

136 Bayfield Street and 14 Sophia Street West
Barrie, ON

Hydrogeological Impact Assessment



PREPARED FOR:
Rockap Holdings Inc.
701 St. Nicolas Court
Mississauga, ON L5H 4M5

PREPARED BY:
PGL Environmental Consultants
250 Water Street, Suite 102
Whitby, ON L1N 0G5

PGL File: 5689-02.01

November 2022



solve and simplify

Executive Summary

PGL Environmental Consultants (PGL) conducted a Hydrogeological Impact Assessment (HIA) at 136 Bayfield Street and 14 Sophia Street West, Barrie, Ontario (the Site). This HIA was completed on behalf of Rockap Holdings Inc. (the Client) as part of their plan to redevelop the Site.

Redevelopment of the Site will involve constructing a 12-storey, mixed-use condominium building with 282 residential apartments, 10 live-work units, and ground-floor commercial space. Eight ground-related units fronting Maple Avenue will be constructed as part of the redevelopment plan. The redevelopment will also include structured parking, along with amenity areas such as a large outdoor courtyard and private balconies and terraces. No underground levels are proposed as part of the redevelopment. The property is currently improved with a four-storey commercial building and a two-storey commercial building. These buildings will be removed as part of the redevelopment efforts.

The HIA was completed by PGL to assess the following for the Site: (1) groundwater conditions; (2) construction dewatering requirements; (3) long-term dewatering requirements; (4) dewatering discharge options; and (5) potential effects that may result from any dewatering and discharge.

Key results of the HIA at the Site are summarized as follows:

- Excavation dewatering activities at the Site will largely be restricted to shallow materials at the Site (roughly the upper 2m of the subsurface);
- The excavation dewatering rate was estimated at 45,000L/day. A rate of 225,000L/day (incorporating a 5X safety factor) is recommended for permitting purposes;
- Long-term dewatering will not be required as the proposed structures will be slab-on-grade;
- Groundwater quality results indicate that discharge would likely meet the City of Barrie criteria for discharge to the sanitary sewer system or the storm sewer system;
- An Environmental Activity and Sector Registry will likely be required for dewatering activities;
- Groundwater quality results did not exceed any Provincial Water Quality Objectives standards for which the sample was tested (detection limits for certain parameters exceeded the corresponding standards);
- Dewatering activities may lower groundwater levels beneath exposed portions of Sophia Creek (i.e., sections not running through a culvert), and therefore, dewatering has the potential to reduce baseflow in the creek;
- Monitoring requirements to evaluate potential impacts to Sophia Creek should be confirmed with the Lake Simcoe Region Conservation Authority prior to dewatering activities; and
- No adverse effects to existing water users, local aquifers, or any other natural features are expected as a result of the proposed dewatering.

Geotechnical concerns related to dewatering were beyond the scope of this assessment. V.A. Wood Associates Ltd. previously completed a geotechnical investigation at the Site.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

Table of Contents

1.0	Introduction.....	1
2.0	Scope of Work	2
3.0	Site Description	3
3.1	Topography and Physical Setting.....	3
3.2	Geology	4
3.3	Hydrogeology	5
4.0	Hydrogeological Work Program.....	6
4.1	Borehole Drilling and Well Construction.....	6
4.2	Groundwater Elevations, Flow Directions, and Hydraulic Gradients.....	6
4.3	Hydraulic Conductivity Tests	6
5.0	Construction Dewatering	7
5.1	Construction Excavation Activities	7
5.2	Need for Dewatering.....	8
5.3	Zone of Influence for Excavation Dewatering.....	8
5.4	Pumping Requirements for Excavation Dewatering.....	8
5.5	Permitting for Water Takings	9
5.6	Discharge Water Quality.....	9
5.7	Discharge Options	9
6.0	Hydrogeological Impact Assessment	10
6.1	Groundwater Quantity	10
6.2	Groundwater Quality.....	10
6.3	Monitoring and Mitigation	11
7.0	Summary	12
8.0	Statement of Limitations and Conditions for Report.....	12
8.1	Complete Report	12
8.2	Basis of Report.....	12
8.3	Use of the Report	12

LIST OF TABLES

Table A: Site Geology.....	5
Table B: Calculated Hydraulic Conductivities.....	7

LIST OF FIGURES

Figure 1	Site Location and Investigation Locations
Figure 2	Site Groundwater Elevations
Figure 3	Estimated Zone of Influence

LIST OF APPENDICES

Appendix 1	Site Development Plans
Appendix 2	Borehole Logs and Well Construction Details
Appendix 3	Information Pertaining to Sophia Creek and Other Area Drainage Features
Appendix 4	Well Construction Details Summary and Groundwater Level Monitoring Results
Appendix 5	Single Well Response Test Results
Appendix 6	Dewatering Calculations
Appendix 7	Groundwater Quality Laboratory Results
Appendix 8	Groundwater Quality Results Compared to PWQO Criteria

List of Acronyms

asl	-	above sea level
bgs	-	below ground surface
BH##	-	borehole
ESA	-	Environmental Site Assessment
HIA	-	Hydrogeological Impact Assessment
LSRCA	-	Lake Simcoe Region Conservation Authority
MECP	-	Ministry of the Environment, Conservation and Parks
MW##	-	monitoring well
PGL	-	PGL Environmental Consultants
PWQO	-	Provincial Water Quality Objectives
WHPA	-	Wellhead Protection Area

1.0 INTRODUCTION

PGL Environmental Consultants (PGL) conducted a Hydrogeological Impact Assessment (HIA) at 136 Bayfield Street and 14 Sophia Street West, Barrie, Ontario (the Site). This HIA was completed on behalf of Rockap Holdings Inc. (the Client) as part of their plan to redevelop the Site. The Site location is shown in Figure 1.

Redevelopment of the Site will involve constructing a 12-storey, mixed-use condominium building with 282 residential apartments, 10 live-work units, and ground-floor commercial space. Eight ground-related units fronting Maple Avenue will be constructed as part of the redevelopment plan. The redevelopment will also include structured parking, along with amenity areas such as a large outdoor courtyard and private balconies and terraces. No underground levels are proposed as part of the redevelopment. Future land use will be mixed-use residential and commercial. Redevelopment plans are included as Appendix 1.

The property is currently improved with a four-storey commercial building and a two-storey commercial building. The current land use is commercial. These buildings will be removed as part of the redevelopment efforts at the Site.

The Site falls within the Sophia Creek watershed. Within this watershed, Sophia Creek drains into the storm sewer system. A portion of Sophia Creek, as contained within the storm sewer system, runs along the southern boundary of the Site (see Figure 1 and Appendix 3). The presence of this feature in close proximity to the proposed development represents an important consideration for Site dewatering and discharge activities.

Initial hydrogeological field investigation work was completed at the Site in 2019. Concurrently, V.A. Wood Associates Ltd. (V.A. Wood) completed a preliminary geotechnical investigation of the Site. As part of this investigation work, five boreholes (BH1 to BH5) were drilled and completed as monitoring wells (MW1 to MW5). Borehole logs for these wells are included as Appendix 2.

Based in part on the findings of the initial studies, as well as on the close proximity of Sophia Creek, the redevelopment plans for the Site were altered in 2020 to remove all subsurface levels and incorporate parking in aboveground levels. The HIA (PGL, 2021)¹ and geotechnical report (V.A. Wood, 2022)² were updated to reflect these changes.

PGL (2020A)³ also completed a regulatory Phase 1 Environmental Site Assessment (ESA) for the Site. PGL identified four Areas of Potential Environmental Concern related to the onsite importation of fill of unknown quality, offsite operation of a dry-cleaning facility to the south of the Site, offsite retail gasoline distribution to the south of the Site, and offsite storage of fuels in tanks to the north of the Site. Based on these findings, PGL recommended a Phase 2 ESA for the Site.

¹ PGL (2021) *Hydrogeological Impact Assessment [for 136 Bayfield Street and 14 Sophia Street West[,] Barrie, ON]*. June 2021, pp. 86.

² V.A. Wood (2022) *Preliminary Geotechnical Investigation Proposed Condominium [-] 136 Bayfield Street and 14 Sophia Street West[,] Barrie, Ontario]*. October 2022, pp. 38.

³ PGL (2020A) *Phase 1 Environmental Site Assessment [for 136 Bayfield Street and 14 Sophia Street West[,] Barrie, ON]*. April 2020, pp. 279.

PGL (2020B)⁴ subsequently completed a regulatory Phase 2 ESA for the Site. Investigation work included drilling 15 boreholes (BH101 to BH107 and BH201 to BH208) to maximum depths of 7.6m below ground surface (bgs). Four of these boreholes were completed as monitoring wells (BH101M to BH103M and BH205M) to depths of 4m bgs. Additionally, groundwater samples were collected from pre-existing monitoring wells MW3 and MW5. All collected samples met the applied Site Condition Standards with the exception of:

- Fill material in the northern portion of the Site that had elevated levels polycyclic aromatic hydrocarbons; and
- Groundwater in the southern portion of the Site that had an elevated level of cadmium.

The identified impacts will need to be addressed prior to submission for a Record of Site Condition, either through remediation or a Risk Assessment. It is expected that Site development activities will incorporate remedial excavation work.

This HIA report represents an update to the previous HIA. It was completed to incorporate new Site details and address comments from the Client and the regulator.

2.0 SCOPE OF WORK

The HIA was completed by PGL to assess the following for the Site: (1) groundwater conditions; (2) construction dewatering requirements; (3) long-term dewatering requirements; (4) dewatering discharge options; and (5) potential effects that may result from any dewatering and discharge.

To address the above objectives, PGL completed the following scope of work:

1. Contracted V.A. Wood to complete a geotechnical investigation (V.A. Wood, 2022)⁵ including drilling and installing five monitoring wells (borehole logs and monitoring well records are included as Appendix 2);
2. Reviewed and evaluated existing Site information, including:
 - a. Site redevelopment plans (Appendix 1);
 - b. Results of the geotechnical study (V.A. Wood, 2022)⁶ including borehole logs and monitoring well records (Appendix 2);
 - c. Information pertaining to the surrounding watershed and associated infrastructure (Appendix 3), including:
 - i. Drainage features for the surrounding area (C.C. Tatham & Associates Ltd., 2017); and
 - ii. Cross-sections of Sophia Creek showing current drainage features (City of Barrie Municipal Works Department, 2002) and proposed upgrades (Barrie Engineering Department, 2020);
 - d. Available Ministry of the Environment, Conservation and Parks (MECP) well records, Ministry of Natural Resources and Forestry Heritage maps, Lake Simcoe Region Conservation Authority (LSRCA) maps, and the City of Barrie Official Plan (pertinent figures included in Appendix 3);

⁴ PGL (2020B) *Phase 2 Environmental Site Assessment [for 136 Bayfield Street and 14 Sophia Street West]*, Barrie, ON]. April 2020, pp. 202.

⁵ See footnote 2.

⁶ *Ibid.*

5. Developed the new wells;
6. Collected manual groundwater level measurements at MW1 to MW5 (when accessible) during five monitoring events from May 2019 to June 2021;
7. Completed single well response tests at MW1 to MW5 to estimate hydraulic conductivity values for the relevant subsurface materials;
8. Estimated the zone of influence resulting from any required excavation dewatering at the Site;
9. Estimated pumping rates required for any required excavation dewatering at the Site;
10. Estimated the zone of influence resulting from any long-term dewatering at the Site, if such dewatering is required;
11. Estimated pumping rates related to any long-term dewatering at the Site, if such dewatering is required;
12. Collected one groundwater sample and submitted this sample for comparison to the City of Barrie Sewer Use Bylaw criteria;
13. Identified dewatering discharge options based on the groundwater sample results; and
14. Assessed whether dewatering activities may adversely affect any existing users or environmentally sensitive features.

This report has been prepared in an effort to address the relevant requirements of the Ontario *Water Resources Act*, Ontario Regulation 387/04, and Toronto Municipal Code Chapter 681 – Sewers.

3.0 SITE DESCRIPTION

The Site is a rectangular property on the west side of Bayfield Street, immediately north of Sophia Street West. It is bounded to the west by Maple View Drive, to the north by an institutional property (part of Georgian College), to the east by Bayfield Street, and to the south by Sophia Street West. The Site is 8,860m² (0.886ha).

The Site is improved with a four-storey commercial building on the northeast side and a two-storey commercial building on the southwest side. Most of the remaining Site area is asphalt-covered for parking. There are small, landscaped areas scattered across the Site. The Site is currently used for commercial purposes.

Surrounding properties are used primarily for commercial, institutional, and residential. This includes several larger buildings along Bayfield Street, with smaller single-family homes in the surrounding area.

3.1 Topography and Physical Setting

The Site is located at the intersection of the Simcoe Uplands and the Simcoe Lowlands physiographic regions, with the Simcoe Uplands covering the northern portion of the Site and the Simcoe Lowlands covering the southern portion of the Site (Chapman and Putnam, 1984).⁷ The physiographic landform type is identified as drumlinized till plains in the northern portion of the Site (Simcoe Uplands) and sand plains in the southern portion of the Site (Simcoe lowlands). The

⁷ Chapman, L.J., and Putnam, D.F. (1984) *The Physiography of Southern Ontario*; Ontario Geological Survey. Special Volume 2, 270p. Accompanied by Map P.2715 (coloured), scale 1:600 000.

boundary between the northern and southern portions of the Site is interpreted as a shorecliff, likely associated with a previous shoreline for glacial Lake Algonquin.

The ground surface elevation at the Site ranges from roughly 244m above sea level (asl) in the northern portion of the Site to 235m asl in the southern portion of the Site (Appendix 1). The surrounding lands generally slope toward the southeast, toward Kempenfelt Bay, the western arm of Lake Simcoe. Kempenfelt Bay is approximately 600m south of the Site. The slope at the Site is particularly pronounced, likely due to the presence of the shorecliff at the Site.

Sophia Creek runs adjacent the southern part of the Site. The creek is contained within the storm sewer system, specifically a culvert, in the vicinity of the Site. The culvert runs along the north side of Sophia Street, ending approximately 300m east of the Site and 40m west of the Site (Appendix 3).

The City of Barrie Official Plan (2022)⁸ shows a Natural Heritage Area at the southern part of the Site. The Natural Heritage Area relates to Sophia Creek. This portion of the Site is classified as 'Level 1 with Existing Development.'

Based on a review of MECP (2021)⁹ records, the Site falls within:

- A Source Protection Area associated with Lake Simcoe;
- A Wellhead Protection Area (WHPA) with a 5-to-25-year travel time (WHPA-D) to municipal wells No. 11, 12, 14, and 15, located near the shore of Kempenfelt Bay;
- An Issues Contributing Area related to the potential for sodium and chloride in groundwater to adversely affect municipal wells No. 11, 12, 14, and 15, located near the shore of Kempenfelt Bay;
- A Significant Groundwater Recharge Area; and
- A Highly Vulnerable Aquifer Area.

The southern part of the Site is identified as a Regulated Area by the LSRCA (Appendix 3), due to the presence of Sophia Creek. As such, construction activities at the Site will very likely require a permit from the LSRCA.

No further Natural Resources Heritage Sites, Area of Natural and Scientific Research sites, Oak Ridges Moraine, Niagara Escarpment, or Environmentally Sensitive areas were identified within 250m of the Site.

3.2 Geology

Geological maps indicate that the surficial materials in the southern portion of the Site consist of coarse-textured glaciolacustrine deposits of sand, gravel, minor silt and clay associated with a relic shoreline, while the surficial materials in the northern portion of the Site consist of stone-poor, sandy silt to silty sand-textured till (Ontario Geological Survey, 2010)¹⁰. Review of borehole logs at the Site suggest that surficial materials at the Site generally range from silty sand till to sandy silt till, with a thin layer (approximately 1m thick) of gravelly sand noted in most boreholes (this material is

⁸ City of Barrie (2022) *Official Plan 2051*. February 15, 2022, pp. 230.

⁹ MECP (2021) *Source Protection Information Atlas*. Available online: <https://www.liaoapplications.lrc.gov.on.ca/SourceWaterProtection/> [accessed October 12, 2022].

¹⁰ Ontario Geological Survey (2010) *1:50 000 Scale Surficial Geology of Southern Ontario*. OGSEarth (Miscellaneous Release - Data 128-Rev).

generally interpreted as fill, although it may represent reworked native material). The onsite drilling results are broadly consistent with the regional mapping.

Overburden at the Site is underlain by limestone and shale of the Verulam Formation, part of the Simcoe Group (Ontario Geological Survey, 2011)¹¹. Based on a review of available borehole records, the depth to bedrock is likely on the order of 100m at the Site (Ontario Geological Survey, 2006).¹²

Based on a review of boreholes completed at the Site (Appendix 2), the following simplified overburden units were identified:

Table A: Site Geology

Stratigraphy	Approximate Typical Depths (m bgs)
Sand to Gravelly Sand Fill	0 to 1.5
Silty Sand Till to Sandy Silt Till	1.5 to 15.4 (max. investigated depth)

Unit depths, thicknesses, and compositions were variable across the Site; however, the above listed units were generally continuous across the Site (where investigated).

3.3 Hydrogeology

For the purposes of this study, Site hydrogeology was separated into two systems:

- A shallow system incorporating the upper 1.5m of sand to gravelly sand and fill (Shallow Sand System); and
- A deeper system incorporating the silty sand till to sandy silt till (Deep Till System).

All the monitoring wells installed at the Site are screened over the Deep Till System; however, the shallowest monitoring well, MW3, may be influenced by the Shallow Sand System.

Given the presence of a shallow layer of coarse material overlying a finer and denser till material, perched groundwater systems may occur at the Site. Groundwater flow in both systems would be expected to flow toward the south to southeast; however, groundwater flow directions in perched systems are often variable. Additionally, past development activities at the Site and surrounding properties may have introduced preferential pathways that affect groundwater flow directions.

¹¹ Ontario Geological Survey (2011) *1:250 000 Scale Bedrock Geology of Ontario*. OGSEarth (Miscellaneous Release - Data 126-Rev 1).

¹² Ontario Geological Survey (2006) *Bedrock topography and overburden thickness mapping, Southern Ontario*. OGSEarth (Miscellaneous Release--Data 207).

4.0 HYDROGEOLOGICAL WORK PROGRAM

The following sections outline the collection of hydrogeological data at the Site.

4.1 Borehole Drilling and Well Construction

In May 2019, V.A. Wood drilled five boreholes at the Site. Each of these boreholes was completed as a monitoring well. Monitoring well details are summarized in Table A4.1 of Appendix 4. Borehole logs and monitoring well records are included in Appendix 2. All monitoring wells were developed prior to further testing or monitoring.

4.2 Groundwater Elevations, Flow Directions, and Hydraulic Gradients

PGL measured groundwater levels at all of monitoring wells MW1 to MW5 (when accessible) at the Site during five monitoring events from May 2019 to June 2021. Results of these events are included in Table A4-2 of Appendix 4. Results are shown graphically in Table A4-3 of Appendix 4. Results for May 16, 2019, are shown on Figure 2.

In general, water levels showed broadly similar trends in each of the wells. Water levels fluctuated less than 1m at each well, based on the collected results.

The horizontal groundwater flow gradient was estimated at 0.04, by comparing results in the northern portion of the Site (i.e., at MW4) to those in the southern portion of the Site (i.e., at MW1). This result is consistent with a broadly southward groundwater flow direction.

The vertical gradient could not be readily estimated as no shallow well was in close proximity to the lone deep well, MW5. That said, water levels at MW5 appear broadly consistent with the prevailing trend in the shallow wells, suggesting that any vertical gradient is likely modest.

4.3 Hydraulic Conductivity Tests

Single well response tests (commonly called “slug tests”) were completed at each of the monitoring wells. Two tests were completed at each well, except for monitoring well MW5, where only one test was completed due to the slow response time in this well.

Results were collected using data loggers supplemented with manual measurements, with data collected both before and during the test. The results were analyzed using the Bouwer-Rice (1976)¹³ method, applying the normalized head ranges recommended by Butler (2008)¹⁴, where appropriate. The anisotropy ratio (i.e., vertical hydraulic conductivity over horizontal hydraulic conductivity) was estimated at 0.1 for the silty sand till to sandy silt till (i.e., all wells), based on literature values for similar materials (e.g., Fan and Miguez-Macho, 2010).¹⁵

¹³ Bouwer, H. and Rice, R.C. (1976) *A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells*. Water Resources Research, 12, 423-428.

¹⁴ Powers, J.P.; Corwin, A.B.; Schmall, P.C.; and Kaeck, W.E. (2007) *Construction Dewatering and Groundwater Control: New Methods and Applications*. Jon Wiley and Sons (Third Edition).

¹⁵ Fan, Y. and Miguez-Macho, G. (2010) *A simple hydrologic framework for simulating wetlands in climate and earth system models*. Climate Dynamics 37(1):253-278 (July 2010).

The calculated hydraulic conductivities are shown below in Table B with the individual test reports included in Appendix 5. Where two test were completed, the reported hydraulic conductivity value is the geometric mean of the two test results.

Table B: Calculated Hydraulic Conductivities

Well	Test	Hydraulic Conductivity (m/s)	Reported Hydraulic Conductivity (m/s)	Interval
MW1	1	7.3E-07	7.4E-07	Intermediate
	2	7.5E-07		
MW2	1	4.8E-07	5.7E-07	Intermediate
	2	6.7E-07		
MW3	1	7.9E-06	8.1E-06	Shallow
	2	8.3E-06		
MW4	1	3.4E-07	3.9E-07	Intermediate
	2	4.5E-07		
MW5	1	6.9E-08	6.9E-08	Deep

The hydraulic conductivity values summarized above are broadly consistent with the expected ranges for the corresponding geological materials (e.g., Domenico and Schwartz, 1990)¹⁶, except for the value recorded for MW3. The hydraulic conductivity value for this well is unusually high for a silty sand to sandy silt till unit and may reflect an influence from shallow coarser materials.

The geometric mean of the hydraulic conductivity values for the shallow and intermediate wells was calculated at 1.1E-06m/s. This value was used in all dewatering calculations. It is interpreted as adequately representative for the mix of shallow materials at the Site.

5.0 CONSTRUCTION DEWATERING

The following sections outline considerations specific to construction dewatering at the Site.

5.1 Construction Excavation Activities

Based on the most recent development plans provided by the Client (Appendix 1), the excavation will effectively cover the whole Site, or roughly 8,860m² (0.886ha). The lowest portion of the ground floor of the building will occur at an elevation of 236.15m asl. Given that slope at the Site, regrading activities will be required to level the terrain. To allow for the construction of the building foundation and associated utilities, excavation work will extend 2 to 3m below grade (Appendix 1). This equates to a minimum elevation of 233.15m asl. Based on the provided drawings, it is our understanding that elements of the building foundation will extend to broadly comparable depths and elevations.

¹⁶ Domenico, P.A.; and Schwartz, F.W. (1990) *Physical and Chemical Hydrogeology*. John Wiley and Son, New York, 824 pp.

The percentage of the Site to be developed as impermeable is expected to be 90.7%. This represents an improvement relative to current Site conditions, where 91.5% of the Site is impermeable (PGL, 2022)¹⁷.

5.2 Need for Dewatering

Based on the water levels measured at the Site, excavation dewatering will be required. It is noted that, due to the regrading activities required to level out the terrain at the Site, current water levels may not reflect water levels post-regrading. As such, peak water levels at the Site were assumed to occur at the proposed regraded ground level (i.e., 236.15m asl) as a broadly conservative assumption.

Long-term dewatering will not be required at the Site as the proposed structures will be slab-on-grade. As such, no estimates for the zone of influence or required dewatering rate are provided for long-term dewatering.

5.3 Zone of Influence for Excavation Dewatering

PGL calculated the zone of influence estimate for excavation dewatering using a water balance method after Marinelli and Niccoli (2000)¹⁸. This method relies on the assumption that the total groundwater infiltration rate within the radius of influence must equal the pumping rate of groundwater from the excavation, with the radius of influence set to ensure that these two rates balance.

The estimated zone of influence for excavation dewatering was estimated at 133m from the edge of excavation. Calculations and assumptions pertaining to the zone of influence estimate are shown in Appendix 5.

As a precautionary measure, a zone of influence of 300m was used to evaluate potential offsite impacts. This zone of influence is illustrated on Figure 3.

5.4 Pumping Requirements for Excavation Dewatering

PGL estimated the dewatering requirements for excavation work at the Site using the Marinelli and Niccoli (2000)¹⁹ equation for flow to an excavation. This method calculates steady-state radial flow to the sides of an excavation as well as upwelling through the base of the excavation. This method also relies on the zone of influence values discussed in Section 5.3.

The excavation dewatering rate was estimated at 45,00L/day. A rate of 225,000L/day (incorporating a 5X safety factor) is recommended for permitting purposes.

Calculations and assumptions related to the excavation dewatering calculations are shown in Appendix 6.

¹⁷ PGL (2022) *Water Balance Study [for 136 Bayfield Street and 14 Sophia Street West[,] Barrie, ON]*. October 2022, pp. 26.

¹⁸ Marinelli, F. and Niccoli W. (2000) *Simple analytical equations for estimating ground water inflow to a mine pit*. Groundwater 38:2 (311-134), March-April 2000.

