



REPORT

MCCARTHY QUARRY

McCarthy Quarry 2018 Annual Permit To Take Water Compliance Report

Submitted to:

Cindy Hood

Ontario Ministry of Environment, Conservation and Parks
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Table of Contents

1.0 INTRODUCTION	1
2.0 BACKGROUND INFORMATION.....	1
2.1 Geology	1
2.2 Hydrogeological Setting	2
2.3 Quarry Dewatering	2
3.0 MONITORING RESULTS	3
4.0 RECOMMENDATIONS.....	6
5.0 LIMITATIONS AND USE OF REPORT	7
6.0 CLOSURE	7

TABLES (IN TEXT)

Table 1: Groundwater Monitoring Locations.....	3
Table 2: Groundwater Quality Requirements	6

FIGURES

Figure 1 – Location Map
Figure 2 – Site Location Map
Figure 3 – Site Section C-C'
Figure 4 – Site Section D-D'
Figure 5 – 2018 Weather
Figure 6 – Overburden Monitoring Wells Groundwater Elevations
Figure 7 – Verulam Monitoring Wells Groundwater Elevations
Figure 8 – Bobcaygeon Monitoring Wells Groundwater Elevations
Figure 9 – Gull River Monitoring Wells Groundwater Elevations
Figure 10 – Precambrian Bedrock Monitoring Wells Groundwater Elevations

TABLES (APPENDED)

Table 1 - Groundwater Monitoring Locations (embedded)

Table 2 - Groundwater Quality Requirements (embedded)

Table 3 – 2018 Water Levels

Table 4 – Private Water Supply Water Quality

Table 5 – Onsite Observation Wells Water Quality

Table 6 – 2018 Measured Water Volume and Rate of Discharge from Quarry Sump

APPENDICES**APPENDIX A**

PTTW No. 7818-9QJNL4

APPENDIX B

Hydrographs

APPENDIX C

Certificates of Analysis

APPENDIX D

Borehole Log

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by QBJR/Coco Aggregates Inc. (Coco) to prepare the annual Permit To Take Water (PTTW) report for the McCarthy Quarry (the Site) located in the Township of Ramara, County of Simcoe (Figure 1). The annual report is a requirement of the PTTW No. 7818-9QJNL4 which expires December 31, 2019 (Appendix A). The PTTW for McCarthy Quarry authorizes pumping of up to 6,544,800 L/day with a maximum taking of 196,500,000 L/year over a maximum of 150 days per year. The disposal of water from the Site is governed by Environmental Compliance Approval (ECA) No. 4731-987KM8 under Section 20.2 of the Environmental Protection Act.

The property is located approximately six kilometres south-east of the Community of Brechin at Lot 1, Concession 1, Township of Ramara former Mara, Simcoe County (Figures 1 and 2). The area around the Site is primarily rural consisting of woodlots, pasture and scattered single-family homes. To the south and east along the Talbot River and Canal Lake are numerous seasonal and year round residences.

PTTW No. 7818-9QJNL4 directs Coco to regularly collect monitoring data of the Site water taking, groundwater levels in the on-Site monitoring wells and off-Site residential wells, groundwater quality in selected on-Site monitoring wells and off-Site residential wells and meteorological data from an on-Site meteorological station (Conditions 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 and 4.10). Coco is also required to maintain a publicly accessible site on the internet containing the required monitoring data and every report that has been required by the PTTW (Condition 4.13). Coco is also required to establish a Public Liaison Committee (PLC) that is to meet once every four months (Condition 4.14).

2.0 BACKGROUND INFORMATION

The following provides an overview of the area, including information on the surface water, geological and hydrogeological regime of the Site.

2.1 Geology

The quarry is located on a broad, arching, low relief upland area within a low relief clay and limestone plain typical of the physiography to the east of Lake Simcoe (Chapman & Putman, 1975). The elevation of the land in the area, 255 metres above sea level (masl), places the higher elevations on the property at the shoreline of the glacial Lake Algonquin. The original aggregate operation on this Site extracted gravel deposited on the shoreline of Lake Algonquin. To the south of the Site, the overburden thickens and older silt and clay materials are present over the bedrock. At elevations above 254 masl the land area was in an active erosional environment for approximately 700 years by Lake Algonquin which drained across this area and out the Kirkfield Outlet toward Lake Ontario. In this “washed zone” the surficial geological deposits consist of a patchwork of thin clayey-silt, sandy-silt to silty-sand glacial till, with occasional gravelly beach ridges. Below the level of Lake Algonquin, the pre-existing fine-grained glaciolacustrine and fine-grained till deposits, the land escaped shoreline erosion and in the Talbot River Valley the overburden thickness can reach tens of metres in thickness. On the Site, the overburden thickness ranges from 0.3 m to the north at OW9 to approximately 8 m at OW4 to the south.

Underlying the overburden are Middle Ordovician aged limestone of the Verulam, Bobcaygeon and Gull River Formations, which are part of the Simcoe Group. The Verulam Formation consists of thinly bedded limestone and shale or shaly limestone. The Verulam Formation is relatively thin at the Site (0 to 4 m in thickness).

The underlying Bobcaygeon Formation consists of thin to medium bedded limestones ranging in thickness from approximately 31 m (OW6) to 40 m (OW9) within the area of investigation (Figures 3 and 4). Quarrying at the Site will be primarily in the Bobcaygeon Formation.

The Gull River Formation (approximately 16 m in thickness) will not be quarried at the Site. It consists of fine-grained limestone with minor interbeds of shale or shaly limestone. Beneath the Gull River Formation is the Shadow Lake Formation (estimated to be approximately 7 m thick), which consists of conglomerate sandstone and mudstone, and overlies the Precambrian Bedrock. The Shadow Lake Formation as well as Precambrian Bedrock were encountered at OW8 and OW7.

2.2 Hydrogeological Setting

The overburden deposits in the area are thin and generally fine-grained. These deposits host numerous dug or bored wells in the area. Bored wells are often preferred by homeowners because of the fresh water that can be obtained. The wells are often vulnerable to the impact of surface activities and frequently filtration and ultraviolet disinfection is added to domestic water supplies. In the Talbot River Valley there are buried granular deposits that provide sufficient groundwater for domestic use, through both dug and drilled wells.

Wells constructed in the bedrock aquifer most often obtain water supplies from the Gull River Formation. This bedrock, however, is known to contain sulfate minerals and the water often has a sulphurous odour. The deep bedrock wells may also contain salty water where wells intersect a sluggish groundwater flow system. Bedrock wells often produce sufficient water supplies for domestic use; however when wells are drilled deeper than 5 m to 10 m into the bedrock, the well yield is not often improved and the groundwater is prone to containing elevated levels of chloride and sulphur (MOE, 1990).

The Ministry of Environment, Conservation and Parks (MECP) water well database was reviewed to identify nearby water wells in the vicinity (less than 1,000 m) of the McCarthy Quarry. Nine wells were located within 1,000 m of McCarthy Quarry, seven of which are on Concession Road 1 and two of which are on the Mara-Eldon Boundary Road.

2.3 Quarry Dewatering

The handling of water will increase as the quarry area increases and the majority of the water removed from the Site will be precipitation and snow melt. Currently, the water taking on-Site is well below the permitted volume of 6,544,800 L/day at a maximum rate of 76 L/sec. Water is removed from the quarry sump at a rate of 35 L/sec and the water pumping ranges from 0 to 3,024,000 L/day (2,100 L/min) (Table 6).

Groundwater and precipitation entering the quarry is collected in a sump on the quarry floor. The sump is equipped with a 4-inch Grindex pump rated at 35 L/sec and is attached to a 4-inch (101 mm) diameter discharge line. The water is pumped from the quarry floor up the quarry face to a 4-inch (101 mm) diameter discharge pipeline that directs the water to a ditch that runs southward through the McCarthy property to the 14,000 m³ settling pond. The water in the settling pond is discharged to the roadside ditches along Concession Road 1 with a Hickenbottom control structure. The water in the roadside ditch travels eastward along the north side of Concession Road 1 to a municipal drain and eventually to the Talbot River, which discharges to Lake Simcoe.

3.0 MONITORING RESULTS

Monitoring Condition 4.1: Water Level Monitoring of Sump

The quarry floor is approximately 15 metres below ground level (mbgl) or 240 masl and is permitted to be extracted to an elevation of 232 masl to an approximate depth of 23 mbgl.

The current quarry footprint is approximately 400 m by 100 m and the future extent of the quarry is shown in Figure 4. The extraction rate is dictated by market demand and the future size of the quarry is difficult to predict. However, the current extraction is approximately 150,000 m³/year and at this rate of extraction, the footprint of the quarry would be 18 to 20 ha in ten years if a second lift is not started. If a second lift into the Bobcaygeon Formation is started, then the quarry footprint will be smaller.

Monitoring Condition 4.2: Local Climatic Conditions

The on-Site climate conditions are monitored with an RM Young tipping bucket precipitation gauge with a heater that is connected to the Solinst Rainlogger as well as an on-Site Barologger that measures temperature. Precipitation data is incomplete for the weather station in 2018 and the 2018 on-Site weather data was supplemented with weather data from the nearby Environment Canada Barrie-Oro weather station. Figure 5 illustrates the precipitation and temperature data collected at the meteorological station for the 2018 monitoring period.

The on-Site meteorological data is used to evaluate fluctuations in the groundwater elevations throughout the monitoring period as well as to estimate how the water pumped from the quarry sump is actually surface water runoff.

Monitoring Condition 4.3, 4.4 and 4.5: Groundwater Elevations

Water level monitoring has been ongoing at the McCarthy Quarry since the early stages of quarry development commencing in 2002 and ongoing until 2018. Both on-Site observation wells and off-Site residential wells have been incorporated into the monitoring program in order to meet the requirements of Conditions 4.3, 4.4, 4.5, and 4.6. Pressure transducers are installed in select wells for daily monitoring of the groundwater elevation and monthly monitoring is completed with a manual water level meter. The monitoring wells and residential wells that are monitored are listed in Table 1.

Table 1: Groundwater Monitoring Locations

	Daily Monitoring	Monthly Monitoring
Monitoring Wells	OW4-1, OW4-2, OW5-1, OW6-1, OW6-2, OW9-1, OW9-2, Bored, CKL-1 and CKL-2	AM1b, AMx-R, TW1-1, OW4-1, OW4-2, OW5-1, OW5-2, OW5-3, OW6-1, OW6-2, OW6-3, OW7-1, OW7-2, OW7-3, OW8-1, OW8-2, OW8-3, OW9-1, OW9-2, Bored, CKL-1 and CKL-2
Residential Wells	DW3	DW3, DW1, DW2, DW4, DW5*, DW6*, DW7* and DW8*

*Monitored at least once every two months

The water level monitoring data for the 2018 monitoring period is presented in graphic form on Figures 6 to 10 and is listed in Table 2. The ongoing hydrographs can be found in Appendix B. The groundwater monitoring locations are provided on Figures 1 and 2. With the exception of OW9-1, OW9-2, and OW8-3 (Figures 8 and 9, respectively) no declining trends were observed in the monitoring wells in previous years. These three monitoring wells are in close proximity to the active quarry and it was noted during the PTTW renewal that these monitoring locations are being impacted by the ongoing dewatering activities at the Site. These monitoring locations allow for a zone of influence to be mapped out surrounding the quarry. Additionally, when looking at the historical ranges (Appendix B) the deeper Gull River and Precambrian monitors appear to be changing with time; however, these monitoring wells are much deeper than the quarry excavation and the variation is due to external forces. In 2016, declines were noted at most monitoring wells, notably TW1-1 and OW8-3, and are likely a result of low precipitation throughout 2016. It is noted that water levels started to increase at most locations in December of 2016 until the summer of 2017 when water levels began to decrease, consistent with the anticipated seasonal fluctuations. It is noted that an increasing trend (approximately 7 m) has been observed at OW6-3 since the start of 2015.

Monitoring wells installed in the overburden materials are: Bored, OW5-1, AM1b, and CKL-1. The following private off-Site residential wells are part of the monitoring program: DW1, DW2, DW4, DW5, DW6, DW7, and DW8. The location of these wells is shown in Figure 1. The fluctuations in the groundwater elevations at the overburden observation wells have been minimal since the beginning of the monitoring program in 2006 (Appendix B). During the 2018 monitoring program, the groundwater levels at the on-Site overburden monitoring wells have fluctuated as little as 1.63 m at OW5-1 and as much as 2.79 m at Bored. The fluctuations (decreases observed throughout the summer) in 2018 were similar to previous years.

The water levels in the upper bedrock, Verulam Formation, are monitored at wells DW3, OW4-1, OW6-1, OW7-1, OW8-1, CKL-2, and AMx-R (Figure 7). Changes in the groundwater elevations in the on-Site Verulam Formation ranged from 1.62 m at OW4-1 to 3.12 m at OW6-1. AMx was monitored until April 2015; it was within the quarry extraction area and was removed as the quarry face advanced towards the south. A replacement monitoring well for AMx (AMx-R) was installed along the western property boundary between the quarry face and OW4 in late 2017 and monitoring started at this location in April 2018. The borehole log for AMx-R is provided in Appendix D. It is noted that an increasing trend (approximately 6 m) was been observed at AMx-R from April through December 2018.

Water levels in the Bobcaygeon Formation are monitored at OW4-2, OW5-2, OW5-3, OW6-2, OW7-2, OW8-2, OW9-1, OW9-2, and TW1-1 (Figure 8). Changes in the groundwater elevation in the Bobcaygeon Formation ranged from 0.09 m at OW9-2 to 3.28 m at OW8-2. Water levels at OW9-1 and OW9-2 declined in 2018 and both locations are now dry. The water level changes at OW9-1 and OW9-2 appear to be related to quarrying. OW9 is approximately 10 m from the active quarry face now and was originally installed 230 m away from the quarry face. The water levels started to react to gravity drainage when the quarry face was at a distance of approximately 150 m from the well. This is consistent with observations of drawdown at other quarries in this rock type.

Water levels in the Gull River Formation are monitored at OW6-3, OW7-3, and OW8-3 (Figure 9). Changes in the groundwater elevation in the Gull River Formation ranged from 0.79 m at OW6-3 to 1.60 m at OW8-3. The Gull River Formation water levels are reacting to regional groundwater level trends.

The Precambrian bedrock monitoring well is TW1-2. Changes in the groundwater elevation in the Precambrian bedrock monitoring was 1.25 m at TW1-2.

The regional groundwater flow in the Upper Bobcaygeon Formation is generally towards Lake Simcoe in the southwest direction (Figure 2). The regional groundwater flow in the overburden material is most influenced by the topography in the area and the Talbot River and is generally in the south-southeast direction (Figure 1).

Impact Assessment

The impact of development of the McCarthy Quarry as a result of dewatering is minimal. Drawdowns attributable to the quarrying operations have been observed at OW9 and AMx. OW9 was installed after extraction had begun at the quarry; therefore there are no pre-extraction water level data; however water levels were stable until the quarry face was about 150 m from OW9.

OW9 is currently approximately 10 m from the working face of the quarry and the water levels in the upper screen have declined approximately 15 m in response to the lowering of the groundwater table in the quarry footprint (Figure 8). Based on these observations, drawdown occurs in the shallow bedrock when the quarry face is closer than 150 m. The monitoring well AMx also showed signs of impact as the quarry face approached (Figure B-2).

It can be concluded from the water level monitoring that the impact area of quarry dewatering is restricted to less than 150 m from the quarry face. Off-Site impacts are not expected for several years as quarrying will be in the northern part of the Site. At the current extraction rate of approximately 2 ha per year, the quarry will expand to approximately 12 ha over the next five years or 20 ha over the next ten years, unless a deeper lift is developed, then the quarry footprint would be smaller.

The closest neighbour, McIntosh residence, is approximately 280 m from the closest the excavation to their water supply well. It is not expected that this well will be impacted during the life of the current PTTW renewal application. The on-Site observation wells (OW4 and OW6) will serve as sentinel wells for impacts at the McIntosh well.

Monitoring Condition 4.6 and 4.7: Groundwater Quality

Groundwater quality is analyzed on a semi-annual basis at both on-Site monitoring wells and off-Site residential wells. A summary of the parameters and locations are provided in Table 3.

The results from the water quality monitoring program from May 2018 and October 2018 can be found in Appendix C as well as in Tables 4 and 5. The water quality results have been compared to Ontario Drinking Water Standards (ODWS) and any exceedances have been highlighted.

The off-Site private residential wells have been tested since April 2013 and were tested in May and October of 2018 (Table 4). The water quality at DW1, DW2, and DW3 met the ODWS during the 2018 sampling events for the parameters tested with the exception of Total Dissolved Solids (TDS) at DW1 and DW2 (maximum of 690 mg/L in May 2018) and Hardness (CaCO_3) at DW1, DW2, and DW3 (maximum of 560 mg/L at DW1 in May 2018).

At the on-Site monitoring wells, the water quality continues to represent the pre-quarry conditions (Table 5). Hard water and high TDS are common for this area and are representative of the overburden and bedrock conditions found in the Carden Plain.

Table 2: Groundwater Quality Requirements

	Monitoring Locations	Water Quality Parameters
Monitoring Wells	AM1b, AMx, TW1-1, Bored, OW4-1, OW4-2, OW5-1, OW5-2, OW5-3, OW6-2, OW7-1, OW7-2, OW8-1, OW8-2, OW9-1, and OW9-2	pH, Alkalinity, Bicarbonate, Fluoride, Chloride, Magnesium, Calcium, Sodium, Potassium, Ammonia, Sulphate, Nitrate, Nitrite, Phosphate, Phosphorous, Conductivity, DOC, Colour, TDS, Hardness
Residential Wells	DW3, DW1, and DW2	pH, Alkalinity (CaCO ₃), Bicarbonate, Conductivity, Fluoride, Chloride, Nitrate, Nitrite, Chromium, Tannins, Sulphate, Magnesium, Calcium, Sodium, Potassium, Ammonia (N), Phosphate, Phosphorous, Anion Sum, Cation Sum, DOC, Colour, Turbidity, Aluminium, Arsenic, Barium, Boron, Cadmium, Ion Ratio, % Difference, Copper, Iron, Lead, Manganese, Selenium, Zinc, Hardness (CaCO ₃), TDS (iron sum calc.), Langelier Index

Monitoring Conditions 4.10 and 4.12 Water Taking Measurements and Reporting

The rate and volume of discharge from the quarry is measured on-Site by an inline flow meter in the discharge line from the quarry sump. The pump records are provided by McCarthy Quarry staff. The pump records for January 2018 to December 2018 are found in Table 6. The discharge rate between January 2018 and December 2018 was below the permitted rate of 4,545 L/min (76 L/sec).

As previously mentioned the dewatering equipment consists of a Grindex pump with a 4-inch discharge capable of pumping 35 L/sec. Estimating the precipitation proportion of the water taking can be done by assuming the moisture surplus is 500 mm/year and that the capture area for the excavation is 15 ha (the stripped area including the excavation). This volume of water is equal to 75,000,000 L and the total volume removed from January 1 to December 31, 2018 is 130,536,000 L, which results in a proportion of groundwater of 43%. The total volume of water removed was less than the maximum taking of 196,500,000 L/year and the pumping was completed for a total of 117 days in 2018, which was less than the maximum of 150 days per year.

Condition 4.13 Publicly-accessible Site

The water quality and quantity monitoring data that is required by the PTTW is available at:

www.cocoaggregates.com

To access the reports for the McCarthy Quarry click "Documents" on the homepage.

4.0 RECOMMENDATIONS

Golder recommends that the groundwater monitoring continue as outlined in the PTTW No. 7818-9QJNL4.

5.0 LIMITATIONS AND USE OF REPORT

The services performed as described in this report were conducted in a manner consistent with the level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

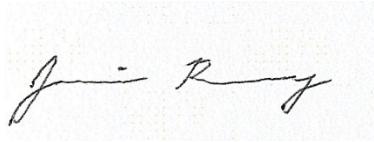
Any use which a third party makes this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

6.0 CLOSURE

We trust that this report meets your needs at the present time. If you have any questions or require clarification, please do not hesitate to contact the undersigned

Signature Page

Golder Associates Ltd.



Jamie Bonany, M.A.Sc.
Project Scientist



John Easton, M.Sc., P.Geo.
Associate Senior Hydrogeologist

JEB/JAE/cdr

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FIGURES

Figure 1 – Location Map
Figure 2 – Site Location Map

Figure 3 – Site Section C-C'
Figure 4 – Site Section D-D'

Figure 5 – 2018 Weather

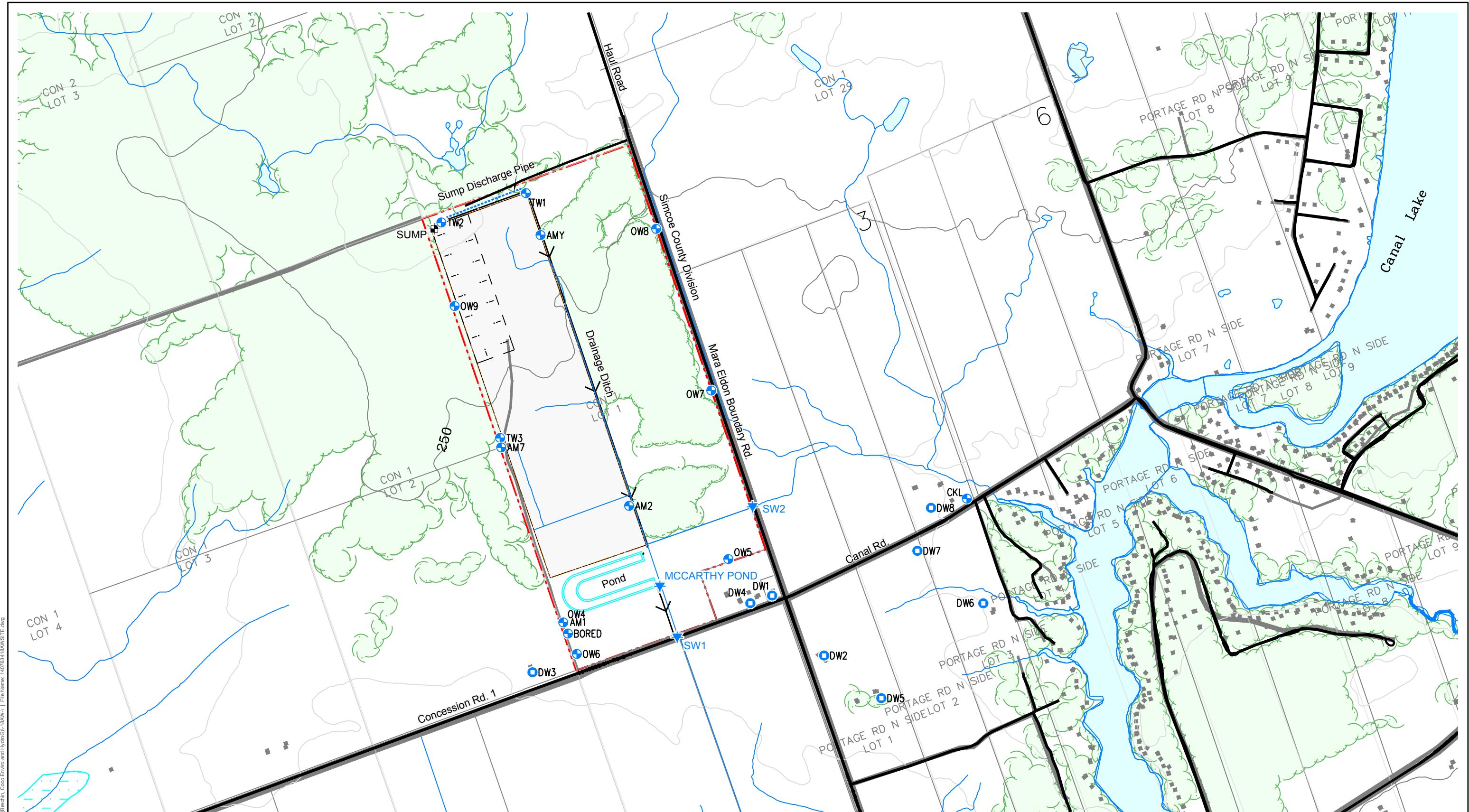
Figure 6 – Overburden Monitoring Wells Groundwater Elevations

Figure 7 – Verulam Monitoring Wells Groundwater Elevations

Figure 8 – Bobcaygeon Monitoring Wells Groundwater Elevations

Figure 9 – Gull River Monitoring Wells Groundwater Elevations

Figure 10 – Precambrian Bedrock Monitoring Wells Groundwater Elevations



LEGEND

- Approximate Property Boundary
- Approximate Licensed Boundary
- Approximate Extent of Quarry

- Private Well Monitoring Location
- Observation Well Monitoring Location
- ▼ Surface Water Sampling Location

REFERENCES AND NOTES

1. Projection UTM NAD83 Zone 17
2. Mapping based on ESRI Geography Network OBM Features and 2012 Road Network
3. All Mapped features are Approximate and Not to Scale

0 250 500
1:10,000 METRES

 **GOLDER**

CLIENT
COCO / QBJR AGGREGATES INC.

CONSULTANT

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PREPARED STB

DESIGN

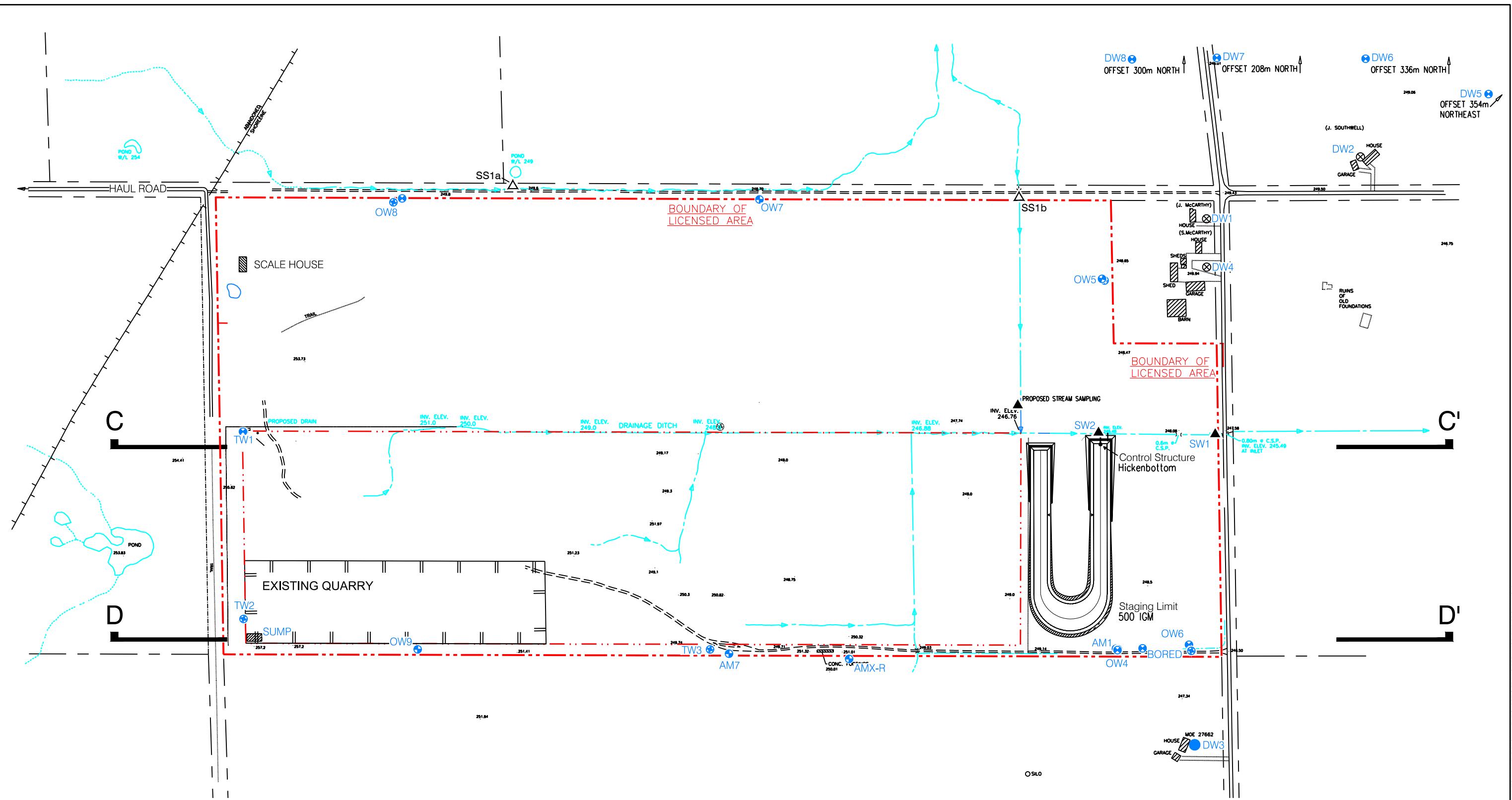
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APPROVED

PROJECT
STAN McCARTHY QUARRY
2018 ANNUAL MONITORING REPORT

TITLE
LOCATION MAP

PROJECT No. 140-7634 Phase Rev. A



Site Digital Mapping Licensed from KIRBY & ASSOCIATES LTD

LEGEND

- Quarry Boundary
 - Limit of Extraction
 - Swales and Drainage Plan
 - ▲ Surface Water Sampling Location
 - ⊗ Private Dug Well
 - Private Drilled Well
 - Standpipe
 - ⊕ Observation Well

NOTE

1. Test Well AM7 inaccessible
 2. DW1 Formally Degroot
 3. DW2 Formally Southwell
 4. DW3 Formally Lamarre
 5. DW4 Formally McCarthy
 6. AMX decommissioned replaced with AMX-I

CLIENT
COCO / QBJR AGGREGATES INC

CONSULTA

PREPARED BY: [REDACTED] DATE: [REDACTED]

1

 GOLDER

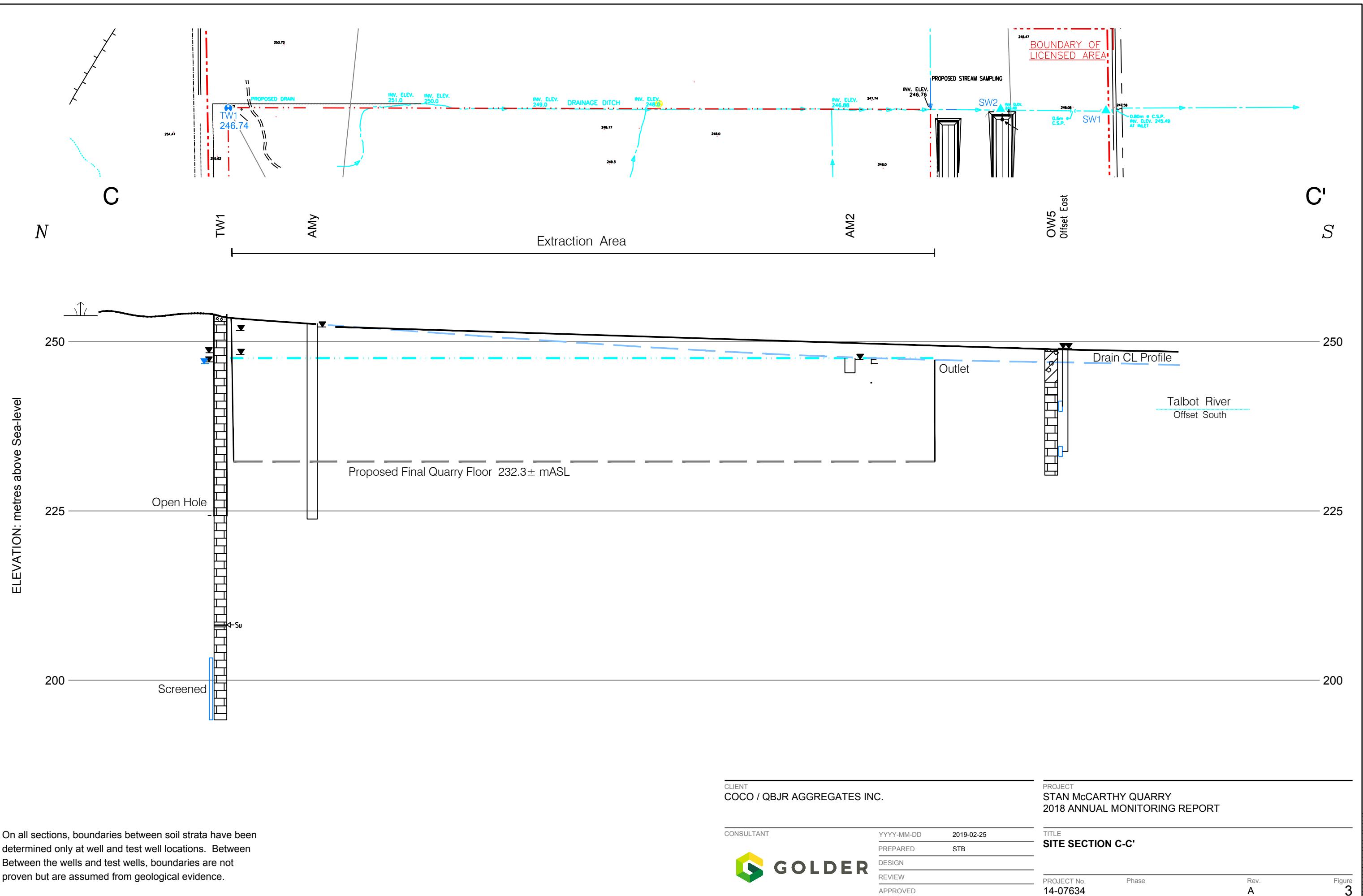
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2018 ANNUAL MONITORING REPORT**

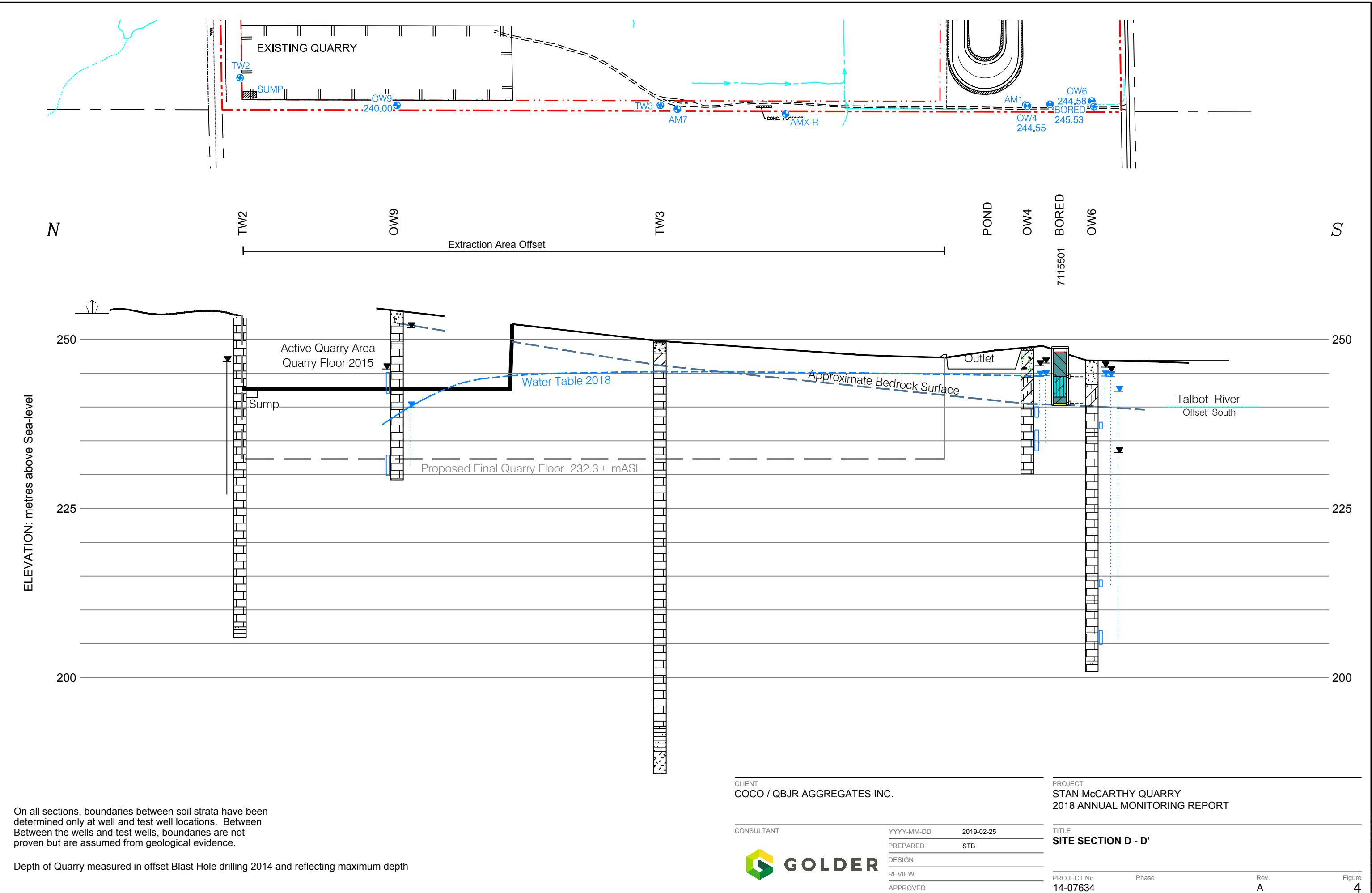
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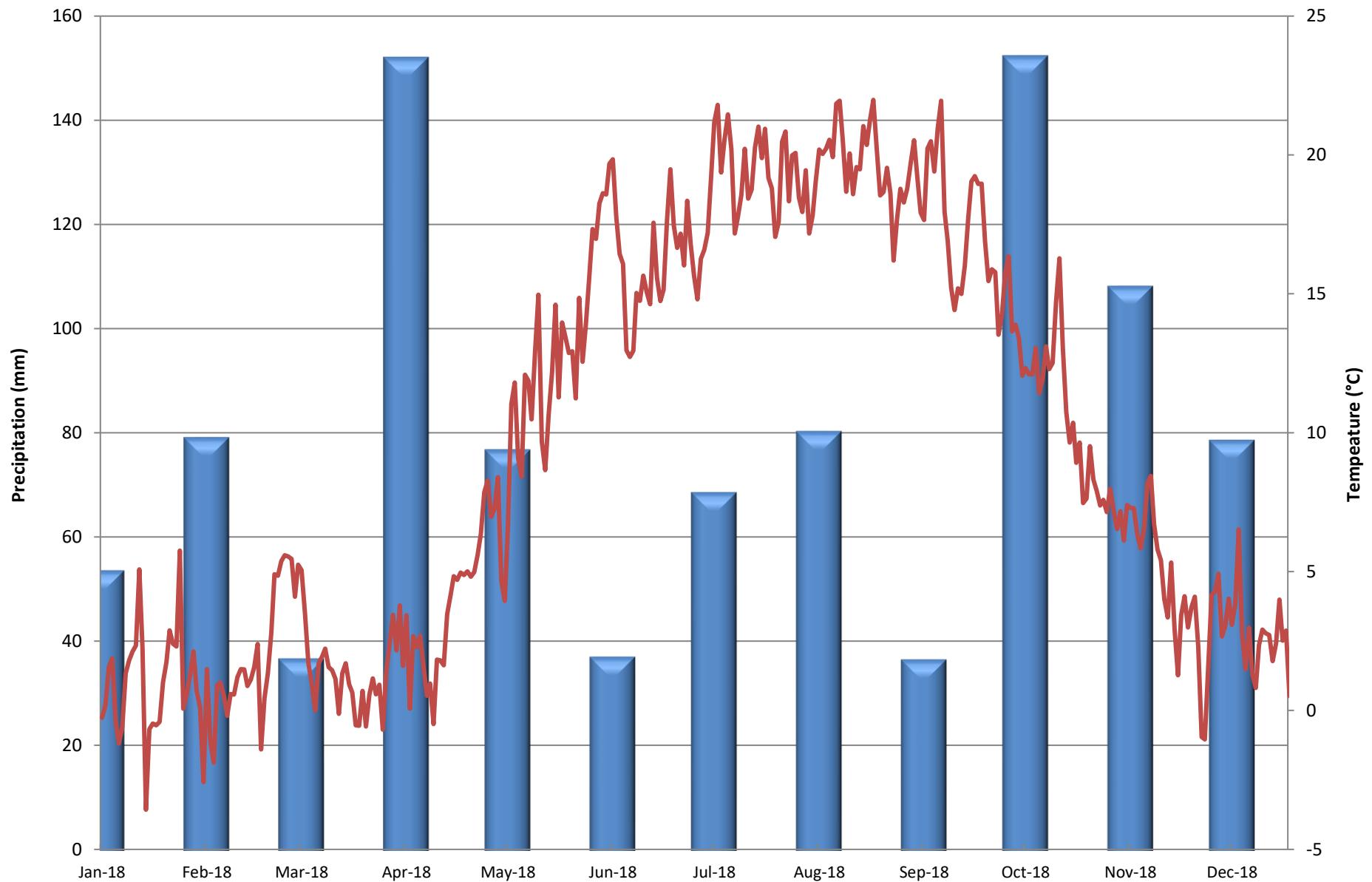
SITE LOCATION MAP

PROJECT No. 140-7624 Phase









Precipitation
Temperature



SCALE: NTS

DATE: 16-Feb-19

CAD: JEB

**McCarthy Quarry
On Site 2018 Weather**

FILE No.

