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REPORT

Maximum Predicted Water Table Report

Proposed Caledon Pit / Quarry

Submitted to:

CBM Aggregates (CBM), a Division of St. Marys Cement Inc. (Canada)

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Submitted by:

Golder Associates Ltd.

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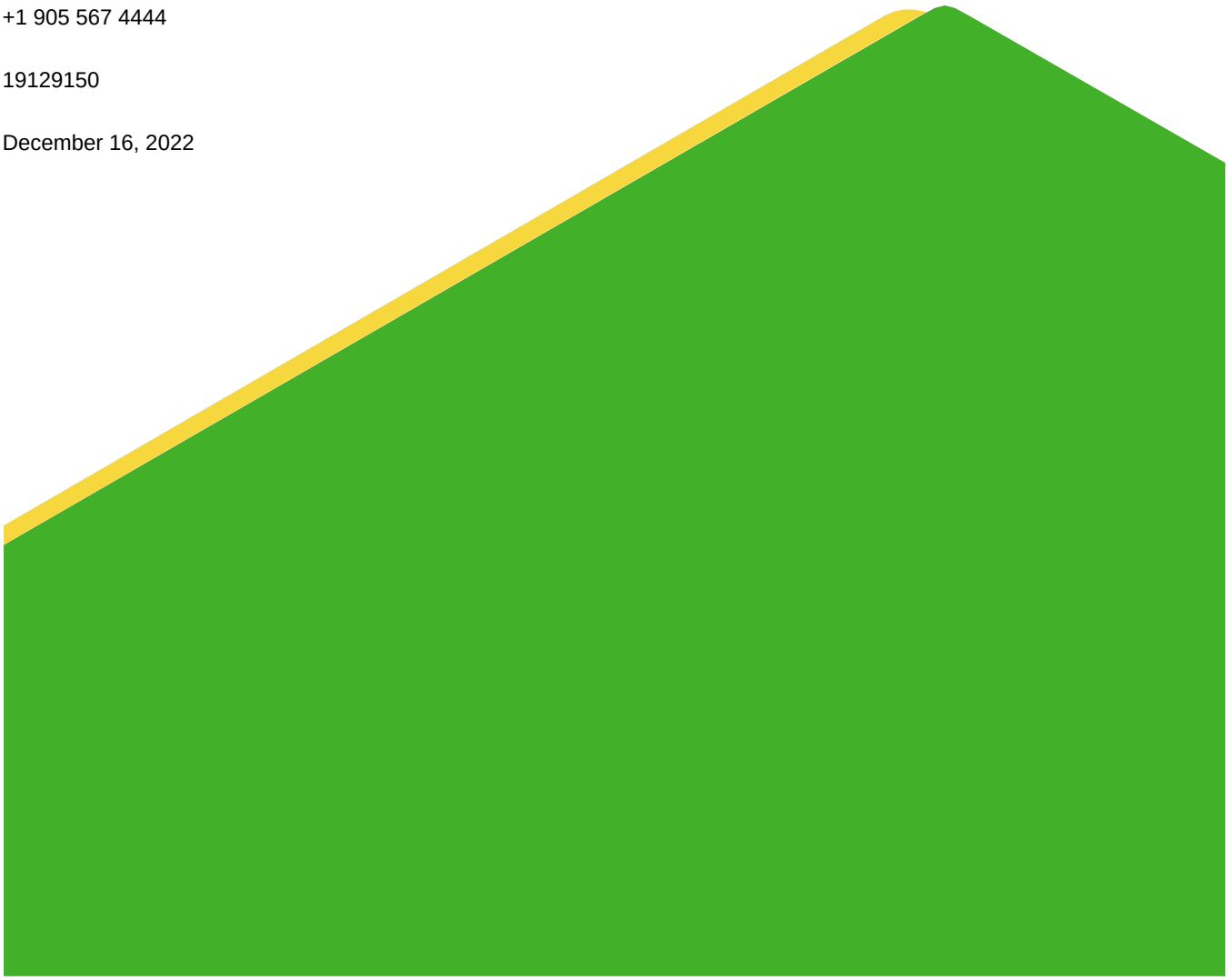
19129150

December 16, 2022



Distribution List

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1.0 INTRODUCTION

CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada) is applying to the Ministry of Natural Resources and Forestry (MNRF) for a Class A Licence (Pit and Quarry Below Water) and to the Town of Caledon for an Official Plan Amendment and Zoning By-law Amendment to permit a mineral aggregate operation. Golder Associates Ltd., a WSP company (Golder), has been retained by CBM to complete a Maximum Predicted Water Table Report for the proposed CBM Caledon Pit / Quarry in accordance with the Terms of Reference developed in consultation with the Development Application Review Team (DART) found in Appendix A, and the MNRF, Aggregate Resources Act Ontario Regulation 244/97.

1.1 Site and Adjacent Lands

CBM owns / controls approximately 323 hectares of land located at the northwest, northeast and southwest intersection of Regional Road 24 (Charleston Sideroad) and Regional Road 136 (Main Street). Of these lands, approximately 262 hectares are proposed to be licenced under the Aggregate Resources Act and designated / zoned under the Planning Act to permit the proposed CBM Caledon Pit / Quarry (Figure 1-1). These lands are mapped as a Caledon High Potential Mineral Aggregate Resource Area (CHPMARA) in the Town of Caledon Official Plan and High Potential Mineral Aggregate Resource Area (HPMARA) in the Region of Peel Official Plan and are protected for their aggregate potential.

The remaining approximately 61 hectares of land owned / controlled by CBM are not subject to the application. These lands are referred to as “CBM Additional Lands” and these lands include approximately 36 hectares of land that is located adjacent to the minor urban centre of Cataract. As part of the application, CBM is proposing to create an upland forest and meadow grassland on these lands and is exploring the potential of conveying them permanently to a public authority for long term protection.

The lands proposed to be licenced under the Aggregate Resources Act are referred to as the “Subject Site” (or “Site”) and are legally described as Part of Lots 15-18, Concession 4 WSCR and Part of Lot 16, Concession 3 WSCR (former Geographic Township of Caledon). The Site is approximately 262 hectares and extraction is proposed on approximately 204 hectares. These lands are referred to as the “Extraction Area”. The remaining approximate 58 hectares within the Site and outside of the Extraction Area are referred to as the “Setback / Buffer Lands”. The Setback / Buffer Lands are used to provide setbacks to surrounding land uses and natural heritage features. The majority of these lands include a 5 metre (m) visual / acoustic berm and visual plantings.

For the purpose of this assessment, “Adjacent Lands” are defined as lands within 120 m of the Site. The “Study Area” for this assessment included all lands within 1,000 m of the Site, as well as additional lands beyond this distance, as discussed in this Report.

2.0 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed Extraction Area includes approximately 80 million tonnes (Mt) of a high quality bedrock resource and approximately 5 Mt of a high quality sand and gravel resource. Testing has confirmed that the mineral aggregate resource found on-site is suitable for the production of a wide range of construction products, including the use for high performance concrete. The bedrock resource provides some of the strongest and most durable aggregate material in Southern Ontario. The primary market area for the proposed CBM Caledon Pit / Quarry is the Greater Toronto Area, including the Town of Caledon and the Region of Peel. This site represents a close to market source of a high quality mineral aggregate resource.

2.1 Proposed Site Operations

The proposed tonnage limit for the proposed CBM Caledon Pit / Quarry is 2.5 million tonnes (Mt) per year and on average CBM anticipates shipping approximately 2.0 Mt per year. The proposed CBM Caledon Pit / Quarry is proposed to be operated in 7 phases, as shown on Figure 2-1. Phases 1, 2A, 3, 4, 5 are located to the northwest of the intersection of Regional Road 24 and 136. This area is referred to as the “Main Area”. Phase 2B is located to the northeast of the intersection of Regional Road 24 and 136. This area is referred to as the “North Area”. Phases 6 and 7 are located to the southwest of the intersection of Regional Road 24 and 136. This area is referred to as the “South Area”.

Operations would commence in the Main Area and Phase 1 would include the permanent processing area (crushing, screening and wash plant), aggregate recycling area and the entrance / exit for the proposed CBM Caledon Pit / Quarry. Until such time as sufficient space is opened up to establish the permanent processing area, a temporary mobile crushing and processing plant is proposed to be used in Phase 1. The entrance / exit for the CBM Caledon Pit / Quarry is proposed to be located onto Regional Road 24, approximately 775 m west of Regional Road 136. The entrance / exit is proposed to be controlled by a new traffic light and the installation of taper lanes and acceleration lanes on Regional Road 24 at CBM’s expense. The primary haul route for the proposed CBM Caledon Pit / Quarry includes trucks travelling eastward on Regional Road 24 and then southward on Highway 10. The proposed haul route is an existing aggregate haul route and is designated as an aggregate haul route in the Town of Caledon Official Plan.

Access to the North Area for aggregate extraction is anticipated approximately 10 years after the start of the operations in the Main Area. There will be no processing in the North Area and aggregate extracted from the North Area is proposed to be transported to the Main Area through a proposed tunnel underneath Regional Road 136. Access to the South Area is anticipated approximately 30 years after the start of the operations in the Main Area. In the South Area, CBM is proposing to permit a portable processing plant and the aggregate extracted and / or processed from the South Area is proposed to be moved to the Main Area through a proposed tunnel underneath Regional Road 24. Aside from the establishment of a 1 hectare stormwater settling pond on the easternmost portion of the North Area in the initial year of operation, the North and South areas will be maintained in their current state and agricultural uses until they are required for preparation for aggregate extraction.

The CBM Caledon Pit / Quarry is proposed to operate (extraction, processing and drilling) 7:00 am to 7:00 pm Monday to Saturday, excluding statutory holidays and shipping is proposed from 6:00 am to 7:00 pm Monday to Saturday consistent with other mineral aggregate operations in Caledon. CBM is also proposing to permit limited shipping in the evening and nighttime (7:00 pm to 6:00 am) to support public authority contracts that require the delivery of aggregates during these hours to complete public infrastructure projects. These activities will be limited

to only highway trucks and shipping loaders and no other operations will be permitted during evening or nighttime hours. Site preparation and rehabilitation is proposed to be permitted 7:00 am to 7:00 pm Monday to Friday.

The proposed CBM Caledon Pit / Quarry involves stripping topsoil and overburden from the Site to create perimeter berm and any excess soil will be temporarily stored in the northern portion of the Main Area or used for progressive rehabilitation of the site. The proposed Extraction Area includes extracting both sand and gravel below the water table and the site will be dewatered to allow operations in a dry state. The site will be extracted in sequence of the proposed phases (Phase 1 to 7) and following extraction of Phase 7 the permanent processing plant in Phase 1 will be removed and this will be the final area to be extracted and rehabilitated. The phasing of the proposed mineral aggregate operation has been designed to reach final extraction limits and depths within each phase so progressive rehabilitation of the side slopes can be completed.

2.2 Site Servicing

The Site, including the Main, North and South Areas, is not municipally serviced for water or sewer, and no municipal water or sewer servicing is required to support the proposed development. Potable water for workers will be supplied privately to the Site, and septic waste generated on-site will be stored in a holding tank and disposed off-site.

It is noted that there are three properties within the Main Area that currently have private wells supplying water and septic systems for domestic use. Two farms on the western portion of the Main Area (18501 Mississauga Rd. and 18667 Mississauga Rd.) and the other is a residential property on the southeastern portion of the Main Area (1420 Charleston Sideroad). There are no private water wells or septic systems currently in use on the North Area or South Area.

2.3 Proposed Site Rehabilitation

The overall goal of the final rehabilitation plan is to create a landform that represents an ecological and visual enhancement and provides future opportunities for conservation, recreational, tourism and water management. Overall, the progressive and final rehabilitation plan for the Site includes the creation of: lakes, vegetated shorelines, islands, wetlands, upland forested areas, riparian plantings adjacent to the existing watercourse, nodal shrub and tree planting on upland areas, grassland meadows and specialized habitat features for bats and turtles. The proposed rehabilitation has been designed to use all of the on-Site topsoil and overburden and does not require the importation of additional soils.

3.0 PURPOSE AND SCOPE

This Maximum Predicted Water Table Report for the proposed Caledon Pit / Quarry details how the maximum predicted water table was identified in metres above sea level, relative to the proposed depth of excavation at the Site.

For the purposes of this Report “groundwater table” means the following.

a) For unconsolidated surficial deposits, the groundwater table is the surface of an unconfined water-bearing zone at which the fluid pressure in the unconsolidated medium is atmospheric. Generally, the groundwater table is the top of the saturated zone.

b) For confined water bearing zones or consolidated bedrock materials, the groundwater table, or potentiometric surface, is a level that represents the fluid pressure in the water bearing zone and is generally defined by the level to which water will rise in a well.

Note: The groundwater table is not static and is expected to vary from location to location and over time.

For the purposes of this Report “maximum predicted water table” means the maximum groundwater elevation (metres above sea level) predicted by qualified persons who have considered conditions at the Site and mean annual precipitation levels. For confined water bearing zones the groundwater table is the level to which water will rise in a well.

At the proposed Caledon Pit / Quarry, the maximum predicted water table was determined by the installation of a series of monitoring wells in 2020 across the Site and Study Area, surveying the wells for location and elevation using a licenced Ontario Land surveyor, assessing the measured groundwater levels on the Site for the one-year period of January 1, to December 31, 2021, and then preparing a groundwater level contour map showing the maximum predicted groundwater table at the Site. This report was prepared by qualified persons, and their CVs are provided in Appendix B.

4.0 DRILLING AND MONITORING WELL INSTALLATION

The borehole drilling and monitoring well installation was carried out by Choice Sonic Drilling Ltd. (CSD) of Brighton, Ontario under Golder supervision. The drilling and monitoring well installation of the 18 monitoring well nests used for the maximum predicted water table (MW20-01 to MW20-18) took place over a five month period from February to June 2020. Those monitoring well locations, as well as additional test wells and off-site monitoring wells are shown on Figure 4-1.

The general methodology for the drilling and installation of monitoring wells MW20-01 to MW20-18 was as follows.

- The boreholes were drilled using a track-mounted Sonic SDC 550 drill rig and support equipment including 4x4 pickup trucks, a skid-steer, and a utility trailer equipped with low-impact tires.
- The rotasonic drilling method was used at the start of each borehole, which obtained a continuous 114 mm diameter (4 ½") soil core through the overburden and ~1 m into competent bedrock, leaving a temporary casing in place. The overburden samples were logged and bagged for future testing as drilling proceeded.
- Once in competent bedrock, tooling was switched on the rig and the borehole was advanced into the rock by diamond drilling, obtaining HQ-sized (63.5 mm) continuous rock core. Most boreholes were drilled through the overburden and bedrock zone of interest, until shale or shaley dolostone was encountered.
- The rock cores were logged, photographed and boxed. The rock core was later split, with one half of the core sent for testing, and the other half retained for future reference.
- Upon the completion of the drilling, the open rock boreholes were left in place temporarily to allow for downhole geophysical logging and packer testing, as required.
- Once downhole testing was completed, the boreholes were completed as bedrock monitoring well nests.
- Monitoring well nests (typically two per location) were installed in the 96 mm open rock borehole using 25 mm (1") SCH40 PVC well screen and riser pipe. A sand pack was placed in the borehole annulus at each well screen interval, and bentonite pellets were placed in the borehole annulus between the screened intervals to provided hydraulic separation. The borehole annulus was then sealed to surface using bentonite pellets. Each installation was completed at surface with a lockable protective well casing.
- Additional shallow overburden monitoring wells were installed in three locations, including two locations where the shallow well was offset and installed in a separate borehole. The offset wells were drilled and installed in the overburden using the same rotasonic drilling method. The wells were installed with 25 mm (1") SCH40 PVC well screen and riser pipe. A sand pack was placed in the borehole annulus at each well screen interval and bentonite pellets were placed in the borehole annulus to surface. Each offset installation was completed at surface with a lockable protective well casing.
- The monitoring wells were later developed by purged, using a 13 mm inner diameter Waterra tubing with an inertial foot valve. Development was considered complete based on one of the following conditions being met: development water became clear, ten times the volume of water in the monitoring well had been pumped, or the well was pumped dry allowed to recover (fully or partially depending on recovery speed) and pumped dry again.

All boreholes and monitoring wells were surveyed by Delph and Jenkins North Ltd. of Aurora, Ontario (licences Ontario Land surveyors) and the results provided to Golder via CBM.

All monitoring wells were tagged and registered with the Ontario Ministry of the Environment, Conservation and Parks (MECP) in their Water Well Information System (WWIS). The well records were submitted to the MECP by CSD on behalf of CBM, the owner of the wells.

A summary of the monitoring well installation details for MW20-01 to MW20-18 is provided in Table 4-1. Record of Monitoring Well Logs are provided in Appendix C.