¹⁹ *Ibid.*

5.5 Permitting for Water Takings

In Ontario, groundwater takings for construction dewatering at or above 50,000L/day but less than 400,000L/day require registration on the Environmental Activity and Sector Registry. An Environmental Activity and Sector Registry will likely be required for excavation dewatering work at the Site.

5.6 Discharge Water Quality

One groundwater sample was collected at the Site for comparison to the City of Barrie sewer use bylaw criteria for (1) sanitary and combined sewer discharge; and (2) storm sewer discharge. Sample results were also compared to selected Provincial Water Quality Objectives (PWQO) as Sophia Creek runs through the storm sewer system near the Site.

The sample was collected on July 19, 2019, at MW4. PGL interprets this sampling location as adequately representative of expected discharge water quality. Sample results and supporting documentation are included as Appendix 7. Tables comparing the results to selected PWQO criteria are included in Appendix 8.

The sample from MW4 met all criteria when compared to the City of Barrie sewer use bylaw criteria for sanitary and combined sewer discharge. The sample from MW4 also met all criteria when compared to the City of Barrie sewer use bylaw criteria for storm sewer discharge.

The sample from MW4 met all PWQO criteria for which it was tested; however, the detection limits for certain parameters exceeded the corresponding PWQO criterion. These parameters included:

- Six polycyclic aromatic hydrocarbons, specifically anthracene, benzo(a)anthracene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and fluoranthene;
- Four metals, specifically cobalt, copper, silver, and zinc; and
- One pesticide, specifically hexachlorobenzene.

It is interpreted that the above-listed parameters are unlikely to represent contaminants of concern at the Site.

Confirmatory sampling to evaluate water quality (particularly with respect to PWQO criteria and/or other LSRCA requirements) should be completed once the dewatering system for the Site is in place.

5.7 Discharge Options

If discharge is planned to the sanitary sewer system, no treatment is anticipated; however, appropriate confirmatory samples and a discharge permit from the City of Barrie would be required.

If discharge is planned to the storm sewer system, no treatment is anticipated to meet City of Barrie discharge requirements; however, as Sophia Creek travels through the storm sewer system near the Site, Site-specific discharge requirements should be confirmed with the LSRCA. Comparison of groundwater sample results to selected PWQO criteria did not identify any exceedances (Appendix 8). Once Site-specific requirements are confirmed, and the dewatering and discharge system is in place, appropriate confirmatory samples should be collected to evaluate actual discharge water quality. A discharge permit from the City of Barrie would also be required.

6.0 HYDROGEOLOGICAL IMPACT ASSESSMENT

PGL assessed potential impacts to groundwater quality and quantity because of the proposed excavation dewatering work.

6.1 Groundwater Quantity

Impacts to groundwater quantity are expected to be largely restricted to the shallow materials (i.e., less than 1.5m deep) at the Site. These materials include fill, sand, gravelly sand, and the upper portion of the silty sand till to sandy silt till. This shallow system is unlikely to be used as a drinking water source locally.

Based on available mapping and cross-sections for the area (LSRCA, 2015)²⁰, the Site likely overlies Newmarket Till. Newmarket Till is interpreted to overlie the uppermost aquifer in the area, identified as Aquifer A1. Given that borehole logs from the Site identify till material extending upwards of 15m bgs, and dewatering activities will occur at much shallower depths (on the order of 1.5m bgs), substantive impacts to any underlying aquifers are not expected.

A water well search was conducted within 300m from the Site, which is greater than the anticipated zone of influence from either excavation or long-term dewatering. Twenty-three water well records were identified within 300m of the Site (Figure 3). None of the 23 wells are designated as groundwater drinking wells. It is expected that all properties within 300m of the Site are municipally serviced with drinking water.

Impacts to surface water features, notably Sophia Creek, may occur as a result of regrading and/or excavation dewatering activities at Site. While Sophia Creek runs through a culvert in the immediate vicinity of the Site, the creek is exposed approximately 40m west of the Site. This location is within the predicted zone of influence. Drawdown at this location is estimated to be on the order of 1.4m²¹, although it should be noted that this estimate may be heavily influenced by changes in subsurface materials and ground surface elevation. It is also unclear whether Sophia Creek is influenced by groundwater elevations in this area (i.e., the creek may be a perched feature separated from the water table).

Monitoring should be undertaken during dewatering activities at the Site to evaluate whether such activities are adversely affecting Sophia Creek. Mitigation measures (including discharge to the creek to help maintain flow) may be required.

No other environmentally sensitive receptors were identified within 300m of the Site.

6.2 Groundwater Quality

Excavation dewatering efforts at the Site are not expected to substantively degrade water quality at the Site and surrounding areas. This assumes that there is adequate capture of groundwater entering the excavation and that captured water is adequately treated and discharged in an appropriate manner.

²⁰ LSRCA (2015) *Approved Assessment Report: Lake Simcoe and Couchiching-Black River Source Protection Area [-] Part 1: Lake Simcoe Watershed*. Available online: <https://ourwatershed.ca/resources/reports-and-plans/assessment-reports/> [accessed October 12, 2022].

²¹ Calculated using the Dupuit-Forchheimer equation for horizontal unconfined flow and solving for drawdown 40m from the edge of the excavation.

Discharge to the storm sewer system, if required, is unlikely to adversely affect groundwater conditions at the Site. As discussed previously in Sections 5.6 and 5.7 of this report, such discharge may be held to more stringent standards (e.g., PWQO criteria) than are typical for most sites in the area (i.e., City of Barrie storm sewer discharge criteria).

PGL (2020B)²² previously completed a Phase 2 ESA for the Site. All collected samples met the applied Site Condition Standards except for:

- Fill material in the northern portion of the Site, which had elevated levels polycyclic aromatic hydrocarbons; and
- Groundwater in the southern portion of the Site, which had an elevated level of cadmium.

Such contamination could adversely affect water quality at the Site, if not properly managed. It is expected that remedial excavation work will be completed as part of Site redevelopment activities, and such efforts will help to reduce impacts to soil and groundwater.

6.3 Monitoring and Mitigation

With respect to potential impacts to groundwater quantity as a result of the proposed short-term dewatering, potential adverse affects largely relate to Sophia Creek, and in particular, nearby sections of the creek that are not contained within a culvert. Water levels in the creek should be monitored at regular intervals (i.e., weekly) both before and during the proposed dewatering. Water levels should be measured at an accessible point upstream of the Site (i.e., at the exposed portion of the creek approximately 150m west of the Site) and downstream (i.e., at the exposed section of the creek approximately 40m east of the Site). Specific details of this monitoring should be confirmed with the LSRCA and/or other regulatory parties.

With respect to potential impacts to water quality as a result of Site discharge, specific water quality monitoring requirements should be determined once the discharge methodology (e.g., to the storm sewer system or the sanitary system) is confirmed. Specific details of this monitoring should be confirmed with the LSRCA and/or other regulatory parties.

With respect to existing contamination at the Site, it is expected that remedial excavation work will be completed as part of Site redevelopment activities, and such efforts will help to reduce impacts to soil and groundwater. Contaminant management mitigation measures will involve removing excavated soil and groundwater and ensuring it is appropriately disposed of offsite in accordance with all relevant regulations. Efforts will also be made to ensure that any potential preferential pathways formed as part of the development process (e.g., gravel-filled infrastructure lines) are identified and addressed in accordance with best practices (e.g., use of low hydraulic conductivity barriers at set intervals within such features).

Assuming the remedial excavation work is successful in addressing existing contamination, the contaminant monitoring measures will consist of confirmatory sampling consistent with the requirements of Ontario Regulation 153/04 will be completed. As an alternative, a Risk Assessment, consistent with the requirements of Ontario Regulation 153/04, could be completed to address any contamination that is not adequately addressed through the remedial excavation work.

²² See footnote 4.

7.0 SUMMARY

The results of the HIA indicate the following for the Site:

- Dewatering activities at the Site will largely be restricted to shallow materials at the Site (roughly the upper 2m of the subsurface);
- The excavation dewatering rate was estimated at 45,000L/day. A rate of 225,000L/day (incorporating a 5X safety factor) is recommended for permitting purposes;
- Long-term dewatering will not be required as the proposed structures will be slab-on-grade;
- Groundwater quality results indicate that discharge would likely meet the City of Barrie criteria for discharge to the sanitary sewer system or the storm sewer system;
- An Environmental Activity and Sector Registry will likely be required for dewatering activities;
- Groundwater quality results did not exceed any PWQO standards for which the sample was tested (detection limits for certain parameters exceeded the corresponding standards);
- Dewatering activities may lower groundwater levels beneath exposed portions of Sophia Creek (i.e., sections not running through a culvert), and therefore, dewatering has the potential to reduce baseflow in the creek;
- Monitoring requirements to evaluate potential impacts to Sophia Creek should be confirmed with the LSRCA prior to dewatering activities; and
- No adverse effects to existing water users, local aquifers, or any other natural features are expected as a result of the proposed dewatering.

8.0 STATEMENT OF LIMITATIONS AND CONDITIONS FOR REPORT

8.1 Complete Report

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to PGL by the Client, communications between PGL and the Client, and any other reports, proposals or documents prepared by PGL for the Client relative to the specific site described herein, all of which together constitute the Report.

In order to properly understand the suggestions, recommendations and opinions expressed herein, reference must be made to the whole of the Report. **PGL is not responsible for use by any part of portions of the Report without reference to the whole report.**

8.2 Basis of Report

The Report has been prepared for the specific site and purposes that are set out in the contract between PGL and the Client. The findings, recommendations, suggestions, or opinions expressed in the Report are only applicable to the site and purposes in relation to which the Report is expressly provided, and then only to the extent that there has been no material alteration to or variation from the information provided or available to PGL.

8.3 Use of the Report

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. No other party may use or rely upon the Report or any portion thereof without PGL's written consent, and such use shall be on terms and conditions as PGL may expressly approve. Ownership in and copyright for the contents of the Report belong to PGL. Any use which a third party makes of the Report, is the sole responsibility of such third party. **PGL accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report.**

Respectfully submitted,

PGL ENVIRONMENTAL CONSULTANTS

Per:



Michael Howlett, M.Sc., M.B.A., P.Geo.
Hydrogeologist

A handwritten signature in blue ink, appearing to read "Christina Trotter".

Christina Trotter, M.Sc., P.Geo.
Senior Hydrogeologist

MRH/CET/neg/ncb/neg
\\pglonfile1\ON Project Files\5600-5699\5689 - Rockap Holdings Inc\02-01_Client Docs\HIA -v10\r-5689-02-02-HIA-v10.docx

Figures

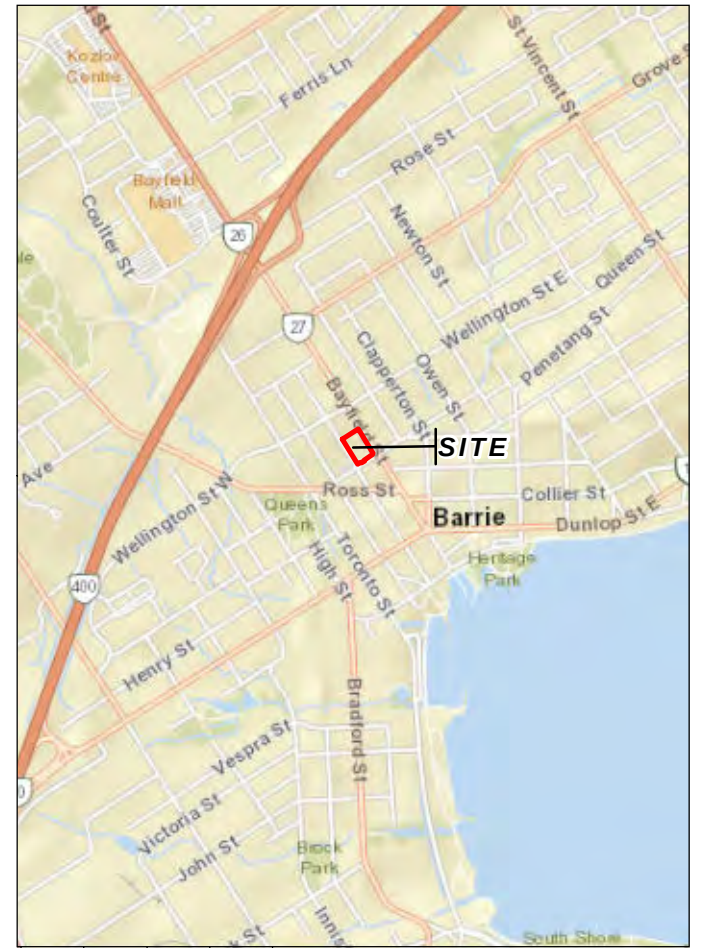
\\PGL\FILE\N\ION Project Files\5600-5699\5689 - Rockap Holdings Inc\02-01\Graphics\5689\0201_HIA_0010_SiteLocation.mxd



Parcel boundary and site features are presented for discussion purposes only.

0 1:600 35 m

2020 orthoimage and street map from ESRI
Parcel data from City of Barrie webGIS
NAD 1983 UTM Zone 17N



0 1 Km

-  Site Boundary (Approximate)
-  Monitoring Well

SITE LOCATION			
136 Bayfield Street & 14 Sophia Street West, Barrie, ON			
ROCKAP HOLDINGS INC.			
	File No.:	Dwg No.:	FIGURE 1
	5689-02.01	HIA_0010	
	Date:	Drawn by:	
	OCT 2022	RSS	

\\PGL\FILE\N\ION Project Files\5600-5699\5689 - Rockap Holdings Inc\02-01\Graphics\5689\201_HIA_0020_GroundwaterElevations_Gradient_May_19_2019.mxd



Parcel boundary and site features are presented for discussion purposes only.

0 1:600 35 m

2020 orthoimage from ESRI
Parcel data from City of Barrie webGIS
NAD 1983 UTM Zone 17N

- Site Boundary (Approximate)
- Groundwater Contour (m asl)
- Groundwater Flow Direction
- Groundwater Elevation (m asl)
- Monitoring Well

GROUNDWATER ELEVATIONS AND GRADIENT (MAY 19, 2019)

136 Bayfield Street & 14 Sophia Street West, Barrie, ON

ROCKAP HOLDINGS INC.



File No.:	Dwg No.:	FIGURE 1
5689-02.01	HIA_0010	
Date:	Drawn by:	
OCT 2022	RSS	

\\PGL\ONFILE\ION Project Files\5600-5689\5689 - Rockap Holdings Inc\02-01\Graphics\5689\0201_HIA_0030_RadiusOfInfluence.mxd



Parcel boundary and site features are presented for discussion purposes only.

0 1:3,800 240 m

2020 orthoimage from ESRI
Parcel data from City of Barrie webGIS
NAD 1983 UTM Zone 17N

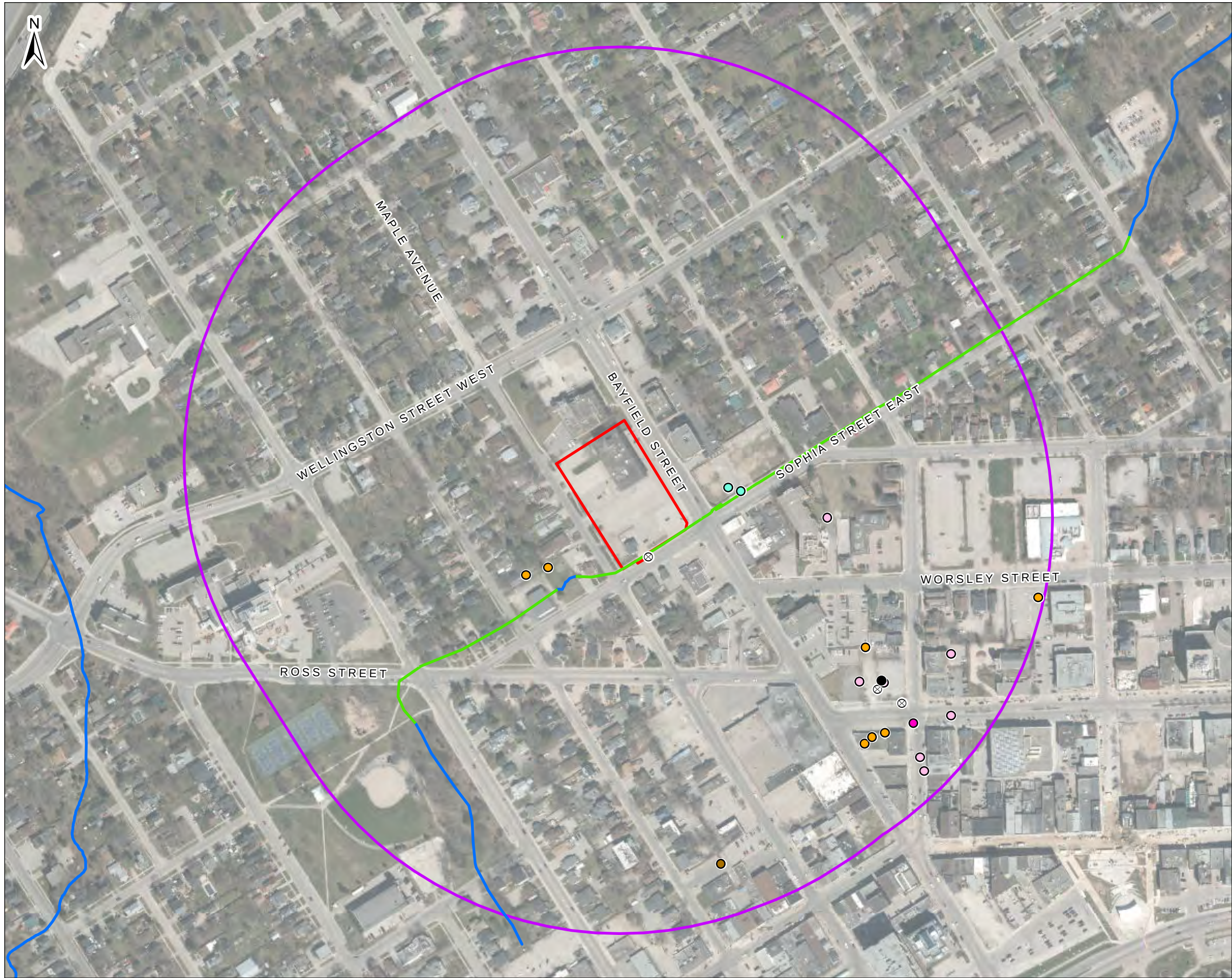
- Site Boundary (Approximate)
- Estimated Zone of Influence - 300m

Ontario Well Record Database

- Abandoned
- Monitoring Well
- Monitoring Well/Test Hole
- Not Classified
- Observation Well
- Observation/Monitoring Well
- Test Hole

RADIUS OF INFLUENCE			
136 Bayfield Street & 14 Sophia Street West, Barrie, ON			
ROCKAP HOLDINGS INC.			
	File No.:	Dwg No.:	FIGURE
	5689-02.01	HIA_0030	
	Date:	Drawn by:	
	OCT 2022	RSS	

\\PGL\FILE\ION Project Files\5600-5689\5689 - Rockap Holdings Inc\02-01\Graphics\5689\201_HIA_0030b_RadiusOfInfluence.mxd



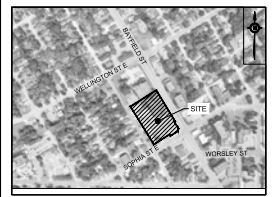
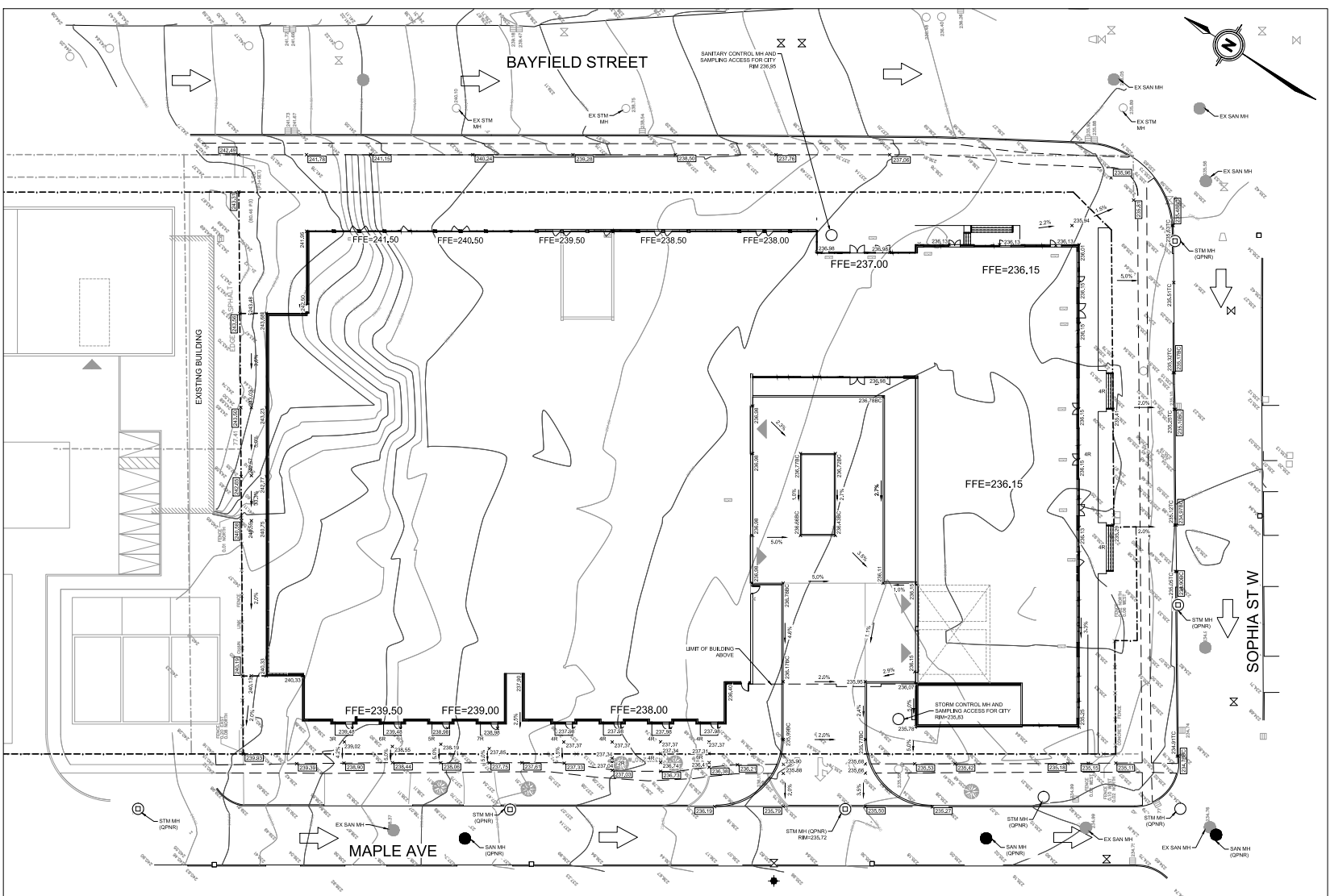
Parcel boundary and site features are presented for discussion purposes only.

2020 orthoimage from ESRI
Parcel data from City of Barrie webGIS
NAD 1983 UTM Zone 17N

- Site Boundary (Approximate)
 - Estimated Zone of Influence - 300m
 - Watercourse (Daylighted)
 - Watercourse (Piped)
- Ontario Well Record Database**
- Abandoned
 - Monitoring Well
 - Monitoring Well/Test Hole
 - Not Classified
 - Observation Well
 - Observation/Monitoring Well
 - Test Hole

RADIUS OF INFLUENCE			
136 Bayfield Street & 14 Sophia Street West, Barrie, ON			
ROCKAP HOLDINGS INC.			
	File No.:	Dwg No.:	FIGURE
	5689-02.01	HIA_0030b	
	Date:	Drawn by:	
	OCT 2022	RSS	

Appendix 1
Site Development Plans



KEY PLAN
1:1 SCALE
CITY OF BARRIE, ONTARIO
SEE ABBREVIATIONS BELOW

- LEGEND
- 200.00 ± 0.25% PROPOSED ITEMS
 - 200.00 ± 0.25% EXISTING ITEMS
 - LIMIT OF PROPERTY LINE
 - LIMIT OF UNDERGROUND STRUCTURE
 - ▲ BUILDING ENTRANCE
 - ▲ PROP. ELEVATION TO MATCH EXISTING
 - EMERGENCY OVERLAND FLOW ROUTE
 - SANITARY MH
 - STM MH / CBMH / DCBMH / CDS
 - CB / CDS / AD / TD
 - HYDRANT / SAMOSE / METER CHAMBER
 - ⊗ VALVE BOX / VALVE CHAMBER
 - FUTURE ROAD WIDENING
 - FUTURE ROAD WIDENING SETBACK

BENCHMARK: ELEVATIONS ARE GEODETIC IN METRES, AND DERIVED FROM: CITY OF BARRIE DATUM

BEARING: BEARINGS ARE UTM GRID AND ARE REFERRED TO THE CENTRAL MERIDIAN ZONE 17BTW AND ARE DERIVED FROM GPS OBSERVATION IN WGS84 AND CALIBRATED TO NAD 83

SITE PLAN:

SURVEY: CON LAND SURVEYORS INC., MAY 25, 2008

NO.	CONCEPT	DATE	BY
1	CONCEPT DRAFT FOR DISCUSSION	2008/21	B.D.
2	ISSUED FOR REZONING/SPA	2008/30	B.D.

