ² [] Rotary (conventional) ³ [] Rotary (reverse) ⁴ [] Rotary (air) 	 Boring Diamond Jetting 	11 Other			228	071
			/			
Norms of Well Contractor	KED DRILLIATE	Well Contractor's Licence No.	Data 58 Contracto	467	SFP 1 Q 7	nm ⁶³⁻⁶⁸ *
Address R	JT RADAL		Date of inspection	Inspector		
KK#1 U	TI EARKIE	Well Technician's Licence No.	ı́́> Remarks			
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BROWN BROWN BROWN BROWN BROWN	CUAY STONE SAND SAND SAND SAND	- Till	filo med. Cs. Med.			3.1 9.7 24.4 2.0	9.7 24.4 32.1 32.1 36.1 132.1
	Annular Space		Results of W	sll Yiel	d Testing		
Depth Set at (m/ft) From To $2W$	Type of Sealant Used (Material and Type) BENTONIR (MO	Volume Placed (m³/ft³) LT 380LTA	After test of well yield, water was: Clear and sand free Other, <i>specify</i> If pumping discontinued, give reason:	Dr Time <i>(min)</i> Static Level	aw Down Water Leve (m/ft) 3.64	R I Time (min)	ecovery Water Level (m/ft)
			Pump intake set at (m/ft)	1	14.102	2	

350 i/m Cable Tool Diamond Public Commercial Not used 4 Duration of pumping Domestic Rotary (Conventional) Jetting ____ Municipal Dewatering 16-44 5 hrs + RAmin 5 Rotary (Reverse) Driving Livestock Test Hole Monitoring Boring Final water level end of pumping (m/ft) Digging ____ Irrigation Cooling & Air Conditioning 10 10 16.92m Air percussion Industrial Other, specify Other, specify 16.61 15 15 f flowing give rate (IImin / GPM) **Construction Record - Casing** Status of Well 20 20 Inside Water Supply Open Hole OR Material Depth (*m*/*ft*) Wall Recommended pump depth (m/ft) Diameter (Galvanized, Fibreglass, Thickness Replacement Well 25 25 From То (cmlin) 6 M Concrete, Plastic, Steel) 16. (cmlin) Test Hole Recommended pump rate STEEL 31.7 16.70 Recharge Well 30 30 (Ilmin / GPM) Dewatering Well 1ft 113491 STEEL 12 40 40 31.7 Observation and/or Well production (Ilmin / GPM) Qe 1 3 I LIVE Monitoring Hole 50 50 Alteration Disinfected? (Construction) 60 60 Yes No Abandoned, Insufficient Supply **Construction Record - Screen** Map of Well Location Abandoned, Poor Outside Please provide a map below following instructions on the back. Depth (*m/ft*) Water Quality Material Diameter Slot No. (Plastic, Galvanized, Steel) Abandoned, other, (cmlin) From То specify STEEL 36.0 15 16 Other, *specify* Water Details Hole Diameter 400 m Water found at Depth Kind of Water: Fresh KUntested Depth (*m*/*ft*) Diameter Kmit Das From (cmlin) То HURSESHIC MARIEN MARIEN Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested Other, specify (m/ft) Gas Well Contractor and Well Technician, Information N Business Name of Well Contractor Well Contractor's Licence No. MATCh Weas Business Address (Street, Number/Name Municipality Comments: Province Business E-mail Address Postal Odde CR Well owner's Date Package Delivered Ministry Use Only information Bus Telephone No. (inc. area code), Mame of Well Technician (Last Name, First Name) Audit No. package delivered . Lon 828 Date Work Completed Well Technician's Licence No. Signature of Technician and or Contractor Date Submitted X Yes No © Queen's Printer for Ontario, 200 0506E (2007/12) Ministry's Copy

😵 Or	ntario	Ministry of the Environment	Well Tag Number (Plac	ce sticker and print	number below)	Regulation 903	Wel Ontario Water I	Record Resources Act
Instructions	s for Comple	ting Form	A02371	4			pa	ge of
 For use All Section Question All metric Please p 	in the Proving ons must be ons regarding c e measurem orint clearly in	ce of Ontario only. This completed in full to avoid ompleting this applicate ants shall be reported blue or black ink only.	s document is a perm id delays in processin ion can be directed to I to 1/10 th of a metre.	anent legal ng. Further in the Water V	document. Ple structions and Well Managem	ease retain for future l explanations are ava nent Coordinator at 4 Ministry Use	e reference. ilable on the bac 416-235-6203. Only	k of this form.
Well Owner	r's Information	on and Location of V	Well Information	MUN	CC			OT
RR#/Street Nu HWY. GPS Reading	MAD	COUNTY RD. 1 Zone Easting 17 576437	Northing 4929983	City/Town/Vill Roc Unit Make/Mc Garmin	Age KFORD Odel Mode eTREX Ver	of Operation: X Undi	rtment/Block/Tra	ct etc. Averaged
Log of Over	rburden and	Bedrock Materials (see instructions)		-			: :
General Colour	Most comm	non material	Other Materials		General	Description	Depti From	
Brown	Jandy Bedro	ctay Sta	ines				9'	6 23'
		·			-			
		<u> </u>			1	I		
Depth	Diameter Intros Diamet	er Insido	Construction Reco	Denth	Matros	Pumping test method	Draw Down	Recovery
From	To Gentlemet	diam Mate	erial thickness	Erom	Ft.		Time Water Level	Time Water Level
0	23' 6"		Casing	110111	10	Pump intake set at -	Static	
			Fibreglass	· · ·	,	(metres) Pumping rate -	1	1
	<u> </u>		Concrete Sch. 40	0'	13'	(litres/min)	0	0
Water found	r Record Kind of Wate	Galvaniz	ed			hrs + min	2	2
at Metres /	Fresh Sulph					Final water level end of pumping	3	3
Gas	Salty 🗌 Miner	als Galvaniz	ed			Recommended pump	4	4
	Fresh Sulph		Fibreglass			type.		·
Gas	Salty 🗌 Miner	als Galvaniz	ed			depthmetres	. 5	5
	Fresh 🛄 Sulph		Screen			Recommended pump	10	10
Gas Gas	Salty Miner	als Outside Steel	Fibreglass Slot No.			(litres/min)	15	15
After test of we	ll yield, water wa	s 2. H Columniz	Concrete	13'	23	(litres/min)	25	25
Clear and se	ediment free		No Coping or Sor			If pumping discontin- ued, give reason.	30	30
			No Casing of Sch			а. — — — — — — — — — — — — — — — — — — —	50	50
Chlorinated	Yes No						60	60
F+	, Plugging and	Sealing Record	Annular space	bandonment	In diagram halou	Location of well for	of Well	ad building
From	To Material an	d type (bentonite slurry, neat c	ement slurry) etc. (cubic	c metres)	Indicate north by	arrow.	om road, iot line, a t	i i i i i i i i i i i i i i i i i i i
23	12' San	d		5. 	N			
12	O' Hole	pluq				RD.	18	
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				· · · · · · · · · · · · · · · · · · ·		75	· · · · · · · · · · · · · · · · · · ·)
		Method of Construct	tion			10^{-2}		
Cable Tool	entional) 🗌 Air	ary (air)	Diamond	Digging		1-7		
Rotary (rever	rse) Bor		Driving	<u></u>				1
		Water Use		l Other		1		SITE
Stock		mmercial	Not used					
Irrigation	Mu	nicipal	Cooling & air conditioning		Audit No. Z	37292 ^{Dat}	e Weil Completed	MM DD
U Water Suppl	y 🗌 Recharg	je well	Unfinished Abando	oned, (Other)	Was the well ow	ner's information	e Delivered YY	YY MM DD
Observation Test Hole	well 🔲 Abando 🗌 Abandoi	ned, insufficient supply 🛛 ned, poor quality 🗖	Dewatering Replacement well		package delivere		n Mariana ang kanalang kanalan	
	Well (Contractor/Technician	Information	iconos Na	Data Source	Ministry Us	e Only	
Name of Well C	N MELL D	RILLING LIMIT	EO VVell Contractor's L	Licence No.			173	7
Business Addre	ss (street name, n	umber, city etc.)	ONTARIA NAG	200	Date Received		e of Inspection Y	YY MM DD
Name of Well Te	echnician (last nar	me, first name)	Well Technician's	Licence No.	Remarks	< 1 2005 we	I Record Number	
FENTO Signature of Tot	A DOL	<u>l</u> G	Date Submitted					
XYC	Lauro Le	m)	2005	09 30				
0506E (09/03)		Contractor's C	opy 🔲 Ministry's Copy	Well Own	er's Copy 🔲	Cette f	ormule est dispoi	nible en français

UTM 19912 19919191919191 19 R 81919191919191 Elev. ANRI ____ 98 The Water-well Drillers Act, 1954 Basino 12 B RES **Department** of Mines Water-Well Record rnuter Township, Village, Town or City. Flos County of Territorial District..... Con..... treet and Number (if in Village, Town or City)..... Address . A. J. J. J. Ke Owner KSTON [195-7] Date completed ... (month) (year) **Pumping Test** Pipe and Casing Record Casing diameter(s) ...?. Pumping rate ... 3.0.0.9 Length(s) $\frac{100}{100}$ Type of screen L) (60 Pumping level 7 Water Record Well Log Depth(s) at which Kind of water No. of feet From То (fresh, salty, Overburden and Bedrock Record ater (s) ft. ft. water rises or sulphur) found 0 100 6 WAM For what purpose(s) is the water to be used? Location of Well Home & farm user garde In diagram below show distances of well from Is water clear or cloudy?...... road and lot line. Indicate north by arrow. Is well on upland, in valley, or on hillside? Drilling firm Address (J. D. medlurs Ont Name of Driller W· Address Licence Number...... ił I certify that the foregoing statements of fact are true 11957 Form 5 CSS.S8 y/set is directly

				-Q	
UTM 17 2 5964438 E	y			TESDURCA C	
5 R 4929 620 N The Ontario Water Reso	ources Commission	Act	MAY .	1967	
Elev. 5 R 0 8 2 5 WATER WEI	L REC	DRD	57 _{ONT} N	699	
Basin 22 I SINCOR	Cownship Village T	own or City	FLO S	COMMISSION	
County of District Lot 3	Date completed	4	FEB.	1967	
			HELPS	year) 7014 -	
		II CSS			
Casing and Screen Record	Static level		Z		
Total length of casing 76	Test-pumping ra	te /	2	G.P.M.	
Type of screen Cook SLOT 16	Pumping level	4	481		
Length of screen	Duration of test p	oumping	I HR.	, ,	
Depth to top of screen 76	Water clear or cl	oudy at end of	test CLE	AR1	
Diameter of finished hole	Recommended I	umping rate	5	G.P.M.	
•	with pump settin	g of 60	feet belo	w ground surface	
Well Log			Water	r Record	
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)	
Duy well	0	42			
HARD PAN	47	74			
		0			
COARSE SAND	74	80	74	RESH	
For what purpose(s) is the water to be used?		Location (of Well	11 6	
FARM	In diagram road and	n below show lot line. Ind	distances of we icate north by	arrow.	
Is well on upland, in valley, or on hillside?		. 1			
Drilling or Boring Firm					
PT-CAMERONY	1			γ	
Address / K / M / D / U / V / S /	· · · ·				
1500 Number 2563		/ 4	. 0	× .	
Name of Driller or Borer			- //AI	· 0,00 /	
Traffic of Diffici of Dorci					
Address April		10/1		¥ °	
Address Ant Date April 167		1076 275		¥°	
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Address Date Apple 267 (Signature of Licensed Drilling or Boring Contractor)		X076		¥	
Address Date Apple 267 (Signature of Licensed Drilling or Boring Contractor) Form 7 15M-60-4138		X076		¥	

	The Ontario Water Re	sources Commiss	ion Act	, gan an a						
Water management in Ontaria 1. PRINT ONLY 2. CHECK 🕅 CC	IN SPACES PROVIDED	570683	MUNICIP. P 57 Q 1 C	CON.						
COUNTY OR DISTRICT	TOWNSHIP, BOROWSH, CITY, TOWN, VILLAGE	w p ³	CON., BLOCK TRACT, SURVEY	TC.						
IOWNER (SURNAME FIRST) 28.47	RHIM	IDHURST		DATE COMPLETED 48-53 DAY NO CE YE 69						
	NG 2 8 5 2 0 24	$\begin{array}{c} \text{RC} \\ 4 \\ 25 \\ 26 \end{array} \begin{array}{c} \text{ELEVATION} \\ 8 \\ 25 \\ 3 \end{array}$	BASIN CODE							
GENERAL COLOUR MOST	LOG OF OVERBURDEN AND BED	ROCK MATERIALS (SEE INSTRUCTIONS)	4 /						
GREY SAND	CLQ4 BOULD	GE	NERAL DESCRIPTION	FROM TO						
SAND		ERS HAR	U	039						
SILT				87 104						
SAND				104 113						
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31 aa39209ast/13 ba	87 99 0/08 06	6/1/3 9								
$\begin{array}{c c} 32 \\ 10 \\ 14 \\ 15 \\ 21 \\ 10 \\ 14 \\ 15 \\ 21 \\ 21 \\ 21 \\ 21 \\ 21 \\ 21 \\ 21$			54 7E/SL DE OPENING 21.2	65 75 80						
WATER RECORD	INSIDE MATERIAL THICKNESS		22(3) OF OPENING 31-3. (LOT NO.) 12	DIAMETER 34-38 LENGTH 39-40 05.000 INCHES 03 FEET						
0104 ¹⁰⁻¹³ 1 🕱 FRESH 3 🗆 SULPHUR ¹⁴ 2 🗋 SALTY 4 🗔 MINERAL	INCHES INCHES F 05 T0-11 12 STEEL 12 18 8 2 C CALVANIZED 2 C CALVANIZED 12 18 8		TAINLESSST	DEPTH TO TOP 41-44 80 OF SCREEN						
15-18 1 FRESH 3 SULPHUR 2 SALTY 4 MINERAL		61	PLUGGING &	SEALING RECORD						
20-23 1 G FRESH 3 G SULPHUR 2 G SALTY 4 MINERAL	17-18 □ STEEL 19 2 □ GALVANIZED 3 □ CONCRETE	20-23 DEP FR(TH SET AT FEET MATER DM TO 10-13 14-17 14-17	IAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)						
25-28 1 🗌 FRESH 3 🗌 SULPHUR ²⁹ 2 🗍 SALTY 4 🗍 MINERAL	4 OPEN HOLE	27-30	18-21 22-25							
30-33 1 T FRESH 3 SULPHUR 34 2 SALTY 4 MINERAL	80 2 GALVANIZED 3 CONCRETE 4 OPEN HOLE		26-29 30-33 80							
	TE 11-14 DURATION OF PUMPING .		LOCATION ØF	WELL						
STATIC EVEL PUMPING VATER LEVEL VAT	GPM. HOURS	IN DIAGRAM LOT LINE. IN	BELOW SHOW DISTANCES OF V	KELL FROM ROAD AND						
	ES 30 MINUTES 45 MINUTES 60 MINUTES 32-34 35-37	FA	OS 72073							
C IF FLOWING, GIVE RATE 38-41 PUMP INTAK	EET 7 FEET 3 FEED 7 FEET E SET AT WATER AT END OF TEST 42			A						
GPM. RECOMMENDED PUMP TYPE RECOMMENDI PUMP	FEET 1 CLOUDY ED 43-45 RECOMMENDED , 46-49 PUMPING		2 2	5						
	SFEET RAEDOT GPM.		T S 1	AN TH						
FINAL	5 ABANDONED, INSUFFICIENT SUPPLY	N	- 2 3							
STATUS 3 TEST HOLE OF WELL 4 RECHARGE WELL			1 4 7	i - SB						
	5 COMMERCIAL 6 MUNICIPAL	54	3							
	7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED	7	SIL 4	ot M						
METHOD 57 CABLE TOOL										
OF 3 ROTARY (CONVEN DRILLING 4 ROTARY (AIR)	TIONAL) 7 □ DIAMOND E) 8 □ JETTING ' 9 □ DRIVING									
5 AIR PERCUSSION		DRILLERS REMARKS:								
ANDERSUN DA	PILLINIC 3326		1204	19116 9 ⁶³⁻⁶⁸ ⁶⁰						
OF DRILLER OR BORER	BARIE ONIT	B JAN. 27/9		P/c.B.						
NDE ASON CONTRACTOR	SUBMISSION DATE			CSS.58						
pr anderson	DAY 16 MO OCT YR 69	1 E O		J.R.						
RC COPY										
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COUNTY OR DISTRICT	OF	TOWNSHIP, E	BOROUGH. CITY	Y. TOWN, VILLAGE	3	9 CON.	BLOCK, TRACT, SU	14 15 RVEY, ETC.		LOT 7 25-
21/10	02						X		BLETED	48-53
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· · · ·	E		BURDEN	AND BEDP	OCK MATER	IALS (SEE)	NSTRUCTIONS)	MAK 1	7, 197	
GENERAL COLOUR	MOST COMMON MATERIAL		OTHER MAT	ERIALS		GENER	AL DESCRIPTION		DEPTI	H - FEET
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BROWN	1.		1,						85	105
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	ER RECORD	51 CA	SING & O	PEN HOLE	RECORD	Z SIZE (S)	4 OF OPENING NO.	65 31-33 DIAMET	ER 34-38 L	75 ENGTH 3
TER FOUND	KIND OF WATER									
10-13 , 1	14	DIAM. M/	ATERIAL	WALL THICKNESS INCHES	DEPTH - FEET ROM TO		AL AND TYPE	05	DEPTH TO TOP	41:44
	FRESH $3 \square$ SULPHUR 14 SALTY $4 \square$ MINERAL		ATERIAL TEEL 12 ALVANIZED	WALL THICKNESS INCHES F	DEPTH - FEET ROM TO 13-16		IAL AND TYPE	3	DEPTH TO TOP OF SCREEN	03 F 41-44 9 FEET
	FRESH 3 SULPHUR 14 SALTY 4 MINERAL FRESH 3 SULPHUR 19 SALTY 4 MINERAL	DIAM. INCHES M) 10-11 2 G 3 □ Ct 4 □ 0	ATERIAL TEEL 12 IALVANIZED ONCRETE IPEN HOLE	WALL THICKNESS INCHES F	DEPTH - FEET ROM TO 13-16 0 0109		DUD IAL AND TYPE	G & SEALI	DEPTH TO TOP OF SCREEN	03 _{FEET}
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10-13 1 2 15-18 1 2 2 20-23 1 2 2 20-23 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2	FRESH 3 SULPHUR 14 SALTY 4 MINERAL 19 FRESH 3 SULPHUR 19 SALTY 4 MINERAL 19 FRESH 3 SULPHUR 24 SALTY 4 MINERAL FRESH 3 SULPHUR 24 SALTY 4 MINERAL FRESH 3 SULPHUR 29	DIAL MJ INCHES MJ INCHES 2 G G 3 G 17-18 1 S 2 G G 3 G C 4 G 0 17-18 1 S 2 G G 3 G C 4 G 0	ATERIAL 12 TEEL 12 ALVANIZED ONCRETE 19 PEN HOLE 19 ALVANIZED ONCRETE PEN HOLE	THICKNESS INCHESS F	DEPTH - FEET ROM TO 13-16 D 0/09 20-23	61 DEPTH SE FROM	DUD IAL AND TYPE IKIN 3 PLUGGIN ST AT - FEET TO 3 TO	G & SEALI MATERIAL AND	DEPTH TO TOP OF SCREEN NG RECO TYPE (CEME) LEAD PAI	A1-44 FEET RD NT GROUT CKER ETC.
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OWNER (SURNAME FIR	ST) 28.47	ADDRESS PH o	n l l			·····	DATE COMPLETED	48-53
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32 64.78								
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25-28 1 🗌 F 2 🗆 S	RESH 3 SULPHUR ²⁹	4 OPEN HOLE 24-25 1 STEEL 26		27-30	18-21	22-25		
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¹⁹⁻²¹	22-24 15 MINUTES 147 04	30 MINUTES 29-31 45 MINUTES 29-31 29-31	60 MINUTES 35-37					
U IF FLOWING, GIVE RATE	FEET FEET FEET 38-41 PUMP INTAKE S	ET AT FEET WATER AT END O	F TEST 42					
	GPM. TYPE RECOMMENDED	FEET CLEAR	2 CLOUDY				1	
	DEEP SETTING		9 дрм.				15	
	2.0.7 GPM./FT. SPECIFI	C CAPACITY		1-1-	-		11	
FINAL STATUS	WATER SUPPLY	5 🗋 ABANDONED, INSUFF 6 🗋 ABANDONED, POOR	CIENT SUPPLY	1 June	-	/ V		
OF WELL	4 RECHARGE WELL	✓ LI UNFINISHED				11		
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USE O/	4 IRRIGATION	/ ↓ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDIT	TIONING	Ver		11	111	
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41 WAT	TER RECORD	51 CASIN	G & OPEN HOLE	RECORD	SIZE (S) OF OPENING (SLOT NO.)	31-33 DIAMETER 34-38	LENGTH 3
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╞	20.23 : 0	FRESH SULPHUR	1. (8] DSTEEL 2 DGALVANIZED	9	20-23	DEPTH SET AT - FEET FROM TO	MATERIALA	ND TYPE LEAD PA	NT GROUT NCKER. ETC +
	2 25 28 1	SALTY GAS	3 CONCRETE 4 DOPEN HOLE 5 DPLASTIC			102-13 EAL-1*	CUTTI	N63 -11	ENSTRL
	30-23	SALTY	24-25 1 □ STEEL 2 □ GALVANIZED 3 □ CONCRETE	ũ .	27.10	26 29 30-33	K-1	PACKIE	ৎ
	2	FRESH 4 MINERALS SALTY GAS	4 DOPEN HOLE 5 DPLASTIC						
7		D BALLER	E 15-16 DURATION OF P			LOCATIO	N OF WE	LL	
	STATIC	WATER LEVEL 25 END OF WATER	LEVELS DURING		IN DI LOT U	AGRAM BELOW SHOW DIST INE INDICATE NORTH	ANCES OF WEL BY ARROW.	L FROM ROAD A	
		22:24 IS MINUTES	28 30 NINUTES 45 MINUTES	60 MINUTES -34 35-37		Court	74 10	22	/ N
	IF FLOWING	33 41 PUNP INTAKE	ET C FEET FEET FEET	EET FEET OF TEST 42	Inile	Craistert	>		
		GPM	FEET CLEAR	2 CLOUDY					
		DEEP SETTING	150 FEET PUMPING	25 GPM					
	50.51 	<u></u>	•						
	FINAL STATUS	Deservation wi	S 🗌 ABANDONED, INSU ELL S 🗌 ABANDONED POOT	IFFICIENT SUPPLY R QUALITY		60	3	~	
	OF WELL	TEST HOLE G RECHARGE WELL				M	4	م ب	
	WATER		5 COMMERCIAL 6 C MUNICIPAL 7 PUBLIC SUPPLY			A gin		5	•
	USE			DITIONING DT USED				X	
			5 🗋 BORING			DJERO JENA			
	METHOD OF	2 LE ROTARY (CONVE 3 C ROTARY (REVER	NTIONAL) 7 DIAMOND SE) 8 DIETTING)				4.0	~ • • • •
	CONSTRUCTIO	N 4 C ROTARY (AIR) 5 C AIR PERCUSSION			DRILLERS REMA	RKS		12	8430
ſ	NAME OF WELL C			L CONTRACTOR'S	DATA SCORCE	58 COLIRA 88 5	59-62 DATE RECE	JAN 1 5	1992
	ADDRESS	rg Well K	II-Iling 1	821		POLITIN INSPE	TOP -	Vrin i J	
	NAME OF WELL	TH Sale	Lir LUM	LL TECHNICIAN'S					
	E LARR	TECHNICIAN/CONTRACTOR	165 7 SUBMISSION DATE	-2041	FICE			000	FC
	SIGNATORE OF	Hot	DAY 11_ MC	<u>01 yr.93</u>	õ			C33	(11 /06) 50011 5
	MINISTRY	OF THE ENVIRON	MENT COPY					FURM NO. 0506	(11/86) FORM 9