Table 4-1 - Summary of Monitoring Wells for Maximum Predicted Water Table
Caledon Pit / Quarry

Well	Date Drilled	Easting (m) UTM 17T	Northing (m) UTM 17T	Elevation (masl)	Total Hole Depth (mbgs)	Depth of casing (mbgs)	Depth to Bedrock (mbgs)	Depth to bottom of Gasport (mbgs)	Depth to top of Cabot Head (mbgs)	Downhole Geophysics Completion	Packer Testing Completion	Mon Well Completion	Deep (A) Well Stickup (m)	Deep (A) Well Formation	Screen from (m)	Screen to (m)	Shallow (B) Well Stickup (m)	Shallow (B) Well Formation	Screen from (m)	Screen to (m)
MW20-01(CAL) A/B	27-Feb-20	577458.50	4852268.28	395.10	19.41	9.06	8.53	14.86	17.32	13-Mar-20	19-Mar-20	20-Mar-20	0.99	Shaley Dolostone or Cabot Head Fm	15.40	17.10	0.99	Gasport Fm	11.10	12.62
MW20-02(CAL)	02-Mar-20	577900.04	4852138.37	399.63	19.57	15.94	15.24	18.05	19.57	11-Mar-20	N/A	23-Mar-20	1.05	Shaley Dolostone or Cabot Head Fm	16.96	18.48				
MW20-03(CAL)	04-Mar-20	578243.54	4851907.30	390.67	35.97	N/A	34.44	Not present	35.66	N/A	N/A	05-Mar-20	1.00	Overburden	15.58	18.63				
MW20-04(CAL)	06-Mar-20	578264.75	4852313.19	399.46	18.50	15.08	14.33	Not present	16.54	13-Mar-20	N/A	24-Mar-20	1.04	Shaley Dolostone or Cabot Head Fm	16.11	17.63				
MW20-05(CAL) A/B	09-Mar-20	578423.10	4852712.60	399.63	14.84	2.06	1.52	10.60	13.91	20-Mar-20	25-Mar-20	25-Mar-20	1.00	Shaley Dolostone or Cabot Head Fm	12.25	13.77	1.00	Gasport Fm	4.25	5.77
MW20-06(CAL) A/B	10-Mar-20	578474.24	4852972.59	400.15	16.03	2.32	2.14	10.96	14.25	23-Mar-20	26-Mar-20	26-Mar-20	0.99	Gasport Fm	10.12	11.64	0.99	Gasport Fm	4.20	5.72
MW20-07(CAL) A/B	11-Mar-20	578359.89	4853250.44	404.07	19.45	2.74	2.13	13.20	16.40	18-Mar-20	01-Apr-20	01-Apr-20	0.77	Shaley Dolostone or Cabot Head Fm	15.11	16.63	0.77	Gasport Fm	9.74	11.26
MW20-08(CAL) A/B	13-Mar-20	578009.81	4853574.83	406.93	18.59	2.74	1.98	15.10	17.32	19-Mar-20	30-Mar-20	31-Mar-20	0.92	Gasport Fm	13.30	14.82	0.92	Gasport Fm	5.38	6.90
MW20-09(CAL)	17-Mar-20	578343.84	4854157.49	399.95	9.01	5.79	5.33	Not Present	7.48	26-Mar-20	N/A	07-Apr-20	1.01	Shaley Dolostone or Cabot Head Fm	6.85	8.37				
MW20-10(CAL) A/B	19-Mar-20	577837.95	4854407.28	411.32	21.19	12.04	10.97	16.76	19.55	24-Mar-20	08-Apr-20	08-Apr-20	0.92	Shaley Dolostone or Cabot Head Fm	18.62	20.14	0.89	Gasport Fm	14.49	16.01
MW20-11(CAL) A/B	24-Mar-20	577671.98	4853921.39	409.72	19.39	3.07	2.13	16.46	18.16	07-Apr-20	14-Apr-20	15-Apr-20	1.03	Gasport Fm	13.81	15.33	1.01	Gasport Fm	3.96	5.48
MW20-12(CAL) A/B	26-Mar-20	577271.90	4854321.42	412.43	22.65	5.94	3.66	19.80	21.66	08-Apr-20	17-Apr-20	17-Apr-20	1.02	Gasport Fm	17.09	18.62	1.01	Gasport Fm	4.42	5.94
MW20-13(CAL) A/B	08-Apr-20	576873.11	4854473.14	415.53	28.23	15.08	13.10	23.92	25.68	15-Apr-20	23-Apr-20	24-Apr-20	0.93	Shaley Dolostone or Cabot Head Fm	24.05	25.57	0.93	Gasport Fm	18.14	19.66
MW20-13 (CAL) C	08-Apr-20	576873.11	4854473.14	415.53	5.10	N/A	N/A	N/A	N/A	N/A	N/A	08-Apr-20	0.93	Overburden	3.08	4.60				
MW20-14(CAL) A/B	28-Apr-20	577575.99	4853100.42	406.71	26.35	2.74	2.29	22.40	24.50	14-May-20	26-May-20	26-May-20	0.96	Shaley Dolostone or Cabot Head Fm	22.60	24.12	1.05	Gasport Fm	14.98	16.50
MW20-15(CAL) A/B	20-May-20	576576.79	4853544.15	417.06	37.17	12.30	11.60	33.84	35.62	27-May-20	08-Jun-20	09-Jun-20	0.70	Shaley Dolostone or Cabot Head Fm	33.77	35.29	0.71	Gasport Fm	28.81	30.33
MW20-15 (CAL) C	20-May-20	576576.79	4853544.15	417.06	5.00	N/A	N/A	N/A	N/A	N/A	N/A	20-May-20	0.70	Overburden	2.74	4.27				
MW20-16(CAL) A/B	22-May-20	576784.58	4853806.76	421.40	39.77	14.90	11.90	35.52	37.28	26-May-20	10-Jun-20	10-Jun-20	1.05	Gasport Fm	34.84	36.36	1.05	Gasport Fm	16.80	18.33
MW20-17(CAL) A/B	26-May-20	576752.28	4852966.36	406.64	28.82	3.15	3.05	24.84	27.49	01-Jun-20	02-Jun-20	02-Jun-20	1.05	Shaley Dolostone or Cabot Head Fm	25.64	27.16	0.99	Gasport Fm	12.75	14.27
MW20-18(CAL)	09-Jun-20	577058.36	4852658.80	404.29	28.15	12.19	11.88	23.80	26.06	12-Jun-20	15-Jun-20	15-Jun-20	1.03	Gasport Fm	12.42	13.94				

5.0 GROUNDWATER MONITORING AND MAXIMUM PREDICTED WATER TABLE

Groundwater monitoring began in June 2020 and the scope of monitoring expanded as new monitoring wells were installed and developed. Monitoring is currently ongoing at the Site and within the Study Area, as described in the Water Report Level 1/2 (Golder 2022).

Monitoring wells were equipped with a Van Essen TD-Diver pressure transducer / logger, following well development. The loggers were generally installed in the screened interval, each with a range suitable for the range of water levels that may be encountered, and programmed to record water levels on a 15-minute interval.

Loggers were typically downloaded quarterly, with manual water levels also collected quarterly at each download event using a water level tape.

Pressures observed by the logger were then corrected using a barometric pressure logger (Van Essen Baro-Diver) deployed on the Site. Water levels below the reference point were then calculated by matching the water level to the manual water level at the time it was observed and to the hydrograph of previous water level data. Groundwater levels were converted to elevations using the surveyed elevation (Delph and Jenkins North Ltd. of Aurora, Ontario) of the lower lip of each monitoring well monument.

The water level hydrographs for the monitoring period up to the end of 2021 are provided in Appendix D, with wells grouped geographically and by monitor type (i.e., by aquifer). The figures present data collected between the start of monitoring (summer 2020 or the time of installation if later) up to the end of 2021. Note that additional monitoring wells outside of the Site within the Study Area are included on some hydrographs.

Most groundwater levels showed approximately one to two metres of seasonal fluctuation during the monitoring period in 2021.

In general, the seasonal trend observed throughout the Site during the observation period showed a smooth steady decline in the summer months, concurrent with warm weather and active plant growth, which presumably reduces the water available for infiltration and recharge. The summer and early fall period is followed by an increase in groundwater levels in the late fall, concurrent with cooler temperatures and most vegetation becoming dormant, making more water available for recharge. This is followed by the winter period in which groundwater levels further decline, as the ground is frozen and precipitation is stored in the snow pack. This period was followed by the spring freshet, and a corresponding rise in groundwater levels due to increased infiltration and recharge.

The Maximum Predicted Water Table measured over a 12 month period from January to December 2021 is presented on Figure 5-1, and was determined by taking the highest groundwater elevation at any piezometer for each of the monitoring well nests for the period of record and posting that elevation on the figure, as well as generating maximum predicted water table elevation contours for the Site.

The maximum water table elevation at the Site during the monitoring period (2021) closely matches the head distribution observed in the Gasport Formation in May/April and December 2021. The maximum water table elevation in the Main Area was observed to vary from 420.7 masl at MW20-16 in the north, to 393.5 masl at MW20-18 in the southwest. The maximum water table elevation in the North Area was observed to vary from approximately 407 masl near MW20-11 in the northwest, to 397.3 masl at MW20-09 in the southeast. The

maximum water table elevation in the South Area was observed to vary from 405.3 masl at MW20-08 in the northeast, to 391.0 masl at MW20-02 in the south.

Overall, the maximum water table elevation across the Site ranges from approximately 421 masl to 391 masl with horizontal groundwater flow generally from the northwest to the east, southeast and south towards the Niagara escarpment and Credit River valley (Figure 5-1).

6.0 CLOSURE

This Maximum Predicted Water Table Report for the proposed CBM Caledon Pit / Quarry has been prepared in accordance with the Terms of Reference developed in consultation with the DART, and the MNRF, Aggregate Resources Act Ontario Regulation 244/97. For further information on the water resources on the Site see the Water Report Level 1/2 Proposed Caledon Pit / Quarry (Golder 2022).

Signature Page

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Senior Geoscientist

VP/PGM/GRP/GWS/mp

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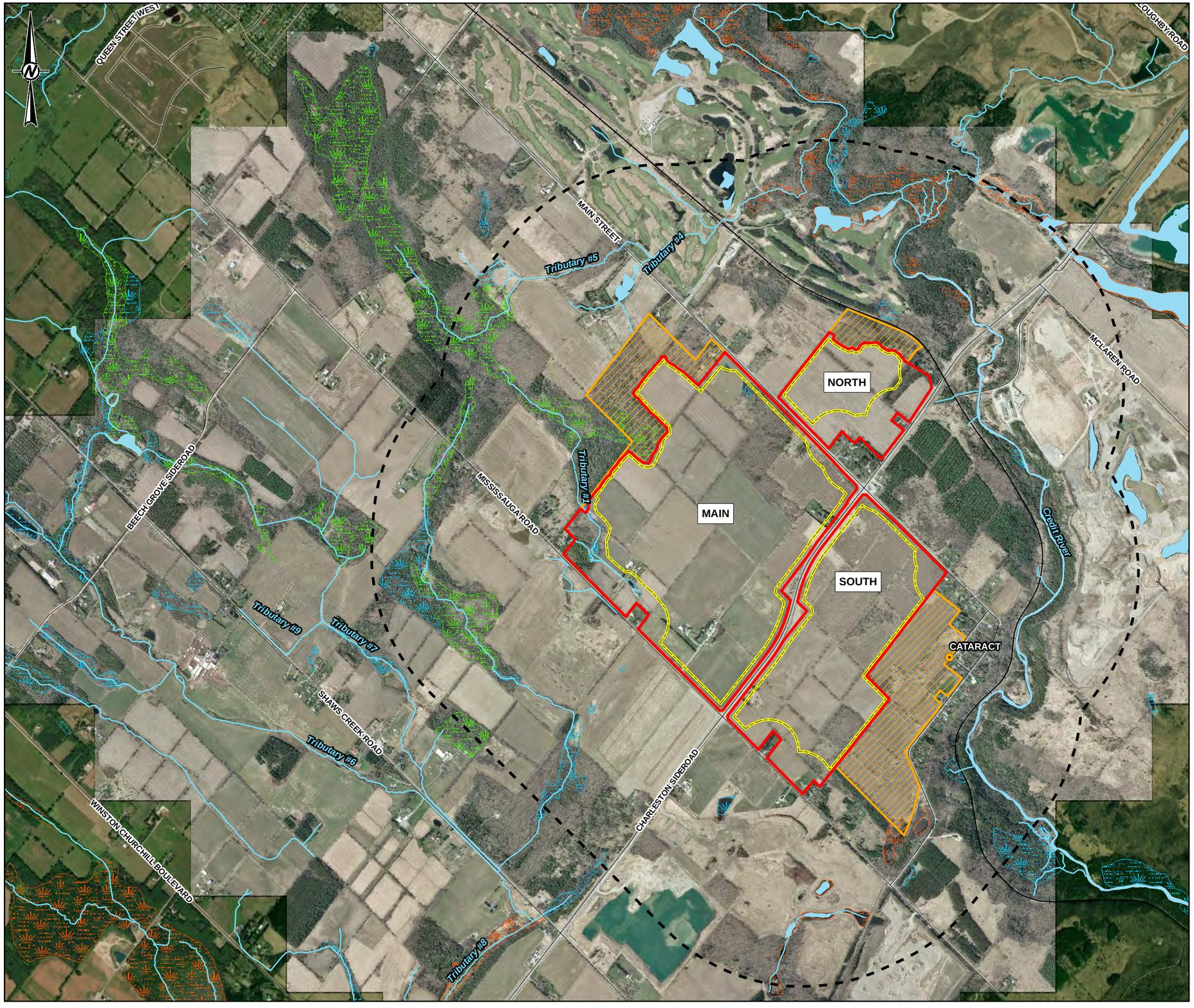
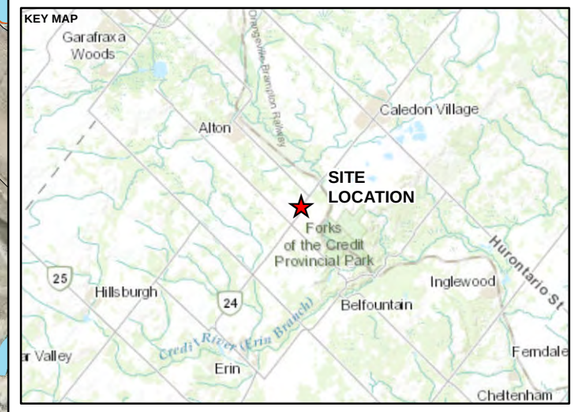
FIGURES



LEGEND

- TOWN/VILLAGE
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- 1 km LICENCE BOUNDARY BUFFER
- LIMIT OF EXTRACTION
- LICENCE BOUNDARY
- ADDITIONAL LANDS OWNED / CONTROLLED BY CBM

KEY MAP



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REFERENCE(S)

1. BASEDATA MNRF LIO OBTAINED APRIL 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021.
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
4. LICENCE AND LIMIT OF EXTRACTION PROVIDED BY MHBC NOVEMBER 2022.
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT
CALEDON PIT / QUARRY

TITLE
STUDY AREA

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-15
DESIGNED	SO
PREPARED	SO
REVIEWED	GWS
APPROVED	HM

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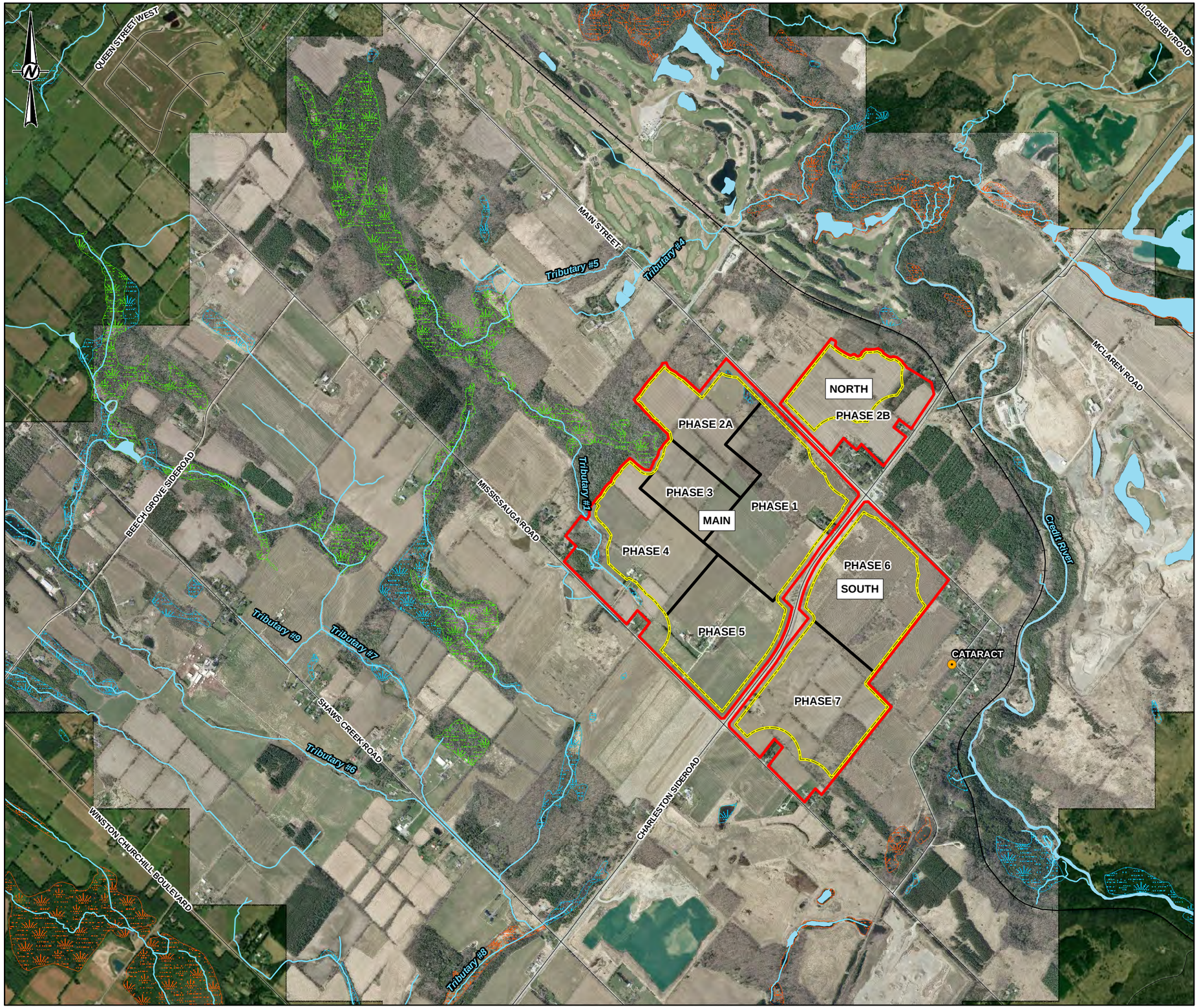

LEGEND

- TOWN/VILLAGE
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- LICENCE BOUNDARY
- LIMIT OF EXTRACTION
- EXTRACTION PHASE

0 500 1,000

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REFERENCE(S)