DRAWING NOTES NOT FOR CONSTRUCTION

- THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE MUNICIPAL INFRASTRUCTURE GROUP (TMIG). THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT FROM TMIG IS STRICTLY PROHIBITED.
- THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER DRAWINGS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
- THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNTIL ALL REQUIRED PERMITS HAVE BEEN ISSUED.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONAL ELEVATIONS, INVERTS AND DATA ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO TMIG 48 HOURS PRIOR TO ANY CONSTRUCTION.

ABBREVIATIONS

GENERAL	PROPOSED	EXISTING	RENEWAL	REPAIR
EX	EXISTING	STM	SANITARY	WAT
EX	EXISTING	STM	SANITARY	WAT
EX	EXISTING	STM	SANITARY	WAT
EX	EXISTING	STM	SANITARY	WAT



GRADING PLAN

136 BAYFIELD

ROCKAP HOLDINGS

SCALE: 1:250	PROJECT #	19501
DATE: JANUARY 2020	DRAWING #	G1
DRAWN BY: C.B.		
DESIGNED BY: C.B.		
CHECKED BY: B.D.		

GENERAL NOTES:

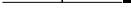
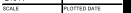
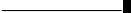
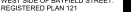
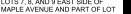
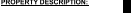
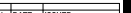
- ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CURRENT OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS. THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
- ALL TEMPORARY TRAFFIC CONTROL, AND SIGNAGE DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT ONTARIO ALL THE CONSTRUCTION WORK FOR THIS PROJECT SHALL COMPLY WITH THE STANDARD DRAWINGS AND SPECIFICATIONS OF THE CITY, THE REGION AND THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
- THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH ALL OTHER CONTRACTORS AND PREVENT CONFLICTS.
- THE INFORMATION SHOWN FOR EXISTING UTILITIES WAS PROVIDED BY OTHERS. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. ALL EXISTING UTILITIES MUST BE LOCATED AND VERIFIED BY EACH UTILITY PRIOR TO THE COMMENCEMENT OF WORK. ANY VARIANCE IS TO BE IMMEDIATELY REPORTED TO THE ENGINEER, LOST TIME DUE TO FAILURE OF THE CONTRACTOR TO CONFIRM UTILITY LOCATIONS AND NOTIFY THE ENGINEER OF CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT THE CONTRACTORS EXPENSE.
- PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT OF WAY, THE CONTRACTOR OR DEVELOPER OR CONSULTANT WILL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS FROM THE CITY'S RIGHT-OF-WAY MANAGEMENT UNIT. ROAD OCCUPANCY ACCESS PERMIT MUST BE OBTAINED 48 HOURS PRIOR TO COMMENCING ANY WORKS WITHIN THE MUNICIPAL ROAD ALLOW.
- ALL WORK TO BE DESIGNED AND COMPLETED AS PER OPS, OPSD, AND MTD.
- NO ALTERATIONS TO EXISTING BOUNDARY ELEVATIONS OR ADJACENT LANDS SHALL BE UNDERTAKEN UNLESS WRITTEN AGREEMENT WITH THE ADJACENT PROPERTY OWNER IS OBTAINED AND SUBMITTED IN A FORMAT ACCEPTABLE TO THE CITY.
- SITE GRADING:**
 - SIDEWALK TO BE REMOVED AND REPLACED AS PER CITY OF BARRIE STANDARDS AS DIRECTED BY THE ENGINEERING DEPARTMENT.
 - ALL DISTURBED GRASSED AREAS SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER WITH 100% TOPSOIL.
 - RELOCATION OF TREES AND SHRUBS SHALL BE SUBJECT TO APPROVAL BY THE PROJECT LANDSCAPE ARCHITECT OR ENGINEER.
 - ALL GRANULAR BASE AND SUB-BASE MATERIALS SHALL BE GRADED AND COMPACTED TO 98% STANDARD PROCTOR DENSITY. FREE OF DEPRESSIONS AS PER THE GEOTECHNICAL REPORT.
 - THE PAVEMENT STRUCTURE SHALL BE CONSTRUCTED BASED ON SPECIFICATIONS AS PER THE GEOTECHNICAL REPORT.
 - ALL BARRIER CURBS WITHIN THE SITE TO BE CONSTRUCTED AS PER DETAIL ON DRAWING 01 UNLESS OTHERWISE SPECIFIED.
 - TRENCH BACKFILL WITHIN THE RIGHT OF WAY SHALL BE UNGRAVELLED FILL AND SHALL EXTEND TO THE BASE OF ASPHALT. LANDSCAPED AREA MAY BE EXEMPTED.
 - ALL WORK SHALL BE SUBJECT TO THE CONDITIONS AND REQUIREMENTS OF CITY ROAD OCCUPANCY PERMIT.
 - INSPECTIONS: ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR TO BACKFILLING ALL WORK RELATING TO WATERMANS AND SEWERS TO BE INSPECTED BY THE MUNICIPALITY WHEN REQUIRED BY THE MUNICIPALITY.
 - STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT.
 - TRANSITIONS WITHIN THE SUBGRADE WITHIN 12m FROM THE TOP OF PAVEMENT SHOULD INCLUDE 30:70 TRANSITIONS.
 - EMBANKMENTS TO BE SLOPED AT MAX. 3:1 UNLESS OTHERWISE SPECIFIED.
 - ALL PAVEMENT MARKING, LINE PAINTING, DIRECTIONAL LINES/ARROWS ETC. SHALL BE PLACED IN ACCORDANCE WITH THE ARCHITECTURAL SITE PLAN OR THE OWNERS TRAFFIC ENGINEERING CONSULTANTS DRAWINGS. LINE PAINTING AND DIRECTIONAL SYMBOLS SHALL BE APPLIED WITH A MINIMUM OF TWO COATS OF ORGANIC SOLVENT BASED PAINT IN ACCORDANCE WITH OPS 1712.
 - WHERE APPLICABLE THE CONTRACTOR IS TO SUBMIT SHOP DRAWINGS FOR THE RETAINING WALL (GROUPE RALLAGE IF APPLICABLE) TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS MUST BE SITE SPECIFIC, BORED AND SEALED BY A LICENSED STRUCTURAL ENGINEER. THE CONTRACTOR WILL ALSO BE REQUIRED TO OBTAIN A LICENSED STRUCTURAL AND GEOTECHNICAL CERTIFICATION OF THE AS-CONSTRUCTED RETAINING WALL TO THE ENGINEER PRIOR TO FINAL ACCEPTANCE.
 - THE CONTRACTOR SHALL PROVIDE TO THE ENGINEER 1 (ONE) SET OF AS-CONSTRUCTED SITE SERVING, GRADING, AND SITE ELECTRICAL DRAWINGS.

QUEEN'S PARK NEIGHBOURHOOD RENEWAL (QPNR) PROJECT INCLUDES THE RECONSTRUCTION OF INFRASTRUCTURE AND ROADWAYS IN THE QUEEN'S PARK NEIGHBOURHOOD. PHASE A1 OF THE PROGRAM INVOLVES ROAD RECONSTRUCTION, SIDEWALK REPLACEMENTS, WATERMAIN REPLACEMENT, SANITARY SEWER REPLACEMENT, STORM SEWER REPLACEMENT AND UPGRADES, AND LOCAL DRAINAGE IMPROVEMENTS ALONG MAPLE AVENUE (FROM WELLINGTON STREET W. TO SOPHIA STREET W.). THE CITY OF BARRIE IS CURRENTLY IN THE DESIGN STAGE (60%) OF THE PROJECT. WITH THE CONSTRUCTION BEING IDENTIFIED IN THE CAPITAL PLAN FOR THE 2021/2022 CONSTRUCTION SEASON (PENDING COUNCIL APPROVAL). THE 60% DESIGN DRAWINGS WERE OBTAINED FROM THE CITY AND HAVE BEEN USED IN THIS PROPOSED DESIGN. INFRASTRUCTURE PROPOSED AS PART OF THE QPNR HAS BEEN IDENTIFIED ON THE DRAWING.

BAYFIELD STREET DEVELOPMENT
136 BAYFIELD STREET, BARRIE, ONTARIO

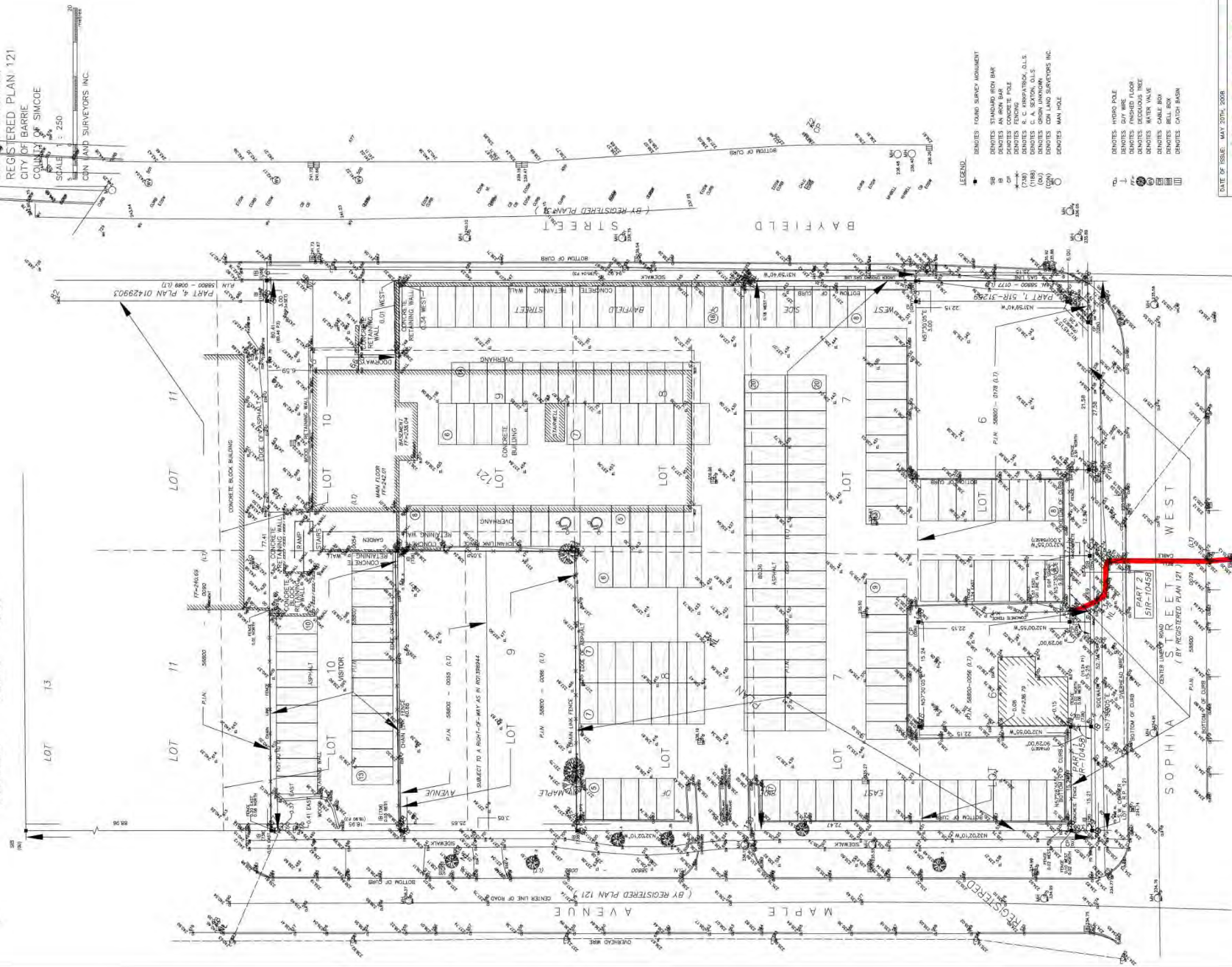
LIST OF ARCHITECTURAL DRAWINGS

SPA	
A012	AREA PLANS - BY-LAW REDUCTIONS
A013	AREA PLANS - BY-LAW REDUCTIONS
100 Series - General Site Studies, Site Plan & Schedules	
A001	TOPOGRAPHY
A002	EXISTENT PLAN
A003	EXISTENT DATA & COORDINATES
A004	SITE SURVEY
A005	SITE SURVEY - EXISTENT PLAN
A006	SITE PLAN
A007	LAND MANAGEMENT PLAN
A008	WASTE MANAGEMENT PLAN
A009	WASTE MANAGEMENT PLAN
A010	WASTE MANAGEMENT PLAN - BELL PROPERTY
A011	WASTE MANAGEMENT PLAN - BELL PROPERTY
A012	AREA PLANS - GROSS CONSTRUCTION AREA
A013	AREA PLANS - GROSS CONSTRUCTION AREA
100 Series - General Site Plans	
A101	GROUND FLOOR PLAN
A102	2ND FLOOR PLAN
A103	3RD FLOOR PLAN
A104	4TH FLOOR PLAN
A105	5TH FLOOR PLAN
A106	6TH FLOOR PLAN
A107	7TH FLOOR PLAN
A108	8TH FLOOR PLAN
A109	9TH FLOOR PLAN
A110	10TH FLOOR PLAN
A111	11TH FLOOR PLAN
A112	MECHANICAL FLOOR PLAN
A113	TYPICAL FLOOR PLANS
A114	TYPICAL FLOOR PLANS
100 Series - Elevations	
A201	NORTH ELEVATION
A202	EAST ELEVATION
A203	WEST ELEVATION
A204	SOUTH ELEVATION
100 Series - Building Section	
A301	STREET SECTION (BAYFIELD)
A302	STREET SECTION (EAST)
A303	STREET SECTION (WEST)
A304	BUILDING SECTION
A305	BUILDING SECTION
100 Series - Perspectives	
A401	PERSPECTIVES
A402	PERSPECTIVES



No.	DATE	ISSUED
PROPERTY DESCRIPTION		
PART OF LOTS 6 AND 10 AND ALL OF LOTS 7, 8, AND 9 AND EAST SIDE OF MAPLE AVENUE AND PART OF LOT 10 AND ALL OF LOTS 4, 7, 8, AND 9 WEST SIDE OF BAYFIELD STREET, REGISTERED PLAN 121, CITY OF BARRIE, COUNTY OF SIMCOE		
CLIENT		
ROCKAP HOLDINGS		
PROJECT NAME		
BAYFIELD DEVELOPMENT		
PROJECT ADDRESS		
136 BAYFIELD STREET, BARRIE, ONTARIO		
DEVELOPMENT TYPE		
RESIDENTIAL		
APPLICANT NUMBER		
DRAWING		
COVER PAGE		
PROJECT NUMBER	DATE	
21011	10/10/2021 3:04:41 PM	
SCALE	PLOTTED DATE	
	10/10/2021 3:04:41 PM	

WELLINGTON STREET WEST

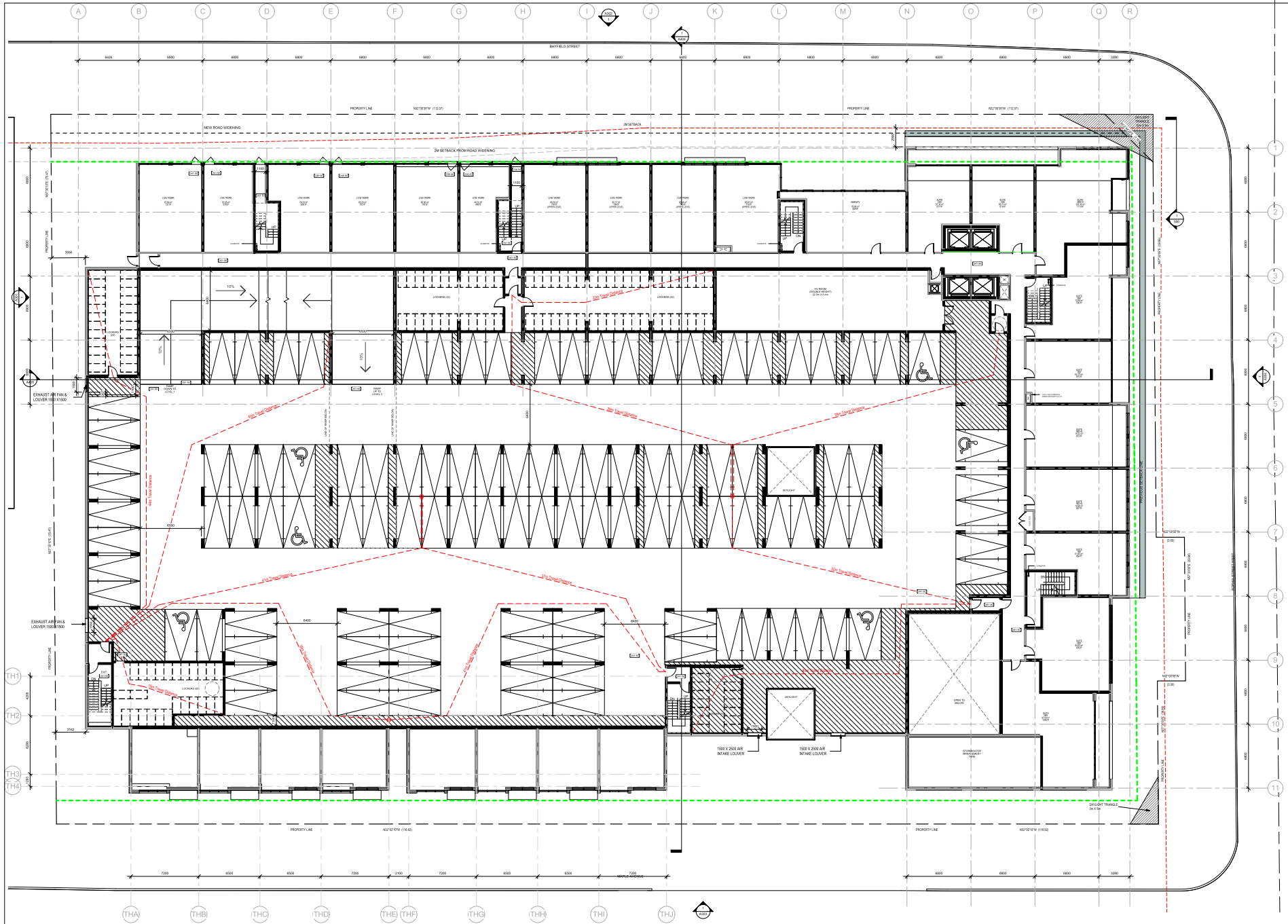


BEARING NOTE
BEARINGS ARE UTM GRID BEARING AND ARE REFERRED TO THE CENTRAL MERIDIAN ZONE 11(01°W) AND ARE DERIVED FROM GPS OBSERVATION IN WGS84 AND CALIBRATED TO NAD 83(ORIGINAL).

ELEVATION
ELEVATION ARE GEODETIC AND ARE DERIVED FROM

BEARING NOTE
BEARINGS ARE UTM GRID BEARINGS AND ARE REFERRED TO THE CENTRAL MERIDIAN ZONE 17(81°W) AND ARE DERIVED FROM GPS OBSERVATION IN WGS84 AND CALIBRATED TO NAD 83(ORIGINAL).

CDN
LAND SURVEYORS INC.
Ontario Land Surveyors
 89 BQ BAY PONT ROAD
 BARRIE, ONTARIO L4M 8M5 (705) 722-3845
 E-MAIL MAIL@CDNLANDSURVEYORS.COM



1 2ND FLOOR PLAN
1:125

PARKING TYPES	
COMMERCIAL PARKING SPACE	RESIDENTIAL PARKING SPACE
TYPE A - HC PARKING SPACE	TYPE B - HC PARKING SPACE
BIKE PARKING HORIZONTAL	

No. DATE ISSUED

PROPERTY DESCRIPTION

PART OF LOTS 6 AND 10 AND ALL OF LOTS 7, 8 AND 9 EAST SIDE OF MAPLE AVENUE AND PART OF LOT 10 AND ALL OF LOTS 4, 5, 6 AND 9 WEST SIDE OF BAYFIELD STREET, REGISTERED PLAN 121, CITY OF BARRE, COUNTY OF SIMCOE

CLIENT

ROCKAP HOLDINGS

PROJECT NAME

BAYFIELD DEVELOPMENT

PROJECT ADDRESS

136 BAYFIELD STREET, BARRE, ONTARIO

DEVELOPMENT TYPE

RESIDENTIAL

APPLICANT NUMBER

2ND FLOOR PLAN

PROJECT NUMBER

DATE

21011

PLOTTED DATE

10/06/2021 3:00:31 PM

SCALE

AS SHOWN

DATE

10/06/2021 3:00:31 PM

No. DATE ISSUED

PROPERTY DESCRIPTION:
PART OF LOTS 6 AND 10 AND ALL OF
LOTS 7, 8, AND 9 EAST SIDE OF
MAPLE AVENUE AND PART OF LOT
10 AND ALL OF LOTS 6, 7, 8, AND 9
WEST SIDE OF BAYFIELD STREET.
REGISTERED PLAN 121
CITY OF BARRIE
COUNTY OF SIMCOE

ALL DRAWINGS ARE THE PROPERTY OF ONESPACE AND THEY
ARE NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT
THE WRITTEN CONSENT OF ONESPACE.
DRAWINGS ARE INTENDED TO CONVEY SCOPE OF WORK AND
DESIGN CONCEPTS AND ARE NOT TO BE USED FOR
ARRANGEMENT AND USES OF MATERIALS AND PRODUCTS.
ALL CONSTRUCTION TO BE ACCORDING TO BEST CONSTRUCTION
PRACTICE AND CONFORM TO THE DRAFTING BUILDING CODE IN
EFFECT AT THE TIME.

CLIENT
ROCKAP HOLDINGS

PROJECT NAME
BAYFIELD DEVELOPMENT

PROJECT ADDRESS
136 BAYFIELD STREET,
BARRIE, ONTARIO

DEVELOPMENT TYPE
RESIDENTIAL

APPLICANT NUMBER

DRAWING

PRELIMINARY BASE OF
FOUNDATION / EXCAVATION
PLAN

PROJECT NUMBER	DATE
21011-	2022-08-10 10:52:20
SCALE	ALL PLOTTED DATE
1:125	2022-08-10 10:52:20 AM

Appendix 2

Borehole Logs and Well Construction Details

Project No: 7601-19-4

Monitoring Well No.: 1

Project: Proposed Condominium

Client: PGL Environmental Consultants

Enclosure:

Location: 136 Bayfield Street, Barrie, ON

Engineer: VAWood Assoc.

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test blows/ft	Well Data	Remarks
Depth	Symbol	Description	Elev.	Number	Type	Blows/ft	Recovery			
0		Ground Surface	0					20 40 60 80		
0		Asphalt 90 mm	235.73	1	SS	41				
1		Granular Base 100 mm		2	AS	38				
1		GRAVELLY SAND	1.4							
1		Dense, some cobbles	234.33	3	SS	11				
2		SAND	2.5							
2		Compact to dense, brown, saturated	233.23	4	SS	38				
3		brown		5	SS	58				
4		SILTY SAND TILL								
4		Dense to very dense, trace to some fine to medium gravel, brown then grey, wet		6	SS	100+				
5			5.5							
6			230.23	7	SS	100+				
7										
8		SANDY SILT TILL		8	SS	100+				
9		Very dense, trace fine to medium gravel, grey, moist to wet		9	SS	100+				
10										
11			11.5	10	SS	100+				
12			224.23							
13		SILT		11	SS	100+				
14		Hard, occasional thin seams of fine sand, grey, moist		12	SS	100+				
15			15.6							
16		End of Borehole	220.13	13	SS	100+				
17										

Drilled By: Walker Drilling Ltd.

V A WOOD ASSOCIATES LTD.
1080 Tapscott Road, Unit 24
Scarborough, ON
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: May 2, 2019

Sheet: 1 of 1

Project No: 7601-19-4

Monitoring Well No.: 2

Project: Proposed Condominium

Client: PGL Environmental Consultants

Enclosure:

Location: 136 Bayfield Street, Barrie, ON

Engineer: VAWood Assoc.

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test blows/ft	Well Data	Remarks
Depth	Symbol	Description	Elev.	Number	Type	Blows/ft	Recovery	20 40 60 80		
0		Ground Surface	0							
		Asphalt 90 mm	236.54	1	SS	21				50 mm diameter PVC pipe
		Granular Base 100 mm								
1		GRAVELLY SAND								
		Compact, wet at the bottom	1.2	2	SS	12				
			235.34	3	SS	13				
2		SILTY SAND TILL								
		Compact to dense, trace to some fine to medium gravel, brown then grey, wet		4	SS	22				
3		grey		5	SS	31				
4			4							
			232.54	6	SS	100+				
5		SANDY SILT TILL								
		Very dense, trace fine to medium gravel, grey, moist		7	NR	100+				
6										
7			7							
			229.54	8	SS	75				
8		SILTY SAND TILL								
		Very dense, trace to some fine to medium gravel, grey, moist								
9			9.5	9	SS	100+				
		End of Borehole	227.04							
10										
11										
12										

Drilled By: Walker Drilling Ltd.