TEST:

QBJR/Coco Aggregates Inc.

FIGURE No

PROJECT No.

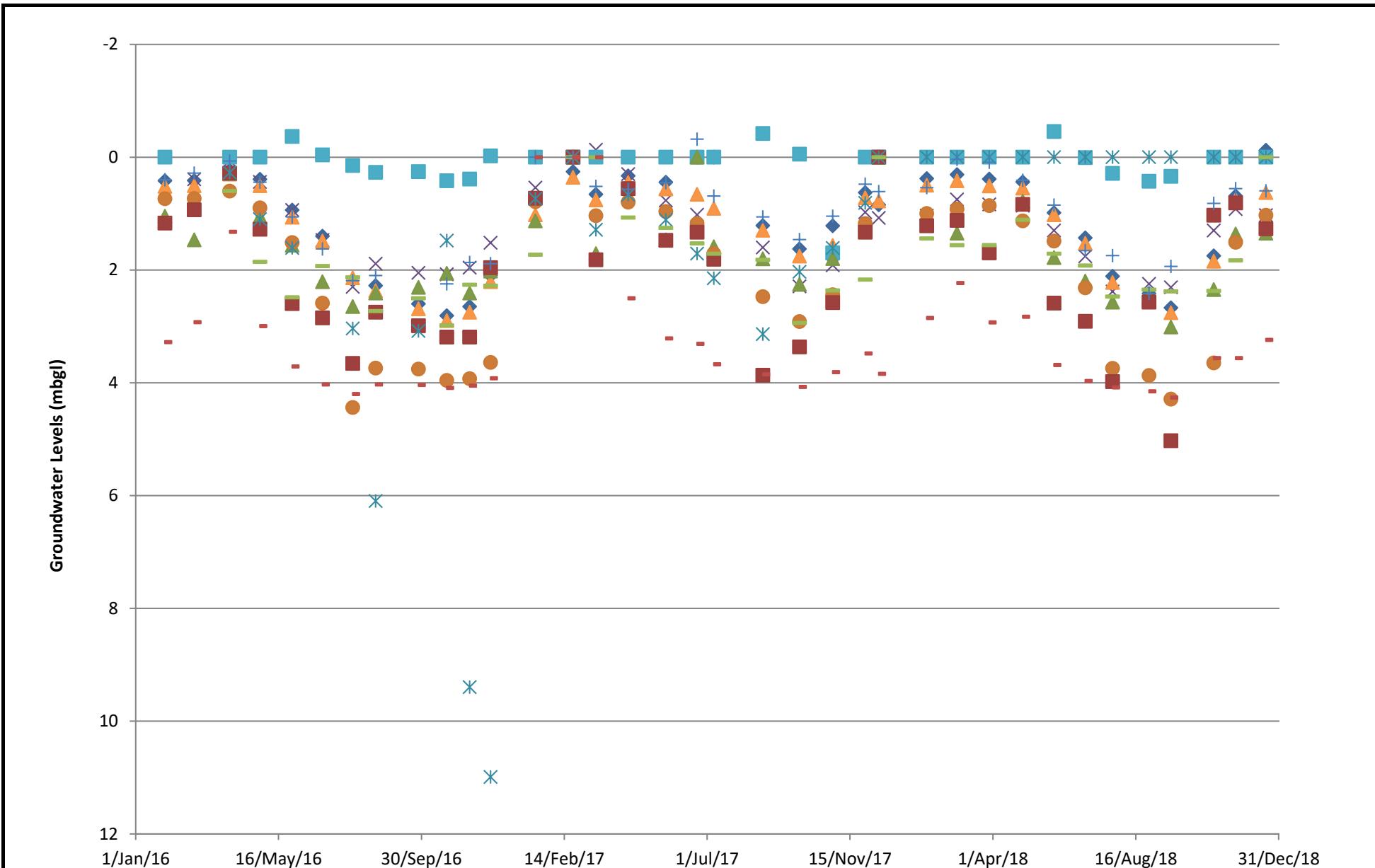
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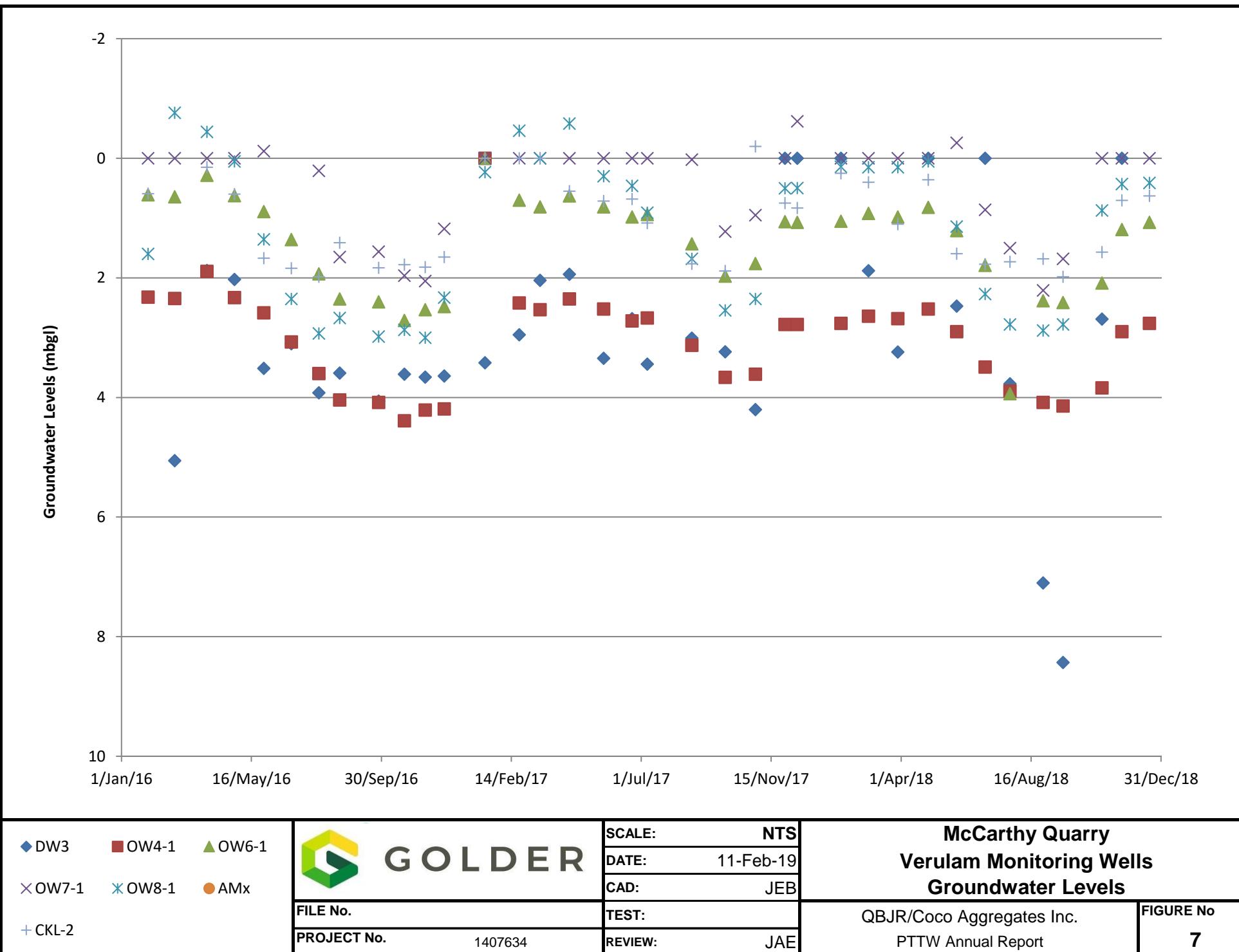
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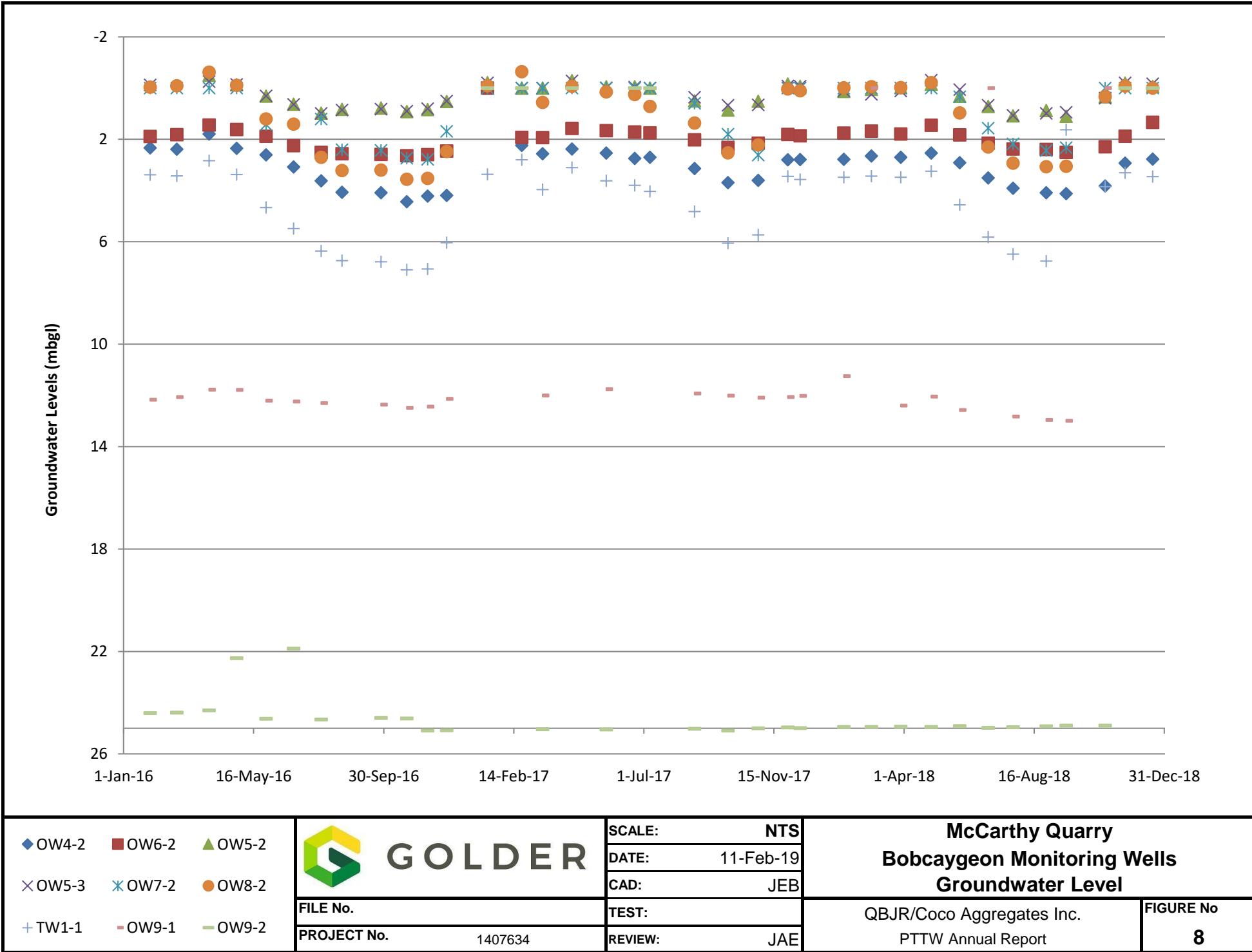
PTTW Annual Report

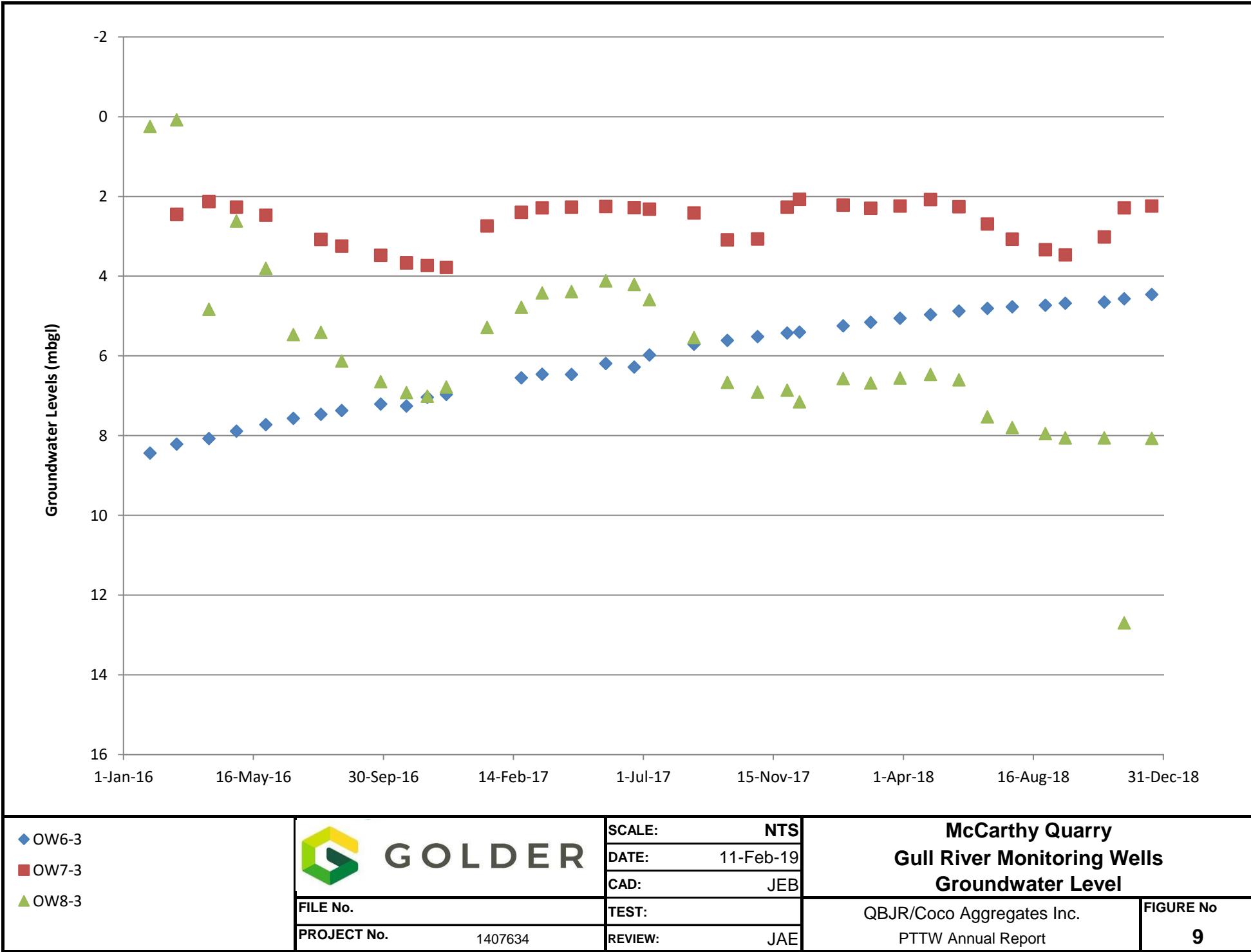
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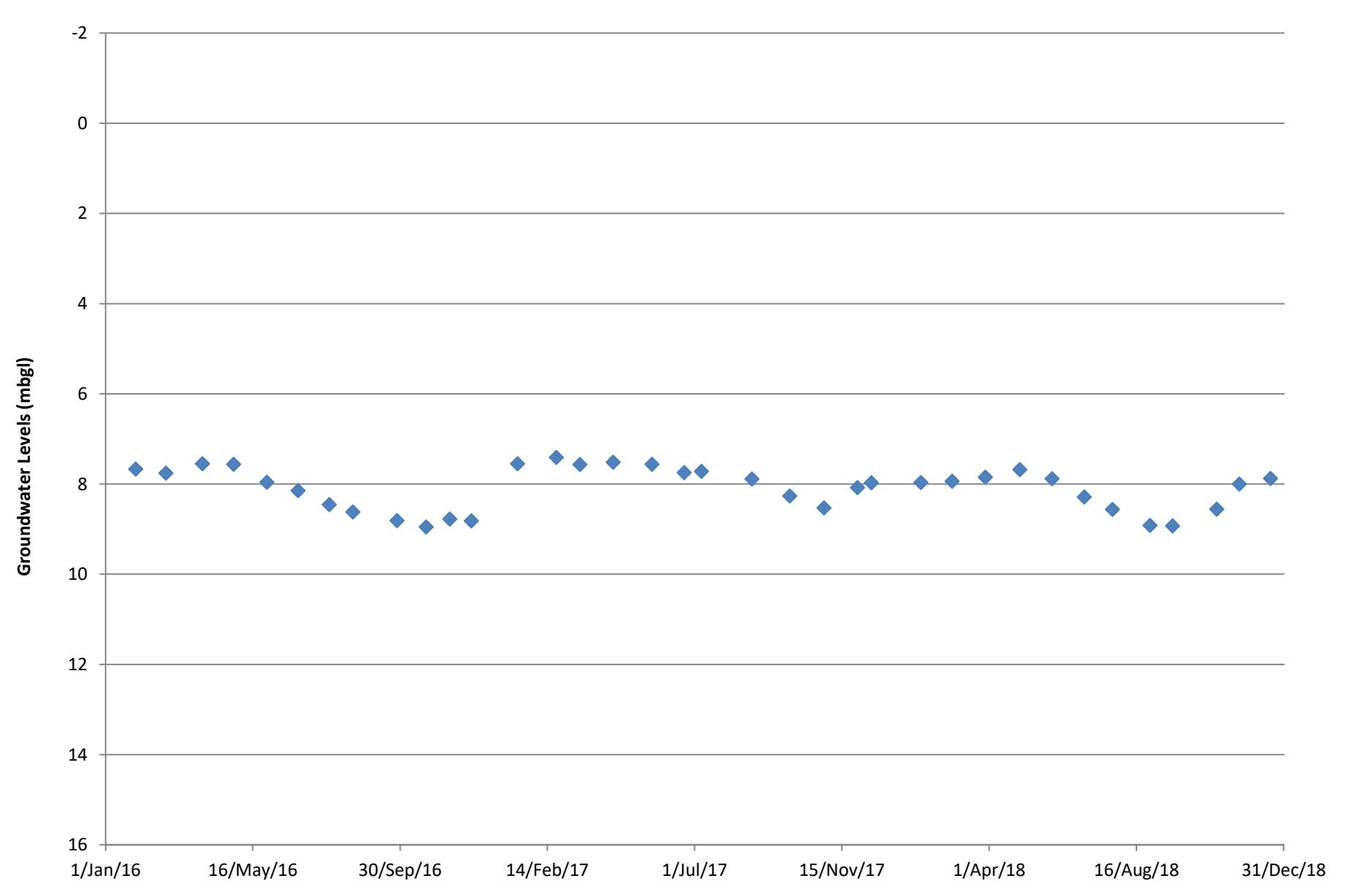


◆ Bored	✗ OW5-1	▲ AM1b	GOLDER FILE No. PROJECT No.	SCALE: NTS	McCarthy Quarry Overburden Monitoring Wells Groundwater Levels	
■ CKL-1	▲ DW1	● DW2		DATE: 11-Feb-19		
■ DW4	✗ DW5	— DW6		CAD: JEB		
+ DW7	- DW8			TEST:		
PROJECT No.		1407634	REVIEW:	JAE	QBJR/Coco Aggregates Inc. PTTW Annual Report	
					FIGURE No 6	









TABLES

Table 1 - Groundwater Monitoring Locations (embedded)

Table 2 - Groundwater Quality Requirements (embedded)

Table 3 – 2018 Water Levels

Table 4 – Private Water Supply Water Quality

Table 5 – Onsite Observation Wells Water Quality

Table 6 – 2018 Measured Water Volume and Rate of
Discharge from Quarry Sump

Well	Unit	Elevation (masl)	Stick up (m)	28-Jan-18	26-Feb-18	29-Mar-18	30-Apr-18	30-May-18	29-Jun-18	25-Jul-18	29-Aug-18	19-Sep-18	30-Oct-18	20-Nov-18	19-Dec-18
				Water Levels (mbgl)											
DW3	Verulam	246.52	0.46	NA	1.88	3.24	NA	2.47	NA	3.77	7.10	8.43	2.69	NA	15.17
OW4-1	Verulam	249.57	0.88	2.76	2.64	2.68	2.52	2.90	3.49	3.89	4.08	4.14	3.84	2.90	2.76
OW4-2	Bobcaygeon	249.62	0.86	2.78	2.65	2.70	2.54	2.91	3.51	3.91	4.09	4.12	3.82	2.93	2.77
Bored	Overburden	248.86	0.66	0.38	0.31	0.39	0.44	0.99	1.43	2.11	2.42	2.67	1.75	0.69	-0.12
OW6-1	Verulam	247.60	0.61	1.05	0.92	0.98	0.82	1.21	1.79	3.94	2.38	2.41	2.09	1.19	1.07
OW6-2	Bobcaygeon	247.52	0.53	1.76	1.68	1.79	1.45	1.83	2.15	2.38	2.40	2.51	2.30	1.88	1.34
OW6-3	Gull River	247.46	0.47	5.25	5.16	5.06	4.97	4.88	4.81	4.77	4.73	4.68	4.65	4.57	4.46
DW4	Overburden	250.19	0.24	1.22	1.12	1.70	0.84	2.59	2.91	3.98	2.57	5.03	1.03	0.81	1.27
DW1	Overburden	249.83	0.3	1.00	1.35	1.69	0.78	1.78	2.20	2.57	2.48	3.01	2.35	1.36	1.35
OW5-1	Overburden	249.84	0.8	1.04	0.75	0.84	0.86	1.30	1.76	2.38	2.25	2.31	1.30	0.92	1.03
OW5-2	Bobcaygeon	249.76	1.0	0.13	0.05	-0.02	-0.15	0.32	0.72	1.08	0.87	1.10	0.34	-0.19	-0.06
OW5-3	Bobcaygeon	249.70	1.0	0.10	0.24	0.11	-0.31	0.06	0.67	1.07	0.99	0.94	0.39	-0.20	-0.17
DW5	Overburden		0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DW2	Overburden	247.50	0.8	1.00	0.92	0.86	1.13	1.49	2.32	3.75	3.87	4.29	3.65	1.51	1.03
DW7	Overburden		0.32	0.54	0.04	0.09	0.41	0.85	1.66	1.75	2.42	1.94	0.82	0.56	0.60
DW8	Overburden			2.85	2.23	2.93	2.83	3.69	3.97	4.08	4.15	4.26	3.56	3.56	3.24
DW6	Overburden		0.5	1.44	1.56	1.56	1.11	1.71	1.92	2.47	2.35	2.38	2.37	1.83	NA
OW7-1	Verulam	249.80	0.62	flowing	flowing	flowing	flowing	-0.26	0.86	1.50	2.21	1.68	flowing	flowing	flowing
OW7-2	Bobcaygeon	249.78		flowing	flowing	flowing	flowing	0.34	1.57	2.18	2.44	2.33	flowing	flowing	flowing
OW7-3	Gull River	249.74	0.61	2.22	2.30	2.24	2.08	2.26	2.69	3.08	3.34	3.47	3.02	2.29	2.24
OW8-1	Verulam	251.47	0.76	0.14	0.15	0.15	0.05	1.14	2.27	2.78	2.88	2.78	0.87	0.43	0.41
OW8-2	Bobcaygeon	251.44	0.83	-0.01	-0.05	-0.02	-0.21	0.97	2.30	2.94	3.07	3.05	0.33	-0.08	0.00
OW8-3	Gull River	251.40	0.8	6.57	6.68	6.56	6.47	6.60	7.53	7.80	7.95	8.06	8.06	12.70	8.07
TW1-1	Bobcaygeon	254.10	0.6	3.48	3.44	3.48	3.25	4.56	5.82	6.48	6.76	1.63	3.85	3.31	3.46
TW1-2	Precambrian	254.10	0.52	7.97	7.94	7.85	7.68	7.89	8.29	8.56	8.92	8.93	8.56	8.00	7.88
OW9-1	Bobcaygeon	253.40	0.41	11.25	dry	12.39	12.04	12.57	dry	12.82	12.95	12.99	dry	dry	dry
OW9-2	Bobcaygeon	253.31	0.35	24.95	24.95	24.94	24.95	24.91	24.98	24.96	24.92	24.89	24.89	dry	dry
CKL-1	Overburden		0.6	flowing	flowing	flowing	flowing	-0.45	0.01	0.29	0.43	0.34	flowing	flowing	flowing
CKL-2	Verulam		0.6	0.25	0.40	1.10	0.36	1.60	1.77	1.73	1.68	1.98	1.57	0.70	0.63
AM1b	Overburden	249.45	0.65	0.50	0.42	0.51	0.55	1.02	1.53	2.22	2.50	2.76	1.85	0.75	0.63
AMX-R	Verulam		0.2	-	-	-	10.72	9.42	8.47	7.92	7.30	6.98	6.41	6.22	6.08

Notes:

1. Highlighted cells represent groundwater measurements in terms of meters above sea level (masl)

2. Not Accessible (NA)

	Sample	DW1												DW2													
		Date	02-May-14	16-Oct-14	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	30-Oct-17	30-May-18	31-Oct-18	02-May-14	16-Oct-14	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	30-Oct-17	30-May-18	31-Oct-18					
		ODWS																									
Anion Sum	Sum		4.43	12.80	13	11.9	12.6	12.3	12.3	9.78	12.7	12.1	5.47	11.80	7.53	7.44	8.62	11.2	7.76	9.18	8.33	11.6					
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L	228	340	320	320	330	340	310	350	320	320	302	290	310	290	340	330	340	340	340	350	330					
Calculated TDS	mg/L	500 (AO)	<30	680	964	670	700	640	660	530	690	650	240	680	430	410	470	570	400	470	430	610					
Cation Sum	Sum		6.67	12.60	13.5	13.3	13.8	11.5	12.4	10.5	13.2	12.2	9.10	11.60	8.46	8.1	9.22	10.3	7.36	8.51	7.65	11.3					
Hardness (CaCO ₃)	mg/L	80-100 (OG)	318	540	590	580	600	500	540	460	560	510	426	4	380	350	400	450	340	380	340	480					
Ion Balance (% Difference)	%		20.18	0.89	2.07	5.68	4.69	3.23	0.37	3.6	1.80	0.410	24.91	0.80	5.81	4.24	3.37	4.12	2.61	3.8	4.21	1.32					
Langelier Index (@ 20C)	NA		0	1.110	0.783	0.872	0.917	1.10	0.778	1.08	1.06	0.725	0.820	-0.796	0.78	0.984	1.01	0.923	0.905	1.04	1.04	0.665					
Langelier Index (@ 4C)	NA		0.863	0.537	0.625	0.670	0.848	0.531	0.835	0.815	0.478		-1.040	0.532	0.736	0.757	0.675	0.657	0.792	0.791	0.418						
Saturation pH (@ 20C)	NA		6.760	6.79	6.75	6.71	6.77	6.8	6.75	6.76	6.84		8.980	6.88	6.97	6.81	7.01	6.84	6.9	6.85	6.99						
Saturation pH (@ 4C)	NA		7.010	7.04	7	6.96	7.02	7.05	6.99	7.01	7.09		9.230	7.13	7.22	7.06	7.26	7.09	7.15	7.09	7.23						
Total Ammonia-N	mg/L	0.037	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.086	<0.050	0.047	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.084	<0.050				
Colour	TCU	5 (AO)	3.9	<2	<2	<2	<2	<2	<2	4	<2	3	5.7	<2	<2	<2	<2	<2	<2	<2	<2	<2	3				
Conductivity	µS/cm	543	1300	1300	1200	1300	1200	1300	910	1400	1200	682	1300	710	730	810	1100	730	840	780	1100						
Fluoride (F ⁻)	mg/L	1.5	<0.1	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	0.12	<0.1	0.150	<0.10	0.11	0.10	0.17	0.11	0.1	<0.10	0.18						
Dissolved Organic Carbon	mg/L	5 (AO)		1.20	1.3	1.1	1.1	1.5	1.4	2.0	1.1	0.93		1.10	2.9	1.7	3.6	1.9	3.2	2	3.0	2.0					
Orthophosphate (P)	mg/L			<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010			<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		
pH	units	6.5-8.5 (OG)	7.72	7.87	7.57	7.62	7.62	7.86	7.58	7.83	7.83	7.57	7.69	8.19	7.66	7.96	7.81	7.94	7.75	7.94	7.88	7.65					
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	8.1	35.0	36	33	35	32	30	21	32	32	10.6	37.0	19	24	32	47	18	29	25	54					
Tannins & Lignins	mg/L	0.480	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.920	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Turbidity	NTU	5	0.28	<0.2	<0.2	1.8	0.2	1.7	0.2	0.1	0.1	<0.1	0.50	<0.2	<0.2	<0.2	0.6	<0.1	0.3	0.3	0.6	<0.1					
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	229	340	320	320	330	350	310	360	320	320	303	300	310	290	340	330	340	340	350	330					
Dissolved Chloride (Cl)	mg/L	250 (OG)	21	190	210	170	190	170	200	77	200	180	14	180	35	41	38	130	22	63	27	140					
Nitrite (N)	mg/L	1	<0.03	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.03	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		
Nitrate (N)	mg/L	10	0.11	0.20	0.59	0.35	0.29	0.16	0.13	0.43	0.40	0.24	0.28	0.85	<0.10	<0.10	<0.10	<0.10	1.39	<0.10	0.14	<0.10	2.05				
Nitrate + Nitrite	mg/L	10		0.200	0.59	0.35	0.29	0.16	0.13	0.43	0.40	0.24	0.850	<0.10	<0.10	<0.10	1.39	<0.10	0.14	<0.10	2.05						
Dissolved Aluminum (Al)	mg/L	0.1 (OG)	0.003	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Dissolved Antimony (Sb)	ug/L	6																									
Dissolved Arsenic (As)	ug/L	25	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Dissolved Barium (Ba)	ug/L	1000	60.9	160.0	180	140	170	110	170	90	190	170	64.1	2.0	74	76	85	170	51	69	71	220					
Dissolved Beryllium (Be)	ug/L																										
Dissolved Boron (B)	ug/L	5000	19.7	38.0	21	25	25	30	36	40	25	40	129.0	25.0	88	11	30	33	44	17	37	33					
Dissolved Cadmium (Cd)	ug/L	5	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
Dissolved Calcium (Ca)	mg/L	107.0	160.0	180.0	170.0	190.0	150.0	160.0	150.0	170.0	140.0	151.0	1.1	120.0	100.0	130.0	89.0	120.0	110.0	120.0	98.0						
Dissolved Chromium (Cr)	ug/L	50	<1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	7.9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		
Dissolved Cobalt (Co)	ug/L																										
Dissolved Copper (Cu)	ug/L	1000 (AO)	21.4	26.0	96	1.5	110	1.6	130	<1.0	100	62	1.7	24.0	2.7	<1.0	1.3	1.9	1.5	<1.0	3.7	5.0					
Dissolved Iron (Fe)	mg/L	0.3 (AO)	0.040	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.062	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Dissolved Lead (Pb)	ug/L	10																									
Dissolved Magnesium (Mg)	mg/L		13.2	33.0	36.0	35.0	30.0	29.0	32.0	21.0	32.0	37.0	11.9	0.3	17.0	23.0	19.0	55.0	9.8	26.0	12.0	58.0					
Dissolved Manganese (Mn)	ug/L	50 (AO)	1.9	75.0	6.8	44	3.1	34	4.1	32	<2.0	<2.0	2.6	<2.0	17	6.5	32	6.6	15	<2.0	9.5	5.1					
Dissolved Molybdenum (Mo)	ug/L		<1	0.5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Dissolved Nickel (Ni)	ug/L		2.8	1.4		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Dissolved Phosphorus (P)	mg/L		0.008	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.018	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Dissolved Potassium (K)	mg/L		0.71	1.90	1.60	2.1	1.6	2.0	1.8	1.6	2.0	2.3	5.8	0.5	7.0	3.5	8.6	3.3	4.3	3.2	11.0	3.4					
Dissolved Selenium (Se)	ug/L	50	<1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		
Dissolved Silicon (Si)	mg/L			8.20		8.70	7.2	8.0	7.0	8.4	7.0	8.9	<0.6	8.2		6.7	5.0	9.1	3.9	7.6	4.6	9.0					
Dissolved Silver																											