1. BASEDATA MNRF LIO OBTAINED APRIL 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
4. LICENCE AND LIMIT OF EXTRACTION PROVIDED BY MHBC NOVEMBER 2022.
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT
CALEDON PIT / QUARRY

TITLE
OPERATIONAL PHASES

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-15
DESIGNED	SO
PREPARED	SO
REVIEWED	GWS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
19129150	0044	0.0	2-1

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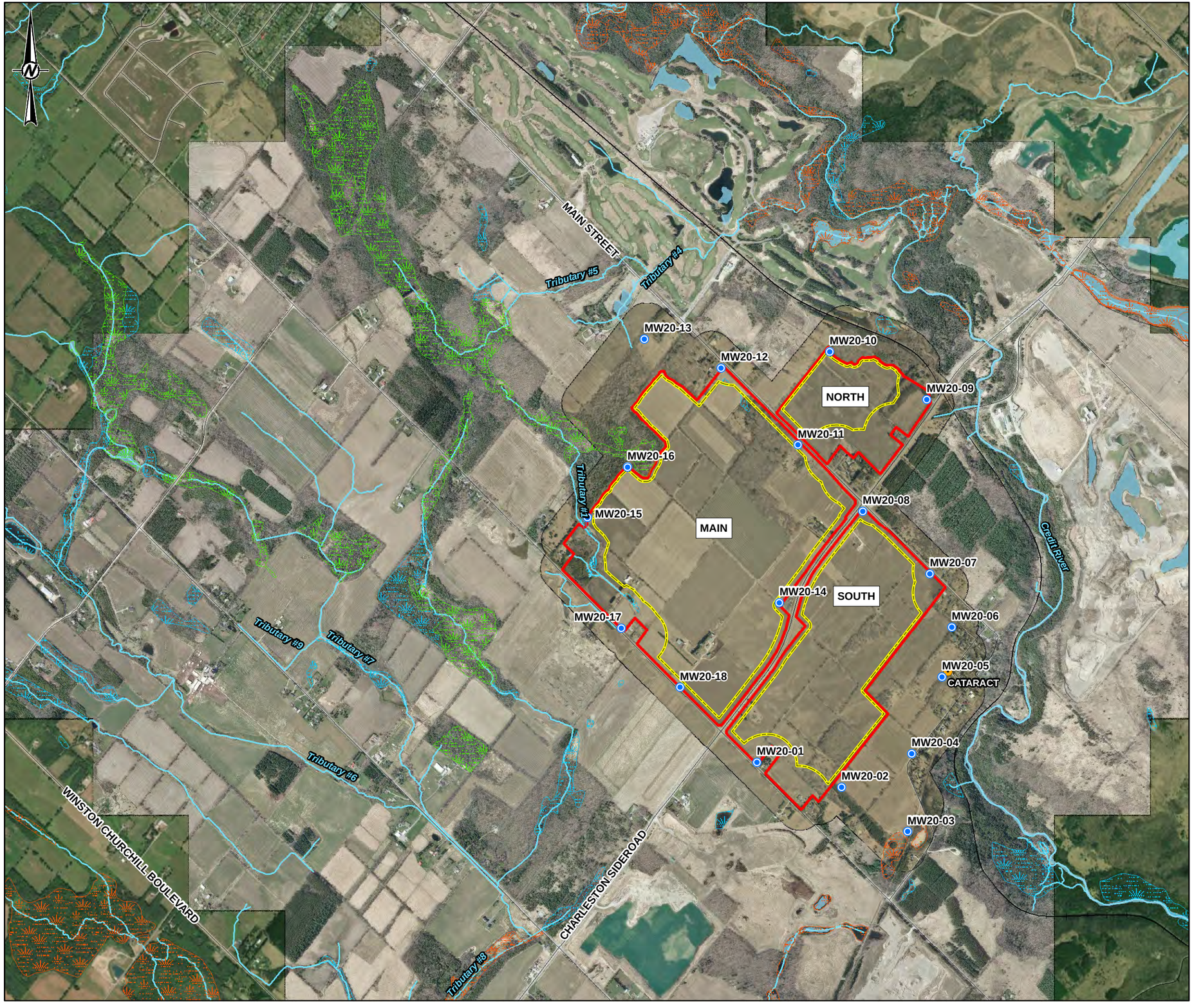


LEGEND

- TOWN/VILLAGE
- MONITORING WELL
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- LICENCE BOUNDARY
- LIMIT OF EXTRACTION

0 500 1,000

1:20,000 METRES

NOTE(S)

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2021, SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
4. LICENCE AND LIMIT OF EXTRACTION PROVIDED BY MHBC NOVEMBER 2022.
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

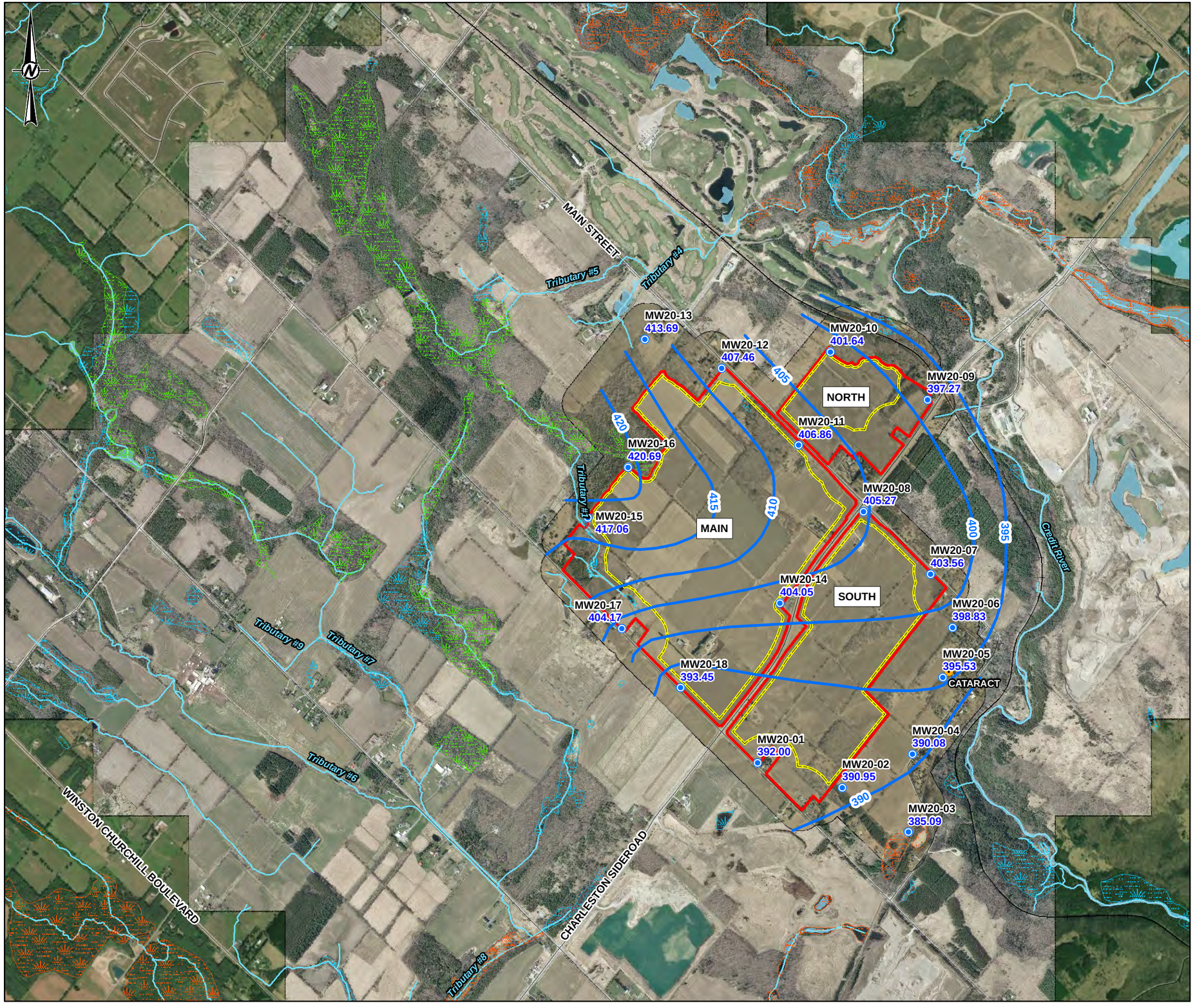
PROJECT
CALEDON PIT / QUARRY

TITLE
MONITORING WELL LOCATIONS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-15
DESIGNED	CGE
PREPARED	SO
REVIEWED	GWS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
19129150	0044	0.0	4-1



LEGEND

- TOWN/VILLAGE
- MONITORING WELL
- 2021 MAXIMUM GROUNDWATER HEAD
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- LICENCE BOUNDARY
- LIMIT OF EXTRACTION
- 434.26 MAXIMUM PREDICTED WATER TABLE ELEVATION

0 500 1,000

1:20,000 METRES

NOTE(S)

1. HIGH WATER TABLE PREPARED BASED ON THE MAXIMUM GROUNDWATER HEAD OBSERVATION AT EACH MONITORING WELL NEST DURING THE 2021 GROUNDWATER MONITORING PROGRAM. FIGURE TO BE READ WITH ACCOMPANYING REPORT.

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2021, SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
4. LICENCE AND LIMIT OF EXTRACTION PROVIDED BY MHBC NOVEMBER 2022.
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT

CALEDON PIT / QUARRY

TITLE

MAXIMUM PREDICTED WATER TABLE

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-15
DESIGNED	CGE
PREPARED	SO
REVIEWED	GWS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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APPENDIX A

Terms of Reference

TECHNICAL MEMORANDUM

DATE August 24, 2022 **Project No.** 19129150

TO David Hanratty, PGeo
CBM Aggregates

CC Jennifer Deleemans, Mike Lebreton

FROM Heather Melcher **EMAIL heather_melcher@golder.com**

PROPOSED CBM CALEDON QUARRY TERMS OF REFERENCE – WATER RESOURCES AND NATURAL ENVIRONMENT

Golder Associates Ltd. (Golder) has been retained by CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada) to complete technical studies to accompany an application to the Ministry of Natural Resources and Forestry (MNRF) for a new Class A Quarry Below Water licence under the *Aggregate Resources Act* (ARA) (project). The assessment will also be used for a Planning Act approval and application for Town of Caledon Official Plan and Zoning By-law amendment. Furthermore, these studies will provide an assessment of the application taking into consideration the applicable in-effect policies contained in the relevant Provincial Plans, Region of Peel Official Plan and Town of Caledon Official Plan.

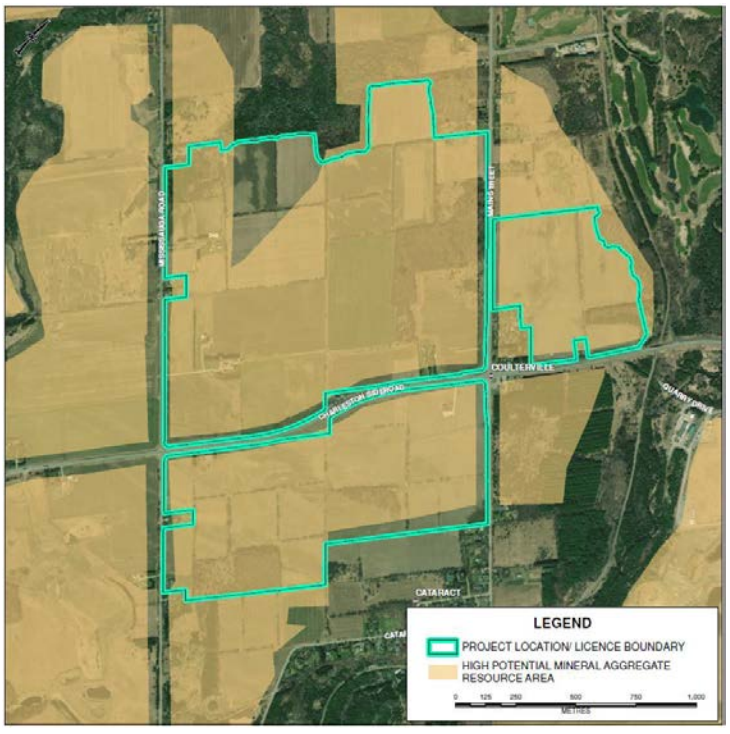

Figure 1: Proposed CBM Caledon Quarry Location

Golder Associates Ltd.
6925 Century Avenue, Suite #100 Mississauga, Ontario, L5N 7K2 Canada T: +1 905 567 4444 +1 905 567 6561

The properties to be licensed are located on Charleston Sideroad and Mississauga Road, Town of Caledon, Region of Peel, Ontario (site). The site is approximately 262.4 hectares (ha) in size (Figure 1).

This Terms of Reference (TOR) includes a summary of the assessment and deliverables associated with the water resources and natural environment components.

On June 2, 2021, CBM submitted to Credit Valley Conservation (CVC), the Town of Caledon, and the Region of Peel an earlier version of this TOR document, as requested during a meeting held on April 22, 2021. Comments were received from CVC on the TOR on July 9, 2021. Comments were also recently received from the Region of Peel on July 11, 2022. Golder has incorporated these comments into this TOR document, where applicable.

1.0 WATER RESOURCES

Groundwater and surface water resource investigations will be undertaken in accordance with the Technical Reports and Information Standards published by the MNRF in August 2020, with the following technical reports being prepared by qualified persons upon completion of the investigations.

Maximum Predicted Water Table Report

This report will detail how the maximum predicted water table is identified in metres above sea level, relative to the proposed depth of excavation at the site, and will be determined by monitoring the groundwater table for a minimum of one (1) year to account for seasonal variations and influences due to precipitation.

Water Report Level 1 and 2 (combined)

Level 1 – This assessment will determine the potential for impacts to groundwater and surface water resources and their uses (including water wells, groundwater aquifers, surface water courses and bodies, springs, discharge areas) and will identify if the site is in a Wellhead Protection Area for Quantity (WHPA-Q) under the Clean Water Act. If so, the report will identify applicable source water protection policies and mitigation measures that will be implemented.

Level 2 – Where the Level 1 assessment has identified a potential for impacts from the site on groundwater and/or surface water resources and their uses, an impact assessment will be carried out to determine the significance of the effect and the potential for mitigation. The assessment will address the potential effects of the operation on groundwater and surface water features located within the zone of influence, including but not limited to:

- Water wells (includes all types e.g., municipal, private, industrial, commercial, geothermal and agricultural);
- Springs (e.g., place where ground water flows out of the ground);
- Aquifers;
- Surface water courses and bodies (e.g., lakes, rivers, brooks); and
- Wetlands.

The assessment will include (but not be limited to) the following:

- A description of the physical setting including local geology, hydrogeology, and surface water systems;
- Any proposed water diversion, discharge, storage and drainage facilities;
- A water budget (e.g., how water is managed on-site);
- The possible positive or negative impacts that the proposed site may have on the water regime;
- Monitoring and mitigation plan(s); and
- Technical supporting data in the form of tables, graphs and figures.

Greenbelt Plan Considerations

The scope of the planned groundwater and surface water investigations will also address key hydrologic areas and features, as described in the Greenbelt Plan (2017). Key hydrogeologic areas are areas which contribute to the hydrologic functions of the Water Resource System. These areas maintain ground and surface water quality and quantity by collecting, storing and filtering rainwater and overland flow, recharge aquifers and feed downstream tributaries, lakes, wetlands and discharge areas. These areas are also sensitive to contamination and feed key hydrologic features and drinking water sources.

Key hydrologic areas include:

- Significant groundwater recharge areas;
- Highly vulnerable aquifers; and
- Significant surface water contribution areas.

Key hydrologic features within these areas include:

- Permanent and intermittent streams;
- Lakes (and their littoral zones);
- Seepage areas and springs; and
- Wetlands.

For lands within a key hydrologic feature in the Protected Countryside, it is noted that development or site alteration is permitted for aggregate extraction, subject to the non-renewable resource policies set out in Section 4.3.2 of the Greenbelt Plan.

Caledon Official Plan Considerations

The scope of the planned groundwater and surface water investigations will also address the requirements for development within valley and stream corridors as set out in Section 3.2.5 of the Town of Caledon Official Plan (2018). This includes the following considerations:

- The quality and quantity of surface water entering valley and stream corridors are to be maintained, and, where appropriate, enhanced and restored.

- Restoration and enhancement of valley and stream corridors is encouraged. Where appropriate, a riparian habitat zone will be maintained or established on lands abutting watercourses and waterbodies.
- Management and restoration of valley and stream corridors will adhere to the Town's ecosystem principle, goals, objectives, policies and performance measures.

Other Considerations

The groundwater and surface water investigations will be undertaken at the scales necessary to characterize groundwater and surface water conditions potentially impacted by the proposed quarry, including the immediate site, zone of influence and surrounding subwatershed scales, where information is available and relevant to the assessment of impacts.

The predicted zone of influence of the quarry will ultimately be determined through the hydrogeologic and surface water assessments, and as such, a pre-defined maximum zone of influence is not assumed. Justification of the proposed extent and scale of the investigation and analysis undertaken will be provided in the Water Report.

The impact assessment will evaluate the potential for cumulative impacts of the proposed quarry where information for the assessment of cumulative impacts is available and relevant to the impact assessment, including groundwater quantity, groundwater users and total groundwater use in the broader subwatershed).

The study will also assess the potential impact of the quarry in relation to future climate change, including a drought scenario, if considered applicable.

1.1 Hydrogeologic Investigation

The hydrogeologic investigation is a key component of the overall program to support the licence application. The hydrogeologic investigation program integrates with the surface water and natural environment studies. The key components of the hydrogeologic investigation are summarized below.

A karst assessment will also be completed as part of the hydrogeologic investigation which will include: an investigation of closed depressions and surface water flows, tracer tests and conductivity profiling in wells during the planned pumping tests, an evaluation of the proportions of surface water and groundwater flows in the study area, and an assessment of evidence potentially indicative of preferential flow in the bedrock aquifer.