V A WOOD ASSOCIATES LTD.
1080 Tapscott Road, Unit 24
Scarborough, ON
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: May 3, 2019

Sheet: 1 of 1

Project No: 7601-19-4

Monitoring Well No.: 3

Project: Proposed Condominium

Client: PGL Environmental Consultants

Enclosure:

Location: 136 Bayfield Street, Barrie, ON

Engineer: VAWood Assoc.

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test blows/ft	Well Data	Remarks
Depth	Symbol	Description	Elev.	Number	Type	Blows/ft	Recovery			
0		Ground Surface	0					20 40 60 80		
		Asphalt 90 mm	237.97	1	SS	9				50 mm diameter PVC pipe
		Granular Base 100 mm								
		GRAVELLY SAND	0.7							
		Compact, some topsoil, moist	237.27							
1				2	SS	17				
				3	SS	21				
2		SILTY SAND TILL								
		Compact, then dense to very		4	SS	38				
		dense, trace to some fine to								
3		medium gravel, brown then		5	SS	43				
		grey, moist to wet								
4		<u>brown</u>								
		<u>grey</u>								
5			5.15	6	SS	57				
		End of Borehole	232.82							
6										
7										
8										

Drilled By: Walker Drilling Ltd.

V A WOOD ASSOCIATES LTD.
1080 Tapscott Road, Unit 24
Scarborough, ON
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: May 6, 2019

Sheet: 1 of 1

Project No: 7601-19-4

Monitoring Well No.: 4

Project: Proposed Condominium

Client: PGL Environmental Consultants

Enclosure:

Location: 136 Bayfield Street, Barrie, ON

Engineer: VAWood Assoc.

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test blows/ft	Well Data	Remarks
Depth	Symbol	Description	Elev.	Number	Type	Blows/ft	Recovery			
0		Ground Surface	0					20 40 60 80		
1			239.84							
2		Augered to 3.5 m								
3			3.05							
4		saturated	236.79	1	SS	100+				
5		SILTY SAND TILL								
6		grey								
7		Very dense, trace to some fine to medium gravel, brown then grey, saturated at the top, then moist		2	SS	100+				
8			8							
9		SANDY SILT TILL	231.84							
10		Very dense, trace fine to medium gravel, grey, wet		3	SS	100+				
11			10.5							
12		SILTY SAND TILL	229.34							
13		Very dense, trace fine to medium gravel, grey, wet		4	SS	100+				
14		End of Borehole	227.24							

Drilled By: Walker Drilling Ltd.

V A WOOD ASSOCIATES LTD.
1080 Tapscott Road, Unit 24
Scarborough, ON
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: May 7, 2019

Sheet: 1 of 1

Project No: 7601-19-4

Monitoring Well No.: 5

Project: Proposed Condominium

Client: PGL Environmental Consultants

Enclosure:

Location: 136 Bayfield Street, Barrie, ON

Engineer: VAWood Assoc.

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test blows/ft	Well Data	Remarks
Depth	Symbol	Description	Elev.	Number	Type	Blows/ft	Recovery	20 40 60 80		
0		Ground Surface	0							
			236							
1		Augered to 3.5 m								50 mm diameter PVC pipe
2										
3			3.05							
4		brown grey SILTY SAND TILL Very dense, trace to some fine to medium gravel, brown then grey, moist, to wet, saturated at the bottom	232.95	1	SS	58				
5										
6				2	SS	100+				
7										
8										
9				3	SS	100+				
10										
11										
12				4	SS	100+				
13										
14										
15		saturated	15.4	5	SS	100+				
16		End of Borehole	220.6							
17										

Drilled By: Walker Drilling Ltd.

Drill Method: Hollow Stem Auger

Drill Date: May 7, 2019

V A WOOD ASSOCIATES LTD.
1080 Tapscott Road, Unit 24
Scarborough, ON
M1X 1E7

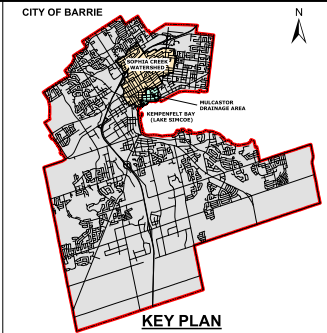
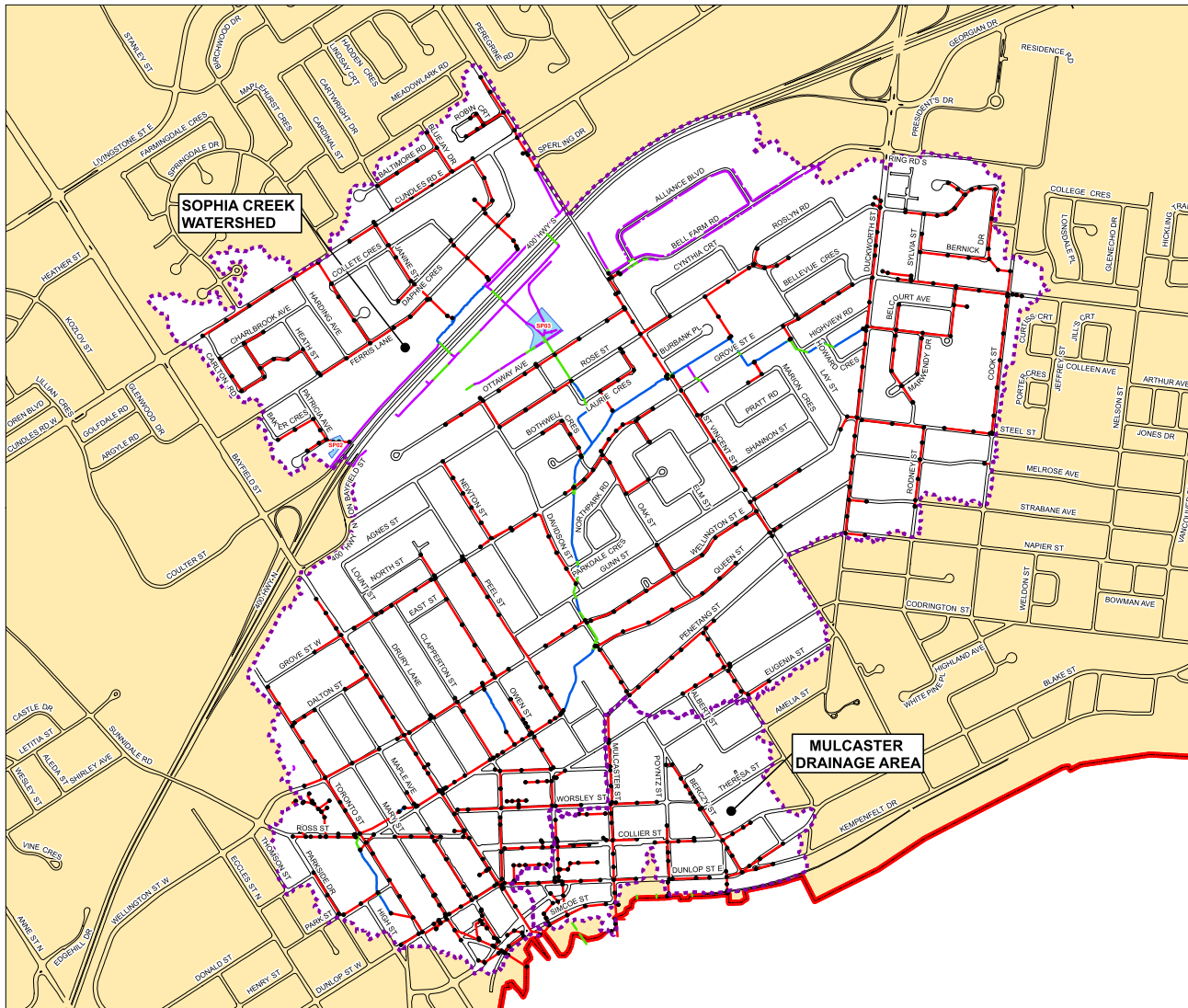
Hole Size: 110 mm

Datum: Geodetic

Sheet: 1 of 1

Appendix 3

Information Pertaining to Sophia Creek and Other Area Drainage Features

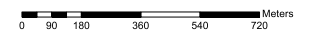


Legend

- STORM DEVICES
- CULVERT
- DITCH
- WATERCOURSE
- STORM SEWER
- ROADS
- SWMF
- STUDY AREA
- MUNICIPAL BORDER



SCALE = 1:7,000



**SOPHIA CREEK WATERSHED
& MULCASTER DRAINAGE AREA EA UPDATE**

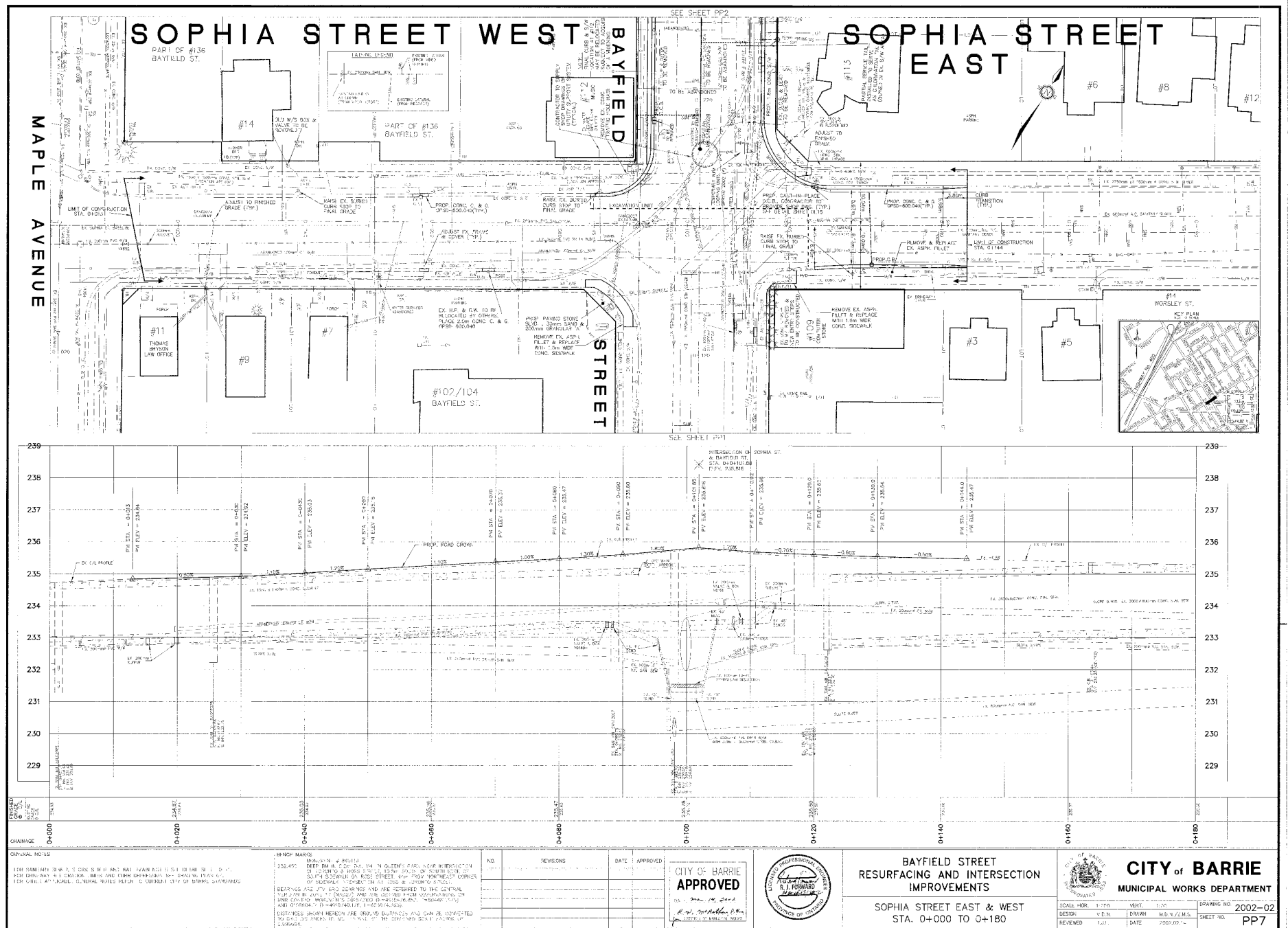
FIGURE 2 - EXISTING DRAINAGE FEATURES

DATE: OCTOBER 2016

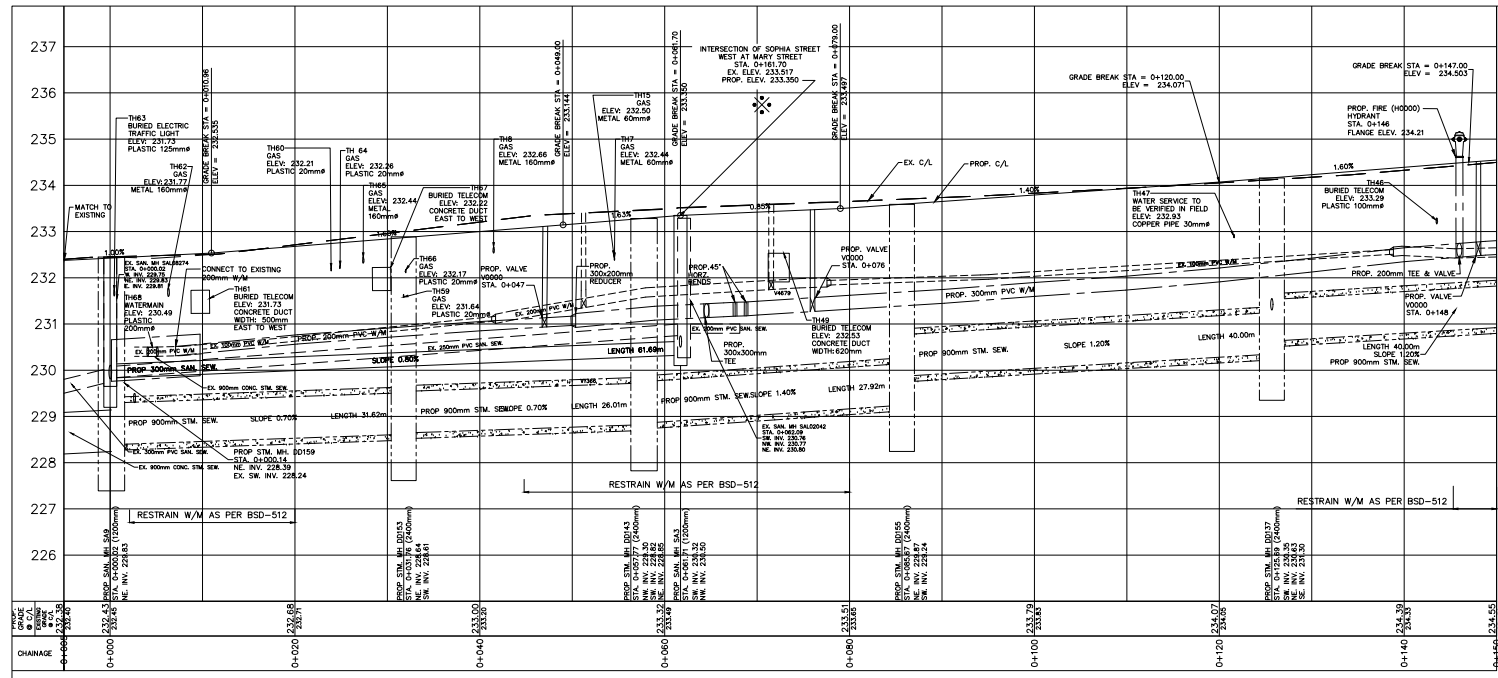
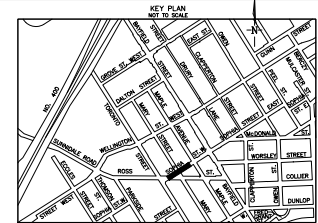
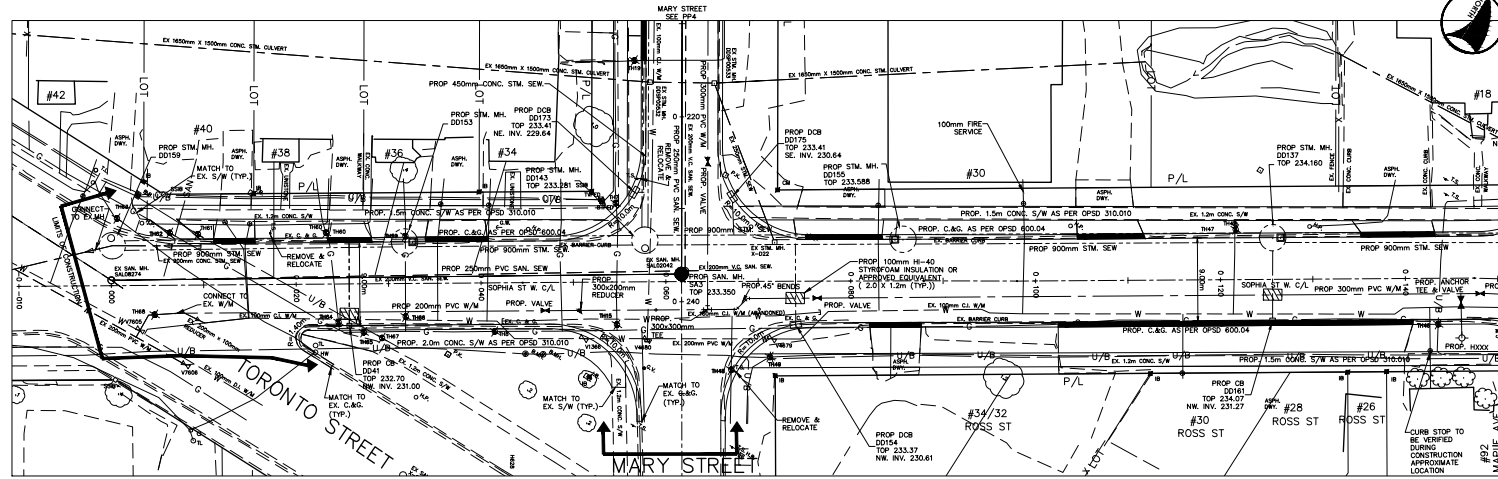
DISCLAIMER

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and C.C. Tatham & Associates Ltd. undertakes no duty to or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the contract between the Corporation of the City of Barrie and C.C. Tatham & Associates Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form without the express written consent of C.C. Tatham & Associates Ltd.



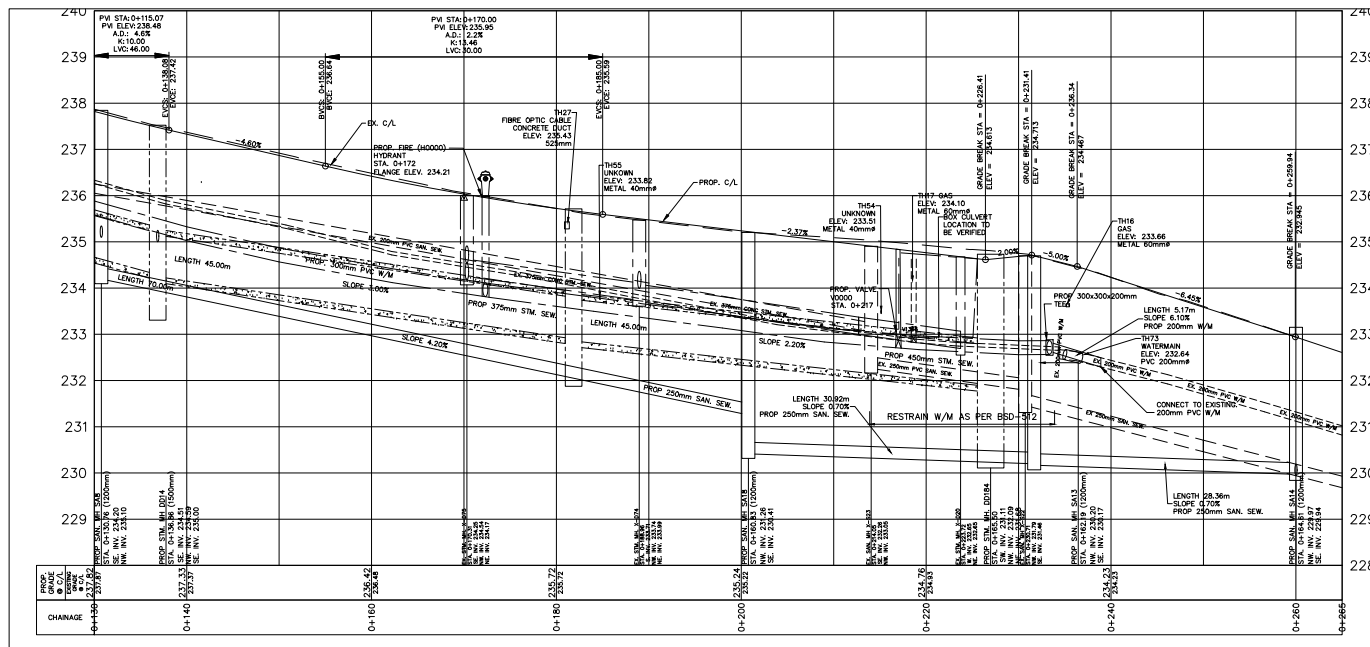
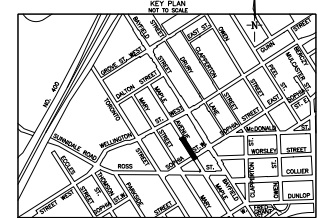
SOPHIA STREET WEST



GENERAL NOTES		BENCH MARKS		NO.	REVISIONS	DATE	APPROVED	CITY OF BARRIE ACCEPTED DATE: DIRECTOR OF ENGINEERING	QUEEN'S PARK NEIGHBORHOOD RENEWAL SOPHIA STREET WEST, MARY STREET, AND MAPLE AVENUE PLAN AND PROFILE - SOPHIA STREET WEST STA. 0+000 TO STA. 0+150
REFER TO CURRENT CITY OF BARRIE STANDARDS FOR APPLICABLE GENERAL NOTES.		DISTANCE NOTE							
		DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999884.							
		BEARINGS HEREON ARE GRID BEARINGS AND ARE DERIVED FROM CONTROL MONUMENTS 0300000406 (N=489005.774, E=400000.000) AND 0300000407 (N=489005.774, E=400000.000) AND ARE REFERRED TO THE CENTRAL MERIDIAN (IN DEGREES OF LONGITUDE) IN ZONE 17 AND ARE BASED ON NAD83 (ORIGINAL), UTM COORDINATES.							
		BENCH MARK: 0001580202		1.	SIZE DESIGN	09.19.18	A.K.		
		237.75 - COLLAR STREET STREET CORNER (SPRINKLER) WESTLINE WITHOUT CHURCH 1864, ON THE NORTH SIDE OF COLLAR STREET AND WEST OF POINT STREET, INTERSECTION OF POINT OF SOUTH CORNER EXISTENCE OF WEST CORNER OF COLLAR STREET.		2.	SIZE DESIGN	01.24.20	J.B.		
		BENCH MARKS WILL BE FROM CITY OF BARRIE VERTICAL CONTROL NETWORK. INITIAL BENCH MARK TO BE OF 2ND ORDER ACCURACY.							

Barrie ENGINEERING DEPARTMENT	SCALE HOR. 1:250 VERT. 1:50 DESIGN J.D.H. DRAWN J.D.H. CONTRACT NO. 2020-000 REVIEWED J.B. DATE 2020.01.24 SHEET NO. PP1
---	---

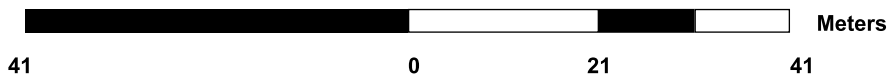
SOPHIA STREET WEST SEE PP2



SCALE HOR. 1:250	VERT. 1:50	CONTRACT NO. 2020-000
DESIGN J.D.H.	DRAWN J.D.H.	SHEET NO. PP6
REVIEWED J.B.	DATE 2020.01.24	



Scale 1: 811



Features

- LSRCA Watershed Boundary
- LSPP Watershed Boundary
- Regulation Boundary
- Regulated Wetland
 - PSW
 - Non PSW
- Wetland With Adjacent Lands
- Regulation Area
- MNRF Evaluated Wetland
 - PSW
 - Other Evaluated
- MNRF Unevaluated Wetland
- Assessment Parcel
- Lot and Concession
- Assessment Parcel Labels
- Watercourse
- Roads
 - Hwy 400 Series
 - Highway, Arterials
 - Local Road
- Railway
- Lower Tier Municipality

Printed On:
2/5/2020



WGS_1984_Web_Mercator_
Auxiliary_Sphere

Mapped By:

This product was produced by the Lake Simcoe Region Conservation Authority and some information depicted on this map may have been compiled from various sources. While every effort has been made to accurately depict the information, data/mapping errors may exist. This map has been produced for illustrative purposes from an interactive web mapping site. LSRCA GIS Services DRAFT printed 2020. © LAKE SIMCOE REGION CONSERVATION AUTHORITY, 2020. All Rights Reserved. The following data sets of Assessment Parcel, Roads, Upper & Lower Tier Municipalities, Wetlands are © Queens Printer for Ontario. Reproduced with Permission, 2020. The Current Regulation Limit and Boundary data sets are derived products from several datasets. Orthophotography 2002, 2005, 2007-2009, 2011-2018, © First Base Solutions, Inc.