Ministry	T	he Ontario Water Resources	Act
of the Environment	WATEF	R WELL R	ECORD
Ontario	<u>11</u> 572	9793 57016	# 2 03
2. CHECK Z CORRECT BOX WHERE APPLICABLE COUNTY OR DISTRICT TOWNSHIP BOROUGH C	SITY, TOWN VILLINGE	CON BLOCK TRACT, SURVEY ETC	LOT 25-27
OWN ADDRESS	<u>) [K]4</u>		E COMPLETED 48.53
ZONE EASTING NOPTHING	Centre STA. THE RC ELEVAT	ON RC BASIN CODE	
	24 25 26	30 31	
	EN AND BEDROCK MAT	ERIALS (SEE INSTRUCTIONS)	DEPTH - FEET
GENERAL COLOUR COMMON MATERIAL OTHER	MATERIALS	GENERAL DESCRIPTION	FROM TO
ISLAKA TOP SOIL			13
KED SHAND	AX		3 20
MCAULA SALA			20 24
CRAY CLAY S	ILT		24 155
WATER BEARING	SAND		155 170
		· · · · · · · · · · · · · · · · · · ·	
3)			
			65 83
41 WATER RECORD 51 CASING	& OPEN HOLE RECORD	SIZE(S) OF OPENING 31.33 (SLOT NO)	DIAMETER 34 38 LENGTH 59-40
AT - FEET KIND OF WATER INSIDE DIAM MATERIAL	WALL DEFTRICT	TO UNATERIAL AND TYPE	DEPTH TO TOP 41 C3 10 OF SCREEN
155 = SALTY SULPARALS GARANTERALS	· 188 0 1	57	
GAS		20 23 DEPTH SET AT - FEET MATEI	CEMENT GROUT
GALVANIZE	ε	10-11 10-17 (LT	TINKS-BEANSIAL
1 FRESH 3 USULPHUR 2 PLASTIC 4 UMINERALS 24-21 3 3 3 3 3 5 3 <td< td=""><td>20 J</td><td></td><td>C. PACKIER</td></td<>	20 J		C. PACKIER
30-33 1 _ FRESH 3 _ DSULPHUR 3 3 _ COORCETE 4 _ IMINERALS 2 _ SALTY 8 _ DGAS 5 _ PLASTIC	E	26 29 30 33 80	
7 1 PUMPING TEST METHOD PUMPING RATE D. 16 DURATION	0F PUMPING 15-16 17-13	LOCATION OF	WELL
STATIC WATER LEVEL 25 UNITER LEVEL 25 WATER LEVEL 25 WATER LEVELS DURING		IN DIAGRAM BELOW SHOW DISTANCES OF LOT LINE INDICATE NORTH BY ARROV	WELL FROM FOAD AND
EVEL PUMPING $\frac{19.71}{72.74}$ IS MINUTES 30 MINUTES 45 MIN	101ES 60 MINUTES	12477 10 20	
15 FLOWING. 38-41 PUMP INTAKE SET AT WATER AT	FEET FEET	COUNT NO 22	
B SHALLOW BEEP SETTING 150 FEET RATE	4 дрм	DI Blevi	
**	(
FINAL 2 OBSERVATION WELL 4 ABANDONED STATUS 5 TELEVATION WELL 5 ABANDONED	POOR QUALITY	X	\rightarrow
OF WELL 4 RECHARGE WELL DEWATERING			3
WATER 3 STOCK 5 MUNICIPAL 3 IRRIGATION 7 PUBLIC SUPPLY			2
	CONDITIONING NOT USED		io j
OF ³ CONSTRUCTION ⁴ ROTARY (AIR) ⁴ DETT CONSTRUCTION ⁴ ROTARY (AIR) ⁹ DRIV	ING		128427
	WELL CONTRACTOR'S	RS REMARKS	RECEIVED 63 56 80
C DE UES Well DENling	LIGENCE NUMBER	IRCE 18551	JAN 1 5 1993
To ADDRESS ANT ANT I BULLIA	4M498 3		
L DRRY HASTINGS	WEEL TECHNICIAN'S	N # 15 X 7	
	T2041 10		
SIGNATURE OF TECHNICIAN/CONTRACTOR SUBMISSION D	T2044 UI		CSS.ES

Ontario	Ministry of the Environment		, Th	e Ontario Wa WATER V	ter Resourd VELL RE(ces Act CORD
nt only in spaces provide ark correct box with a che	d. ckmark, where applicable.	11	5736248	Municipality 57003	Con.	22 23 24
ounty or District		Township/Borough/City/To	own/Village	Con block tract	survey, etc. Lo	25-27
SIHCDE		Address		Date	 ລ ຊ /	- or
		RR#2	I HELPSTON		bleted day m	onth year
2						
	LOG OF OVE	RBURDEN AND BEDRO	OCK MATERIALS (see instruc	tions)	Denth	- feet
eneral colour Mos	t common material	Other materials	Gene	ral description	From	То
SROWN T	OP DOIL					
SOUN	DAND	\overline{n}				7
RAY S	AND	CLAY/ST	DNES			92
RAY C	LAY	SANS			52	64
SROWN .	SANA	A			64	11
RAY .	SAND (LAY		· · · · · · · · · · · · · · · · · · ·	//	
	I OTAL LEP	TH /	feel			
		•				
						1 1 1
		SING & OPEN HOLE R	ECORD Sizes	of opening 31-33 Di	ameter 34-38 Leng	75 th 39-40
ater found Kind of	water linside diam	Wall Material thickness	Depth - feet	No.) 14	5 inches	4 feet
$64^{10^{13}}$ ¹ Fresh ³ ² Salty ⁴	Sulphur 14 10-11 1 1	Gleel ¹² Galvanized	IFT 13-16 SS Mater	and type	Depth at top	51 SCreen 3 41-44
15-18 1 🗆 Fresh 🔏	Gas Sulphur 19 Minerals	Concrete Open hole Plastic		· WINLESS (
2 □ Salty 6 20-23 1 □ Fresh 3	Gas 17-18 1 0 Sulphur 24 2	Steel ¹⁹ Galvanized	20-23	Annular space	ALING HECOHD	ent
2 🗋 Salty 6	□ Minerals 3 □ □ Gas 4 □ ■ Sulphur 29	Concrete Open hole Plastic	From	To Material and	type (Cement grout, be	ntonite, etc.)
²⁵⁻²⁸ 1	Supplui 23 3 Minerals 24-25 1 Gas 2 2	Steel ²⁶ Galvanized	27-30	22-25 K	PACK	ER St.
30-33 1 □ Fresh 3 2 □ Satty	Sulphur 34 60 3 3 Minerals 4 1	Concrete Open hole	26-29	30-33 80	More r	The
	Gas 5	Plastic	L	I I I		
Pumpine test method 10 1 1 Horning 2 Bailer	Pumping rate 5 11-14 Du	15-16 Hours Mins	L In diagram below st	OCATION OF WELL	from road and lot	line
Static level Water level end of pumpin	g Water levels during 1	mping 2 🗆 Recovery	Indicate north by an	ow.		
11 58	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	582-34 58-37				
If flowing give rate 38-4	et feet feet Pump intake set at Wa	feet feet iter at enclosif test 42		T2 FT FROM	1	
GPM Recommended pump type	A feet Recommended 43-45 F	Clear Cloudy lecommended 46-49		HOUSE	W	
Shallow Deep	pump setting 67 feet	ump rate GPM				
INAL STATUS OF WE	LL 54			E		
Water supply Observation well	 ⁵ Abandoned, insufficient supply ⁶ Abandoned, poor quality 	 ⁹ Unfinished ¹⁰ Replacement well 	• - WELL	Other	S	
 ³ Test hole ⁴ Recharge well 	 Abandoned (Other) Dewatering 			- Alexandre - Alex		LINE
	55-56	9 □ Not use				
2 Stock 3 Irrigation	6 D Municipal 7 D Public supply	10 🔲 Other				
4 📋 Industrial	8 🔲 Cooling & air conditioning		/		11	-
	5 Air percussion	⁹ Driving	<i>_</i>		Hom	RD =
 ² [] Rotary (conventional) ³ [] Rotary (reverse) ⁴ [] Rotary (air) 	 Boring Diamond Jetting 	11 Other			228	071
			/			
Norms of Well Contractor	KED DRILLIATE	Well Contractor's Licence No.	Data 58 Contracto	467	SFP 1 Q 7	nm ⁶³⁻⁶⁸ *
Address R	JT RADAL		Date of inspection	Inspector		
KK#1 U	TI EARKIE	Well Technician's Licence No.	ı́́> Remarks			
vaprejor vveii recnniciąn						

2 - MINISTRY OF THE ENVIRONMENT COPY

(V) Onta	nrio ^r	Ministry of he Enviror	nment	Well 121	A OF	e sticker and prir	nt number below)	Regulation 903	ontario	Well Water I	Re Resou	COľĆ
Instructions for	Completin	a Form		4	1050	785				pa	ge	_ of
 For use in the 	Province	of Ontario	only. This	s docum	ent is a perm	anent lega	document. P	ease retain for futur	e refere	ence.		
 All Sections n Questions reg 	nust be con jarding com	npleted in f npleting thi	full to avoi is applicat	id delays tion can	be directed	ig. Further in the the tilt to the Wate	nstructions and er Well Help D	d explanations are ava Desk (Toll Free) at 1	allable of -888-39	n the bac 96-9355	k of th	iis form.
 All metre me Please print c 	a <mark>surement</mark> learlv in blu	s shall be e or black	reported ink only.	l to 1/10 ¹¹	^h of a metre.	· [Ministry Use	Only			*******
Well Owner's In	formation	and boca	tion of V	Vell Info	rmation	MUN	C	DN NC		L	от	
<u>S M</u>	q/+m	in (Our	T		SPIE	ngwater	Site/Compa	K urtmont/E	Block/Tra	ot oto	
	Name					Lelp	S-f0	- Site/Compa				
GPS Reading	NAD Zon 813	e Eastin	8838	North 49	129105	Unit Make/M	odel * Mode	e of Operation:	ifferentiate erentiated,	ed specify	Average	ed
Log of Overburg	len and Be	edrock Ma	aterials (see inst	ructions)		0			Dent	Fe	et-
General Colour N	lost common	material		Other Ma	terials		Genera			Fron	D	To
6.000	Sand		0	11			Fac !	ted			es .	210
grey a	lay		<u>د</u>	117	101		10050	<u> </u>		218	1	210
110000 -	sand			3740	! <u>e</u> [10056			210		<u> </u>

Hole Diame	ater			Cons	truction Becc	ord		Tes	t of Wel	ll Yield		- and
Depth Metres-	Diameter	Inside			Wall	Depth	Metros-	Pumping test method	Draw	Down	Rec	covery
From To	Centimetres	diam centimetres	Mate	rial	thickness centimetres	From	То	Pump	Time Wa min 4	ater Level M etres	Time V min	Vater Lev Metree
0 20	874				Casing			Pump intake set at -	Static Level • (511		
20 217	. 7 "		Steel	Fibreglass			t and t	Pumping rate -	1 \$	5.6	1 🥃	6
Water Rec	ord	68	Plastic Galvanize	Concrete	2.19	+2'	215	Duration of pumping	26	1710	2	
Water found at Metres / Kin	d of Water	. 11	Steel	Fibreglass		*****		hrs + <u>00</u> min		1011		
m Fresh	Sulphur Minerals	54	Plastic	Concrete	2.19	213'	215'	of pumping	3 @	٢	3	
Other:	· <u>·</u> ····		Steel	Fibreglass				Recommended pump type.	4		4	
Gas Salty	Sulphur Minerals		Plastic	Concrete				Recommended pump	5		5	
Other:	· · · · · · · .		Galvanize	d	Screen			Recommended pump	10		10	
Gas Salty	Minerals	Outside	Steel	Fibreglass	Slot No.			rate. 75 GPM	15		15	
After test of well yield,	water was	cL(1	Plastic]Concrete	10	215'	219'	(litres/min)	20 25		20 25	
Clear and sedimen	t free	52	Galvanize	ed	12			If pumping discontin- ued, give reason.	30		30	
Other, specify				No C	asing or Scre	een			40 50		40 50	
Chlorinated X Yes	No								60 6	ne gee	60	
Plug	ging and Se	ealing Reco	ord	街 Annula	r space 🗌 At	pandonment	In diagram belov	Location of well fr	of Well	lot line a	nd build	lina
From To	viaterial and typ		siurry, neat ce	ament siurry	cubic	c metres)	Indicate north by	arrow. Rwell	onn road,	/	VJ	ø
O RO.		9200	<u> </u>					80°				
								Maltman		and the second secon		
							FON	CAT				
	n	8 - M	0				Re					
Cable Tool	Rotary	(air)		Diamond		Digging						
Rotary (conventiona Rotary (reverse)	I) Air perc	cussion		Jetting Driving] Other						
		Wate	er Use				·	Horseshoe	Vell	y Rd		
Domestic Stock	Industri	al ercial	۹ 🗌 ۲	Public Supp Not used	ly	Other				/		
Irrigation	Municip	Einal Stat		Cooling & a	ir conditioning		Audit No.	73329 Dat	te Well Co	ompleted	N N	MM DD
Water Supply	Recharge w	ell		Jnfinished	Abando	oned, (Other)	Was the well ov	vner's information Dat	e Delivere	ed yy	YY N	MM DD
Observation well Test Hole	Abandoned, Abandoned,	insufficient su poor quality	upply	Dewatering Replacemer	nt well		package delivere	ea?				L
Name of Woll Contract	Well Con	tractor/Tec	hnician li	nformatio	on ell Contractor's I	icence No	Data Source	Ministry Us Co	e Only			
	Well	Drill	ing		<u> -7071</u>				20	75		
- una orun	et name, numt 2つ A/	per, city etc.) McThus	rst	ON	LOC-	1×0	UCI 4	9 2007 ^{MM} ^{DD} ^{Dat}	e ot Inspe	ection yy	YY N I	MM DD
Business Address (stre 12493 Huse					ell Technician's I	icence No.	Bemarks	We	I Record	Number		
Business Address (stre 12493 Hwy Name of Well Technicia	an (last name, f	first name)		We	7-2874	/	1 ionianio	I				
Business Address (stre 12493 If Jan Name of Well Technicia Flemen of Signature of Technicia	an (last name, f	first name) 2 /		Daj	7-2879 te Submitted YYYY	Mar Do		н. - С				