1.1.1 Initial Activities

A detailed background review of hydrogeological information will be carried out initially, including the following:

- LIO SWOOP Topographic Data;
- OGS Surficial geology;
- OGS Bedrock geology;
- OGS Drift thickness;
- MECP Water Well Records;
- MECP PTTWs;
- AquaResource Integrated Water Budget Report - Tier 2, Credit Valley Source Protection Area;

- Information from previous site investigations Credit Valley Conservation (CVC) Subwatershed Study Reports;
- CVC Source Protection Area and CTC Source Protection Region Assessment Reports; and
- Other websites with information on water taking activities and natural features in the study area.

Published geological data for the area provides an initial understanding of the distribution of overburden on the site, the depth to bedrock, the thickness of the Gasport (formerly Amabel) Formation and approximate elevation of the base of the Gasport (formerly Amabel) Formation, and an initial understanding of groundwater elevations across the area.

The hydrogeological information compiled during the background review will be presented as a series of maps and will establish a framework for the refinement and finalization of the field investigations.

Initial activities will also include site reconnaissance of the area to help verify information obtained during the background review and support finalization of the field investigations.

A survey of private wells within 1 km of the site will also be undertaken.

1.1.2 Monitoring Well Installation and Testing

Twenty-eight monitoring well locations will be drilled, to an approximate depth of 30 m (assumed 5 m of overburden, on average, and 25 m of rock). All locations in the monitoring network will be surveyed for location and elevation. Further details of the proposed monitoring well network are provided in Attachment A.

Drilling, Core Logging and Photography

The drilling will be carried out under Golder supervision using Choice Sonic Drilling Ltd. (CSD), obtaining 100 mm continuous core through the overburden and HQ-sized (63.5 mm) continuous core in the bedrock. All cores will be logged and photographed. Overburden core will be bagged, and rock core will be boxed (1.5 m boxes holding a total of 3 m of core per box).

Following coring, the rock boreholes will be reamed to 120 mm to facilitate monitoring well installation. A surface casing will be installed into the top of rock to provide access for geophysical logging and hydraulic (packer) testing, and for monitoring well installation.

Geophysical Logging

Geophysical logging will be carried out immediately following the coring of the drillholes, and will consist of collecting natural gamma, conductivity, heat pulse flowmeter (static and low pumping conditions), and optical televiewer (OTV) logs. The field work and analysis will be carried out in house by Golder staff using in house equipment. Results will be compiled and processed relatively quickly and used to help plan the hydraulic (packer) testing program. All data will be processed and presented using WellCAD.

Hydraulic (Packer) Testing

Upon completion of geophysical logging, the boreholes will be packer tested. We will complete up to three interval tests per borehole using straddle packers (nominally spaced at 5 m), testing from the bottom of the hole up to the highest level possible within the water column. Using the geological and hydrogeological information obtained

from coring and geophysics, the tests will be conducted within appropriate geologic intervals (i.e., within the Gasport (formerly Amabel) or within the underlying strata).

Monitoring Well Installation and Instrumentation

Each of the 28 boreholes will be completed with two piezometers. The piezometers will typically have 1.5 m well screens and be 32 mm in diameter. The wells will be constructed by a licensed well driller using filter sand, bentonite pellets and grout, and completed at surface with a lockable protective casing and registered in the MECP system with a well tag.

We understand that it is important to obtain hydraulic information in the Gasport (formerly Amabel), and underlying Clinton and Cataract Groups, and propose that each piezometer nest target two of the three zones, to provide overall coverage of hydraulic heads in all three zones (i.e., 56 piezometers will provide the ability to have about 18 monitors in each of these three zones).

Single-well Hydraulic Testing

All piezometers will be developed, and single well response tests completed in the piezometer. This will be carried out by using dedicated water level loggers, which will be left in place for the groundwater monitoring program. Hydraulic conductivity will be estimated from the tests, and used as input to the hydrogeological assessment, and groundwater-surface water modelling.

Water Quality Sampling

All wells will be completed with dedicated water sampling equipment (tubing and Waterra foot-valves) for groundwater sampling. The wells will be purged and then sampled following standard collection and sample handling protocols. All 56 piezometers will be sampled for general chemistry, nutrients, inorganics and metals (RCAP suite), and 28 of the wells will also be sampled for BTEX and PHC F1-F4. The analytical work will be carried out by BV Labs (formerly Maxxam Analytics) in Mississauga.

Analysis and Reporting

The data collected during the drilling and testing, and water sampling will be compiled and used to inform other investigations and be incorporated into the combined Water Report Level 1/2 and a Maximum Predicted Water Table Report.

1.1.3 Groundwater Monitoring Program

The groundwater monitoring program will take place from the point of drilling the wells until submission of the licence application package to the MNRF and include monitoring of the 56 piezometers at the 28 proposed monitoring well locations, in addition to monitoring springs and seeps located in areas along the Credit River, the Niagara Escarpment and the Alton Forest complex.

All wells and piezometers will be equipped with water level loggers, programmed to record at 15 minute intervals. Loggers will be downloaded quarterly, and manual water level measurements made to correlate to the logger data. A barologger station will be set up at the site to provide barometric corrections to the logger data. Hydrographs will be compiled on a quarterly basis.

Analysis and Reporting

The data collected during the groundwater monitoring program will be compiled and used to inform other investigations, provide important hydrogeological inputs to groundwater-surface water modelling and support the

hydrogeological impact assessment. The overall results will be incorporated into the Level 1 and 2 Water Report and . Maximum Predicted Water Table Report.

1.1.4 Pumping and Tracer Tests

Based on the data obtained during the monitoring well and resource investigations described above, locations to conduct pumping / tracer tests will be selected on the property. Up to four tests, if required, will be completed depending on the nature of hydrogeologic conditions on the site.

Combined pumping and tracer tests will help establish the transmissivity of the rock, as well as assess the potential connectivity of fractures in the rock mass to various natural environment features in the area. Four pumping / tracer tests will be performed, each of 96 hours in duration, as described below.

Install Pumping Wells and Offset Monitoring Wells

Once the number and location of the test areas have been determined, a 150 mm diameter pumping well will be installed at each test location (cased through the overburden and open in the bedrock), to an assumed depth of 30 m (assumed 5 m through overburden and 25 m in the rock). Up to four offset wells nests will also be installed at each location to the same assumed maximum depth, completing the open holes with two-level 32 mm diameter piezometers, in a manner similar to the other monitoring wells. Pumping and offset observation wells will be MECP registered and tagged.

Obtain Category 2 PTTW

Golder will prepare and submit EASR applications on behalf of VCNA for permits to take water (PTTW) for each of the four planned 96 hour tests.

Conduct Four (96 hour) Pumping and Tracer Tests

Once the pumping and offset observation wells have been installed and permits obtained, pumping and tracer tests will be carried out. An ecologically friendly tracer such as fluorescein would be introduced in one or more observation wells prior to the start of pumping, and the pumping well water monitored using a fluorometer or other appropriate device to detect the potential presence of traced water at the pumping well. Pumped water will be managed to ensure that it is not recirculated into the groundwater system during the test.

Groundwater levels at the pumping well, offset wells, and other monitoring wells will be monitored using data loggers and/or manual measurements during the test. Levels would also be monitored prior to the test for a minimum of 48 hours and immediately following the test for a period of 7 days, to monitor the recovery data.

It is proposed that the four tests will be completed a minimum of 3 weeks apart, which should allow time for water levels to recover to ambient between successive tests.

Analysis and Reporting

The data collected during the pumping / tracer tests will be compiled and used to inform other investigations, provide important hydrogeological inputs to groundwater-surface water modelling and support the hydrogeological impact assessment. The overall results will be incorporated into the Level 1/2 Hydrogeological Study Report.

1.1.5 Integrated Groundwater / Surface Water Modelling

An integrated, fully-coupled groundwater / surface water model will be developed to simulate current conditions and estimate future water quantity impacts as a result of quarrying. The modelling will be undertaken using the computer program HydroGeoSphere (HGS).

HGS has been successfully applied in water resource and mining applications at the watershed and subwatershed scale in Ontario and worldwide. Of particular note, HGS was given a comparatively favourable review in the MNRF-sponsored document *Integrated Surface and Groundwater Model Review and Technical Guide* (AquaResource, 2011).

HGS is a three-dimensional numerical code that can dynamically consider all major components of the hydrologic cycle, including: precipitation, evapotranspiration, snowmelt, overland flow, infiltration, unsaturated zone flow, and saturated groundwater flow. HGS may model flow within bedrock using an equivalent porous media (EPM) approach or a discrete fracture network; however, at the scale of this analysis we assume that an EPM approach is sufficient. HGS' fully inclusive treatment of the hydrologic system allows for a seamless and robust simulation of flow and water level behaviour within the watershed, including at quarries, streams, wetlands and within the subsurface.

The model will be constructed on the basis of both publicly available data and the results of the site-specific geology and water resources field assessments, including: Digital Elevation Model (DEM) topography, government mapping and databases (e.g., Ministry of Environment, Conservation and Parks [MECP], Water Well Information System [WWIS] and Permit To Take Water [PTTW] databases), background data/reporting including CVC source water protection modelling, climate data, subcatchment delineations and water budgets, drilling data including geologic picks and hydrostratigraphic unit characterization, geophysical testing, packer testing, pumping tests, spring reconnaissance and measured groundwater levels and surface water levels / flows. The model will be calibrated to field observations in both steady-state (long-term average) and transient settings at appropriate time scale(s).

The modelling assessment will consider the following base simulations:

1) Existing Conditions (calibrated model)

2) Full Build-Out Operations (maximum extraction and dewatered state)

3) Full Rehabilitation (all rehabilitative measures, including backfilling and flooding, in-place)

The modelling will examine potential impacts under both average annual steady-state and transient (likely monthly) conditions for each scenario. Modelled effects will include drawdown and flow changes at key receptors including PTTW permit holders, private water wells, wetlands, streams and the Credit River as well as any interaction with pre-existing source protection plans and policies. The modelling may also include, at a relatively coarse scale, other major water users within the zone of influence and will thus be able to address cumulative impacts.

After the base scenarios have been finalized, a sensitivity analysis will be performed to better understand potential upper and lower bounds to potential impacts.

1.1.6 Impact Assessment and Hydrogeological Reporting

The results of the various geological and hydrogeological field investigations, monitoring, pumping and tracer testing, and integrated groundwater-surface modelling will be brought together to complete a hydrogeologic impact assessment. The hydrogeologic impact assessment and its supporting studies will inform the natural environment studies and provide the basis for preparing the combined Level 1 and 2 Water Report and a Maximum Predicted Water Table for a Class A, Quarry Below Water licence application under the Aggregate Resources Act.

If the assessment identifies a potential for impacts, mitigation measures and/or an adaptive management plan, if required, will be identified in the report.

1.2 Surface Water Resources Assessment

A surface water monitoring program and impact assessment will be completed for the site and surrounding catchment areas. The impact assessment and reporting for these tasks will be combined with the results of the hydrogeological assessment in the combined Water Report Level 2 and a Maximum Predicted Water Table Report.

1.2.1 Background Review

Golder will complete a background review of the available information pertaining to the site and surround area that may be within the zone of influence of the proposed quarry. The information reviewed will consist of:

- Aerial photographs and topographic, physiographic and geologic mapping;
- Water Survey or Canada and Credit Valley Conservation stream gauging data;
- Meteorological data from local CVC gauges (i.e., 1795 Quarry Drive, Town of Caledon, etc.);
- Ontario source water protection mapping;
- Published water resources reports; and
- Any existing permits or monitoring reports from the site.

Any additional work to fill data gaps identified as part of the background review will be included in a separate scope and budget.

1.2.2 Field Monitoring

A stream monitoring network will be established on the watercourses that drain the site and the areas of the proposed numerical model extents. We have assumed this will include 14 - 16 monitoring stations on tributaries to the Credit River. The exact number of stations and locations will be determined through the initial field reconnaissance that will be completed with the hydrogeology and natural environment component leads.

Manual water level (staff gauges) and flow measurements will be conducted at each station quarterly for a period of two years. Pressure transducers will be deployed at each station to develop a water level record for each station at 15-minute intervals. A barologger will also be installed at the site to provide atmospheric pressure compensation for the water level transducer data. Two on-site stations will be paired with mini-piezometers to better understand surface groundwater interactions in the area. Field monitoring will be continued following the development of the impact assessment to continue the understanding and characterisation of the watercourses.

No stream flow monitoring stations are proposed on the main channel of the Credit River at this time. Publicly available government stream gauge data will be relied upon to provide water level and flow data from the Credit River. Available baseflow data will be supplemented by completing low flow monitoring in the Credit River at three locations, to evaluate the baseflow contributions in the project study area. Two low flow monitoring events are currently proposed.

The surface water monitoring will also include a one-year of quarterly water quality monitoring program. This program will include the analysis of metals, nutrients and general chemistry at five watercourse stations surrounding the Site. The five sampling locations will be selected from a subset of the stream flow monitoring stations in an attempt to maximise the value of each monitoring station by selected stations that more likely maintain water and flow year-round (avoiding stations that have dry conditions most of the year). The five stations will be remain consistent throughout the sampling year. Turbidity and total suspended solids (TSS) will also be collected at these five stations to develop a turbidity / TSS relationship that can be used to estimate TSS from real-time measurements.

1.2.3 Cross Sectional Surveys

To develop a reliable stage-discharge rating curves (rating curves) at the surface water stations, cross sectional surveys will be collected and used to develop small local hydraulic models, which will in turn be used to interpolate and extrapolate the rating curves somewhat beyond the range of measured flows. It is recommended that approximately four detailed cross sectional surveys be completed at each surface water station to capture key hydraulic controls. Surveys are to be completed at upstream and downstream locations for each of the water level logger installations. The cross sectional surveys are typically distributed along the stream profile to capture the station equipment and key hydraulic characteristics (i.e., pools, riffles and control features), with the feature controlling the downstream water levels being most important to capture. The cross sectional surveys are expected to extend over the stream banks and on to the floodplain, to capture the total flow cross section under a flood event.

All survey data will be tied into a local benchmark which is permanently secured above the anticipated high water level. The water level logger installation will be surveyed to the benchmark upon installation and once each year to identify any settling, heave or other movement of the logger stations.

1.2.4 Rating Curve Development

The cross-sectional survey data will be collected and incorporated into a hydraulic model to develop theoretical rating curves which will be calibrated to measured flows.

Rating curves will be developed for each water level monitoring station in a hydraulic modelling package (i.e., HEC-RAS or equivalent) using the manual flow and water level measurements and cross sectional survey data collected during the monitoring program. The hydraulic model will utilize the cross sectional surveys at each station to generate a theoretical rating curve that will be calibrated using the measured flows and water levels collected over the monitoring period. Typically, the HEC-RAS modelled results are utilized to extrapolate the upper end of the rating curve, while field measured points better served to populate the lower and mid sections of the curve.

The Water Survey of Canada operates flow stations and already provides continuous flow data for the Credit River (downstream of Charleston Sideroad, and others further up and downstream), meaning that Golder will not need to develop rating curves and flow hydrographs for the stations on the Credit River.

1.2.5 Water Balance

An annual water balance will be developed for the drainage areas contributing to the quarry and monitoring station catchments using Thornthwaite water budgets available from Meteorological Services of Canada under the existing, operational and rehabilitated conditions. The results of the water balances will be used to help assess the potential impacts that the proposed extraction and rehabilitation activities may have on the existing local hydrologic cycle. Meteorological Services of Canada data will be compared to local CVC station data.

Results of the Thornthwaite water balance will also be used to verify the recharge distributions developed using the integrated numerical model.

1.2.6 Water Level Hydrographs

Continuous water level and flow data will be processed on a monthly basis to confirm data quality and equipment accuracy. This will allow Golder to identify, and correct, any variations or potential issues with the monitoring stations, or equipment, early to reduce the risk of lost data.

The continuous water level record will be used with the rating curves to develop a continuous flow record which will be presented in flow hydrographs. Flow hydrographs will be created for the continuous water level stations. The flow hydrograph records will be further analysed to provide an estimate of baseflow, flow duration statistics, peak flows and totals of monthly and annual discharge at each location. This information will be used to calibrate and verify the HGS existing conditions model.

1.2.7 Stream Temperature Monitoring

Through their review of an earlier version of this TOR document, CVC requested continuous temperature monitoring be completed at the 14 – 16 surface water stations located on tributaries to the Credit River. Dedicated water temperature loggers will be installed to collect continuous daily temperature measurements. Monitoring of these loggers will be completed as part of the quarterly surface water monitoring program outlined in Section 1.2.2.

1.2.8 Impact Assessment and Reporting

The data collected will be analysed in conjunction with the background information and integrated with the hydrogeological and natural science studies. The impact assessment will consider potential effects of the proposed extraction on the surface water features on the site, and up to the distance of the expected groundwater drawdown zone (nine stream flow monitoring stations have been assumed within this drawdown). Potential effects will be estimated for two future scenarios including full development of the proposed quarry (i.e., the last day of extraction) and rehabilitated conditions (i.e., the residual effects of the development following completion of rehabilitation to a flooded quarry lake or partially backfilled and flooded excavation).

Reporting will be completed in conjunction with the hydrogeology discipline and will include the following:

- Documented field data
- Present rating curves and water level / flow hydrographs as well as monthly and annual total volumes
- Present WSC gauge flows on the Credit River as well as monthly and annual total volumes

- Quantify expected project effects on surface water resources by comparing projected post-development to pre-development flow rates. This information will be provided to the Natural Environment discipline for assessment of the significance of changes to the natural environment

2.0 NATURAL ENVIRONMENT ASSESSMENT

Golder will undertake a work program for a Natural Environment Report (NER) in order to evaluate the natural features in the vicinity of the site. Golder will assess the potential impacts of the proposed below water extraction on those features and their ecological functions and, if necessary, recommend measures to prevent or mitigate negative impacts on any significant features.

This study will provide an assessment of the application taking into consideration the applicable in-effect policies contained in the relevant Provincial Plans, Region of Peel Official Plan and Town of Caledon Official Plan.