Appendix 4

Well Construction Details Summary and Groundwater Level Monitoring Results

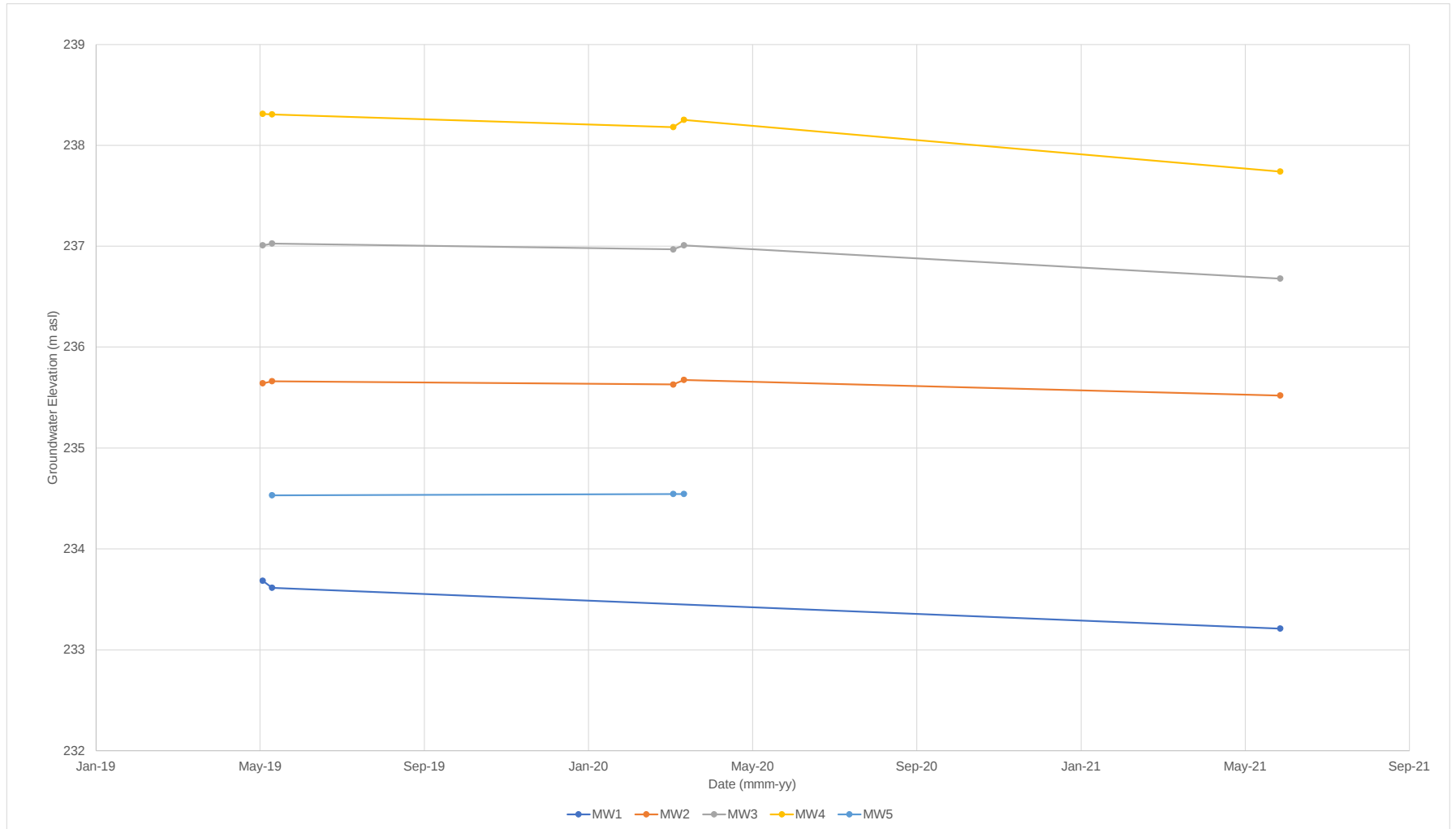
Table A4.1
Monitoring Well Installation Details
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockap Holdings Inc., PGL File 5689-02.01

Location	Riser Elevation (m asl)	Ground Elevation (m asl)	Bottom of Screen (m bgs)	Bottom of Screen Elevation (m asl)	Top of Screen (m bgs)	Top of Screen Elevation (m asl)	Interval	Interpreted Screened Geological Zone
MW1	235.67	235.73	6.00	229.73	3.00	232.73	Intermediate	Silty Sand to Sandy Silty Till
MW2	236.40	236.54	9.00	227.54	6.00	230.54	Intermediate	Silty Sand to Sandy Silty Till
MW3	237.89	237.97	4.60	233.37	1.60	236.37	Shallow	Silty Sand to Sandy Silty Till
MW4	239.72	239.84	9.00	230.84	6.00	233.84	Intermediate	Silty Sand to Sandy Silty Till
MW5	235.93	236.00	14.00	222.00	11.00	225.00	Deep	Silty Sand to Sandy Silty Till

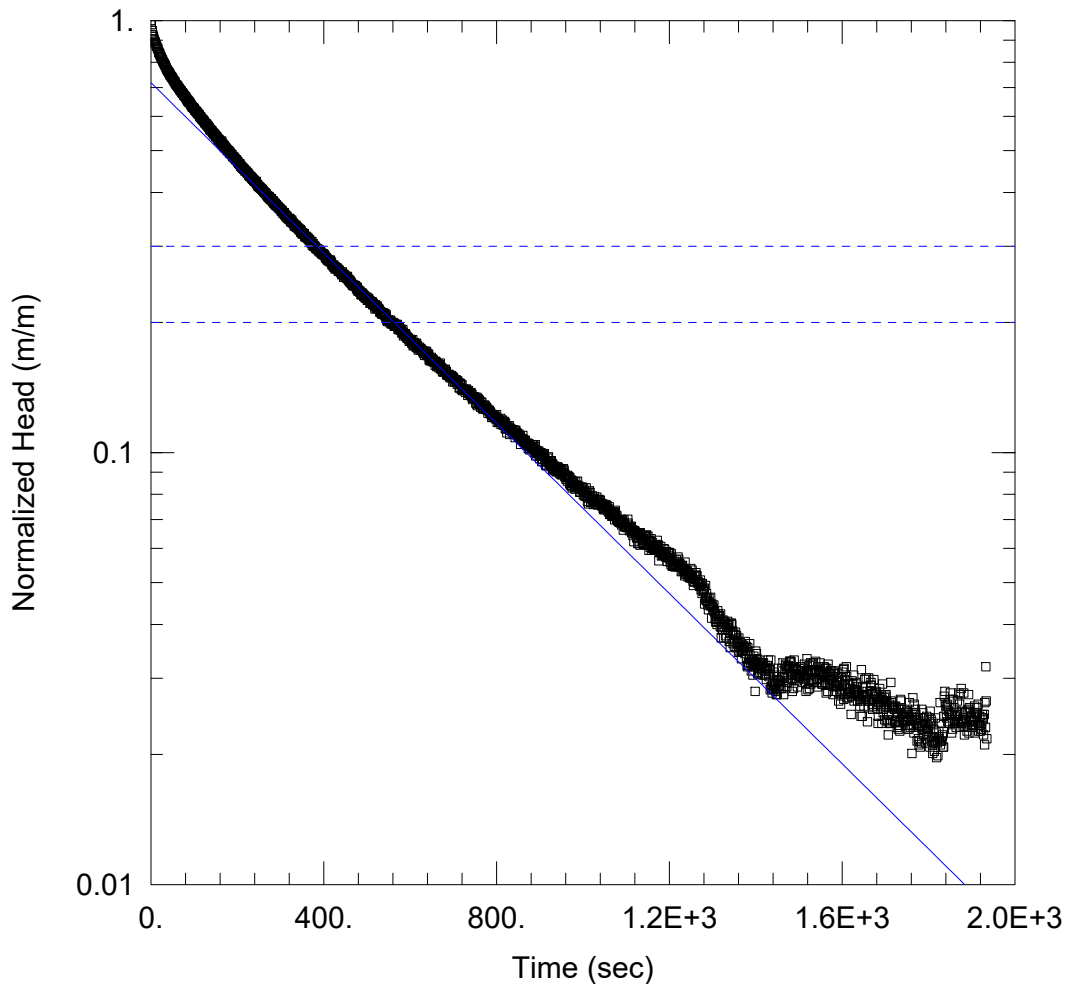
Table A4.2
Groundwater Elevation Results
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockap Holdings Inc., PGL File 5689-02.01

Location	Interval	09-May-19		16-May-19		09-Mar-20		17-Mar-20		03-Jun-21	
		Groundwater Depth (m bgs)	Groundwater Elevation (m asl)	Groundwater Depth (m bgs)	Groundwater Elevation (m asl)	Groundwater Depth (m bgs)	Groundwater Elevation (m asl)	Groundwater Depth (m bgs)	Groundwater Elevation (m asl)	Groundwater Depth (m bgs)	Groundwater Elevation (m asl)
MW1	Intermediate	2.04	233.69	2.11	233.61	-	-	-	-	2.51	233.21
MW2	Intermediate	0.90	235.64	0.88	235.66	0.91	235.63	0.86	235.68	1.02	235.52
MW3	Shallow	0.96	237.01	0.94	237.03	1.00	236.97	0.96	237.01	1.29	236.68
MW4	Intermediate	1.52	238.31	1.53	238.31	1.66	238.18	1.58	238.25	2.09	237.74
MW5	Deep	-	-	1.46	234.53	1.45	234.55	1.45	234.55	-	-

Table A4.3
Graph of Groundwater Elevation Results
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockap Holdings Inc., PGL File 5689-02.01



Appendix 5
Single Well Response Test Results



TEST 1

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW1-Test1 - MRH.aqt
 Date: 10/12/22 Time: 10:11:41

PROJECT INFORMATION

Company: PGL Environmental
 Client: Rockcap Holdings Inc
 Project: 5689-02.01
 Test Well: MW3
 Test Date: May 16, 2019

AQUIFER DATA

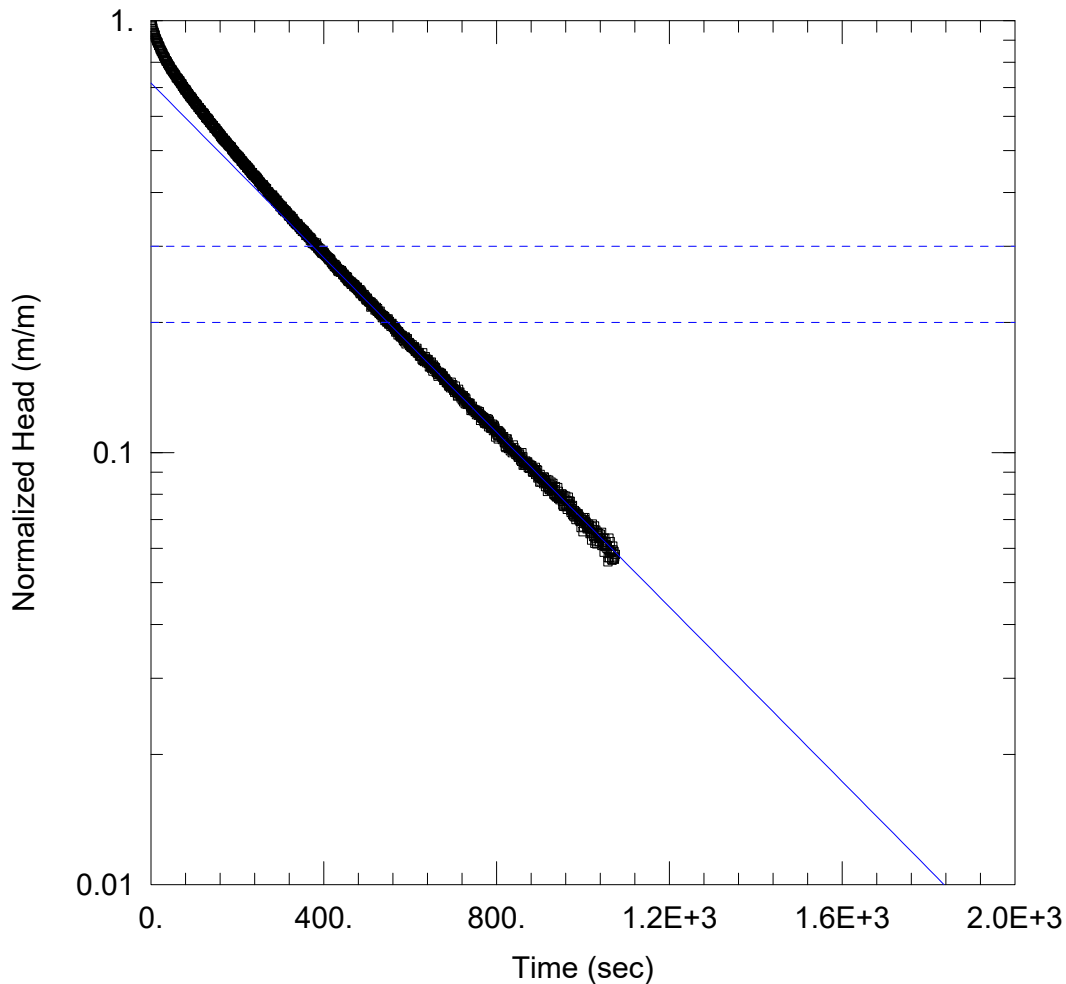
Saturated Thickness: 4.057 m Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (Test 1)

Initial Displacement: 0.4325 m Static Water Column Height: 4.057 m
 Total Well Penetration Depth: 4.057 m Screen Length: 3. m
 Casing Radius: 0.0214 m Well Radius: 0.055 m
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
 $K = 7.268E-7$ m/sec $y_0 = 0.3105$ m



TEST 2

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW1-Test2 - MRH.aqt

Date: 10/12/22

Time: 10:12:21

PROJECT INFORMATION

Company: PGL Environmental

Client: Rockcap Holdings Inc

Project: 5689-02.01

Test Well: MW1

Test Date: May 16, 2019

AQUIFER DATA

Saturated Thickness: 4.057 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (Test 2)

Initial Displacement: 0.41 m

Total Well Penetration Depth: 4.057 m

Casing Radius: 0.0214 m

Static Water Column Height: 4.057 m

Screen Length: 3. m

Well Radius: 0.055 m

Gravel Pack Porosity: 0.

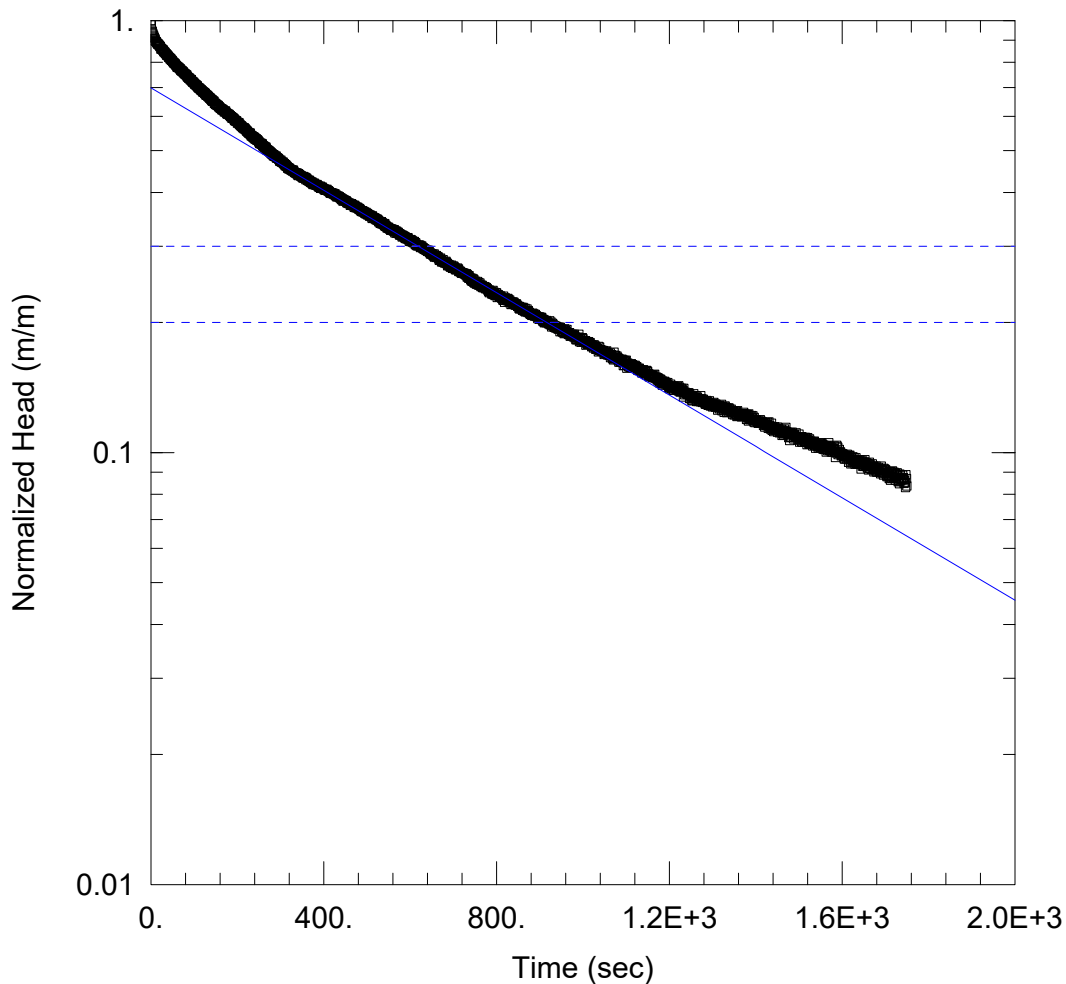
SOLUTION

Aquifer Model: Unconfined

$K = 7.454E-7$ m/sec

Solution Method: Bouwer-Rice

$y_0 = 0.2938$ m



WELL TEST ANALYSIS

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW2-Test1-MRH.aqt
 Date: 10/12/22 Time: 10:12:46

PROJECT INFORMATION

Company: PGL Environmental
 Client: Rockcap Holdings Inc
 Project: 5689-02.01
 Test Well: MW2
 Test Date: May 16, 2019

AQUIFER DATA

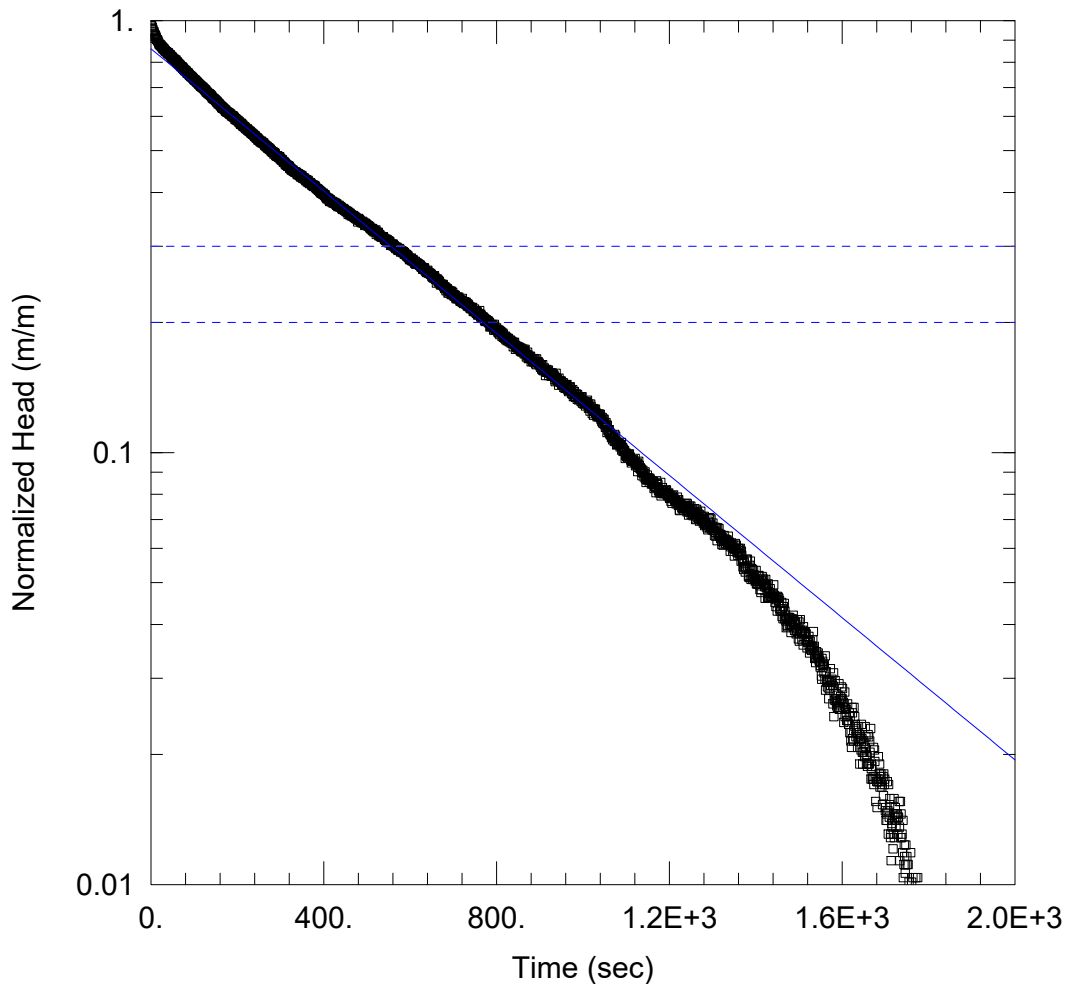
Saturated Thickness: 8.088 m Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (Test 1)

Initial Displacement: 0.4289 m Static Water Column Height: 8.088 m
 Total Well Penetration Depth: 8.088 m Screen Length: 3. m
 Casing Radius: 0.0214 m Well Radius: 0.055 m
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
 $K = 4.834E-7$ m/sec $y_0 = 0.2997$ m



TEST 2

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW2-Test2-MRH.aqt

Date: 10/12/22

Time: 10:13:17

PROJECT INFORMATION

Company: PGL Environmental

Client: Rockcap Holdings Inc

Project: 5689-02.01

Test Well: MW2

Test Date: May 16, 2019

AQUIFER DATA

Saturated Thickness: 8.088 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (Test 2)

Initial Displacement: 0.4048 m

Static Water Column Height: 8.088 m

Total Well Penetration Depth: 8.088 m

Screen Length: 3. m

Casing Radius: 0.0214 m

Well Radius: 0.055 m

Gravel Pack Porosity: 0.

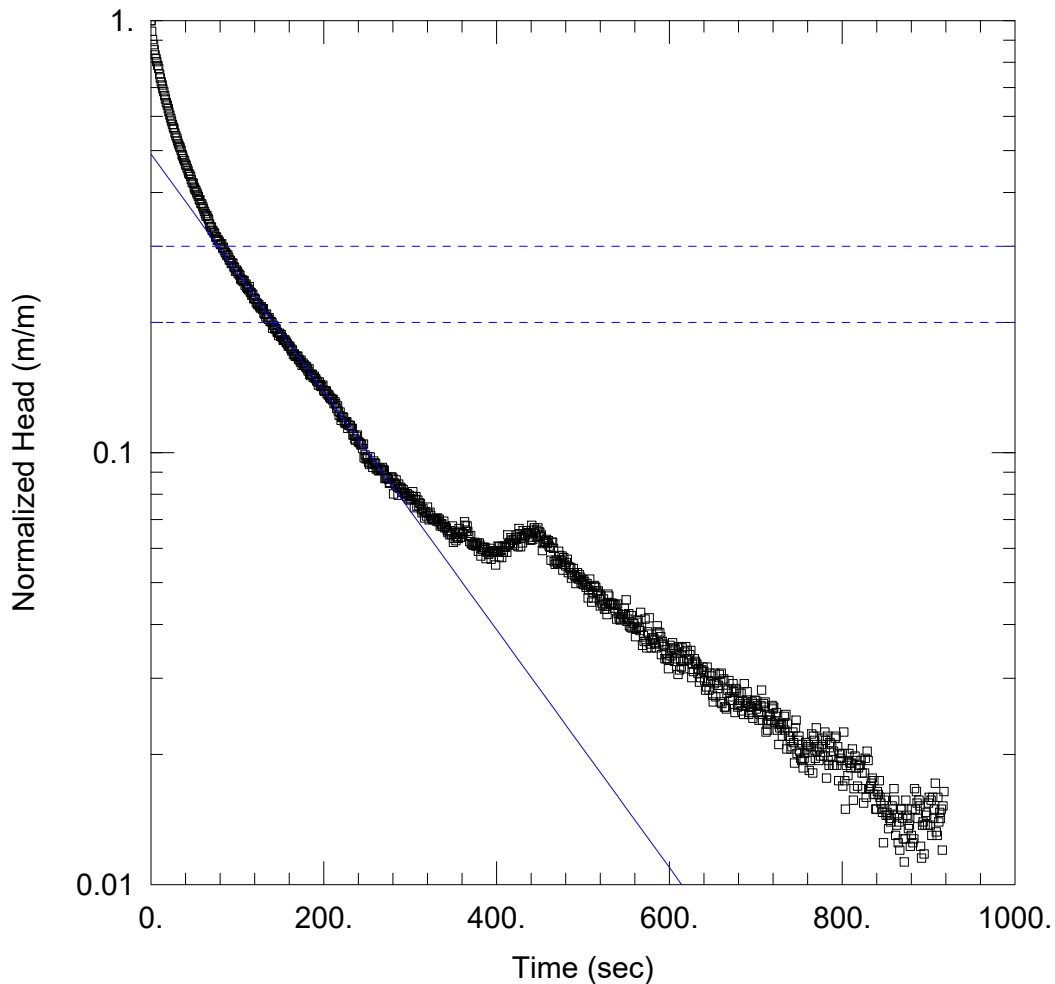
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 6.708E-7$ m/sec

$y_0 = 0.3481$ m



TEST 1

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW3-Test1-MRH.aqt

Date: 10/12/22

Time: 10:13:43

PROJECT INFORMATION

Company: PGL Environmental

Client: Rockcap Holdings Inc

Project: 5689-02.01

Test Well: MW3

Test Date: May 16, 2019

AQUIFER DATA

Saturated Thickness: 3.397 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (Test 1)

Initial Displacement: 0.4081 m

Static Water Column Height: 3.397 m

Total Well Penetration Depth: 3.397 m

Screen Length: 3. m

Casing Radius: 0.0214 m

Well Radius: 0.055 m

Gravel Pack Porosity: 0.