Ontario Ministry of the Environment

Well Tat A 066527 (Below) A 066527



Regulation 903 Ontario Water Resources Act
Page _____ of _____

Well Owner's Information

lat 16 C.	Hedre Coc		Oprim		600	~	16				
County/District/M	Municipality	City/	Town/Villag	e				Provin	ce	Postal	Code
Since	oe	M	idhors	· +				Onta	ario	40	C 1 X 0
NAD 8 3		orthing GPS U	Init Make	Model		Mode of C	Deration:	Undiffe	rentiated	Avi	raged
Overburden an	d Bedrock Materials (see inst	ructions on the back of this for	m)					0		1	Feet
General Colour	Most Common Material	Other Materials	5			General D	escription			Depth From	(Metres) To
biown	Sand			1005e						0	20'
giey	clay	Silt			ho	ard				20	52'
brown	Sand	gravel				1005e				52	60'
		· ·									
	Annular Space/Abando	nment Sealing Record					Results of W	ell Yiel	d Testing	F	eet
Depth Set at .(Afo From To	mes) Type of Se (Material a	alant Used nd Type)	Volume (Cubic M	Placed <i>(etres</i>)	Che	eck box if after tes ter was:	t of well yield,	Time	aw Down Water Lev	el Time	ecovery Water Level
0 20	0' arou	F	40 90	a 1		Clear and sand	free to sand-free	(Min)	(Metres)	(Min)	(Metres)
	J.20		105			state	ad also manage	Level	8'	Level	
					1" "	umping asconunc	ieu, give reason.	1	12'1	1	913
					Pur	mping test metho	d	2	14'2	· 2	81
	10 11				Put	pump mp intake set at	Matrice	3	14'6	3	
Cable Tool	Diamond P	ublic Commercia		ot used		20'		4	14.6	4	
Rotary (Conver	ntional) Jetting	omestic Municipal		watering	Pur	mping rate (Lilves	(min)	5	1. 28	5	
Rotary (Revers		igation Cooling & A	ir Conditionia	ng	Du	ration of pumping)	10	e de la composition d La composition de la c	10	
Other, specify	Boring In	dustrial ther. specify				1 hrs +0.0	min	15		15	
	Status	of Well			Fina (Me	al water level end	of pumping	20		20	
Water Supply	Dewatering Well Abandoned Insufficie	Observation Alteration (and/or Monik	oring Hole	Re	commended pur	np type	25		25	
Test Hole	Abandoned, Poor Wa	ater Quality Other, spec	ify			Shallow X	Deep an death	20		20	
Recharge Well	Abandoned, other, si	pecify		_	3	30 Metre	ip depui	30		30	
Please provide a	map below showing:	n or well			Re (Lit	commended pun tres/min)	np rate	40		40	
 all property boun an arrow indicati 	idaries, and measurements sufficient ing the North direction	ent to locate the well in relation	n to fixed poi	nts,	If fi	IS 9 PM lowing give rate	T	50		50	
 detailed drawing: vidigital pictures 	is can be provided as attachments of inside of well can also be provid	no larger than legal size (8.5" led	by 14") 🖊	3	(Lit	tres/min)		60	14'6	60	
		Gill Rd					Wate	r Deta	ils		
2			110.01	Loc	W	ater found at De	pth Kind	of Wate	er]Saltv 🗔	Sulphur	Minerals
		all	cres	141	W	ater found at De	pth Kind	of Wate	er		
		Q + 120 +	0.02		1	Metres	Gas Fr	esh 🗌	Salty	Sulphur	Minerals
						ater found at De	Gas Fr	of Wate	er]Salty 🔲	Sulphur	Minerals
)				Casing Used	Screen Use	d	Casing	and Wel	Details
						Galvanized	Galvanized	Di	ameter of th	e Hole (O	ntimetres)
						Steel 2,19 Fibreglass	Steel 6	OF De	epth of the H	ole (Motre	5)
Date Well Comp	pleted Was the well owner's infor	mation Date the Well Rec	ord and Pac	kage mm/delt		Plastic	Plastic 6'	· .	60'	1 denter	
2008 04	10 Yes	No			빌브	No Casing an	Concrete	- **	2,19	s (meues)	Self-Treese
Bueleass Namo	Well Contractor and We	II Technician Informatio	n antractor's Lie	once No.		Open Hole	u Screen Oser	Ins	side Diamete	er of the C	asing (Metres)
Conodi	an Well Drill	ing 7		S S	Disi	infected?		De	epth of the C	asing (M	t res)
Business Address	s (Street No./Name, number, RF	() Municipality				Yes 🗌 No			56'	1	Server and
9 Bertia	Postal Code Busines	S F-mail Address	ngive	te~	Aut	dit No.	Ministr	y Use	Only Contractor N	0.	
ON	4061X0					z 78	235			18.67	
Bus.Telephone No	o. (inc. area code) Name of Well T	echnician (Last Name, First	Name)		Dal	te Bernived 2720	081/00)	Date of	f Inspection	(yyyy/mm	Vdd)
Technician's L	Licence No. Signature of Technic	ian Date S	submitted by	yyimm/dd)	Re	marks		1			1000
217	7 4 Peter Fle	ming 2	28/4	1D			13				- AND - AND
-			Ministry	s Copy	1				© Queer	's Printer i	or Ontario, 2006

205	56140	IT. L	rol.		A0	82191		W	1264				· · · ·
UP0)ntario) the E	try of nvironmer	it	Well Ta	0821	9	Print Below,) Regulation	n 903 (W Ontario Wa	ell F	Record
Measurem	nents recor	ded in:	Metric 🎽	Imperial		002					Page		of
Well Ow Eirst Name	ner's Info	ormation	Last Name	Organizatio	n			E-mail Addre	226				
205	SbIY	Oato	122	LAC	re.				200		L	J Well by W	Constructed ell Owner
Matthin Ad	idress (Stree	et,Numbel/Ne	(me)	Inil	#1	Municipality		Province	Postal Code	17	Telephone	No. (int.	area code)
Well Loc	ation	-110-00	110.	unit	.+- (UV.	LYNU	-1-	7037	79	Sto.
Address of	f Well Locat	ion (Street Nu	imber/Name)	1	Township			Lot 2		Concession	1	
County/Dis	strict/Munici	ner Cr ipality	res		(City/Town/Village	Wet	(r		Provir	nce	Posta	l Code
Sin	coe	- Easting		o sthin o		Michurst	1 Cuble	h bloogh og		Ont	ario	20	L 1 X 0
NAD		7598	1914	928	054	viunicipai Pian an	a Subio	t Number		Other			
Overburd	len and Be	drock Mater	ials/Aband	onment Se	aling Reco	ord (see instruction	s on the	back of this form)				-	41- (- 451)
General C	Colour	Most Com	mon Materia		Oth	er Materials			General Description			From	th (m/ft)
brown	1	San	d Fig	e				/0	ose			0	18
gley		clay			Sil	+		50	<i>ft</i>				72'
brow	A F	ne sa	nd					1005	ৎ			12	80'
	In the second		Annula	Space					Results of We	ell Yiel	ld Testing	111111	
Depth S From	et at (<i>m/ft</i>) To		Type of Se (Material ar	alant Used		Volume Plac (m ³ /ft ³)	ed	After test of well y	ield, water was:	Dr	aw Down	R	ecovery Water Level
0	21'	a	rout			40 94	(Other, specil	fy	(min)	(m/ft)	(min)	(m/ft)
		~	0					If pumping discon	tinued, give reason:	Static Level	34'		
										1	42'	1	34'
								Pump intake set	at <i>(m/ft)</i>	2	45'	2	
Meth	hod of Co	nstruction			Well IIs	0		Pumping rate (Vn	nin / GPM)	3	45'	3	
Cable To	ool	Diamono	d 🗌 Pu	blic	Comme	rcial 🗌 Not u	sed	129pm	lea	4		4	
Rotary (Conventional Reverse)) Ustting		mestic estock	Municipa Test Ho	al Dewa le Monit	tering oring	hrs + 0 c	2 min	5		5	
Boring		Digging		gation	Cooling	& Air Conditioning		Final water level e	nd of pumping (m/ft)	10		10	
Other, s	pecify Ko	tary Ai		ner, specify _				7 J If flowing give rate	e (l/min-/ GPM)	15		15	
Incide	Cor	nstruction R	ecord - Ca	sing	. (m. 161)	Status of W	ell			20		20	
Diameter (cm/in)	(Galvanize	e OR Material ed, Fibreglass, Plastic, Steel)	Thickness	From	То	Replacement	Well	Recommended p	ump depth (m/ft)	25		25	- L
6 4 "	Cto	• 1	1.01	+21	24	Test Hole Recharge We	.	Recommended p	ump rate	30		30	
0.9	5/2		1.00	1 02	16	Dewatering W	/ell	129Pm	+	40		40	
						Monitoring Hol	e	Well production (Vmin / GPM) ∲	50		50	
						(Construction)		Disinfected?		60	45	60	
	Cr	onstruction R	ecord - Scre	en	NTUMBER .	Insufficient Su	pply		Map of We		ation		
Outside Diameter	Ma	aterial	Slat No.	Depth	(<i>m/lt</i>)	Water Quality	'oor	Please provide a r	map below following	instructi	ions on the b	ack.	<u></u>
(cm/in)	(Plastic, Gal	vanized, Steel)	0101140.	From	То	Abandoned, o specify	ther,		GillRd	/			N
6"	Ste	e l'	8	76'	80.	Other. specify							
				5				t					
Water foun	d at Depth	Water Det Kind of Wate	tails		H	ole Diameter	neter						
72' (m	ı∕ft) ⊡ Gas	Other, spe	cify	Aontested	From	To (cn	vin)						
Water foun	d at Depth	Kind of Wate	r: Fresh	Untested	0	211 8	4		Galla	ghe	Se /		
Water foun	d at Depth	Kind of Wate	r: Fresh	Untested	21'	80' 7	ci		T	~ 21	es -		
(m	v/ft)Gas	Other, spe	ecify						120	1			
Business Na	We ame of Well	Contractor	or and Well	Technicia	n Informat	ion I Contractor's Licenc	e No.		æ				
Canad	lian W	ell pr	illing		7	07	5	1	Well	(
Business Ac	ddress (Stre	et Number/Na	me)	c	Mu	nicipality		Comments:					
Province	Po	ostal Code	Business	E-mail Add	ress	ringwate							
ON	L	0 L 1 X	0	ashelet	ooi bi-	inst blocks		Well owner's Da information	te Package Delivered	1	Minist	ry Use	Only
205	ne No. (inc. a 7 2 8 9	area code) Na 8 72 /	enia	ecnnician (L	.ast Name, I	-irst Name)		delivered Y	YYYMM	D	Audit No.Z	94	347
Well Technici	an's Licence	No. Signature	of Technicia	n and/or Co	ntractor Date	e Submitted	On I	Yes Da	te Work Completed	20	1111	22	2009
0506E (12/200)7)	1103	plen	ing	1	Ministral	- J	I NO X	00706-	57	Received L	Printer fo	r Optario 2007
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tho	ntario Minist	ry of ivironment	N.	Nell Tac	No. (Plac	e Sticker ar	nd/or Print Belo	W) WWH	9030	We Intario Wat	ell R	b.
Measurem	ents recorded in:	Aetric XIm	perial	_ A	08	216	7		1303 0	Page_	ter rres	of
Well Own	ner's Information	ast Nanhe / Or	rganization	0			E-mail Add	Iress			1.10/	
200	SG14	2ntag	200	X			Phoning	[Photel Code	- 1	Filophone	by We	Il Owner
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Well Loca Addrese of	ation Well Location (Street Nur	nber/Name)		Te	ownship			Lot	11111	Concession		angere.
52 eounty/Dis	trict/Municipality			G	ity/Town/VIII	age 0 /	/ .		Provin	CB	Póstal	Code, /
Galk	Cher Ch	S.	bing]	4 10h	uRO	t Number		Onta	ario	10	C/XO
NAD	8 3 17 59 81	1749	1285	75		n and Subic	, Number		Other	1		
Overburde General Co	en and Bedrock Materia olour Most Comm	als/Abandon non Material	ment Seali	ng Recor Othe	rd <i>(see instru</i> er Materials	ictions on the	back of this form	General Description			Dep	th (<i>m/ft</i>)
brown	n Sand	Fine						loose			0	17'
grey	clay		-	Silt	-		2	ort			17'	23'
brown	Sand	medio	m				100	ve			73'	80'
								1				
				-								
		Annular S	pace	1911010	(FALLER			Results of We	ell Yiel	d Testing	11111	
Depth Se From	at at (m/ft) To	Type of Seala (Material and	ant Used <i>Type)</i>		Volume (m ³	Placed //ft ²)	After test of we	l yield, water was: sand free	Dra	aw Down Water Leve	R/	ecovery Water Level
0	21' 9.	rout			405	e1	Other, spe	ontinued, give reason:	(min) Static	(m/ft)	(min)	(m/ft)
							In particular acco	energed, give reason.	Level 1	2	1	
							Pump intake s	et at (m/ft)	2		2	
				Mallilla			40 Pumping rate	(Vmin / GPM)	3		3	
Cable To	ol Diamond	I D Publi	ic [Commer	cial	Not used	10 gPn	1 mping	4		4	5'
Rotary (C	Conventional) U Jetting Reverse) Driving	Dom Lives	estic L stock [] Municipa] Test Hol	e 🗌	Dewatering Monitoring	hrs +0	0 min	5	29'	5	
Air percu		Irriga	ation] Cooling i	& Air Conditic	oning	Final water level	end of pumping (m/tt)	10		10	
Other, sk	Construction R	ecord - Casi	na		Status	of Well	If flowing give	rate (Vmin-/ GPM)	15		15	
Inside Diameter	Open Hole OR Material (Galvanized, Fibreglass,	Wall Thickness	Depth (r	m/ft)	Water S	Supply ment Well	Recommende	d pump depth (m/ft)	20		20	
(cm/in)	Concrete, Plastic, Steel)	(cm/in)	From	To	Test Ho	le ne Well	Recommende	d pump rate	30		30	
68	Steel	1.98	T2	16	Dewate	ring Well	(Umin / GPM)	Pm	40		40	
					Monitori Alteratio	ng Hole	259P	n (Vmin / GPM) 7/n	50		50	
					(Construction (Construction)	uction) ned,	Disinfected?	No	60	29'	60	
-	Construction R	ecord - Scree	n	HEE	Insuffici Abando	ent Supply ned, Poor	Please provide	Map of W	ell Loc	ation	ack	
Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (/ From	m/ft) To	Abando	ned, other,	Please provide	O'hara	P		NT	(
5"	steel	12	76'	80'				Lane	1001			
					Other, s	specify		6	180 7	Rwell		
Water four	Water De and at Depth Kind of Wate	tails r: 🗌 Fresh 🍞	Untested	H Dept	ole Diamet	biameter			-	~		
74° (m	n/ft) Gas Other, spe	ecify		From	To	(cm/in)						
Water foun (m	nd at Depth Kind of Wate	r: 🔄 Fresh 🔄 acify	Untested	21'	20'	014						
Water four	ad at Depth Kind of Wate	r: Fresh	Untested	~ '	00	02	1451	Gallaghe				
	Well Contracto	or and Well T	echnician	Informat	ion		l t	cres		-		
Business N	dian Well Contractor	Drill	inc	We	Il Contractor's	Licence No.						
Business A	ddress (Street Number/Na	ame) Mill	inst	Mu	nicipality	oter	Comments:					
Province	Postal Code	Business	E-mail Addre	ISS	ing w	eler			1			
O /V Bus.Telepho	LOLIX one No. (inc. area code) Na	ame of Well Te	chnician (La	st Name,	First Name)		Well owner's information package	Date Package Delivere	ed	Minis Audit No. 7	stry Use	Only
705	7289872	Flemin	3 Pe	ter	a Submitted		delivered	Date Work Completed	DD		94	1340
28	74 Pet	er Fle	miz	2	0091	0200	No No	20109 1.00	210	REDEC	16	2009

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nt Below)

7 PINEHILL DRIVE	THEREAL	SPRINGWATER		
County/District/Municipality	City/Town/Village		Province	. Postal Code
UTM Coordinates Zone , Easting , Northing	Municipal Plan and Suble	ot Number	Officiario	LOLAKO
NAD 8 3 17 5 9 8 5 3 7 4 9 2 9 4 0 8				
Overburden and Bedrock Materials/Abandonment Sealing Rec	ord (see instructions on the	back of this form)		D
General Colour Most Common Material O	ther Materials	General Description	1	From To
Brown Sand				0' 10'
Circy Clay				10' 70'
Grey Silt				70' 120'
Grey Clay				120' 165'
(rrev Sand		fine		165 177'
	Sales in Second		1.0.000	Sector - Andrews
Annular Space		Results of W	ell Yield Testi	ng
Depth Set at (m/ft) Type of Sealant Used	Volume Placed	After test of well yield, water was:	Draw Down	n Recovery
material and Type	(117/11-)	Other, specify	(min) (m/ft	(min) (m/ft)
0 20 17 Dags 5/8 Holepi	ug	If pumping discontinued, give reason:	Static 6.5	5 135
	· · · · · · · · · · · · · · · · · · ·		1	1 101
		Pump intake set at (m/ft)	2	2 1.211
		177		- 113.4
Method of Construction Well L	lse	Pumping rate (Vmin / GPM)	3	3 106.4
Cable Tool Diamond Public Comm	nercial Not used	Duration of putating	4	4 99.8
Rotary (Conventional) Getting Conventional Multic	Hole Monitoring	<u>3</u> hrs + min	5	5 93.8
Boring Digging Irrigation Coolin Industrial	ng & Air Conditioning	Final water level end of pumping (m/t)	10	10 69.1
Nother, specify Arr Rotary Other, specify		If flowing give rate (I/min / GPM)	15	15 521
Construction Record - Casing	Status of Well		20	20 4/0
Inside Open Hole OR Material Wall Depth (m/ft) Diameter (Galvanized, Fibreglass, Thickness	Water Supply	Recommended pump depth (m/ft)	25	25 715
(cm/in) Concrete, Plastic, Steel) (cm/in) Promi	Test Hole	Recommended pump rate	20	20 31.5
6 Steel 219 12 172	Dewatering Well	(I/min / GPM)	30	30 25,6
	Observation and/or Monitorion Hole	Well production (Amin / GPM)	40	40 18.3
	Alteration	20 + gpm Disinfected?	50	50 14.5
	Abandoned,	X Yes No	60	60 12.5
Construction Record - Screen	Insufficient Supply Abandoned, Poor	Map of W	ell Location	
Outside Material Diameter (Plastic Galvanized Steel) Slot No. Depth (m/ft)	Water Quality	Please provide a map below following	instructions on th	he back.
	specify			
5 Steel 6 172 177	Other, specify			1
		Horses	hoe Vall	ley Rel W
Water found at Depth Kind of Water: Ersch Ulaterted	Hole Diameter		17	T
(m/ft) Gas Other, specify	To (cm/in)		-2	te n
Water found at Depth Kind of Water: Fresh Untested		aro.	27	1 2
(m/ft) Gas Other, specify		His	22	18 N
(m/ft) Gas Other, specify		× (3	
Well Contractor and Well Technician Inform	ation		R	
Business Name of Well Contractor	Vell Contractor's Licence No.		- 10 A	
Business Address (Street Number/Name)	J 4 1 J.	Comments: 20 FF PEOR	n House	2
P.O. Box 280	LEFROY	100 ft from	Road	a service and the service of the ser
Province Postal Code Business E-mail Address		Well owner's Data Package Delivery	ed be	nistry lies Only
Bus. Telephone No. (inc. area code) Name of Well Technician (Last Name	e, First Name)	information	Audit No	D. O C C C T
7054364359 JIM MOORE		delivered Date Work Completed	Z	123297
Well Technician's Licence No. Signature of Technician and/or Contractor D	ate Submitted		HE FE	B 0 9 2011
0506E (2007/12) © Queen's Printerior Ontario, 2007	Ministry's Copy	04011101	Received	

Ministry of the Environment Measurements recorded in:	Well T: Tag#: A12 Well T: A/275	7584 elow) <i>Regulation</i>	n 903 Ontario V Pag	Vell Record Vater Resources Act
Address of Well Location (Street Number/Name) <u>/O Gallagher</u> County/District/Municipality <u>Simcoe</u> UTM Coordinates Zone Easting Northing NAD 8 3 17598049494924	Township SpringWG City/Town/Village MSDDJJ Municipal Plan and Suble 9327	Lot Ac./ ot Number	Concess Province Ontario Other	Postal Code LOLIXO
Overburden and Bedrock Materials/AbandonmentGeneral ColourMost Common Material $bid wn$ $Sand$ $giey$ $cley$ $giey$ $cley$	Sealing Record (see instructions on the Other Materials Sci / A	back of this form) General Description 10050 10050		$\frac{Depth(m/ft)}{From}$ $\frac{O}{O}$ \frac
Annular SpaceDepth Set at (m/ft)FromTo(Material and Type)O209.001	ed Volume Placed (m³/ft³) 409 e 1	Results of We After test of well yield, water was: Clear and sand free Other, specify If pumping discontinued, give reason:	Il Yield Testir Draw Down Time Water Le (min) (m/ft) Static Level	ig Recovery evel Time Water Level (min) (m/ft)
Method of Construction Cable Tool Diamond Public	Well Use	Pump intake set at (m/ft) 35 Pumping rate $(l/min / GPM)$ 1557m	1 2 3 4	1 2 3 4
Rotary (Conventional) Jetting Rotary (Reverse) Driving Boring Digging Air percussion Industrial Other, specify Other, specify Construction Record - Casing	Municipal Dewatering Test Hole Cooling & Air Conditioning	$\frac{1}{1} \text{ hrs } + O O \text{ min}$ Final water level end of pumping (<i>m</i> / <i>ft</i>) $\frac{2}{2}O$ If flowing give rate (<i>I</i> / <i>min</i> / <i>GPM</i>)	5 10 15 20	5 10 15 20
Inside Diameter (cm/in)Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)Wall Thickness (cm/in)D6357675357675357617	epth (m/ft) To To To To Test Hole Particular Particular	Recommended pump depth (<i>m/ft</i>) Recommended pump rate (<i>l/min / GPM</i>) Well production (<i>l/min / GPM</i>)	25 30 40	25 30 40
Construction Record - Screen Outside Material Diameter (Plastic, Galvanized, Steel) Slot No. From	Alteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor Water Quality To To Abandoned, other,	Disinfected? Yes No Map of We Please provide a map below following	150 60 20 Il Location Instructions on th	e back.
6"" SSteel 16 4/7	specify		Gi	IRJ