2.1 Background Review

A background information search and literature review will be completed to gather data about the local area and identify significant natural features, as defined under the Provincial Policy Statement, Greenbelt Plan, Region of Peel (Core Areas, Natural Features and Corridors and Potential Natural Features and Corridors), and Town of Caledon (Environmental Policy Areas), and species at risk (SAR) that have been reported as occurring, or potentially occurring in the local landscape, including the following resources:

- Natural Heritage Information Centre (NHIC) database maintained by the Ontario Ministry of Natural Resources and Forestry (MNRF)
- Species at Risk Public Registry
- Species at Risk in Ontario (SARO) List
- Atlas of Breeding Birds of Ontario (OBBA)
- Bat Conservation International (BCI) range maps
- Ontario Butterfly Atlas
- Atlas of the Mammals of Ontario
- Ontario’s Reptile and Amphibian Atlas
- Land Information Ontario (LIO)
- MNRF LIO Aquatic Resources Area Layer
- MNRF Fish On-Line
- DFO Aquatic Species at Risk Maps
- eBird species range maps
- Town of Caledon Official Plan

- Region of Peel Official Plan
- Information available from CVC (e.g., fish collection records, wetland mapping)
- Credit River Watershed Natural Heritage System Final Summary Report
- Existing aerial photography.

To develop an understanding of the ecological communities, wildlife habitat and potential natural heritage features in the study area, MNRF LIO data were used to create base layer mapping for the study area. A geographic query of the NHIC database was conducted to identify element occurrences of any natural heritage features, including wetlands, Areas of Natural and Scientific Interest (ANSIs), life science sites, rare vegetation communities, provincially rare species (ranked S1-S3 by the NHIC) and other natural heritage features within 1 km of the site.

2.1.1 SAR Screening

A SAR screening will be completed conducted for species listed under the *Endangered Species Act* (ESA) (Ontario 2007) per the Species at Risk in Ontario (SARO) List (O. Reg. 230/08), as well as those listed under the *Species at Risk Act* (SARA).

An assessment will be conducted to determine which SAR had potential habitat in the study area**.** Species with ranges overlapping the study area, or recent occurrence records in the vicinity, will be screened by comparing their habitat requirements to habitat conditions in the study area, as interpreted from aerial imagery.

The potential for the species to occur will be determined through a probability of occurrence. A ranking of low indicates no suitable habitat availability for that species in the study area and no specimens identified. Moderate probability indicates more potential for the species to occur, as suitable habitat appeared to be present in the study area, but no occurrence of the species has been recorded. Alternatively, a moderate probability could indicate an observation of a species, but there is no suitable habitat in the study area. High potential indicates a known species record in the study area (based on the background data review) and good quality habitat is present.

The desktop SAR screening will be confirmed and updated through the field surveys, described below.

2.2 Field Surveys

Based on preliminary desktop review, there are limited surface water features on the site. Golder is planning limited surveys in the designated and/or mapped significant woodlands as it is anticipated, based on review of land use policies and regulations, that extraction will not be permitted within the woodlands, and a setback may be required.

The following field surveys will be completed on the site (assuming no land access in the study area will be permitted). In the case that Golder is not scoping to complete the survey in the mapped/designated significant woodlands, it has been identified below. If a feature was to be excluded from the licence or extraction boundary, field surveys were sufficient to determine potential impacts of the project, but not as detailed as if the feature was going to be removed. The field surveys have been determined based on the known habitats on the site, as determined through the desktop assessment. Species-specific surveys will target SAR identified as having a moderate or high potential to occur in the vicinity of the site, to confirm use of habitats. Observations of wildlife and vegetation during all surveys will be documented and a running list maintained for inclusion in the NER.

Species-specific surveys will also provide data for evaluation of significant wildlife habitat (SWH). All surveys will be completed using provincially-approved methods and guidelines.

- Three-season plant community assessment (using Ecological Land Classification [ELC]) and botanical inventory (spring, summer and late summer). Due to the large size of the site, the botanical inventory will be limited to dominant species in each ELC community. Based on preliminary knowledge of the site, the potential for SAR plants is anticipated to be minimal and specific surveys for rare plants will not be required. However, all rare plants observed in the field will be recorded.
- Verification of any on-site wetlands and evaluation using the Ontario Wetland Evaluation System [OWES] where necessary).
- Woodland dripline delineation. Woodlands will be assessed for significance based on the applicable in-effect policies contained in the relevant Provincial Plans, Region of Peel Official Plan and Town of Caledon Official Plan. The boundary of significant woodlands will be delineated using a handheld GPS and verified with the Town of Caledon, the Region of Peel and CVC.
- Two rounds of breeding bird surveys.
- Three rounds of nighttime anuran (frog and toad) call count surveys.
- Turtle habitat assessment.
- Qualitative aquatic/fish habitat assessment of the on-site watercourses. “Windshield” survey of the watercourses that will be monitored as part of surface water assessment. Only the portion of the watercourses that intersect a public road or access will be assessed. The Credit River will not be assessed. It is assumed that there is sufficient background fish community data available for all watercourses and a fish inventory is not required.
- Bat habitat assessment. Golder will complete an assessment for habitat suitability for maternity roosting and for hibernacula.
- Bat acoustic assessment. Golder will deploy up to seven acoustic detectors to be located throughout the site in areas identified as suitable maternity roost habitat, during the bat habitat assessment. Acoustic monitoring will not be completed in the mapped/designated significant woodlands.
- Wildlife habitat assessment, including SWH. VES will be completed using MNRF-approved protocols to search for wildlife, including mammals, amphibians, reptiles, etc. Focus will be given to habitat edges and all signs of wildlife (e.g., scat, fur, browse, etc.) will be documented.

2.3 Impact Assessment and Reporting

The data collected will be analysed in conjunction with the background data and integration with other disciplines, including hydrogeological and surface water studies. The impact assessment will consider all potential impacts of the proposed extraction on the natural environment on the site, and up to the distance of the expected groundwater drawdown zone. Where relevant, the impact assessment will evaluate wetland water balance based on guidance from Toronto and Region Conservation Authority (TRCA) documents: Wetland Water Balance Risk Evaluation (2017), Water Balance Guidelines for the Protection of Natural Features (2012), and Wetland Water Balance Monitoring Protocol (2016). The results of the desktop review, SAR screening, any consultation with

agencies, field surveys, and the impact assessment will be incorporated into a report that satisfies the requirements of both the NER, including relevant figures, under the ARA and an Environmental Impact Study (EIS) for the Town of Caledon and the Region of Peel. Mitigation measures and recommendations on suitable setbacks from natural features with appropriate rationale will also be included.

Where relevant, this study shall be shared with other technical experts completing studies for the application to avoid internal inconsistencies.

In addition, Golder will provide proactive input to the development of the site plans, including the progressive and final rehabilitation plans for the site, in consultation with the planner. It is anticipated that the analysis will also facilitate discussions of potential regional enhancement opportunities.

3.0 CLOSURE

We trust that this technical memorandum meets your current needs. Please contact the undersigned with any questions or comments.

Golder Associates Ltd.

Heather Melcher, MSc
Director, Ecology

Craig De Vito, PEng
Surface Water Engineer

George Schneider, MSc, PGeo
Senior Geoscientist

HM/CDV/GS/mp

Attachments: Attachment A – Groundwater Monitoring Well Network Details

ATTACHMENT A

Groundwater Monitoring Well Network Details

TABLE 1 - SUMMARY OF MONITORING WELLS INSTALLED
PROPOSED CBM CALEDON QUARRY

Drilled Name:	Date Drilled:	Easting (m) UTM 17T	Northing (m) UTM 17T	Elevation (masl)	Total Hole Depth (mbgs):	Depth of casing (mbgs):	Depth to Bedrock (mbgs):	Depth to bottom of Gasport (mbgs)	Depth to top of Cabot Head (mbgs):	Downhole Geophysics Completion	Packer Testing Completion	Mon Well Completion	Deep (A) Well Stickup (m)	Deep (A) Well Formation	Screen from (m)	Screen to (m)	Shallow (B) Well Stickup (m)	Shallow (B) Well Formation	Screen from (m)	Screen to (m)
MW20-01(CAL) A/B	27-Feb-20	577458.50	4852268.28	395.10	19.41	9.06	8.53	14.86	17.32	13-Mar-20	19-Mar-20	20-Mar-20	0.99	Shaley Dolostone or Cabot Head Fm	15.40	17.10	0.99	Gasport Fm	11.10	12.62
MW20-02(CAL)	02-Mar-20	577900.04	4852138.37	399.63	19.57	15.94	15.24	18.05	19.57	11-Mar-20	N/A	23-Mar-20	1.05	Shaley Dolostone or Cabot Head Fm	16.96	18.48				
MW20-03(CAL)	04-Mar-20	578243.54	4851907.30	390.67	35.97	N/A	34.44	Not present	35.66	N/A	N/A	05-Mar-20	1.00	Overburden	15.58	18.63				
MW20-04(CAL)	06-Mar-20	578264.75	4852313.19	399.46	18.50	15.08	14.33	Not present	16.54	13-Mar-20	N/A	24-Mar-20	1.04	Shaley Dolostone or Cabot Head Fm	16.11	17.63				
MW20-05(CAL) A/B	09-Mar-20	578423.10	4852712.60	399.63	14.84	2.06	1.52	10.60	13.91	20-Mar-20	25-Mar-20	25-Mar-20	1.00	Shaley Dolostone or Cabot Head Fm	12.25	13.77	1.00	Gasport Fm	4.25	5.77
MW20-06(CAL) A/B	10-Mar-20	578474.24	4852972.59	400.15	16.03	2.32	2.14	10.96	14.25	23-Mar-20	26-Mar-20	26-Mar-20	0.99	Gasport Fm	10.12	11.64	0.99	Gasport Fm	4.20	5.72
MW20-07(CAL) A/B	11-Mar-20	578359.89	4853250.44	404.07	19.45	2.74	2.13	13.20	16.40	18-Mar-20	01-Apr-20	01-Apr-20	0.77	Shaley Dolostone or Cabot Head Fm	15.11	16.63	0.77	Gasport Fm	9.74	11.26
MW20-08(CAL) A/B	13-Mar-20	578009.81	4853574.83	406.93	18.59	2.74	1.98	15.10	17.32	19-Mar-20	30-Mar-20	31-Mar-20	0.92	Gasport Fm	13.30	14.82	0.92	Gasport Fm	5.38	6.90
MW20-09(CAL)	17-Mar-20	578343.84	4854157.49	399.95	9.01	5.79	5.33	Not Present	7.48	26-Mar-20	N/A	07-Apr-20	1.01	Shaley Dolostone or Cabot Head Fm	6.85	8.37				
MW20-10(CAL) A/B	19-Mar-20	577837.95	4854407.28	411.32	21.19	12.04	10.97	16.76	19.55	24-Mar-20	08-Apr-20	08-Apr-20	0.92	Shaley Dolostone or Cabot Head Fm	18.62	20.14	0.89	Gasport Fm	14.49	16.01
MW20-11(CAL) A/B	24-Mar-20	577671.98	4853921.39	409.72	19.39	3.07	2.13	16.46	18.16	07-Apr-20	14-Apr-20	15-Apr-20	1.03	Gasport Fm	13.81	15.33	1.01	Gasport Fm	3.96	5.48
MW20-12(CAL) A/B	26-Mar-20	577271.90	4854321.42	412.43	22.65	5.94	3.66	19.80	21.66	08-Apr-20	17-Apr-20	17-Apr-20	1.02	Gasport Fm	17.09	18.62	1.01	Gasport Fm	4.42	5.94
MW20-13(CAL) A/B	08-Apr-20	576873.11	4854473.14	415.53	28.23	15.08	13.10	23.92	25.68	15-Apr-20	23-Apr-20	24-Apr-20	0.93	Shaley Dolostone or Cabot Head Fm	24.05	25.57	0.93	Gasport Fm	18.14	19.66
MW20-13 (CAL) C	08-Apr-20	576873.11	4854473.14	415.53	5.10	N/A	N/A	N/A	N/A	N/A	N/A	08-Apr-20	0.93	Overburden	3.08	4.60				
MW20-14(CAL) A/B	28-Apr-20	577575.99	4853100.42	406.71	26.35	2.74	2.29	22.40	24.50	14-May-20	26-May-20	26-May-20	0.96	Shaley Dolostone or Cabot Head Fm	22.60	24.12	1.05	Gasport Fm	14.98	16.50
MW20-15(CAL) A/B	20-May-20	576576.79	4853544.15	417.06	37.17	12.30	11.60	33.84	35.62	27-May-20	08-Jun-20	09-Jun-20	0.70	Shaley Dolostone or Cabot Head Fm	33.77	35.29	0.71	Gasport Fm	28.81	30.33
MW20-15 (CAL) C	20-May-20	576576.79	4853544.15	417.06	5.00	N/A	N/A	N/A	N/A	N/A	N/A	20-May-20	0.70	Overburden	2.74	4.27				
MW20-16(CAL) A/B	22-May-20	576784.58	4853806.76	421.40	39.77	14.90	11.90	35.52	37.28	26-May-20	10-Jun-20	10-Jun-20	1.05	Gasport Fm	34.84	36.36	1.05	Gasport Fm	16.80	18.33
MW20-17(CAL) A/B	26-May-20	576752.28	4852966.36	406.64	28.82	3.15	3.05	24.84	27.49	01-Jun-20	02-Jun-20	02-Jun-20	1.05	Shaley Dolostone or Cabot Head Fm	25.64	27.16	0.99	Gasport Fm	12.75	14.27
MW20-18(CAL)	09-Jun-20	577058.36	4852658.80	404.29	28.15	12.19	11.88	23.80	26.06	12-Jun-20	15-Jun-20	15-Jun-20	1.03	Gasport Fm	12.42	13.94				
MW20-19(CAL) A/B	27-Oct-20	576906.96	4851999.96	396.98	27.39	6.20	2.14	22.05	24.48	29-Oct-20	30-Oct-20	31-Oct-20	1.07	Gasport Fm	15.95	17.47	1.07	Gasport Fm	8.00	9.52
MW20-20(CAL) A/B	29-Oct-20	576476.35	4852467.69	403.00	27.99	5.98	2.14	25.15	27.18	30-Oct-20	03-Nov-20	03-Nov-20	0.82	Shaley Dolostone or Cabot Head Fm	25.33	26.85	0.82	Gasport Fm	12.97	14.49
MW20-20(CAL) C	03-Nov-20	576476.26	4852468.33	403.00	5.00	N/A	2.14	N/A	N/A	N/A	N/A	03-Nov-20	0.96	Gasport Fm	2.42	3.95				
MW20-21(CAL) A/B	04-Nov-20	576014.37	4852839.77	415.23	39.70	15.10	12.51	36.73	38.38	05-Nov-20	06-Nov-20	07-Nov-20	1.07	Gasport Fm	33.27	34.79	1.07	Gasport Fm	15.77	17.29
MW20-22(CAL) A/B	18-Nov-20	575785.36	4851966.28	399.27	30.75	5.94	4.57	28.16	29.81	18-Nov-20	N/A	19-Nov-20	0.97	Goat Island Fm	23.47	25.00	0.97	Goat Island Fm	6.89	8.41
MW20-23(CAL) A/B	23-Nov-20	576205.53	4851555.91	395.05	26.76	12.19	11.28	23.54	25.30	24-Nov-20	N/A	24-Nov-20	0.87	Shaley Dolostone or Cabot Head Fm	22.59	24.11	0.87	Goat Island Fm	14.68	16.20
MW20-23 (CAL) C	23-Nov-20	576205.91	4851556.34	395.00	7.00	N/A	N/A	N/A	N/A	N/A	N/A	23-Nov-20	0.88	Overburden	4.57	6.09				
MW20-24(CAL) A/B	03-Dec-20	575337.66	4854341.85	437.75	37.49	20.88	20.11	37.49	N/A	04-Dec-20	N/A	04-Dec-20	0.87	Gasport Fm	33.81	35.33	0.87	Goat Island Fm	21.49	23.02
MW20-25(CAL) A/B	10-Dec-20	574853.76	4852900.48	419.02	51.82	13.39	10.52	48.93	50.67	10-Dec-20	N/A	11-Dec-20	1.56	Gasport Fm	44.03	45.55	1.55	Goat Island Fm	16.84	18.36
MW20-26(CAL) A/B	17-Dec-20	574373.86	4853638.42	438.89	66.11	15.55	12.19	64.55	66.11	18-Dec-20	N/A	21-Dec-20	1.16	Gasport Fm	55.16	56.68	1.16	Goat Island Fm	31.12	32.64
MW20-26 (CAL) C	17-Dec-20	574375.17	4853637.62	438.88	10.00	N/A	N/A	N/A	N/A	N/A	N/A	17-Dec-20	1.07	Overburden	7.26	8.78				
MW20-27(CAL) A/B	12-Feb-21	575953.96	4853770.16	431.15	52.43	31.24	28.96	50.32	51.93	17-Feb-21	N/A	18-Feb-21	0.97	Goat Island Fm	41.99	43.51	0.98	Goat Island Fm	33.85	35.37
MW20-28(CAL) A/B	22-Feb-21	576139.79	4854987.82	419.31	30.82	12.80	12.19	28.45	30.20	23-Feb-21	N/A	23-Feb-21	0.96	Gasport Fm	24.07	25.59	0.93	Gasport Fm	16.51	18.03

LEGEND

- MONITORING WELL
- MONITORING WELL (PUMPING TEST)
- TEST WELL
- HISTORICAL MONITORING WELL
- TOWN/VILLAGE
- WATERCOURSE
- ROAD
- WATERBODY
- WETLAND
- PRELIMINARY PROJECT LOCATION

0 500 1,000

1:15,000 METRES

NOTE(S)

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. IMAGERY FIRSTBASE SOLUTIONS SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
   SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT
CALEDON QUARRY

TITLE
2020-2021 MONITORING AND PUMPING WELL LOCATIONS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-08-26
DESIGNED	CGE
PREPARED	CGE
REVIEWED	GP
APPROVED	-

PROJECT NO.	CONTROL	REV.	FIGURE
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APPENDIX B

Author / Qualified Person CVs

Education

MSc. Earth Sciences, University of Waterloo, 1995

BSc. Honours Earth Sciences, Physics Minor, University of Waterloo, 1987

Areas of Experience

Large Project Management

Aggregates

Water Resources and Protection

Nuclear Waste Management

Mine Site and Tailings Investigations

Explosives Site Assessment

Contaminated Site Assessment

Geothermal Energy

Waste Management

Engineering Geophysics

Archaeology

Applied Geophysics Research

George Schneider, MSc., P.Geo.