Table 4: Private Water Supply Water Quality

	Sample	MOE 5727662 (DW3)										
		Date	13-May-14	15-Oct-14	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	30-Oct-17	30-May-18	31-Oct-18
		ODWS										
Anion Sum	Sum		6.65	8.62	8.57	10.2	8.90	9.10	8.79	8.57	8.77	10.7
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L		220	230	230	250	240	230	240	230	230	230
Calculated TDS	mg/L	500 (AO)	400	460	464	570	490	490	480	460	470	580
Cation Sum	Sum		6.81	8.13	9.11	11	9.05	8.86	8.74	8.6	8.68	10.7
Hardness (CaCO ₃)	mg/L	80-100 (OG)	167	180	190	190	200	180	180	190	190	190
Ion Balance (% Difference)	%		1.19	2.94	3.06	3.82	0.820	1.34	0.29	0.16	0.520	0.310
Langelier Index (@ 20C)	NA			0.601	0.471	0.635	0.439	0.548	0.368	0.48	0.393	0.404
Langelier Index (@ 4C)	NA				0.353	0.223	0.387	0.191	0.300	0.12	0.232	0.145
Saturation pH (@ 20C)	NA				7.560	7.55	7.55	7.53	7.59	7.57	7.61	7.56
Saturation pH (@ 4C)	NA					7.810	7.8	7.8	7.78	7.83	7.82	7.85
Total Ammonia-N	mg/L		0.379	0.470	0.42	<0.050	<0.050	0.46	<0.050	0.41	0.51	<0.050
Colour	TCU	5 (AO)	<2	<2	<2	<2	<2	<2	<2	<2	<2	5
Conductivity	µS/cm		393	860	890	1100	900	960	900	860	880	1100
Fluoride (F ⁻)	mg/L	1.5	0.560	0.730	0.72	0.8	0.75	0.79	0.75	0.77	0.70	0.73
Dissolved Organic Carbon	mg/L	5 (AO)	0.97	0.77	0.72	0.78	0.23	1.1	0.38	<0.50	<0.50	0.67
Orthophosphate (P)	mg/L				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
pH	units	6.5-8.5 (OG)	8.05	8.16	8.02	8.19	7.97	8.13	7.94	8.08	7.95	7.99
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	4.1	2.0	5	<10	6.9	1.5	6	2.4	5.0	<1.0
Tannins & Lignins	mg/L		0.210	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Turbidity	NTU	5	0.29	0.20	<0.2	<0.2	0.1	0.3	0.4	2.4	1.3	<0.1
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	222	240	230	250	240	230	240	230	240	240
Dissolved Chloride (Cl)	mg/L	250 (OG)	106	130	130	180	140	160	140	140	140	210
Nitrite (N)	mg/L	1	<0.03	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate (N)	mg/L	10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrate + Nitrite	mg/L	10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Aluminum (Al)	mg/L	0.1 (OG)	0.002	<0.005	0.011	<0.005	<0.005	<0.005	0.006	<0.005	<5.0	<5.0
Dissolved Antimony (Sb)	ug/L	6				<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Arsenic (As)	ug/L	25	1.600	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Barium (Ba)	ug/L	1000	186.0	200.0	190	220	190	210	190	190	200	200
Dissolved Beryllium (Be)	ug/L					<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Boron (B)	ug/L	5000	696.0	810.0	790	770	730	760	820	790	780	610
Dissolved Cadmium (Cd)	ug/L	5	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Calcium (Ca)	mg/L		28.0	34.0	35.0	34.0	36.0	33.0	33.0	31.0	34.0	34.0
Dissolved Chromium (Cr)	ug/L	50	1.5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Cobalt (Co)	ug/L					<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Copper (Cu)	ug/L	1000 (AO)	6.3	4.9	2.7	97	9.5	<1.0	<1.0	<1.0	2.6	43
Dissolved Iron (Fe)	mg/L	0.3 (AO)	0.167	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.190	<0.1
Dissolved Lead (Pb)	ug/L	10				<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Magnesium (Mg)	mg/L		23.0	22.0	26.0	26.0	26.0	24.0	25.0	25.0	26.0	26.0
Dissolved Manganese (Mn)	ug/L	50 (AO)	5.8	4.8	4.6	<2.0	<2.0	4.3	3.9	4.9	5.5	<2.0
Dissolved Molybdenum (Mo)	ug/L		<1	<0.50		0.65	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Nickel (Ni)	ug/L		1.6	<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Phosphorus (P)	mg/L		<0.001	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Potassium (K)	mg/L		6.4	7.5	7.4	7.20	6.9	7.6	7.1	7.2	7.2	7.2
Dissolved Selenium (Se)	ug/L	50	1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dissolved Silicon (Si)	mg/L		3.18	4.60		5.40	5.60	5.00	5.50	5.30	5.6	5.0
Dissolved Silver (Ag)	ug/L		<0.1	<0.10		0.64	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Sodium (Na)	mg/L	200 (OG)	87.4	100.0	120.0	160.0	110.0	120.0	110.0	110.0	110.0	150.0
Dissolved Strontium (Sr)	mg/L		2.35	2.40		2.50	2.50	2.20	2.30	2.30	2.60	
Dissolved Thallium (Tl)	mg/L		0.0004	<0.00005		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dissolved Titanium (Ti)	ug/L		<1	<5.0		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Uranium (U)	mg/L	0.02	<0.001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Vanadium (V)	ug/L		<1	<0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Zinc (Zn)	ug/L	5000 (AO)	13.4	12.0	<5.0	480	210	<5.0	6.9	180	8.9	630

	Sample	AM1B									BORED WELL								
		Date	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	30-Oct-18	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	31-Oct-18	
Parameter	Units	ODWS																	
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L		210	200	220	240	210	220	220	240	210	210	230	210	230	220	260	240	
Total Ammonia-N	mg/L		0.075	0.12	0.14	0.11	0.12	0.16	0.17	0.098	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.084	<0.050	
Colour	TCU	5 (AO)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Conductivity	µS/cm		480	470	480	500	470	490	480	480	490	490	490	470	490	490	540	500	
Total Dissolved Solids	mg/L	500 (AO)	280	280	290	290	280	270	290	290	290	290	300	280	300	280	310	300	
Fluoride (F-)	mg/L	1.5	0.23	0.26	0.24	0.23	0.25	0.27	0.21	0.20	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.14	
Dissolved Organic Carbon	mg/L	5 (AO)	0.7	0.63	0.81	0.61	0.82	0.72	0.75	0.75	0.92	0.88	0.91	1.0	1	1	1.1	0.99	
Hardness	mg/L	80-100 (OG)	240	240	240	240	240	220	250	260	180	190	210	190	220	170	250	230	
Phosphate	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
pH	units	6.5-8.5 (OG)	7.92	7.92	7.98	8.03	7.92	7.99	8.02	8.08	8.18	8.2	8.13	8.23	8.17	8.19	8.07	8.25	
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	38	41	41	33	41	37	41	30	34	33	34	31	32	30	28	28	
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	210	210	220	240	210	220	220	240	210	210	230	210	230	230	260	240	
Dissolved Chloride (Cl)	mg/L	250 (AO)	4	3.9	3.0	3.4	3.2	2.7	2.3	2.4	7	6.1	4.2	4.5	3.5	3.1	2.1	2.3	
Nitrite (N)	mg/L	1	0.019	<0.010	0.012	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Nitrate (N)	mg/L	10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.29	0.33	0.36	0.44	0.38	0.45	
Nitrate + Nitrite	mg/L	10	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.29		0.36	0.44	0.38	0.45	
Dissolved Calcium (Ca)	mg/L		46	46	47	48	45	42	47	53	39	40	48	40	48	35	56	52	
Dissolved Magnesium (Mg)	mg/L		30	30	31	30	31	29	31	31	21	21	23	21	25	21	26	25	
Dissolved Phosphorus (P)	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Dissolved Potassium (K)	mg/L		2.3	2.0	2.3	2.3	2.4	2.3	2.3	2.4	16	18	13	14	13	13	7.1	8.8	
Dissolved Sodium (Na)	mg/L	200 (AO)	6.8	6.9	6.5	6.5	7.6	6.4	6.7	6.3	25	26	21	19	19	20	15	16	

Notes:

AO: aesthetic objective

OG: operational guideline

Exceedances of the OWDS (operational guidelines excluded) are shown in bold.

Parameter	Units	ODWS	OW4-I								OW4-II								
			Date	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	30-Oct-18	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	30-Oct-18
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L			260	270	280	260	260	250	240	240	280	270	280	240	230	230	250	230
Total Ammonia-N	mg/L			0.72	0.89	0.74	0.84	0.77	1.3	1.2	1.3	0.77	0.81	0.80	1.1	1.1	1.1	1.2	1.2
Colour	TCU	5 (AO)	<2	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Conductivity	us/cm			760	850	950	910	1200	1600	1400	1300	900	1000	1100	1800	1800	1900	1600	1800
Total Dissolved Solids	mg/L	500 (AO)		430	460	530	490	630	780	690	700	530	550	570	930	910	910	810	920
Fluoride (F-)	mg/L	1.5		1.5	1.5	1.4	1.4	1.2	0.99	1.0	1.1	1.5	1.4	1.3	0.95	0.95	0.91	0.98	0.90
Dissolved Organic Carbon	mg/L	5 (AO)		1.6	1.3	1.8	3.2	2.2	1.9	1.7	2.7	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.2
Hardness	mg/L	80-100 (OG)		72	76	94	82	130	170	140	170	120	120	130	250	250	230	210	240
Phosphate	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	<0.010	
pH	units	6.5-8.5 (OG)		8.33	8.27	8.28	8.45	8.16	8.06	8.19	8.42	8.18	8.13	8.09	8.05	7.94	7.96	8.05	8.29
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)		4	6.3	4.1	11	6.7	2.9	7.5	2.8	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)		260	280	290	270	260	260	240	250	280	280	280	240	230	240	250	240
Dissolved Chloride (Cl)	mg/L	250 (AO)		84	95	130	120	210	330	270	260	110	140	160	430	400	430	340	430
Nitrite (N)	mg/L	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Nitrate (N)	mg/L	10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Nitrate + Nitrite	mg/L	10	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Dissolved Calcium (Ca)	mg/L			14	15	18	16	24	32	28	33	22	22	24	45	47	42	39	47
Dissolved Magnesium (Mg)	mg/L			9	9.3	12	10	17	22	18	21	15	15	16	32	33	31	27	31
Dissolved Phosphorus (P)	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Potassium (K)	mg/L			4.9	6.0	6.2	5.2	6.7	7.5	7.0	7.8	6.8	7.0	7.3	9.9	11	9.8	9.3	9.8
Dissolved Sodium (Na)	mg/L	200 (AO)		140	150	170	150	190	210	200	220	190	190	180	260	260	250	230	260

Notes:

AO: aesthetic objective

OG: operational guideline

Exceedances of the OWDS (operational guidelines excluded) are

	Sample	OW5-I									OW5-II								
		Date	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	30-Oct-18	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	30-Oct-18	
Parameter	Units	ODWS																	
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L		220	230	230	240	230	250	260	260	110	110	110	110	110	110	110	110	
Total Ammonia-N	mg/L		0.84	0.91	0.65	0.78	0.81	0.78	0.75	0.72	9.4	9.9	9.2	9.5	9.4	9.6	12	9.9	
Colour	TCU	5 (AO)	<2	<2	<2	4	<2	<2	2	73	26	51	100	51	9	6	34		
Conductivity	us/cm		610	610	620	620	600	690	710	690	28000	26000	29000	27000	28000	28000	28000	25000	
Total Dissolved Solids	mg/L	500 (AO)	330	340	350	340	340	360	390	390	17000	16000	16000	16000	16000	16000	18000	16000	
Fluoride (F-)	mg/L	1.5	0.85	0.90	0.85	0.89	0.82	0.8	0.65	0.73	0.44	0.46	0.45	0.45	0.44	0.47	0.42	0.44	
Dissolved Organic Carbon	mg/L	5 (AO)	1.2	1.1	1.2	1.3	1.4	1.3	1.3	1.3	0.49	0.34	0.53	0.48	0.7	0.49	0.51	0.62	
Hardness	mg/L	80-100 (OG)	160	160	170	160	170	160	210	200	6100	5900	6300	6300	6300	5200	7900	6300	
Phosphate	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
pH	units	6.5-8.5 (OG)	8.04	8.05	8.02	8.11	8.01	8.02	8.01	8.28	7.23	7.31	7.28	7.34	7.27	7.34	7.31	7.69	
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	28	29	32	27	28	31	35	35	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	230	230	240	240	230	250	260	260	110	110	110	110	110	110	110	110	
Dissolved Chloride (Cl)	mg/L	250 (AO)	36	37	39	35	37	44	46	43	11000	9900	10000	9800	10000	11000	10000	9700	
Nitrite (N)	mg/L	1	0.072	0.121	0.107	0.066	0.033	0.055	<0.010	0.086	<0.010	<0.010	0.013	<0.010	<0.050	<0.010	<0.010	<0.010	
Nitrate (N)	mg/L	10	0.24	0.25	0.41	0.26	<0.10	0.39	0.43	0.26	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	
Nitrate + Nitrite	mg/L	10	0.31		0.52	0.32	<0.10	0.45	0.43	0.34	<0.10		<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	
Dissolved Calcium (Ca)	mg/L		28	31	31	29	29	29	39	37	1300	1200	1300	1300	1200	1000	1600	1300	
Dissolved Magnesium (Mg)	mg/L		21	21	22	21	22	22	27	25	730	710	750	760	780	640	920	750	
Dissolved Phosphorus (P)	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<0.5	<1	<0.5	<0.5	
Dissolved Potassium (K)	mg/L		6.6	8.0	7.2	7.5	6.9	7.4	6.9	7.5	68	70	69	77	74	62	77	70	
Dissolved Sodium (Na)	mg/L	200 (AO)	65	64	63	64	64	64	66	70	3700	3700	3800	3900	3900	3300	4400	4000	

Notes:

AO: aesthetic objective

OG: operational guideline

Exceedances of the OWDS (operational guidelines excluded) are

	Sample	OW5-III										OW6-II									
		Date	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	30-Oct-18	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	30-Oct-17	30-May-18	30-Oct-18			
Parameter	Units	ODWS																			
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L		110	100	110	120	110	130	130	100	150	160	160	160	150	150	150	150	150	150	150
Total Ammonia-N	mg/L		9.5	11	8.9	10	9.6	10	9.6	9.4	0.82	1.4	1.0	1.3	0.059	0.96	0.12	1.2			
Colour	TCU	5 (AO)	38	18	35	59	2	5	3	12	<2	2	<2	<2	<2	<2	<2	<2	3		
Conductivity	us/cm		29000	37000	27000	32000	29000	33000	31000	21000	5400	6000	6200	6300	6400	6300	6500	6100			
Total Dissolved Solids	mg/L	500 (AO)	17000	22000	16000	18000	17000	20000	18000	13000	3100	3800	3800	4000	4000	3700	4100	4000			
Fluoride (F-)	mg/L	1.5	0.42	0.44	0.44	0.43	0.44	0.43	0.39	0.34	0.46	0.49	0.49	0.51	0.51	0.52	0.57	0.60			
Dissolved Organic Carbon	mg/L	5 (AO)	0.97	1.4	1.1	1.3	0.78	1.1	0.85	2.8	1.2	0.86	1.0	0.63	0.77	0.82	0.58	0.66			
Hardness	mg/L	80-100 (OG)	6200	8300	6600	6900	6500	6400	6300	5300	1100	1400	1600	1600	1600	1400	1600	1600			
Phosphate	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
pH	units	6.5-8.5 (OG)	7.35	7.21	7.28	7.45	7.33	7.36	7.35	7.17	7.82	7.67	7.69	7.77	7.6	7.67	7.67	8.00			
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	20	150	33	77	14	83	79	2.8	570	1000	1000	1100	1100	990	1100	990			
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	110	100	110	120	110	130	130	100	150	160	160	160	150	150	150	160			
Dissolved Chloride (Cl)	mg/L	250 (AO)	11000	14000	9900	11000	10000	13000	12000	7500	1400	1400	1400	1500	1500	1400	1600	1600			
Nitrite (N)	mg/L	1	<0.010	0.015	0.013	<0.010	<0.050	<0.010	<0.010	0.180	0.256	0.026	0.127	0.020	0.019	0.114	0.164	0.077			
Nitrate (N)	mg/L	10	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	0.64	0.66	<0.10	<0.10	<0.10	<0.10	1.24	0.18	0.80	0.20		
Nitrate + Nitrite	mg/L	10	<0.10		0.10	<0.10	<0.50	<0.10	<0.10	0.82	0.91		0.21	<0.10	1.26	0.29	0.97	0.27			
Dissolved Calcium (Ca)	mg/L		1300	1700	1400	1400	1300	1300	1300	1100	230	280	330	320	310	280	320	330			
Dissolved Magnesium (Mg)	mg/L		740	960	770	800	790	780	760	630	120	170	180	190	200	180	200	190			
Dissolved Phosphorus (P)	mg/L		<1	<1	<1	<1	<0.5	<1	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1			
Dissolved Potassium (K)	mg/L		71	79	67	71	76	67	69	59	13	14	15	16	18	15	17	17			
Dissolved Sodium (Na)	mg/L	200 (AO)	3800	5200	4200	4300	4200	4200	3800	3300	650	790	760	770	790	720	760	800			

Notes:

AO: aesthetic objective

OG: operational guideline

Exceedances of the OWDS (operational guidelines excluded) are

	Sample	OW7-I										OW7-II									
		Date	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	30-Oct-17	30-May-18	30-Oct-18	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	30-Oct-18			
Parameter	Units	ODWS																			
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L		270	230	270	220	310	230	280	260	270	280	270	290	320	250	280	230			
Total Ammonia-N	mg/L		3.7	3.1	3.0	2.5	2.8	4.7	3.0	3.1	2.3	2.4	2.6	1.6	1.6	3.6	2.2	2.8			
Colour	TCU	5 (AO)	3	3	76	21	23	90	190	17	3	<2	20	<2	3	<2	<2	<2			
Conductivity	us/cm		5600	700	5800	690	5300	11000	6400	6500	8000	7300	9800	860	5600	15000	6800	7300			
Total Dissolved Solids	mg/L	500 (AO)	3200	520	3100	360	2800	5600	3400	3800	4700	3800	5400	470	3000	8300	3800	4300			
Fluoride (F-)	mg/L	1.5	2.7	0.51	2.7	0.46	2.8	1.2	2.2	1.1	2.4	1.2	2.1	0.49	2.8	1.4	2.1	1.1			
Dissolved Organic Carbon	mg/L	5 (AO)	1	1.8	0.92	1.8	0.98	0.92	1.0	1.3	0.86	1.9	2.0	3.2	1	1	1.0	1.4			
Hardness	mg/L	80-100 (OG)	890	450	860	250	710	1900	830	1300	1500	1500	1800	330	800	3000	1100	1400			
Phosphate	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
pH	units	6.5-8.5 (OG)	7.76	7.98	7.93	7.90	7.86	7.72	7.85	7.98	7.78	7.83	7.73	8.14	7.87	7.66	7.74	7.77			
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	23	49	9.1	49	37	32	14	32	31	55	23	50	24	7	28	28			
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	270	230	280	220	310	230	280	260	280	280	270	300	320	250	280	230			
Dissolved Chloride (Cl)	mg/L	250 (AO)	1700	55	1700	46	1500	3600	2000	2200	2700	2200	3200	71	1600	5300	2200	2600			
Nitrite (N)	mg/L	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Nitrate (N)	mg/L	10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Nitrate + Nitrite	mg/L	10	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Dissolved Calcium (Ca)	mg/L		180	91	170	52	140	390	160	270	320	300	380	66	160	600	220	290			
Dissolved Magnesium (Mg)	mg/L		110	54	110	30	86	230	100	150	180	180	210	39	97	360	130	160			
Dissolved Phosphorus (P)	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	0.11		
Dissolved Potassium (K)	mg/L		15	13	15	12	13	26	14	22	20	19	21	13	14	29	16	22			
Dissolved Sodium (Na)	mg/L	200 (AO)	910	110	890	28	790	1200	890	950	1300	880	1400	44	850	1900	1000	1100			

Notes:

AO: aesthetic objective

OG: operational guideline

Exceedances of the OWDS (operational guidelines excluded) are

Parameter	Units	ODWS	OW8-I								OW8-II								
			Date	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	30-Oct-17	29-May-18	30-Oct-18	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	29-May-18	30-Oct-18
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L			340	240	330	370	310	300	290	250	300	250	290	340	320	300	300	290
Total Ammonia-N	mg/L			0.58	2.4	0.72	1.3	0.63	1.4	0.84	1.1	0.93	2.4	1.1	1.7	0.48	1.1	0.51	0.95
Colour	TCU	5 (AO)	<2	3	<2	<2	<2	<2	7	<2	<2	9	40	<2	<2	<2	4	<2	
Conductivity	µS/cm			1300	7300	2000	3200	980	2400	1300	2000	1200	8400	4700	5100	800	3000	810	2500
Total Dissolved Solids	mg/L	500 (AO)	680	3900	1100	1700	600	1200	780	1200	1000	4500	2500	2700	470	1500	450	1400	
Fluoride (F-)	mg/L	1.5	2.4	0.82	2.2	1.3	1.6	0.89	0.91	1.1	0.8	0.71	0.47	1.2	0.71	0.79	0.47	0.90	
Dissolved Organic Carbon	mg/L	5 (AO)	1.3	1.1	1.4	1.3	1.5	1.4	1.5	1.5	1.7	1.2	1.7	1.2	1.9	1.4	1.7	1.4	
Hardness	mg/L	80-100 (OG)	250	1500	550	450	240	520	500	450	890	1900	1300	780	260	660	320	480	
Phosphate	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
pH	units	6.5-8.5 (OG)	8.02	7.62	7.92	7.85	7.96	7.86	7.85	8.04	7.88	7.62	7.65	7.85	7.73	7.67	7.76	7.96	
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	33	19	30	20	53	45	46	58	37	20	54	8.4	52	37	60	22	
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	350	240	330	370	310	300	290	250	300	260	290	340	330	300	310	300	
Dissolved Chloride (Cl)	mg/L	250 (AO)	160	2300	420	820	110	540	240	470	180	2700	1300	1500	36	770	44	630	
Nitrite (N)	mg/L	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Nitrate (N)	mg/L	10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Nitrate + Nitrite	mg/L	10	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Dissolved Calcium (Ca)	mg/L		66	370	140	110	62	140	140	120	220	450	340	180	70	170	96	130	
Dissolved Magnesium (Mg)	mg/L		21	150	45	43	22	44	39	39	85	180	120	79	20	58	18	41	
Dissolved Phosphorus (P)	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Dissolved Potassium (K)	mg/L		5.4	20	6.9	11	5.5	8.4	5.7	8.5	7.3	20	9.5	14	4.9	9.0	3.9	8.5	
Dissolved Sodium (Na)	mg/L	200 (AO)	170	920	270	480	150	250	130	330	310	1000	430	710	84	300	36	340	

Notes:

AO: aesthetic objective

OG: operational guideline

Exceedances of the OWDS (operational guidelines excluded) are

Parameter	Units	ODWS	OW9-I							OW9-II				
			Date	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	29-May-18	28-May-15	22-Oct-15	30-May-16	25-Oct-16
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L			220	470	230	150	170	130	200	280	260	250	230
Total Ammonia-N	mg/L			5.2	2.5	12	18	18	21	18	1.9	2.9	0.23	0.22
Colour	TCU	5 (AO)	7	6	21	87	110	49	14	7	8	7	7	4
Conductivity	µS/cm			15000	5200	50000	80000	81000	88000	73000	7000	13000	15000	16000
Total Dissolved Solids	mg/L	500 (AO)	8500	3200	31000	55000	58000	57000	46000	4600	7400	8300	9000	
Fluoride (F-)	mg/L	1.5	0.18	0.23	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	0.36	0.12	0.11	0.11
Dissolved Organic Carbon	mg/L	5 (AO)	8.8	11	10	9.1	12	9.1	8.7	8.8	9.6	8.8	8.7	
Hardness	mg/L	80-100 (OG)	2900	1200	16000	26000	27000	25000	22000	1900	2700	3300	3900	
Phosphate	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
pH	units	6.5-8.5 (OG)	7.6	7.63	7.02	6.90	6.73	6.95	6.93	7.61	7.4	7.37	7.40	
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	150	77	150	210	180	160	120	270	380	380	320	
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	220	470	230	150	170	130	200	290	260	250	240	
Dissolved Chloride (Cl)	mg/L	250 (AO)	5200	1400	19000	35000	37000	39000	30000	2100	4200	4700	5000	
Nitrite (N)	mg/L	1	<0.010	<0.010	<0.050	<0.050	<0.10	<0.010	<0.050	<0.010	<0.010	0.065	0.026	
Nitrate (N)	mg/L	10	<0.10	<0.10	<0.50	<0.50	<1.0	<0.10	<0.50	<0.10	<0.10	3.38	2.84	
Nitrate + Nitrite	mg/L	10	<0.10		<0.50	<0.50	<1.0	<0.10	<0.50	<0.10		3.44	2.86	
Dissolved Calcium (Ca)	mg/L			660	260	3500	5500	5700	5000	4600	480	670	800	930
Dissolved Magnesium (Mg)	mg/L			300	120	1800	3100	3200	3100	2500	180	260	310	370
Dissolved Phosphorus (P)	mg/L		<0.1	<0.1	<1	<1	<2	<1	<1	<0.1	<0.1	<0.5	<0.5	
Dissolved Potassium (K)	mg/L		40	24	100	150	140	140	120	25	33	34	42	
Dissolved Sodium (Na)	mg/L	200 (AO)	2000	1000	6500	11000	11000	10000	9000	1300	1700	1900	2200	

Notes:

AO: aesthetic objective

OG: operational guideline

Exceedances of the OWDS (operational guidelines excluded) are

Parameter	Units	ODWS	TW1-1								AMx-R
			Date	28-May-15	22-Oct-15	30-May-16	25-Oct-16	23-May-17	26-Oct-17	30-May-18	
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L			250	270	260	280	290	290	290	280
Total Ammonia-N	mg/L			0.89	0.93	1.0	1.0	0.47	1.2	0.80	0.62
Colour	TCU	5 (AO)		<2	<2	<2	2	<2	<2	<2	<2
Conductivity	us/cm			2400	3000	2800	3500	1300	2300	1900	1800
Total Dissolved Solids	mg/L	500 (AO)	1200	1400	1400	1800	670	1300	950	930	14000
Fluoride (F-)	mg/L	1.5	0.55	0.51	0.54	0.50	0.5	0.5	0.49	0.49	0.61
Dissolved Organic Carbon	mg/L	5 (AO)	1.5	1.5	1.6	1.7	1.8	1.7	1.6	1.8	3.6
Hardness	mg/L	80-100 (OG)	550	640	650	810	410	760	450	490	5700
Phosphate	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
pH	units	6.5-8.5 (OG)	7.82	7.76	7.85	7.84	7.71	7.78	7.83	8.10	7.66
Dissolved Sulphate (SO ₄)	mg/L	500 (AO)	14	12	17	11	22	20	27	24	53
Alkalinity (Total as CaCO ₃)	mg/L	30-500 (OG)	250	270	260	280	290	290	290	280	100
Dissolved Chloride (Cl)	mg/L	250 (AO)	580	770	690	980	220	510	420	390	9200
Nitrite (N)	mg/L	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate (N)	mg/L	10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrate + Nitrite	mg/L	10	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Calcium (Ca)	mg/L		120	140	140	180	96	160	100	120	1100
Dissolved Magnesium (Mg)	mg/L		61	69	75	89	41	86	48	50	720
Dissolved Phosphorus (P)	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	<100	<0.5
Dissolved Potassium (K)	mg/L		9.6	10	12	10	6.1	10	7.7	7.1	56
Dissolved Sodium (Na)	mg/L	200 (AO)	230	250	300	320	100	320	160	160	3200

Notes:

AO: aesthetic objective

OG: operational guideline

Exceedances of the OWDS (operational guidelines excluded) are

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
1-Jan-18	NO PUMP		0	0	-	-	-
2-Jan-18	NO PUMP		0	0	-	-	-
3-Jan-18	NO PUMP		0	0	-	-	-
4-Jan-18	NO PUMP		0	0	-	-	-
5-Jan-18	NO PUMP		0	0	-	-	-
6-Jan-18	NO PUMP		0	0	-	-	-
7-Jan-18	NO PUMP		0	0	-	-	-
8-Jan-18	NO PUMP		0	0	-	-	-
9-Jan-18	NO PUMP		0	0	-	-	-
10-Jan-18	NO PUMP		0	0	-	-	-
11-Jan-18	NO PUMP		0	0	-	-	-
12-Jan-18	NO PUMP		0	0	-	-	-
13-Jan-18	NO PUMP		0	0	-	-	-
14-Jan-18	NO PUMP		0	0	-	-	-
15-Jan-18	NO PUMP		0	0	-	-	-
16-Jan-18	NO PUMP		0	0	-	-	-
17-Jan-18	NO PUMP		0	0	-	-	-
18-Jan-18	NO PUMP		0	0	-	-	-
19-Jan-18	NO PUMP		0	0	-	-	-
20-Jan-18	NO PUMP		0	0	-	-	-
21-Jan-18	NO PUMP		0	0	-	-	-
22-Jan-18	7AM	5PM	36000	600	1,260,000	35	2,100
23-Jan-18	NO PUMP		0	0	-	-	-
24-Jan-18	7AM	5PM	36000	600	1,260,000	35	2,100
25-Jan-18	NO PUMP		0	0	-	-	-
26-Jan-18	NO PUMP		0	0	-	-	-
27-Jan-18	NO PUMP		0	0	-	-	-
28-Jan-18	NO PUMP		0	0	-	-	-
29-Jan-18	7AM	5PM	36000	600	1,260,000	35	2,100
30-Jan-18	7AM	5PM	36000	600	1,260,000	35	2,100
31-Jan-18	7AM	5PM	36000	600	1,260,000	35	2,100
1-Feb-18	NO PUMP		0	0	-	-	-
2-Feb-18	NO PUMP		0	0	-	-	-
3-Feb-18	NO PUMP		0	0	-	-	-
4-Feb-18	NO PUMP		0	0	-	-	-
5-Feb-18	7AM	5PM	36000	600	1,260,000	35	2,100
6-Feb-18	9AM	5PM	28800	480	1,008,000	35	2,100
7-Feb-18	NO PUMP		0	0	-	-	-
8-Feb-18	NO PUMP		0	0	-	-	-
9-Feb-18	7AM	3PM	28800	480	1,008,000	35	2,100
10-Feb-18	NO PUMP		0	0	-	-	-
11-Feb-18	NO PUMP		0	0	-	-	-

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
12-Feb-18	NO PUMP		0	0	-	-	-
13-Feb-18	NO PUMP		0	0	-	-	-
14-Feb-18	8AM	5PM	32400	540	1,134,000	35	2,100
15-Feb-18	7AM	5PM	36000	600	1,260,000	35	2,100
16-Feb-18	7AM	3PM	28800	480	1,008,000	35	2,100
17-Feb-18	NO PUMP		0	0	-	-	-
18-Feb-18	NO PUMP		0	0	-	-	-
19-Feb-18	NO PUMP		0	0	-	-	-
20-Feb-18	7AM	5PM	36000	600	1,260,000	35	2,100
21-Feb-18	NO PUMP		0	0	-	-	-
22-Feb-18	7AM	5PM	36000	600	1,260,000	35	2,100
23-Feb-18	NO PUMP		0	0	-	-	-
24-Feb-18	NO PUMP		0	0	-	-	-
25-Feb-18	NO PUMP		0	0	-	-	-
26-Feb-18	NO PUMP		0	0	-	-	-
27-Feb-18	NO PUMP		0	0	-	-	-
28-Feb-18	NO PUMP		0	0	-	-	-
1-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
2-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
3-Mar-18	NO PUMP		0	0	-	-	-
4-Mar-18	NO PUMP		0	0	-	-	-
5-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
6-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
7-Mar-18	NO PUMP		0	0	-	-	-
8-Mar-18	8AM	5PM	32400	540	1,134,000	35	2,100
9-Mar-18	7AM	3PM	28800	480	1,008,000	35	2,100
10-Mar-18	NO PUMP		0	0	-	-	-
11-Mar-18	NO PUMP		0	0	-	-	-
12-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
13-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
14-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
15-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
16-Mar-18	7AM	3PM	28800	480	1,008,000	35	2,100
17-Mar-18	NO PUMP		0	0	-	-	-
18-Mar-18	NO PUMP		0	0	-	-	-
19-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
20-Mar-18	NO PUMP		0	0	-	-	-
21-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
22-Mar-18	NO PUMP		0	0	-	-	-
23-Mar-18	NO PUMP		0	0	-	-	-
24-Mar-18	NO PUMP		0	0	-	-	-
25-Mar-18	NO PUMP		0	0	-	-	-

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
26-Mar-18	NO PUMP		0	0	-	-	-
27-Mar-18	NO PUMP		0	0	-	-	-
28-Mar-18	NO PUMP		0	0	-	-	-
29-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
30-Mar-18	7AM	5PM	36000	600	1,260,000	35	2,100
31-Mar-18	NO PUMP		0	0	-	-	-
1-Apr-18	NO PUMP		0	0	-	-	-
2-Apr-18	NO PUMP		0	0	-	-	-
3-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
4-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
5-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
6-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
7-Apr-18	NO PUMP		0	0	-	-	-
8-Apr-18	NO PUMP		0	0	-	-	-
9-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
10-Apr-18	NO PUMP		0	0	-	-	-
11-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
12-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
13-Apr-18	7AM	3PM	28800	480	1,008,000	35	2,100
14-Apr-18	NO PUMP		0	0	-	-	-
15-Apr-18	NO PUMP		0	0	-	-	-
16-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
17-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
18-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
19-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
20-Apr-18	7AM	3PM	28800	480	1,008,000	35	2,100
21-Apr-18				0	-	-	-
22-Apr-18				0	-	-	-
23-Apr-18				0	-	-	-
24-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
25-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
26-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
27-Apr-18	7AM	4PM	32400	540	1,134,000	35	2,100
28-Apr-18				0	-	-	-
29-Apr-18				0	-	-	-
30-Apr-18	7AM	5PM	36000	600	1,260,000	35	2,100
1-May-18	NO PUMP		0	0	-	-	-
2-May-18	NO PUMP		0	0	-	-	-
3-May-18	NO PUMP		0	0	-	-	-
4-May-18	NO PUMP		0	0	-	-	-
5-May-18	NO PUMP		0	0	-	-	-
6-May-18	NO PUMP		0	0	-	-	-

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
7-May-18	NO PUMP		0	0	-	-	-
8-May-18	NO PUMP		0	0	-	-	-
9-May-18	NO PUMP		0	0	-	-	-
10-May-18	NO PUMP		0	0	-	-	-
11-May-18	NO PUMP		0	0	-	-	-
12-May-18	NO PUMP		0	0	-	-	-
13-May-18	NO PUMP		0	0	-	-	-
14-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
15-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
16-May-18	7AM	12PM	18000	300	630,000	35	2,100
17-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
18-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
19-May-18	NO PUMP		0	0	-	-	-
20-May-18	NO PUMP		0	0	-	-	-
21-May-18	NO PUMP		0	0	-	-	-
22-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
23-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
24-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
25-May-18	NO PUMP		0	0	-	-	-
26-May-18	7AM	12PM	18000	300	630,000	35	2,100
27-May-18	NO PUMP		0	0	-	-	-
28-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
29-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
30-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
31-May-18	7AM	5PM	36000	600	1,260,000	35	2,100
1-Jun-18	7AM	4PM	32400	540	1,134,000	35	2,100
2-Jun-18	NO PUMP		0	0	-	-	-
3-Jun-18	NO PUMP		0	0	-	-	-
4-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
5-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
6-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
7-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
8-Jun-18	7AM	4PM	32400	540	1,134,000	35	2,100
9-Jun-18	NO PUMP		0	0	-	-	-
10-Jun-18	NO PUMP		0	0	-	-	-
11-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
12-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
13-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
14-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
15-Jun-18	7AM	4PM	32400	540	1,134,000	35	2,100
16-Jun-18	NO PUMP		0	0	-	-	-
17-Jun-18	NO PUMP		0	0	-	-	-

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
18-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
19-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
20-Jun-18	7AM	4PM	32400	540	1,134,000	35	2,100
21-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
22-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
23-Jun-18	NO PUMP		0	0	-	-	-
24-Jun-18	NO PUMP		0	0	-	-	-
25-Jun-18	7AM	5PM	36000	600	1,260,000	35	2,100
26-Jun-18	7AM	2PM	25200	420	882,000	35	2,100
27-Jun-18	NO PUMP		0	0	-	-	-
28-Jun-18	NO PUMP		0	0	-	-	-
29-Jun-18	NO PUMP		0	0	-	-	-
30-Jun-18	NO PUMP		0	0	-	-	-
1-Jul-18	NO PUMP		0	0	-	-	-
2-Jul-18	7AM	12PM	18000	300	630,000	35	2,100
3-Jul-18	NO PUMP		0	0	-	-	-
4-Jul-18	NO PUMP		0	0	-	-	-
5-Jul-18	NO PUMP		0	0	-	-	-
6-Jul-18	NO PUMP		0	0	-	-	-
7-Jul-18	NO PUMP		0	0	-	-	-
8-Jul-18	NO PUMP		0	0	-	-	-
9-Jul-18	NO PUMP		0	0	-	-	-
10-Jul-18	NO PUMP		0	0	-	-	-
11-Jul-18	NO PUMP		0	0	-	-	-
12-Jul-18	NO PUMP		0	0	-	-	-
13-Jul-18	NO PUMP		0	0	-	-	-
14-Jul-18	NO PUMP		0	0	-	-	-
15-Jul-18	NO PUMP		0	0	-	-	-
16-Jul-18	NO PUMP		0	0	-	-	-
17-Jul-18	NO PUMP		0	0	-	-	-
18-Jul-18	NO PUMP		0	0	-	-	-
19-Jul-18	NO PUMP		0	0	-	-	-
20-Jul-18	NO PUMP		0	0	-	-	-
21-Jul-18	NO PUMP		0	0	-	-	-
22-Jul-18	NO PUMP		0	0	-	-	-
23-Jul-18	NO PUMP		0	0	-	-	-
24-Jul-18	NO PUMP		0	0	-	-	-
25-Jul-18	7AM	5PM	36000	600	1,260,000	35	2,100

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
26-Jul-18	7AM	5PM	36000	600	1,260,000	35	2,100
27-Jul-18	7AM	5PM	36000	600	1,260,000	35	2,100
28-Jul-18	NO PUMP		0	0	-	-	-
29-Jul-18	NO PUMP		0	0	-	-	-
30-Jul-18	7AM	5PM	36000	600	1,260,000	35	2,100
31-Jul-18	7AM	5PM	36000	600	1,260,000	35	2,100
1-Aug-18	NO PUMP		0	0	-	-	-
2-Aug-18	NO PUMP		0	0	-	-	-
3-Aug-18	NO PUMP		0	0	-	-	-
4-Aug-18	NO PUMP		0	0	-	-	-
5-Aug-18	NO PUMP		0	0	-	-	-
6-Aug-18	NO PUMP		0	0	-	-	-
7-Aug-18	NO PUMP		0	0	-	-	-
8-Aug-18	9AM	5PM	28800	480	1,008,000	35	2,100
9-Aug-18	NO PUMP		0	0	-	-	-
10-Aug-18	NO PUMP		0	0	-	-	-
11-Aug-18	NO PUMP		0	0	-	-	-
12-Aug-18	NO PUMP		0	0	-	-	-
13-Aug-18	8AM	4PM	28800	480	1,008,000	35	2,100
14-Aug-18	NO PUMP		0	0	-	-	-
15-Aug-18	NO PUMP		0	0	-	-	-
16-Aug-18	NO PUMP		0	0	-	-	-
17-Aug-18	6AM	4PM	36000	600	1,260,000	35	2,100
18-Aug-18	NO PUMP		0	0	-	-	-
19-Aug-18	NO PUMP		0	0	-	-	-
20-Aug-18	NO PUMP		0	0	-	-	-
21-Aug-18	NO PUMP		0	0	-	-	-
22-Aug-18	NO PUMP		0	0	-	-	-
23-Aug-18	NO PUMP		0	0	-	-	-
24-Aug-18	NO PUMP		0	0	-	-	-
25-Aug-18	NO PUMP		0	0	-	-	-
26-Aug-18	NO PUMP		0	0	-	-	-
27-Aug-18	NO PUMP		0	0	-	-	-
28-Aug-18	NO PUMP		0	0	-	-	-
29-Aug-18	NO PUMP		0	0	-	-	-
30-Aug-18	7AM	4PM	32400	540	1,134,000	35	2,100
31-Aug-18	NO PUMP		0	0	-	-	-
1-Sep-18	NO PUMP		0	0	-	-	-
2-Sep-18	NO PUMP		0	0	-	-	-
3-Sep-18	NO PUMP		0	0	-	-	-
4-Sep-18	NO PUMP		0	0	-	-	-
5-Sep-18	NO PUMP		0	0	-	-	-