Water Details Hole Diameter Gallagher crest Water found at Depth Kind of Water: Fresh XUntested Depth (*m/ft*) Diameter (cm/in) From То 4/5 (m/ft) Gas Other, specify 7 47 < Water found at Depth Kind of Water: Fresh Untested \Diamond 40. 160 (m/ft) Gas Other, specify 47 Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Well Well Contractor and Well Technician Information **Business Name of Well Contractor** Well Contractor's Licence No. Canadian Well Sriling Business Address (Street Number/Name) C Municipality Comments: 12493 Hwy 27 NM Milhorst Spains 4 6 tra Province Postal Code Business E-mail Address ON 60K11X0 Ministry Use Only Well owner's Date Package Delivered information Audit No. Bus.Telephone No. (inc. area code) Name of Well Technician (Last Name, First Name) package z155554 7288872 Le te -leming 205 delivered Date Work Completed Well Technician's Licence No. Signature of Technician and/or Contractor Date Submitted Yes 0222 2017 No 2013 827 6 X Capzin nr 0049 © Queen's Printer for Ontario, 2007 Ministry's Copy 0506E (2007/12)



BROWN BROWN BROWN BROWN BROWN	CUAY STONE SAND SAND SAND SAND	- Till	filo med. Cs. Med.			3.1 9.7 24.4 2.0	9.7 24.4 32.1 32.1 36.1 132.1
	Annular Space		Results of W	sll Yiel	d Testing		
Depth Set at (m/ft) From To $2W$	Type of Sealant Used (Material and Type) BENTONIR (MO	Volume Placed (m³/ft³) LT 380LTA	After test of well yield, water was: Clear and sand free Other, <i>specify</i> If pumping discontinued, give reason:	Dr Time <i>(min)</i> Static Level	aw Down Water Leve (m/ft) 3.64	R I Time (min)	ecovery Water Level (m/ft)
			Pump intake set at (m/ft)	1	14.102	2	

350 i/m Cable Tool Diamond Public Commercial Not used 4 Duration of pumping Domestic Rotary (Conventional) Jetting ____ Municipal Dewatering 16-44 5 hrs + 3 min 5 Rotary (Reverse) Driving Livestock Test Hole Monitoring Boring Final water level end of pumping (m/ft) Digging ____ Irrigation Cooling & Air Conditioning 10 10 16.92m Air percussion Industrial Other, specify Other, specify 16.61 15 15 f flowing give rate (IImin / GPM) **Construction Record - Casing** Status of Well 20 20 Inside Water Supply Open Hole OR Material Depth (*m*/*ft*) Wall Recommended pump depth (m/ft) Diameter (Galvanized, Fibreglass, Thickness Replacement Well 25 25 From То (cmlin) 6 M Concrete, Plastic, Steel) 16. (cmlin) Test Hole Recommended pump rate STEEL 31.7 16.70 Recharge Well 30 30 (Ilmin / GPM) Dewatering Well 1ft 113491 STEEL 12 40 40 31.7 Observation and/or Well production (Ilmin / GPM) Qe 1 3 I LIVE Monitoring Hole 50 50 Alteration Disinfected? (Construction) 60 60 Yes No Abandoned, Insufficient Supply **Construction Record - Screen** Map of Well Location Abandoned, Poor Outside Please provide a map below following instructions on the back. Depth (*m/ft*) Water Quality Material Diameter Slot No. (Plastic, Galvanized, Steel) Abandoned, other, (cmlin) From То specify STEEL 36.0 15 16 Other, *specify* Water Details Hole Diameter 400 m Water found at Depth Kind of Water: Fresh KUntested Depth (*m*/*ft*) Diameter Kmit Das From (cmlin) То HURSESHIC MARIEN MARIEN Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested Other, specify (m/ft) Gas Well Contractor and Well Technician, Information N Business Name of Well Contractor Well Contractor's Licence No. MATCh Weas Business Address (Street, Number/Name Municipality Comments: Province Business E-mail Address Postal Odde CR Well owner's Date Package Delivered Ministry Use Only information Bus Telephone No. (inc. area code), Mame of Well Technician (Last Name, First Name) Audit No. package delivered . Lon 828 Date Work Completed Well Technician's Licence No. Signature of Technician and or Contractor Date Submitted X Yes No © Queen's Printer for Ontario, 200 0506E (2007/12) Ministry's Copy

Measurem	ntari	O Mini the E	stry of Environmen Metric 🕅	t Imperial	Wei	Гад‡ 416	#: A16 247	624 ^{and/or} 1 70	Print Below)	Regulatio	n 903 (M Dotario W Page	/ell F later Res	Record
Well Ow	ner's Inf	ormation	A	,panai	L					3			ł	
First Name	e		Last Name /	Organizati	n to	Mas		E	E-mail Address				Well	Constructed ell Owner
Mailing Ad	dress (Stre	et Number/N	lame)	Pm	1		vrip	F	Province	Postal Code	; , , , , , ,	Telephone	No. (inc.	area code)
Vell Loc	$\frac{\mathcal{D}\mathcal{U}}{\text{ation}}$	Nem	Jani	RUR	1	601	11		00	LYNS	21	105	100	440 :
Address of	Well Loca	tion (Street N	lumber/Name)	<u></u>	Township		1		Lot		Concessio	ิวท	
County/Dis	Gal strict/Munic	laghe cipality e	r cre	5		SP City/Town/	Village	i te	<u></u>		Provin Ont	ice ario	Posta	l Code
UTM Coord NAD	linates Zor 8 3	The Easting	297	Northing	253	Municipal	Plan and Sub	olot Nun	nber		Other			<u> </u>
Overburd	en and B	edrock Mate	rials/Aband	onment So	ealing Reco	ord (see in	structions on th	he back (of this form)	10			Der	oth (<i>m/ft</i>)
L	oloui	MOST COM		11	00	ier materi	ais				1		From	To
DEOL	SM	sar cla	12		C	:1+			1005	./			17	101
bar		C14	Υ,		هم	(1 /			<u> </u>	2 4			Ini	110
			*										······································	
	et at (m/ft)	1	Annula Type of Se	r Space		Volu	me Placed	After	test of well yield	Results of W	ell Yiel	d Testing		
From	To	e Le constantes de	(Material a	nd Type)		voiu	(m ³ /ft ³)	K	Clear and sand f	'ee	Time (min)	Water Lev	el Time	Water Level
0	20		9100+	-		40) ga 1		mping discontinue	d, give reason:	Static	(111/11) CC*	(min)	(11/11)
											Level	00	1	an a
								Pum	p intake set at (n	∩/ft)	2		2	
									100		3		3	<u>e sed e district e se.</u> Adapte district
	nod of Co	onstruction		thlip	Well Us	ie reiol	- Netweed	Pum	159Pm	GPM))		<u>na polonati</u> Secondaria		
Rotary (C	Conventiona	I) Ualition		omestic		al	Dewatering	Dura	tion of pumping	un.	5		5	
Boring	≺everse)	Driving) [] Liv	vestock igation	Cooling	le & Air Cond	Itioning	Final	water level end o	f pumping (m/ft)	10		10	
Air percu	pecify D	R24	0t	dustrial her, <i>specify</i>				16.0-	90'		15	11999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	15	
	Co	nstruction I	Record - Ca	sing		Statu	us of Well		ving give rate (i/n	nn / GPM)	20	<u>n de constant</u> Second	- 10	
Inside Diameter	Open Ho (Galvaniz	le OR Material ed, Fibreglass,	Wall Thickness	Dept	h (<i>m/ft</i>)	Wate	er Supply	Reco	mmended pump	depth (m/ft)	20		20	
(cm/in)	Concrete	, Plastic, Steel)	(cm/in)	From	То	Test	Hole	Reco	100 '	rate	25		25	r-r-i
68	57-	ee/	1.88	0	164	Rech	arge Well atering Well	(I/min	GPM)		30	90'	30	J J
5 73	St	ee1	1.88	102	104	Obse	rvation and/or	Well	production (I/min	/ GPM)	40		40	
							ation	Disin	18 9Pm fected?		50		50	· · · · · · · · · · · · · · · · · · ·
	17					Aban	doned,	X	Yes 🗌 No		60	90'	60	55'
Outside Diameter	C N (Plastic G	onstruction I laterial	Slot No.	en Dept	h (<i>m/ft</i>)	Aban	doned, Poor r Quality	Pleas	se provide a map	Map of Wo	ell Loc instructio	ation ons on the	back.	€-N
(cm/in)	SS	teel	8	104	' 112'	speci	fy			Calla	ghe	er	G	-1//
							, speeny			610	5			RI
Nator four	d at Daath	Water De	etails	500	H	ole Diam	eter			<u> </u>	- er			
1/2 (m	d at Deptn /ft) □Gas	Cond of Wate	er: ∐ ⊢resh <i>becifv</i>	Untested	From	n (<i>m/π)</i> Το	<i>cm/in)</i>	11.0						
Water found	d at Depth	Kind of Wate	er: Fresh	Untested	O	104	6-4	ME	1003					
m) Nater found m)	/ft)	Other, sp Kind of Wate	ecify er:	Untested	104	112	6 "							
Jusiness No	Wame of We	ell Contractor	or and Well	Technicia	in Informat	ion	r's Licepco Ma	1			-1		-	
Can	adia	n We	11 Dr	·illi,	19 7	20	7 5				/		1	
Business Ad	Idress (Stre	eet Number/N	ame)	Sha	CC+ C	nicipality	alist.	Comn	nents:	3)	
rovince	> 17h	ostal Code	Business	E-mail Add	J/ J dress	ring	a 419-	1	77774 V CONMANDER 1100					
ON	2	0L1X	0					Well c	wner's Date Pa	ckage Delivere		Minis	try Use	Only
us.Telephor	ne No. (inc.	area code) N	ame of Well T	echnician (l	Last Name, I Do Lo	-irst Name	;)	packa	ge red	Y. Y. M. N.	210 010	Audit No.Z	186	5192
	an's Licence	No. Signature	e of Technicia	in and/or Co	er Date	e Submitter	b	<u>□</u> γ	es Date W	ork Completed		9893 <i>-</i>		
<u>K 8</u>		1 Per	ti Fles	ming	21	014	0630		10 20	1400	46	JUL	: 1 20)14
JUUE (2007/1)	∠) ©QUee	as a minuter for Or	ndHU, ∠UU7			Minis	try's Copy							

Appendix G Surface Water Monitoring Data

SW-01									
Benchmark Elevation (m):	239.011								
Date	Time	BM to WS (m)	Water Surface Elevation (m)	Flow Rate (Lps)					
7/20/2016	9:15	Dry	Dry	Dry					
9/1/2016	13:38	Dry	Dry	Dry					
10/27/2016	10:58	Dry	Dry	Dry					
11/30/2016	9:40	Dry	Dry	Dry					
12/30/2016	13:08	Dry	Dry	Dry					
1/30/2017	10:45	0.885	238.126	0.5					
2/27/2017	12:50	0.870	238.141	3.7					
3/28/2017	13:10	0.855	238.156	11.0					
5/3/2017	13:10	0.850	238.161	13.7					
5/31/2017	8:20	0.875	238.136	2.0					

SW-02									
Benchmark Elevation (m):	218.576								
Date	Time	BM to WS (m)	Water Surface Elevation (m)	Flow Rate (Lps)					
7/20/2016	10:40	2.645	215.931	172.9					
9/1/2016	11:30	2.652	215.924	139.8					
10/27/2016	9:45	2.635	215.941	189.3					
11/30/2016	12:05	2.535	216.041	345.5					
12/30/2016	12:15	2.572	216.004	311.5					
1/30/2017		Unable to a	ccess monitoring location safely						
2/27/2017	12:15	2.382	216.194	786.4					
3/28/2017	12:25	2.32	216.256	987.3					
5/3/2017	12:05	2.145	216.431	1459.2					
5/31/2017	7:45	2.464	216.112	505.4					





Appendix H Laboratory Analytical Reports



Your P.O. #: 73504533 Your Project #: 086822-03-5.0 Your C.O.C. #: 572334-01-01

Attention:Jennifer Balkwill

GHD Limited 651 Colby Dr Waterloo, ON N2V 1C2

Report Date: 2016/09/07 Report #: R4156757 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6H9596

Received: 2016/08/24, 08:15

Sample Matrix: Water # Samples Received: 4

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Alkalinity	4	N/A	2016/08/25	CAM SOP-00448	SM 22 2320 B m
Carbonate, Bicarbonate and Hydroxide	4	N/A	2016/08/26	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	4	N/A	2016/08/25	CAM SOP-00463	EPA 325.2 m
Colour	4	N/A	2016/08/26	CAM SOP-00412	SM 22 2120C m
Dissolved Organic Carbon (DOC) (1)	4	N/A	2016/08/26	CAM SOP-00446	SM 22 5310 B m
Fluoride	4	2016/08/24	2016/08/25	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	4	N/A	2016/08/30	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	4	N/A	2016/08/29	CAM SOP-00447	EPA 6020A m
Total Metals Analysis by ICPMS	3	N/A	2016/09/02	CAM SOP-00447	EPA 6020A m
Total Metals Analysis by ICPMS	1	N/A	2016/09/03	CAM SOP-00447	EPA 6020A m
Ion Balance (% Difference)	4	N/A	2016/08/30		
Total Ammonia-N	2	N/A	2016/08/26	CAM SOP-00441	EPA GS I-2522-90 m
Total Ammonia-N	2	N/A	2016/08/29	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2016/08/25	CAM SOP-00440	SM 22 4500-NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (2)	3	N/A	2016/08/26	CAM SOP-00440	SM 22 4500-NO3I/NO2B
Organic Nitrogen	4	N/A	2016/08/29		
рН	4	N/A	2016/08/25	CAM SOP-00413	SM 4500H+ B m
Field pH (3)	4	N/A	2016/09/02		Field pH Meter
Orthophosphate	4	N/A	2016/08/25	CAM SOP-00461	EPA 365.1 m
Sulphate by Automated Colourimetry	4	N/A	2016/08/25	CAM SOP-00464	EPA 375.4 m
Sulphide	4	N/A	2016/08/25	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	4	N/A	2016/08/26	CAM SOP-00428	SM 22 2540C m
Field Temperature (3)	4	N/A	2016/09/06		Field Thermometer
Total Kjeldahl Nitrogen in Water	4	2016/08/26	2016/08/26	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	4	2016/08/29	2016/08/29	CAM SOP-00407	SM 22 4500 P B H m
Low Level Total Suspended Solids	4	N/A	2016/08/25	CAM SOP-00428	SM 22 2540D m
Turbidity	4	N/A	2016/08/25	CAM SOP-00417	SM 22 2130 B m
Un-ionized Ammonia	4	2016/08/24	2016/09/06		

Remarks:



Your P.O. #: 73504533 Your Project #: 086822-03-5.0 Your C.O.C. #: 572334-01-01

Attention:Jennifer Balkwill

GHD Limited 651 Colby Dr Waterloo, ON N2V 1C2

> Report Date: 2016/09/07 Report #: R4156757 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6H9596 Received: 2016/08/24, 08:15

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection act.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

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) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

(3) This is a field test, therefore, the results relate to items that were not analysed at Maxxam Analytics Inc.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Madison Bingley, Project Manager Email: MBingley@maxxam.ca Phone# (613)274-3549

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.



RESULTS OF ANALYSES OF WATER

Maxxam ID		CYC212			CYC213		
Sampling Date		2016/08/22			2016/08/22		
		17:05			10:35		
COC Number		572334-01-01			572334-01-01		
	UNITS	GW-86882-082216-SA-	RDL	QC Batch	GW-86882-082316-SA-	RDL	QC Batch
		WW04			MW01		
Calculated Parameters		1			1		
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	130	1.0	4632822	200	1.0	4632822
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.2	1.0	4632822	2.1	1.0	4632822
Hardness (CaCO3)	mg/L	140	1.0	4632688	170	1.0	4632688
Hydrox. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	4632822	ND	1.0	4632822
Ion Balance (% Difference)	%	1.34	N/A	4633035	3.30	N/A	4633035
Total Organic Nitrogen	mg/L	0.16	0.10	4633247	0.36	0.10	4633247
Total Un-ionized Ammonia	mg/L	ND	0.00084	4633087	0.0014	0.0005	4633087
Field Measurements							
Field Temperature	Celcius	9.83	N/A	ONSITE	10.48	N/A	ONSITE
Field pH	рН	7.97		ONSITE	7.71		ONSITE
Inorganics							
Total Ammonia-N	mg/L	ND	0.050	4636625	0.12	0.050	4636625
Colour	TCU	ND	2	4634074	ND	2	4634074
Total Dissolved Solids	mg/L	214	10	4636293	328	10	4635313
Fluoride (F-)	mg/L	ND	0.10	4633973	ND	0.10	4633973
Total Kjeldahl Nitrogen (TKN)	mg/L	0.16	0.10	4636732	0.48	0.10	4636732
Dissolved Organic Carbon	mg/L	2.3	0.20	4635571	0.74	0.20	4635571
Orthophosphate (P)	mg/L	ND	0.010	4634029	ND	0.010	4634029
рН	рН	7.98		4633983	8.05		4633983
Total Phosphorus	mg/L	1.9	0.2	4638824	3.8	0.2	4638824
Total Suspended Solids	mg/L	610	2	4634800	2000	5	4634800
Dissolved Sulphate (SO4)	mg/L	23	1.0	4634024	31	1.0	4634024
Sulphide	mg/L	ND	0.020	4633388	ND	0.020	4633388
Turbidity	NTU	4.2	0.1	4633223	15	0.1	4633223
Alkalinity (Total as CaCO3)	mg/L	130	1.0	4633984	200	1.0	4633984
Dissolved Chloride (Cl)	mg/L	2.2	1.0	4634011	7.6	1.0	4634011
Nitrite (N)	mg/L	ND	0.010	4634061	0.019	0.010	4634067
Nitrate (N)	mg/L	0.12	0.10	4634061	0.80	0.10	4634067
Nitrate + Nitrite (N)	mg/L	0.12	0.10	4634061	0.81	0.10	4634067
DDI Dementable Detection Limit			•	•	•		

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

ND = Not detected

N/A = Not Applicable



RESULTS OF ANALYSES OF WATER

Maxxam ID		CYC214		CYC215		
Sampling Date		2016/08/22		2016/08/22		
		15:45		13:45		
COC Number		572334-01-01		572334-01-01		
	UNITS	GW-86882-082216-SA-	RDL	GW-86882-081916-SA-	RDL	QC Batch
		MW02		MW03		-
Calculated Parameters				1		
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	240	1.0	270	1.0	4632822
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.0	1.0	1.9	1.0	4632822
Hardness (CaCO3)	mg/L	230	1.0	260	1.0	4632688
Hydrox. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	ND	1.0	4632822
Ion Balance (% Difference)	%	1.44	N/A	2.13	N/A	4633035
Total Organic Nitrogen	mg/L	0.69	0.10	0.17	0.10	4633247
Total Un-ionized Ammonia	mg/L	0.0010	0.0005	ND	0.0005	4633087
Field Measurements						
Field Temperature	Celcius	9.70	N/A	10.93	N/A	ONSITE
Field pH	рН	7.56		7.30		ONSITE
Inorganics						
Total Ammonia-N	mg/L	0.13	0.050	ND	0.050	4636413
Colour	TCU	ND	2	ND	2	4634074
Total Dissolved Solids	mg/L	300	10	336	10	4636293
Fluoride (F-)	mg/L	ND	0.10	ND	0.10	4633973
Total Kjeldahl Nitrogen (TKN)	mg/L	0.82	0.10	0.17	0.10	4636732
Dissolved Organic Carbon	mg/L	1.0	0.20	2.9	0.20	4635571
Orthophosphate (P)	mg/L	ND	0.010	ND	0.010	4634029
рН	рН	7.96		7.88		4633983
Total Phosphorus	mg/L	2.4	0.2	0.13	0.02	4638824
Total Suspended Solids	mg/L	3000	5	300	4	4634800
Dissolved Sulphate (SO4)	mg/L	12	1.0	20	1.0	4634024
Sulphide	mg/L	ND	0.020	ND	0.020	4633388
Turbidity	NTU	23	0.1	6.7	0.1	4633223
Alkalinity (Total as CaCO3)	mg/L	240	1.0	270	1.0	4633984
Dissolved Chloride (Cl)	mg/L	2.8	1.0	3.5	1.0	4634011
Nitrite (N)	mg/L	0.012	0.010	ND	0.010	4634061
Nitrate (N)	mg/L	1.54	0.10	ND	0.10	4634061
Nitrate + Nitrite (N)	mg/L	1.56	0.10	ND	0.10	4634061
RDL = Reportable Detection Limit QC Batch = Quality Control Batch						