PROFESSIONAL SUMMARY

George Schneider is a Senior Geoscientist and Principal with Golder's Greater Toronto Area (GTA) Operations and has over 30 years of professional experience. George received his B.Sc. (1987) and M.Sc. (1995) in Earth Sciences from the University of Waterloo. From 1987 to 1995, he was a researcher in the Geophysics Laboratory at the Centre for Groundwater Research at the University of Waterloo and has co-authored more than 25 technical publications. George joined Golder in 1995; he became an Associate in 2002 and a Principal in 2006. George is a Professional Geoscientist registered in the Province of Ontario.

EMPLOYMENT HISTORY

Principal / Senior Geoscientist, Golder Associates (2013 to Present)

Cambridge, Ontario

Project Manager / Director responsible for multi-disciplinary projects including: nuclear waste management, explosives site remediation, mine site rehabilitation, aggregate resource studies, and groundwater supply and source water protection studies. George has been with Golder for 23 years, he is currently a leader of the Canadian Nuclear Services Group, responsible for project management, business development and client relations.

George is currently serving as a member of the Lake Erie Source Protection Committee (LESWPC) and the Waterloo-Wellington-Brant Regional Committee of the Ontario Stone Sand and Gravel Association (OSSGA).

Principal / Division Manager, Golder Associates (2006 to 2013)

Mississauga, Cambridge and Whitby, Ontario

Project director responsible for a range of multi-disciplinary projects including: environmental investigations at explosive contaminated sites and mine sites, aggregate resource studies, groundwater supply and management studies and nuclear waste management. Managed the Environmental Services Division in the GTA including: Geosciences, Geophysics, Site Characterization and Restoration, Environmental Due Diligence, Hydrogeology and Waste Management and Field Technician Groups.

Associate / Senior Project Manager, Golder Associates (2002 to 2005)

Mississauga, Ontario

Senior geoscientist responsible for the management of a diverse range of projects including: environmental investigations at explosive contaminated sites, aggregate resource studies, hydrogeological studies and geophysical investigations in support of hydrogeological studies, environmental site

assessments, mine site developments, aggregate resource studies and geotechnical investigations.

Intermediate, then Senior Geoscientist, Golder Associates (1995 to 2002)

Waterloo, then Mississauga, Ontario

Responsible for project management, performing geophysical, geological and hydrogeological field investigations, numerical data analysis, data assessment, and reporting for: aggregate resource studies, groundwater resource studies, permits to take water, assessment of contaminated sites, geotechnical investigations and hydrogeologic characterization of mine tailings disposal and open pit mine sites.

Collected, processed and interpreted data for a variety of land and marine geophysical techniques including: time and frequency domain electromagnetics, magnetics, gravity, ground penetrating radar (GPR), seismic reflection and refraction, acoustic tomography, pulse velocity testing of man-made structures, cross-hole seismic testing, leak detection, vertical seismic profiling (VSP), electrical resistivity imaging (ERI), borehole camera logging and geophysical well logging including: natural gamma, gamma-gamma, neutron, temperature, deviation, inductive conductivity, magnetic, caliper, resistivity, heat-pulse flowmeter and optical televiewer.

Geophysicist, Waterloo Centre for Groundwater Research (1987 to 1995)

University of Waterloo, Waterloo, Ontario

Conducted geophysical field investigations and drilling programmes under the direction of Dr. J.P. Greenhouse and Dr. P.F. Karrow in the Waterloo Region related to the quaternary geology and the assessment of water resources in the Region including: seismic surveys, borehole geophysical surveys and two Rotasonic drilling programmes. Compiled three editions of a catalogue of geophysical logs for the Waterloo Region from 1988 to 1993. Co-authored more than 20 research papers, reports and posters, including 13 publications on the quaternary geology and/or water resources of the Waterloo Region.

Designed and constructed borehole and resistivity geophysical instruments, digital data acquisitions systems and developed innovative computer software for geophysical and hydrogeological applications. Carried out surface, borehole and laboratory geophysical investigations in support of more than 85 groundwater-related research projects including: geophysical investigations of DNAPL/LNAPL contamination, delineation of aquifers, groundwater contaminant plumes and karst features.

Other duties included: teaching assistance for University of Waterloo Earth Sciences and Geophysics courses and organization of technical conferences, short courses and field demonstrations.

RELEVANT EXPERIENCE

Project Experience – Large Project Management (>$1M)

Phase 2 Initial Drilling and Testing, Ignace - NWMO (2017- 2020)
Ignace, Ontario

Project manager and senior geoscientist responsible for the Phase 2 Initial Borehole Drilling and Testing in the Ignace Area. Main point of contact to NWMO responsible for project management, HSSE, QA/QC, schedule tracking, budget and earned value tracking, change management, and subcontractors. Managed daily activities on the project including planning and coordination of multiple work packages, including site infrastructure setup, drilling, core logging, core sampling, downhole geophysics, hydraulic testing, and the installation of Westbay monitoring systems.

Phase 1 and Phase 2 Geoscientific and Environmental Studies - NWMO (2009-2017)
Canada

Project manager responsible for geoscientific, geophysical and environmental studies conducted by Golder for NWMO including reports on: assessment of geophysical methods for site characterization, Initial Screenings, Phase 1 Geoscientific Assessments, Phase 1 Reports on Environment and Safety, and Phase 2 OGGF and Detailed Mapping. Specific experience at Ignace and other communities in northern Ontario and Saskatchewan.

IUS Project – Region of Waterloo (2005-2014)
Waterloo Region, Ontario

The hydrogeological assessment and permitting of existing and potential new Municipal supply Wells for the Region of Waterloo's Integrated Urban Supply System. Project manager, responsible for technical tasks, invoicing, budgeting, tendering and contract administration, presentations, interim and final reporting. Performed a technical role in the water supply development and expansion tasks carried out at the Chicopee, Breslau, Fountain Street, Lancaster, Seagrams and Waterloo North study areas.

Coldstream Mine Site - EWL Management Ltd. (2003-2015)
Kashabowie, Ontario

Project Manager and senior geoscientist responsible for environmental investigations and remediation at this former mine site. Work has included surface water, groundwater and ecological studies, assessment of above water and below water tailings management areas, ecological and human health risk assessment, tailings relocation, spillway and watercourse improvements, predictive modelling, public consultation, and negotiations with regulatory agencies.

CIL Explosives Site – Akzo Nobel Coatings Ltd. (1998-2019)
Parry Sound, Ontario

Project Manager and senior geoscientist responsible for environmental investigations and remediation at this former mine site. Work has included surface water, groundwater and ecological studies, assessment of above water and below water tailings management areas, ecological and human health risk assessment, tailings relocation, spillway and watercourse improvements, predictive modelling, public consultation, and negotiations with regulatory agencies.

McMasterville Site – Akzo Nobel Coatings Ltd. (1999-2016)
McMasterville, Quebec

Project manager for the assessment and remediation of this former explosives and fertilizer manufacturing site, which operated from the 1890 to 1999 and manufactured a wide range of products including TNT, nitroglycerine, PETN, slurries, and fertilizers. Work has included: geophysical investigations, remote control drilling for explosives contaminants, Phase I ESA, Phase II ESA, risk assessment, ecological assessment, diversion and repatriation of a creek, construction of an onsite landfill and risk-managed area, and ongoing surface water and groundwater monitoring.

Project Experience – Aggregates

Aggregate Licence Investigations (2019-present) Caledon, Ontario	Project Director and Senior Technical Reviewer for resource and hydrogeological technical studies at the Caledon properties for CBM Aggregates for a future below water table quarry licence application near Caledon, Ontario.
Aggregate Licence Investigations (2018-present) Peterborough, Ontario	Project Director and Senior Technical Reviewer for hydrogeological, natural environment and cultural heritage technical studies at the Blezard property for CBM Aggregates near Peterborough, Ontario.
Resource Evaluation – CBM (2018) Ayr, Ontario	Project Manager and Senior Technical Reviewer for an aggregate resource assessment at the Bromberg Pit for CBM Aggregates near Ayr Ontario.
Resource and Hydrogeological Investigation – CBM (2018) Dorchester, Ontario	Project Director and Senior Technical Reviewer for aggregate resource and hydrogeological studies at the Dorchester Pit for CBM Aggregates to support a Site Plan Amendment.
Resource and Hydrogeological Investigation – CBM (2018) Thamesford, Ontario	Project Director and Senior Technical Reviewer for aggregate resource and hydrogeological studies at the Thamesford Pit for CBM Aggregates to support a Site Plan Amendment.
Aggregate Licence Investigations – CBM (2018-present) Puslinch, Ontario	Project Director and Senior Technical Reviewer for hydrogeological, natural environment and cultural heritage studies at the Lake property for CBM Aggregates in Puslinch, Ontario.
Resource and Hydrogeological Investigation – CBM (2017) Puslinch, Ontario	Project Director and Senior Technical Reviewer for aggregate resource and hydrogeological studies at the Lanci Pit for CBM Aggregates to support a Site Plan Amendment.
Resource Evaluation – CBM (2017) North Dumfries, Ontario	Project Manager and Senior Technical Reviewer for an aggregate resource assessment at the Dabrowski Pit for CBM Aggregates.
Resource Evaluation – CBM (2017) Puslinch, Ontario	Project Manager and Senior Technical Reviewer for an aggregate resource assessment at the McNally Pit in support the expropriation of land for highway development at the McNally Pit for CBM Aggregates.
Resource and Hydrogeological Investigation – CBM (2016) North Dumfries, Ontario	Project Director and Senior Technical Reviewer for an aggregate resource evaluation and Level 1&2 Hydrogeological Assessment at the Dance Pit for CBM Aggregates in North Dumfries, Ontario.
Imported Fill Investigation – CBM (2016) Limehouse, Ontario	Project Manager for a soil sampling investigation to confirm imported soil quality at the CBM Pit near Limehouse, Ontario.
Resource Evaluation – CBM (2016) Orangeville, Ontario	Project Director and Senior Technical Reviewer for an aggregate resource evaluation at the Gray Pit for CBM Aggregates near Orangeville, Ontario.

Resource and Hydrogeological Investigation – CBM (2016) North Dumfries, Ontario	Project Director and Senior Technical Reviewer for an aggregate resource evaluation and Level 1&2 Hydrogeological Assessment at the Dance Pit for CBM Aggregates in North Dumfries, Ontario.
Aggregate Investigations - MTO Northeast (2015) North Bay, Ontario	Project Manager for aggregate investigations on numerous Crown land sites for MTO Northeast. Work included resource assessments, Level 1 / 2 Hydrogeological, Natural Heritage and Cultural Heritage Assessments, in support of Pit and Quarry Permits.
Resource Evaluation and Expert Testimony- Ministry of Transportation Ontario (2013-2014) Ontario	Provided specialized forensic engineering / geological advice and services related to aggregate resources on a property in northern Ontario. Work included resource modelling and resource valuation for a variety of potential land development scenarios.
Resource Evaluation Arriscraft International (2011) Ontario	Conducted a geological testing program and completed a resource evaluation of the Hill Top Pit Property in Kitchener, Ontario. Resource evaluation results were used in the appraisal of the property for the purposes of acquisition.
Aggregate Properties Valuation – Confidential (2011) Ontario, Alberta	Conducted valuation studies of more than a dozen aggregate properties in Ontario and Alberta to estimate the net present value of these properties for the purposes of financing.
Aggregate Source Investigations – MTO (2010-2011) Northeastern Ontario	Project Director and senior technical reviewer for the geological and hydrogeological components of the 2010 Northeastern Region Aggregate Source Investigation (MTO Assignment NO. 5010-E-0003) which included assessment and permitting studies for 23 sites across Ontario.
Resource Evaluation, Weeks Pit and Quarry – Altus Group (2010-2011) Parry Sound, Ontario	Senior technical review for an investigation to estimate the total aggregate resources available at the Weeks Pit and quarry property, in order to assist in the valuation of the property to settle an expropriation dispute with the owner and the MTO.
Feasibility Assessment – Lafarge (2010) Harvey Township, Ontario	Senior technical review for an investigation to assess the feasibility for the development of a limestone quarry on the Buckhorn Property in support of the renewal of a mining lease for the property.
Soil Borrow Search - IBI Group (2009-2010) Niagara, Ontario	Senior technical reviewer for a soil borrow search in the Niagara Region for the MTO, in support of new construction activities on Highway 406.
Geophysical Investigation – Confidential (2007) Ontario	Project manager and senior technical advisor for a geophysical and test pitting investigation at a confidential quarry site in Ontario to assess the potential presence of buried waste, as part of a legal claim.
Preliminary Resource Evaluation – SCAW (2004) Caledon, Ontario	Directed junior staff in a preliminary assessment of the potential for aggregate resources to be present on a property in Caledon, Ontario on behalf of the property owner.

Borehole Geophysical Logging – Confidential (2004)
Brechin, Ontario

Acquired gamma and conductivity borehole geophysical logs at a property near Brechin, Ontario for a confidential client.

Acton Quarry Escarpment Seep Investigation - Dufferin Aggregates (2003)
Acton, Ontario

Led a multidisciplinary project team in an investigation to assess hydrogeologic conditions at Phase 2 of the Acton Quarry and develop conceptual designs for short term and long term hydrogeologic mitigation systems to maintain seep flow in the Guelph-Amabel Formation along the Niagara Escarpment, immediately adjacent to advancing quarry workings.

Resource Evaluation – Dufferin Aggregates (2003)
Ontario

Led a project team to carry out a resource evaluation of the Mosport West Pit property for Dufferin Aggregates. The project involved the integration of high quality coring methods, gradation testing of core samples and ERI (electrical resistivity imaging) geophysical surveying to develop realistic 3D subsurface geologic models for these properties, from which available resources were then estimated and areas of preferred extraction were identified. Duties included: planning, ERI field QA/QC, ERI interpretation, correlation of geophysical and gradation data to establish empirical relationships between ERI response and resource quality and reporting.

ERI Investigation – Nelson Aggregates (2003)
Burlington, Ontario

Directed junior staff in an ERI geophysical investigation to map overburden thickness and assess the underlying rock for karst potential as part of a Level 2 Hydrogeological Assessment under the Aggregate Resources Act, for the planned expansion of the Nelson Quarry in Burlington, Ontario.

Aggregate Resource Evaluation – Confidential (2003)
Sudbury, Ontario

Carried out an evaluation of the potential aggregate resources present on properties in Dill Township near Sudbury, Ontario in support of the appraisal of the properties, which were to be expropriated from the owner by the MTO for the construction of an interchange and highway realignment.

Overburden Investigation – Dufferin Aggregates (2002)
Milton, Ontario

Conducted an ERI (electrical resistivity imaging) and test pitting investigation to develop a 3D model of overburden thickness and the top of bedrock to assist in planning overburden stripping requirements for Dufferin Aggregates in the Western Extension of the Milton North Quarry. Responsible for all aspects of planning, acquisition, processing, interpretation and reporting, as well as client liaison.

Gravel Pit Evaluation - Township of Perth East (2002)
Shakespeare, Ontario

Conducted an investigation to complete a resource evaluation, assess the net present value and make recommendations for optimization to the Perth East Gravel Pit near Shakespeare, Ontario. The Project Team consisted of Golder Associates Ltd., Beck and Associates GeoConsultants Inc. and MHBC Planning Ltd.

Aggregate Properties Valuation – Confidential (2002)
Ontario

Led a multidisciplinary project team which conducted valuations studies of four large aggregate properties in Ontario to estimate the net present value of these properties for the purposes of obtaining bank financing. The Project Team consisted of Golder Associates Ltd., Beck and Associates GeoConsultants Inc. and MHBC Planning Ltd.

Acton Quarry Resource Evaluation – Dufferin Aggregates (2002)
Acton, Ontario

Conducted a resource evaluation and estimated overburden stripping requirements for Phase 3 of the Acton Quarry, which involved ERI geophysical surveying, test pitting and drilling. Responsible for all aspects of

planning, acquisition, processing, interpretation and reporting, as well as client liaison.

Overburden Investigation – Dufferin Aggregates (2001)
Milton, Ontario

Conducted a GPR and test pitting investigation to develop a 3D model of overburden thickness and the top of bedrock to assist in planning overburden stripping requirements for Dufferin Aggregates in the Milton North Quarry. Responsible for all aspects of planning, acquisition, processing, interpretation and reporting, as well as client liaison.

Quarry Resource Assessment – Dufferin Aggregates (2001)
Ontario

Acquired, processed, interpreted and reported gamma and conductivity geophysical log surveys in test boreholes at the Ogden Point Limestone Quarry to identify the stratigraphy within a Regional context and infer the suitability of strata within the quarry for use in the manufacture of cement products, based on experience elsewhere in Ontario.

Resource Evaluations – Dufferin Aggregates (1998-1999)
Ontario

Helped conduct sand and gravel resource evaluations as part of a multidisciplinary project team for Dufferin Aggregates at sand and gravel properties in Ontario including Mosport Pit 1 and 2, Bethany, TRT, Mill Creek, Paris and Naylor properties. The projects involved the integration of high quality coring methods, gradation testing of core samples and ERI (electrical resistivity imaging) geophysical surveying to develop realistic 3D subsurface geologic models for these properties, from which available resources were then estimated and areas of preferred extraction were identified. Duties included: ERI modelling and interpretation, 3D geological modelling, correlation of geophysical and gradation data to establish empirical relationships between ERI response and resource quality, volume and tonnage estimates and reporting.