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
6-Sep-18	NO PUMP		0	0	-	-	-
7-Sep-18	7AM	4PM	32400	540	1,134,000	35	2,100
8-Sep-18	NO PUMP		0	0	-	-	-
9-Sep-18	NO PUMP		0	0	-	-	-
10-Sep-18	NO PUMP		0	0	-	-	-
11-Sep-18	NO PUMP		0	0	-	-	-
12-Sep-18	NO PUMP		0	0	-	-	-
13-Sep-18	NO PUMP		0	0	-	-	-
14-Sep-18	7AM	4PM	32400	540	1,134,000	35	2,100
15-Sep-18	NO PUMP		0	0	-	-	-
16-Sep-18	NO PUMP		0	0	-	-	-
17-Sep-18	NO PUMP		0	0	-	-	-
18-Sep-18	NO PUMP		0	0	-	-	-
19-Sep-18	NO PUMP		0	0	-	-	-
20-Sep-18	NO PUMP		0	0	-	-	-
21-Sep-18	NO PUMP		0	0	-	-	-
22-Sep-18	NO PUMP		0	0	-	-	-
23-Sep-18	NO PUMP		0	0	-	-	-
24-Sep-18	8AM	3PM	25200	420	882,000	35	2,100
25-Sep-18	NO PUMP		0	0	-	-	-
26-Sep-18	7:30AM	5:30PM	36000	600	1,260,000	35	2,100
27-Sep-18	NO PUMP		0	0	-	-	-
28-Sep-18	NO PUMP		0	0	-	-	-
29-Sep-18	NO PUMP		0	0	-	-	-
30-Sep-18	NO PUMP		0	0	-	-	-
1-Oct-18	NO PUMP		0	0	-	-	-
2-Oct-18	NO PUMP		0	0	-	-	-
3-Oct-18	NO PUMP		0	0	-	-	-
4-Oct-18	NO PUMP		0	0	-	-	-
5-Oct-18	NO PUMP		0	0	-	-	-
6-Oct-18	NO PUMP		0	0	-	-	-
7-Oct-18	NO PUMP		0	0	-	-	-
8-Oct-18	NO PUMP		0	0	-	-	-
9-Oct-18	NO PUMP		0	0	-	-	-
10-Oct-18	NO PUMP		0	0	-	-	-
11-Oct-18	NO PUMP		0	0	-	-	-
12-Oct-18	NO PUMP		0	0	-	-	-
13-Oct-18	NO PUMP		0	0	-	-	-
14-Oct-18	NO PUMP		0	0	-	-	-
15-Oct-18	NO PUMP		0	0	-	-	-
16-Oct-18	6AM	6PM	43200	720	1,512,000	35	2,100
17-Oct-18	6AM	6PM	43200	720	1,512,000	35	2,100

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
18-Oct-18	NO PUMP		0	0	-	-	-
19-Oct-18	7AM	5PM	36000	600	1,260,000	35	2,100
20-Oct-18	NO PUMP		0	0	-	-	-
21-Oct-18	NO PUMP		0	0	-	-	-
22-Oct-18	NO PUMP		0	0	-	-	-
23-Oct-18	7AM	5PM	36000	600	1,260,000	35	2,100
24-Oct-18	NO PUMP		0	0	-	-	-
25-Oct-18	7AM	5PM	36000	600	1,260,000	35	2,100
26-Oct-18	7AM	5PM	36000	600	1,260,000	35	2,100
27-Oct-18	NO PUMP		0	0	-	-	-
28-Oct-18	NO PUMP		0	0	-	-	-
29-Oct-18	NO PUMP		0	0	-	-	-
30-Oct-18	7AM	5PM	36000	600	1,260,000	35	2,100
31-Oct-18	NO PUMP		0	0	-	-	-
1-Nov-18	10AM	12PM	7200	120	252,000	35	2,100
2-Nov-18	6:30AM	11AM	16200	270	567,000	35	2,100
3-Nov-18	NO PUMP		0	0	-	-	-
4-Nov-18	NO PUMP		0	0	-	-	-
5-Nov-18	NO PUMP		0	0	-	-	-
6-Nov-18	NO PUMP		0	0	-	-	-
7-Nov-18	NO PUMP		0	0	-	-	-
8-Nov-18	NO PUMP		0	0	-	-	-
9-Nov-18	6:30AM	12PM	19800	330	693,000	35	2,100
10-Nov-18	7:30AM	12PM	16200	270	567,000	35	2,100
11-Nov-18	6:30AM	12:30PM	21600	360	756,000	35	2,100
12-Nov-18	NO PUMP		0	0	-	-	-
13-Nov-18	NO PUMP		0	0	-	-	-
14-Nov-18	6:30AM	4PM	34200	570	1,197,000	35	2,100
15-Nov-18	6:30AM	12PM	19800	330	693,000	35	2,100
16-Nov-18	NO PUMP		0	0	-	-	-
17-Nov-18	NO PUMP		0	0	-	-	-
18-Nov-18	NO PUMP		0	0	-	-	-
19-Nov-18	NO PUMP		0	0	-	-	-
20-Nov-18	NO PUMP		0	0	-	-	-
21-Nov-18	6:30AM	4PM	34200	570	1,197,000	35	2,100
22-Nov-18	6:30AM	12PM	19800	330	693,000	35	2,100
23-Nov-18	6:30AM	1:30PM	25200	420	882,000	35	2,100
24-Nov-18	NO PUMP		0	0	-	-	-
25-Nov-18	NO PUMP		0	0	-	-	-
26-Nov-18	NO PUMP		0	0	-	-	-
27-Nov-18	NO PUMP		0	0	-	-	-
28-Nov-18	10AM	6PM	28800	480	1,008,000	35	2,100

Table 6: Measured Water Volume and Rate of Discharge from Quarry Sump

Date	Start	Stop	Total Sec.	Total Min.	Total Litres	Rate of Taking (L/sec)	Rate of Taking (L/min)
ECA Permitted Rate					6,550,000	76	4,545
29-Nov-18	6:30AM	12:30PM	21600	360	756,000	35	2,100
30-Nov-18	6:30AM	4PM	34200	570	1,197,000	35	2,100
1-Dec-18	NO PUMP		0	0	-	-	-
2-Dec-18	NO PUMP		0	0	-	-	-
3-Dec-18	NO PUMP		0	0	-	-	-
4-Dec-18	7AM	4PM	32400	540	1,134,000	35	2,100
5-Dec-18	7AM	4PM	32400	540	1,134,000	35	2,100
6-Dec-18	NO PUMP		0	0	-	-	-
7-Dec-18	7AM	4PM	32400	540	1,134,000	35	2,100
8-Dec-18	NO PUMP		0	0	-	-	-
9-Dec-18	NO PUMP		0	0	-	-	-
10-Dec-18	NO PUMP		0	0	-	-	-
11-Dec-18	NO PUMP		0	0	-	-	-
12-Dec-18	NO PUMP		0	0	-	-	-
13-Dec-18	NO PUMP		0	0	-	-	-
14-Dec-18	NO PUMP		0	0	-	-	-
15-Dec-18	NO PUMP		0	0	-	-	-
16-Dec-18	NO PUMP		0	0	-	-	-
17-Dec-18	NO PUMP		0	0	-	-	-
18-Dec-18	6:30AM	3:30PM	32400	540	1,134,000	35	2,100
19-Dec-18	7AM	12PM	18000	300	630,000	35	2,100
20-Dec-18	7AM	4PM	32400	540	1,134,000	35	2,100
21-Dec-18	NO PUMP		0	0	-	-	-
22-Dec-18	NO PUMP		0	0	-	-	-
23-Dec-18	NO PUMP		0	0	-	-	-
24-Dec-18	NO PUMP		0	0	-	-	-
25-Dec-18	NO PUMP		0	0	-	-	-
26-Dec-18	NO PUMP		0	0	-	-	-
27-Dec-18	NO PUMP		0	0	-	-	-
28-Dec-18	NO PUMP		0	0	-	-	-
29-Dec-18	NO PUMP		0	0	-	-	-
30-Dec-18	NO PUMP		0	0	-	-	-
31-Dec-18	NO PUMP		0	0	-	-	-

APPENDIX A

PTTW No. 7818-9QJNL4



Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en
matière de changement climatique

PERMIT TO TAKE WATER
Ground Water
NUMBER 7818-9QJNL4

Pursuant to Section 34 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

QBJR Aggregates Inc.
949 Wilson Ave
Toronto, Ontario, M3K 1G2
Canada

For the water taking from: Quarry Sump, McCarthy Quarry

Located at: Lot 1, Concession 1, Geographic Township of Mara
Ramara, County of Simcoe

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

- (a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34, OWRA.
- (b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.
- (c) "Ministry" means Ontario Ministry of the Environment and Climate Change.
- (d) "District Office" means the Barrie District Office.
- (e) "Permit" means this Permit to Take Water No. 7818-9QJNL4 including its Schedules, if any, issued in accordance with Section 34 of the OWRA.
- (f) "Permit Holder" means QBJR Aggregates Inc..
- (g) "OWRA" means the *Ontario Water Resources Act*, R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

- 1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated October 7, 2014 and signed by Jenny Coco, and all Schedules included in this Permit.
- 1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.
- 1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.
- 1.4 This Permit is not transferable to another person.
- 1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.
- 1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.
- 1.7 The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change. A change in ownership in the property shall cause this Permit to be cancelled.

2. General Conditions and Interpretation

2.1 Inspections

The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act*, R.S.O. 1990, the *Pesticides Act*, R.S.O. 1990, or the *Safe Drinking Water Act*, S.O. 2002.

2.2 Other Approvals

The issuance of, and compliance with this Permit, does not:

- (a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act*, and the *Environmental Protection Act*, and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

- (a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or
- (b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 Expiry

This Permit expires on **December 31, 2019**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken per Year:	Zone/ Easting/ Northing:
1	Quarry Sump	Pond Connected	Pits and Quarries	Dewatering	4,545	24	6,544,800	150	17 650950 4933500
						Total Taking:	6,544,800		

- 3.3 There is an additional water taking limitation per year for Source 1 described as Quarry Sump within Table A. The maximum taking per year from the Quarry Sump is 196,500,000 litres.

4. Monitoring

- 4.1 The Permit Holder shall not lower the water in the quarry below an elevation of 232.0 metres above sea level.
- 4.2 The Permit Holder shall establish and maintain a weather station within 1 km of the McCarthy Quarry property that collects and records, at a minimum, the following climatic data on a daily basis:
- a) Precipitation (rain and/or snow); and
 - b) Temperature (maximum and minimum).
- 4.3 The Permit Holder shall conduct daily water level monitoring with the use of pressure transducers and data loggers at:
- a) The residential well known by the MOE Water Well Record Number 5727662 and identified as well DW3 on Figure 2 in Item 2 of Schedule A of this Permit, if granted permission by the property owner.
 - b) The monitoring wells named OW4-1, OW4-2, OW5-1, OW6-1, OW6-2, OW9-1, OW9-2, and Bored Well (shown on Figure 2, in Item 2 of Schedule A of this Permit).
 - c) The City of Kwartha Lakes monitoring well CKL-1, if granted permission by the property owner .
- These pressure transducers and data loggers shall be inspected and downloaded at least every 6 months.
- 4.4 The Permit Holder shall conduct monthly water level monitoring with the use of a manual water level meter at:
- a) The residential well known by the MOE Water Well Record Number 5727662 and identified as well DW3 on Figure 2 in Item 2 of Schedule A of this Permit, if granted permission by the property owner.
 - b) The residential wells named DW1, DW2, and DW4, if granted permission by the property owner (shown on Figure 2, in Item 2 of Schedule A of this Permit).

- c) The monitoring wells named AM1b, AMx, TW1-1, OW4-1, OW4-2, OW5-1, OW5-2, OW5-3, OW6-1, OW6-2, OW6-3, OW7-1, OW7-2, OW7-3, OW8-1, OW8-2, OW8-3, OW9-1, OW9-2, and Bored Well (shown on Figure 2 in Item 2 of Schedule A of this Permit).
- d) The City of Kwartha Lakes monitoring wells CKL-1 and CKL-2, if granted permission by the property owner .

The Permit Holder may suspend monthly water level monitoring under Condition 4.4 for the months of January and/or February if no water is taken from the quarry on those months.

- 4.5 The Permit Holder shall, if granted permission by the property owner, measure and record static water levels in the residential wells named DW5, DW6, DW7, and DW8, as shown on Figure 2 in Item 2 of Schedule A of this Permit, at least once in every two (2) month period during which water is taken from the quarry. The Permit Holder may suspend monthly water level monitoring under Condition 4.5 for the months of January and/or February if no water is taken from the quarry on those months.
- 4.6 The Permit Holder shall, if granted permission by the property owner, on a semi-annual basis collect raw water samples from the residential wells named DW1, DW2, and the well identified in condition 4.3(a). Each sample shall be tested, at a minimum, for the parameters listed in Table 1 below:

Table 1: Water Quality Parameters for Residential Wells

pH	Sulphate	DOC	Copper
Alkalinity (CaCO ₃)	Magnesium	Colour	Iron
Bicarbonate	Calcium	Turbidity	Lead
Conductivity	Sodium	Aluminium	Manganese
Fluoride	Potassium	Arsenic	Selenium
Chloride	Ammonia (N)	Barium	Zinc
Nitrate	Phosphate	Boron	Hardness (CaCO ₃)
Nitrite	Phosphorus	Cadmium	TDS (iron sum calc.)
Chromium	Anion Sum	Ion Ratio	Langelier Index
Tannins	Cation Sum	% Difference	

The Permit Holder shall immediately report to the respective well owner, the Director, and District Office any sampling result that exceeds the Ontario Drinking Water Quality Standards as prescribed by O.Reg. 169/03, as amended.

- 4.7 The Permit Holder shall on a semi-annual basis conduct the groundwater quality monitoring from the on-site groundwater monitors listed in Table 2. Each sample shall be tested, at a minimum, for the parameters listed in Table 3.

Table 2: On-Site Groundwater Monitors for Water Quality Sampling

AM1b	OW4-I	OW5-III	OW8-I
AMx	OW4-II	OW6-II	OW8-II
TW1-1	OW5-I	OW7-I	OW9-I
Bored Well	OW5-II	OW7-II	OW9-II

Table 3: Water Quality Parameters for On-Site Groundwater Monitors

pH	Magnesium	Sulphate	Conductivity
Alkalinity	Calcium	Nitrate	DOC
Bicarbonate	Sodium	Nitrite	Colour
Fluoride	Potassium	Phosphate	TDS
Chloride	Ammonia	Phosphorus	Hardness

- 4.8 Monitoring well AMx is within the quarry extraction area and will be mined out as the quarry face advances to the south. The Permit Holder shall continue to monitor AMx as listed in Conditions 4.4 and 4.7 until such monitoring is either deemed unsafe or the monitoring is not possible due to damage to AMx. Once monitoring of AMx is not possible under Conditions 4.4 and/or 4.7, then a replacement monitoring well must be established along the western property boundary between the quarry face and OW4. This replacement well shall be monitored as per Conditions 4.4 and 4.7 instead of AMx.
- 4.9 The Permit Holder shall notify the Director, in writing, within 30 days if the groundwater level or groundwater quality monitoring of any well listed under conditions 4.3, 4.4, 4.5, 4.6, and 4.7 is not possible, including being denied access to a private well. In the event of damage or loss of any monitoring well, monitoring devices or related equipment, the Permit Holder shall be allowed 30 calendar days from the date of discovery of the occurrence to repair or replace equipment. If a well is too damaged to be repaired or monitored, or if the well is deemed unsafe to be monitored, then the Director will decide if a replacement well is required and will modify the appropriate monitoring conditions in a written letter to the Permit Holder.
- 4.10 The Permit Holder shall maintain a record of all water takings. This record shall include the dates and times of water takings, and the total measured or calculated amounts for water pumped per day for each day that water is taken under the authorization of this Permit.
- 4.11 The Permit Holder shall keep all required records up to date and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request.
- 4.12 The Permit Holder shall provide to the Director an annual monitoring report no

later than March 1 each year during the life of this Permit. The annual monitoring report shall be prepared by an individual with P.Geo. or equivalent qualifications and shall include, at a minimum:

- a) The review and assessment of all monitoring data required by this Permit.
- b) An up-date of the quarry operations and predicted quarrying and dewatering for the next twelve (12) months.
- c) An assessment of the groundwater trends using the on-site on off-site monitoring data. This analysis should state the actual impact area of quarry dewatering and determine the potential for off-site impacts. If any impacts are predicted then a detailed mitigation plan shall be included within this report.
- d) Analysis that includes amount of water pumped, precipitation data, and an estimate of how much groundwater was pumped versus surface water.
- e) Figures that include site maps with current quarry depths, groundwater contour maps, impact area of quarry dewatering, groundwater elevation graphs, and geological cross-sections.
- f) Any groundwater interference complaints.
- g) Description of all communication with the public.
- h) Conclusions and recommendations, if any, to improve the monitoring and reporting at the site.

An electronic copy of the data collected must also accompany the report.

4.13 The Permit Holder shall make available on a publicly-accessible site on the internet the water quality and quantity data that it is required to monitor and record under this Permit and O.Reg. 387/04, as amended, and a copy of every report that is required to be prepared under this Permit. For greater clarity, the Permit Holder shall not publish any personal information as defined by the *Freedom of Information and Protection of Privacy Act*, R.S.O. 1990, c. F.31, as amended.

4.14 The Permit Holder shall maintain a Public Liaison Committee ("PLC") comprised of not more than seven (7) members that will meet at least once every four (4) months, unless the majority of the PLC decide that more or less frequent meetings are required. The PLC shall be comprised of: two (2) members appointed by the Permit Holder - one of whom shall act as Chairperson; one (1) member from each of the Township and the County, if they wish to have representatives; and three (3) members appointed by the public, if they wish to have representatives, who must be permanent residents within a 3 kilometre radius of the quarry property. The PLC shall serve in an advisory / community liaison role and shall have no powers to direct the Permit Holder or the Ministry.

4.15 Any request for an amendment or renewal of this Permit must be accompanied by a report prepared by an individual with P.Geo. or equivalent qualifications and shall include, at a minimum:

- a) The review and assessment of all monitoring data required by this Permit.
- b) An up-date of the quarry operations and predicted quarrying and dewatering for the duration of the requested permit.
- c) An assessment of the groundwater trends using the on-site on off-site monitoring

- data. This analysis should state the actual impact area of quarry dewatering and determine the potential for off-site impacts. If any impacts are predicted then a detailed mitigation plan shall be included within this report.
- d) Analysis that includes amount of water pumped, precipitation data, and an estimate of how much groundwater was pumped versus surface water.
 - e) Figures that include site maps with current quarry depths, groundwater contour maps, impact area of quarry dewatering, groundwater elevation graphs, and geological cross-sections.
 - f) Any groundwater interference complaints.
 - g) Description of all communication with the public.
 - h) Conclusions and recommendations, if any, to improve the monitoring and reporting at the site.

An electronic copy of the data collected must also accompany the report. Any application for renewal of this Permit must be submitted to the Ministry at least ninety (90) days prior to the expiry of this Permit.

- 4.16 The Permit Holder shall, as directed by the Ministry, participate in a cumulative impact assessment for the Carden Plain Area with other quarry operators who have been issued a permit to take water in this area.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 For Groundwater Takings

If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

- 5.2.1 Where the water supply provided by the well known by MOE Water Well Record Number 5727662 is restored in accordance with Condition 5.2, the Permit Holder shall

restore the supply in a manner satisfactory to the Director, taking into account the residential needs, requirements and preferences of the persons serviced by the well.

- 5.3 Upon the receipt of a groundwater interference complaint, the Permit Holder shall:
- a) Implement the McCarthy Quarry Complaint Resolution Process as described in Item 3 of Schedule A of this Permit.
 - b) In addition, appropriate notification and actions must be taken as described in conditions 5.1 and 5.2 of this Permit. The provisions of conditions 5.1 and 5.2 shall take precedence over the provisions of condition 5.3(a) if there is a conflict.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water Resources Act*, Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.
2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.
3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

*In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written notice served upon me, the Environmental Review Tribunal and the Environmental Commissioner, **Environmental Bill of Rights**, R.S.O. 1993, Chapter 28, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 101 of the Ontario Water Resources Act, as amended provides that the Notice requiring a hearing shall state:*

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
 2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
 4. The address of the appellant;
 5. The Permit to Take Water number;
 6. The date of the Permit to Take Water;
 7. The name of the Director;
 8. The municipality within which the works are located;

This notice must be served upon:

*The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5
Fax: (416) 314-4506
Email:
ERTTribunalsecretary@ontario.ca*

*The Environmental Commissioner
1075 Bay Street
6th Floor, Suite 605
Toronto, Ontario M5S 2W5*

*The Director, Section 34,
Ministry of the Environment and
Climate Change
8th Floor
5775 Yonge St
Toronto ON M2M 4J1
Fax: (416) 325-6347*

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by telephone at (416) 314-4600

by fax at (416) 314-4506

by e-mail at www.ert.gov.on.ca

This instrument is subject to Section 38 of the Environmental Bill of Rights that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.

This Permit cancels and replaces Permit Number 8271-8VQJGU, issued on 2012/07/11.

Dated at Toronto this 30th day of December, 2014.

H. Zhang

Helen Zhang, P.Eng.
Director, Section 34
Ontario Water Resources Act, R.S.O. 1990

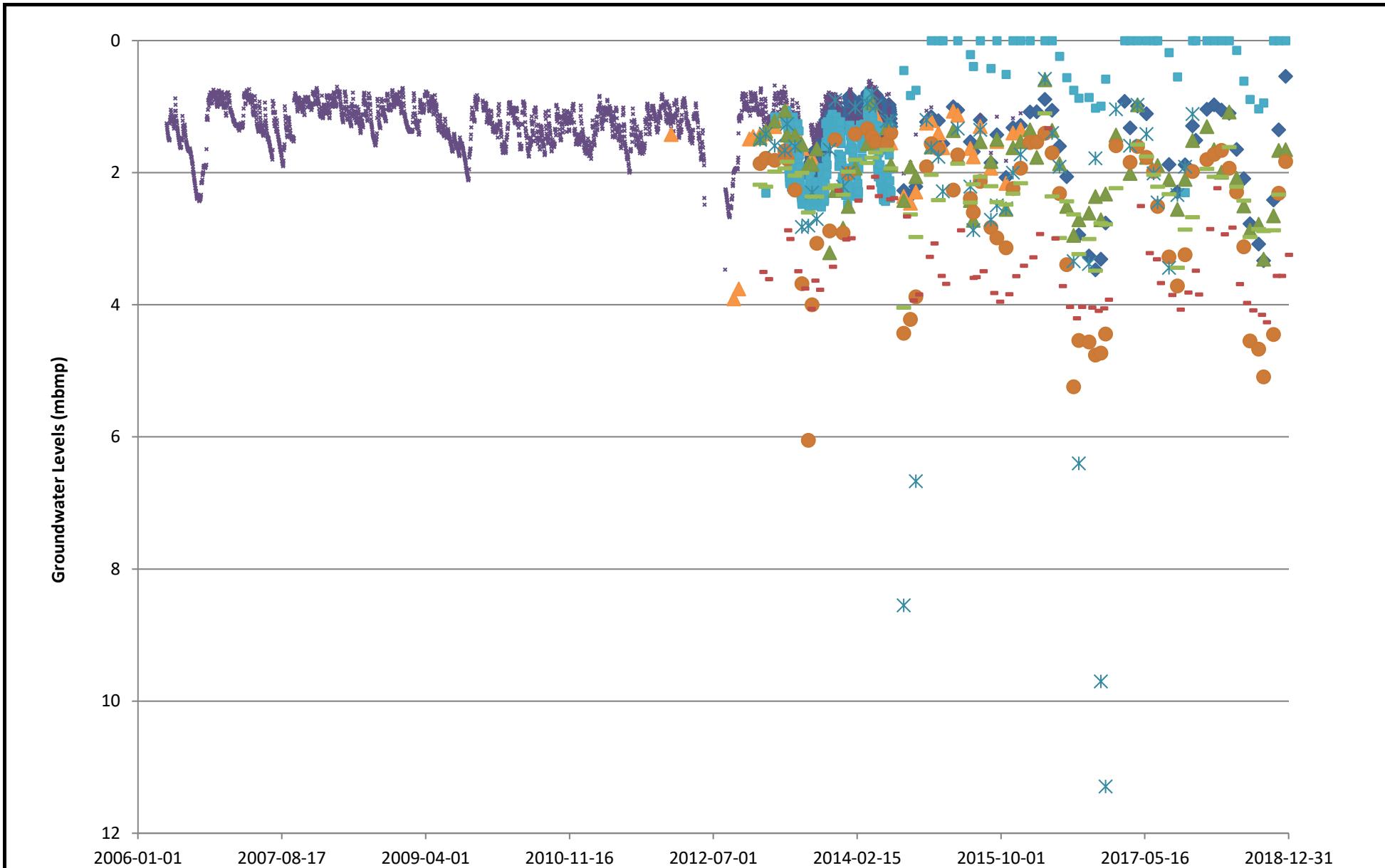
Schedule A

This Schedule "A" forms part of Permit To Take Water 7818-9QJNL4, dated December 30, 2014.

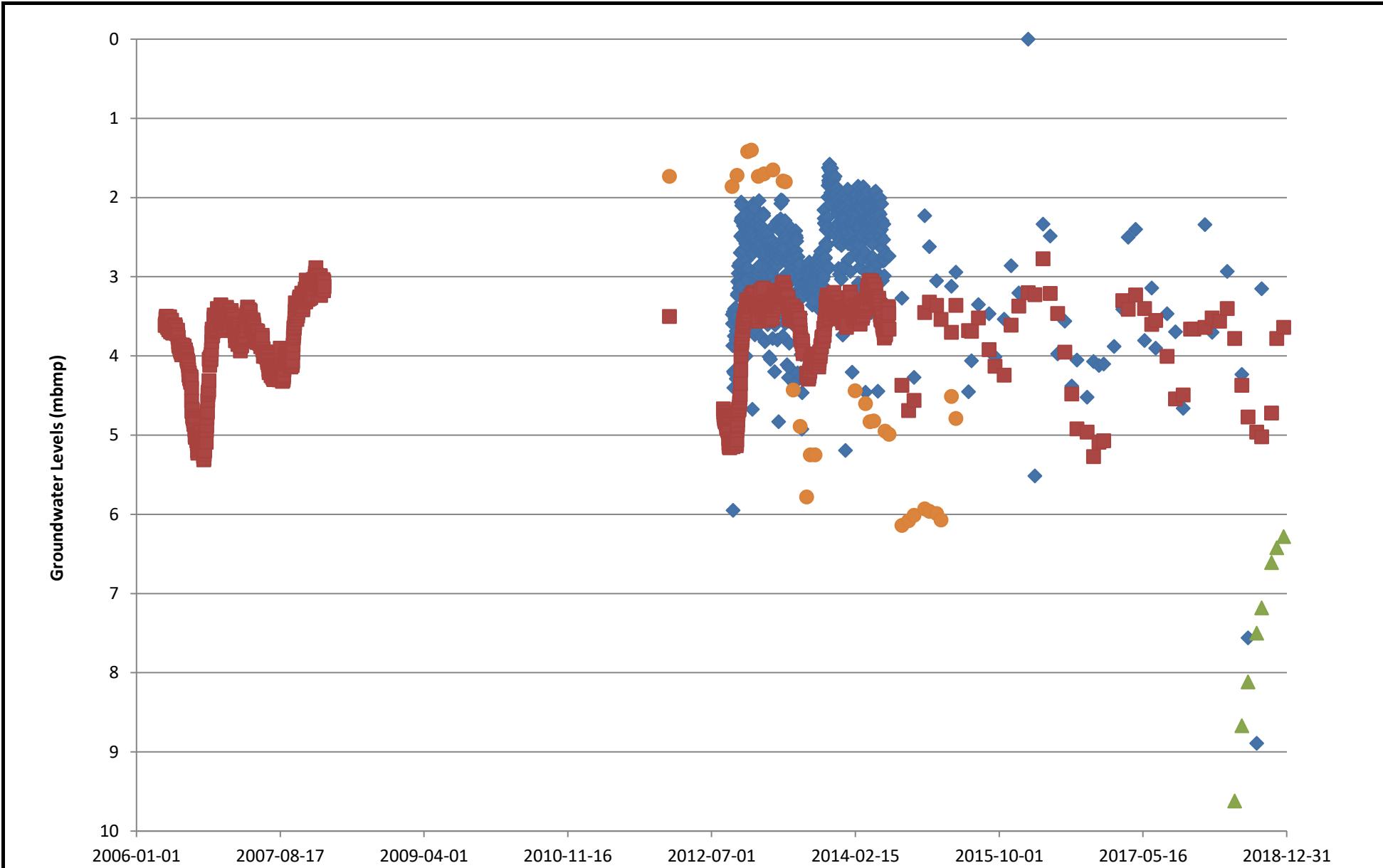
1. Permit To Take Water Application, signed by Jenny Coco, October 7, 2014.
2. Permit To Take Water Application - Renewal Application for McCarthy Quarry, Township of Ramara. Golder Associates Ltd. October 2014.
3. McCarthy Quarry Complaint Resolution Process, Golder Associates Ltd. November 2014.
4. Further Changes to PTTW No. 8271-8VQJGU. Golder Associates Ltd. November 11, 2014.

APPENDIX B

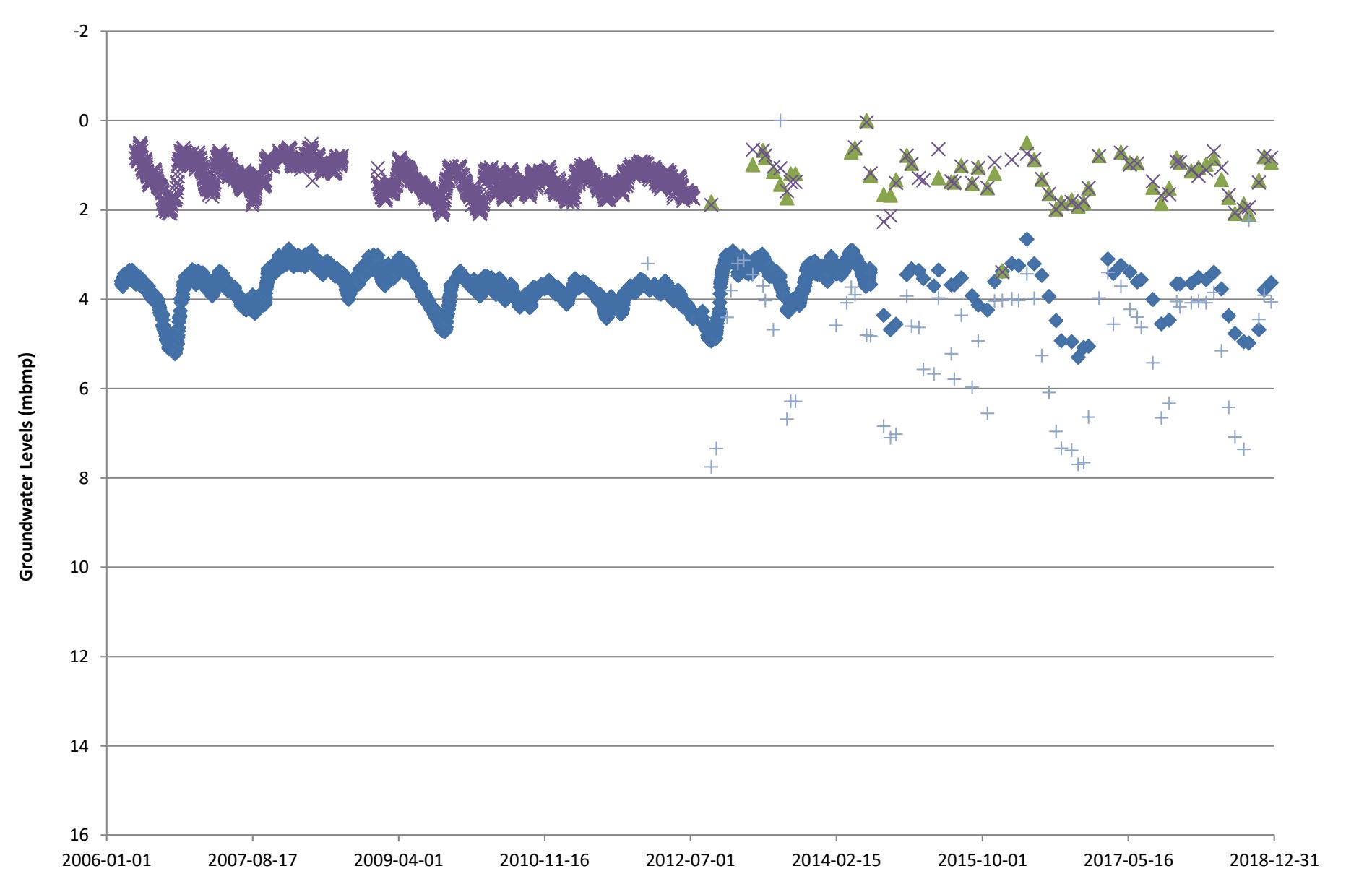
Hydrographs



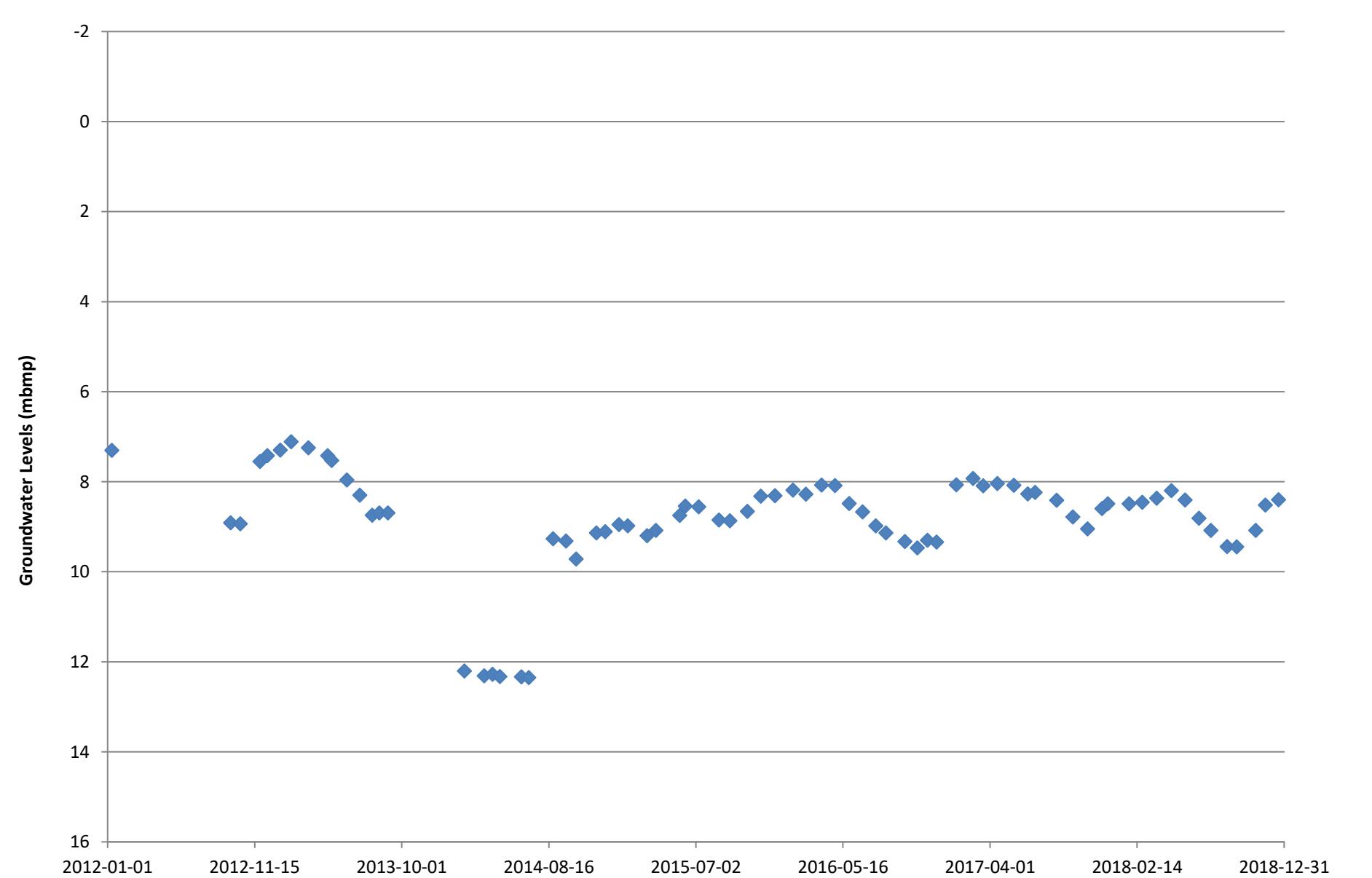
◆ Bored	* OW5-1	▲ AM1b	 GOLDER FILE No. PROJECT No.	SCALE: NTS	McCarthy Quarry Overburden Monitoring Wells GroundwaterLevel
■ CKL-1	▲ DW1	● DW2		DATE: 11-Feb-19	
✖ DW5	▬ DW6	- DW8		CAD: JEB	
				TEST: JAE	
				REVIEW: PTTW Annual Report	FIGURE No B-1
				QBJR/Coco Aggregates Inc.	