ND = Not detected

N/A = Not Applicable



ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		CYC212		CYC213		CYC214		
Compling Data		2016/08/22		2016/08/22		2016/08/22		
Sampling Date		17:05	<u> </u>	10:35		15:45		
COC Number		572334-01-01	<u> </u>	572334-01-01		572334-01-01		
	UNITS	GW-86882-082216-SA-	RDL	GW-86882-082316-SA-	RDL	GW-86882-082216-SA-	RDL	OC Batch
		MW04		MW01		MW02		
Metals								
Total Aluminum (Al)	ug/L	5000	5.0	16000	5.0	22000	25	4644849
Total Antimony (Sb)	ug/L	ND	0.50	ND	0.50	ND	0.50	4644849
Total Arsenic (As)	ug/L	ND	1.0	3.5	1.0	3.0	1.0	4644849
Total Barium (Ba)	ug/L	260	2.0	220	2.0	310	2.0	4644849
Total Beryllium (Be)	ug/L	ND	0.50	0.59	0.50	0.79	0.50	4644849
Total Boron (B)	ug/L	ND	10	31	10	25	10	4644849
Total Cadmium (Cd)	ug/L	ND	0.10	ND	0.10	ND	0.10	4644849
Dissolved Calcium (Ca)	ug/L	42000	200	50000	200	72000	200	4636483
Total Chromium (Cr)	ug/L	9.0	5.0	22	5.0	58	5.0	4644849
Total Cobalt (Co)	ug/L	4.3	0.50	11	1.0	22	1.0	4644849
Total Copper (Cu)	ug/L	14	1.0	34	1.0	55	1.0	4644849
Total Iron (Fe)	ug/L	8200	100	25000	100	39000	100	4644849
Total Lead (Pb)	ug/L	3.3	0.50	8.8	0.50	11	0.50	4644849
Dissolved Magnesium (Mg)	ug/L	8000	50	10000	50	13000	50	4636483
Total Manganese (Mn)	ug/L	360	2.0	1300	2.0	1700	2.0	4644849
Total Molybdenum (Mo)	ug/L	1.5	0.50	11	0.50	34	0.50	4644849
Total Nickel (Ni)	ug/L	6.7	1.0	19	2.0	34	2.0	4644849
Total Phosphorus (P)	ug/L	2000	100	6500	100	2200	100	4644849
Dissolved Potassium (K)	ug/L	1400	200	2600	200	2400	200	4636483
Total Selenium (Se)	ug/L	ND	2.0	ND	2.0	ND	2.0	4644849
Total Silver (Ag)	ug/L	ND	0.10	ND	0.10	ND	0.10	4644849
Dissolved Sodium (Na)	ug/L	8200	100	29000	100	7000	100	4636483
Total Sodium (Na)	ug/L	9100	100	33000	100	9300	100	4644849
Total Thallium (Tl)	ug/L	0.078	0.050	0.21	0.050	0.38	0.050	4644849
Total Tungsten (W)	ug/L	ND	1.0	ND	1.0	31	1.0	4644849
Total Uranium (U)	ug/L	2.5	0.10	3.1	0.10	1.4	0.10	4644849
Total Vanadium (V)	ug/L	11	0.50	38	0.50	51	0.50	4644849
Total Zinc (Zn)	ug/L	17	5.0	51	5.0	79	5.0	4644849
Total Zirconium (Zr)	ug/L	1.6	1.0	8.2	1.0	9.2	1.0	4644849
RDL = Reportable Detection L	imit							
QC Batch = Quality Control Ba	atch							

ND = Not detected



ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		CYC214		CYC215					
Sampling Data		2016/08/22		2016/08/22					
		15:45		13:45					
COC Number		572334-01-01		572334-01-01					
		GW-86882-082216-SA-		GW-86882-081916-SA-					
	UNITS	IVIWUZ Lab-Dun	RDL	MW03	RDL	QC Batch			
Motols		200 200							
Total Aluminum (Al)			25	4400	Г О	4644940			
Total Antimony (Sh)	ug/L		25	4400	5.0	4044849			
Total Antiniony (56)	ug/L		1.0	ND	0.50	4044849			
Total Arsenic (As)	ug/L		1.0	ND 100	1.0	4644849			
Total Danullium (Da)	ug/L		2.0	100	2.0	4644849			
Total Berymulli (Be)	ug/L		0.50	ND	0.50	4644849			
Total Codmium (Cd)	ug/L		10	15	10	4644849			
Discolved Coloium (Co)	ug/L	72000	0.10	ND	0.10	4644849			
	ug/L	72000	200	82000	200	4636483			
Total Chromium (Cr)	ug/L		5.0	8.5	5.0	4644849			
	ug/L		1.0	4.2	0.50	4644849			
Total Copper (Cu)	ug/L		1.0	14	1.0	4644849			
Total Iron (Fe)	ug/L		100	6500	100	4644849			
Total Lead (Pb)	ug/L		0.50	2.3	0.50	4644849			
Dissolved Magnesium (Mg)	ug/L	13000	50	13000	50	4636483			
Total Manganese (Mn)	ug/L		2.0	260	2.0	4644849			
Total Molybdenum (Mo)	ug/L		0.50	2.4	0.50	4644849			
Total Nickel (Ni)	ug/L		2.0	8.4	1.0	4644849			
Total Phosphorus (P)	ug/L		100	120	100	4644849			
Dissolved Potassium (K)	ug/L	2300	200	2100	200	4636483			
Total Selenium (Se)	ug/L		2.0	ND	2.0	4644849			
Total Silver (Ag)	ug/L		0.10	ND	0.10	4644849			
Dissolved Sodium (Na)	ug/L	6800	100	9600	100	4636483			
Total Sodium (Na)	ug/L		100	10000	100	4644849			
Total Thallium (Tl)	ug/L		0.050	0.088	0.050	4644849			
Total Tungsten (W)	ug/L		1.0	ND	1.0	4644849			
Total Uranium (U)	ug/L		0.10	2.9	0.10	4644849			
Total Vanadium (V)	ug/L		0.50	9.3	0.50	4644849			
Total Zinc (Zn)	ug/L		5.0	20	5.0	4644849			
Total Zirconium (Zr)	ug/L		1.0	1.5	1.0	4644849			
RDL = Reportable Detection Limit									
QC Batch = Quality Control Ba	atch								
Lab-Dup = Laboratory Initiated Duplicate									

ND = Not detected



GHD Limited Client Project #: 086822-03-5.0 Your P.O. #: 73504533 Sampler Initials: SA

TEST SUMMARY

Maxxam ID:	CYC212	Collected:	2016/08/22
Sample ID: Matrix:	GW-86882-082216-SA-MW04 Water	Shipped: Received:	2016/08/24
WIGCHA.	Water	neceiveu.	2010/00/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4633984	N/A	2016/08/25	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	4632822	N/A	2016/08/26	Automated Statchk
Chloride by Automated Colourimetry	KONE	4634011	N/A	2016/08/25	Alina Dobreanu
Colour	SPEC	4634074	N/A	2016/08/26	Viorica Rotaru
Dissolved Organic Carbon (DOC)	TOCV/NDIR	4635571	N/A	2016/08/26	Anastasia Hamanov
Fluoride	ISE	4633973	2016/08/24	2016/08/25	Surinder Rai
Hardness (calculated as CaCO3)		4632688	N/A	2016/08/30	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	4636483	N/A	2016/08/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4644849	N/A	2016/09/02	Cristina Petran
Ion Balance (% Difference)	CALC	4633035	N/A	2016/08/30	Automated Statchk
Total Ammonia-N	LACH/NH4	4636625	N/A	2016/08/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4634061	N/A	2016/08/26	Chandra Nandlal
Organic Nitrogen	CALC	4633247	N/A	2016/08/29	Automated Statchk
рН	AT	4633983	N/A	2016/08/25	Surinder Rai
Field pH	РН	ONSITE	N/A	2016/08/24	Madison Bingley
Orthophosphate	KONE	4634029	N/A	2016/08/25	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	4634024	N/A	2016/08/25	Deonarine Ramnarine
Sulphide	ISE/S	4633388	N/A	2016/08/25	Neil Dassanayake
Total Dissolved Solids	BAL	4636293	N/A	2016/08/26	Lu Wang(Alice)
Field pH	РН	ONSITE	N/A	2016/08/24	Madison Bingley
Total Kjeldahl Nitrogen in Water	SKAL	4636732	2016/08/26	2016/08/26	Amarinder Sawhney
Total Phosphorus (Colourimetric)	LACH/P	4638824	2016/08/29	2016/08/29	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4634800	N/A	2016/08/25	Zahid Soikot
Turbidity	AT	4633223	N/A	2016/08/25	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	4633087	2016/09/06	2016/09/06	Automated Statchk

Maxxam ID: CYC213 Sample ID: GW-86882-082316-SA-MW01 Matrix: Water

Collected: Shipped: 2016/08/22 Received: 2016/08/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4633984	N/A	2016/08/25	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	4632822	N/A	2016/08/26	Automated Statchk
Chloride by Automated Colourimetry	KONE	4634011	N/A	2016/08/25	Alina Dobreanu
Colour	SPEC	4634074	N/A	2016/08/26	Viorica Rotaru
Dissolved Organic Carbon (DOC)	TOCV/NDIR	4635571	N/A	2016/08/26	Anastasia Hamanov
Fluoride	ISE	4633973	2016/08/24	2016/08/25	Surinder Rai
Hardness (calculated as CaCO3)		4632688	N/A	2016/08/30	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	4636483	N/A	2016/08/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4644849	N/A	2016/09/02	Cristina Petran
Ion Balance (% Difference)	CALC	4633035	N/A	2016/08/30	Automated Statchk
Total Ammonia-N	LACH/NH4	4636625	N/A	2016/08/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4634067	N/A	2016/08/25	Chandra Nandlal
Organic Nitrogen	CALC	4633247	N/A	2016/08/29	Automated Statchk

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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



GHD Limited Client Project #: 086822-03-5.0 Your P.O. #: 73504533 Sampler Initials: SA

TEST SUMMARY

Collected:	2016/08/22
Shipped:	

Received: 2016/08/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
рН	AT	4633983	N/A	2016/08/25	Surinder Rai
Field pH	PH	ONSITE	N/A	2016/08/24	Madison Bingley
Orthophosphate	KONE	4634029	N/A	2016/08/25	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	4634024	N/A	2016/08/25	Deonarine Ramnarine
Sulphide	ISE/S	4633388	N/A	2016/08/25	Neil Dassanayake
Total Dissolved Solids	BAL	4635313	N/A	2016/08/26	Gurpreet Kaur
Field pH	PH	ONSITE	N/A	2016/08/24	Madison Bingley
Total Kjeldahl Nitrogen in Water	SKAL	4636732	2016/08/26	2016/08/26	Amarinder Sawhney
Total Phosphorus (Colourimetric)	LACH/P	4638824	2016/08/29	2016/08/29	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4634800	N/A	2016/08/25	Zahid Soikot
Turbidity	AT	4633223	N/A	2016/08/25	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	4633087	2016/09/06	2016/09/06	Automated Statchk



Sample ID: GW-86882-082216-SA-MW02

Collected: 2016/08/22 Shipped: **Received:** 2016/08/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4633984	N/A	2016/08/25	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	4632822	N/A	2016/08/26	Automated Statchk
Chloride by Automated Colourimetry	KONE	4634011	N/A	2016/08/25	Alina Dobreanu
Colour	SPEC	4634074	N/A	2016/08/26	Viorica Rotaru
Dissolved Organic Carbon (DOC)	TOCV/NDIR	4635571	N/A	2016/08/26	Anastasia Hamanov
Fluoride	ISE	4633973	2016/08/24	2016/08/25	Surinder Rai
Hardness (calculated as CaCO3)		4632688	N/A	2016/08/30	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	4636483	N/A	2016/08/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4644849	N/A	2016/09/03	Cristina Petran
Ion Balance (% Difference)	CALC	4633035	N/A	2016/08/30	Automated Statchk
Total Ammonia-N	LACH/NH4	4636413	N/A	2016/08/26	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4634061	N/A	2016/08/26	Chandra Nandlal
Organic Nitrogen	CALC	4633247	N/A	2016/08/29	Automated Statchk
рН	AT	4633983	N/A	2016/08/25	Surinder Rai
Field pH	РН	ONSITE	N/A	2016/08/24	Madison Bingley
Orthophosphate	KONE	4634029	N/A	2016/08/25	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	4634024	N/A	2016/08/25	Deonarine Ramnarine
Sulphide	ISE/S	4633388	N/A	2016/08/25	Neil Dassanayake
Total Dissolved Solids	BAL	4636293	N/A	2016/08/26	Lu Wang(Alice)
Field pH	РН	ONSITE	N/A	2016/08/24	Madison Bingley
Total Kjeldahl Nitrogen in Water	SKAL	4636732	2016/08/26	2016/08/26	Amarinder Sawhney
Total Phosphorus (Colourimetric)	LACH/P	4638824	2016/08/29	2016/08/29	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4634800	N/A	2016/08/25	Zahid Soikot
Turbidity	AT	4633223	N/A	2016/08/25	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	4633087	2016/09/06	2016/09/06	Automated Statchk
				-	



GHD Limited Client Project #: 086822-03-5.0 Your P.O. #: 73504533 Sampler Initials: SA

TEST SUMMARY

Maxxam ID: Sample ID: Matrix:	CYC214 Dup GW-86882-08221 Water	6-SA-MW02				Collected: 2016/08/22 Shipped: Received: 2016/08/24	
Test Description		Instrumentation	Batch	Extracted	Date Analyzed	Analyst	
Dissolved Metals by ICPM	15	ICP/MS	4636483	N/A	2016/08/29	Arefa Dabhad	
Maxxam ID: Sample ID: Matrix:	CYC215 GW-86882-08191 Water	6-SA-MW03				Collected: 2016/08/22 Shipped: Received: 2016/08/24	
Test Description		Instrumentation	Batch	Extracted	Date Analyzed	Analyst	
Alkalinity		AT	4633984	N/A	2016/08/25	Surinder Rai	
Carbonate, Bicarbonate a	nd Hydroxide	CALC	4632822	N/A	2016/08/26	Automated Statchk	
Chloride by Automated C	olourimetry	KONE	4634011	N/A	2016/08/25	Alina Dobreanu	
Colour		SPEC	4634074	N/A	2016/08/26	Viorica Rotaru	
Dissolved Organic Carbor	n (DOC)	TOCV/NDIR	4635571	N/A	2016/08/26	Anastasia Hamanov	
Fluoride		ISE	4633973	2016/08/24	2016/08/25	Surinder Rai	
Hardness (calculated as C	CaCO3)		4632688	N/A	2016/08/30	Automated Statchk	
Dissolved Metals by ICPM	1S	ICP/MS	4636483	N/A	2016/08/29	Arefa Dabhad	
Total Metals Analysis by I	CPMS	ICP/MS	4644849	N/A	2016/09/02	Cristina Petran	
Ion Balance (% Difference	2)	CALC	4633035	N/A	2016/08/30	Automated Statchk	
Total Ammonia-N		LACH/NH4	4636413	N/A	2016/08/26	Charles Opoku-Ware	
Nitrate (NO3) and Nitrite	(NO2) in Water	LACH	4634061	N/A	2016/08/26	Chandra Nandlal	
Organic Nitrogen		CALC	4633247	N/A	2016/08/29	Automated Statchk	
рН		AT	4633983	N/A	2016/08/25	Surinder Rai	
Field pH		РН	ONSITE	N/A	2016/08/24	Madison Bingley	
Orthophosphate		KONE	4634029	N/A	2016/08/25	Alina Dobreanu	
Sulphate by Automated C	Colourimetry	KONE	4634024	N/A	2016/08/25	Deonarine Ramnarine	
Sulphide		ISE/S	4633388	N/A	2016/08/25	Neil Dassanayake	
Total Dissolved Solids		BAL	4636293	N/A	2016/08/26	Lu Wang(Alice)	
Field pH		PH	ONSITE	N/A	2016/08/24	Madison Bingley	
Total Kjeldahl Nitrogen in	Water	SKAL	4636732	2016/08/26	2016/08/26	Amarinder Sawhney	
Total Phosphorus (Colour	imetric)	LACH/P	4638824	2016/08/29	2016/08/29	Sarabjit Raina	
Low Level Total Suspende	ed Solids	BAL	4634800	N/A	2016/08/25	Zahid Soikot	
Turbidity		AT	4633223	N/A	2016/08/25	Neil Dassanayake	
Un-ionized Ammonia		CALC/NH3	4633087	2016/09/06	2016/09/06	Automated Statchk	



GHD Limited Client Project #: 086822-03-5.0 Your P.O. #: 73504533 Sampler Initials: SA

GENERAL COMMENTS

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

Package 1 3.0°C

Revised Report (2016/09/07): Updated Unionized Ammonia values.

Results relate only to the items tested.