Project Experience – Water Resources and Protection

Hydrogeological Assessment – Cambridge Zone 3 Class EA – Region of Waterloo (2016-2019) Cambridge, Ontario	As a subcontractor to GM BluePlan, completed a hydrogeological assessment for the Region of Waterloo of the Cambridge Zone 3 Well Field, as part of a class EA, to examine options to increase the sustainable water supply capacity of the well field. Project Director and Senior Technical Reviewer.
Hydrogeological Assessment – Harrington McAvan (2015 – 2019) Puslinch, Ontario	Carried out a hydrogeological and geotechnical assessment to support the re-zoning and future redevelopment of a property near Puslinch, Ontario for Farhi Holdings, including a preliminary assessment of potential water resources and septic capacity. Project Manager and Senior Technical Reviewer.
Municipal Well Construction and Testing (2015-2019) Waterloo Region, Ontario	Project manager, contract administrator and senior technical reviewer for the construction and testing of new municipal supply wells in 2015 at K21, K4A and W6A/B and in 2016 at NH3 and Maryhill. Designed, constructed and permitted new supply wells at each of these sites in order to replace older wells with performance problems, provide system redundancy and help ensure the well fields can deliver their full permitted capacity.
Hydrogeological Assessment of Production Wells K23 and K24 (2014-2018) Waterloo Region, Ontario	Senior technical reviewer for the hydrogeological assessment of wells K23 and K24, initiated in 2014 to better understand increasing nitrate concentrations in the wells due to nearby anthropogenic sources, primarily septic systems and agricultural fertilizers. The investigation is developing an improved understanding of the hydrogeology, aquifer vulnerability and water quality in areas around the supply wells and the interrelationships between the wells and potential contaminant sources.
Hydrogeologic Data Analysis Software System Update (2014-present) Waterloo Region, Ontario	Project manager and senior technical reviewer for the selection and implementation of a new hydrogeologic data analysis (HDA) system for the Region. The project involved a detailed assessment of the Region's current and future data needs, the procurement and evaluation of potential commercial software solutions, and the implementation of the new software database and tools.
Hydrogeologic and Source Water Protection Services (2013-2018) Centre Wellington, Ontario	Senior technical reviewer for hydrogeologic and source water protection services provided on an as-needed basis to the Township of Centre Wellington. The work includes on-going investigations and monitoring related to source water "Issues", as well as the evaluation of the hydrogeological aspects of infrastructure and development projects on behalf of the Township.
Hydrogeologic Services - Cambridge Aggregates (2008-present) North Dumfries and Brant, Ontario	Senior technical reviewer for various projects for Cambridge Aggregates related to the development of large volume groundwater supply wells and Permits to Take Water for aggregate washing, and hydrogeological assessments in support of new licence applications and licence expansions under the Aggregate Resources Act.
Water Supply Class EA – Region of Waterloo (2010-2012) West Montrose, Ontario, Canada	Senior technical reviewer for the hydrogeological component of a Water Supply Class Environmental Assessment for West Montrose. The hydrogeological component involved the exploration for an additional water supply within West Montrose. Through a field program involving drilling, hydraulic testing and water quality sampling a potential groundwater supply source was identified and carried forward as part of the assessment.

TICS Project – Region of Waterloo (2009-2012) Waterloo Region, Ontario	Project manager for the Threats Inventory and Circumstances Survey (TICS) project for the Region of Waterloo. The project involved conducting Canada's largest drinking water census across the Waterloo Region and the evaluation of potential threats to drinking water sources in the Waterloo Region for each well field and surface water intake source.
Waterloo North Water Supply Class EA – Region of Waterloo (2008-2012) Waterloo Region, Ontario	Senior technical advisor to the class EA project carried out for the Region of Waterloo with AECOM to develop additional groundwater supply wells in North Waterloo and Erbsville. The project involved the drilling of a new test supply well and a long term pumping test of three new supply wells, along with an extensive groundwater monitoring program.
New Wells Project – Region of Waterloo (2008-2009) Waterloo Region, Ontario	Senior technical advisor to the project to install over 40 new monitoring wells nests throughout the Waterloo Region. Focus was on senior technical review and the interpretation of overburden and bedrock stratigraphy based on core logs, core photographs and samples, grain size analysis and geophysical logs, using nomenclature recently developed by the Ontario Geologic Survey (OGS).
Land Use Designations for Source Water Protection – Brookfield Homes (2007) Paris, Ontario	Manager and senior technical review on a project to evaluate potential changes in land use designation within WHPAs and the associated change in risk to groundwater to well fields, that have high aquifer vulnerability ratings for a proposed development in Paris, Ontario.
Geophysical Investigation, Middleton Wellfield – Stantec (2005) Cambridge, Ontario	Manager and senior technical reviewer on a project to use geophysical methods to map the top of bedrock and identify buried infrastructure around the Middleton Wellfield, in order to identify potential contaminant pathways to the shallow bedrock aquifer system.
IUS Project – Region of Waterloo (2005-present) Waterloo Region, Ontario	The hydrogeological assessment and permitting of existing and potential new Municipal supply Wells for the Region of Waterloo's Integrated Urban Supply System. Assistant project manager, responsible for technical tasks, invoicing, budgeting, tendering and contract administration, presentations, interim and final reporting. Performed a technical role in the water supply development and expansion tasks carried out at the Chicopee, Breslau, Fountain Street, Lancaster, Seagrams and Waterloo North study areas.
Permit to Take Water – Lafarge (2002) Guelph, Ontario	Completed a hydrogeologic study to support a permit to take water (PTTW) application for Lafarge Canada at the Guelph Asphalt and Ready Mix Concrete Plant in Guelph, Ontario.
Permit to Take Water – Lafarge (2002) New Lowell, Ontario	Completed a hydrogeologic study to support a permit to take water (PTTW) application for Lafarge Canada at the Home Pit in New Lowell, Ontario.
Permit to Take Water – Heritage Golf Club (2002) Barrie, Ontario	Completed a hydrogeologic study to support a permit to take water (PTTW) application for Heritage Golf Club near Barrie, Ontario. The work included the supervision and analysis of a 24 hour pumping test.
Geophysical Logging Investigation – Golder (1994) Cambridge, Ontario	Acquired, processed, interpreted and reported on gamma and neutron geophysical logs in a test supply well in Cambridge East, Ontario as part of a water supply development programme for Golder Associates.

Groundwater Study - Victoria County (2000) Oak Ridges Moraine, Ontario	Acquired gamma and conductivity geophysical logs in deep boreholes in the Oak Ridges Moraine as part of the Groundwater Study for Victoria County.
Oxford County Groundwater Study – Oxford County (2000) Stratford, Ontario	Acquired gamma, conductivity, heat pulse flowmeter and optical televiewer geophysical logs in Municipal Supply wells in the Town of Stratford, Ontario, as part of the Oxford County Groundwater Study.
Permit to Take Water – Lafarge (2001) New Dundee, Ontario	Completed a hydrogeologic study to support a permit to take water (PTTW) application for Lafarge Canada at Warren Bitulithic's Seibert Pit in New Dundee, Ontario.
Rotasonic Drilling Programme – Waterloo Region University of Waterloo (1990-1991) Waterloo, Ontario	Under the direction of Dr. P.F. Karrow, carried out all aspects of two drilling programmes in 1990 and 1991 including: siting, permitting, utility clearances, drill supervision, well development, geophysical logging, vertical seismic profiling and reporting.
Borehole Geophysical Logging and Well Log Catalogue for the Waterloo Region University of Waterloo (1987-1993) Waterloo, Ontario	Under the direction of Dr. J.P. Greenhouse, acquired the first digital geophysical logs in the Waterloo Region including: gamma, density, neutron, resistivity, conductivity and caliper log data. Collected and digitized historic logs, as well as digital logs from local consultants. Compiled these logs into a Catalogue in Viewlog format. This log catalogue formed the basis of the current understanding of the quaternary geology and overburden aquifer system in the Waterloo Region.
Seismic Reflection and VSP Studies – Waterloo Region - University of Waterloo (1987-1995) Waterloo, Ontario	Under the direction of Dr. J.P. Greenhouse, carried out pioneering investigative work to optimise high resolution shallow seismic reflection and vertical seismic profiling geophysical methods for the characterisation of geology and aquifers in the Waterloo Region. This work culminated in the development of a controlled vibratory source for high resolution seismic surveys.

Professional Affiliations

Practising Member, Association of Professional Geoscientists of Ontario

Active Member, Society of Exploration Geophysicists

Member, Canadian Nuclear Society

Publications

Monier-Williams, M.E., Davis, R.K., Paillet, F.L., Turpening, R.M., Sol, S.J.Y. and Schneider, G.W. 2009. Review of Borehole Based Geophysical Site Evaluation Tools and Techniques. NWMO Technical Report TR-2009-25, 174 p.

Emsley, S., Schneider, G.W., Sol, S.J.Y., Fleming, J. and Fairs, J. 2008. Review of Satellite, Airborne and Surface Based Geophysical Tools and Techniques for Screening Potential Nuclear Repository Candidate Sites. NWMO Technical Report TR-2008-15, 143 p.

Gill, J.B. and Schneider, G.W. 2005. Innovative Aggregate Resource Evaluations using Electrical Resistivity Imaging. In the proceedings of the 56th Highway Geology Symposium, Wilmington, North Carolina, May 2005, 15 p.

Schneider, G.W., Nobes, D.C., Lockhard, M.A. and Greenhouse, J.P. 1997. Urban Geophysics in the Kitchener-Waterloo Region, Ontario. In: Environmental Geology of Urban Areas, Geological Association of Canada, Edited by Nicholas Eyles, pp. 457-464.

Nobes, D.C. and Schneider, G.W., 1996. Results of Downhole Geophysical Measurements and Vertical Seismic Profile from the Canandaigua Borehole of New York State Finger Lakes. In: Subsurface Geologic Investigations of New York Finger Lakes: Implications for Late Quaternary Deglaciation and Environmental Change, Special Paper 311, The Geological Society of America, Edited by Henry T. Mullins and Nicholas Eyles, pp. 51-64.

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contamination in Kitchener-Waterloo: A case study with policy implications. Waterloo '94, Abstracts of GAC-MAC Annual meeting, May, 1994.

Greenhouse, J.P., and Schneider, G.W., 1994. Geophysics and Groundwater Supply in the Waterloo Region. A Poster. Waterloo '94, Abstracts of GAC-MAC Annual Meeting, May, 1994.

Schneider, G.W., and Greenhouse, J.P., 1994. The Geophysical Log Catalogue for the Waterloo Region. A Poster. Waterloo '94, Abstracts of GAC-MAC Annual Meeting, May, 1994.

Endres, A.L., Coe, R.D., Gilson, E.W., Zawadzki, A.A., Schneider, G.W. and Greenhouse, J.P., 1993. The use of neutron logging methods for the detection and monitoring of chlorinated solvents: A quantitative study. Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems, San Diego, California, April 18-22, 1993, pp. 39-50.

Karrow, P.F., Greenhouse, J.P., Paloschi, J.V.R., and Schneider, G.W., 1993. The 1990-91 Rotasonic drilling programme. Final Report to the Ontario MOEE as part of work under grant #E564G, 181 p.

Schneider, G.W. 1993b. Geophysical well logs for the Waterloo Region and surrounding areas: A catalogue (Third Edition). Quaternary Sciences Institute Publication #9, Department of Earth Sciences, University of Waterloo, 699 p.

Schneider, G.W., DeRyck, S.M., and Ferre, P.A., 1993a. The application of automated high-resolution DC resistivity in monitoring hydrogeological field experiments. Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems, San Diego, California, April 18-22, 1993, pp. 145-162.

Annan, A.P., Brewster, M.L., Greenhouse, J.P., Redman, J.D., Schneider, G.W., Olhoeft, G.R., and Sander, K.A., 1992. Geophysical monitoring of DNAPL migration in a sandy aquifer. Expanded Abstracts SEG 62nd Annual Meeting, October, New Orleans, USA.

Brewster, M.L., Annan, A.P., Greenhouse, J.P., Schneider, G.W., and Redman, J.D., 1992. Geophysical detection of DNAPLs: Field experiments. IAH Conference "Modern Trends in Hydrogeology", May 10-13th, Hamilton, Ontario, Canada.

Schneider, G.W., and Greenhouse, J.P., 1992. Geophysical detection of perchloroethylene in a sandy aquifer using resistivity and nuclear logging techniques. Proceedings of the Symposium of the Application of Geophysics to Engineering and Environmental Problems, April 26-29th, 1992, Oakbrook, Illinois, USA, pp. 619-628.

Greenhouse, J.P., Brewster, M.L., Schneider, G.W., Redman, J.D., Annan, A.P., Olhoeft, G.R., Lucius, J., Sander, K.A., and Mazzella, A., 1991. Geophysics and solvents: The Borden experiments. The Leading Edge, Vol. 12, pp. 261-267.

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Greenhouse, J.P., Nobes, D.C., and Schneider, G.W., 1990. Groundwater beneath the city: A geophysical study. Ground Water Management, Vol. 2, pp. 1179-1191. Proceedings of the Fourth Annual Outdoor Action Conference on Aquifer Restoration, Groundwater Monitoring and Geophysical Methods, Las Vegas, Nevada, USA.

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Nobes, D.C., Schneider, G.W., and Hodgson, S., 1987. Discussion on: "Effects of porosity and clay content on wave velocities in sandstones". Geophysics, Vol. 52 pp. 1439.

Education

B.A.Sc Geological Engineering (Water Resources Option) University of Waterloo, Waterloo, Ontario, 1997

M.Sc. Earth Sciences (Hydrogeology), University of Waterloo, Waterloo Ontario, 2001

Certifications

Registered Professional Geoscientist, Association of Professional Geoscientists Ontario (PGO)

Registered Professional Engineer, Association of Professional Engineers Ontario (PEO)

Golder Associates Ltd. – Cambridge

Project Manager / Hydrogeologist

Greg is a Project Manager/Hydrogeologist within Golder's Cambridge office with over 20 years of experience in groundwater resource consulting. He is a graduate of the M.Sc. program in hydrogeology at the University of Waterloo where he studied groundwater contamination from agricultural activities near a municipal well field in Southern Ontario. Greg has technical experience in assessment of aquifer and well yields, groundwater exploration, development and protection, groundwater/surface water interactions, source water protection, groundwater under the direct influence of surface water investigations, groundwater monitoring, borehole geophysics interpretation, groundwater modelling, well installations, well maintenance and decommissioning and aggregate resource investigations. He is typically responsible for hydrogeologic analysis, interpretation and assessment, field supervision, report preparation and project management. Greg has been a project hydrogeologist and project manager for several large and challenging aggregate resource development projects in Ontario.

Employment History

Golder Associates Ltd. – Cambridge, Ontario

Hydrogeologist (2009 to Present)

Hydrogeologist and project manager responsible for the implementation and management of hydrogeological projects that encompass groundwater supply, development and protection. Greg has technical experience in assessment of aquifer and well yields, groundwater exploration, development and protection, groundwater/surface water interactions, source water protection, groundwater under the direct influence of surface water investigations, groundwater monitoring, borehole geophysics interpretation, well installations, well maintenance and decommissioning, and aggregate resource investigations.

Lotowater Technical Services Inc. – Paris, Ontario

Hydrogeologist (2000 to 2009)

Project hydrogeologist and project manager responsible for hydrogeologic assessments, water supply, development and protection projects, groundwater under the direct influence of surface water investigations and source water protection studies. Responsibilities included hydrogeologic analysis, interpretation and assessment, field supervision, report preparation, development and coordination of field investigation and/or monitoring programs and liaison with regulatory agencies. These projects typically included both a field investigation/testing component and a desk-top assessment/analysis. Projects included the exploration and development of groundwater supplies for various uses, assessing the associated impacts and developing water resources protection strategies. Several large and challenging groundwater resource and development projects have been undertaken in southern Ontario.

Research Experience – Woodstock, Ontario
M.Sc. Thesis (1997 to 2001)

Research on groundwater contamination from agricultural land use activities. The study investigated the increasing nitrate concentrations at a municipal well field located in an urban/rural area. The investigation included a hydrogeological investigation to assess the impacts of agricultural activities at the regional scale on nitrate quality in an urban/rural well field and to evaluate potential strategies to minimize the impacts within a reasonable time period. The research included the installation and monitoring of numerous monitoring wells, a large-scale aquifer test and numerical modelling of the aquifer system. The results were used to aide in protecting the municipal aquifer.

PROJECT EXPERIENCE – AGGREGATE RESOURCES

CBM Aggregates North Dumfries Township, Ontario, Canada	Lead Hydrogeologist for an integrated impact assessment to support a future licence application for the Cambridge Pit Expansion. The application is for aggregate extraction below the water table and the study includes a Level 1/2 Water Report. The study also included a drilling and testing program to evaluate the resource.
CBM Aggregates North Dumfries Township, Ontario, Canada	Lead Hydrogeologist for an integrated impact assessment to support a future licence application for the David Pite Expansion. The application is for aggregate extraction below the water table and the study includes a Level 1/2 Water Report. The study also included a drilling and testing program to evaluate the resource.
CBM Aggregates Caledon, Ontario, Canada	Senior Reviewer and Field Program Lead for an integrated impact assessment to support a future licence application for the Caledon Pit / Quarry. The proposed licence is intended to permit the extraction of aggregate and rock from below the water table.
CBM Aggregates Dorchester, Ontario, Canada	Lead Hydrogeologist for an integrated impact assessment supporting a major Site Plan amendment at the Dorchester Pit. The proposed amendment is intended to permit the extraction of additional available aggregate resources from below the water table at the existing pit.
CBM Aggregates Sunderland, Ontario, Canada	Lead Hydrogeologist for an integrated impact assessment to support a future licence application for the Sunderland South Pit Expansion. The application is for aggregate extraction below the water table and the study includes a Level 1/2 Water Report. The study also included a drilling and testing program to evaluate the resource.
CBM Aggregates Peterborough County, Ontario, Canada	Lead Hydrogeologist for an integrated impact assessment to support a future licence application for the Godfrey Pit Expansion. The application is for aggregate extraction above and below the water table and the study includes a Level 1/2 Water Report. The study also included a drilling and testing program to evaluate the resource.
Lafarge Canada Glen Morris, Ontario, Canada	Lead Hydrogeologist for an integrated impact assessment to support a future licence application for the Glen Morris Pit. The application is for aggregate extraction above and below the water table and the study includes a Level 1/2 Water Report. The study also included a drilling and testing program to evaluate the resource.