◆ DW3	 GOLDER	SCALE:	NTS	McCarthy Quarry Verulam Monitoring Wells Groundwater Level
■ OW4-1		DATE:	11-Feb-19	
● AMx		CAD:	JEB	
▲ Amx-R		FILE No.	TEST:	
	PROJECT No.	1407634	REVIEW:	PTTW Annual Report
				FIGURE No B-2



◆ OW4-2 ▲ OW5-2 ✕ OW5-3 + TW1-1	 GOLDER	SCALE:	NTS	McCarthy Quarry Bobcaygeon Monitoring Wells Groundwater Level
		DATE:	11-Feb-19	
		CAD:	JEB	
		FILE No.	TEST:	
		PROJECT No.	1407634	QBJR/Coco Aggregates Inc. PTTW Annual Report
		REVIEW:	JAE	FIGURE No B-3



◆ TW1-2



GOLDER

SCALE: NTS
DATE: 11-Feb-19
CAD: JEB

**McCarthy Quarry
Precambrian Monitoring Wells
Groundwater Level**

FILE No.

TEST:

QBJR/Coco Aggregates Inc.

FIGURE No

PROJECT No.

1407634

REVIEW:

JAE

PTTW Annual Report

B-4

APPENDIX C

Certificates of Analysis

Your Project #: 1407634
 Site Location: MCCARTHY
 Your C.O.C. #: 665335-01-01

Attention: Jamie Bonany

Golder Associates Ltd
 121 Commerce Park Drive
 Unit L
 Barrie, ON
 CANADA L4N 8X1

Report Date: 2018/06/07

Report #: R5220905

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8D1262

Received: 2018/06/01, 09:20

Sample Matrix: Water

Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	2	N/A	2018/06/02	CAM SOP-00448	SM 23 2320 B m
Alkalinity	1	N/A	2018/06/04	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	2	N/A	2018/06/04	CAM SOP-00102	APHA 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	1	N/A	2018/06/05	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2018/06/04	CAM SOP-00463	EPA 325.2 m
Chloride by Automated Colourimetry	2	N/A	2018/06/05	CAM SOP-00463	EPA 325.2 m
Colour	3	N/A	2018/06/04	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2018/06/02	CAM SOP-00414	SM 23 2510 m
Conductivity	1	N/A	2018/06/04	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	3	N/A	2018/06/04	CAM SOP-00446	SM 23 5310 B m
Fluoride	2	2018/06/01	2018/06/02	CAM SOP-00449	SM 23 4500-F C m
Fluoride	1	2018/06/02	2018/06/04	CAM SOP-00449	SM 23 4500-F C m
Hardness (calculated as CaCO ₃)	3	N/A	2018/06/05	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	3	N/A	2018/06/04	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2018/06/05		
Ion Balance (% Difference)	2	N/A	2018/06/06		
Anion and Cation Sum	3	N/A	2018/06/05		
Total Ammonia-N	3	N/A	2018/06/06	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO ₃) and Nitrite (NO ₂) in Water (2)	1	N/A	2018/06/05	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate (NO ₃) and Nitrite (NO ₂) in Water (2)	2	N/A	2018/06/06	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	N/A	2018/06/02	CAM SOP-00413	SM 4500H+ B m
pH	1	N/A	2018/06/04	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	3	N/A	2018/06/04	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2018/06/05		
Sat. pH and Langelier Index (@ 20C)	2	N/A	2018/06/06		
Sat. pH and Langelier Index (@ 4C)	1	N/A	2018/06/05		
Sat. pH and Langelier Index (@ 4C)	2	N/A	2018/06/06		
Sulphate by Automated Colourimetry	3	N/A	2018/06/04	CAM SOP-00464	EPA 375.4 m
Tannins & Lignins	3	N/A	2018/06/01	CAM SOP-00410	SM 23 5550 B m

Your Project #: 1407634
 Site Location: MCCARTHY
 Your C.O.C. #: 665335-01-01

Attention: Jamie Bonany

Golder Associates Ltd
 121 Commerce Park Drive
 Unit L
 Barrie, ON
 CANADA L4N 8X1

Report Date: 2018/06/07

Report #: R5220905

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8D1262

Received: 2018/06/01, 09:20

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Total Dissolved Solids (TDS calc)	1	N/A	2018/06/05		
Total Dissolved Solids (TDS calc)	2	N/A	2018/06/06		
Turbidity	3	N/A	2018/06/01	CAM SOP-00417	SM 23 2130 B m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

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

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

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

Your Project #: 1407634
Site Location: MCCARTHY
Your C.O.C. #: 665335-01-01

Attention: Jamie Bonany

Golder Associates Ltd
121 Commerce Park Drive
Unit L
Barrie, ON
CANADA L4N 8X1

Report Date: 2018/06/07

Report #: R5220905

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8D1262

Received: 2018/06/01, 09:20

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ema Gitej, Senior Project Manager

Email: EGitej@maxxam.ca

Phone# (905)817-5829

=====

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

Maxxam Job #: B8D1262
Report Date: 2018/06/07

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

RCAP - COMPREHENSIVE (WATER)

Maxxam ID				GVP578			GVP579		GVP580													
Sampling Date				2018/05/30 12:10			2018/05/30 11:15		2018/05/30 02:45													
COC Number				665335-01-01			665335-01-01		665335-01-01													
Calculated Parameters																						
Anion Sum	me/L	-	-	12.7	N/A	5559660	8.33	5559660	8.77	N/A	5559660											
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	320	1.0	5559654	350	5559654	230	1.0	5559654											
Calculated TDS	mg/L	-	500	690	1.0	5559664	430	5559664	470	1.0	5559664											
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	2.0	1.0	5559654	2.5	5559654	2.0	1.0	5559654											
Cation Sum	me/L	-	-	13.2	N/A	5559660	7.65	5559660	8.68	N/A	5559660											
Hardness (CaCO3)	mg/L	-	80:100	560	1.0	5559633	340	5559633	190	1.0	5559633											
Ion Balance (% Difference)	%	-	-	1.80	N/A	5559659	4.21	5559659	0.520	N/A	5559659											
Langelier Index (@ 20C)	N/A	-	-	1.06		5559662	1.04	5559662	0.393		5559662											
Langelier Index (@ 4C)	N/A	-	-	0.815		5559663	0.791	5559663	0.145		5559663											
Saturation pH (@ 20C)	N/A	-	-	6.76		5559662	6.85	5559662	7.56		5559662											
Saturation pH (@ 4C)	N/A	-	-	7.01		5559663	7.09	5559663	7.81		5559663											
Inorganics																						
Total Ammonia-N	mg/L	-	-	0.086	0.050	5561665	0.084	5561665	0.51	0.050	5561665											
Conductivity	umho/cm	-	-	1400	1.0	5560548	780	5560548	880	1.0	5561603											
Dissolved Organic Carbon	mg/L	-	5	1.1	0.50	5561443	3.0	5561443	<0.50	0.50	5561443											
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5560501	<0.010	5561664	<0.010	0.010	5561664											
pH	pH	-	6.5:8.5	7.83		5560549	7.88	5560549	7.95		5561602											
Dissolved Sulphate (SO4)	mg/L	-	500	32	1.0	5560483	25	5561663	5.0	1.0	5561663											
Alkalinity (Total as CaCO3)	mg/L	-	30:500	320	1.0	5560547	350	5560547	240	1.0	5561600											
Dissolved Chloride (Cl)	mg/L	-	250	200	2.0	5560474	27	5561661	140	1.0	5561661											
Nitrite (N)	mg/L	1	-	<0.010	0.010	5560321	<0.010	5560458	<0.010	0.010	5560458											
Nitrate (N)	mg/L	10	-	0.40	0.10	5560321	<0.10	5560458	<0.10	0.10	5560458											
Nitrate + Nitrite (N)	mg/L	10	-	0.40	0.10	5560321	<0.10	5560458	<0.10	0.10	5560458											
Metals																						
Dissolved Aluminum (Al)	ug/L	-	100	<5.0	5.0	5561282	<5.0	5561282	<5.0	5.0	5561282											
Dissolved Antimony (Sb)	ug/L	6	-	<0.50	0.50	5561282	<0.50	5561282	<0.50	0.50	5561282											
Dissolved Arsenic (As)	ug/L	25	-	<1.0	1.0	5561282	<1.0	5561282	<1.0	1.0	5561282											
No Fill	No Exceedance																					
Grey	Exceeds 1 criteria policy/level																					
Black	Exceeds both criteria/levels																					
RDL = Reportable Detection Limit																						
QC Batch = Quality Control Batch																						
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively																						
(Made under the Ontario Safe Drinking Water Act, 2002)																						
N/A = Not Applicable																						

Maxxam Job #: B8D1262
Report Date: 2018/06/07

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

RCAP - COMPREHENSIVE (WATER)

Maxxam ID				GVP578			GVP579		GVP580		
Sampling Date				2018/05/30 12:10			2018/05/30 11:15		2018/05/30 02:45		
COC Number				665335-01-01			665335-01-01		665335-01-01		
	UNITS	MAC	A/O	DW1	RDL	QC Batch	DW2	QC Batch	DW3	RDL	QC Batch
Dissolved Barium (Ba)	ug/L	1000	-	190	2.0	5561282	71	5561282	200	2.0	5561282
Dissolved Beryllium (Be)	ug/L	-	-	<0.50	0.50	5561282	<0.50	5561282	<0.50	0.50	5561282
Dissolved Boron (B)	ug/L	5000	-	25	10	5561282	37	5561282	780	10	5561282
Dissolved Cadmium (Cd)	ug/L	5	-	<0.10	0.10	5561282	<0.10	5561282	<0.10	0.10	5561282
Dissolved Calcium (Ca)	ug/L	-	-	170000	200	5561282	120000	5561282	34000	200	5561282
Dissolved Chromium (Cr)	ug/L	50	-	<5.0	5.0	5561282	<5.0	5561282	<5.0	5.0	5561282
Dissolved Cobalt (Co)	ug/L	-	-	<0.50	0.50	5561282	<0.50	5561282	<0.50	0.50	5561282
Dissolved Copper (Cu)	ug/L	-	1000	100	1.0	5561282	3.7	5561282	2.6	1.0	5561282
Dissolved Iron (Fe)	ug/L	-	300	<100	100	5561282	<100	5561282	190	100	5561282
Dissolved Lead (Pb)	ug/L	10	-	<0.50	0.50	5561282	<0.50	5561282	<0.50	0.50	5561282
Dissolved Magnesium (Mg)	ug/L	-	-	32000	50	5561282	12000	5561282	26000	50	5561282
Dissolved Manganese (Mn)	ug/L	-	50	<2.0	2.0	5561282	9.5	5561282	5.5	2.0	5561282
Dissolved Molybdenum (Mo)	ug/L	-	-	<0.50	0.50	5561282	<0.50	5561282	<0.50	0.50	5561282
Dissolved Nickel (Ni)	ug/L	-	-	<1.0	1.0	5561282	<1.0	5561282	<1.0	1.0	5561282
Dissolved Phosphorus (P)	ug/L	-	-	<100	100	5561282	<100	5561282	<100	100	5561282
Dissolved Potassium (K)	ug/L	-	-	2000	200	5561282	11000	5561282	7200	200	5561282
Dissolved Selenium (Se)	ug/L	50	-	<2.0	2.0	5561282	<2.0	5561282	<2.0	2.0	5561282
Dissolved Silicon (Si)	ug/L	-	-	7000	50	5561282	4600	5561282	5600	50	5561282
Dissolved Silver (Ag)	ug/L	-	-	<0.10	0.10	5561282	<0.10	5561282	<0.10	0.10	5561282
Dissolved Sodium (Na)	ug/L	-	200000	45000	100	5561282	14000	5561282	110000	100	5561282
Dissolved Strontium (Sr)	ug/L	-	-	620	1.0	5561282	300	5561282	2300	1.0	5561282
Dissolved Thallium (Tl)	ug/L	-	-	<0.050	0.050	5561282	<0.050	5561282	<0.050	0.050	5561282
Dissolved Titanium (Ti)	ug/L	-	-	<5.0	5.0	5561282	<5.0	5561282	<5.0	5.0	5561282
Dissolved Uranium (U)	ug/L	20	-	1.5	0.10	5561282	0.30	5561282	<0.10	0.10	5561282
Dissolved Vanadium (V)	ug/L	-	-	<0.50	0.50	5561282	<0.50	5561282	<0.50	0.50	5561282
Dissolved Zinc (Zn)	ug/L	-	5000	17	5.0	5561282	10	5561282	8.9	5.0	5561282

No Fill
Grey
Black

No Exceedance
Exceeds 1 criteria policy/level
Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B8D1262

Report Date: 2018/06/07

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP578			GVP578			GVP579														
Sampling Date				2018/05/30 12:10			2018/05/30 12:10			2018/05/30 11:15														
COC Number				665335-01-01			665335-01-01			665335-01-01														
	UNITS	MAC	A/O	DW1	RDL	QC Batch	DW1 Lab-Dup	RDL	QC Batch	DW2	RDL	QC Batch												
Inorganics																								
Colour	TCU	-	5	<2	2	5561581				<2	2	5561581												
Fluoride (F-)	mg/L	1.5	-	<0.10	0.10	5560550				<0.10	0.10	5560550												
Tannins & Lignins	mg/L	-	-	<0.2	0.2	5560012	<0.2	0.2	5560012	<0.2	0.2	5560012												
Turbidity	NTU	-	5	0.1	0.1	5559390				0.6	0.1	5560317												
No Fill	No Exceedance																							
Grey	Exceeds 1 criteria policy/level																							
Black	Exceeds both criteria/levels																							
RDL = Reportable Detection Limit																								
QC Batch = Quality Control Batch																								
Lab-Dup = Laboratory Initiated Duplicate																								
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively																								
(Made under the Ontario Safe Drinking Water Act, 2002)																								

Maxxam ID				GVP579			GVP580											
Sampling Date				2018/05/30 11:15			2018/05/30 02:45											
COC Number				665335-01-01			665335-01-01											
	UNITS	MAC	A/O	DW2 Lab-Dup	RDL	QC Batch	DW3	RDL	QC Batch									
Inorganics																		
Colour	TCU	-	5				<2	2	5561581									
Fluoride (F-)	mg/L	1.5	-				0.70	0.10	5561598									
Tannins & Lignins	mg/L	-	-				<0.2	0.2	5560012									
Turbidity	NTU	-	5	0.6	0.1	5560317	1.3	0.1	5560317									
No Fill	No Exceedance																	
Grey	Exceeds 1 criteria policy/level																	
Black	Exceeds both criteria/levels																	
RDL = Reportable Detection Limit																		
QC Batch = Quality Control Batch																		
Lab-Dup = Laboratory Initiated Duplicate																		
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively																		
(Made under the Ontario Safe Drinking Water Act, 2002)																		

Maxxam Job #: B8D1262
 Report Date: 2018/06/07

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP578
Sample ID: DW1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5560547	N/A	2018/06/02	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5559654	N/A	2018/06/04	Automated Statchk
Chloride by Automated Colourimetry	KONE	5560474	N/A	2018/06/04	Deonarine Ramnarine
Colour	SPEC	5561581	N/A	2018/06/04	Viorica Rotaru
Conductivity	AT	5560548	N/A	2018/06/02	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5561443	N/A	2018/06/04	Nimarta Singh
Fluoride	ISE	5560550	2018/06/01	2018/06/02	Surinder Rai
Hardness (calculated as CaCO ₃)		5559633	N/A	2018/06/05	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5561282	N/A	2018/06/04	Thao Nguyen
Ion Balance (% Difference)	CALC	5559659	N/A	2018/06/05	Automated Statchk
Anion and Cation Sum	CALC	5559660	N/A	2018/06/05	Automated Statchk
Total Ammonia-N	LACH/NH4	5561665	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5560321	N/A	2018/06/05	Chandra Nandlal
pH	AT	5560549	N/A	2018/06/02	Surinder Rai
Orthophosphate	KONE	5560501	N/A	2018/06/04	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5559662	N/A	2018/06/05	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5559663	N/A	2018/06/05	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5560483	N/A	2018/06/04	Deonarine Ramnarine
Tannins & Lignins	SPEC	5560012	N/A	2018/06/01	Viorica Rotaru
Total Dissolved Solids (TDS calc)	CALC	5559664	N/A	2018/06/05	Automated Statchk
Turbidity	AT	5559390	N/A	2018/06/01	Tahir Anwar

Maxxam ID: GVP578 Dup
Sample ID: DW1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Tannins & Lignins	SPEC	5560012	N/A	2018/06/01	Viorica Rotaru

Maxxam ID: GVP579
Sample ID: DW2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5560547	N/A	2018/06/02	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5559654	N/A	2018/06/04	Automated Statchk
Chloride by Automated Colourimetry	KONE	5561661	N/A	2018/06/05	Deonarine Ramnarine
Colour	SPEC	5561581	N/A	2018/06/04	Viorica Rotaru
Conductivity	AT	5560548	N/A	2018/06/02	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5561443	N/A	2018/06/04	Nimarta Singh
Fluoride	ISE	5560550	2018/06/01	2018/06/02	Surinder Rai
Hardness (calculated as CaCO ₃)		5559633	N/A	2018/06/05	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5561282	N/A	2018/06/04	Thao Nguyen
Ion Balance (% Difference)	CALC	5559659	N/A	2018/06/06	Automated Statchk

Maxxam Job #: B8D1262

Report Date: 2018/06/07

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP579
Sample ID: DW2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Anion and Cation Sum	CALC	5559660	N/A	2018/06/05	Automated Statchk
Total Ammonia-N	LACH/NH4	5561665	N/A	2018/06/06	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5560458	N/A	2018/06/06	Chandra Nandlal
pH	AT	5560549	N/A	2018/06/02	Surinder Rai
Orthophosphate	KONE	5561664	N/A	2018/06/04	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5559662	N/A	2018/06/06	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5559663	N/A	2018/06/06	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5561663	N/A	2018/06/04	Alina Dobreanu
Tannins & Lignins	SPEC	5560012	N/A	2018/06/01	Viorica Rotaru
Total Dissolved Solids (TDS calc)	CALC	5559664	N/A	2018/06/06	Automated Statchk
Turbidity	AT	5560317	N/A	2018/06/01	Tahir Anwar

Maxxam ID: GVP579 Dup
Sample ID: DW2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Turbidity	AT	5560317	N/A	2018/06/01	Tahir Anwar

Maxxam ID: GVP580
Sample ID: DW3
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5561600	N/A	2018/06/04	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5559654	N/A	2018/06/05	Automated Statchk
Chloride by Automated Colourimetry	KONE	5561661	N/A	2018/06/05	Deonarine Ramnarine
Colour	SPEC	5561581	N/A	2018/06/04	Viorica Rotaru
Conductivity	AT	5561603	N/A	2018/06/04	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5561443	N/A	2018/06/04	Nimarta Singh
Fluoride	ISE	5561598	2018/06/02	2018/06/04	Surinder Rai
Hardness (calculated as CaCO3)		5559633	N/A	2018/06/05	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5561282	N/A	2018/06/04	Thao Nguyen
Ion Balance (% Difference)	CALC	5559659	N/A	2018/06/06	Automated Statchk
Anion and Cation Sum	CALC	5559660	N/A	2018/06/05	Automated Statchk
Total Ammonia-N	LACH/NH4	5561665	N/A	2018/06/06	Parminder Sangha
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5560458	N/A	2018/06/06	Chandra Nandlal
pH	AT	5561602	N/A	2018/06/04	Surinder Rai
Orthophosphate	KONE	5561664	N/A	2018/06/04	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5559662	N/A	2018/06/06	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5559663	N/A	2018/06/06	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5561663	N/A	2018/06/04	Alina Dobreanu
Tannins & Lignins	SPEC	5560012	N/A	2018/06/01	Viorica Rotaru
Total Dissolved Solids (TDS calc)	CALC	5559664	N/A	2018/06/06	Automated Statchk

Maxxam Job #: B8D1262

Report Date: 2018/06/07

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP580
Sample ID: DW3
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Turbidity	AT	5560317	N/A	2018/06/01	Tahir Anwar

Maxxam Job #: B8D1262

Report Date: 2018/06/07

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

GENERAL COMMENTS

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

Package 1	5.7°C
Package 2	4.7°C
Package 3	7.7°C

Results relate only to the items tested.

Maxxam Job #: B8D1262

Report Date: 2018/06/07

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: DH

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5559390	TA1	Spiked Blank	Turbidity	2018/06/01		100	%	85 - 115
5559390	TA1	Method Blank	Turbidity	2018/06/01	<0.1		NTU	
5559390	TA1	RPD	Turbidity	2018/06/01	NC		%	20
5560012	VRO	Matrix Spike [GVP578-01]	Tannins & Lignins	2018/06/01		93	%	80 - 120
5560012	VRO	Spiked Blank	Tannins & Lignins	2018/06/01		100	%	80 - 120
5560012	VRO	Method Blank	Tannins & Lignins	2018/06/01	<0.2		mg/L	
5560012	VRO	RPD [GVP578-01]	Tannins & Lignins	2018/06/01	NC		%	20
5560317	TA1	Spiked Blank	Turbidity	2018/06/01		101	%	85 - 115
5560317	TA1	Method Blank	Turbidity	2018/06/01	<0.1		NTU	
5560317	TA1	RPD [GVP579-01]	Turbidity	2018/06/01	1.6		%	20
5560321	C_N	Matrix Spike	Nitrite (N)	2018/06/05		98	%	80 - 120
			Nitrate (N)	2018/06/05		104	%	80 - 120
5560321	C_N	Spiked Blank	Nitrite (N)	2018/06/05		96	%	80 - 120
			Nitrate (N)	2018/06/05		104	%	80 - 120
5560321	C_N	Method Blank	Nitrite (N)	2018/06/05	<0.010		mg/L	
			Nitrate (N)	2018/06/05	<0.10		mg/L	
5560321	C_N	RPD	Nitrite (N)	2018/06/05	NC		%	20
			Nitrate (N)	2018/06/05	NC		%	20
5560458	C_N	Matrix Spike	Nitrite (N)	2018/06/06		96	%	80 - 120
			Nitrate (N)	2018/06/06		82	%	80 - 120
5560458	C_N	Spiked Blank	Nitrite (N)	2018/06/06		98	%	80 - 120
			Nitrate (N)	2018/06/06		98	%	80 - 120
5560458	C_N	Method Blank	Nitrite (N)	2018/06/06	<0.010		mg/L	
			Nitrate (N)	2018/06/06	<0.10		mg/L	
5560458	C_N	RPD	Nitrite (N)	2018/06/06	11		%	20
			Nitrate (N)	2018/06/06	1.0		%	20
5560474	DRM	Matrix Spike	Dissolved Chloride (Cl)	2018/06/04		116	%	80 - 120
5560474	DRM	Spiked Blank	Dissolved Chloride (Cl)	2018/06/04		102	%	80 - 120
5560474	DRM	Method Blank	Dissolved Chloride (Cl)	2018/06/04	<1.0		mg/L	
5560474	DRM	RPD	Dissolved Chloride (Cl)	2018/06/04	11		%	20
5560483	DRM	Matrix Spike	Dissolved Sulphate (SO4)	2018/06/04		107	%	75 - 125
5560483	DRM	Spiked Blank	Dissolved Sulphate (SO4)	2018/06/04		105	%	80 - 120
5560483	DRM	Method Blank	Dissolved Sulphate (SO4)	2018/06/04	<1.0		mg/L	
5560483	DRM	RPD	Dissolved Sulphate (SO4)	2018/06/04	7.2		%	20
5560501	ADB	Matrix Spike	Orthophosphate (P)	2018/06/04		113	%	75 - 125
5560501	ADB	Spiked Blank	Orthophosphate (P)	2018/06/04		100	%	80 - 120
5560501	ADB	Method Blank	Orthophosphate (P)	2018/06/04	<0.010		mg/L	
5560501	ADB	RPD	Orthophosphate (P)	2018/06/04	NC		%	25
5560547	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2018/06/02		94	%	85 - 115
5560547	SAU	Method Blank	Alkalinity (Total as CaCO3)	2018/06/02	<1.0		mg/L	
5560547	SAU	RPD	Alkalinity (Total as CaCO3)	2018/06/02	0.51		%	20
5560548	SAU	Spiked Blank	Conductivity	2018/06/02		100	%	85 - 115
5560548	SAU	Method Blank	Conductivity	2018/06/02	<1.0		umho/cm	
5560548	SAU	RPD	Conductivity	2018/06/02	0		%	25
5560549	SAU	Spiked Blank	pH	2018/06/02		102	%	98 - 103
5560549	SAU	RPD	pH	2018/06/02	0.42		%	N/A
5560550	SAU	Matrix Spike	Fluoride (F-)	2018/06/02		106	%	80 - 120
5560550	SAU	Spiked Blank	Fluoride (F-)	2018/06/02		104	%	80 - 120
5560550	SAU	Method Blank	Fluoride (F-)	2018/06/02	<0.10		mg/L	
5560550	SAU	RPD	Fluoride (F-)	2018/06/02	0		%	20
5561282	TNG	Matrix Spike	Dissolved Aluminum (Al)	2018/06/04		106	%	80 - 120
			Dissolved Antimony (Sb)	2018/06/04		116	%	80 - 120

Maxxam Job #: B8D1262

Report Date: 2018/06/07

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5561282	TNG	Spiked Blank	Dissolved Arsenic (As)	2018/06/04	105	%	80 - 120	
			Dissolved Barium (Ba)	2018/06/04	109	%	80 - 120	
			Dissolved Beryllium (Be)	2018/06/04	108	%	80 - 120	
			Dissolved Boron (B)	2018/06/04	106	%	80 - 120	
			Dissolved Cadmium (Cd)	2018/06/04	110	%	80 - 120	
			Dissolved Calcium (Ca)	2018/06/04	NC	%	80 - 120	
			Dissolved Chromium (Cr)	2018/06/04	104	%	80 - 120	
			Dissolved Cobalt (Co)	2018/06/04	103	%	80 - 120	
			Dissolved Copper (Cu)	2018/06/04	107	%	80 - 120	
			Dissolved Iron (Fe)	2018/06/04	108	%	80 - 120	
			Dissolved Lead (Pb)	2018/06/04	102	%	80 - 120	
			Dissolved Magnesium (Mg)	2018/06/04	107	%	80 - 120	
			Dissolved Manganese (Mn)	2018/06/04	107	%	80 - 120	
			Dissolved Molybdenum (Mo)	2018/06/04	114	%	80 - 120	
			Dissolved Nickel (Ni)	2018/06/04	102	%	80 - 120	
			Dissolved Phosphorus (P)	2018/06/04	117	%	80 - 120	
			Dissolved Potassium (K)	2018/06/04	108	%	80 - 120	
			Dissolved Selenium (Se)	2018/06/04	105	%	80 - 120	
			Dissolved Silicon (Si)	2018/06/04	103	%	80 - 120	
			Dissolved Silver (Ag)	2018/06/04	107	%	80 - 120	
			Dissolved Sodium (Na)	2018/06/04	NC	%	80 - 120	
			Dissolved Strontium (Sr)	2018/06/04	107	%	80 - 120	
			Dissolved Thallium (Tl)	2018/06/04	102	%	80 - 120	
			Dissolved Titanium (Ti)	2018/06/04	103	%	80 - 120	
			Dissolved Uranium (U)	2018/06/04	107	%	80 - 120	
			Dissolved Vanadium (V)	2018/06/04	107	%	80 - 120	
			Dissolved Zinc (Zn)	2018/06/04	104	%	80 - 120	
			Dissolved Aluminum (Al)	2018/06/04	100	%	80 - 120	
			Dissolved Antimony (Sb)	2018/06/04	105	%	80 - 120	
			Dissolved Arsenic (As)	2018/06/04	98	%	80 - 120	
			Dissolved Barium (Ba)	2018/06/04	103	%	80 - 120	
			Dissolved Beryllium (Be)	2018/06/04	101	%	80 - 120	
			Dissolved Boron (B)	2018/06/04	96	%	80 - 120	
			Dissolved Cadmium (Cd)	2018/06/04	102	%	80 - 120	
			Dissolved Calcium (Ca)	2018/06/04	103	%	80 - 120	
			Dissolved Chromium (Cr)	2018/06/04	97	%	80 - 120	
			Dissolved Cobalt (Co)	2018/06/04	97	%	80 - 120	
			Dissolved Copper (Cu)	2018/06/04	101	%	80 - 120	
			Dissolved Iron (Fe)	2018/06/04	101	%	80 - 120	
			Dissolved Lead (Pb)	2018/06/04	97	%	80 - 120	
			Dissolved Magnesium (Mg)	2018/06/04	99	%	80 - 120	
			Dissolved Manganese (Mn)	2018/06/04	99	%	80 - 120	
			Dissolved Molybdenum (Mo)	2018/06/04	103	%	80 - 120	
			Dissolved Nickel (Ni)	2018/06/04	96	%	80 - 120	
			Dissolved Phosphorus (P)	2018/06/04	111	%	80 - 120	
			Dissolved Potassium (K)	2018/06/04	101	%	80 - 120	
			Dissolved Selenium (Se)	2018/06/04	101	%	80 - 120	
			Dissolved Silicon (Si)	2018/06/04	96	%	80 - 120	
			Dissolved Silver (Ag)	2018/06/04	99	%	80 - 120	
			Dissolved Sodium (Na)	2018/06/04	99	%	80 - 120	
			Dissolved Strontium (Sr)	2018/06/04	98	%	80 - 120	
			Dissolved Thallium (Tl)	2018/06/04	96	%	80 - 120	

Maxxam Job #: B8D1262

Report Date: 2018/06/07

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5561282	TNG	Method Blank	Dissolved Titanium (Ti)	2018/06/04	100	%	80 - 120	
			Dissolved Uranium (U)	2018/06/04	99	%	80 - 120	
			Dissolved Vanadium (V)	2018/06/04	99	%	80 - 120	
			Dissolved Zinc (Zn)	2018/06/04	98	%	80 - 120	
			Dissolved Aluminum (Al)	2018/06/04	<5.0		ug/L	
			Dissolved Antimony (Sb)	2018/06/04	<0.50		ug/L	
			Dissolved Arsenic (As)	2018/06/04	<1.0		ug/L	
			Dissolved Barium (Ba)	2018/06/04	<2.0		ug/L	
			Dissolved Beryllium (Be)	2018/06/04	<0.50		ug/L	
			Dissolved Boron (B)	2018/06/04	<10		ug/L	
			Dissolved Cadmium (Cd)	2018/06/04	<0.10		ug/L	
			Dissolved Calcium (Ca)	2018/06/04	<200		ug/L	
			Dissolved Chromium (Cr)	2018/06/04	<5.0		ug/L	
			Dissolved Cobalt (Co)	2018/06/04	<0.50		ug/L	
			Dissolved Copper (Cu)	2018/06/04	<1.0		ug/L	
			Dissolved Iron (Fe)	2018/06/04	<100		ug/L	
			Dissolved Lead (Pb)	2018/06/04	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2018/06/04	<50		ug/L	
			Dissolved Manganese (Mn)	2018/06/04	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2018/06/04	<0.50		ug/L	
			Dissolved Nickel (Ni)	2018/06/04	<1.0		ug/L	
			Dissolved Phosphorus (P)	2018/06/04	<100		ug/L	
			Dissolved Potassium (K)	2018/06/04	<200		ug/L	
			Dissolved Selenium (Se)	2018/06/04	<2.0		ug/L	
			Dissolved Silicon (Si)	2018/06/04	<50		ug/L	
			Dissolved Silver (Ag)	2018/06/04	<0.10		ug/L	
			Dissolved Sodium (Na)	2018/06/04	<100		ug/L	
			Dissolved Strontium (Sr)	2018/06/04	<1.0		ug/L	
			Dissolved Thallium (Tl)	2018/06/04	<0.050		ug/L	
			Dissolved Titanium (Ti)	2018/06/04	<5.0		ug/L	
			Dissolved Uranium (U)	2018/06/04	<0.10		ug/L	
			Dissolved Vanadium (V)	2018/06/04	<0.50		ug/L	
			Dissolved Zinc (Zn)	2018/06/04	<5.0		ug/L	
5561282	TNG	RPD	Dissolved Antimony (Sb)	2018/06/04	NC	%	20	
			Dissolved Arsenic (As)	2018/06/04	NC	%	20	
			Dissolved Barium (Ba)	2018/06/04	0.67	%	20	
			Dissolved Beryllium (Be)	2018/06/04	NC	%	20	
			Dissolved Boron (B)	2018/06/04	3.0	%	20	
			Dissolved Cadmium (Cd)	2018/06/04	NC	%	20	
			Dissolved Chromium (Cr)	2018/06/04	NC	%	20	
			Dissolved Cobalt (Co)	2018/06/04	NC	%	20	
			Dissolved Copper (Cu)	2018/06/04	NC	%	20	
			Dissolved Lead (Pb)	2018/06/04	NC	%	20	
			Dissolved Molybdenum (Mo)	2018/06/04	5.8	%	20	
			Dissolved Nickel (Ni)	2018/06/04	NC	%	20	
			Dissolved Selenium (Se)	2018/06/04	NC	%	20	
			Dissolved Silver (Ag)	2018/06/04	NC	%	20	
			Dissolved Sodium (Na)	2018/06/04	1.5	%	20	
			Dissolved Thallium (Tl)	2018/06/04	NC	%	20	
			Dissolved Uranium (U)	2018/06/04	3.2	%	20	
			Dissolved Vanadium (V)	2018/06/04	NC	%	20	
			Dissolved Zinc (Zn)	2018/06/04	NC	%	20	

Maxxam Job #: B8D1262

Report Date: 2018/06/07

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5561443	NS3	Matrix Spike	Dissolved Organic Carbon	2018/06/04	93	%	80 - 120	
5561443	NS3	Spiked Blank	Dissolved Organic Carbon	2018/06/04	98	%	80 - 120	
5561443	NS3	Method Blank	Dissolved Organic Carbon	2018/06/04	<0.50		mg/L	
5561443	NS3	RPD	Dissolved Organic Carbon	2018/06/04	NC	%	20	
5561581	VRO	Spiked Blank	Colour	2018/06/04		100	%	80 - 120
5561581	VRO	Method Blank	Colour	2018/06/04	<2		TCU	
5561581	VRO	RPD	Colour	2018/06/04	0.67		%	25
5561598	SAU	Matrix Spike	Fluoride (F-)	2018/06/04		96	%	80 - 120
5561598	SAU	Spiked Blank	Fluoride (F-)	2018/06/04		98	%	80 - 120
5561598	SAU	Method Blank	Fluoride (F-)	2018/06/04	<0.10		mg/L	
5561598	SAU	RPD	Fluoride (F-)	2018/06/04	3.3		%	20
5561600	SAU	Spiked Blank	Alkalinity (Total as CaCO ₃)	2018/06/04		97	%	85 - 115
5561600	SAU	Method Blank	Alkalinity (Total as CaCO ₃)	2018/06/04	<1.0		mg/L	
5561600	SAU	RPD	Alkalinity (Total as CaCO ₃)	2018/06/04	2.0		%	20
5561602	SAU	Spiked Blank	pH	2018/06/04		102	%	98 - 103
5561602	SAU	RPD	pH	2018/06/04	0.14		%	N/A
5561603	SAU	Spiked Blank	Conductivity	2018/06/04		101	%	85 - 115
5561603	SAU	Method Blank	Conductivity	2018/06/04	<1.0		umho/cm	
5561603	SAU	RPD	Conductivity	2018/06/04	1.6		%	25
5561661	DRM	Matrix Spike	Dissolved Chloride (Cl)	2018/06/05		94	%	80 - 120
5561661	DRM	Spiked Blank	Dissolved Chloride (Cl)	2018/06/05		105	%	80 - 120
5561661	DRM	Method Blank	Dissolved Chloride (Cl)	2018/06/05	<1.0		mg/L	
5561661	DRM	RPD	Dissolved Chloride (Cl)	2018/06/05	1.9		%	20
5561663	ADB	Matrix Spike	Dissolved Sulphate (SO ₄)	2018/06/04		NC	%	75 - 125
5561663	ADB	Spiked Blank	Dissolved Sulphate (SO ₄)	2018/06/04		104	%	80 - 120
5561663	ADB	Method Blank	Dissolved Sulphate (SO ₄)	2018/06/04	<1.0		mg/L	
5561663	ADB	RPD	Dissolved Sulphate (SO ₄)	2018/06/04	0.68		%	20
5561664	ADB	Matrix Spike	Orthophosphate (P)	2018/06/04		108	%	75 - 125
5561664	ADB	Spiked Blank	Orthophosphate (P)	2018/06/04		99	%	80 - 120
5561664	ADB	Method Blank	Orthophosphate (P)	2018/06/04	<0.010		mg/L	
5561664	ADB	RPD	Orthophosphate (P)	2018/06/04	NC		%	25
5561665	SAN	Matrix Spike	Total Ammonia-N	2018/06/06		87	%	75 - 125
5561665	SAN	Spiked Blank	Total Ammonia-N	2018/06/06		102	%	80 - 120
5561665	SAN	Method Blank	Total Ammonia-N	2018/06/06	<0.050		mg/L	
5561665	SAN	RPD	Total Ammonia-N	2018/06/06	0.60		%	20

N/A = Not Applicable

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

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

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

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

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

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

Maxxam Job #: B8D1262
Report Date: 2018/06/07

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

VALIDATION SIGNATURE PAGE

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



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



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

Maxxam Job #: B8D1262
Report Date: 2018/06/07

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

Exceedence Summary Table – ODWS (2002)

Result Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
No Exceedences						
The exceedence summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.						