Maxxam Job #: B6H9596 Report Date: 2016/09/07

QUALITY ASSURANCE REPORT

GHD Limited Client Project #: 086822-03-5.0 Your P.O. #: 73504533 Sampler Initials: SA

			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
4633223	Turbidity	2016/08/25			101	85 - 115	ND, RDL=0.1	NTU	6.3 (1)	20		
4633388	Sulphide	2016/08/25	89	80 - 120	93	80 - 120	ND, RDL=0.020	mg/L	NC (1)	20		
4633973	Fluoride (F-)	2016/08/25	NC	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	2.3 (1)	20		
4633983	рН	2016/08/25			101	98 - 103			0.083 (1)	N/A		
4633984	Alkalinity (Total as CaCO3)	2016/08/25			95	85 - 115	ND, RDL=1.0	mg/L	0.0013 (1)	25		
4634011	Dissolved Chloride (Cl)	2016/08/25	NC	80 - 120	99	80 - 120	ND, RDL=1.0	mg/L	1.2 (1)	20		
4634024	Dissolved Sulphate (SO4)	2016/08/25	NC	75 - 125	103	80 - 120	ND, RDL=1.0	mg/L	0.20 (1)	20		
4634029	Orthophosphate (P)	2016/08/25	102	75 - 125	101	80 - 120	ND, RDL=0.010	mg/L	NC (1)	25		
4634061	Nitrate (N)	2016/08/26	NC	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	0.77 (1)	25		
4634061	Nitrite (N)	2016/08/26	97	80 - 120	108	80 - 120	ND, RDL=0.010	mg/L	NC (1)	25		
4634067	Nitrate (N)	2016/08/25	94	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	NC (1)	25		
4634067	Nitrite (N)	2016/08/25	100	80 - 120	111	80 - 120	ND, RDL=0.010	mg/L	NC (1)	25		
4634074	Colour	2016/08/26			100	80 - 120	ND,RDL=2	TCU	NC (1)	25		
4634800	Total Suspended Solids	2016/08/25					ND,RDL=1	mg/L	NC (1)	25	99	85 - 115
4635313	Total Dissolved Solids	2016/08/26					ND, RDL=10	mg/L	4.7 (1)	25	98	90 - 110
4635571	Dissolved Organic Carbon	2016/08/26	NC	80 - 120	102	80 - 120	ND, RDL=0.20	mg/L	0.60 (1)	20		
4636293	Total Dissolved Solids	2016/08/26					ND, RDL=10	mg/L	1.8 (1)	25	101	90 - 110
4636413	Total Ammonia-N	2016/08/26	NC	80 - 120	100	85 - 115	ND, RDL=0.050	mg/L	1.8 (1)	20		
4636483	Dissolved Calcium (Ca)	2016/08/29	NC (2)	80 - 120	97	80 - 120	ND, RDL=200	ug/L	0.22 (3)	20		
4636483	Dissolved Magnesium (Mg)	2016/08/29	NC (2)	80 - 120	97	80 - 120	ND, RDL=50	ug/L	0.035 (3)	20		
4636483	Dissolved Potassium (K)	2016/08/29	100 (2)	80 - 120	96	80 - 120	ND, RDL=200	ug/L	3.0 (3)	20		
4636483	Dissolved Sodium (Na)	2016/08/29	99 (2)	80 - 120	97	80 - 120	ND, RDL=100	ug/L	3.0 (3)	20		
4636625	Total Ammonia-N	2016/08/29	99	80 - 120	99	85 - 115	ND, RDL=0.050	mg/L	NC (1)	20		
4636732	Total Kjeldahl Nitrogen (TKN)	2016/08/26	113	80 - 120	102	80 - 120	ND, RDL=0.10	mg/L	NC (1)	20	103	80 - 120



Maxxam Job #: B6H9596 Report Date: 2016/09/07

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited Client Project #: 086822-03-5.0 Your P.O. #: 73504533 Sampler Initials: SA

			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
4638824	Total Phosphorus	2016/08/29	101	80 - 120	93	80 - 120	ND, RDL=0.004	mg/L	NC (1)	20	95	80 - 120
4644849	Total Aluminum (Al)	2016/09/02	104	80 - 120	106	80 - 120	ND, RDL=5.0	ug/L				
4644849	Total Antimony (Sb)	2016/09/02	110	80 - 120	105	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
4644849	Total Arsenic (As)	2016/09/02	102	80 - 120	102	80 - 120	ND, RDL=1.0	ug/L	NC (1)	20		
4644849	Total Barium (Ba)	2016/09/02	NC	80 - 120	105	80 - 120	ND, RDL=2.0	ug/L				
4644849	Total Beryllium (Be)	2016/09/02	103	80 - 120	102	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
4644849	Total Boron (B)	2016/09/02	NC	80 - 120	99	80 - 120	ND, RDL=10	ug/L	4.1 (1)	20		
4644849	Total Cadmium (Cd)	2016/09/02	102	80 - 120	102	80 - 120	ND, RDL=0.10	ug/L	NC (1)	20		
4644849	Total Chromium (Cr)	2016/09/02	97	80 - 120	99	80 - 120	ND, RDL=5.0	ug/L	NC (1)	20		
4644849	Total Cobalt (Co)	2016/09/02	94	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
4644849	Total Copper (Cu)	2016/09/02	101	80 - 120	101	80 - 120	ND, RDL=1.0	ug/L	NC (1)	20		
4644849	Total Iron (Fe)	2016/09/02	97	80 - 120	99	80 - 120	ND, RDL=100	ug/L	NC (1)	20		
4644849	Total Lead (Pb)	2016/09/02	91	80 - 120	94	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
4644849	Total Manganese (Mn)	2016/09/02	NC	80 - 120	99	80 - 120	ND, RDL=2.0	ug/L				
4644849	Total Molybdenum (Mo)	2016/09/02	108	80 - 120	103	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
4644849	Total Nickel (Ni)	2016/09/02	93	80 - 120	97	80 - 120	ND, RDL=1.0	ug/L	NC (1)	20		
4644849	Total Phosphorus (P)	2016/09/02	110	80 - 120	101	80 - 120	ND, RDL=100	ug/L				
4644849	Total Selenium (Se)	2016/09/02	103	80 - 120	104	80 - 120	ND, RDL=2.0	ug/L	NC (1)	20		
4644849	Total Silver (Ag)	2016/09/02	98	80 - 120	99	80 - 120	ND, RDL=0.10	ug/L	NC (1)	20		
4644849	Total Sodium (Na)	2016/09/02	NC	80 - 120	100	80 - 120	ND, RDL=100	ug/L				
4644849	Total Thallium (TI)	2016/09/02	91	80 - 120	93	80 - 120	ND, RDL=0.050	ug/L	NC (1)	20		
4644849	Total Tungsten (W)	2016/09/02	98	80 - 120	97	80 - 120	ND, RDL=1.0	ug/L	NC (1)	20		
4644849	Total Uranium (U)	2016/09/02	101	80 - 120	99	80 - 120	ND, RDL=0.10	ug/L	NC (1)	20		
4644849	Total Vanadium (V)	2016/09/02	99	80 - 120	99	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
4644849	Total Zinc (Zn)	2016/09/02	102	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L	NC (1)	20		



Maxxam Job #: B6H9596 Report Date: 2016/09/07

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited Client Project #: 086822-03-5.0 Your P.O. #: 73504533 Sampler Initials: SA

			Matrix	Spike	SPIKED	BLANK	Method B	lank	RPD		D QC Sta	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
4644849	Total Zirconium (Zr)	2016/09/02	110	80 - 120	107	80 - 120	ND, RDL=1.0	ug/L	NC (1)	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.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [CYC214-04]

(3) Duplicate Parent ID [CYC214-04]



GHD Limited Client Project #: 086822-03-5.0 Your P.O. #: 73504533 Sampler Initials: SA

VALIDATION SIGNATURE PAGE

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

Brad Newman, Scientific Specialist

avistin Carriere

Cristina Carriere, Scientific Services

ÛŶ

Madison Bingley, Project Manager

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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Table 1	Guiation 153 (2011) Other Regulations		Special Ir	nstructions	A circ		tuori		Nitro						(will be a	pplied if Rush TAT is not specified):	V
Table 2	Ind/Comm Coarse Reg 558 Storm Sewer B	Bylaw			ase	Meta	Anior and F	1.000	Org	1.4					Standard	TAT = 5-7 Working days for most tests .	
Table 3	Agri/Other For RSC MISA Municipality				die (pie	otal	(H)	ess	TKN,	DS		8			Please n davs - co	ote: Standard TAT for certain lests such as intact your Project Manager for details	BOD and Dioxins/Furans are > 5
Table	PWQO	of Anderson States			ared	ste.	kalm 4, P(Hard	H4,	TP. 1		nalan			Job Sp	ecific Rush TAT (if applies to entire sul	bmission)
	Other	-	and the second second		Filte	Met	1 AI	, ino	Un-N	level	epiq	lon B			Date Rec	aured:1	lime Required
-	Include Criteria on Certificate of Analysis (Y/N)?				Pield S	olved	in03	Col	and	(-wo)	Suip	dity.	1000	1.01	Rush Co	infirmation Number	(call lab for #)
5	Sample Barcode Label Sample (Location) Identification	Date Sampled	Time Sampled	Matrix		Diss	Spec N02	DOC	NH4	.Hq	TSS.	Turb	2		# of Bott	les Com	ments
	GW-86882-082216-5A-14404	ANG	17:05	GW	Y	\times	\mathbb{X}	X	X	\times	\times	X			8	1 18	
	GW-86822-082316-5AHW02	Aug 23	10:35	GW	Y	1	1			1	1	1			8		
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8	* RELINQUISHED BY: (Signature/Print) Date: (YY/	MM/DD) Ti	me	RECEIV	ED BY: (Signatu	ure/Print)		Data	YY/MM/D	D)	Time	#	jars used	and		Laboratory Use Only	
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Your P.O. #: 73507898 Your Project #: 86822 Site Location: 2976 HORSESHOE VALLEY RD,W Your C.O.C. #: na

Attention:86822 Distribution List

GHD Limited 651 Colby Dr Waterloo, ON N2V 1C2

Report Date: 2017/06/21 Report #: R4552758 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7C0195

Received: 2017/06/09, 17:01

Sample Matrix: Water # Samples Received: 1

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Alkalinity	1	N/A	2017/06/20	CAM SOP-00448	SM 22 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2017/06/14	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2017/06/20	CAM SOP-00463	EPA 325.2 m
Colour	1	N/A	2017/06/14	CAM SOP-00412	SM 22 2120C m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2017/06/12	CAM SOP-00446	SM 22 5310 B m
Fluoride	1	2017/06/13	2017/06/13	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	1	N/A	2017/06/15	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	1	N/A	2017/06/20	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2017/06/15	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2017/06/15		
Total Ammonia-N	1	N/A	2017/06/19	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2017/06/13	CAM SOP-00440	SM 22 4500-NO3I/NO2B
Organic Nitrogen	1	N/A	2017/06/19		
рН	1	N/A	2017/06/13	CAM SOP-00413	SM 4500H+ B m
Field pH (3)	1	N/A	2017/06/15		Field pH Meter
Orthophosphate	1	N/A	2017/06/13	CAM SOP-00461	EPA 365.1 m
Sulphate by Automated Colourimetry	1	N/A	2017/06/20	CAM SOP-00464	EPA 375.4 m
Sulphide	1	N/A	2017/06/13	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	1	2017/06/12	2017/06/13	CAM SOP-00428	SM 22 2540C m
Field Temperature (3)	1	N/A	2017/06/15		Field Thermometer
Total Kjeldahl Nitrogen in Water	1	2017/06/14	2017/06/16	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2017/06/14	2017/06/15	CAM SOP-00407	SM 22 4500 P B H m
Low Level Total Suspended Solids	1	2017/06/13	2017/06/13	CAM SOP-00428	SM 22 2540D m
Turbidity	1	N/A	2017/06/13	CAM SOP-00417	SM 22 2130 B m
Un-ionized Ammonia	1	2017/06/10	2017/06/19		

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 P.O. #: 73507898 Your Project #: 86822 Site Location: 2976 HORSESHOE VALLEY RD,W Your C.O.C. #: na

Attention:86822 Distribution List

GHD Limited 651 Colby Dr Waterloo, ON N2V 1C2

> Report Date: 2017/06/21 Report #: R4552758 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7C0195 Received: 2017/06/09, 17:01

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.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

(3) This is a field test, therefore, the results relate to items that were not analysed at Maxxam Analytics Inc.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Rachael Watt, Customer Service Representative Email: rwatt@maxxam.ca Phone# (905)817-5755

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.


RESULTS OF ANALYSES OF WATER

Maxxam ID		ENO960	ENO960		
Sampling Date		2017/06/09	2017/06/09		
		11:00	11:00		
COC Number		na	na		
	UNITS	GW-086822-060917- SH-001	GW-086822-060917- SH-001 Lab-Dup	RDL	QC Batch
Calculated Parameters					
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	200		1.0	5022620
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.9		1.0	5022620
Hardness (CaCO3)	mg/L	250		1.0	5022541
Hydrox. Alkalinity (calc. as CaCO3)	mg/L	ND		1.0	5022620
Ion Balance (% Difference)	%	13.1		N/A	5022621
Total Organic Nitrogen	mg/L	0.26		0.10	5022622
Total Un-ionized Ammonia	mg/L	ND		0.0005	5022623
Field Measurements					
Field Temperature	Celcius	9.10		N/A	ONSITE
Field pH	рН	6.59			ONSITE
Inorganics					
Total Ammonia-N	mg/L	ND		0.050	5027756
Colour	TCU	9	9	2	5027107
Total Dissolved Solids	mg/L	234		10	5023299
Fluoride (F-)	mg/L	0.11		0.10	5025360
Total Kjeldahl Nitrogen (TKN)	mg/L	0.26		0.10	5027267
Dissolved Organic Carbon	mg/L	11		0.20	5023651
Orthophosphate (P)	mg/L	ND		0.010	5024915
рН	рН	7.99			5025365
Total Phosphorus	mg/L	0.11		0.02	5027740
Total Suspended Solids	mg/L	170		3	5025928
Dissolved Sulphate (SO4)	mg/L	5.1		1.0	5035788
Sulphide	mg/L	ND		0.020	5025227
Turbidity	NTU	120	140	0.1	5024183
Alkalinity (Total as CaCO3)	mg/L	200		1.0	5035557
Dissolved Chloride (Cl)	mg/L	1.4		1.0	5035785
Nitrite (N)	mg/L	ND		0.010	5024139
Nitrate (N)	mg/L	0.42		0.10	5024139
Nitrate + Nitrite (N)	mg/L	0.42		0.10	5024139
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					
Lab-Dup = Laboratory Initiated Dup	licate				
ND = Not detected					



Maxxam ID ENO960 2017/06/09 Sampling Date 11:00 COC Number na GW-086822-060917-UNITS RDL QC Batch SH-001 Metals Dissolved Aluminum (Al) ug/L 950 5.0 5036026 Total Aluminum (Al) ug/L ND 5.0 5028135 Dissolved Antimony (Sb) ug/L 1.1 0.50 5036026 Total Antimony (Sb) ug/L ND 0.50 5028135 Dissolved Arsenic (As) ug/L ND 1.0 5036026 Total Arsenic (As) ug/L ND 1.0 5028135 Dissolved Barium (Ba) ug/L 48 2.0 5036026 Total Barium (Ba) ug/L 29 2.0 5028135 Dissolved Beryllium (Be) 0.50 ug/L ND 5036026 Total Beryllium (Be) ug/L ND 0.50 5028135 Dissolved Boron (B) 5036026 ug/L 21 10 Total Boron (B) ug/L 17 10 5028135 Dissolved Cadmium (Cd) ug/L ND 0.10 5036026 Total Cadmium (Cd) ug/L 5028135 ND 0.10 Dissolved Calcium (Ca) ug/L 77000 200 5036026 Dissolved Chromium (Cr) ug/L ND 5.0 5036026 Total Chromium (Cr) ug/L ND 5.0 5028135 Dissolved Cobalt (Co) 5036026 ug/L 1.5 0.50 Total Cobalt (Co) ND 0.50 5028135 ug/L Dissolved Copper (Cu) ug/L 3.5 1.0 5036026 Total Copper (Cu) ug/L ND 1.0 5028135 Dissolved Iron (Fe) ug/L 2000 100 5036026 Total Iron (Fe) 350 100 5028135 ug/L Dissolved Lead (Pb) ug/L 0.50 1.1 5036026 Total Lead (Pb) ug/L ND 0.50 5028135 Dissolved Magnesium (Mg) ug/L 14000 50 5036026 Dissolved Manganese (Mn) ug/L 260 2.0 5036026 Total Manganese (Mn) 2.0 ug/L 170 5028135 Dissolved Molybdenum (Mo) ug/L 15 0.50 5036026 Total Molybdenum (Mo) 5028135 ug/L 21 0.50 Dissolved Nickel (Ni) ug/L 2.8 1.0 5036026 Total Nickel (Ni) ND 5028135 ug/L 1.0 RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)



Maxxam ID		ENO960				
Sampling Date		2017/06/09				
		11:00				
COC Number		na				
	UNITS	GW-086822-060917- SH-001	RDL	QC Batch		
Dissolved Phosphorus (P)	ug/L	160	100	5036026		
Total Phosphorus (P)	ug/L	ND	100	5028135		
Dissolved Potassium (K)	ug/L	2600	200	5036026		
Dissolved Selenium (Se)	ug/L	ND	2.0	5036026		
Total Selenium (Se)	ug/L	ND	2.0	5028135		
Dissolved Silver (Ag)	ug/L	ND	0.10	5036026		
Total Silver (Ag)	ug/L	ND	0.10	5028135		
Dissolved Sodium (Na)	ug/L	6700	100	5036026		
Total Sodium (Na)	ug/L	7100	100	5028135		
Dissolved Thallium (Tl)	ug/L	ND	0.050	5036026		
Total Thallium (Tl)	ug/L	ND	0.050	5028135		
Dissolved Tungsten (W)	ug/L	ND	1.0	5036026		
Total Tungsten (W)	ug/L	ND	1.0	5028135		
Dissolved Uranium (U)	ug/L	0.18	0.10	5036026		
Total Uranium (U)	ug/L	0.11	0.10	5028135		
Dissolved Vanadium (V)	ug/L	2.3	0.50	5036026		
Total Vanadium (V)	ug/L	ND	0.50	5028135		
Dissolved Zinc (Zn)	ug/L	120	5.0	5036026		
Total Zinc (Zn)	ug/L	ND	5.0	5028135		
Dissolved Zirconium (Zr)	ug/L	ND	1.0	5036026		
Total Zirconium (Zr)	ug/L	ND	1.0	5028135		
RDL = Reportable Detection	Limit		•			
QC Batch = Quality Control E ND = Not detected	Batch					

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)



TEST SUMMARY

Maxxam ID:	ENO960
Sample ID:	GW-086822-060917-SH-001
Matrix:	Water

Collected: 2017/06/09 Shipped: Received: 2017/06/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5035557	N/A	2017/06/20	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5022620	N/A	2017/06/14	Automated Statchk
Chloride by Automated Colourimetry	KONE	5035785	N/A	2017/06/20	Alina Dobreanu
Colour	SPEC	5027107	N/A	2017/06/14	Viorica Rotaru
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5023651	N/A	2017/06/12	Anastasia Hamanov
Fluoride	ISE	5025360	2017/06/13	2017/06/13	Surinder Rai
Hardness (calculated as CaCO3)		5022541	N/A	2017/06/15	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5036026	N/A	2017/06/20	Thao Nguyen
Total Metals Analysis by ICPMS	ICP/MS	5028135	N/A	2017/06/15	Prempal Bhatti
Ion Balance (% Difference)	CALC	5022621	N/A	2017/06/15	Automated Statchk
Total Ammonia-N	LACH/NH4	5027756	N/A	2017/06/19	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5024139	N/A	2017/06/13	Chandra Nandlal
Organic Nitrogen	CALC	5022622	N/A	2017/06/19	Automated Statchk
рН	AT	5025365	N/A	2017/06/13	Surinder Rai
Field pH	PH	ONSITE	N/A	2017/06/09	Ronklin Gracian
Orthophosphate	KONE	5024915	N/A	2017/06/13	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5035788	N/A	2017/06/20	Alina Dobreanu
Sulphide	ISE/S	5025227	N/A	2017/06/13	Tahir Anwar
Total Dissolved Solids	BAL	5023299	2017/06/12	2017/06/13	Xue Zheng Li(Scott)
Field pH	PH	ONSITE	N/A	2017/06/09	Ronklin Gracian
Total Kjeldahl Nitrogen in Water	SKAL	5027267	2017/06/14	2017/06/16	Bramdeo Motiram
Total Phosphorus (Colourimetric)	LACH/P	5027740	2017/06/14	2017/06/15	Amanpreet Sappal
Low Level Total Suspended Solids	BAL	5025928	2017/06/13	2017/06/13	Xue Zheng Li(Scott)
Turbidity	AT	5024183	N/A	2017/06/13	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5022623	2017/06/19	2017/06/19	Automated Statchk

Maxxam ID:	ENO960 Dup
Sample ID:	GW-086822-060917-SH-001
Matrix:	Water

Collected: 2017/06/09 Shipped: Received: 2017/06/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Colour	SPEC	5027107	N/A	2017/06/14	Viorica Rotaru
Turbidity	AT	5024183	N/A	2017/06/13	Neil Dassanayake



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt								
	Package 1	7.3°C						
Metals	Metals bottle received with sediment.							
Sample	Sample ENO960 [GW-086822-060917-SH-001] : Elevated ion balance result was confirmed by reanalysis.							

Results relate only to the items tested.