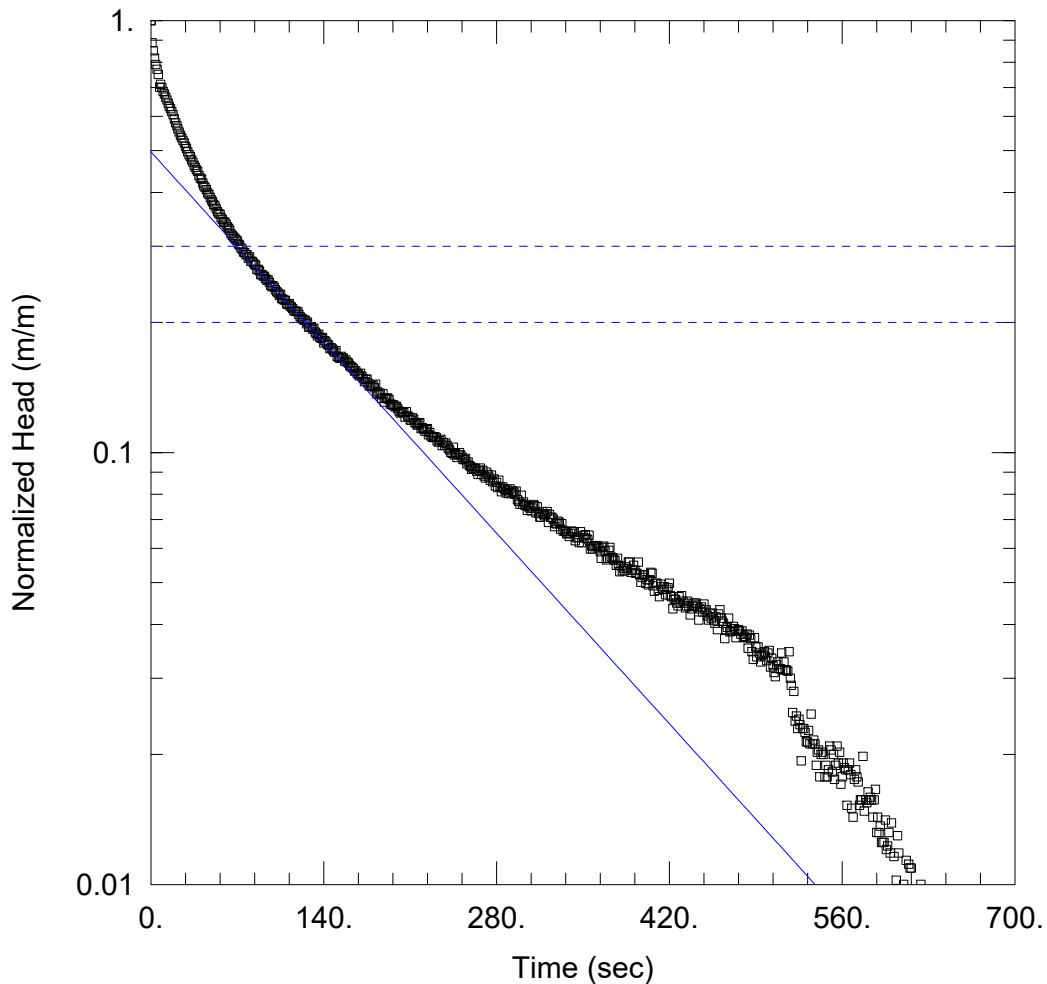
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 7.873E-6$ m/sec

$y_0 = 0.2004$ m



TEST 2

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW3-Test2-MRH.aqt

Date: 10/12/22

Time: 10:14:07

PROJECT INFORMATION

Company: PGL Environmental

Client: Rockcap Holdings Inc

Project: 5689-02.01

Test Well: MW3

Test Date: May 16, 2019

AQUIFER DATA

Saturated Thickness: 3.397 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (Test 2)

Initial Displacement: 0.4396 m

Static Water Column Height: 3.397 m

Total Well Penetration Depth: 3.397 m

Screen Length: 3. m

Casing Radius: 0.0214 m

Well Radius: 0.055 m

Gravel Pack Porosity: 0.

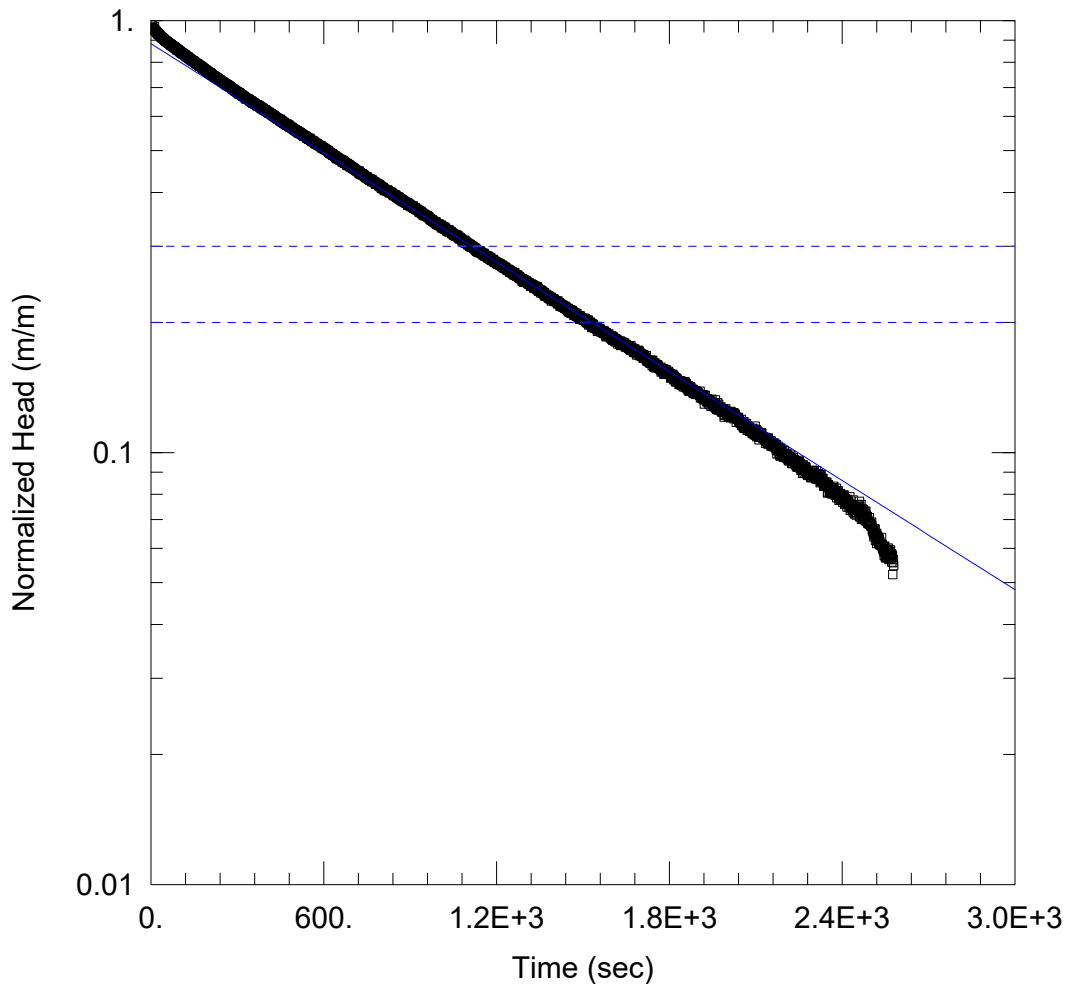
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 8.276E-6$ m/sec

$y_0 = 0.2182$ m



TEST 1

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW4-Test1-MRH.aqt

Date: 10/12/22

Time: 10:14:29

PROJECT INFORMATION

Company: PGL Environmental

Client: Rockcap Holdings Inc

Project: 5689-02.01

Test Well: MW4

Test Date: May 16, 2019

AQUIFER DATA

Saturated Thickness: 7.332 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (Test 1)

Initial Displacement: 0.4827 m

Static Water Column Height: 7.332 m

Total Well Penetration Depth: 7.332 m

Screen Length: 3. m

Casing Radius: 0.0214 m

Well Radius: 0.055 m

Gravel Pack Porosity: 0.

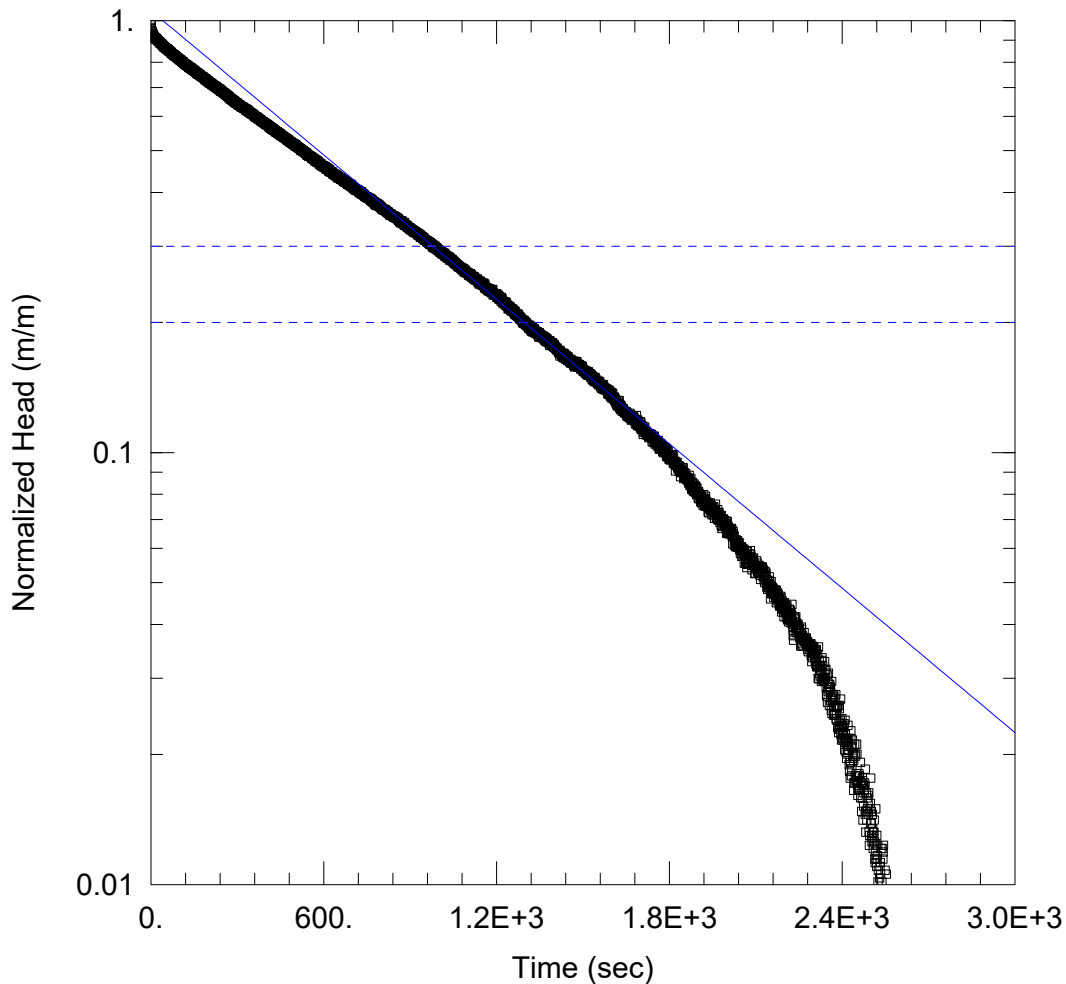
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 3.388E-7$ m/sec

$y_0 = 0.4267$ m



TEST 2

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW4-Test2-MRH.aqt

Date: 10/12/22

Time: 10:14:58

PROJECT INFORMATION

Company: PGL Environmental

Client: Rockcap Holdings Inc

Project: 5689-02.01

Test Well: MW4

Test Date: May 16, 2019

AQUIFER DATA

Saturated Thickness: 7.332 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (Test 2)

Initial Displacement: 0.4541 m

Static Water Column Height: 7.332 m

Total Well Penetration Depth: 7.332 m

Screen Length: 3. m

Casing Radius: 0.0214 m

Well Radius: 0.055 m

Gravel Pack Porosity: 0.

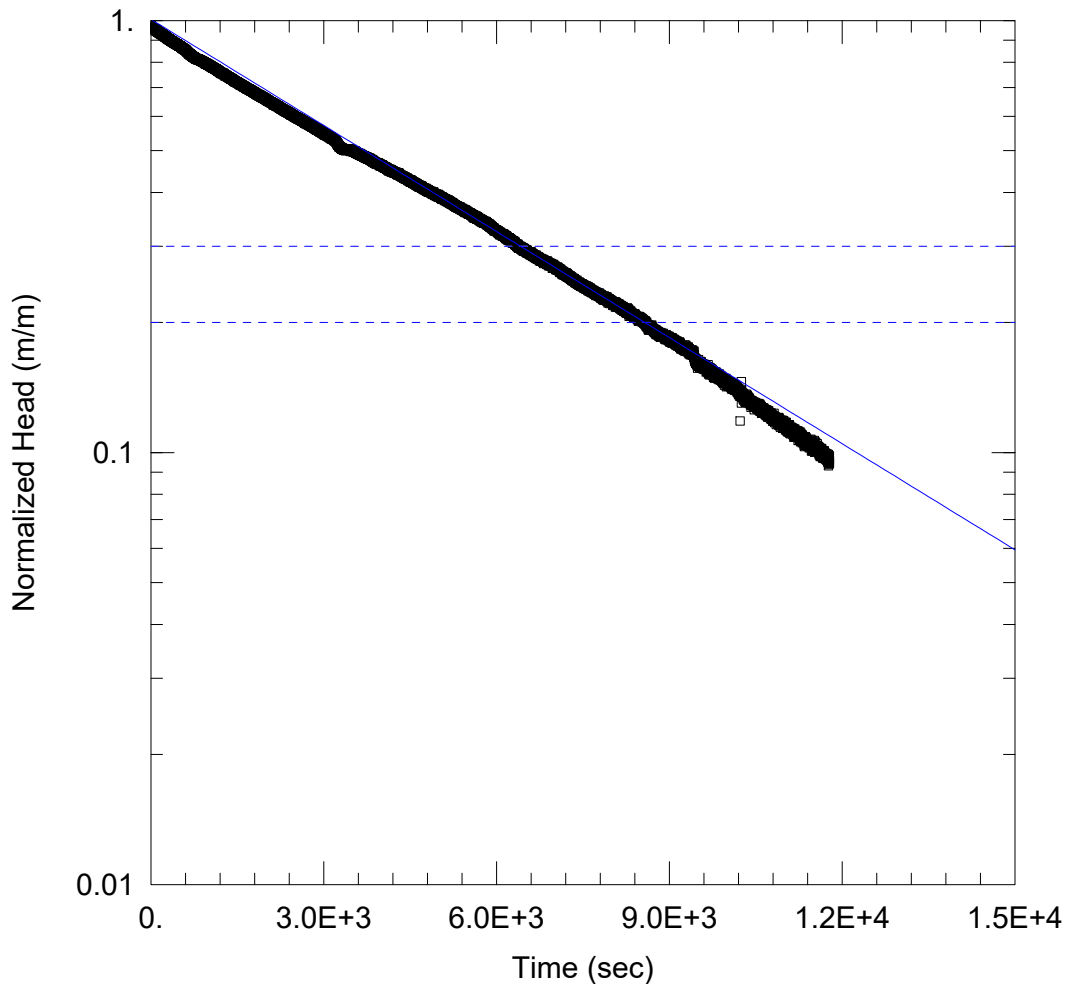
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 4.48E-7$ m/sec

$y_0 = 0.4787$ m



TEST 1

Data Set: C:\Users\mhowlett\Desktop\Bayfield - Backup\MW5-Test1-MRH.aqt
 Date: 10/12/22 Time: 10:15:19

PROJECT INFORMATION

Company: PGL Environmental
 Client: Rockcap Holdings Inc
 Project: 5689-02.01
 Test Well: MW5
 Test Date: May 16, 2019

AQUIFER DATA

Saturated Thickness: 10.72 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (Test 1)

Initial Displacement: 0.4712 m Static Water Column Height: 10.72 m
 Total Well Penetration Depth: 10.72 m Screen Length: 3. m
 Casing Radius: 0.0214 m Well Radius: 0.055 m
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
 K = 6.925E-8 m/sec y0 = 0.4741 m

Appendix 6
Dewatering Calculations

Table A6.1
Excavation Dewatering Calculations
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockap Holdings Inc., PGL File 5689-02.01

Item	Value	Unit	Source of Information
Ground Level	236.15	m asl	As identified in provided design plans.
Lowest Subsurface Level Floor	0.00	m bgs	See Drawing dA4.1 in Appendix 1
Lowest Subsurface Level Floor Elevation	236.15	m asl	Calculated: Lowest Subsurface Level Floor Elevation = Ground Level - Lowest Subsurface Floor Level
Maximum for Slab, Footings and other Appurtenances	3.00	m	As recommended by geotechnical engineer.
Lowest Elevation for Slab, Footings and other Appurtenances	233.15	m asl	Calculated: Base of Slab Elevation = Lowest Subsurface Level Floor Elevation - Slab Thickness
Base of Excavation	233.15	m asl	Set at Lowest Elevation for Slab, Footings and other Appurtenances
Required Dewatering Depth	232.65	m asl	Additional 0.5m buffer applied to base of excavation.
Peak Water Level for Horizontal Flow	236.15	m asl	Due to planned regrading activities, groundwater level was set at ground level.
Water Level Above Dewatering Depth (H)	3.50	m	Calculated: H = Peak Water Level for Horizontal Flow - Required Dewatering Depth
Water Level Above Dewatering Depth (h)	0.00	m	Analytical solution requires this value to be 0 (unless there is standing water in pit).
Horizontal Hydraulic Conductivity (K_{h1})	1.07E-06	m/s	Geometric mean of slug test results for all shallow and intermediate wells.
Area of Excavation (A)	8,860	m ²	Assumed as full area of Site.
Radius of Equal Area Circle (r)	53.11	m	Calculated: $r = \sqrt{A/\pi}$
Radius of Influence (R)	133.05	m	Value is solved such that the total pumping rate (Q_T) equals total inflows (Q_E)
Distance of Influence (L)	79.94	m	Calculated: $L = R - r$
Pumping Rate (Q_H) for Horizontal Flow	3,874	L/day	Calculated: $Q_1 = (\pi)(K)(H^2 - h^2)/\ln(R/r)$ and corrected to L/day = 8.64E07(m ³ /s)
Horizontal Hydraulic Conductivity (K_{h2})	1.07E-06	m/s	Geometric mean of slug test results for all shallow and intermediate wells.
Anisotropic Factor ($a = K_{v2}/K_{h2}$)	0.10	m/s	Literature value representative of relevant subsurface material (i.e., silty sand to sandy silt)
Vertical Hydraulic Conductivity (K_{v2})	1.07E-07	m/s	Calculated: $K_{v2} = K_{h2}(a)$
Representative Water Elevation for Upwelling Pressure	236.15	m asl	Due to planned regrading activities, groundwater level was set at ground level.
Water Level Above Dewatering Depth for Upwelling (H_2)	3.50	m	Calculated: H = Representative Water Elevation for Upwelling Pressure - Required Dewatering Depth
Pumping Rate (Q_V) for Upwards Flow into Excavation Base	21,735	L/day	Calculated using steady-state flow to one side of a disk sink (Marinelli and Niccoli, 2000): $Q_V = 4r(K_{h2}/\sqrt{K_{h2}/K_{v2}})(H - h)$ and corrected to L/day = 8.64E07(m ³ /s)
Precipitation Rate (P)	2.54E-08	m/s	Precipitation rate of 800 mm/yr (interpreted as reasonable for SW Ontario)
Precipitation Capture (Q_P)	19444	L/day	Calculated assuming capture all precipitation directly into the excavation: $Q_P = (P)(\pi)(r^2)$ and corrected to L/day = 8.64E07(m ³ /s)
Total Pumping Rate (Q_T)	45,053	L/day	Calculated: $Q_T = Q_H + Q_V + Q_P$
Groundwater Infiltration Rate (I)	6.34E-09	m/s	This rate corresponds to an infiltration rate of 200 mm/yr, interpreted as reasonable for silty sand overburden in Southwestern Ontario.
Groundwater Capture from Infiltration (Q_I)	25,609	L/day	Calculated infiltration within zone of influence but outside of excavation: $Q_P = (I)(\pi)(R^2 - r^2)$ and corrected to L/day = 8.64E07(m ³ /s)
Total Inflows (Q_E)	45,053	L/day	Calculated: $Q_E = Q_P + Q_I$
Water Balance (B)	0	L/day	Calculated (analytical method is solved when B is minimized): $B = \text{abs}(Q_T - Q_E)$
Estimated Excavation Dewatering Rate (Q_t)	45,000	L/day	Calculated and corrected to two significant digits: $Q_t = Q_1 + Q_2$
Recommend Factor of Safety	5	X	Based on professional judgement.
Recommend Excavation Dewatering Rate for Permitting	225,000	L/day	Calculated: Recommend Excavation Dewatering Rate for Permitting = $Q_t \times \text{Factor of Safety}$

Table A6.2
Long-Term Dewatering Calculations
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockap Holdings Inc., PGL File 5689-02.01

Item	Value	Unit	Source of Information
Ground Level	236.15	m asl	As identified in provided design plans.
Lowest Subsurface Level Floor	0.00	m bgs	See Drawing dA4.1 in Appendix 1
Lowest Subsurface Level Floor Elevation	236.15	m asl	Calculated: Lowest Subsurface Level Floor Elevation = Ground Level - Lowest Subsurface Floor Level.
Required Dewatering Depth	236.15	m asl	No dewatering required as building will be constructed as slab-on-grade.
Peak Water Level for Horizontal Flow	236.15	m asl	Due to planned regrading activities, groundwater level was set at ground level.
Water Level Above Dewatering Depth (H)	0.00	m	Calculated: H = Peak Water Level for Horizontal Flow - Required Dewatering Depth
Water Level Above Dewatering Depth (h)	0.00	m	Analytical solution requires this value to be 0 (unless there is standing water in pit).
Horizontal Hydraulic Conductivity (K_{h1})	1.07E-06	m/s	Geometric mean of slug test results for all shallow and intermediate wells.
Area to be dewatered (A)	0	m ²	Area set at 0 as no long-term dewatering will be required.
Radius of Equal Area Circle (r)	0.00	m	Calculated: $r = \sqrt{A/\pi}$
Radius of Influence (R)	0.00	m	Value is solved such that the total pumping rate (Q_T) equals total inflows (Q_E)
Distance of Influence (L)	0.00	m	Calculated: $L = R - r$
Pumping Rate (Q_H) for Horizontal Flow	0	L/day	Calculated: $Q_1 = (\pi)(K)(H^2 - h^2)/\ln(R/r)$ and corrected to L/day = 8.64E07(m ³ /s)
Horizontal Hydraulic Conductivity (K_{h2})	1.07E-06	m/s	Geometric mean of slug test results for all shallow and intermediate wells.
Anisotropic Factor ($a = K_{v2}/K_{h2}$)	0.10	m/s	Literature value representative of relevant subsurface material (i.e., silty sand to sandy silt)
Vertical Hydraulic Conductivity (K_{v2})	1.07E-07	m/s	Calculated: $K_{v2} = K_{h2}(a)$
Representative Water Elevation for Upwelling Pressure	236.15	m asl	Due to planned regrading activities, groundwater level was set at ground level.
Water Level Above Dewatering Depth for Upwelling (H_2)	0.00	m	Calculated: H = Representative Water Elevation for Upwelling Pressure - Required Dewatering Depth
Pumping Rate (Q_V) for Upwards Flow into Excavation Base	0	L/day	Calculated using steady-state flow to one side of a disk sink (Marinelli and Niccoli, 2000): $Q_v = 4r(K_{h2}/\sqrt{K_{h2}/K_{v2}})(H - h)$ and corrected to L/day = 8.64E07(m ³ /s)
Precipitation Rate (P)	2.54E-08	m/s	Precipitation rate of 800 mm/yr (interpreted as reasonable for SW Ontario)
Precipitation Capture (Q_P)	0	L/day	Direct precipitation capture into excavation not a factor for long-term dewatering of built structures.
Total Pumping Rate (Q_T)	0	L/day	Calculated: $Q_T = Q_H + Q_V + Q_P$
Groundwater Infiltration Rate (I)	6.34E-09	m/s	This rate corresponds to an infiltration rate of 200 mm/yr, interpreted as reasonable for silty sand overburden in Southwestern Ontario.
Groundwater Capture from Infiltration (Q_I)	0	L/day	Calculated infiltration within zone of influence but outside of excavation: $Q_P = (I)(\pi)(R^2 - r^2)$ and corrected to L/day = 8.64E07(m ³ /s)
Total Inflows (Q_E)	0	L/day	Calculated: $Q_E = Q_P + Q_I$
Water Balance (B)	0	L/day	Calculated (analytical method is solved when B is minimized): $B = \text{abs}(Q_T - Q_E)$
Estimated Excavation Dewatering Rate (Q_t)	0	L/day	Calculated and corrected to two significant digits: $Q_t = Q_1 + Q_2$
Recommend Factor of Safety	N/A	X	Based on professional judgement.
Recommend Excavation Dewatering Rate for Permitting	0	L/day	Calculated: Recommend Excavation Dewatering Rate for Permitting = $Q_t \times \text{Factor of Safety}$

Appendix 7

Groundwater Quality Laboratory Results



Pottinger Gaherty Environmental (Whitby)
ATTN: PAULA SCHUSTER
102-250 WATER STREET
WHITBY ON L1N 0G5

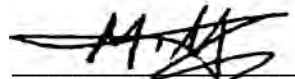
Date Received: 18-JUL-19
Report Date: 06-AUG-19 14:12 (MT)
Version: FINAL REV. 2

Client Phone: 905-668-4908

Certificate of Analysis

Lab Work Order #: L2313016
Project P.O. #: 136 BAYFIELD STREET, BARRIE
Job Reference: 5689-02.01
C of C Numbers: 17-641491
Legal Site Desc:

Comments: AUG-6-19:
Sublet results for Gold, Platinum and Rhodium included at the end of the COA.