Your Project #: 1407634
 Site Location: MCCARTHY
 Your C.O.C. #: 665336-01-01, C#665336-02-01

Attention: Jamie Bonany

Golder Associates Ltd
 121 Commerce Park Drive
 Unit L
 Barrie, ON
 CANADA L4N 8X1

Report Date: 2018/06/08

Report #: R5225564

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8D1292

Received: 2018/06/01, 09:20

Sample Matrix: Water
 # Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	16	N/A	2018/06/06	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	16	N/A	2018/06/07	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	16	N/A	2018/06/06	CAM SOP-00463	EPA 325.2 m
Colour	16	N/A	2018/06/06	CAM SOP-00412	SM 23 2120C m
Conductivity	16	N/A	2018/06/06	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	13	N/A	2018/06/05	CAM SOP-00446	SM 23 5310 B m
Dissolved Organic Carbon (DOC) (1)	3	N/A	2018/06/06	CAM SOP-00446	SM 23 5310 B m
Fluoride	16	2018/06/05	2018/06/06	CAM SOP-00449	SM 23 4500-F C m
Hardness (calculated as CaCO ₃)	16	N/A	2018/06/08	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	11	N/A	2018/06/07	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	5	N/A	2018/06/08	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	16	N/A	2018/06/06	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO ₃) and Nitrite (NO ₂) in Water (2)	16	N/A	2018/06/06	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	16	N/A	2018/06/06	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	16	N/A	2018/06/06	CAM SOP-00461	EPA 365.1 m
Sulphate by Automated Colourimetry	16	N/A	2018/06/06	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	16	N/A	2018/06/08		

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Your Project #: 1407634
Site Location: MCCARTHY
Your C.O.C. #: 665336-01-01, C#665336-02-01

Attention: Jamie Bonany

Golder Associates Ltd
121 Commerce Park Drive
Unit L
Barrie, ON
CANADA L4N 8X1

Report Date: 2018/06/08

Report #: R5225564

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8D1292

Received: 2018/06/01, 09:20

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

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

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDS calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ema Gitej, Senior Project Manager

Email: EGitej@maxxam.ca

Phone# (905)817-5829

=====

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

Maxxam Job #: B8D1292
 Report Date: 2018/06/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP754		GVP755		GVP756												
Sampling Date				2018/05/30 14:20		2018/05/30 10:30		2018/05/30 14:30												
COC Number				665336-01-01		665336-01-01		665336-01-01												
	UNITS	MAC	A/O	AM1B	RDL	TW1-1	RDL	BORED	RDL	QC Batch										
Calculated Parameters																				
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	220	1.0	290	1.0	260	1.0	5563946										
Calculated TDS	mg/L	-	500	290	1.0	950	1.0	310	1.0	5563952										
Carb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	2.1	1.0	1.8	1.0	2.9	1.0	5563946										
Hardness (CaCO ₃)	mg/L	-	80:100	250	1.0	450	1.0	250	1.0	5563947										
Inorganics																				
Total Ammonia-N	mg/L	-	-	0.17	0.050	0.80	0.050	0.084	0.050	5565733										
Colour	TCU	-	5	<2	2	<2	2	<2	2	5565250										
Conductivity	umho/cm	-	-	480	1.0	1900	1.0	540	1.0	5565284										
Fluoride (F-)	mg/L	1.5	-	0.21	0.10	0.49	0.10	0.15	0.10	5565292										
Dissolved Organic Carbon	mg/L	-	5	0.75	0.50	1.6	0.50	1.1	0.50	5565036										
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	<0.010	0.010	<0.010	0.010	5565815										
pH	pH	-	6.5:8.5	8.02		7.83		8.07		5565293										
Dissolved Sulphate (SO ₄)	mg/L	-	500	41	1.0	27	1.0	28	1.0	5565817										
Alkalinity (Total as CaCO ₃)	mg/L	-	30:500	220	1.0	290	1.0	260	1.0	5565278										
Dissolved Chloride (Cl)	mg/L	-	250	2.3	1.0	420	5.0	2.1	1.0	5565814										
Nitrite (N)	mg/L	1	-	<0.010	0.010	<0.010	0.010	<0.010	0.010	5565297										
Nitrate (N)	mg/L	10	-	<0.10	0.10	<0.10	0.10	0.33	0.10	5565297										
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	<0.10	0.10	0.33	0.10	5565297										
No Fill	No Exceedance																			
Grey	Exceeds 1 criteria policy/level																			
Black	Exceeds both criteria/levels																			
RDL = Reportable Detection Limit																				
QC Batch = Quality Control Batch																				
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively (Made under the Ontario Safe Drinking Water Act, 2002)																				

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP756			GVP757		
Sampling Date				2018/05/30 14:30			2018/05/30 14:00		
COC Number				665336-01-01			665336-01-01		
	UNITS	MAC	A/O	BORED Lab-Dup	RDL	QC Batch	OW4-1	RDL	QC Batch

Calculated Parameters

Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-				240	1.0	5563946
Calculated TDS	mg/L	-	500				690	1.0	5563952
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-				3.5	1.0	5563946
Hardness (CaCO3)	mg/L	-	80:100				140	1.0	5563947

Inorganics

Total Ammonia-N	mg/L	-	-	0.071	0.050	5565733	1.2	0.050	5565733
Colour	TCU	-	5				<2	2	5565250
Conductivity	umho/cm	-	-	540	1.0	5565284	1400	1.0	5565284
Fluoride (F-)	mg/L	1.5	-	0.13	0.10	5565292	1.0	0.10	5565292
Dissolved Organic Carbon	mg/L	-	5				1.7	0.50	5565036
Orthophosphate (P)	mg/L	-	-				<0.010	0.010	5565815
pH	pH	-	6.5:8.5	8.08		5565293	8.19		5565293
Dissolved Sulphate (SO4)	mg/L	-	500				7.5	1.0	5565817
Alkalinity (Total as CaCO3)	mg/L	-	30:500	270	1.0	5565278	240	1.0	5565278
Dissolved Chloride (Cl)	mg/L	-	250				270	3.0	5565814
Nitrite (N)	mg/L	1	-				<0.010	0.010	5565297
Nitrate (N)	mg/L	10	-				<0.10	0.10	5565297
Nitrate + Nitrite (N)	mg/L	10	-				<0.10	0.10	5565297

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

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP758			GVP758		
Sampling Date				2018/05/30 14:15			2018/05/30 14:15		
COC Number				665336-01-01			665336-01-01		
	UNITS	MAC	A/O	OW4-2	RDL	QC Batch	OW4-2 Lab-Dup	RDL	QC Batch

Calculated Parameters

Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	250	1.0	5563946			
Calculated TDS	mg/L	-	500	810	1.0	5563952			
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	2.6	1.0	5563946			
Hardness (CaCO3)	mg/L	-	80:100	210	1.0	5563947			

Inorganics

Total Ammonia-N	mg/L	-	-	1.2	0.050	5565733			
Colour	TCU	-	5	<2	2	5565250			
Conductivity	umho/cm	-	-	1600	1.0	5565284			
Fluoride (F-)	mg/L	1.5	-	0.98	0.10	5565292			
Dissolved Organic Carbon	mg/L	-	5	1.1	0.50	5565061	1.1	0.50	5565061
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5565815			
pH	pH	-	6.5:8.5	8.05		5565293			
Dissolved Sulphate (SO4)	mg/L	-	500	<1.0	1.0	5565817			
Alkalinity (Total as CaCO3)	mg/L	-	30:500	250	1.0	5565278			
Dissolved Chloride (Cl)	mg/L	-	250	340	4.0	5565814			
Nitrite (N)	mg/L	1	-	<0.010	0.010	5565297			
Nitrate (N)	mg/L	10	-	<0.10	0.10	5565297			
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5565297			

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP759			GVP760		
Sampling Date				2018/05/30 12:30			2018/05/30 12:45		
COC Number				665336-01-01			665336-01-01		
	UNITS	MAC	A/O	OW5-1	RDL	QC Batch	OW5-2	RDL	QC Batch

Calculated Parameters																		
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	260	1.0	5563946	110	1.0	5563946									
Calculated TDS	mg/L	-	500	390	1.0	5563952	18000	1.0	5563952									
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	2.5	1.0	5563946	<1.0	1.0	5563946									
Hardness (CaCO3)	mg/L	-	80:100	210	1.0	5563947	7900	1.0	5563947									
Inorganics																		
Total Ammonia-N	mg/L	-	-	0.75	0.050	5565733	12	0.050	5565733									
Colour	TCU	-	5	<2	2	5565250	6	2	5565250									
Conductivity	umho/cm	-	-	710	1.0	5565284	28000	1.0	5565284									
Fluoride (F-)	mg/L	1.5	-	0.65	0.10	5565292	0.42	0.10	5565292									
Dissolved Organic Carbon	mg/L	-	5	1.3	0.50	5565061	0.51	0.50	5565036									
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5565815	<0.010	0.010	5565815									
pH	pH	-	6.5:8.5	8.01		5565293	7.31		5565293									
Dissolved Sulphate (SO4)	mg/L	-	500	35	1.0	5565817	<1.0	1.0	5565817									
Alkalinity (Total as CaCO3)	mg/L	-	30:500	260	1.0	5565278	110	1.0	5565278									
Dissolved Chloride (Cl)	mg/L	-	250	46	1.0	5565814	10000	100	5565814									
Nitrite (N)	mg/L	1	-	<0.010	0.010	5565297	<0.010	0.010	5565297									
Nitrate (N)	mg/L	10	-	0.43	0.10	5565297	<0.10	0.10	5565297									
Nitrate + Nitrite (N)	mg/L	10	-	0.43	0.10	5565297	<0.10	0.10	5565297									
No Fill	No Exceedance																	
Grey	Exceeds 1 criteria policy/level																	
Black	Exceeds both criteria/levels																	
RDL = Reportable Detection Limit																		
QC Batch = Quality Control Batch																		
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively (Made under the Ontario Safe Drinking Water Act, 2002)																		

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP760			GVP761		
Sampling Date				2018/05/30 12:45			2018/05/30 12:45		
COC Number				665336-01-01			665336-01-01		
	UNITS	MAC	A/O	OW5-2 Lab-Dup	RDL	QC Batch	OW5-3	RDL	QC Batch

Calculated Parameters

Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-				130	1.0	5563946
Calculated TDS	mg/L	-	500				18000	1.0	5563952
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-				<1.0	1.0	5563946
Hardness (CaCO3)	mg/L	-	80:100				6300	1.0	5563947

Inorganics

Total Ammonia-N	mg/L	-	-				9.6	0.050	5565733
Colour	TCU	-	5				3	2	5565250
Conductivity	umho/cm	-	-				31000	1.0	5565284
Fluoride (F-)	mg/L	1.5	-				0.39	0.10	5565292
Dissolved Organic Carbon	mg/L	-	5				0.85	0.50	5565061
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5565815	<0.010	0.010	5565815
pH	pH	-	6.5:8.5				7.35		5565293
Dissolved Sulphate (SO4)	mg/L	-	500	<1.0	1.0	5565817	79	1.0	5565817
Alkalinity (Total as CaCO3)	mg/L	-	30:500				130	1.0	5565278
Dissolved Chloride (Cl)	mg/L	-	250	10000	100	5565814	12000	120	5565814
Nitrite (N)	mg/L	1	-	<0.010	0.010	5565297	<0.010	0.010	5565297
Nitrate (N)	mg/L	10	-	<0.10	0.10	5565297	<0.10	0.10	5565297
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5565297	<0.10	0.10	5565297

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

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP762		GVP763		GVP764		
Sampling Date				2018/05/30 13:40		2018/05/30 11:45		2018/05/30 12:00		
COC Number				665336-01-01		665336-01-01		C#665336-02-01		
	UNITS	MAC	A/O	OW6-2	RDL	OW7-1	RDL	OW7-2	RDL	QC Batch

Calculated Parameters

Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	150	1.0	280	1.0	280	1.0	5563946
Calculated TDS	mg/L	-	500	4100	1.0	3400	1.0	3800	1.0	5563952
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	<1.0	1.0	1.9	1.0	1.5	1.0	5563946
Hardness (CaCO3)	mg/L	-	80:100	1600	1.0	830	1.0	1100	1.0	5563947

Inorganics

Total Ammonia-N	mg/L	-	-	0.12	0.050	3.0	0.050	2.2	0.050	5565733
Colour	TCU	-	5	<2	2	190	4	<2	2	5565250
Conductivity	umho/cm	-	-	6500	1.0	6400	1.0	6800	1.0	5565284
Fluoride (F-)	mg/L	1.5	-	0.57	0.10	2.2	0.10	2.1	0.10	5565292
Dissolved Organic Carbon	mg/L	-	5	0.58	0.50	1.0	0.50	1.0	0.50	5565036
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	<0.010	0.010	<0.010	0.010	5565815
pH	pH	-	6.5:8.5	7.67		7.85		7.74		5565293
Dissolved Sulphate (SO4)	mg/L	-	500	1100	5.0	14	1.0	28	1.0	5565817
Alkalinity (Total as CaCO3)	mg/L	-	30:500	150	1.0	280	1.0	280	1.0	5565278
Dissolved Chloride (Cl)	mg/L	-	250	1600	15	2000	20	2200	20	5565814
Nitrite (N)	mg/L	1	-	0.164	0.010	<0.010	0.010	<0.010	0.010	5565297
Nitrate (N)	mg/L	10	-	0.80	0.10	<0.10	0.10	<0.10	0.10	5565297
Nitrate + Nitrite (N)	mg/L	10	-	0.97	0.10	<0.10	0.10	<0.10	0.10	5565297

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

Maxxam Job #: B8D1292
Report Date: 2018/06/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP765			GVP766											
Sampling Date				2018/05/29 17:00			2018/05/29 16:30											
COC Number				C#665336-02-01			C#665336-02-01											
	UNITS	MAC	A/O	OW8-1	RDL	QC Batch	OW8-2	RDL	QC Batch									
Calculated Parameters																		
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	290	1.0	5563946	300	1.0	5563946									
Calculated TDS	mg/L	-	500	780	1.0	5563952	450	1.0	5563952									
Carb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	1.9	1.0	5563946	1.7	1.0	5563946									
Hardness (CaCO ₃)	mg/L	-	80:100	500	1.0	5563947	320	1.0	5563947									
Inorganics																		
Total Ammonia-N	mg/L	-	-	0.84	0.050	5565733	0.51	0.050	5565733									
Colour	TCU	-	5	7	2	5565250	4	2	5565250									
Conductivity	umho/cm	-	-	1300	1.0	5565284	810	1.0	5565284									
Fluoride (F ⁻)	mg/L	1.5	-	0.91	0.10	5565292	0.47	0.10	5565292									
Dissolved Organic Carbon	mg/L	-	5	1.5	0.50	5565061	1.7	0.50	5565036									
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5565815	<0.010	0.010	5565815									
pH	pH	-	6.5:8.5	7.85		5565293	7.76		5565293									
Dissolved Sulphate (SO ₄)	mg/L	-	500	46	1.0	5565817	60	1.0	5565817									
Alkalinity (Total as CaCO ₃)	mg/L	-	30:500	290	1.0	5565278	310	1.0	5565278									
Dissolved Chloride (Cl)	mg/L	-	250	240	3.0	5565814	44	1.0	5565814									
Nitrite (N)	mg/L	1	-	<0.010	0.010	5565297	<0.010	0.010	5565297									
Nitrate (N)	mg/L	10	-	<0.10	0.10	5565297	<0.10	0.10	5565297									
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5565297	<0.10	0.10	5565297									
No Fill	No Exceedance																	
Grey	Exceeds 1 criteria policy/level																	
Black	Exceeds both criteria/levels																	
RDL = Reportable Detection Limit																		
QC Batch = Quality Control Batch																		
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively (Made under the Ontario Safe Drinking Water Act, 2002)																		

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP767			GVP767		
Sampling Date				2018/05/29 15:15			2018/05/29 15:15		
COC Number				C#665336-02-01			C#665336-02-01		
	UNITS	MAC	A/O	OW9-1	RDL	QC Batch	OW9-1 Lab-Dup	RDL	QC Batch

Calculated Parameters

Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	200	1.0	5563946			
Calculated TDS	mg/L	-	500	46000	1.0	5563952			
Carb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	<1.0	1.0	5563946			
Hardness (CaCO ₃)	mg/L	-	80:100	22000	1.0	5563947			

Inorganics

Total Ammonia-N	mg/L	-	-	18	0.050	5565733			
Colour	TCU	-	5	14	2	5565250	14	2	5565250
Conductivity	umho/cm	-	-	73000	1.0	5565284			
Fluoride (F ⁻)	mg/L	1.5	-	<0.10	0.10	5565292			
Dissolved Organic Carbon	mg/L	-	5	8.7	0.50	5565061			
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5565815			
pH	pH	-	6.5:8.5	6.93		5565293			
Dissolved Sulphate (SO ₄)	mg/L	-	500	120	1.0	5565817			
Alkalinity (Total as CaCO ₃)	mg/L	-	30:500	200	1.0	5565278			
Dissolved Chloride (Cl)	mg/L	-	250	30000	400	5565814			
Nitrite (N)	mg/L	1	-	<0.050	0.050	5565297			
Nitrate (N)	mg/L	10	-	<0.50	0.50	5565297			
Nitrate + Nitrite (N)	mg/L	10	-	<0.50	0.50	5565297			

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives

[A/O] - Not Health Related, respectively

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B8D1292
Report Date: 2018/06/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID				GVP768			GVP769											
Sampling Date				2018/05/30 10:30			2018/05/30 12:30											
COC Number				C#665336-02-01			C#665336-02-01											
	UNITS	MAC	A/O	TW1-1-D	RDL	QC Batch	OW5-1-D	RDL	QC Batch									
Calculated Parameters																		
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	280	1.0	5563946	260	1.0	5563946									
Calculated TDS	mg/L	-	500	950	1.0	5563952	390	1.0	5563952									
Carb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	2.0	1.0	5563946	2.5	1.0	5563946									
Hardness (CaCO ₃)	mg/L	-	80:100	460	1.0	5563947	210	1.0	5563947									
Inorganics																		
Total Ammonia-N	mg/L	-	-	0.78	0.050	5565733	0.63	0.050	5565733									
Colour	TCU	-	5	<2	2	5565250	<2	2	5565250									
Conductivity	umho/cm	-	-	1900	1.0	5565284	710	1.0	5565284									
Fluoride (F ⁻)	mg/L	1.5	-	0.52	0.10	5565292	0.66	0.10	5565292									
Dissolved Organic Carbon	mg/L	-	5	1.7	0.50	5565061	1.2	0.50	5565036									
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5565815	<0.010	0.010	5565815									
pH	pH	-	6.5:8.5	7.88		5565293	8.01		5565293									
Dissolved Sulphate (SO ₄)	mg/L	-	500	28	1.0	5565817	35	1.0	5565817									
Alkalinity (Total as CaCO ₃)	mg/L	-	30:500	290	1.0	5565278	260	1.0	5565278									
Dissolved Chloride (Cl)	mg/L	-	250	420	5.0	5565814	46	1.0	5565814									
Nitrite (N)	mg/L	1	-	<0.010	0.010	5565297	<0.010	0.010	5565297									
Nitrate (N)	mg/L	10	-	<0.10	0.10	5565297	0.45	0.10	5565297									
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5565297	0.45	0.10	5565297									
No Fill	No Exceedance																	
Grey	Exceeds 1 criteria policy/level																	
Black	Exceeds both criteria/levels																	
RDL = Reportable Detection Limit																		
QC Batch = Quality Control Batch																		
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively (Made under the Ontario Safe Drinking Water Act, 2002)																		

Maxxam Job #: B8D1292
 Report Date: 2018/06/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: DH

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			GVP754	GVP755	GVP756	GVP757	GVP758		
Sampling Date			2018/05/30 14:20	2018/05/30 10:30	2018/05/30 14:30	2018/05/30 14:00	2018/05/30 14:15		
COC Number			665336-01-01	665336-01-01	665336-01-01	665336-01-01	665336-01-01		
	UNITS	A/O	AM1B	TW1-1	BORED	OW4-1	OW4-2	RDL	QC Batch

Metals

Dissolved Calcium (Ca)	ug/L	-	47000	100000	56000	28000	39000	200	5565362
Dissolved Magnesium (Mg)	ug/L	-	31000	48000	26000	18000	27000	50	5565362
Dissolved Phosphorus (P)	ug/L	-	<100	<100	<100	<100	<100	100	5565362
Dissolved Potassium (K)	ug/L	-	2300	7700	7100	7000	9300	200	5565362
Dissolved Sodium (Na)	ug/L	200000	6700	160000	15000	200000	230000	100	5565362

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam ID			GVP759		GVP760	GVP761		GVP762	GVP763		
Sampling Date			2018/05/30 12:30		2018/05/30 12:45	2018/05/30 12:45		2018/05/30 13:40	2018/05/30 11:45		
COC Number			665336-01-01		665336-01-01	665336-01-01		665336-01-01	665336-01-01		
	UNITS	A/O	OW5-1	RDL	OW5-2	OW5-3	RDL	OW6-2	OW7-1	RDL	QC Batch

Metals

Dissolved Calcium (Ca)	ug/L	-	39000	200	1600000	1300000	5000	320000	160000	1000	5565362
Dissolved Magnesium (Mg)	ug/L	-	27000	50	920000	760000	250	200000	100000	50	5565362
Dissolved Phosphorus (P)	ug/L	-	<100	100	<500	<500	500	<100	<100	100	5565362
Dissolved Potassium (K)	ug/L	-	6900	200	77000	69000	1000	17000	14000	200	5565362
Dissolved Sodium (Na)	ug/L	200000	66000	100	4400000	3800000	1000	760000	890000	500	5565362

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			GVP763	GVP764		GVP765	GVP766		
Sampling Date			2018/05/30 11:45	2018/05/30 12:00		2018/05/29 17:00	2018/05/29 16:30		
COC Number			665336-01-01	C#665336-02-01		C#665336-02-01	C#665336-02-01		
	UNITS	A/O	OW7-1 Lab-Dup	OW7-2	RDL	OW8-1	OW8-2	RDL	QC Batch

Metals

Dissolved Calcium (Ca)	ug/L	-	170000	220000	1000	140000	96000	200	5565362
Dissolved Magnesium (Mg)	ug/L	-	110000	130000	50	39000	18000	50	5565362
Dissolved Phosphorus (P)	ug/L	-	<100	<100	100	<100	<100	100	5565362
Dissolved Potassium (K)	ug/L	-	15000	16000	200	5700	3900	200	5565362
Dissolved Sodium (Na)	ug/L	200000	890000	1000000	500	130000	36000	100	5565362

No Fill No Exceedance

Grey Exceeds 1 criteria policy/level

Black Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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

Maxxam ID			GVP767		GVP768	GVP769		
Sampling Date			2018/05/29 15:15		2018/05/30 10:30	2018/05/30 12:30		
COC Number			C#665336-02-01		C#665336-02-01	C#665336-02-01		
	UNITS	A/O	OW9-1	RDL	TW1-1-D	OW5-1-D	RDL	QC Batch

Metals

Dissolved Calcium (Ca)	ug/L	-	4600000	10000	100000	39000	200	5565362
Dissolved Magnesium (Mg)	ug/L	-	2500000	500	48000	27000	50	5565362
Dissolved Phosphorus (P)	ug/L	-	<1000	1000	<100	<100	100	5565362
Dissolved Potassium (K)	ug/L	-	120000	2000	7800	6900	200	5565362
Dissolved Sodium (Na)	ug/L	200000	9000000	5000	160000	66000	100	5565362

No Fill No Exceedance

Grey Exceeds 1 criteria policy/level

Black Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

Maxxam Job #: B8D1292
 Report Date: 2018/06/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP754
Sample ID: AM1B
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP755
Sample ID: TW1-1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP756
Sample ID: BORED
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP756
Sample ID: BORED
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP756 Dup
Sample ID: BORED
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
pH	AT	5565293	N/A	2018/06/06	Surinder Rai

Maxxam ID: GVP757
Sample ID: OW4-1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP757
Sample ID: OW4-1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP758
Sample ID: OW4-2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565061	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP758 Dup
Sample ID: OW4-2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565061	N/A	2018/06/05	Nimarta Singh

Maxxam ID: GVP759
Sample ID: OW5-1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565061	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen

Maxxam Job #: B8D1292
 Report Date: 2018/06/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP759
Sample ID: OW5-1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP760
Sample ID: OW5-2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/08	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP760 Dup
Sample ID: OW5-2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu

Maxxam ID: GVP761
Sample ID: OW5-3
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP761
Sample ID: OW5-3
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565061	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/08	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP762
Sample ID: OW6-2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/06	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/08	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP763
Sample ID: OW7-1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP763
Sample ID: OW7-1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/08	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobrea
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobrea
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP763 Dup
Sample ID: OW7-1
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/08	Thao Nguyen

Maxxam ID: GVP764
Sample ID: OW7-2
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/06	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/08	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobrea
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobrea
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam Job #: B8D1292
Report Date: 2018/06/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP765
Sample ID: OW8-1
Matrix: Water

Collected: 2018/05/29
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565061	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP766
Sample ID: OW8-2
Matrix: Water

Collected: 2018/05/29
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP767
Sample ID: OW9-1
Matrix: Water

Collected: 2018/05/29
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP767
Sample ID: OW9-1
Matrix: Water

Collected: 2018/05/29
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565061	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam ID: GVP767 Dup
Sample ID: OW9-1
Matrix: Water

Collected: 2018/05/29
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru

Maxxam ID: GVP768
Sample ID: TW1-1-D
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565061	N/A	2018/06/05	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

TEST SUMMARY

Maxxam ID: GVP769
Sample ID: OW5-1-D
Matrix: Water

Collected: 2018/05/30
Shipped:
Received: 2018/06/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5565278	N/A	2018/06/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5563946	N/A	2018/06/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5565814	N/A	2018/06/06	Deonarine Ramnarine
Colour	SPEC	5565250	N/A	2018/06/06	Viorica Rotaru
Conductivity	AT	5565284	N/A	2018/06/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5565036	N/A	2018/06/06	Nimarta Singh
Fluoride	ISE	5565292	2018/06/05	2018/06/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5563947	N/A	2018/06/08	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5565362	N/A	2018/06/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5565733	N/A	2018/06/06	Parminder Sangha
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5565297	N/A	2018/06/06	Chandra Nandlal
pH	AT	5565293	N/A	2018/06/06	Surinder Rai
Orthophosphate	KONE	5565815	N/A	2018/06/06	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5565817	N/A	2018/06/06	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5563952	N/A	2018/06/08	Automated Statchk

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

GENERAL COMMENTS

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

Package 1	5.7°C
Package 2	4.7°C
Package 3	7.7°C

Sample GVP760 [OW5-2] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample GVP761 [OW5-3] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample GVP767 [OW9-1] : Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Metal Analysis:Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: DH

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5565036	NS3	Matrix Spike	Dissolved Organic Carbon	2018/06/05	94	%	80 - 120	
5565036	NS3	Spiked Blank	Dissolved Organic Carbon	2018/06/05	96	%	80 - 120	
5565036	NS3	Method Blank	Dissolved Organic Carbon	2018/06/05	<0.50		mg/L	
5565036	NS3	RPD	Dissolved Organic Carbon	2018/06/05	12	%	20	
5565061	NS3	Matrix Spike [GVP758-04]	Dissolved Organic Carbon	2018/06/05	95	%	80 - 120	
5565061	NS3	Spiked Blank	Dissolved Organic Carbon	2018/06/05	96	%	80 - 120	
5565061	NS3	Method Blank	Dissolved Organic Carbon	2018/06/05	<0.50		mg/L	
5565061	NS3	RPD [GVP758-04]	Dissolved Organic Carbon	2018/06/05	1.3	%	20	
5565250	VRO	Spiked Blank	Colour	2018/06/06	99	%	80 - 120	
5565250	VRO	Method Blank	Colour	2018/06/06	<2	TCU		
5565250	VRO	RPD [GVP767-01]	Colour	2018/06/06	5.5	%	25	
5565278	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2018/06/06	97	%	85 - 115	
5565278	SAU	Method Blank	Alkalinity (Total as CaCO3)	2018/06/06	<1.0		mg/L	
5565278	SAU	RPD [GVP756-01]	Alkalinity (Total as CaCO3)	2018/06/06	0.69	%	20	
5565284	SAU	Spiked Blank	Conductivity	2018/06/06	101	%	85 - 115	
5565284	SAU	Method Blank	Conductivity	2018/06/06	<1.0		umho/cm	
5565284	SAU	RPD [GVP756-01]	Conductivity	2018/06/06	0.38	%	25	
5565292	SAU	Matrix Spike [GVP756-01]	Fluoride (F-)	2018/06/06	101	%	80 - 120	
5565292	SAU	Spiked Blank	Fluoride (F-)	2018/06/06	101	%	80 - 120	
5565292	SAU	Method Blank	Fluoride (F-)	2018/06/06	<0.10		mg/L	
5565292	SAU	RPD [GVP756-01]	Fluoride (F-)	2018/06/06	14	%	20	
5565293	SAU	Spiked Blank	pH	2018/06/06	102	%	98 - 103	
5565293	SAU	RPD [GVP756-01]	pH	2018/06/06	0.056	%	N/A	
5565297	C_N	Matrix Spike [GVP760-01]	Nitrite (N)	2018/06/06	99	%	80 - 120	
			Nitrate (N)	2018/06/06	101	%	80 - 120	
5565297	C_N	Spiked Blank	Nitrite (N)	2018/06/06	98	%	80 - 120	
			Nitrate (N)	2018/06/06	97	%	80 - 120	
5565297	C_N	Method Blank	Nitrite (N)	2018/06/06	<0.010		mg/L	
			Nitrate (N)	2018/06/06	<0.10		mg/L	
5565297	C_N	RPD [GVP760-01]	Nitrite (N)	2018/06/06	NC	%	20	
			Nitrate (N)	2018/06/06	NC	%	20	
5565362	TNG	Matrix Spike [GVP763-03]	Dissolved Calcium (Ca)	2018/06/07	NC	%	80 - 120	
			Dissolved Magnesium (Mg)	2018/06/07	NC	%	80 - 120	
			Dissolved Phosphorus (P)	2018/06/07	110	%	80 - 120	
			Dissolved Potassium (K)	2018/06/07	101	%	80 - 120	
			Dissolved Sodium (Na)	2018/06/07	NC	%	80 - 120	
5565362	TNG	Spiked Blank	Dissolved Calcium (Ca)	2018/06/07	97	%	80 - 120	
			Dissolved Magnesium (Mg)	2018/06/07	99	%	80 - 120	
			Dissolved Phosphorus (P)	2018/06/07	110	%	80 - 120	
			Dissolved Potassium (K)	2018/06/07	98	%	80 - 120	
			Dissolved Sodium (Na)	2018/06/07	98	%	80 - 120	
5565362	TNG	Method Blank	Dissolved Calcium (Ca)	2018/06/07	<200		ug/L	
			Dissolved Magnesium (Mg)	2018/06/07	<50		ug/L	
			Dissolved Phosphorus (P)	2018/06/07	<100		ug/L	
			Dissolved Potassium (K)	2018/06/07	<200		ug/L	
			Dissolved Sodium (Na)	2018/06/07	<100		ug/L	
5565362	TNG	RPD [GVP763-03]	Dissolved Calcium (Ca)	2018/06/08	3.4	%	20	
			Dissolved Magnesium (Mg)	2018/06/08	2.8	%	20	
			Dissolved Phosphorus (P)	2018/06/08	NC	%	20	
			Dissolved Potassium (K)	2018/06/08	3.3	%	20	
			Dissolved Sodium (Na)	2018/06/08	0.22	%	20	
5565733	SAN	Matrix Spike [GVP756-02]	Total Ammonia-N	2018/06/06	87	%	75 - 125	

Maxxam Job #: B8D1292

Report Date: 2018/06/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5565733	SAN	Spiked Blank	Total Ammonia-N	2018/06/06	101	%	80 - 120	
5565733	SAN	Method Blank	Total Ammonia-N	2018/06/06	<0.050		mg/L	
5565733	SAN	RPD [GVP756-02]	Total Ammonia-N	2018/06/06	17	%	20	
5565814	DRM	Matrix Spike [GVP760-01]	Dissolved Chloride (Cl)	2018/06/06	0	%	80 - 120	
5565814	DRM	Spiked Blank	Dissolved Chloride (Cl)	2018/06/06	104	%	80 - 120	
5565814	DRM	Method Blank	Dissolved Chloride (Cl)	2018/06/06	<1.0		mg/L	
5565814	DRM	RPD [GVP760-01]	Dissolved Chloride (Cl)	2018/06/06	4.0	%	20	
5565815	ADB	Matrix Spike [GVP760-01]	Orthophosphate (P)	2018/06/06	107	%	75 - 125	
5565815	ADB	Spiked Blank	Orthophosphate (P)	2018/06/06	99	%	80 - 120	
5565815	ADB	Method Blank	Orthophosphate (P)	2018/06/06	<0.010		mg/L	
5565815	ADB	RPD [GVP760-01]	Orthophosphate (P)	2018/06/06	NC	%	25	
5565817	ADB	Matrix Spike [GVP760-01]	Dissolved Sulphate (SO4)	2018/06/06	107	%	75 - 125	
5565817	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2018/06/06	102	%	80 - 120	
5565817	ADB	Method Blank	Dissolved Sulphate (SO4)	2018/06/06	<1.0		mg/L	
5565817	ADB	RPD [GVP760-01]	Dissolved Sulphate (SO4)	2018/06/06	NC	%	20	

N/A = Not Applicable

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

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

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

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

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

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

Maxxam Job #: B8D1292
Report Date: 2018/06/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

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

Maxxam Job #: B8D1292
Report Date: 2018/06/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: DH

Exceedence Summary Table – ODWS (2002)

Result Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
OW7-1	GVP763-01	Fluoride (F-)	1.5	2.2	0.10	mg/L
OW7-2	GVP764-01	Fluoride (F-)	1.5	2.1	0.10	mg/L

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

Your Project #: 1407634
 Site Location: MCCARTHY
 Your C.O.C. #: 686263-01-01, 686263-02-01

Attention: Jamie Bonany

Golder Associates Ltd
 121 Commerce Park Drive
 Unit L
 Barrie, ON
 CANADA L4N 8X1

Report Date: 2018/11/09

Report #: R5477873

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T2332

Received: 2018/11/02, 08:48

Sample Matrix: Water
 # Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	14	N/A	2018/11/06	CAM SOP-00448	SM 23 2320 B m
Alkalinity	1	N/A	2018/11/07	CAM SOP-00448	SM 23 2320 B m
Alkalinity	1	N/A	2018/11/08	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	16	N/A	2018/11/07	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	15	N/A	2018/11/05	CAM SOP-00463	EPA 325.2 m
Chloride by Automated Colourimetry	1	N/A	2018/11/08	CAM SOP-00463	EPA 325.2 m
Colour	16	N/A	2018/11/06	CAM SOP-00412	SM 23 2120C m
Conductivity	15	N/A	2018/11/06	CAM SOP-00414	SM 23 2510 m
Conductivity	1	N/A	2018/11/07	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	16	N/A	2018/11/03	CAM SOP-00446	SM 23 5310 B m
Fluoride	15	2018/11/03	2018/11/06	CAM SOP-00449	SM 23 4500-F C m
Fluoride	1	2018/11/06	2018/11/07	CAM SOP-00449	SM 23 4500-F C m
Hardness (calculated as CaCO ₃)	16	N/A	2018/11/07	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	3	N/A	2018/11/06	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	11	N/A	2018/11/07	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	2	N/A	2018/11/08	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	14	N/A	2018/11/08	CAM SOP-00441	EPA GS I-2522-90 m
Total Ammonia-N	2	N/A	2018/11/09	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO ₃) and Nitrite (NO ₂) in Water (2)	16	N/A	2018/11/06	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	15	N/A	2018/11/06	CAM SOP-00413	SM 4500H+ B m
pH	1	N/A	2018/11/07	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	16	N/A	2018/11/05	CAM SOP-00461	EPA 365.1 m
Sulphate by Automated Colourimetry	15	N/A	2018/11/05	CAM SOP-00464	EPA 375.4 m
Sulphate by Automated Colourimetry	1	N/A	2018/11/08	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	16	N/A	2018/11/07		

Remarks:

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

Your Project #: 1407634
Site Location: MCCARTHY
Your C.O.C. #: 686263-01-01, 686263-02-01

Attention: Jamie Bonany

Golder Associates Ltd
121 Commerce Park Drive
Unit L
Barrie, ON
CANADA L4N 8X1

Report Date: 2018/11/09

Report #: R5477873

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T2332

Received: 2018/11/02, 08:48

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

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

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDS calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ema Gitej, Senior Project Manager

Email: EGitej@maxxam.ca

Phone# (905)817-5829

=====

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

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

RESULTS OF ANALYSES OF WATER

Maxxam ID				IEQ936			IEQ937		
Sampling Date				2018/10/30 17:10			2018/10/31 15:45		
COC Number				686263-01-01			686263-01-01		
	UNITS	MAC	A/O	AM1B	RDL	QC Batch	TW1-1	RDL	QC Batch

Calculated Parameters

Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	240	1.0	5817710	280	1.0	5817710
Calculated TDS	mg/L	-	500	290	1.0	5817713	930	1.0	5817713
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	2.7	1.0	5817710	3.3	1.0	5817710
Hardness (CaCO3)	mg/L	-	80:100	260	1.0	5817139	490	1.0	5817139

Inorganics

Total Ammonia-N	mg/L	-	-	0.098	0.050	5820076	0.62	0.050	5820055
Colour	TCU	-	5	<2	2	5819611	2	2	5819611
Conductivity	umho/cm	-	-	480	1.0	5819431	1800	1.0	5819431
Fluoride (F-)	mg/L	1.5	-	0.20	0.10	5819428	0.49	0.10	5819428
Dissolved Organic Carbon	mg/L	-	5	0.75	0.50	5818108	1.8	0.50	5818108
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5819478	<0.010	0.010	5819478
pH	pH	-	6.5:8.5	8.08		5819434	8.10		5819434
Dissolved Sulphate (SO4)	mg/L	-	500	30	1.0	5819477	24	1.0	5819477
Alkalinity (Total as CaCO3)	mg/L	-	30:500	240	1.0	5819432	280	1.0	5819432
Dissolved Chloride (Cl-)	mg/L	-	250	2.4	1.0	5819471	390	5.0	5819471
Nitrite (N)	mg/L	1	-	<0.010	0.010	5819483	<0.010	0.010	5819483
Nitrate (N)	mg/L	10	-	<0.10	0.10	5819483	<0.10	0.10	5819483
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5819483	<0.10	0.10	5819483