Maxxam Job #: B7C0195 Report Date: 2017/06/21

QUALITY ASSURANCE REPORT

GHD Limited Client Project #: 86822

Site Location: 2976 HORSESHOE VALLEY RD,W Your P.O. #: 73507898

Sampler Initials: SH

			Matrix Spike SPIKED BLA		BLANK	Method Blank		RPD		QC Standard		
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5023299	Total Dissolved Solids	2017/06/13					ND, RDL=10	mg/L	11 (1)	25	98	90 - 110
5023651	Dissolved Organic Carbon	2017/06/12	97	80 - 120	100	80 - 120	0.21, RDL=0.20	mg/L	4.3 (1)	20		
5024139	Nitrate (N)	2017/06/13	130 (2)	80 - 120	106	80 - 120	ND, RDL=0.10	mg/L	NC (1)	20		
5024139	Nitrite (N)	2017/06/13	7.1 (2)	80 - 120	98	80 - 120	ND, RDL=0.010	mg/L	NC (1)	20		
5024183	Turbidity	2017/06/13			99	85 - 115	ND, RDL=0.1	NTU	9.6 (3)	20		
5024915	Orthophosphate (P)	2017/06/13	118	75 - 125	100	80 - 120	ND, RDL=0.010	mg/L	NC (1)	25		
5025227	Sulphide	2017/06/13	96	80 - 120	96	80 - 120	ND, RDL=0.020	mg/L	NC (1)	20		
5025360	Fluoride (F-)	2017/06/13	80	80 - 120	95	80 - 120	ND, RDL=0.10	mg/L	0.48 (1)	20		
5025365	рН	2017/06/13			102	98 - 103			0.051 (1)	N/A		
5025928	Total Suspended Solids	2017/06/13					ND,RDL=1	mg/L	NC (1)	25	97	85 - 115
5027107	Colour	2017/06/14			101	80 - 120	ND,RDL=2	TCU	0.98 (3)	25		
5027267	Total Kjeldahl Nitrogen (TKN)	2017/06/16	102	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	11 (1)	20	97	80 - 120
5027740	Total Phosphorus	2017/06/15	95	80 - 120	92	80 - 120	ND, RDL=0.004	mg/L	3.6 (1)	20	91	80 - 120
5027756	Total Ammonia-N	2017/06/19	NC	80 - 120	101	85 - 115	ND, RDL=0.050	mg/L	0.028 (1)	20		
5028135	Total Aluminum (Al)	2017/06/15	114	80 - 120	106	80 - 120	ND, RDL=5.0	ug/L	13 (1)	20		
5028135	Total Antimony (Sb)	2017/06/15	107	80 - 120	102	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
5028135	Total Arsenic (As)	2017/06/15	107	80 - 120	107	80 - 120	ND, RDL=1.0	ug/L	NC (1)	20		
5028135	Total Barium (Ba)	2017/06/15	100	80 - 120	101	80 - 120	ND, RDL=2.0	ug/L	0.97 (1)	20		
5028135	Total Beryllium (Be)	2017/06/15	108	80 - 120	104	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
5028135	Total Boron (B)	2017/06/15	111	80 - 120	98	80 - 120	ND, RDL=10	ug/L				
5028135	Total Cadmium (Cd)	2017/06/15	105	80 - 120	103	80 - 120	ND, RDL=0.10	ug/L	NC (1)	20		
5028135	Total Chromium (Cr)	2017/06/15	102	80 - 120	102	80 - 120	ND, RDL=5.0	ug/L	NC (1)	20		
5028135	Total Cobalt (Co)	2017/06/15	106	80 - 120	107	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
5028135	Total Copper (Cu)	2017/06/15	105	80 - 120	105	80 - 120	ND, RDL=1.0	ug/L	4.3 (1)	20		
5028135	Total Iron (Fe)	2017/06/15	102	80 - 120	104	80 - 120	ND, RDL=100	ug/L	2.3 (1)	20		



Maxxam Job #: B7C0195 Report Date: 2017/06/21

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited Client Project #: 86822

Site Location: 2976 HORSESHOE VALLEY RD,W Your P.O. #: 73507898 Sampler Initials: SH

			Matrix	Spike	SPIKED	BLANK	Method B	lank	RP	D	QC Sta	indard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5028135	Total Lead (Pb)	2017/06/15	103	80 - 120	102	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
5028135	Total Manganese (Mn)	2017/06/15	101	80 - 120	102	80 - 120	ND, RDL=2.0	ug/L	1.2 (1)	20		
5028135	Total Molybdenum (Mo)	2017/06/15	112	80 - 120	104	80 - 120	ND, RDL=0.50	ug/L	1.3 (1)	20		
5028135	Total Nickel (Ni)	2017/06/15	101	80 - 120	103	80 - 120	ND, RDL=1.0	ug/L	0.26 (1)	20		
5028135	Total Phosphorus (P)	2017/06/15	108	80 - 120	106	80 - 120	ND, RDL=100	ug/L				
5028135	Total Selenium (Se)	2017/06/15	113	80 - 120	110	80 - 120	ND, RDL=2.0	ug/L	NC (1)	20		
5028135	Total Silver (Ag)	2017/06/15	105	80 - 120	103	80 - 120	ND, RDL=0.10	ug/L	NC (1)	20		
5028135	Total Sodium (Na)	2017/06/15	NC	80 - 120	103	80 - 120	ND, RDL=100	ug/L	2.7 (1)	20		
5028135	Total Thallium (Tl)	2017/06/15	105	80 - 120	102	80 - 120	ND, RDL=0.050	ug/L	NC (1)	20		
5028135	Total Tungsten (W)	2017/06/15	109	80 - 120	107	80 - 120	ND, RDL=1.0	ug/L				
5028135	Total Uranium (U)	2017/06/15	104	80 - 120	100	80 - 120	ND, RDL=0.10	ug/L				
5028135	Total Vanadium (V)	2017/06/15	101	80 - 120	100	80 - 120	ND, RDL=0.50	ug/L	NC (1)	20		
5028135	Total Zinc (Zn)	2017/06/15	104	80 - 120	109	80 - 120	ND, RDL=5.0	ug/L	NC (1)	20		
5028135	Total Zirconium (Zr)	2017/06/15	104	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L				
5035557	Alkalinity (Total as CaCO3)	2017/06/20			94	85 - 115	ND, RDL=1.0	mg/L	0.55 (1)	20		
5035785	Dissolved Chloride (Cl)	2017/06/20	NC	80 - 120	104	80 - 120	ND, RDL=1.0	mg/L	0.19 (1)	20		
5035788	Dissolved Sulphate (SO4)	2017/06/20	NC	75 - 125	103	80 - 120	ND, RDL=1.0	mg/L	0.94 (1)	20		
5036026	Dissolved Aluminum (Al)	2017/06/20	101	80 - 120	102	80 - 120	ND, RDL=5.0	ug/L				
5036026	Dissolved Antimony (Sb)	2017/06/20	103	80 - 120	101	80 - 120	ND, RDL=0.50	ug/L				
5036026	Dissolved Arsenic (As)	2017/06/20	98	80 - 120	96	80 - 120	ND, RDL=1.0	ug/L				
5036026	Dissolved Barium (Ba)	2017/06/20	99	80 - 120	100	80 - 120	ND, RDL=2.0	ug/L				
5036026	Dissolved Beryllium (Be)	2017/06/20	103	80 - 120	103	80 - 120	ND, RDL=0.50	ug/L				
5036026	Dissolved Boron (B)	2017/06/20	102	80 - 120	103	80 - 120	ND, RDL=10	ug/L				
5036026	Dissolved Cadmium (Cd)	2017/06/20	100	80 - 120	100	80 - 120	ND, RDL=0.10	ug/L				
5036026	Dissolved Calcium (Ca)	2017/06/20	NC	80 - 120	97	80 - 120	ND, RDL=200	ug/L				
5036026	Dissolved Chromium (Cr)	2017/06/20	98	80 - 120	97	80 - 120	ND, RDL=5.0	ug/L	2.8 (1)	20		
5036026	Dissolved Cobalt (Co)	2017/06/20	96	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L				
5036026	Dissolved Copper (Cu)	2017/06/20	99	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L				
5036026	Dissolved Iron (Fe)	2017/06/20	98	80 - 120	97	80 - 120	ND, RDL=100	ug/L				



Maxxam Job #: B7C0195 Report Date: 2017/06/21

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited Client Project #: 86822

Site Location: 2976 HORSESHOE VALLEY RD,W Your P.O. #: 73507898 Sampler Initials: SH

			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
5036026	Dissolved Lead (Pb)	2017/06/20	93	80 - 120	94	80 - 120	ND, RDL=0.50	ug/L				
5036026	Dissolved Magnesium (Mg)	2017/06/20	98	80 - 120	98	80 - 120	ND, RDL=50	ug/L				
5036026	Dissolved Manganese (Mn)	2017/06/20	95	80 - 120	97	80 - 120	ND, RDL=2.0	ug/L				
5036026	Dissolved Molybdenum (Mo)	2017/06/20	102	80 - 120	100	80 - 120	ND, RDL=0.50	ug/L				
5036026	Dissolved Nickel (Ni)	2017/06/20	95	80 - 120	95	80 - 120	ND, RDL=1.0	ug/L				
5036026	Dissolved Phosphorus (P)	2017/06/20	109	80 - 120	108	80 - 120	ND, RDL=100	ug/L				
5036026	Dissolved Potassium (K)	2017/06/20	NC	80 - 120	99	80 - 120	ND, RDL=200	ug/L				
5036026	Dissolved Selenium (Se)	2017/06/20	97	80 - 120	99	80 - 120	ND, RDL=2.0	ug/L				
5036026	Dissolved Silver (Ag)	2017/06/20	89	80 - 120	97	80 - 120	ND, RDL=0.10	ug/L				
5036026	Dissolved Sodium (Na)	2017/06/20	NC	80 - 120	99	80 - 120	ND, RDL=100	ug/L				
5036026	Dissolved Thallium (TI)	2017/06/20	93	80 - 120	94	80 - 120	ND, RDL=0.050	ug/L				
5036026	Dissolved Tungsten (W)	2017/06/20	97	80 - 120	97	80 - 120	ND, RDL=1.0	ug/L				
5036026	Dissolved Uranium (U)	2017/06/20	100	80 - 120	100	80 - 120	ND, RDL=0.10	ug/L				
5036026	Dissolved Vanadium (V)	2017/06/20	98	80 - 120	96	80 - 120	ND, RDL=0.50	ug/L				
5036026	Dissolved Zinc (Zn)	2017/06/20	96	80 - 120	97	80 - 120	ND, RDL=5.0	ug/L				
5036026	Dissolved Zirconium (Zr)	2017/06/20	104	80 - 120	102	80 - 120	ND, RDL=1.0	ug/L				

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.

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) Duplicate Parent ID

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) Duplicate Parent ID [ENO960-01]



VALIDATION SIGNATURE PAGE

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

Brad Newman, 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.

CAM FCD-01	191/2	CHAIN OF CUSTODY-RECOR Project Information (where applicable)	Turnaround Time (TAT) Required	7
	Report Information (if differs from invoice)	· Question # 2 10017	Regular TAT (5-7 days) Most analyses	
Company Name: GHD, LIMITED	Company Name:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Contact Name: SENNIFER BALKWIL	Contact Name:	Project #: 08/2877	Rush TAT (Surcharges will be applied)	1
Address: COLOLBO DR.	C 2	Site Location	1 Day 2 Days 3-4 Days	
519	Phone: Fax:	Site #:		-
Email: iemiter balkwillegiol. a	Com Email:	Sampled By SIMON HOWELL	Date Required:	
MOE REGULATED DRINKING WATER OR WA	ATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON	HE MAXXAM DRINKING WATER CHAIN OF CUSTODY	Rush Confirmation #:	4
Regulation 153	Other Regulations	Analysis Requested	LABORATORY USE ONLY	
Table 1 Res/Park Med/ Fine	CCME Sanitary Sewer Bylaw	M B 1 cac	Y IN COOLER TEMPERATURES	
Table 3 Agri/ Other	PWQ0 Region		Present Intact 10,17	
FOR RSC (PLEASE CIRCLE) Y / N	Other (Specify)		8	
Include Criteria on Certificate of Analysis: Y / N	Manager and Andrews			
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF	SAMPLING UNTIL DELIVERY TO MAXXAM		COOLING MEDIA PRESENT: (Y) / N	
CANADIE IDENTIFICATION	DATE SAMPLED TIME SAMPLED MATRIX		d COMMENTS	-
	(YYYY/MM/DD) (HH:MM) S E K 5		Y A FILLARD	5
1 GW-086822-060-117-5K-88	20170609 11:00 GW 1 V V		DISCUVED METALS	3
2		*		_
3			E.F. A QUERA	- •
4			FIELD CHENI	-
5			67 - (0,2.1 6.10 9 10 °C	-
6			Pertr. Ino C	4
7				-
8			09-Jun-17 17:01	
9			Rachael Watt	
10				



Your P.O. #: 73507898 Your Project #: 86822-03-5.0 Your C.O.C. #: 61833

Attention:86822-03-5.0 Distribution

GHD Limited 651 Colby Dr Waterloo, ON N2V 1C2

Report Date: 2017/11/28 Report #: R4878900 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7Q5941

Received: 2017/11/24, 15:29

Sample Matrix: Water # Samples Received: 1

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Alkalinity	1	N/A	2017/11/28	CAM SOP-00448	SM 22 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2017/11/28	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2017/11/28	CAM SOP-00463	EPA 325.2 m
Colour	1	N/A	2017/11/28	CAM SOP-00412	SM 22 2120C m
Fluoride	1	2017/11/27	2017/11/28	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	1	N/A	2017/11/28	CAM SOP	SM 2340 B
				00102/00408/00447	
Dissolved Metals by ICPMS	1	N/A	2017/11/28	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2017/11/28	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2017/11/28		
Total Ammonia-N	1	N/A	2017/11/28	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1)	1	N/A	2017/11/28	CAM SOP-00440	SM 22 4500-NO3I/NO2B
Organic Nitrogen	1	N/A	2017/11/28		
рН	1	N/A	2017/11/28	CAM SOP-00413	SM 4500H+ B m
Field pH (2)	1	N/A	2017/11/28		Field pH Meter
Orthophosphate	1	N/A	2017/11/28	CAM SOP-00461	EPA 365.1 m
Sulphate by Automated Colourimetry	1	N/A	2017/11/28	CAM SOP-00464	EPA 375.4 m
Sulphide	1	N/A	2017/11/27	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	1	2017/11/27	2017/11/27	CAM SOP-00428	SM 22 2540C m
Field Temperature (2)	1	N/A	2017/11/27		Field Thermometer
Total Kjeldahl Nitrogen in Water	1	2017/11/27	2017/11/27	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2017/11/27	2017/11/27	CAM SOP-00407	SM 22 4500 P B H m
Total Suspended Solids	1	2017/11/27	2017/11/27	CAM SOP-00428	SM 22 2540D m
Un-ionized Ammonia	1	2017/11/27	2017/11/28		

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



Your P.O. #: 73507898 Your Project #: 86822-03-5.0 Your C.O.C. #: 61833

Attention:86822-03-5.0 Distribution

GHD Limited 651 Colby Dr Waterloo, ON N2V 1C2

> Report Date: 2017/11/28 Report #: R4878900 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7Q5941 Received: 2017/11/24, 15:29

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.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

(2) This is a field test, therefore, the results relate to items that were not analysed at Maxxam Analytics Inc.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Tanya Fidlin, Project Manager Email: tfidlin@maxxam.ca Phone# (905)817-5700

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.

Total Cover Pages : 2 Page 2 of 13



Report Date: 2017/11/28

GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

RESULTS OF ANALYSES OF WATER

Maxxam ID					FPX521			FPX521		
Sampling Date					2017/11/21 14:55			2017/11/21 14:55		
COC Number					61833			61833		
	UNITS	Criteria	м/і	A/O	GW-086822-112117- SH-001	RDL	QC Batch	GW-086822-112117- SH-001 Lab-Dup	RDL	QC Batch
Calculated Parameters	_		-	· · · ·			·			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	240	1.0	5286007			
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	-	2.0	1.0	5286007			
Hardness (CaCO3)	mg/L	-	-	80:100	210	1.0	5285780			
Ion Balance (% Difference)	%	-	-	-	7.43	N/A	5286037			
Total Organic Nitrogen	mg/L	-	-	0.15	0.20	0.10	5286038			
Total Un-ionized Ammonia	mg/L	-	-	-	ND	0.0005	5286039			
Field Measurements										
Field Temperature	Celcius	-	-	-	6.08	N/A	ONSITE			
Field pH	рН	6.5:8.5	-	6.5:8.5	7.59		ONSITE			
Inorganics										
Total Ammonia-N	mg/L	-	-	-	ND	0.050	5286180			
Colour	TCU	-	-	5	ND	2	5286736	ND	2	5286736
Total Dissolved Solids	mg/L	-	-	500	240	10	5286299			
Fluoride (F-)	mg/L	-	1.5	-	ND	0.10	5286774			
Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	-	0.20	0.10	5286216			
Orthophosphate (P)	mg/L	-	-	-	ND	0.010	5286819	ND	0.010	5286819
рН	рН	6.5:8.5	-	6.5:8.5	7.96		5286773			
Total Phosphorus	mg/L	0.01	-	-	1.1	0.2	5286336			
Total Suspended Solids	mg/L	-	-	-	1400	50	5286660			
Dissolved Sulphate (SO4)	mg/L	-	-	500	8.7	1.0	5286818	8.8	1.0	5286818
Sulphide	mg/L	0.02	-	0.05	ND	0.020	5286022			
Alkalinity (Total as CaCO3)	mg/L	-	-	30:500	240	1.0	5286771			
Dissolved Chloride (Cl)	mg/L	-	-	250	ND	1.0	5286815	1.5	1.0	5286815
Nitrite (N)	mg/L	-	1	-	ND	0.010	5286784	ND	0.010	5286784
Nitrate (N)	mg/L	-	10	-	0.68	0.10	5286784	0.66	0.10	5286784
Nitrate + Nitrite (N)	mg/L	-	10	-	0.68	0.10	5286784	0.66	0.10	5286784

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

Criteria: Ontario Provincial Water Quality Objectives

Ref. to MOEE Water Management document dated Feb.1999

M/I,A/O: Ontario Drinking Water Standards (SDWA 2002)

M/I: Table 1 Microbiological Standards, Table 2 Chemical Standards, & Table 3 Radionuclide Standards (Maximum Acceptable Concentrations & Interim Maximum Acceptable Concentrations)

A/O: Table 4 Aesthetic Objectives & Operational Guidelines

N/A = Not Applicable

ND = Not detected



GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					FPX521			FPX521		
Sampling Data					2017/11/21			2017/11/21		
					14:55			14:55		
COC Number					61833			61833		
					GW-086822-112117-			GW-086822-112117-		
	UNITS	Criteria	M/I	A/0	SH-001	RDL	QC Batch	SH-001	RDL	QC Batch
								Lab-Dup		
	ug/L	-	-	100	ND	5.0	5286423	ND	5.0	5286423
Total Aluminum (Al)	ug/L	-	-	100	21000	25	5287473			
Dissolved Antimony (Sb)	ug/L	20	6	-	ND	0.50	5286423	ND	0.50	5286423
Total Antimony (Sb)	ug/L	20	6	-	ND	0.50	5287473			
Dissolved Arsenic (As)	ug/L	100	25	-	ND	1.0	5286423	ND	1.0	5286423
Total Arsenic (As)	ug/L	100	25	-	2.3	1.0	5287473			
Dissolved Barium (Ba)	ug/L	-	1000	-	31	2.0	5286423	31	2.0	5286423
Total Barium (Ba)	ug/L	-	1000	-	290	2.0	5287473			
Dissolved Beryllium (Be)	ug/L	11	-	-	ND	0.50	5286423	ND	0.50	5286423
Total Beryllium (Be)	ug/L	11	-	-	0.65	0.50	5287473			
Dissolved Boron (B)	ug/L	200	5000	-	ND	10	5286423	ND	10	5286423
Total Boron (B)	ug/L	200	5000	-	16	10	5287473			
Dissolved Cadmium (Cd)	ug/L	0.2	5	-	ND	0.10	5286423	ND	0.10	5286423
Total Cadmium (Cd)	ug/L	0.2	5	-	ND	0.10	5287473			
Dissolved Calcium (Ca)	ug/L	-	-	-	60000	200	5286423	61000	200	5286423
Dissolved Chromium (Cr)	ug/L	-	50	-	ND	5.0	5286423	ND	5.0	5286423
Total Chromium (Cr)	ug/L	-	50	-	36	5.0	5287473			
Dissolved Cobalt (Co)	ug/L	0.9	-	-	ND	0.50	5286423	ND	0.50	5286423
Total Cobalt (Co)	ug/L	0.9	-	-	12	0.50	5287473			
Dissolved Copper (Cu)	ug/L	5	-	1000	ND	1.0	5286423	ND	1.0	5286423
Total Copper (Cu)	ug/L	5	-	1000	34	1.0	5287473			
Dissolved Iron (Fe)	ug/L	300	-	300	ND	100	5286423	ND	100	5286423
Total Iron (Fe)	ug/L	300	-	300	28000	100	5287473			
Dissolved Lead (Pb)	ug/L	5	10	-	ND	0.50	5286423	ND	0.50	5286423
Total Lead (Pb)	ug/L	5	10	-	9.3	0.50	5287473			
Dissolved Magnesium (Mg)	ug/L	-	-	-	14000	50	5286423	14000	50	5286423
Dissolved Manganese (Mn)	ug/L	-	-	50	5.1	2.0	5286423	5.2	2.0	5286423