Mathy Mahadeva
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 95 West Beaver Creek Road, Unit 1, Richmond Hill, ON L4B 1H2 Canada | Phone: +1 905 881 9887 | Fax: +1 905 881 8062
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ANALYTICAL GUIDELINE REPORT

L2313016 CONTD....

Page 2 of 7

06-AUG-19 14:12 (MT)

5689-02.01

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte									
L2313016-1	MW4									
Sampled By:	OWM on 17-JUL-19 @ 12:00									
Matrix:	WATER									
Physical Tests										
pH		7.33		0.10	pH units	19-JUL-19	6.0-9.5	6.0-9.5		
Total Suspended Solids		6.1		2.0	mg/L	23-JUL-19	350	15		
Anions and Nutrients										
Chloride (Cl)		1260	DLDS	5.0	mg/L	22-JUL-19	1500			
Fluoride (F)		<0.20	DLDS	0.20	mg/L	22-JUL-19	10			
Total Kjeldahl Nitrogen		<0.15		0.15	mg/L	22-JUL-19	100			
Phosphorus, Total		0.0045		0.0030	mg/L	22-JUL-19	10			
Sulfate (SO4)		96.0	DLDS	3.0	mg/L	22-JUL-19	1500			
Sulphide (as S)		0.023		0.018	mg/L	19-JUL-19				
Sulphide (as H2S)		0.024		0.019	mg/L	19-JUL-19	1			
Cyanides										
Cyanide, Total		<0.0020		0.0020	mg/L	22-JUL-19	1.2			
Total Metals										
Aluminum (Al)-Total		<0.050	DLHC	0.050	mg/L	19-JUL-19	50			
Antimony (Sb)-Total		<0.0010	DLHC	0.0010	mg/L	19-JUL-19	5			
Arsenic (As)-Total		<0.0010	DLHC	0.0010	mg/L	19-JUL-19	1			
Barium (Ba)-Total		0.247	DLHC	0.0010	mg/L	19-JUL-19	5			
Bismuth (Bi)-Total		<0.00050	DLHC	0.00050	mg/L	19-JUL-19	5			
Cadmium (Cd)-Total		<0.000050	DLHC	0.000050	mg/L	19-JUL-19	0.7	0.001		
Chromium (Cr)-Total		<0.0050	DLHC	0.0050	mg/L	19-JUL-19	2	0.08		
Cobalt (Co)-Total		<0.0010	DLHC	0.0010	mg/L	19-JUL-19	5.0			
Copper (Cu)-Total		<0.010	DLHC	0.010	mg/L	19-JUL-19	2.0	0.01		
Iron (Fe)-Total		0.20	DLHC	0.10	mg/L	19-JUL-19	50			
Lead (Pb)-Total		<0.00050	DLHC	0.00050	mg/L	19-JUL-19	0.7	0.05		
Manganese (Mn)-Total		0.0373	DLHC	0.0050	mg/L	19-JUL-19	5			
Mercury (Hg)-Total		<0.000010		0.000010	mg/L	19-JUL-19	0.01			
Molybdenum (Mo)-Total		0.00087	DLHC	0.00050	mg/L	19-JUL-19	5			
Nickel (Ni)-Total		<0.0050	DLHC	0.0050	mg/L	19-JUL-19	2	0.05		
Selenium (Se)-Total		<0.00050	DLHC	0.00050	mg/L	19-JUL-19	1.0			
Silver (Ag)-Total		<0.00050	DLHC	0.00050	mg/L	19-JUL-19	0.4			
Tin (Sn)-Total		<0.0010	DLHC	0.0010	mg/L	19-JUL-19	5			
Titanium (Ti)-Total		0.0039	DLHC	0.0030	mg/L	19-JUL-19				
Vanadium (V)-Total		<0.0050	DLHC	0.0050	mg/L	19-JUL-19	5.0			
Zinc (Zn)-Total		<0.030	DLHC	0.030	mg/L	19-JUL-19	2.0	0.04		
Aggregate Organics										
BOD		<3.0	BODL	3.0	mg/L	24-JUL-19	300	15		
COD		27		10	mg/L	23-JUL-19	600			
Oil and Grease, Total		<5.0		5.0	mg/L	20-JUL-19				
Animal/Veg Oil & Grease		<5.0		5.0	mg/L	22-JUL-19	150			
Mineral Oil and Grease		<2.5		2.5	mg/L	20-JUL-19	15			
Phenols (4AAP)		0.0060		0.0010	mg/L	19-JUL-19	0.1			
Volatile Organic Compounds										
Acetone		<20		20	ug/L	22-JUL-19				
Benzene		<0.50		0.50	ug/L	22-JUL-19	10			
Bromodichloromethane		<1.0		1.0	ug/L	22-JUL-19				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Sewer Use Bylaws = [Suite] - ON-SAN+STORM-BARRIE (2012-172)

#1: Barrie Sanitary Sewer (2012-172)

#2: Barrie Storm Sewer (2012-172)

ANALYTICAL GUIDELINE REPORT

L2313016 CONTD....

Page 3 of 7

06-AUG-19 14:12 (MT)

5689-02.01

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte									
L2313016-1	MW4									
Sampled By:	OWM on 17-JUL-19 @ 12:00									
Matrix:	WATER									
Volatile Organic Compounds										
	Bromoform	<1.0		1.0	ug/L	22-JUL-19				
	Bromomethane	<0.50		0.50	ug/L	22-JUL-19				
	Carbon Disulfide	<1.0		1.0	ug/L	22-JUL-19				
	Carbon tetrachloride	<0.50		0.50	ug/L	22-JUL-19				
	Chlorobenzene	<0.50		0.50	ug/L	22-JUL-19				
	Dibromochloromethane	<1.0		1.0	ug/L	22-JUL-19				
	Chloroethane	<1.0		1.0	ug/L	22-JUL-19				
	Chloroform	<1.0		1.0	ug/L	22-JUL-19				
	Chloromethane	<1.0		1.0	ug/L	22-JUL-19				
	1,2-Dibromoethane	<0.20		0.20	ug/L	22-JUL-19				
	1,2-Dichlorobenzene	<0.50		0.50	ug/L	22-JUL-19	50			
	1,3-Dichlorobenzene	<0.50		0.50	ug/L	22-JUL-19				
	1,4-Dichlorobenzene	<0.50		0.50	ug/L	22-JUL-19	80			
	Dichlorodifluoromethane	<1.0		1.0	ug/L	22-JUL-19				
	1,1-Dichloroethane	<0.50		0.50	ug/L	22-JUL-19				
	1,2-Dichloroethane	<0.50		0.50	ug/L	22-JUL-19				
	1,1-Dichloroethylene	<0.50		0.50	ug/L	22-JUL-19				
	cis-1,2-Dichloroethylene	<0.50		0.50	ug/L	22-JUL-19				
	trans-1,2-Dichloroethylene	<0.50		0.50	ug/L	22-JUL-19				
	Dichloromethane	<2.0		2.0	ug/L	22-JUL-19	90			
	1,2-Dichloropropane	<0.50		0.50	ug/L	22-JUL-19				
	cis-1,3-Dichloropropene	<0.50		0.50	ug/L	22-JUL-19				
	trans-1,3-Dichloropropene	<0.50		0.50	ug/L	22-JUL-19				
	Ethylbenzene	<0.50		0.50	ug/L	22-JUL-19	60			
	n-Hexane	<0.50		0.50	ug/L	22-JUL-19				
	2-Hexanone	<20		20	ug/L	22-JUL-19				
	Methyl Ethyl Ketone	<20		20	ug/L	22-JUL-19				
	Methyl Isobutyl Ketone	<20		20	ug/L	22-JUL-19				
	MTBE	<0.50		0.50	ug/L	22-JUL-19				
	Styrene	<0.50		0.50	ug/L	22-JUL-19				
	1,1,1,2-Tetrachloroethane	<0.50		0.50	ug/L	22-JUL-19				
	1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L	22-JUL-19	60			
	Tetrachloroethylene	<0.50		0.50	ug/L	22-JUL-19	60			
	Toluene	<0.50		0.50	ug/L	22-JUL-19	20			
	1,1,1-Trichloroethane	<0.50		0.50	ug/L	22-JUL-19				
	1,1,2-Trichloroethane	<0.50		0.50	ug/L	22-JUL-19				
	Trichloroethylene	<0.50		0.50	ug/L	22-JUL-19	50			
	Trichlorofluoromethane	<1.0		1.0	ug/L	22-JUL-19				
	Vinyl chloride	<0.50		0.50	ug/L	22-JUL-19				
	o-Xylene	<0.50		0.50	ug/L	22-JUL-19				
	m+p-Xylenes	<1.0		1.0	ug/L	22-JUL-19				
	Xylenes (Total)	<1.1		1.1	ug/L	22-JUL-19	300			
	Surrogate: 4-Bromofluorobenzene	97.9		70-130	%	22-JUL-19				
	Surrogate: 1,4-Difluorobenzene	98.0		70-130	%	22-JUL-19				
Polycyclic Aromatic Hydrocarbons										
	Acenaphthene	<0.020		0.020	ug/L	24-JUL-19				
	Acenaphthylene	<0.020		0.020	ug/L	24-JUL-19				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Sewer Use Bylaws = [Suite] - ON-SAN+STORM-BARRIE (2012-172)

#1: Barrie Sanitary Sewer (2012-172)

#2: Barrie Storm Sewer (2012-172)

#2: Barrie Storm Sewer (2012-172)

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
BOD-WT	Water	BOD	APHA 5210 B
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HEXACHLOROBENZENE-WT	Water	Hexachlorobenzene in water	SW846 8270
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calc	CALCULATION
Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.			
OGG-SPEC-WT	Water	Speciated Oil and Grease- Gravimetric	APHA 5520 B
The procedure involves an extraction of the entire water sample with hexane. Sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.			
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.			

Reference Information

PAH-511-WT Water PAH-O. Reg 153/04 (July 2011) SW846 3510/8270

Aqueous samples, fortified with surrogates, are extracted using liquid/liquid extraction technique. The sample extracts are concentrated and then analyzed using GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PAH-SUM-CALC-WT Water TOTAL PAH's CALCULATION

Total PAH represents the sum of all PAH analytes reported for a given sample. Note that regulatory agencies and criteria differ in their definitions of Total PAH in terms of the individual PAH analytes to be included.

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

S2-T>H2S-CALC-WT Water Total Sulphide Calculated as H2S Calculation

This calculation converts Total Sulphide as (S2-) and reports it as Total Sulphide as (H2S). Total Sulphide as (S2-) is determined using procedures adapted from APHA 4500-S2 "Sulphide".

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

SULPHIDE-WT Water Sulphide (as S) APHA 4500S2D

This analysis is carried out using procedures adapted from APHA Method 4500-S2-D "Methylene Blue Method". Sulphide is determined colourmetrically.

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

VOC-ROU-HS-WT Water Volatile Organic Compounds SW846 8260

Aqueous samples are analyzed by headspace-GC/MS.

XYLENES-SUM-CALC-WT Water Sum of Xylene Isomer Concentrations CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

17-641491

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 2 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT		Water						
Batch	R4720435							
WG3111916-4	DUP	WG3111916-3						
Fluoride (F)		0.096	0.098		mg/L	1.8	20	22-JUL-19
WG3111916-2	LCS							
Fluoride (F)			103.5		%		90-110	22-JUL-19
WG3111916-1	MB							
Fluoride (F)			<0.020		mg/L		0.02	22-JUL-19
WG3111916-5	MS	WG3111916-3						
Fluoride (F)			103.3		%		75-125	22-JUL-19
HEXACHLOROBENZENE-W Water								
Batch	R4720561							
WG3110147-2	LCS							
Hexachlorobenzene			91.9		%		40-130	23-JUL-19
WG3110147-1	MB							
Hexachlorobenzene			<0.040		ug/L		0.04	23-JUL-19
Surrogate: 2-Fluorobiphenyl			92.5		%		40-130	23-JUL-19
Surrogate: p-Terphenyl d14			111.9		%		40-130	23-JUL-19
HG-T-CVAA-WT		Water						
Batch	R4716350							
WG3109754-3	DUP	L2312388-1						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-JUL-19
WG3109754-2	LCS							
Mercury (Hg)-Total			99.6		%		80-120	19-JUL-19
WG3109754-1	MB							
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	19-JUL-19
WG3109754-5	MS	L2312727-2						
Mercury (Hg)-Total			97.3		%		70-130	19-JUL-19
MET-T-CCMS-WT		Water						
Batch	R4716094							
WG3109483-4	DUP	WG3109483-3						
Aluminum (Al)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	19-JUL-19
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-JUL-19
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-JUL-19
Barium (Ba)-Total		0.00027	0.00028		mg/L	3.3	20	19-JUL-19
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-JUL-19
Cadmium (Cd)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	19-JUL-19
Chromium (Cr)-Total		0.00127	0.00128		mg/L	0.9	20	19-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 3 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT		Water						
Batch	R4716094							
WG3109483-4 DUP		WG3109483-3						
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-JUL-19
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	19-JUL-19
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-JUL-19
Lead (Pb)-Total		0.00179	0.00179		mg/L	0.2	20	19-JUL-19
Manganese (Mn)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	19-JUL-19
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-JUL-19
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	19-JUL-19
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-JUL-19
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-JUL-19
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-JUL-19
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	19-JUL-19
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	19-JUL-19
Zinc (Zn)-Total		0.0063	0.0069		mg/L	8.8	20	19-JUL-19
WG3109483-2 LCS								
Aluminum (Al)-Total			100.7		%		80-120	19-JUL-19
Antimony (Sb)-Total			103.7		%		80-120	19-JUL-19
Arsenic (As)-Total			99.5		%		80-120	19-JUL-19
Barium (Ba)-Total			99.4		%		80-120	19-JUL-19
Bismuth (Bi)-Total			100.3		%		80-120	19-JUL-19
Cadmium (Cd)-Total			98.8		%		80-120	19-JUL-19
Chromium (Cr)-Total			99.5		%		80-120	19-JUL-19
Cobalt (Co)-Total			100.5		%		80-120	19-JUL-19
Copper (Cu)-Total			99.7		%		80-120	19-JUL-19
Iron (Fe)-Total			105.0		%		80-120	19-JUL-19
Lead (Pb)-Total			100.9		%		80-120	19-JUL-19
Manganese (Mn)-Total			99.5		%		80-120	19-JUL-19
Molybdenum (Mo)-Total			100.4		%		80-120	19-JUL-19
Nickel (Ni)-Total			99.6		%		80-120	19-JUL-19
Selenium (Se)-Total			101.1		%		80-120	19-JUL-19
Silver (Ag)-Total			100.2		%		80-120	19-JUL-19
Tin (Sn)-Total			101.1		%		80-120	19-JUL-19
Titanium (Ti)-Total			97.1		%		80-120	19-JUL-19
Vanadium (V)-Total			100.3		%		80-120	19-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 4 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT		Water						
Batch	R4716094							
WG3109483-2	LCS							
Zinc (Zn)-Total			96.1		%		80-120	19-JUL-19
WG3109483-1	MB							
Aluminum (Al)-Total			<0.0050		mg/L		0.005	19-JUL-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	19-JUL-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	19-JUL-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	19-JUL-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	19-JUL-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	19-JUL-19
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	19-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	19-JUL-19
Copper (Cu)-Total			<0.0010		mg/L		0.001	19-JUL-19
Iron (Fe)-Total			<0.010		mg/L		0.01	19-JUL-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	19-JUL-19
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	19-JUL-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	19-JUL-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	19-JUL-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	19-JUL-19
Silver (Ag)-Total			<0.000050		mg/L		0.00005	19-JUL-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	19-JUL-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	19-JUL-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	19-JUL-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	19-JUL-19
WG3109483-5	MS	WG3109483-6						
Aluminum (Al)-Total			100.5		%		70-130	19-JUL-19
Antimony (Sb)-Total			100.2		%		70-130	19-JUL-19
Arsenic (As)-Total			96.4		%		70-130	19-JUL-19
Barium (Ba)-Total			N/A	MS-B	%		-	19-JUL-19
Bismuth (Bi)-Total			85.7		%		70-130	19-JUL-19
Cadmium (Cd)-Total			92.0		%		70-130	19-JUL-19
Chromium (Cr)-Total			100.4		%		70-130	19-JUL-19
Cobalt (Co)-Total			95.6		%		70-130	19-JUL-19
Copper (Cu)-Total			91.3		%		70-130	19-JUL-19
Iron (Fe)-Total			N/A	MS-B	%		-	19-JUL-19
Lead (Pb)-Total			89.4		%		70-130	19-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 5 of 14

Client:

Pottinger Gaherty Environmental (Whitby)

102-250 WATER STREET

WHITBY ON L1N 0G5

Contact:

PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT		Water						
Batch	R4716094							
WG3109483-5	MS	WG3109483-6						
Manganese (Mn)-Total			N/A	MS-B	%		-	19-JUL-19
Molybdenum (Mo)-Total			100.8		%		70-130	19-JUL-19
Nickel (Ni)-Total			91.8		%		70-130	19-JUL-19
Selenium (Se)-Total			97.5		%		70-130	19-JUL-19
Silver (Ag)-Total			89.6		%		70-130	19-JUL-19
Tin (Sn)-Total			98.3		%		70-130	19-JUL-19
Titanium (Ti)-Total			102.9		%		70-130	19-JUL-19
Vanadium (V)-Total			104.1		%		70-130	19-JUL-19
Zinc (Zn)-Total			86.1		%		70-130	19-JUL-19
OGG-SPEC-WT		Water						
Batch	R4719572							
WG3110705-2	LCS							
Oil and Grease, Total			88.2		%		70-130	20-JUL-19
Mineral Oil and Grease			92.0		%		70-130	20-JUL-19
WG3110705-1	MB							
Oil and Grease, Total			<5.0		mg/L		5	20-JUL-19
Mineral Oil and Grease			<2.5		mg/L		2.5	20-JUL-19
P-T-COL-WT		Water						
Batch	R4719703							
WG3110508-3	DUP	L2312024-1						
Phosphorus, Total		0.0044	0.0041		mg/L	5.6	20	22-JUL-19
WG3110508-2	LCS							
Phosphorus, Total			97.4		%		80-120	22-JUL-19
WG3110508-1	MB							
Phosphorus, Total			<0.0030		mg/L		0.003	22-JUL-19
WG3110508-4	MS	L2312024-1						
Phosphorus, Total			71.4		%		70-130	22-JUL-19
PAH-511-WT		Water						
Batch	R4723756							
WG3109410-2	LCS							
1-Methylnaphthalene			101.5		%		50-140	24-JUL-19
2-Methylnaphthalene			91.9		%		50-140	24-JUL-19
Acenaphthene			118.1		%		50-140	24-JUL-19
Acenaphthylene			109.3		%		50-140	24-JUL-19
Anthracene			121.8		%		50-140	24-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 6 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT		Water						
Batch	R4723756							
WG3109410-2	LCS							
Benzo(a)anthracene			122.3		%		50-140	24-JUL-19
Benzo(a)pyrene			122.7		%		50-140	24-JUL-19
Benzo(b)fluoranthene			121.5		%		50-140	24-JUL-19
Benzo(g,h,i)perylene			119.5		%		50-140	24-JUL-19
Benzo(k)fluoranthene			115.8		%		50-140	24-JUL-19
Chrysene			122.9		%		50-140	24-JUL-19
Dibenzo(ah)anthracene			122.5		%		50-140	24-JUL-19
Fluoranthene			120.1		%		50-140	24-JUL-19
Fluorene			116.6		%		50-140	24-JUL-19
Indeno(1,2,3-cd)pyrene			131.3		%		50-140	24-JUL-19
Naphthalene			109.3		%		50-140	24-JUL-19
Phenanthrene			123.8		%		50-140	24-JUL-19
Pyrene			117.2		%		50-140	24-JUL-19
WG3109410-1	MB							
1-Methylnaphthalene			<0.020		ug/L		0.02	24-JUL-19
2-Methylnaphthalene			<0.020		ug/L		0.02	24-JUL-19
Acenaphthene			<0.020		ug/L		0.02	24-JUL-19
Acenaphthylene			<0.020		ug/L		0.02	24-JUL-19
Anthracene			<0.020		ug/L		0.02	24-JUL-19
Benzo(a)anthracene			<0.020		ug/L		0.02	24-JUL-19
Benzo(a)pyrene			<0.010		ug/L		0.01	24-JUL-19
Benzo(b)fluoranthene			<0.020		ug/L		0.02	24-JUL-19
Benzo(g,h,i)perylene			<0.020		ug/L		0.02	24-JUL-19
Benzo(k)fluoranthene			<0.020		ug/L		0.02	24-JUL-19
Chrysene			<0.020		ug/L		0.02	24-JUL-19
Dibenzo(ah)anthracene			<0.020		ug/L		0.02	24-JUL-19
Fluoranthene			<0.020		ug/L		0.02	24-JUL-19
Fluorene			<0.020		ug/L		0.02	24-JUL-19
Indeno(1,2,3-cd)pyrene			<0.020		ug/L		0.02	24-JUL-19
Naphthalene			<0.050		ug/L		0.05	24-JUL-19
Phenanthrene			<0.020		ug/L		0.02	24-JUL-19
Pyrene			<0.020		ug/L		0.02	24-JUL-19
Surrogate: d8-Naphthalene			123.1		%		60-140	24-JUL-19
Surrogate: d10-Phenanthrene			109.8		%		60-140	24-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 7 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT								
Water								
Batch	R4723756							
WG3109410-1 MB								
Surrogate: d12-Chrysene			109.5		%		60-140	24-JUL-19
Surrogate: d10-Acenaphthene			110.0		%		60-140	24-JUL-19
PH-WT								
Water								
Batch	R4719124							
WG3109930-4 DUP		WG3109930-3						
pH		8.02	7.98	J	pH units	0.04	0.2	19-JUL-19
WG3109930-2 LCS								
pH			7.02		pH units		6.9-7.1	19-JUL-19
PHENOLS-4AAP-WT								
Water								
Batch	R4719699							
WG3109768-11 DUP		L2312252-1						
Phenols (4AAP)		0.0017	0.0018		mg/L	5.0	20	19-JUL-19
WG3109768-10 LCS								
Phenols (4AAP)			106.5		%		85-115	19-JUL-19
WG3109768-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	19-JUL-19
WG3109768-12 MS		L2312252-1						
Phenols (4AAP)			109.6		%		75-125	19-JUL-19
SO4-IC-N-WT								
Water								
Batch	R4720435							
WG3111916-4 DUP		WG3111916-3						
Sulfate (SO4)		69.3	68.7		mg/L	0.9	20	22-JUL-19
WG3111916-2 LCS								
Sulfate (SO4)			100.2		%		90-110	22-JUL-19
WG3111916-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUL-19
WG3111916-5 MS		WG3111916-3						
Sulfate (SO4)			98.5		%		75-125	22-JUL-19
SOLIDS-TSS-WT								
Water								
Batch	R4720400							
WG3111430-3 DUP		L2313539-5						
Total Suspended Solids		5280	5100		mg/L	3.7	20	23-JUL-19
WG3111430-2 LCS								
Total Suspended Solids			99.6		%		85-115	23-JUL-19
WG3111430-1 MB								
Total Suspended Solids			<2.0		mg/L		2	23-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 8 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SULPHIDE-WT		Water						
Batch	R4715729							
WG3109710-3	DUP	L2310975-2						
Sulphide (as S)		3.86	3.69		mg/L	4.5	20	19-JUL-19
WG3109710-2	LCS							
Sulphide (as S)			85.5		%		75-125	19-JUL-19
WG3109710-1	MB							
Sulphide (as S)			<0.018		mg/L		0.018	19-JUL-19
WG3109710-4	MS	L2310975-2						
Sulphide (as S)			N/A	MS-B	%		-	19-JUL-19
TKN-WT		Water						
Batch	R4719961							
WG3110325-3	DUP	L2311696-8						
Total Kjeldahl Nitrogen		1.40	1.55		mg/L	11	20	22-JUL-19
WG3110325-2	LCS							
Total Kjeldahl Nitrogen			97.0		%		75-125	22-JUL-19
WG3110325-1	MB							
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	22-JUL-19
WG3110325-4	MS	L2311696-8						
Total Kjeldahl Nitrogen			103.0		%		70-130	22-JUL-19
VOC-ROU-HS-WT		Water						
Batch	R4715909							
WG3109620-4	DUP	WG3109620-3						
1,1,1,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,1,1-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,1,2-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,2-Dibromoethane		<0.20	<0.20	RPD-NA	ug/L	N/A	30	22-JUL-19
1,1-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,1-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,2-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,2-Dichloropropane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,3-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
2-Hexanone		<20	<20	RPD-NA	ug/L	N/A	30	22-JUL-19
Acetone		<20	<20	RPD-NA	ug/L	N/A	30	22-JUL-19
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 9 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R4715909							
WG3109620-4 DUP		WG3109620-3						
Bromodichloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Bromoform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Bromomethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Carbon Disulfide		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Carbon tetrachloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Chlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Chloroethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Chloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
cis-1,3-Dichloropropene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Dibromochloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Dichlorodifluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
m+p-Xylenes		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	22-JUL-19
Methyl Isobutyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	22-JUL-19
n-Hexane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
MTBE		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
o-Xylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Toluene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
trans-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
trans-1,3-Dichloropropene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
Trichlorofluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	22-JUL-19
Vinyl chloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	22-JUL-19
WG3109620-1 LCS								
1,1,1,2-Tetrachloroethane			93.8		%		70-130	19-JUL-19
1,1,2,2-Tetrachloroethane			87.5		%		70-130	19-JUL-19
1,1,1-Trichloroethane			98.4		%		70-130	19-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 10 of 14