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

RESULTS OF ANALYSES OF WATER

Maxxam ID				IEQ938			IEQ939		
Sampling Date				2018/10/31 13:45			2018/10/30 17:00		
COC Number				686263-01-01			686263-01-01		
	UNITS	MAC	A/O	BORED	RDL	QC Batch	OW4-1	RDL	QC Batch

Calculated Parameters									
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	240	1.0	5817710	240	1.0	5817710
Calculated TDS	mg/L	-	500	300	1.0	5817713	700	1.0	5817713
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	4.0	1.0	5817710	6.0	1.0	5817710
Hardness (CaCO3)	mg/L	-	80:100	230	1.0	5817139	170	1.0	5817139

Inorganics

Total Ammonia-N	mg/L	-	-	<0.050	0.050	5820082	1.3	0.050	5820076
Colour	TCU	-	5	<2	2	5819611	<2	2	5819611
Conductivity	umho/cm	-	-	500	1.0	5819431	1300	1.0	5819431
Fluoride (F-)	mg/L	1.5	-	0.14	0.10	5819428	1.1	0.10	5819428
Dissolved Organic Carbon	mg/L	-	5	0.99	0.50	5818108	2.7	0.50	5818108
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5819478	<0.010	0.010	5819478
pH	pH	-	6.5:8.5	8.25		5819434	8.42		5819434
Dissolved Sulphate (SO4)	mg/L	-	500	28	1.0	5819477	2.8	1.0	5819477
Alkalinity (Total as CaCO3)	mg/L	-	30:500	240	1.0	5819432	250	1.0	5819432
Dissolved Chloride (Cl-)	mg/L	-	250	2.3	1.0	5819471	260	4.0	5819471
Nitrite (N)	mg/L	1	-	<0.010	0.010	5819483	<0.010	0.010	5819483
Nitrate (N)	mg/L	10	-	0.29	0.10	5819483	<0.10	0.10	5819483
Nitrate + Nitrite (N)	mg/L	10	-	0.29	0.10	5819483	<0.10	0.10	5819483

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

RESULTS OF ANALYSES OF WATER

Maxxam ID				IEQ940			IEQ941		
Sampling Date				2018/10/30 16:45			2018/10/30 15:00		
COC Number				686263-01-01			686263-01-01		
	UNITS	MAC	A/O	OW4-2	RDL	QC Batch	OW5-1	RDL	QC Batch

Calculated Parameters									
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	230	1.0	5817710	260	1.0	5817710
Calculated TDS	mg/L	-	500	920	1.0	5817713	390	1.0	5817713
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	4.2	1.0	5817710	4.6	1.0	5817710
Hardness (CaCO3)	mg/L	-	80:100	240	1.0	5817139	200	1.0	5817139

Inorganics

Total Ammonia-N	mg/L	-	-	1.2	0.050	5820082	0.72	0.050	5820055
Colour	TCU	-	5	<2	2	5819611	2	2	5819611
Conductivity	umho/cm	-	-	1800	1.0	5819431	690	1.0	5819431
Fluoride (F-)	mg/L	1.5	-	0.90	0.10	5819428	0.73	0.10	5819428
Dissolved Organic Carbon	mg/L	-	5	1.2	0.50	5818108	1.3	0.50	5818108
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5819478	<0.010	0.010	5819478
pH	pH	-	6.5:8.5	8.29		5819434	8.28		5819434
Dissolved Sulphate (SO4)	mg/L	-	500	<1.0	1.0	5819477	35	1.0	5819477
Alkalinity (Total as CaCO3)	mg/L	-	30:500	240	1.0	5819432	260	1.0	5819432
Dissolved Chloride (Cl-)	mg/L	-	250	430	5.0	5819471	43	1.0	5819471
Nitrite (N)	mg/L	1	-	<0.010	0.010	5819483	0.086	0.010	5819483
Nitrate (N)	mg/L	10	-	<0.10	0.10	5819483	0.26	0.10	5819483
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5819483	0.34	0.10	5819483

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

RESULTS OF ANALYSES OF WATER

Maxxam ID				IEQ942			IEQ943		
Sampling Date				2018/10/30 15:05			2018/10/30 15:10		
COC Number				686263-01-01			686263-01-01		
	UNITS	MAC	A/O	OW5-2	RDL	QC Batch	OW5-3	RDL	QC Batch

Calculated Parameters									
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	110	1.0	5817710	100	1.0	5817710
Calculated TDS	mg/L	-	500	16000	1.0	5817713	13000	1.0	5817713
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	<1.0	1.0	5817710	<1.0	1.0	5817710
Hardness (CaCO3)	mg/L	-	80:100	6300	1.0	5817139	5300	1.0	5817139

Inorganics

Total Ammonia-N	mg/L	-	-	9.9	0.050	5820076	9.4	0.050	5820076
Colour	TCU	-	5	34	2	5821146	12	2	5819611
Conductivity	umho/cm	-	-	25000	1.0	5819431	21000	1.0	5823584
Fluoride (F-)	mg/L	1.5	-	0.44	0.10	5819428	0.34	0.10	5823585
Dissolved Organic Carbon	mg/L	-	5	0.62	0.50	5818108	2.8	0.50	5818108
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5819478	<0.010	0.010	5819478
pH	pH	-	6.5:8.5	7.69		5819434	7.17		5823587
Dissolved Sulphate (SO4)	mg/L	-	500	<1.0	1.0	5819477	2.8	1.0	5819477
Alkalinity (Total as CaCO3)	mg/L	-	30:500	110	1.0	5819432	100	1.0	5823580
Dissolved Chloride (Cl-)	mg/L	-	250	9700	120	5819471	7500	100	5819471
Nitrite (N)	mg/L	1	-	<0.010	0.010	5819484	0.180	0.010	5819483
Nitrate (N)	mg/L	10	-	<0.10	0.10	5819484	0.64	0.10	5819483
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5819484	0.82	0.10	5819483

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

RESULTS OF ANALYSES OF WATER

Maxxam ID				IEQ943			IEQ944		IEQ945		
Sampling Date				2018/10/30 15:10			2018/10/30 17:20		2018/10/30 13:10		
COC Number				686263-01-01			686263-01-01		686263-01-01		
	UNITS	MAC	A/O	OW5-3 Lab-Dup	RDL	QC Batch	OW6-2	RDL	OW7-1	RDL	QC Batch

Calculated Parameters

Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-				150	1.0	260	1.0	5817710
Calculated TDS	mg/L	-	500				4000	1.0	3800	1.0	5817713
Carb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-				1.4	1.0	2.3	1.0	5817710
Hardness (CaCO ₃)	mg/L	-	80:100				1600	1.0	1300	1.0	5817139

Inorganics

Total Ammonia-N	mg/L	-	-				1.2	0.050	3.1	0.050	5820082
Colour	TCU	-	5				3	2	17	2	5819611
Conductivity	umho/cm	-	-	21000	1.0	5823584	6100	1.0	6500	1.0	5819431
Fluoride (F ⁻)	mg/L	1.5	-	0.34	0.10	5823585	0.60	0.10	1.1	0.10	5819428
Dissolved Organic Carbon	mg/L	-	5				0.66	0.50	1.3	0.50	5818108
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5819478	<0.010	0.010	<0.010	0.010	5819478
pH	pH	-	6.5:8.5	7.21		5823587	8.00		7.98		5819434
Dissolved Sulphate (SO ₄)	mg/L	-	500	2.6	1.0	5819477	990	5.0	32	1.0	5819477
Alkalinity (Total as CaCO ₃)	mg/L	-	30:500	100	1.0	5823580	160	1.0	260	1.0	5819432
Dissolved Chloride (Cl ⁻)	mg/L	-	250	7500	100	5819471	1600	20	2200	30	5819471
Nitrite (N)	mg/L	1	-				0.077	0.010	<0.010	0.010	5819483
Nitrate (N)	mg/L	10	-				0.20	0.10	<0.10	0.10	5819483
Nitrate + Nitrite (N)	mg/L	10	-				0.27	0.10	<0.10	0.10	5819483

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

RESULTS OF ANALYSES OF WATER

Maxxam ID				IEQ946			IEQ947		
Sampling Date				2018/10/30 13:15			2018/10/30 12:20		
COC Number				686263-02-01			686263-02-01		
	UNITS	MAC	A/O	OW7-2	RDL	QC Batch	OW8-1	RDL	QC Batch

Calculated Parameters									
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	230	1.0	5817710	250	1.0	5817710
Calculated TDS	mg/L	-	500	4300	1.0	5817713	1200	1.0	5817713
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	1.3	1.0	5817710	2.6	1.0	5817710
Hardness (CaCO3)	mg/L	-	80:100	1400	1.0	5817139	450	1.0	5817139

Inorganics

Total Ammonia-N	mg/L	-	-	2.8	0.050	5820082	1.1	0.050	5820076
Colour	TCU	-	5	<2	2	5821146	<2	2	5819611
Conductivity	umho/cm	-	-	7300	1.0	5819431	2000	1.0	5819431
Fluoride (F-)	mg/L	1.5	-	1.1	0.10	5819428	1.1	0.10	5819428
Dissolved Organic Carbon	mg/L	-	5	1.4	0.50	5818108	1.5	0.50	5818108
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5819478	<0.010	0.010	5819478
pH	pH	-	6.5:8.5	7.77		5819434	8.04		5819434
Dissolved Sulphate (SO4)	mg/L	-	500	28	1.0	5819477	58	1.0	5825716
Alkalinity (Total as CaCO3)	mg/L	-	30:500	230	1.0	5819432	250	1.0	5825723
Dissolved Chloride (Cl-)	mg/L	-	250	2600	30	5819471	470	5.0	5825715
Nitrite (N)	mg/L	1	-	<0.010	0.010	5819483	<0.010	0.010	5819483
Nitrate (N)	mg/L	10	-	<0.10	0.10	5819483	<0.10	0.10	5819483
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5819483	<0.10	0.10	5819483

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B8T2332
Report Date: 2018/11/09

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SPK

RESULTS OF ANALYSES OF WATER

Maxxam ID				IEQ948			IEQ948											
Sampling Date				2018/10/30 12:30			2018/10/30 12:30											
COC Number				686263-02-01			686263-02-01											
	UNITS	MAC	A/O	OW8-2	RDL	QC Batch	OW8-2 Lab-Dup	RDL	QC Batch									
Calculated Parameters																		
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	290	1.0	5817710												
Calculated TDS	mg/L	-	500	1400	1.0	5817713												
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	2.5	1.0	5817710												
Hardness (CaCO3)	mg/L	-	80:100	480	1.0	5817139												
Inorganics																		
Total Ammonia-N	mg/L	-	-	0.95	0.050	5820082	0.94	0.050	5820082									
Colour	TCU	-	5	<2	2	5819611												
Conductivity	umho/cm	-	-	2500	1.0	5819431												
Fluoride (F-)	mg/L	1.5	-	0.90	0.10	5819428												
Dissolved Organic Carbon	mg/L	-	5	1.4	0.50	5818108												
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	5819478												
pH	pH	-	6.5:8.5	7.96		5819434												
Dissolved Sulphate (SO4)	mg/L	-	500	22	1.0	5819477												
Alkalinity (Total as CaCO3)	mg/L	-	30:500	300	1.0	5819432												
Dissolved Chloride (Cl-)	mg/L	-	250	630	10	5819471												
Nitrite (N)	mg/L	1	-	<0.010	0.010	5819483	<0.010	0.010	5819483									
Nitrate (N)	mg/L	10	-	<0.10	0.10	5819483	<0.10	0.10	5819483									
Nitrate + Nitrite (N)	mg/L	10	-	<0.10	0.10	5819483	<0.10	0.10	5819483									
No Fill	No Exceedance																	
Grey	Exceeds 1 criteria policy/level																	
Black	Exceeds both criteria/levels																	
RDL = Reportable Detection Limit																		
QC Batch = Quality Control Batch																		
Lab-Dup = Laboratory Initiated Duplicate																		
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively (Made under the Ontario Safe Drinking Water Act, 2002)																		

Maxxam Job #: B8T2332
Report Date: 2018/11/09

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SPK

RESULTS OF ANALYSES OF WATER

Maxxam ID				IEQ949		IEQ950			IEQ951		
Sampling Date				2018/10/30 15:00		2018/10/30 17:10			2018/10/31 13:30		
COC Number				686263-02-01		686263-02-01			686263-02-01		
	UNITS	MAC	A/O	DUP 1	QC Batch	DUP 2	RDL	QC Batch	NEW WELL	RDL	QC Batch

Calculated Parameters

Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	260	5817710	230	1.0	5817710	100	1.0	5817710
Calculated TDS	mg/L	-	500	400	5817713	300	1.0	5817713	14000	1.0	5817713
Carb. Alkalinity (calc. as CaCO ₃)	mg/L	-	-	4.7	5817710	2.5	1.0	5817710	<1.0	1.0	5817710
Hardness (CaCO ₃)	mg/L	-	80:100	210	5817139	270	1.0	5817139	5700	1.0	5817139

Inorganics

Total Ammonia-N	mg/L	-	-	0.69	5820076	0.11	0.050	5820076	6.4	0.050	5820076
Colour	TCU	-	5	<2	5819611	<2	2	5821146	<2	2	5819611
Conductivity	umho/cm	-	-	690	5819431	480	1.0	5819431	22000	1.0	5819431
Fluoride (F-)	mg/L	1.5	-	0.71	5819428	0.20	0.10	5819428	0.61	0.10	5819428
Dissolved Organic Carbon	mg/L	-	5	1.2	5818108	0.74	0.50	5818108	3.6	0.50	5818108
Orthophosphate (P)	mg/L	-	-	<0.010	5819478	<0.010	0.010	5819478	<0.010	0.010	5819478
pH	pH	-	6.5:8.5	8.28	5819434	8.06		5819434	7.66		5819434
Dissolved Sulphate (SO ₄)	mg/L	-	500	36	5819477	30	1.0	5819477	53	1.0	5819477
Alkalinity (Total as CaCO ₃)	mg/L	-	30:500	270	5819432	240	1.0	5819432	100	1.0	5819432
Dissolved Chloride (Cl-)	mg/L	-	250	43	5819471	2.6	1.0	5819471	9200	100	5819471
Nitrite (N)	mg/L	1	-	0.105	5819483	<0.010	0.010	5819483	<0.010	0.010	5819483
Nitrate (N)	mg/L	10	-	0.25	5819483	<0.10	0.10	5819483	<0.10	0.10	5819483
Nitrate + Nitrite (N)	mg/L	10	-	0.36	5819483	<0.10	0.10	5819483	<0.10	0.10	5819483

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			IEQ936	IEQ937	IEQ938	IEQ938	IEQ939		
Sampling Date			2018/10/30 17:10	2018/10/31 15:45	2018/10/31 13:45	2018/10/31 13:45	2018/10/30 17:00		
COC Number			686263-01-01	686263-01-01	686263-01-01	686263-01-01	686263-01-01		
	UNITS	A/O	AM1B	TW1-1	BORED	BORED Lab-Dup	OW4-1	RDL	QC Batch

Metals

Dissolved Calcium (Ca)	ug/L	-	53000	120000	52000	52000	33000	200	5820353
Dissolved Magnesium (Mg)	ug/L	-	31000	50000	25000	25000	21000	50	5820353
Dissolved Phosphorus (P)	ug/L	-	<100	<100	<100	<100	<100	100	5820353
Dissolved Potassium (K)	ug/L	-	2400	7100	8800	8700	7800	200	5820353
Dissolved Sodium (Na)	ug/L	200000	6300	160000	16000	16000	220000	100	5820353

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

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

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam ID			IEQ940	IEQ941		IEQ942		IEQ943	
Sampling Date			2018/10/30 16:45	2018/10/30 15:00		2018/10/30 15:05		2018/10/30 15:10	
COC Number			686263-01-01	686263-01-01		686263-01-01		686263-01-01	
	UNITS	A/O	OW4-2	OW5-1	RDL	OW5-2	QC Batch	OW5-3	RDL QC Batch

Metals

Dissolved Calcium (Ca)	ug/L	-	47000	37000	200	1300000	5820353	1100000	5000	5824986
Dissolved Magnesium (Mg)	ug/L	-	31000	25000	50	750000	5820353	630000	250	5824986
Dissolved Phosphorus (P)	ug/L	-	<100	<100	100	<500	5820353	<500	500	5824986
Dissolved Potassium (K)	ug/L	-	9800	7500	200	70000	5820353	59000	1000	5824986
Dissolved Sodium (Na)	ug/L	200000	260000	70000	100	4000000	5820353	3300000	1000	5824986

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B8T2332
 Report Date: 2018/11/09

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SPK

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			IEQ944	IEQ945	IEQ946			IEQ947		
Sampling Date			2018/10/30 17:20	2018/10/30 13:10	2018/10/30 13:15			2018/10/30 12:20		
COC Number			686263-01-01	686263-01-01	686263-02-01			686263-02-01		
	UNITS	A/O	OW6-2	OW7-1	OW7-2	RDL	QC Batch	OW8-1	RDL	QC Batch

Metals

Dissolved Calcium (Ca)	ug/L	-	330000	270000	290000	1000	5820353	120000	200	5824986
Dissolved Magnesium (Mg)	ug/L	-	190000	150000	160000	50	5820353	39000	50	5824986
Dissolved Phosphorus (P)	ug/L	-	<100	<100	110	100	5820353	<100	100	5824986
Dissolved Potassium (K)	ug/L	-	17000	22000	22000	200	5820353	8500	200	5824986
Dissolved Sodium (Na)	ug/L	200000	800000	950000	1100000	500	5820353	330000	100	5824986

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

Maxxam ID			IEQ948	IEQ949	IEQ950		IEQ951		
Sampling Date			2018/10/30 12:30	2018/10/30 15:00	2018/10/30 17:10		2018/10/31 13:30		
COC Number			686263-02-01	686263-02-01	686263-02-01		686263-02-01		
	UNITS	A/O	OW8-2	DUP 1	DUP 2	RDL	NEW WELL	RDL	QC Batch

Metals

Dissolved Calcium (Ca)	ug/L	-	130000	39000	54000	200	1100000	5000	5820353
Dissolved Magnesium (Mg)	ug/L	-	41000	26000	33000	50	720000	250	5820353
Dissolved Phosphorus (P)	ug/L	-	<100	<100	<100	100	<500	500	5820353
Dissolved Potassium (K)	ug/L	-	8500	7800	2400	200	56000	1000	5820353
Dissolved Sodium (Na)	ug/L	200000	340000	74000	6300	100	3200000	1000	5820353

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

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

Maxxam Job #: B8T2332
Report Date: 2018/11/09

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SPK

TEST SUMMARY

Maxxam ID: IEQ936
Sample ID: AM1B
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ937
Sample ID: TW1-1
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820055	N/A	2018/11/09	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ938
Sample ID: BORED
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk

Maxxam Job #: B8T2332
 Report Date: 2018/11/09

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SPK

TEST SUMMARY

Maxxam ID: IEQ938
Sample ID: BORED
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/06	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820082	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ938 Dup
Sample ID: BORED
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/06	Thao Nguyen

Maxxam ID: IEQ939
Sample ID: OW4-1
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam Job #: B8T2332
Report Date: 2018/11/09

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SPK

TEST SUMMARY

Maxxam ID: IEQ940
Sample ID: OW4-2
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/06	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820082	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ941
Sample ID: OW5-1
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820055	N/A	2018/11/09	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ942
Sample ID: OW5-2
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk

Maxxam Job #: B8T2332
 Report Date: 2018/11/09

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SPK

TEST SUMMARY

Maxxam ID: IEQ942
Sample ID: OW5-2
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5821146	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819484	N/A	2018/11/06	Chandra Nandal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ943
Sample ID: OW5-3
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5823580	N/A	2018/11/07	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5823584	N/A	2018/11/07	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5823585	2018/11/06	2018/11/07	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5824986	N/A	2018/11/08	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandal
pH	AT	5823587	N/A	2018/11/07	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ943 Dup
Sample ID: OW5-3
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5823580	N/A	2018/11/07	Surinder Rai
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Conductivity	AT	5823584	N/A	2018/11/07	Surinder Rai
Fluoride	ISE	5823585	2018/11/06	2018/11/07	Surinder Rai

Maxxam Job #: B8T2332
 Report Date: 2018/11/09

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SPK

TEST SUMMARY

Maxxam ID: IEQ943 Dup
Sample ID: OW5-3
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH	AT	5823587	N/A	2018/11/07	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine

Maxxam ID: IEQ944
Sample ID: OW6-2
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820082	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ945
Sample ID: OW7-1
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820082	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine

Maxxam Job #: B8T2332
 Report Date: 2018/11/09

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SPK

TEST SUMMARY

Maxxam ID: IEQ945
Sample ID: OW7-1
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ946
Sample ID: OW7-2
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5821146	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820082	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ947
Sample ID: OW8-1
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5825723	N/A	2018/11/08	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5825715	N/A	2018/11/08	Alina Dobreanu
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5824986	N/A	2018/11/08	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5825716	N/A	2018/11/08	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam Job #: B8T2332
Report Date: 2018/11/09

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SPK

TEST SUMMARY

Maxxam ID: IEQ948
Sample ID: OW8-2
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820082	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ948 Dup
Sample ID: OW8-2
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	5820082	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal

Maxxam ID: IEQ949
Sample ID: DUP 1
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/06	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

TEST SUMMARY

Maxxam ID: IEQ950
Sample ID: DUP 2
Matrix: Water

Collected: 2018/10/30
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5821146	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam ID: IEQ951
Sample ID: NEW WELL
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819432	N/A	2018/11/06	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5819611	N/A	2018/11/06	Viorica Rotaru
Conductivity	AT	5819431	N/A	2018/11/06	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818108	N/A	2018/11/03	Nimarta Singh
Fluoride	ISE	5819428	2018/11/03	2018/11/06	Surinder Rai
Hardness (calculated as CaCO ₃)		5817139	N/A	2018/11/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5820353	N/A	2018/11/07	Thao Nguyen
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819483	N/A	2018/11/06	Chandra Nandlal
pH	AT	5819434	N/A	2018/11/06	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk

Maxxam Job #: B8T2332
Report Date: 2018/11/09

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SPK

GENERAL COMMENTS

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

Package 1	4.7°C
Package 2	4.0°C
Package 3	4.7°C

Sample IEQ942 [OW5-2] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample IEQ943 [OW5-3] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample IEQ951 [NEW WELL] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5818108	NS3	Matrix Spike	Dissolved Organic Carbon	2018/11/03	96	%	80 - 120	
5818108	NS3	Spiked Blank	Dissolved Organic Carbon	2018/11/03	99	%	80 - 120	
5818108	NS3	Method Blank	Dissolved Organic Carbon	2018/11/03	<0.50		mg/L	
5818108	NS3	RPD	Dissolved Organic Carbon	2018/11/03	3.9	%	20	
5819428	SAU	Matrix Spike	Fluoride (F-)	2018/11/06		101	%	80 - 120
5819428	SAU	Spiked Blank	Fluoride (F-)	2018/11/06		99	%	80 - 120
5819428	SAU	Method Blank	Fluoride (F-)	2018/11/06	<0.10		mg/L	
5819428	SAU	RPD	Fluoride (F-)	2018/11/06	2.8	%	20	
5819431	SAU	Spiked Blank	Conductivity	2018/11/06		101	%	85 - 115
5819431	SAU	Method Blank	Conductivity	2018/11/06	<1.0		umho/cm	
5819431	SAU	RPD	Conductivity	2018/11/06	0.65	%	25	
5819432	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2018/11/06		96	%	85 - 115
5819432	SAU	Method Blank	Alkalinity (Total as CaCO3)	2018/11/06	<1.0		mg/L	
5819432	SAU	RPD	Alkalinity (Total as CaCO3)	2018/11/06	0.26	%	20	
5819434	SAU	Spiked Blank	pH	2018/11/06		102	%	98 - 103
5819434	SAU	RPD	pH	2018/11/06	2.2	%	N/A	
5819471	DRM	Matrix Spike [IEQ943-01]	Dissolved Chloride (Cl-)	2018/11/05		NC	%	80 - 120
5819471	DRM	Spiked Blank	Dissolved Chloride (Cl-)	2018/11/05		101	%	80 - 120
5819471	DRM	Method Blank	Dissolved Chloride (Cl-)	2018/11/05	<1.0		mg/L	
5819471	DRM	RPD [IEQ943-01]	Dissolved Chloride (Cl-)	2018/11/05	0.026	%	20	
5819477	DRM	Matrix Spike [IEQ943-01]	Dissolved Sulphate (SO4)	2018/11/05		107	%	75 - 125
5819477	DRM	Spiked Blank	Dissolved Sulphate (SO4)	2018/11/05		102	%	80 - 120
5819477	DRM	Method Blank	Dissolved Sulphate (SO4)	2018/11/05	<1.0		mg/L	
5819477	DRM	RPD [IEQ943-01]	Dissolved Sulphate (SO4)	2018/11/05	8.1	%	20	
5819478	ADB	Matrix Spike [IEQ943-01]	Orthophosphate (P)	2018/11/05		102	%	75 - 125
5819478	ADB	Spiked Blank	Orthophosphate (P)	2018/11/05		101	%	80 - 120
5819478	ADB	Method Blank	Orthophosphate (P)	2018/11/05	<0.010		mg/L	
5819478	ADB	RPD [IEQ943-01]	Orthophosphate (P)	2018/11/05	NC	%	25	
5819483	C_N	Matrix Spike [IEQ948-01]	Nitrite (N)	2018/11/06		101	%	80 - 120
5819483	C_N		Nitrate (N)	2018/11/06		100	%	80 - 120
5819483	C_N	Spiked Blank	Nitrite (N)	2018/11/06		105	%	80 - 120
5819483	C_N		Nitrate (N)	2018/11/06		104	%	80 - 120
5819483	C_N	Method Blank	Nitrite (N)	2018/11/06	<0.010		mg/L	
5819483	C_N		Nitrate (N)	2018/11/06	<0.10		mg/L	
5819483	C_N	RPD [IEQ948-01]	Nitrite (N)	2018/11/06	NC	%	20	
5819483	C_N		Nitrate (N)	2018/11/06	NC	%	20	
5819484	C_N	Matrix Spike	Nitrite (N)	2018/11/06		103	%	80 - 120
5819484	C_N		Nitrate (N)	2018/11/06		100	%	80 - 120
5819484	C_N	Spiked Blank	Nitrite (N)	2018/11/06		105	%	80 - 120
5819484	C_N		Nitrate (N)	2018/11/06		103	%	80 - 120
5819484	C_N	Method Blank	Nitrite (N)	2018/11/06	<0.010		mg/L	
5819484	C_N		Nitrate (N)	2018/11/06	<0.10		mg/L	
5819484	C_N	RPD	Nitrite (N)	2018/11/06	0.48	%	20	
5819484	C_N		Nitrate (N)	2018/11/06	0.79	%	20	
5819611	VRO	Spiked Blank	Colour	2018/11/06		101	%	80 - 120
5819611	VRO	Method Blank	Colour	2018/11/06	<2		TCU	
5819611	VRO	RPD	Colour	2018/11/06	NC	%	25	
5820055	COP	Matrix Spike	Total Ammonia-N	2018/11/09		96	%	75 - 125
5820055	COP	Spiked Blank	Total Ammonia-N	2018/11/09		99	%	80 - 120
5820055	COP	Method Blank	Total Ammonia-N	2018/11/09	<0.050		mg/L	
5820055	COP	RPD	Total Ammonia-N	2018/11/09	17	%	20	
5820076	COP	Matrix Spike	Total Ammonia-N	2018/11/08		98	%	75 - 125

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5820076	COP	Spiked Blank	Total Ammonia-N	2018/11/08		100	%	80 - 120
5820076	COP	Method Blank	Total Ammonia-N	2018/11/08	<0.050		mg/L	
5820076	COP	RPD	Total Ammonia-N	2018/11/08	NC		%	20
5820082	COP	Matrix Spike [IEQ948-02]	Total Ammonia-N	2018/11/08		95	%	75 - 125
5820082	COP	Spiked Blank	Total Ammonia-N	2018/11/08		99	%	80 - 120
5820082	COP	Method Blank	Total Ammonia-N	2018/11/08	<0.050		mg/L	
5820082	COP	RPD [IEQ948-02]	Total Ammonia-N	2018/11/08	0.95		%	20
5820353	TNG	Matrix Spike [IEQ938-04]	Dissolved Calcium (Ca)	2018/11/06		NC	%	80 - 120
			Dissolved Magnesium (Mg)	2018/11/06		87	%	80 - 120
			Dissolved Phosphorus (P)	2018/11/06		97	%	80 - 120
			Dissolved Potassium (K)	2018/11/06		88	%	80 - 120
			Dissolved Sodium (Na)	2018/11/06		88	%	80 - 120
5820353	TNG	Spiked Blank	Dissolved Calcium (Ca)	2018/11/06		99	%	80 - 120
			Dissolved Magnesium (Mg)	2018/11/06		99	%	80 - 120
			Dissolved Phosphorus (P)	2018/11/06		117	%	80 - 120
			Dissolved Potassium (K)	2018/11/06		99	%	80 - 120
			Dissolved Sodium (Na)	2018/11/06		99	%	80 - 120
5820353	TNG	Method Blank	Dissolved Calcium (Ca)	2018/11/06	<200		ug/L	
			Dissolved Magnesium (Mg)	2018/11/06	<50		ug/L	
			Dissolved Phosphorus (P)	2018/11/06	<100		ug/L	
			Dissolved Potassium (K)	2018/11/06	<200		ug/L	
			Dissolved Sodium (Na)	2018/11/06	<100		ug/L	
5820353	TNG	RPD [IEQ938-04]	Dissolved Calcium (Ca)	2018/11/06	0.21		%	20
			Dissolved Magnesium (Mg)	2018/11/06	0.42		%	20
			Dissolved Phosphorus (P)	2018/11/06	NC		%	20
			Dissolved Potassium (K)	2018/11/06	1.1		%	20
			Dissolved Sodium (Na)	2018/11/06	0.52		%	20
5821146	VRO	Spiked Blank	Colour	2018/11/06		99	%	80 - 120
5821146	VRO	Method Blank	Colour	2018/11/06	<2		TCU	
5821146	VRO	RPD	Colour	2018/11/06	NC		%	25
5823580	SAU	Spiked Blank	Alkalinity (Total as CaCO ₃)	2018/11/07		96	%	85 - 115
5823580	SAU	Method Blank	Alkalinity (Total as CaCO ₃)	2018/11/07	<1.0		mg/L	
5823580	SAU	RPD [IEQ943-01]	Alkalinity (Total as CaCO ₃)	2018/11/07	3.0		%	20
5823584	SAU	Spiked Blank	Conductivity	2018/11/07		101	%	85 - 115
5823584	SAU	Method Blank	Conductivity	2018/11/07	<1.0		umho/cm	
5823584	SAU	RPD [IEQ943-01]	Conductivity	2018/11/07	1.5		%	25
5823585	SAU	Matrix Spike [IEQ943-01]	Fluoride (F ⁻)	2018/11/07		69 (1)	%	80 - 120
5823585	SAU	Spiked Blank	Fluoride (F ⁻)	2018/11/07		97	%	80 - 120
5823585	SAU	Method Blank	Fluoride (F ⁻)	2018/11/07	<0.10		mg/L	
5823585	SAU	RPD [IEQ943-01]	Fluoride (F ⁻)	2018/11/07	1.4		%	20
5823587	SAU	Spiked Blank	pH	2018/11/07		102	%	98 - 103
5823587	SAU	RPD [IEQ943-01]	pH	2018/11/07	0.46		%	N/A
5824986	TNG	Matrix Spike	Dissolved Calcium (Ca)	2018/11/08		NC	%	80 - 120
			Dissolved Magnesium (Mg)	2018/11/08		NC	%	80 - 120
			Dissolved Phosphorus (P)	2018/11/08		102	%	80 - 120
			Dissolved Potassium (K)	2018/11/08		98	%	80 - 120
			Dissolved Sodium (Na)	2018/11/08		NC	%	80 - 120
5824986	TNG	Spiked Blank	Dissolved Calcium (Ca)	2018/11/08		98	%	80 - 120
			Dissolved Magnesium (Mg)	2018/11/08		100	%	80 - 120
			Dissolved Phosphorus (P)	2018/11/08		111	%	80 - 120
			Dissolved Potassium (K)	2018/11/08		99	%	80 - 120
			Dissolved Sodium (Na)	2018/11/08		98	%	80 - 120

Maxxam Job #: B8T2332

Report Date: 2018/11/09

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SPK

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5824986	TNG	Method Blank	Dissolved Calcium (Ca)	2018/11/08	<200		ug/L	
			Dissolved Magnesium (Mg)	2018/11/08	<50		ug/L	
			Dissolved Phosphorus (P)	2018/11/08	<100		ug/L	
			Dissolved Potassium (K)	2018/11/08	<200		ug/L	
			Dissolved Sodium (Na)	2018/11/08	<100		ug/L	
5825715	ADB	Matrix Spike	Dissolved Chloride (Cl-)	2018/11/08		NC	%	80 - 120
5825715	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2018/11/08		103	%	80 - 120
5825715	ADB	Method Blank	Dissolved Chloride (Cl-)	2018/11/08	<1.0		mg/L	
5825715	ADB	RPD	Dissolved Chloride (Cl-)	2018/11/08	9.4		%	20
5825716	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2018/11/08		112	%	75 - 125
5825716	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2018/11/08		100	%	80 - 120
5825716	ADB	Method Blank	Dissolved Sulphate (SO4)	2018/11/08	<1.0		mg/L	
5825716	ADB	RPD	Dissolved Sulphate (SO4)	2018/11/08	0.15		%	20
5825723	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2018/11/08		97	%	85 - 115
5825723	SAU	Method Blank	Alkalinity (Total as CaCO3)	2018/11/08	<1.0		mg/L	
5825723	SAU	RPD	Alkalinity (Total as CaCO3)	2018/11/08	3.2		%	20

N/A = Not Applicable

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

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

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

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

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

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

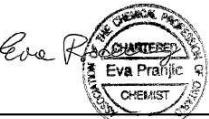
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Maxxam Job #: B8T2332
Report Date: 2018/11/09

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SPK

VALIDATION SIGNATURE PAGE

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



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

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

Maxxam Job #: B8T2332
Report Date: 2018/11/09

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SPK

Exceedence Summary Table – ODWS (2002)

Result Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
No Exceedences						
The exceedence summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.						