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

Criteria: Ontario Provincial Water Quality Objectives

Ref. to MOEE Water Management document dated Feb.1999

M/I,A/O: Ontario Drinking Water Standards (SDWA 2002)

M/I: Table 1 Microbiological Standards, Table 2 Chemical Standards, & Table 3 Radionuclide Standards (Maximum Acceptable Concentrations & Interim Maximum Acceptable Concentrations)

A/O: Table 4 Aesthetic Objectives & Operational Guidelines

ND = Not detected



GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					FPX521			FPX521		
Comulius Data					2017/11/21			2017/11/21		
Sampling Date					14:55			14:55		
COC Number					61833			61833		
					GW-086822-112117-			GW-086822-112117-		
	UNITS	Criteria	M/I	A/O	SH-001	RDL	QC Batch	SH-001	RDL	QC Batch
								Lab-Dup		
Total Manganese (Mn)	ug/L	-	-	50	930	2.0	5287473			
Dissolved Molybdenum (Mo)	ug/L	40	-	-	0.61	0.50	5286423	0.64	0.50	5286423
Total Molybdenum (Mo)	ug/L	40	-	-	2.2	0.50	5287473			
Dissolved Nickel (Ni)	ug/L	25	-	-	ND	1.0	5286423	ND	1.0	5286423
Total Nickel (Ni)	ug/L	25	-	-	21	1.0	5287473			
Dissolved Phosphorus (P)	ug/L	-	-	-	ND	100	5286423	ND	100	5286423
Total Phosphorus (P)	ug/L	10	-	-	970	100	5287473			
Dissolved Potassium (K)	ug/L	-	-	-	1400	200	5286423	1500	200	5286423
Dissolved Selenium (Se)	ug/L	100	10	-	ND	2.0	5286423	ND	2.0	5286423
Total Selenium (Se)	ug/L	100	10	-	ND	2.0	5287473			
Dissolved Silver (Ag)	ug/L	0.1	-	-	ND	0.10	5286423	ND	0.10	5286423
Total Silver (Ag)	ug/L	0.1	-	-	ND	0.10	5287473			
Dissolved Sodium (Na)	ug/L	-	20000	200000	2700	100	5286423	2700	100	5286423
Total Sodium (Na)	ug/L	-	20000	200000	4700	100	5287473			
Dissolved Thallium (TI)	ug/L	0.3	-	-	ND	0.050	5286423	ND	0.050	5286423
Total Thallium (Tl)	ug/L	0.3	-	-	0.25	0.050	5287473			
Dissolved Tungsten (W)	ug/L	30	-	-	ND	1.0	5286423	ND	1.0	5286423
Total Tungsten (W)	ug/L	30	-	-	ND	1.0	5287473			
Dissolved Uranium (U)	ug/L	5	20	-	0.39	0.10	5286423	0.38	0.10	5286423
Total Uranium (U)	ug/L	5	20	-	1.1	0.10	5287473			
Dissolved Vanadium (V)	ug/L	6	-	-	0.78	0.50	5286423	0.78	0.50	5286423
Total Vanadium (V)	ug/L	6	-	-	43	0.50	5287473			
Dissolved Zinc (Zn)	ug/L	30	-	5000	ND	5.0	5286423	ND	5.0	5286423
Total Zinc (Zn)	ug/L	30	-	5000	74	5.0	5287473			
Dissolved Zirconium (Zr)	ug/L	4	-	-	ND	1.0	5286423	ND	1.0	5286423
Total Zirconium (Zr)	ug/L	4	-	-	4.1	1.0	5287473			

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

Criteria: Ontario Provincial Water Quality Objectives

Ref. to MOEE Water Management document dated Feb.1999

M/I,A/O: Ontario Drinking Water Standards (SDWA 2002)

M/I: Table 1 Microbiological Standards, Table 2 Chemical Standards, & Table 3 Radionuclide Standards (Maximum Acceptable Concentrations & Interim Maximum Acceptable Concentrations)

A/O: Table 4 Aesthetic Objectives & Operational Guidelines

ND = Not detected



Report Date: 2017/11/28

GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

TEST SUMMARY

Maxxam ID:	FPX521
Sample ID:	GW-086822-112117-SH-001
Matrix:	Water

Collected:	2017/11/21
Shipped:	
Received:	2017/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5286771	N/A	2017/11/28	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5286007	N/A	2017/11/28	Automated Statchk
Chloride by Automated Colourimetry	KONE	5286815	N/A	2017/11/28	Deonarine Ramnarine
Colour	SPEC	5286736	N/A	2017/11/28	Viorica Rotaru
Fluoride	ISE	5286774	2017/11/27	2017/11/28	Surinder Rai
Hardness (calculated as CaCO3)		5285780	N/A	2017/11/28	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5286423	N/A	2017/11/28	Thao Nguyen
Total Metals Analysis by ICPMS	ICP/MS	5287473	N/A	2017/11/28	Matthew Ritenburg
Ion Balance (% Difference)	CALC	5286037	N/A	2017/11/28	Automated Statchk
Total Ammonia-N	LACH/NH4	5286180	N/A	2017/11/28	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5286784	N/A	2017/11/28	Chandra Nandlal
Organic Nitrogen	CALC	5286038	N/A	2017/11/28	Automated Statchk
рН	AT	5286773	N/A	2017/11/28	Surinder Rai
Field pH	РН	ONSITE	N/A	2017/11/24	Amanda Sica
Orthophosphate	KONE	5286819	N/A	2017/11/28	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5286818	N/A	2017/11/28	Alina Dobreanu
Sulphide	ISE/S	5286022	N/A	2017/11/27	Neil Dassanayake
Total Dissolved Solids	BAL	5286299	2017/11/27	2017/11/27	Xue Zheng Li(Scott)
Field pH	РН	ONSITE	N/A	2017/11/24	Amanda Sica
Total Kjeldahl Nitrogen in Water	SKAL	5286216	2017/11/27	2017/11/27	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	5286336	2017/11/27	2017/11/27	Amanpreet Sappal
Total Suspended Solids	BAL	5286660	2017/11/27	2017/11/27	Xue Zheng Li(Scott)
Un-ionized Ammonia	CALC/NH3	5286039	2017/11/28	2017/11/28	Automated Statchk



Collected: 2017/11/21 Shipped: Received: 2017/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5286815	N/A	2017/11/28	Deonarine Ramnarine
Colour	SPEC	5286736	N/A	2017/11/28	Viorica Rotaru
Dissolved Metals by ICPMS	ICP/MS	5286423	N/A	2017/11/28	Thao Nguyen
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5286784	N/A	2017/11/28	Chandra Nandlal
Orthophosphate	KONE	5286819	N/A	2017/11/28	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5286818	N/A	2017/11/28	Alina Dobreanu



GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

GENERAL COMMENTS

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

Package 1 1.3°C

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

			Matrix	Spike	SPIKED	BLANK	Method B	lank	RP	D	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5286022	Sulphide	2017/11/27	92	80 - 120	95	80 - 120	ND, RDL=0.020	mg/L	NC (1)	20		
5286180	Total Ammonia-N	2017/11/28	100	80 - 120	99	85 - 115	ND, RDL=0.050	mg/L	NC (1)	20		
5286216	Total Kjeldahl Nitrogen (TKN)	2017/11/27	95	80 - 120	100	80 - 120	ND, RDL=0.10	mg/L	NC (2,1)	20	112	80 - 120
5286299	Total Dissolved Solids	2017/11/27					ND, RDL=10	mg/L	9.6 (1)	25	100	90 - 110
5286336	Total Phosphorus	2017/11/27	92	80 - 120	93	80 - 120	ND, RDL=0.004	mg/L	18 (1)	20	98	80 - 120
5286423	Dissolved Aluminum (Al)	2017/11/28	110 (3)	80 - 120	103	80 - 120	ND, RDL=5.0	ug/L	NC (4)	20		
5286423	Dissolved Antimony (Sb)	2017/11/28	110 (3)	80 - 120	103	80 - 120	ND, RDL=0.50	ug/L	NC (4)	20		
5286423	Dissolved Arsenic (As)	2017/11/28	105 (3)	80 - 120	98	80 - 120	ND, RDL=1.0	ug/L	NC (4)	20		L
5286423	Dissolved Barium (Ba)	2017/11/28	103 (3)	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L	1.2 (4)	20		<u> </u>
5286423	Dissolved Beryllium (Be)	2017/11/28	108 (3)	80 - 120	102	80 - 120	ND, RDL=0.50	ug/L	NC (4)	20		<u> </u>
5286423	Dissolved Boron (B)	2017/11/28	107 (3)	80 - 120	100	80 - 120	ND, RDL=10	ug/L	NC (4)	20		
5286423	Dissolved Cadmium (Cd)	2017/11/28	108 (3)	80 - 120	100	80 - 120	ND, RDL=0.10	ug/L	NC (4)	20		<u> </u>
5286423	Dissolved Calcium (Ca)	2017/11/28	NC (3)	80 - 120	98	80 - 120	ND, RDL=200	ug/L	1.8 (4)	20		L
5286423	Dissolved Chromium (Cr)	2017/11/28	104 (3)	80 - 120	97	80 - 120	ND, RDL=5.0	ug/L	NC (4)	20		<u> </u>
5286423	Dissolved Cobalt (Co)	2017/11/28	103 (3)	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L	NC (4)	20		
5286423	Dissolved Copper (Cu)	2017/11/28	105 (3)	80 - 120	100	80 - 120	ND, RDL=1.0	ug/L	NC (4)	20		<u> </u>
5286423	Dissolved Iron (Fe)	2017/11/28	105 (3)	80 - 120	99	80 - 120	ND, RDL=100	ug/L	NC (4)	20		L
5286423	Dissolved Lead (Pb)	2017/11/28	102 (3)	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L	NC (4)	20		<u> </u>
5286423	Dissolved Magnesium (Mg)	2017/11/28	105 (3)	80 - 120	99	80 - 120	ND, RDL=50	ug/L	2.4 (4)	20		
5286423	Dissolved Manganese (Mn)	2017/11/28	106 (3)	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L	1.6 (4)	20		
5286423	Dissolved Molybdenum (Mo)	2017/11/28	106 (3)	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L	4.5 (4)	20		<u> </u>
5286423	Dissolved Nickel (Ni)	2017/11/28	101 (3)	80 - 120	96	80 - 120	ND, RDL=1.0	ug/L	NC (4)	20		
5286423	Dissolved Phosphorus (P)	2017/11/28	111 (3)	80 - 120	111	80 - 120	ND, RDL=100	ug/L	NC (4)	20		<u> </u>
5286423	Dissolved Potassium (K)	2017/11/28	106 (3)	80 - 120	99	80 - 120	ND, RDL=200	ug/L	6.8 (4)	20		
5286423	Dissolved Selenium (Se)	2017/11/28	107 (3)	80 - 120	99	80 - 120	ND, RDL=2.0	ug/L	NC (4)	20		
5286423	Dissolved Silver (Ag)	2017/11/28	104 (3)	80 - 120	96	80 - 120	ND, RDL=0.10	ug/L	NC (4)	20		
5286423	Dissolved Sodium (Na)	2017/11/28	105 (3)	80 - 120	98	80 - 120	ND, RDL=100	ug/L	0.068 (4)	20		



QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

			Matrix	Spike	SPIKED	BLANK	Method B	Blank	RP	D	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5286423	Dissolved Thallium (TI)	2017/11/28	101 (3)	80 - 120	95	80 - 120	ND, RDL=0.050	ug/L	NC (4)	20		
5286423	Dissolved Tungsten (W)	2017/11/28	105 (3)	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L	NC (4)	20		
5286423	Dissolved Uranium (U)	2017/11/28	103 (3)	80 - 120	97	80 - 120	ND, RDL=0.10	ug/L	1.3 (4)	20		
5286423	Dissolved Vanadium (V)	2017/11/28	103 (3)	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L	0.26 (4)	20		
5286423	Dissolved Zinc (Zn)	2017/11/28	104 (3)	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L	NC (4)	20		
5286423	Dissolved Zirconium (Zr)	2017/11/28	108 (3)	80 - 120	101	80 - 120	ND, RDL=1.0	ug/L	NC (4)	20		
5286660	Total Suspended Solids	2017/11/27					ND, RDL=10	mg/L	NC (1)	25	95	85 - 115
5286736	Colour	2017/11/28			101	80 - 120	ND,RDL=2	TCU	NC (5)	25		
5286771	Alkalinity (Total as CaCO3)	2017/11/28			93	85 - 115	ND, RDL=1.0	mg/L	2.7 (1)	20		
5286773	рН	2017/11/28			101	98 - 103			0.11 (1)	N/A		
5286774	Fluoride (F-)	2017/11/28	73 (6)	80 - 120	96	80 - 120	ND, RDL=0.10	mg/L	0.97 (1)	20		
5286784	Nitrate (N)	2017/11/28	98 (7)	80 - 120	100	80 - 120	ND, RDL=0.10	mg/L	3.5 (5)	20		
5286784	Nitrite (N)	2017/11/28	103 (7)	80 - 120	101	80 - 120	ND, RDL=0.010	mg/L	NC (5)	20		
5286815	Dissolved Chloride (Cl)	2017/11/28	117 (7)	80 - 120	105	80 - 120	ND, RDL=1.0	mg/L	NC (5)	20		
5286818	Dissolved Sulphate (SO4)	2017/11/28	102 (7)	75 - 125	98	80 - 120	ND, RDL=1.0	mg/L	0.65 (5)	20		
5286819	Orthophosphate (P)	2017/11/28	96 (7)	75 - 125	100	80 - 120	ND, RDL=0.010	mg/L	NC (5)	25		
5287473	Total Aluminum (Al)	2017/11/28	99	80 - 120	101	80 - 120	ND, RDL=5.0	ug/L				
5287473	Total Antimony (Sb)	2017/11/28	104	80 - 120	99	80 - 120	ND, RDL=0.50	ug/L				
5287473	Total Arsenic (As)	2017/11/28	97	80 - 120	97	80 - 120	ND, RDL=1.0	ug/L				
5287473	Total Barium (Ba)	2017/11/28	92	80 - 120	95	80 - 120	ND, RDL=2.0	ug/L				
5287473	Total Beryllium (Be)	2017/11/28	98	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L				
5287473	Total Boron (B)	2017/11/28	100	80 - 120	102	80 - 120	ND, RDL=10	ug/L				
5287473	Total Cadmium (Cd)	2017/11/28	97	80 - 120	98	80 - 120	ND, RDL=0.10	ug/L				
5287473	Total Chromium (Cr)	2017/11/28	93	80 - 120	96	80 - 120	ND, RDL=5.0	ug/L				
5287473	Total Cobalt (Co)	2017/11/28	91	80 - 120	96	80 - 120	ND, RDL=0.50	ug/L				
5287473	Total Copper (Cu)	2017/11/28	95	80 - 120	96	80 - 120	ND, RDL=1.0	ug/L				
5287473	Total Iron (Fe)	2017/11/28	94	80 - 120	97	80 - 120	ND, RDL=100	ug/L	NC (1)	20		
5287473	Total Lead (Pb)	2017/11/28	91	80 - 120	94	80 - 120	ND, RDL=0.50	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

			Matrix	Spike	SPIKED	BLANK	Method B	Blank	RP	D	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5287473	Total Manganese (Mn)	2017/11/28	91	80 - 120	95	80 - 120	ND, RDL=2.0	ug/L	2.6 (1)	20		
5287473	Total Molybdenum (Mo)	2017/11/28	100	80 - 120	96	80 - 120	ND, RDL=0.50	ug/L				
5287473	Total Nickel (Ni)	2017/11/28	90	80 - 120	95	80 - 120	ND, RDL=1.0	ug/L				
5287473	Total Phosphorus (P)	2017/11/28	104	80 - 120	95	80 - 120	ND, RDL=100	ug/L				
5287473	Total Selenium (Se)	2017/11/28	97	80 - 120	99	80 - 120	ND, RDL=2.0	ug/L				
5287473	Total Silver (Ag)	2017/11/28	92	80 - 120	95	80 - 120	ND, RDL=0.10	ug/L				
5287473	Total Sodium (Na)	2017/11/28	NC	80 - 120	97	80 - 120	ND, RDL=100	ug/L				
5287473	Total Thallium (Tl)	2017/11/28	90	80 - 120	93	80 - 120	ND, RDL=0.050	ug/L				
5287473	Total Tungsten (W)	2017/11/28	96	80 - 120	97	80 - 120	ND, RDL=1.0	ug/L				
5287473	Total Uranium (U)	2017/11/28	94	80 - 120	95	80 - 120	ND, RDL=0.10	ug/L				
5287473	Total Vanadium (V)	2017/11/28	95	80 - 120	95	80 - 120	ND, RDL=0.50	ug/L				
5287473	Total Zinc (Zn)	2017/11/28	93	80 - 120	99	80 - 120	ND, RDL=5.0	ug/L				



QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

			Matrix	Spike	SPIKED	BLANK	Method B	lank	RPI	כ	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5287473	Total Zirconium (Zr)	2017/11/28	101	80 - 120	98	80 - 120	ND, RDL=1.0	ug/L				

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.

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) Duplicate Parent ID

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

(3) Matrix Spike Parent ID [FPX521-06]

(4) Duplicate Parent ID [FPX521-06]

(5) Duplicate Parent ID [FPX521-01]

(6) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(7) Matrix Spike Parent ID [FPX521-01]



GHD Limited Client Project #: 86822-03-5.0 Your P.O. #: 73507898 Sampler Initials: SH

VALIDATION SIGNATURE PAGE

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

austin Camere

Cristina Carriere, Scientific Service 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.

	from invoice)				
	(Oustation #	R40047	DA Nor 17 15-00	0	
ntact Name: Jen Balkwill Contact Name: dress:KOILBY DriveAddress:Address:	P.O. #: Project #: Site Location	086822 -03-5.0	24-NOV-1715:25 Tanya Fidlin B7Q5941	*	л -
nei: jennifer. balkwill@ghd.com Email:	Site #: Sampled By	Simon Havel	MAF ENV-1309		
Note: For M0E Regulated Drinking Water samples, please use the Drinking Water CofC.*** ANALYSIS REQ Regulation 153 (2011) Other Regulations Table 1 Res/Park Med/Fine CCME Sanitary Sewer Bylaw Table 2 Ind/Comm Coarse Reg. 558 Storm Sewer Bylaw Table 3 Agri/Other For RSC MISA Municipality:	Organic N PH low level TP, TDS 25 Sulphide Tuchidity, Jon Balance	TURNAROUND TIME (T PLEASE PROVIDE ADVANCE PROJECT Regular (Standard) TAT: (5-7 working days for most Rush TAT: ""Samples must be received by 3pr Rush Confirmation #: PN 1 day 2 days Date Req'd: TATs for cortain tosts are >5 days. Please contain # of COMMENTS / TA	AT) REQUIRED E NOTICE FOR RUSH S. Tests) In to guarantee your TAT*** 3 days ct your Project Manager for details. IT COMMENTS		
GW-086822-112117-54-001 \$1,2017 14:55 GW NYXXX		7 - Field chemistr - dissolved metal was field:	y pH=7.59 T(oi)=6.08 Is battle filtered.		
RELINQUISHED BY (Signature/Print) Date (YYYY/MM/DD) Time: RECEIVED BY: (Signature/Print) monthquell/Simon Howard 2017/11/24 15:24 Tano & Ton 01125000	Date (YYYY/MM/DD) Time:	#JARS USED AND Labo NOT SUBMITTED Custody Seal Yes No Present	ratory Use Only Temperature (°C) on Receipt		2

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