Client:

Pottinger Gaherty Environmental (Whitby)
 102-250 WATER STREET
 WHITBY ON L1N 0G5

Contact:

PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R4715909							
WG3109620-1	LCS							
1,1,2-Trichloroethane			91.1		%		70-130	19-JUL-19
1,2-Dibromoethane			88.7		%		70-130	19-JUL-19
1,1-Dichloroethane			99.8		%		70-130	19-JUL-19
1,1-Dichloroethylene			98.4		%		70-130	19-JUL-19
1,2-Dichlorobenzene			89.3		%		70-130	19-JUL-19
1,2-Dichloroethane			92.5		%		70-130	19-JUL-19
1,2-Dichloropropane			97.0		%		70-130	19-JUL-19
1,3-Dichlorobenzene			89.1		%		70-130	19-JUL-19
1,4-Dichlorobenzene			89.9		%		70-130	19-JUL-19
2-Hexanone			81.3		%		60-140	19-JUL-19
Acetone			94.8		%		60-140	19-JUL-19
Benzene			99.97		%		70-130	19-JUL-19
Bromodichloromethane			93.9		%		70-130	19-JUL-19
Bromoform			85.2		%		70-130	19-JUL-19
Bromomethane			89.4		%		60-140	19-JUL-19
Carbon Disulfide			104.7		%		70-130	19-JUL-19
Carbon tetrachloride			99.1		%		70-130	19-JUL-19
Chlorobenzene			87.7		%		70-130	19-JUL-19
Chloroethane			109.5		%		70-130	19-JUL-19
Chloroform			97.5		%		70-130	19-JUL-19
Chloromethane			100.1		%		60-140	19-JUL-19
cis-1,2-Dichloroethylene			93.7		%		70-130	19-JUL-19
cis-1,3-Dichloropropene			95.6		%		70-130	19-JUL-19
Dibromochloromethane			84.3		%		70-130	19-JUL-19
Dichlorodifluoromethane			92.6		%		50-140	19-JUL-19
Dichloromethane			95.2		%		70-130	19-JUL-19
Ethylbenzene			96.9		%		70-130	19-JUL-19
m+p-Xylenes			97.6		%		70-130	19-JUL-19
Methyl Ethyl Ketone			86.1		%		60-140	19-JUL-19
Methyl Isobutyl Ketone			85.3		%		50-150	19-JUL-19
n-Hexane			97.0		%		70-130	19-JUL-19
MTBE			97.9		%		70-130	19-JUL-19
o-Xylene			95.6		%		70-130	19-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 11 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R4715909							
WG3109620-1	LCS							
Styrene			93.3		%		70-130	19-JUL-19
Tetrachloroethylene			99.0		%		70-130	19-JUL-19
Toluene			98.0		%		70-130	19-JUL-19
trans-1,2-Dichloroethylene			99.3		%		70-130	19-JUL-19
trans-1,3-Dichloropropene			94.3		%		70-130	19-JUL-19
Trichloroethylene			97.9		%		70-130	19-JUL-19
Trichlorofluoromethane			99.97		%		60-140	19-JUL-19
Vinyl chloride			110.9		%		60-140	19-JUL-19
WG3109620-2	MB							
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	19-JUL-19
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	19-JUL-19
1,1,1-Trichloroethane			<0.50		ug/L		0.5	19-JUL-19
1,1,2-Trichloroethane			<0.50		ug/L		0.5	19-JUL-19
1,2-Dibromoethane			<0.20		ug/L		0.2	19-JUL-19
1,1-Dichloroethane			<0.50		ug/L		0.5	19-JUL-19
1,1-Dichloroethylene			<0.50		ug/L		0.5	19-JUL-19
1,2-Dichlorobenzene			<0.50		ug/L		0.5	19-JUL-19
1,2-Dichloroethane			<0.50		ug/L		0.5	19-JUL-19
1,2-Dichloropropane			<0.50		ug/L		0.5	19-JUL-19
1,3-Dichlorobenzene			<0.50		ug/L		0.5	19-JUL-19
1,4-Dichlorobenzene			<0.50		ug/L		0.5	19-JUL-19
2-Hexanone			<20		ug/L		20	19-JUL-19
Acetone			<20		ug/L		20	19-JUL-19
Benzene			<0.50		ug/L		0.5	19-JUL-19
Bromodichloromethane			<1.0		ug/L		1	19-JUL-19
Bromoform			<1.0		ug/L		1	19-JUL-19
Bromomethane			<0.50		ug/L		0.5	19-JUL-19
Carbon Disulfide			<1.0		ug/L		1	19-JUL-19
Carbon tetrachloride			<0.50		ug/L		0.5	19-JUL-19
Chlorobenzene			<0.50		ug/L		0.5	19-JUL-19
Chloroethane			<1.0		ug/L		1	19-JUL-19
Chloroform			<1.0		ug/L		1	19-JUL-19
Chloromethane			<1.0		ug/L		1	19-JUL-19
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	19-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 12 of 14

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact: PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R4715909							
WG3109620-2 MB								
cis-1,3-Dichloropropene			<0.50		ug/L		0.5	19-JUL-19
Dibromochloromethane			<1.0		ug/L		1	19-JUL-19
Dichlorodifluoromethane			<1.0		ug/L		1	19-JUL-19
Dichloromethane			<2.0		ug/L		2	19-JUL-19
Ethylbenzene			<0.50		ug/L		0.5	19-JUL-19
m+p-Xylenes			<1.0		ug/L		1	19-JUL-19
Methyl Ethyl Ketone			<20		ug/L		20	19-JUL-19
Methyl Isobutyl Ketone			<20		ug/L		20	19-JUL-19
n-Hexane			<0.50		ug/L		0.5	19-JUL-19
MTBE			<0.50		ug/L		0.5	19-JUL-19
o-Xylene			<0.50		ug/L		0.5	19-JUL-19
Styrene			<0.50		ug/L		0.5	19-JUL-19
Tetrachloroethylene			<0.50		ug/L		0.5	19-JUL-19
Toluene			<0.50		ug/L		0.5	19-JUL-19
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	19-JUL-19
trans-1,3-Dichloropropene			<0.50		ug/L		0.5	19-JUL-19
Trichloroethylene			<0.50		ug/L		0.5	19-JUL-19
Trichlorofluoromethane			<1.0		ug/L		1	19-JUL-19
Vinyl chloride			<0.50		ug/L		0.5	19-JUL-19
Surrogate: 1,4-Difluorobenzene			97.8		%		70-130	19-JUL-19
Surrogate: 4-Bromofluorobenzene			98.0		%		70-130	19-JUL-19
WG3109620-5 MS		WG3109620-3						
1,1,1,2-Tetrachloroethane			95.3		%		50-150	22-JUL-19
1,1,2,2-Tetrachloroethane			99.3		%		50-150	22-JUL-19
1,1,1-Trichloroethane			97.3		%		50-150	22-JUL-19
1,1,2-Trichloroethane			93.1		%		50-150	22-JUL-19
1,2-Dibromoethane			90.8		%		50-150	22-JUL-19
1,1-Dichloroethane			99.95		%		50-150	22-JUL-19
1,1-Dichloroethylene			92.7		%		50-150	22-JUL-19
1,2-Dichlorobenzene			88.1		%		50-150	22-JUL-19
1,2-Dichloroethane			93.8		%		50-150	22-JUL-19
1,2-Dichloropropane			98.2		%		50-150	22-JUL-19
1,3-Dichlorobenzene			85.9		%		50-150	22-JUL-19
1,4-Dichlorobenzene			86.2		%		50-150	22-JUL-19



Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Page 13 of 14

Client:

Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5

Contact:

PAULA SCHUSTER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R4715909							
WG3109620-5	MS	WG3109620-3						
2-Hexanone			83.2		%		50-150	22-JUL-19
Acetone			99.6		%		50-150	22-JUL-19
Benzene			99.4		%		50-150	22-JUL-19
Bromodichloromethane			95.3		%		50-150	22-JUL-19
Bromoform			87.5		%		50-150	22-JUL-19
Bromomethane			80.6		%		50-150	22-JUL-19
Carbon Disulfide			95.1		%		50-150	22-JUL-19
Carbon tetrachloride			97.0		%		50-150	22-JUL-19
Chlorobenzene			87.7		%		50-150	22-JUL-19
Chloroethane			102.4		%		50-150	22-JUL-19
Chloroform			97.8		%		50-150	22-JUL-19
Chloromethane			88.9		%		50-150	22-JUL-19
cis-1,2-Dichloroethylene			93.6		%		50-150	22-JUL-19
cis-1,3-Dichloropropene			91.2		%		50-150	22-JUL-19
Dibromochloromethane			85.6		%		50-150	22-JUL-19
Dichlorodifluoromethane			76.7		%		50-150	22-JUL-19
Dichloromethane			94.3		%		50-150	22-JUL-19
Ethylbenzene			96.0		%		50-150	22-JUL-19
m+p-Xylenes			96.0		%		50-150	22-JUL-19
Methyl Ethyl Ketone			87.0		%		50-150	22-JUL-19
Methyl Isobutyl Ketone			87.9		%		50-150	22-JUL-19
n-Hexane			90.0		%		50-150	22-JUL-19
MTBE			97.7		%		50-150	22-JUL-19
o-Xylene			95.3		%		50-150	22-JUL-19
Styrene			93.1		%		50-150	22-JUL-19
Tetrachloroethylene			95.2		%		50-150	22-JUL-19
Toluene			97.0		%		50-150	22-JUL-19
trans-1,2-Dichloroethylene			94.3		%		50-150	22-JUL-19
trans-1,3-Dichloropropene			88.9		%		50-150	22-JUL-19
Trichloroethylene			95.4		%		50-150	22-JUL-19
Trichlorofluoromethane			93.3		%		50-150	22-JUL-19
Vinyl chloride			98.9		%		50-150	22-JUL-19

Quality Control Report

Workorder: L2313016

Report Date: 06-AUG-19

Client: Pottinger Gaherty Environmental (Whitby)
102-250 WATER STREET
WHITBY ON L1N 0G5
Contact: PAULA SCHUSTER

Page 14 of 14

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Quality Control Sample Batch Report

Analysis Information

Workorder: 1921130

Limits: Historical/Performance

Basis: ALS Laboratory Group

Preparation: EPA 3010, SW 6020 Water Prep

Batch: EMS/5511 (HBN: 244773)

Prepared By: Kristie F. Bitner

Analysis: SW 6020

Batch: EMS/5512 (HBN: 244867)

Analyzed By: Kristie F. Bitner

Blank

MB: 666475 Analyzed: 08/01/2019 17:13 Units: ug/L			
Analyte	Result	MDL	RL
Gold	ND	10	25.0
Platinum	ND	3	10.0
Rhodium	ND	3	10.0

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 666476 Analyzed: 08/01/2019 17:21 Dilution: 5 Units: ug/L						LCSD: 666477 Analyzed: 08/01/2019 17:23 Dilution: 5 Units: ug/L				
Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Platinum	397	400	99.2	85.5	111.8	405	101	2.03	0.0	20.0
Gold	387	400	96.9	62.2	119.9	397	99.2	2.43	0.0	20.0
Rhodium	382	400	95.4	80.0	120.0	391	97.7	2.41	0.0	20.0

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Kristie F. Bitner 08/02/2019 10:34	/S/ Penny A. Foote 08/02/2019 11:57

Symbols and Definitions

- * - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- - Sample and Matrix Duplicate less than 5 times the reporting limit
- - Result is above the calibration range
- # - The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable



ANALYTICAL REPORT

Amended-20190806

Report Date: August 06, 2019

Mathy Mahadeva
ALS Environmental
60 Northland Road Unit 1
Waterloo, ON N2V 2B8
CANADA

Phone: (519) 886-6910 x 245

E-mail: Mathy.Mahadeva@ALSGlobal.co
m

Workorder: **34-1921130**

Project ID: L2313016 071719

Purchase Order: L2313016

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
MW4	1921130001	07/17/19	07/24/19	L2313016

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 268 9992

ALS GROUP USA, CORP. An ALS Limited Company

Environmental

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER



ANALYTICAL REPORT

Amended-20190806

Workorder: 34-1921130

Client: ALS Environmental
(Waterloo)

Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: MW4		Sampling Site: L2313016		Collected: 07/17/2019	
Lab ID: 1921130001		Media: 40 mL Clear Glass VOA		Received: 07/24/2019	
Matrix: Water		Sampling Parameter: NA			
Analysis Method - SW 6020					
Preparation: EPA 3010, SW 6020 Water Prep		Weight/Volume	Analysis: SW 6020A, Water		Instrument ID: ICPM02
Batch: EMS/5511 (HBN: 244773)		Initial: 40 mL	Batch: EMS/5512 (HBN: 244867)		Percent Solid: NA
Prepared: 08/01/2019		Final: 50 mL	Analyzed: 08/01/2019 17:26		Report Basis: Wet
Analyte	Result (ug/L)	MDL (ug/L)	RL (ug/L)	Dilution	Qual
Gold	ND	13	31	5	U
Platinum	ND	3.8	13	5	U
Rhodium	ND	3.8	13	5	U

Comments

Workorder: 1921130

SW 6020, Water: Because the sample in this work order, and its associated QC samples, were digested using aqua regia, all samples were diluted 5x prior to analysis to reduce the acid concentration and preserve the instrument integrity. Reporting limits have been raised. Also, sample 1921130001 was prepared using 40 mL of sample.

Change "Reoprt To:"

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
SW 6020	/S/ Kristie F. Bitner 08/02/2019 10:34	/S/ Penny A. Foote 08/02/2019 11:57

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: als@ALSglobal.com
Web: www.als@ALSglobal.com



ANALYTICAL REPORT

Amended-20190806

Workorder: 34-1921130

Client: ALS Environmental
(Waterloo)

Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	PJLA (DoD ELAP)	L17-506	http://www.pjllabs.com
	PJLA (ISO 17025)	L17-507-R1	http://www.pjllabs.com
	Utah (TNI)	UT00953	http://lams.nelac-institute.org/search
	Nevada (TNI)	UT00953201-1	https://ndep.nv.gov/water/lab-certification
	Iowa (TNI)	IA# 376	http://www.shl.uiowa.edu/labcert/idnr/
	Kansas	E-10416	http://www.kdheks.gov/envlab/disclaimer.html
	Oklahoma (TNI)	IJ# 9980	http://www.deq.state.ok.us/CSDnew/labcert.htm
	Texas (TNI)	T104704456-18-9	https://www.tceq.texas.gov/assets/public/compliance/compliance_support/qa/txnelap_lab_list.pdf
Industrial Hygiene	AIHA (ISO 17025 & AIHA IHLAP)	101574	http://www.aihaaccreditedlabs.org
	DOECAP-AP	L18-606	http://www.pjllabs.com
	Washington	C596	https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Laboratory-Accreditation
Dietary Supplements	PJLA (ISO 17025)	L17-507-R1	http://www.pjllabs.com

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.

RL = Reporting Limit, a verified value of method/media/instrument sensitivity.

CRDL = Contract Required Detection Limit

Reg. Limit = Regulatory Limit.

ND = Not Detected, testing result not detected above the MDL or RL.

< Means this testing result is less than the numerical value.

** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.

J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.

B = Qualifier indicates that the analyte was detected in the blank.

E = Qualifier indicates that the analyte result exceeds calibration range.

P = Qualifier indicates that the RPD between the two columns is greater than 40%.

JULY 2017 EBCO

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Appendix 8

Groundwater Quality Results Compared to PWQO Criteria

PGL Environmental Consultants
Standard Table Notes
Sediment and Surface Water Samples

Sediment sample results are presented as ug/g (ppm) on a dry weight basis unless otherwise noted

Surface water sample results are presented as ug/L (ppb) unless otherwise noted

BH#M	Borehole with monitoring well installed
MW#	Monitoring Well
~	No standard
<	Less than stated detection limit
#	Greater than applicable Standard
<#	RDL greater than applicable Standard
m bgs	metres below ground surface
m asl	metres above mean sea level
CNA	could not access
mg/kg	milligrams per kilogram
mS/cm	micro-siemens per centimetre
PWQO	Table of PWQOs and Interim PWQOs of <i>Water Management, Policies, Guidelines, Provincial Water Quality Objectives of the Ministry of Environment and Energy</i> , MOE, July 1994 for surface water

Table A8.1
Groundwater Results - Petroleum Hydrocarbons
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockcap Holdings Inc., PGL File 5689-02.02

				PHCs				Other PHCs		TPH
				Benzene	Toluene	Ethylbenzene	Xylene Total	Xylene (m & p)	Xylene (o)	MINERAL OIL & GREASE
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RDL				0.5	0.5	0.5	1.1	1	0.5	2500
PWQOs				100	0.8	8	-	-	40	-

Sample Location	Sample ID	Sample Date	Analytical Report Reference Number							
MW4	MW4	17-Jul-19	L2313016	<0.5	<0.5	<0.5	<1.1	<1	<0.5	<2500

Table A8.2
Groundwater Results - Volatile Organic Compounds
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockcap Holdings Inc., PGL File 5689-02.02

				VOC																		
				Acetone	Bromodichloromethane	Bromoform	Bromomethane	Carbon tetrachloride	Chlorobenzene	1,1-Dichloroethylene	Chloroform	Chloromethane	Dibromochloromethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,1-Dichloroethane	1,2-Dichloroethane	Dichlorodifluoromethane	cis-1,2-Dichloroethylene	1,2-Dichloropropane	cis-1,3-Dichloropropene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RDL				20	1	1	0.5	0.5	0.5	0.5	1	1	1	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5
PWQOs				~	200	60	0.9	~	15	40	~	700	40	2.5	2.5	4	200	100	~	200	0.7	~

Sample Location	Sample ID	Sample Date	Analytical Report Reference Number																			
MW4	MW4	17-Jul-19	L2313016	<20	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5

Table A8.2
Groundwater Results - Volatile Organic Compounds
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockcap Holdings Inc., PGL File 5689-02.02

				VOC																Other VOC			
				trans-1,3-Dichloropropene	trans-1,2-Dichloroethylene	Ethylene Dibromide	Hexane	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Methyl tert-butyl ether	Methylene Chloride	1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	Styrene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Tetrachloroethylene	Trichloroethylene	Trichlorofluoromethane	Vinyl Chloride	Carbon disulfide	Chloroethane	2-Hexanone
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RDL				0.5	0.5	0.2	0.5	20	20	0.5	2	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	1	1	20	
PWQOs				7	200	5	~	400	~	200	100	20	70	4	10	800	50	20	~	600	~	~	~

Sample Location	Sample ID	Sample Date	Analytical Report Reference Number	<0.5	<0.5	<0.2	<0.5	<20	<20	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<1	<1	<20
MW4	MW4	17-Jul-19	L2313016	<0.5	<0.5	<0.2	<0.5	<20	<20	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<1	<1	<20

Table A8.3
Groundwater Results - Polycyclic Aromatic Hydrocarbons
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockcap Holdings Inc., PGL File 5689-02.02

	PAH																		Other PAH	
	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)	Phenols (4AAP)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RDL	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.09	1
PWQOs	~	~	0.0008	0.0004	~	0.00002	~	0.0002	0.0001	0.002	0.0008	0.2	~	2	~	7	0.03	~	~	~

Sample Location	Sample ID	Sample Date	Analytical Report Reference Number	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.095	6
MW4	MW4	17-Jul-19	L2313016																			

Table A8.4
Groundwater Results - Metals and Inorganics
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockcap Holdings Inc., PGL File 5689-02.02

				Metals																Other Metals			Inorganics									
				Aluminium	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Vanadium	Zinc	Bismuth	Tin	Titanium	Chloride	Cyanide Total	Fluoride	Kjeldahl Nitrogen Total	Phosphorus	Sulphate	Sulphide	sulphide (as H2S)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RDL				50	1	1	1	0.05	5	1	10	100	0.5	5	0.01	0.5	5	0.5	0.5	5	30	0.5	1	3	5000	2	200	150	3	3000	10	10
PWQOs				15 75	20	5	~	0.1 0.5	~	0.9	1 5	300	1 3 5	~	0.2	40	25	100	0.1	6	20	~	~	~	~	5	~	~	10	~	~	~

Sample Location	Sample ID	Sample Date	Analytical Report Reference Number																													
MW4	MW4	17-Jul-19	L2313016	<50	<1	<1	247	<0.05	<5	<1	<10	200	<0.5	37.3	<0.01	0.87	<5	<0.5	<0.5	<5	<30	<0.5	<1	3.9	1.26E6	<2	<200	<150	4.5	96,000	23	24

Table A8.5
Groundwater Results - Pesticides
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockcap Holdings Inc., PGL File 5689-02.02

				OC Pesticides
				Hexachlorobenzene
				µg/L
RDL				0.04
PWQOs				0.0065
Sample Location	Sample ID	Sample Date	Analytical Report Reference Number	
MW4	MW4	17-Jul-19	L2313016	<0.04

Table A8.6
Groundwater Results - Physical Parameters
136 Bayfield Street and 14 Sophia Street West, Barrie, ON
Rockcap Holdings Inc., PGL File 5689-02.02

				Physical			
				pH (Lab)	BOD	COD	TSS
				pH_Units	µg/L	µg/L	mg/L
RDL				0.1	2000	10000	2
PWQOs				6.5-8.5	~	~	~

Sample Location	Sample ID	Sample Date	Analytical Report Reference Number				
MW4	MW4	17-Jul-19	L2313016	7.33	<3000	27,000	6.1
MW4	MW4_Lab_Dup	20-Jul-19	L2313016	-	<3000	-	-