Your Project #: 1407634
 Site Location: MCCARTHY
 Your C.O.C. #: 686257-01-01

Attention: Jamie Bonany

Golder Associates Ltd
 121 Commerce Park Drive
 Unit L
 Barrie, ON
 CANADA L4N 8X1

Report Date: 2018/11/08

Report #: R5476392

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T2320

Received: 2018/11/02, 08:48

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	2	N/A	2018/11/03	CAM SOP-00448	SM 23 2320 B m
Alkalinity	1	N/A	2018/11/05	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	3	N/A	2018/11/05	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2018/11/05	CAM SOP-00463	EPA 325.2 m
Chloride by Automated Colourimetry	2	N/A	2018/11/06	CAM SOP-00463	EPA 325.2 m
Colour	3	N/A	2018/11/05	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2018/11/03	CAM SOP-00414	SM 23 2510 m
Conductivity	1	N/A	2018/11/05	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2018/11/02	CAM SOP-00446	SM 23 5310 B m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2018/11/05	CAM SOP-00446	SM 23 5310 B m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2018/11/06	CAM SOP-00446	SM 23 5310 B m
Fluoride	2	2018/11/02	2018/11/03	CAM SOP-00449	SM 23 4500-F C m
Fluoride	1	2018/11/03	2018/11/05	CAM SOP-00449	SM 23 4500-F C m
Hardness (calculated as CaCO ₃)	3	N/A	2018/11/06	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	3	N/A	2018/11/05	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2018/11/06		
Ion Balance (% Difference)	2	N/A	2018/11/07		
Anion and Cation Sum	3	N/A	2018/11/06		
Total Ammonia-N	3	N/A	2018/11/08	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO ₃) and Nitrite (NO ₂) in Water (2)	3	N/A	2018/11/04	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	N/A	2018/11/03	CAM SOP-00413	SM 4500H+ B m
pH	1	N/A	2018/11/05	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	3	N/A	2018/11/05	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2018/11/06		
Sat. pH and Langelier Index (@ 20C)	2	N/A	2018/11/07		
Sat. pH and Langelier Index (@ 4C)	1	N/A	2018/11/06		
Sat. pH and Langelier Index (@ 4C)	2	N/A	2018/11/07		
Sulphate by Automated Colourimetry	3	N/A	2018/11/05	CAM SOP-00464	EPA 375.4 m
Tannins & Lignins	3	N/A	2018/11/05	CAM SOP-00410	SM 23 5550 B m

Your Project #: 1407634
 Site Location: MCCARTHY
 Your C.O.C. #: 686257-01-01

Attention: Jamie Bonany

Golder Associates Ltd
 121 Commerce Park Drive
 Unit L
 Barrie, ON
 CANADA L4N 8X1

Report Date: 2018/11/08

Report #: R5476392

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T2320

Received: 2018/11/02, 08:48

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Total Dissolved Solids (TDS calc)	1	N/A	2018/11/06		
Total Dissolved Solids (TDS calc)	2	N/A	2018/11/07		
Turbidity	3	N/A	2018/11/05	CAM SOP-00417	SM 23 2130 B m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

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

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

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

Your Project #: 1407634
Site Location: MCCARTHY
Your C.O.C. #: 686257-01-01

Attention: Jamie Bonany

Golder Associates Ltd
121 Commerce Park Drive
Unit L
Barrie, ON
CANADA L4N 8X1

Report Date: 2018/11/08

Report #: R5476392

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T2320

Received: 2018/11/02, 08:48

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ema Gitej, Senior Project Manager

Email: EGitej@maxxam.ca

Phone# (905)817-5829

=====

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

Maxxam Job #: B8T2320
 Report Date: 2018/11/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SDL

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IEQ892		IEQ892		IEQ893				
Sampling Date		2018/10/31 12:00		2018/10/31 12:00		2018/10/31 11:00				
COC Number		686257-01-01		686257-01-01		686257-01-01				
	UNITS	DW1	RDL	QC Batch	DW1 Lab-Dup	RDL	QC Batch	DW2	RDL	QC Batch

Calculated Parameters

Anion Sum	me/L	12.1	N/A	5817591			11.6	N/A	5817591
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	320	1.0	5817710			330	1.0	5817710
Calculated TDS	mg/L	650	1.0	5817713			610	1.0	5817713
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.1	1.0	5817710			1.4	1.0	5817710
Cation Sum	me/L	12.2	N/A	5817591			11.3	N/A	5817591
Hardness (CaCO3)	mg/L	510	1.0	5817874			480	1.0	5817874
Ion Balance (% Difference)	%	0.410	N/A	5817917			1.32	N/A	5817917
Langelier Index (@ 20C)	N/A	0.725		5817918			0.665		5817918
Langelier Index (@ 4C)	N/A	0.478		5817919			0.418		5817919
Saturation pH (@ 20C)	N/A	6.84		5817918			6.99		5817918
Saturation pH (@ 4C)	N/A	7.09		5817919			7.23		5817919

Inorganics

Total Ammonia-N	mg/L	<0.050	0.050	5820076	<0.050	0.050	5820076	<0.050	0.050	5820208
Conductivity	umho/cm	1200	1.0	5818830				1100	1.0	5819188
Dissolved Organic Carbon	mg/L	0.93	0.50	5818461				2.0	0.50	5818339
Orthophosphate (P)	mg/L	<0.010	0.010	5819478				<0.010	0.010	5819470
pH	pH	7.57		5818831				7.65		5819189
Dissolved Sulphate (SO4)	mg/L	32	1.0	5819477				54	1.0	5819468
Alkalinity (Total as CaCO3)	mg/L	320	1.0	5818829				330	1.0	5819187
Dissolved Chloride (Cl-)	mg/L	180	2.0	5819471				140	1.0	5819466
Nitrite (N)	mg/L	<0.010	0.010	5819182				<0.010	0.010	5819182
Nitrate (N)	mg/L	0.24	0.10	5819182				2.05	0.10	5819182
Nitrate + Nitrite (N)	mg/L	0.24	0.10	5819182				2.05	0.10	5819182

Metals

Dissolved Aluminum (Al)	ug/L	<5.0	5.0	5819386				<5.0	5.0	5819386
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	5819386				<0.50	0.50	5819386
Dissolved Arsenic (As)	ug/L	<1.0	1.0	5819386				<1.0	1.0	5819386
Dissolved Barium (Ba)	ug/L	170	2.0	5819386				220	2.0	5819386
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	5819386				<0.50	0.50	5819386

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B8T2320

Report Date: 2018/11/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SDL

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IEQ892		IEQ892		IEQ893				
Sampling Date		2018/10/31 12:00		2018/10/31 12:00		2018/10/31 11:00				
COC Number		686257-01-01		686257-01-01		686257-01-01				
	UNITS	DW1	RDL	QC Batch	DW1 Lab-Dup	RDL	QC Batch	DW2	RDL	QC Batch
Dissolved Boron (B)	ug/L	40	10	5819386			33	10	5819386	
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	5819386			<0.10	0.10	5819386	
Dissolved Calcium (Ca)	ug/L	140000	200	5819386			98000	200	5819386	
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	5819386			<5.0	5.0	5819386	
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	5819386			<0.50	0.50	5819386	
Dissolved Copper (Cu)	ug/L	62	1.0	5819386			5.0	1.0	5819386	
Dissolved Iron (Fe)	ug/L	<100	100	5819386			<100	100	5819386	
Dissolved Lead (Pb)	ug/L	<0.50	0.50	5819386			<0.50	0.50	5819386	
Dissolved Magnesium (Mg)	ug/L	37000	50	5819386			58000	50	5819386	
Dissolved Manganese (Mn)	ug/L	<2.0	2.0	5819386			5.1	2.0	5819386	
Dissolved Molybdenum (Mo)	ug/L	<0.50	0.50	5819386			1.0	0.50	5819386	
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	5819386			<1.0	1.0	5819386	
Dissolved Phosphorus (P)	ug/L	<100	100	5819386			<100	100	5819386	
Dissolved Potassium (K)	ug/L	2300	200	5819386			3400	200	5819386	
Dissolved Selenium (Se)	ug/L	<2.0	2.0	5819386			<2.0	2.0	5819386	
Dissolved Silicon (Si)	ug/L	8900	50	5819386			9000	50	5819386	
Dissolved Silver (Ag)	ug/L	<0.10	0.10	5819386			<0.10	0.10	5819386	
Dissolved Sodium (Na)	ug/L	46000	100	5819386			36000	100	5819386	
Dissolved Strontium (Sr)	ug/L	570	1.0	5819386			590	1.0	5819386	
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	5819386			<0.050	0.050	5819386	
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	5819386			<5.0	5.0	5819386	
Dissolved Uranium (U)	ug/L	1.5	0.10	5819386			2.6	0.10	5819386	
Dissolved Vanadium (V)	ug/L	<0.50	0.50	5819386			0.65	0.50	5819386	
Dissolved Zinc (Zn)	ug/L	16	5.0	5819386			7.0	5.0	5819386	

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

Maxxam Job #: B8T2320

Report Date: 2018/11/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SDL

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IEQ893	<th></th> <th>IEQ894</th> <td></td> <td></td>		IEQ894		
Sampling Date		2018/10/31 11:00			2018/10/31 16:30		
COC Number		686257-01-01			686257-01-01		
	UNITS	DW2 Lab-Dup	RDL	QC Batch	DW3	RDL	QC Batch
Calculated Parameters							
Anion Sum	me/L				10.7	N/A	5817591
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				230	1.0	5817710
Calculated TDS	mg/L				580	1.0	5817713
Carb. Alkalinity (calc. as CaCO3)	mg/L				2.1	1.0	5817710
Cation Sum	me/L				10.7	N/A	5817591
Hardness (CaCO3)	mg/L				190	1.0	5817874
Ion Balance (% Difference)	%				0.310	N/A	5817917
Langelier Index (@ 20C)	N/A				0.404		5817918
Langelier Index (@ 4C)	N/A				0.157		5817919
Saturation pH (@ 20C)	N/A				7.58		5817918
Saturation pH (@ 4C)	N/A				7.83		5817919
Inorganics							
Total Ammonia-N	mg/L				<0.050	0.050	5820076
Conductivity	umho/cm	1100	1.0	5819188	1100	1.0	5818830
Dissolved Organic Carbon	mg/L				0.67	0.50	5818339
Orthophosphate (P)	mg/L				<0.010	0.010	5819470
pH	pH	7.67		5819189	7.99		5818831
Dissolved Sulphate (SO4)	mg/L				<1.0	1.0	5819468
Alkalinity (Total as CaCO3)	mg/L	330	1.0	5819187	240	1.0	5818829
Dissolved Chloride (Cl-)	mg/L				210	3.0	5819466
Nitrite (N)	mg/L				<0.010	0.010	5819182
Nitrate (N)	mg/L				<0.10	0.10	5819182
Nitrate + Nitrite (N)	mg/L				<0.10	0.10	5819182
Metals							
Dissolved Aluminum (Al)	ug/L				<5.0	5.0	5819386
Dissolved Antimony (Sb)	ug/L				<0.50	0.50	5819386
Dissolved Arsenic (As)	ug/L				<1.0	1.0	5819386
Dissolved Barium (Ba)	ug/L				200	2.0	5819386
Dissolved Beryllium (Be)	ug/L				<0.50	0.50	5819386
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							

Maxxam Job #: B8T2320
Report Date: 2018/11/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SDL

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IEQ893		IEQ894		
Sampling Date		2018/10/31 11:00		2018/10/31 16:30		
COC Number		686257-01-01		686257-01-01		
	UNITS	DW2 Lab-Dup	RDL	QC Batch	DW3	RDL
Dissolved Boron (B)	ug/L			610	10	5819386
Dissolved Cadmium (Cd)	ug/L			<0.10	0.10	5819386
Dissolved Calcium (Ca)	ug/L			34000	200	5819386
Dissolved Chromium (Cr)	ug/L			<5.0	5.0	5819386
Dissolved Cobalt (Co)	ug/L			<0.50	0.50	5819386
Dissolved Copper (Cu)	ug/L			43	1.0	5819386
Dissolved Iron (Fe)	ug/L			<100	100	5819386
Dissolved Lead (Pb)	ug/L			<0.50	0.50	5819386
Dissolved Magnesium (Mg)	ug/L			26000	50	5819386
Dissolved Manganese (Mn)	ug/L			<2.0	2.0	5819386
Dissolved Molybdenum (Mo)	ug/L			<0.50	0.50	5819386
Dissolved Nickel (Ni)	ug/L			<1.0	1.0	5819386
Dissolved Phosphorus (P)	ug/L			<100	100	5819386
Dissolved Potassium (K)	ug/L			7200	200	5819386
Dissolved Selenium (Se)	ug/L			<2.0	2.0	5819386
Dissolved Silicon (Si)	ug/L			5000	50	5819386
Dissolved Silver (Ag)	ug/L			<0.10	0.10	5819386
Dissolved Sodium (Na)	ug/L			150000	100	5819386
Dissolved Strontium (Sr)	ug/L			2600	1.0	5819386
Dissolved Thallium (Tl)	ug/L			<0.050	0.050	5819386
Dissolved Titanium (Ti)	ug/L			<5.0	5.0	5819386
Dissolved Uranium (U)	ug/L			<0.10	0.10	5819386
Dissolved Vanadium (V)	ug/L			<0.50	0.50	5819386
Dissolved Zinc (Zn)	ug/L			630	5.0	5819386

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

Maxxam Job #: B8T2320

Report Date: 2018/11/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SDL

RESULTS OF ANALYSES OF WATER

Maxxam ID		IEQ892			IEQ892			IEQ893		
Sampling Date		2018/10/31 12:00			2018/10/31 12:00			2018/10/31 11:00		
COC Number		686257-01-01			686257-01-01			686257-01-01		
	UNITS	DW1	RDL	QC Batch	DW1 Lab-Dup	RDL	QC Batch	DW2	RDL	QC Batch
Inorganics										
Colour	TCU	3	2	5818277				3	2	5818277
Fluoride (F-)	mg/L	0.12	0.10	5818828				0.18	0.10	5819190
Tannins & Lignins	mg/L	<0.2	0.2	5819825	<0.2	0.2	5819825	<0.2	0.2	5819825
Turbidity	NTU	<0.1	0.1	5818293				<0.1	0.1	5818293
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										
Lab-Dup = Laboratory Initiated Duplicate										

Maxxam ID		IEQ893			IEQ894		
Sampling Date		2018/10/31 11:00			2018/10/31 16:30		
COC Number		686257-01-01			686257-01-01		
	UNITS	DW2 Lab-Dup	RDL	QC Batch	DW3	RDL	QC Batch
Inorganics							
Colour	TCU				5	2	5818277
Fluoride (F-)	mg/L	0.15	0.10	5819190	0.73	0.10	5818828
Tannins & Lignins	mg/L				<0.2	0.2	5819825
Turbidity	NTU				<0.1	0.1	5818293
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							
Lab-Dup = Laboratory Initiated Duplicate							

Maxxam Job #: B8T2320
 Report Date: 2018/11/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SDL

TEST SUMMARY

Maxxam ID: IEQ892
Sample ID: DW1
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5818829	N/A	2018/11/03	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/05	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819471	N/A	2018/11/05	Deonarine Ramnarine
Colour	SPEC	5818277	N/A	2018/11/05	Viorica Rotaru
Conductivity	AT	5818830	N/A	2018/11/03	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818461	N/A	2018/11/02	Nimarta Singh
Fluoride	ISE	5818828	2018/11/02	2018/11/03	Surinder Rai
Hardness (calculated as CaCO ₃)		5817874	N/A	2018/11/06	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5819386	N/A	2018/11/05	Thao Nguyen
Ion Balance (% Difference)	CALC	5817917	N/A	2018/11/06	Automated Statchk
Anion and Cation Sum	CALC	5817591	N/A	2018/11/06	Automated Statchk
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO ₃) and Nitrite (NO ₂) in Water	LACH	5819182	N/A	2018/11/04	Amanpreet Sappal
pH	AT	5818831	N/A	2018/11/03	Surinder Rai
Orthophosphate	KONE	5819478	N/A	2018/11/05	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5817918	N/A	2018/11/06	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5817919	N/A	2018/11/06	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5819477	N/A	2018/11/05	Deonarine Ramnarine
Tannins & Lignins	SPEC	5819825	N/A	2018/11/05	Viorica Rotaru
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/06	Automated Statchk
Turbidity	AT	5818293	N/A	2018/11/05	Barbara Kalbasi Esfahani

Maxxam ID: IEQ892 Dup
Sample ID: DW1
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Tannins & Lignins	SPEC	5819825	N/A	2018/11/05	Viorica Rotaru

Maxxam ID: IEQ893
Sample ID: DW2
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819187	N/A	2018/11/05	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/05	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819466	N/A	2018/11/06	Deonarine Ramnarine
Colour	SPEC	5818277	N/A	2018/11/05	Viorica Rotaru
Conductivity	AT	5819188	N/A	2018/11/05	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818339	N/A	2018/11/06	Nimarta Singh
Fluoride	ISE	5819190	2018/11/03	2018/11/05	Surinder Rai
Hardness (calculated as CaCO ₃)		5817874	N/A	2018/11/06	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5819386	N/A	2018/11/05	Thao Nguyen

Maxxam Job #: B8T2320
 Report Date: 2018/11/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SDL

TEST SUMMARY

Maxxam ID: IEQ893
Sample ID: DW2
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Ion Balance (% Difference)	CALC	5817917	N/A	2018/11/07	Automated Statchk
Anion and Cation Sum	CALC	5817591	N/A	2018/11/06	Automated Statchk
Total Ammonia-N	LACH/NH4	5820208	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5819182	N/A	2018/11/04	Amanpreet Sappal
pH	AT	5819189	N/A	2018/11/05	Surinder Rai
Orthophosphate	KONE	5819470	N/A	2018/11/05	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5817918	N/A	2018/11/07	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5817919	N/A	2018/11/07	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5819468	N/A	2018/11/05	Alina Dobreanu
Tannins & Lignins	SPEC	5819825	N/A	2018/11/05	Viorica Rotaru
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk
Turbidity	AT	5818293	N/A	2018/11/05	Barbara Kalbasi Esfahani

Maxxam ID: IEQ893 Dup
Sample ID: DW2
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5819187	N/A	2018/11/05	Surinder Rai
Conductivity	AT	5819188	N/A	2018/11/05	Surinder Rai
Fluoride	ISE	5819190	2018/11/03	2018/11/05	Surinder Rai
pH	AT	5819189	N/A	2018/11/05	Surinder Rai

Maxxam ID: IEQ894
Sample ID: DW3
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5818829	N/A	2018/11/03	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5817710	N/A	2018/11/05	Automated Statchk
Chloride by Automated Colourimetry	KONE	5819466	N/A	2018/11/06	Deonarine Ramnarine
Colour	SPEC	5818277	N/A	2018/11/05	Viorica Rotaru
Conductivity	AT	5818830	N/A	2018/11/03	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5818339	N/A	2018/11/05	Nimarta Singh
Fluoride	ISE	5818828	2018/11/02	2018/11/03	Surinder Rai
Hardness (calculated as CaCO3)		5817874	N/A	2018/11/06	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5819386	N/A	2018/11/05	Thao Nguyen
Ion Balance (% Difference)	CALC	5817917	N/A	2018/11/07	Automated Statchk
Anion and Cation Sum	CALC	5817591	N/A	2018/11/06	Automated Statchk
Total Ammonia-N	LACH/NH4	5820076	N/A	2018/11/08	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5819182	N/A	2018/11/04	Amanpreet Sappal
pH	AT	5818831	N/A	2018/11/03	Surinder Rai
Orthophosphate	KONE	5819470	N/A	2018/11/05	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5817918	N/A	2018/11/07	Automated Statchk

Maxxam Job #: B8T2320
 Report Date: 2018/11/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SDL

TEST SUMMARY

Maxxam ID: IEQ894
Sample ID: DW3
Matrix: Water

Collected: 2018/10/31
Shipped:
Received: 2018/11/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sat. pH and Langelier Index (@ 4C)	CALC	5817919	N/A	2018/11/07	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5819468	N/A	2018/11/05	Alina Dobreanu
Tannins & Lignins	SPEC	5819825	N/A	2018/11/05	Viorica Rotaru
Total Dissolved Solids (TDS calc)	CALC	5817713	N/A	2018/11/07	Automated Statchk
Turbidity	AT	5818293	N/A	2018/11/05	Barbara Kalbasi Esfahani

Maxxam Job #: B8T2320

Report Date: 2018/11/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SDL

GENERAL COMMENTS

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

Package 1	4.7°C
Package 2	4.0°C
Package 3	4.7°C

Results relate only to the items tested.

Maxxam Job #: B8T2320

Report Date: 2018/11/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SDL

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5818277	VRO	Spiked Blank	Colour	2018/11/05		100	%	80 - 120
5818277	VRO	Method Blank	Colour	2018/11/05	<2		TCU	
5818277	VRO	RPD	Colour	2018/11/05	NC		%	25
5818293	BKE	Spiked Blank	Turbidity	2018/11/05		95	%	85 - 115
5818293	BKE	Method Blank	Turbidity	2018/11/05	<0.1		NTU	
5818293	BKE	RPD	Turbidity	2018/11/05	11		%	20
5818339	NS3	Matrix Spike	Dissolved Organic Carbon	2018/11/05		95	%	80 - 120
5818339	NS3	Spiked Blank	Dissolved Organic Carbon	2018/11/05		98	%	80 - 120
5818339	NS3	Method Blank	Dissolved Organic Carbon	2018/11/05	<0.50		mg/L	
5818339	NS3	RPD	Dissolved Organic Carbon	2018/11/05	2.6		%	20
5818461	NS3	Matrix Spike	Dissolved Organic Carbon	2018/11/02		98	%	80 - 120
5818461	NS3	Spiked Blank	Dissolved Organic Carbon	2018/11/02		99	%	80 - 120
5818461	NS3	Method Blank	Dissolved Organic Carbon	2018/11/02	<0.50		mg/L	
5818461	NS3	RPD	Dissolved Organic Carbon	2018/11/02	1.0		%	20
5818828	SAU	Matrix Spike	Fluoride (F-)	2018/11/03		94	%	80 - 120
5818828	SAU	Spiked Blank	Fluoride (F-)	2018/11/03		97	%	80 - 120
5818828	SAU	Method Blank	Fluoride (F-)	2018/11/03	<0.10		mg/L	
5818828	SAU	RPD	Fluoride (F-)	2018/11/03	2.4		%	20
5818829	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2018/11/03		98	%	85 - 115
5818829	SAU	Method Blank	Alkalinity (Total as CaCO3)	2018/11/03	<1.0		mg/L	
5818829	SAU	RPD	Alkalinity (Total as CaCO3)	2018/11/03	0.70		%	20
5818830	SAU	Spiked Blank	Conductivity	2018/11/03		102	%	85 - 115
5818830	SAU	Method Blank	Conductivity	2018/11/03	<1.0		umho/cm	
5818830	SAU	RPD	Conductivity	2018/11/03	0		%	25
5818831	SAU	Spiked Blank	pH	2018/11/03		102	%	98 - 103
5818831	SAU	RPD	pH	2018/11/03	0.0025		%	N/A
5819182	ASP	Matrix Spike	Nitrite (N)	2018/11/04		98	%	80 - 120
5819182	ASP	Spiked Blank	Nitrate (N)	2018/11/04		93	%	80 - 120
5819182	ASP	Method Blank	Nitrite (N)	2018/11/04		103	%	80 - 120
5819182	ASP	RPD	Nitrate (N)	2018/11/04		98	%	80 - 120
5819182	ASP	Spiked Blank	Nitrite (N)	2018/11/04	<0.010		mg/L	
5819182	ASP	Method Blank	Nitrate (N)	2018/11/04	<0.10		mg/L	
5819182	ASP	RPD	Nitrite (N)	2018/11/04	NC		%	20
5819182	ASP	Spiked Blank	Nitrate (N)	2018/11/04	1.9		%	20
5819187	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2018/11/05		97	%	85 - 115
5819187	SAU	Method Blank	Alkalinity (Total as CaCO3)	2018/11/05	<1.0		mg/L	
5819187	SAU	RPD [IEQ893-01]	Alkalinity (Total as CaCO3)	2018/11/05	1.8		%	20
5819188	SAU	Spiked Blank	Conductivity	2018/11/05		101	%	85 - 115
5819188	SAU	Method Blank	Conductivity	2018/11/05	<1.0		umho/cm	
5819188	SAU	RPD [IEQ893-01]	Conductivity	2018/11/05	0.093		%	25
5819189	SAU	Spiked Blank	pH	2018/11/05		102	%	98 - 103
5819189	SAU	RPD [IEQ893-01]	pH	2018/11/05	0.27		%	N/A
5819190	SAU	Matrix Spike [IEQ893-01]	Fluoride (F-)	2018/11/05		95	%	80 - 120
5819190	SAU	Spiked Blank	Fluoride (F-)	2018/11/05		102	%	80 - 120
5819190	SAU	Method Blank	Fluoride (F-)	2018/11/05	<0.10		mg/L	
5819190	SAU	RPD [IEQ893-01]	Fluoride (F-)	2018/11/05	16		%	20
5819386	TNG	Matrix Spike	Dissolved Aluminum (Al)	2018/11/05		105	%	80 - 120
			Dissolved Antimony (Sb)	2018/11/05		111	%	80 - 120
			Dissolved Arsenic (As)	2018/11/05		105	%	80 - 120
			Dissolved Barium (Ba)	2018/11/05		105	%	80 - 120
			Dissolved Beryllium (Be)	2018/11/05		105	%	80 - 120
			Dissolved Boron (B)	2018/11/05		101	%	80 - 120

Maxxam Job #: B8T2320
 Report Date: 2018/11/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SDL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5819386	TNG	Spiked Blank	Dissolved Cadmium (Cd)	2018/11/05	106	%	80 - 120	
			Dissolved Calcium (Ca)	2018/11/05	NC	%	80 - 120	
			Dissolved Chromium (Cr)	2018/11/05	101	%	80 - 120	
			Dissolved Cobalt (Co)	2018/11/05	101	%	80 - 120	
			Dissolved Copper (Cu)	2018/11/05	103	%	80 - 120	
			Dissolved Iron (Fe)	2018/11/05	104	%	80 - 120	
			Dissolved Lead (Pb)	2018/11/05	101	%	80 - 120	
			Dissolved Magnesium (Mg)	2018/11/05	NC	%	80 - 120	
			Dissolved Manganese (Mn)	2018/11/05	101	%	80 - 120	
			Dissolved Molybdenum (Mo)	2018/11/05	109	%	80 - 120	
			Dissolved Nickel (Ni)	2018/11/05	101	%	80 - 120	
			Dissolved Phosphorus (P)	2018/11/05	116	%	80 - 120	
			Dissolved Potassium (K)	2018/11/05	104	%	80 - 120	
			Dissolved Selenium (Se)	2018/11/05	106	%	80 - 120	
			Dissolved Silicon (Si)	2018/11/05	100	%	80 - 120	
			Dissolved Silver (Ag)	2018/11/05	104	%	80 - 120	
			Dissolved Sodium (Na)	2018/11/05	104	%	80 - 120	
			Dissolved Strontium (Sr)	2018/11/05	102	%	80 - 120	
			Dissolved Thallium (Tl)	2018/11/05	101	%	80 - 120	
			Dissolved Titanium (Ti)	2018/11/05	101	%	80 - 120	
			Dissolved Uranium (U)	2018/11/05	104	%	80 - 120	
			Dissolved Vanadium (V)	2018/11/05	103	%	80 - 120	
			Dissolved Zinc (Zn)	2018/11/05	100	%	80 - 120	
			Dissolved Aluminum (Al)	2018/11/05	102	%	80 - 120	
			Dissolved Antimony (Sb)	2018/11/05	103	%	80 - 120	
			Dissolved Arsenic (As)	2018/11/05	100	%	80 - 120	
			Dissolved Barium (Ba)	2018/11/05	100	%	80 - 120	
			Dissolved Beryllium (Be)	2018/11/05	101	%	80 - 120	
			Dissolved Boron (B)	2018/11/05	103	%	80 - 120	
			Dissolved Cadmium (Cd)	2018/11/05	101	%	80 - 120	
			Dissolved Calcium (Ca)	2018/11/05	99	%	80 - 120	
			Dissolved Chromium (Cr)	2018/11/05	99	%	80 - 120	
			Dissolved Cobalt (Co)	2018/11/05	99	%	80 - 120	
			Dissolved Copper (Cu)	2018/11/05	100	%	80 - 120	
			Dissolved Iron (Fe)	2018/11/05	101	%	80 - 120	
			Dissolved Lead (Pb)	2018/11/05	99	%	80 - 120	
			Dissolved Magnesium (Mg)	2018/11/05	101	%	80 - 120	
			Dissolved Manganese (Mn)	2018/11/05	98	%	80 - 120	
			Dissolved Molybdenum (Mo)	2018/11/05	104	%	80 - 120	
			Dissolved Nickel (Ni)	2018/11/05	99	%	80 - 120	
			Dissolved Phosphorus (P)	2018/11/05	113	%	80 - 120	
			Dissolved Potassium (K)	2018/11/05	100	%	80 - 120	
			Dissolved Selenium (Se)	2018/11/05	104	%	80 - 120	
			Dissolved Silicon (Si)	2018/11/05	100	%	80 - 120	
			Dissolved Silver (Ag)	2018/11/05	100	%	80 - 120	
			Dissolved Sodium (Na)	2018/11/05	100	%	80 - 120	
			Dissolved Strontium (Sr)	2018/11/05	98	%	80 - 120	
			Dissolved Thallium (Tl)	2018/11/05	98	%	80 - 120	
			Dissolved Titanium (Ti)	2018/11/05	99	%	80 - 120	
			Dissolved Uranium (U)	2018/11/05	101	%	80 - 120	
			Dissolved Vanadium (V)	2018/11/05	99	%	80 - 120	
			Dissolved Zinc (Zn)	2018/11/05	99	%	80 - 120	

Maxxam Job #: B8T2320
 Report Date: 2018/11/08

Golder Associates Ltd
 Client Project #: 1407634
 Site Location: MCCARTHY
 Sampler Initials: SDL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5819386	TNG	Method Blank	Dissolved Aluminum (Al)	2018/11/05	<5.0		ug/L	
			Dissolved Antimony (Sb)	2018/11/05	<0.50		ug/L	
			Dissolved Arsenic (As)	2018/11/05	<1.0		ug/L	
			Dissolved Barium (Ba)	2018/11/05	<2.0		ug/L	
			Dissolved Beryllium (Be)	2018/11/05	<0.50		ug/L	
			Dissolved Boron (B)	2018/11/05	<10		ug/L	
			Dissolved Cadmium (Cd)	2018/11/05	<0.10		ug/L	
			Dissolved Calcium (Ca)	2018/11/05	<200		ug/L	
			Dissolved Chromium (Cr)	2018/11/05	<5.0		ug/L	
			Dissolved Cobalt (Co)	2018/11/05	<0.50		ug/L	
			Dissolved Copper (Cu)	2018/11/05	<1.0		ug/L	
			Dissolved Iron (Fe)	2018/11/05	<100		ug/L	
			Dissolved Lead (Pb)	2018/11/05	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2018/11/05	<50		ug/L	
			Dissolved Manganese (Mn)	2018/11/05	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2018/11/05	<0.50		ug/L	
			Dissolved Nickel (Ni)	2018/11/05	<1.0		ug/L	
			Dissolved Phosphorus (P)	2018/11/05	<100		ug/L	
			Dissolved Potassium (K)	2018/11/05	<200		ug/L	
			Dissolved Selenium (Se)	2018/11/05	<2.0		ug/L	
			Dissolved Silicon (Si)	2018/11/05	<50		ug/L	
			Dissolved Silver (Ag)	2018/11/05	<0.10		ug/L	
			Dissolved Sodium (Na)	2018/11/05	<100		ug/L	
			Dissolved Strontium (Sr)	2018/11/05	<1.0		ug/L	
			Dissolved Thallium (Tl)	2018/11/05	<0.050		ug/L	
			Dissolved Titanium (Ti)	2018/11/05	<5.0		ug/L	
			Dissolved Uranium (U)	2018/11/05	<0.10		ug/L	
			Dissolved Vanadium (V)	2018/11/05	<0.50		ug/L	
			Dissolved Zinc (Zn)	2018/11/05	<5.0		ug/L	
5819386	TNG	RPD	Dissolved Arsenic (As)	2018/11/05	NC	%		20
			Dissolved Boron (B)	2018/11/05	6.6	%		20
			Dissolved Cadmium (Cd)	2018/11/05	NC	%		20
			Dissolved Calcium (Ca)	2018/11/05	0.46	%		20
			Dissolved Chromium (Cr)	2018/11/05	NC	%		20
			Dissolved Copper (Cu)	2018/11/05	NC	%		20
			Dissolved Iron (Fe)	2018/11/05	0.052	%		20
			Dissolved Lead (Pb)	2018/11/05	NC	%		20
			Dissolved Magnesium (Mg)	2018/11/05	0.0074	%		20
			Dissolved Manganese (Mn)	2018/11/05	5.6	%		20
			Dissolved Nickel (Ni)	2018/11/05	NC	%		20
			Dissolved Potassium (K)	2018/11/05	3.5	%		20
			Dissolved Sodium (Na)	2018/11/05	0.10	%		20
			Dissolved Zinc (Zn)	2018/11/05	NC	%		20
5819466	DRM	Matrix Spike	Dissolved Chloride (Cl-)	2018/11/06		NC	%	80 - 120
5819466	DRM	Spiked Blank	Dissolved Chloride (Cl-)	2018/11/06		102	%	80 - 120
5819466	DRM	Method Blank	Dissolved Chloride (Cl-)	2018/11/06	<1.0		mg/L	
5819466	DRM	RPD	Dissolved Chloride (Cl-)	2018/11/06	1.8	%		20
5819468	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2018/11/05		NC	%	75 - 125
5819468	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2018/11/05		105	%	80 - 120
5819468	ADB	Method Blank	Dissolved Sulphate (SO4)	2018/11/05	<1.0		mg/L	
5819468	ADB	RPD	Dissolved Sulphate (SO4)	2018/11/05	1.5	%		20
5819470	ADB	Matrix Spike	Orthophosphate (P)	2018/11/05		109	%	75 - 125

Maxxam Job #: B8T2320

Report Date: 2018/11/08

Golder Associates Ltd

Client Project #: 1407634

Site Location: MCCARTHY

Sampler Initials: SDL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5819470	ADB	Spiked Blank	Orthophosphate (P)	2018/11/05		100	%	80 - 120
5819470	ADB	Method Blank	Orthophosphate (P)	2018/11/05	<0.010		mg/L	
5819470	ADB	RPD	Orthophosphate (P)	2018/11/05	NC		%	25
5819471	DRM	Matrix Spike	Dissolved Chloride (Cl-)	2018/11/05		NC	%	80 - 120
5819471	DRM	Spiked Blank	Dissolved Chloride (Cl-)	2018/11/05		101	%	80 - 120
5819471	DRM	Method Blank	Dissolved Chloride (Cl-)	2018/11/05	<1.0		mg/L	
5819471	DRM	RPD	Dissolved Chloride (Cl-)	2018/11/05	0.026		%	20
5819477	DRM	Matrix Spike	Dissolved Sulphate (SO4)	2018/11/05		107	%	75 - 125
5819477	DRM	Spiked Blank	Dissolved Sulphate (SO4)	2018/11/05		102	%	80 - 120
5819477	DRM	Method Blank	Dissolved Sulphate (SO4)	2018/11/05	<1.0		mg/L	
5819477	DRM	RPD	Dissolved Sulphate (SO4)	2018/11/05	8.1		%	20
5819478	ADB	Matrix Spike	Orthophosphate (P)	2018/11/05		102	%	75 - 125
5819478	ADB	Spiked Blank	Orthophosphate (P)	2018/11/05		101	%	80 - 120
5819478	ADB	Method Blank	Orthophosphate (P)	2018/11/05	<0.010		mg/L	
5819478	ADB	RPD	Orthophosphate (P)	2018/11/05	NC		%	25
5819825	VRO	Matrix Spike [IEQ892-02]	Tannins & Lignins	2018/11/05		94	%	80 - 120
5819825	VRO	Spiked Blank	Tannins & Lignins	2018/11/05		95	%	80 - 120
5819825	VRO	Method Blank	Tannins & Lignins	2018/11/05	<0.2		mg/L	
5819825	VRO	RPD [IEQ892-02]	Tannins & Lignins	2018/11/05	NC		%	20
5820076	COP	Matrix Spike [IEQ892-03]	Total Ammonia-N	2018/11/08		98	%	75 - 125
5820076	COP	Spiked Blank	Total Ammonia-N	2018/11/08		100	%	80 - 120
5820076	COP	Method Blank	Total Ammonia-N	2018/11/08	<0.050		mg/L	
5820076	COP	RPD [IEQ892-03]	Total Ammonia-N	2018/11/08	NC		%	20
5820208	COP	Matrix Spike	Total Ammonia-N	2018/11/08		93	%	75 - 125
5820208	COP	Spiked Blank	Total Ammonia-N	2018/11/08		99	%	80 - 120
5820208	COP	Method Blank	Total Ammonia-N	2018/11/08	<0.050		mg/L	
5820208	COP	RPD	Total Ammonia-N	2018/11/08	NC		%	20

N/A = Not Applicable

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

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

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

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

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

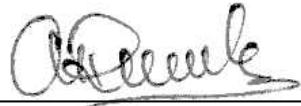
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Maxxam Job #: B8T2320
Report Date: 2018/11/08

Golder Associates Ltd
Client Project #: 1407634
Site Location: MCCARTHY
Sampler Initials: SDL

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist

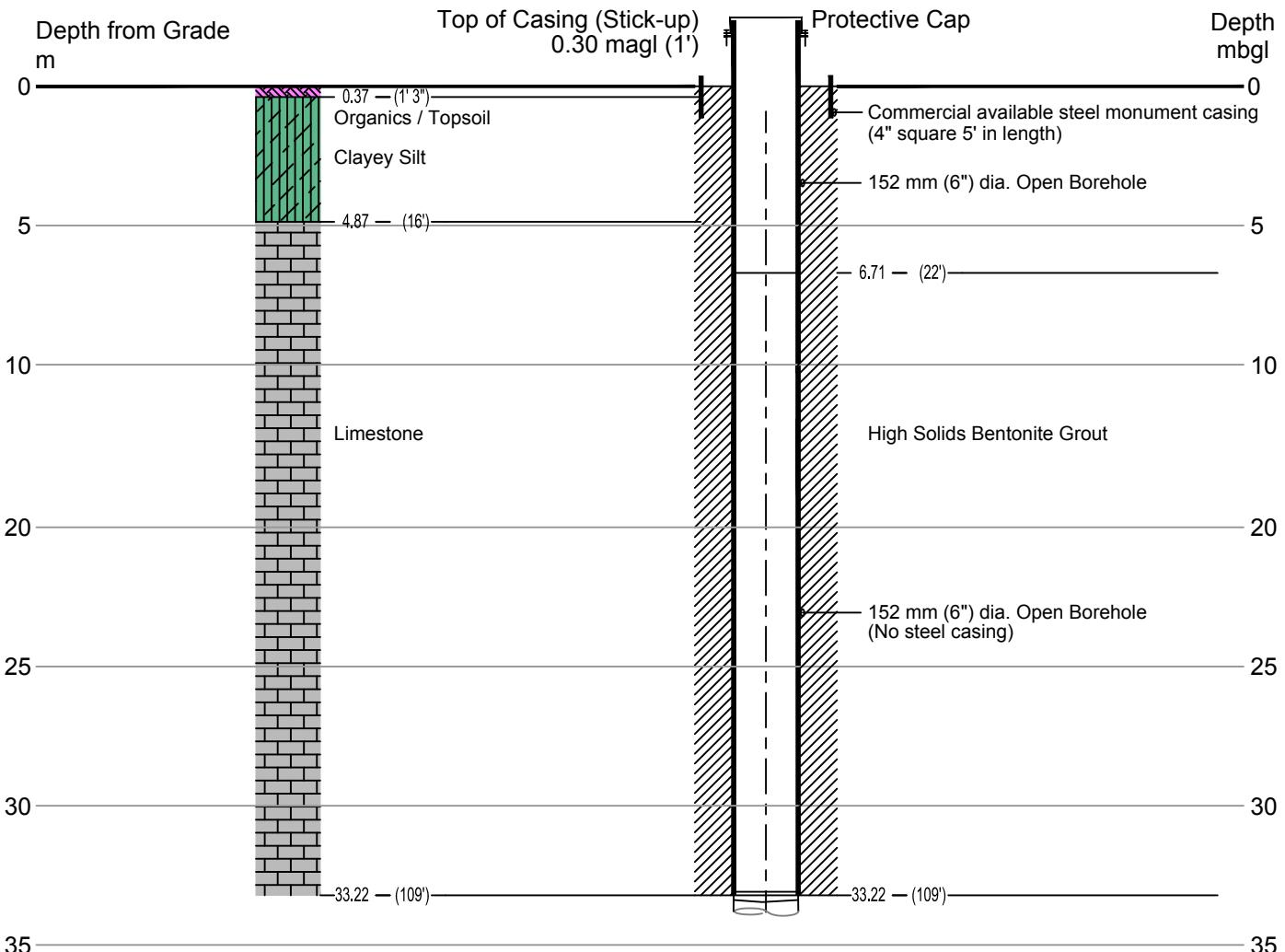
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

APPENDIX D

Borehole Log

Replacement of AMx

Well Design



*Note:
All depths are metres below ground level unless otherwise stated.

CLIENT
COCO / QBJR AGGREGATES INC.

PROJECT
STAN McCARTHY QUARRY

CONSULTANT

YYYY-MM-DD
2019-02-27

PREPARED
STB

DESIGN
JAE

REVIEW
JEB

APPROVED



REPLACEMENT OBSERVATION WELL AMx

PROJECT No.	Phase	Rev.	Figure
1407634	-		D1



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