CBM Aggregates North Dumfries Township, Ontario, Canada	Lead Hydrogeologist for an integrated impact assessment to support a future licence application for the Dance Pit Extension to an existing licence. The application is for aggregate extraction above the water table and the study includes a Maximum Predicted Water Table Assessment.
Cambridge Aggregates Ayr, Ontario, Canada	Lead Hydrogeologist for a Level 1/2 Hydrogeological Assessment in support of a licence application for the Ayr Pit. Work was conducted in a sensitive area and included the preparation of trigger levels and a contingency plan. Aggregate extraction is above the water table.
Cambridge Aggregates North Dumfries Township, Ontario, Canada	Lead Hydrogeologist for a Level 1/2 Hydrogeological Assessment in support of a licence application to expand the North Dumfries Pit. Aggregate extraction is above the water table. Work also included testing a supply well to provide water for aggregate washing along with the associated permitting.
Preston Sand and Gravel North Dumfries Township, Ontario, Canada	Lead Hydrogeologist for a Level 1/2 Hydrogeological Assessment in support of a licence application for the Henning Pit. Aggregate extraction is above the water table.

TRAINING

Aquifer Mapping/Wellhead Delineation Workshop, 2001

Source Water Protection Best Management Practices and Other Measures for Protecting Drinking Water Supplies, 2003

Borehole Geophysics Short Course, 2007

Critical Thinking in Aquifer Test Interpretation, 2011

Interpreting Aquifer Tests in Fractured Rock, 2012

PUBLICATIONS

Padusenko, G. 1997. Undergrad Thesis (B.A.Sc.): The Influence of Scale on Hydraulic Conductivity Measurements.

Padusenko, G. 2001. Masters Thesis (M.Sc.): Regional Hydrogeologic Evaluation of a Complex Glacial Aquifer System in an Agricultural Landscape: Implications for Nitrate Distribution.

Padusenko, G. 2003. Presentation: A Comparison of Particle Count Data to On Line Turbidity From a Pumping Well. OWWA Conference.

Lotimer, T. and Padusenko, G. 2008. Presentation: Constructed Preferential Pathways: Where Did My Well Go? OWWA Conference.

Chapman et. al., 2015. Paper: Hybrid Multilevel System for Monitoring Groundwater Flow and Agricultural Impacts in Fractured Sedimentary Bedrock. National Groundwater Association – Groundwater Monitoring and Remediation.

APPENDIX C

Record of Monitoring Wells

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-01 (CAL)

SHEET 1 OF 2

LOCATION: N 4852268.3 ;E 577458.5

DRILLING DATE: Febuary 26-27, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate; BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage; PL - Planar; CU- Curved; UN - Undulating; ST - Stepped; IR - Irregular; PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break; BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		395.10																		
		(SM) SILTY SAND TILL; brown, no odor, no staining, non-cohesive, moist (TOPSOIL)		0.16																		
2		(GP/SP) SAND and GRAVEL, some cobbles; brown, no odor, no staining, non-cohesive, moist		392.66																		
		(SP) SAND, some gravel; brown, no odor, no staining, non-cohesive, wet		2.44																		
4				391.14																		April 19, 2021 (A) April 19, 2021 (B)
		(SM) SILTY SAND; brown, no odor, no staining, non-cohesive, wet		3.96																		
				389.61																		Bentonite
6		(GP)GRAVEL some sand some silt; brown, no odor, no staining, wet		5.49																		
8				386.57																		
		DOLOSTONE, fresh to moderately weathered, bedded dolostone, light grey (GASPORT FORMATION)		8.53																		
10					1										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,VR								Sand
12					2										BD,IR,VR BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR								Screen Sand
14				380.24	3										BD,CU,RO BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO								Bentonite
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey with blue banding		14.86											BD,IR,RO BD,CU,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,VR BD,IR,VR								Sand
16				377.78	4										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO								Screen
18		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		17.32																		Sand Bentonite
				375.69																		
20		BOTTOM OF HOLE		19.41											BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,UN,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO								
30		*CONTINUED NEXT PAGE*																				

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DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL

CHECKED: GRP

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-01 (CAL)

SHEET 2 OF 2

LOCATION: N 4852268.3 ;E 577458.5

DRILLING DATE: Febuary 26-27, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate

BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage

PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular

PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
30															BD,IR,RO							
32															BD,IR,RO							
34															BD,IR,RO							
36															BD,IR,RO							
38															BD,IR,RO							
40															BD,IR,RO							
42															BD,IR,RO							
44															BD,IR,RO							
46															BD,IR,RO							
48															BD,IR,RO							
50															BD,IR,RO							
52															BD,IR,RO							
54															BD,IR,RO							
56															BD,IR,RO							
58															BD,IR,RO							
60															BD,IR,RO							

DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL

CHECKED: GRP

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PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-02 (CAL)

SHEET 1 OF 1

LOCATION: N 4852138.4 ;E 577900.0

DRILLING DATE: Febuary 28- March 2, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		399.63																		
		(SM) SILTY SAND TILL; brown, no odor, no staining, non-cohesive, moist		0.00 398.11																		
2		(SP/GP) SAND and GRAVEL, some cobbles; brown, no odor, no staining, non-cohesive, moist		1.52 395.06																		
4		(SP) GRAVELLY SAND; brown, no odor, no staining, non-cohesive, moist		4.57 394.14																		
6		(GM) SILTY GRAVEL, some sand; brown/grey, no odor, no staining, non-cohesive, wet		5.49 391.10																		
8		(SP) SAND, some silt; brown, no odor, no staining, non-cohesive, wet		8.53 388.63																		Bentonite April 19, 2021
10		(GP) GRAVEL and COBBLES; red, no odor, no staining, non-cohesive, wet		11.00 388.05																		
12		(SP/GP) SAND and GRAVEL, some cobbles; brown, no odor, no staining, non-cohesive, wet		11.58 386.53																		
14		(SM/GP) SILTY SAND and GRAVEL, some clay; reddish brown, no odor, no staining, non-cohesive, wet		13.10 384.39																		
16		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		15.24 381.58	1										BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO							Sand Screen Sand Bentonite
18		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		18.05 380.06																		
20		BOTTOM OF HOLE		19.57											BD,IR,SM BD,IR,SM BD,IR,SM BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,UN,VR							
22																						
24																						
26																						
28																						
30																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

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PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-03 (CAL)

SHEET 1 OF 2

LOCATION: N 4851907.3 ;E 578243.5

DRILLING DATE: March 3-4, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		390.67																		
0		(SM) SILTY SAND TILL; brown, no odor, no staining, non-cohesive, moist (TOPSOIL)		0.00 / 389.67																		
		(SP/GP) SAND and GRAVEL, some cobbles; reddish brown, no odor, no staining, non-cohesive, moist		1.00																		
2																						
4				386.10																		
		(SP) GRAVELLY SAND; brown, no odor, no staining, non-cohesive, wet		4.57																		
6				384.57																		April 19, 2021
		(SP) SAND, some silt; reddish brown, no odor, no staining, non-cohesive, wet		6.10																		
8																						Bentonite
10																						
12																						
14																						
16																						Sand
				373.67																		
		(CH) CLAYEY SILT; golden brown, no odor, no staining, cohesive W ~ PL		17.00 / 372.99																		Screen
18		(CH) CLAY, some silt; brown/grey, no odors, no staining, cohesive, W ~ PL		17.68																		Sand
20																						
				369.24																		
		(CH) CLAY TILL, some silt; brown/grey, no odors, no staining, cohesive, W ~ PL		21.43																		
22																						
24																						Natural Backfil
26																						
28																						
30		*CONTINUED NEXT PAGE*																				

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

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PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-03 (CAL)

SHEET 2 OF 2

LOCATION: N 4851907.3 ;E 578243.5

DRILLING DATE: March 3-4, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
30		(CH) CLAY TILL, some silt; brown/grey, no odors, no staining, cohesive, W ~ PL																				Natural Backfil
32																						
34				356.23																		
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		34.44																		
				355.01																		
36		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		35.66																		
		BOTTOM OF HOLE		35.97																		
38																						
40																						
42																						
44																						
46																						
48																						
50																						
52																						
54																						
56																						
58																						
60																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

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PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-04 (CAL)

SHEET 1 OF 1

LOCATION: N 4852313.2 ;E 578264.7

DRILLING DATE: March 5-6, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		399.46																		
		(SC) CLAYEY SAND TILL, some silt; dark brown, no odors, no staining, cohesive,W ~ PL		0.00 / 397.94																		
2		(SP/GP) SAND and GRAVEL, some cobbles; dark brown, no odors, no staining, non-cohesive, moist		1.52 / 395.50																		
4		(SM/GP) SILTY SAND and GRAVEL; dark brown, no odors, no staining, non-cohesive, moist		3.96 / 392.45																		
6		(SP) SAND; brown, no odors, no staining, non-cohesive, moist		7.01 / 391.46																		
8		(SM/GP) SILTY SAND and GRAVEL; brown, no odors, no staining, non-cohesive, moist		8.00 / 390.93																		Bentonite
		(SP) GRAVELLY SAND; brown, no odors, no staining, non-cohesive, wet		8.53 / 389.40																		April 19, 2021
10		(SM) SILTY SAND, some clay, some cobbles; golden brown, no odors, no staining, non-cohesive, wet		10.06 / 385.13																		
12																						
14		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey with dark grey banding		14.33 / 382.92	1										BD,IR,VR							Sand
16		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		16.54 / 380.96	2										BD,IR,VR / BD,IR,RO / BD,IR,RO / BD,IR,VR / BD,IR,VR							Screen / Sand / Bentonite
18		BOTTOM OF HOLE		18.50											BD,UN,RO / BD,UN,RO / BD,IR,RO / BD,IR,RO / BD,IR,VR / BD,IR,VR / BD,IR,VR / BD,IR,K							
20															BD,IR,K							
22															BD,IR,K							
24															BD,IR,K							
26															BD,IR,K / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO							
28																						
30																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

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PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-05 (CAL)

SHEET 1 OF 1

LOCATION: N 4852712.6 ;E 578423.1

DRILLING DATE: March 9, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate; BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage; PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular; PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break; BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		399.63																		
		(SC) CLAYEY SAND, some silt; brown/black, no odor, no staining, non-cohesive, wet (TOPSOIL)		0.00 / 399.02																		
		(SM) SILTY SAND, some clay; light brown, no odors, no staining, non-cohesive, wet		0.61 / 398.11																		
2		DOLOSTONE, fresh to slightly weathered, bedded dolostone, light grey (GASPORT FORMATION)		1.52																		Bentonite
					1										BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,VR / BD,IR,RO / BD,IR,VR / BD,IR,VR / BD,IR,RO / BD,IR,RO / BD,CU,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,CU,VR / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,K / BD,IR,K / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO						Sand
4																						Screen
					2																	Sand
6																						April 19, 2021 (A)
8					3																	Bentonite
10				389.03																		
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey with dark grey banding		10.60	4																	Sand
12																						Screen
				385.72	5																	Sand
14		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		13.91 / 384.79																		Bentonite
		BOTTOM OF HOLE		14.84											BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,VR / BD,IR,VR / BD,IR,VR / BD,IR,VR / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,RO / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K / BD,IR,K						
16																						
18																						
20																						
22																						
24																						
26																						
28																						
30																						

DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL

CHECKED: GRP

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-06 (CAL)

SHEET 1 OF 1

LOCATION: N 4852972.6 ;E 578474.2

DRILLING DATE: March 10, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		400.15																		
0		(SC/GP) CLAYEY SAND and GRAVEL, some cobbles; brown, no odors, no staining, non-cohesive, wet		0.00																		
				398.63																		
2		(SM/GP) SILTY SAND and GRAVEL; golden brown, no odors, no staining, non-cohesive, wet		1.52 398.01																		Bentonite
				2.14																		
		DOLOSTONE, fresh, bedded dolostone, light grey (GASPORT FORMATION)			1										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,CU,RO BD,IR,RO BD,IR,RO BD,CU,RO BD,IR,VR BD,CU,RO							April 19, 2021 (B) Sand April 19, 2021 (A) Screen
4																						
					2										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,VR BD,IR,RO							Sand
6																						
					3										BD,IR,RO							Bentonite
8															BD,IR,RO BD,IR,RO							
															BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,SM BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO							Sand Screen Sand
10				389.19																		
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey with dark grey banding		10.96	4																	
12																						
14				385.90											BD,IR,RO BD,IR,RO							Bentonite
		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		14.25	5										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR							
16				384.12																		
		BOTTOM OF HOLE		16.03											BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,UN,RO BD,UN,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K							
18																						
20																						
22																						
24																						
26																						
28																						
30																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-07 (CAL)

SHEET 1 OF 2

LOCATION: N 4853250.4 ;E 578359.9

DRILLING DATE: March 11, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate; BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage; PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular; PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break; BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		404.07																		
		(SC) CLAYEY SAND, some silt some cobbles; brown, no odirs, no staining, non-cohesive, moist (TOPSOIL)		0.00																		
		(SM/GP) SILTY SAND and GRAVEL, some cobbles; golden brown, no odors, no staining, non-cohesive, moist		0.50																		
2		DOLOSTONE, fresh to moderately weathered, bedded, dolostone, light grey to blue-grey (GASPORT FORMATION)		401.94 2.13	1										BD,IR,RO							April 19, 2021 (B) April 19, 2021 (A)
4					2										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR					Bentonite
6																						
8					3										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,VR BD,IR,RO							Sand
10					4										BD,UN,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO							Screen Sand
12				390.87																		Bentonite
14		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		13.20	5										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO							Sand
16				387.67																		Screen
18		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		16.40	6										BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO							Sand Bentonite
				384.62																		
20		BOTTOM OF HOLE		19.45											BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,UN,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,K							
30		*CONTINUED NEXT PAGE*																				

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DEPTH SCALE

1 : 150

GOLDER MEMBER OF WSP

LOGGED: AL

CHECKED: GRP

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-07 (CAL)

SHEET 2 OF 2

LOCATION: N 4853250.4 ;E 578359.9

DRILLING DATE: March 11, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate

BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage

PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular

PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
30															BD,IR,K							
32															BD,IR,K							
34															BD,IR,K							
36															BD,IR,K							
38															BD,IR,K							
40															BD,IR,K							
42															BD,IR,K							
44															BD,IR,K							
46															BD,IR,K							
48															BD,IR,K							
50															BD,IR,K							
52															BD,IR,K							
54															BD,IR,K							
56															BD,IR,K							
58															BD,IR,K							
60															BD,IR,K							

DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL

CHECKED: GRP

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-08 (CAL)

SHEET 1 OF 1

LOCATION: N 4853574.8 ;E 578009.8

DRILLING DATE: March 12, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		406.93																		
		(SM) CLAYEY SILTY SAND TILL, some cobbles; brown, no odors, no staining, non-cohesive, wet (TOPSOIL)		0.00 406.32																		
		(SM) CLAYEY SILTY SAND, some cobbles; brown, no odors, no staining, non-cohesive, wet		0.61 404.95																		
2		DOLOSTONE, fresh to moderately weathered, bedded dolostone, light grey (GASPORT FORMATION)		1.98	1										BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,SM BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,CU,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO							Bentonite April 19, 2021 (B) April 19, 2021 (A) Sand Screen Sand Bentonite Sand Screen Sand Bentonite
4					2																	
6																						
8					3																	
10																						
12					4																	
14																						
				391.83	5																	
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		15.10																		
16																						
				389.61																		
		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		17.32	6																	
18				388.34																		
		BOTTOM OF HOLE		18.59											BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,K BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K							
20																						
22																						
24																						
26																						
28																						
30																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

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PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-09 (CAL)

SHEET 1 OF 1

LOCATION: N 4854157.5 ;E 578343.8

DRILLING DATE: March 17, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		399.95																		
		(SC) SILTY CLAYEY SAND TILL; black/brown, no odors, no staining, non-cohesive, wet (TOPSOIL)		0.00 399.04																		
		(SP) SAND; brown, no odors, no staining, non-cohesive, moist		0.91 397.36																		
2		(CH) SANDY CLAY TILL and COBBLES, some gravel; grey/light brown, no odors, no staining, non-cohesive, moist		2.59 394.62																		Bentonite April 19, 2021
4		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		5.33 392.47	1										BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,VR								Sand
6		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		7.48 390.94	2										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,K BD,IR,K BD,IR,RO								Screen Sand Bentonite
8		BOTTOM OF HOLE		9.01											BD,IR,RO BD,IR,RO BD,IR,VR BD,CU,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,K BD,IR,SM BD,IR,K								
10																						
12																						
14																						
16																						
18																						
20																						
22																						
24																						
26																						
28																						
30																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

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PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-10 (CAL)

SHEET 1 OF 1

LOCATION: N 4854407.3 ;E 577838.0

DRILLING DATE: March 18-19, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		411.32																		
0		(SC) SILTY CLAYEY SAND, some cobbles; brown/black, no odors, no staining, non-cohesive, moist (TOPSOIL)		0.00 410.71																		
		(CH) SANDY CLAY; red, no odors, no staining, cohesive, W ~ PL		0.61 409.49																		
2		(SP) GRAVELLY SAND, some cobbles; golden brown, no odors, no staining, non-cohesive, moist		1.83 408.88																		
		(SM/GP) SILTY SAND and GRAVEL, some cobbles; whitish brown, no odors, no staining, non-cohesive, moist		2.44																		
4																						
6				404.31																		Bentonite
		(SC/GP) CLAYEY SAND and GRAVEL, some cobbles; reddish brown, no odors, no staining, non-cohesive, moist		7.01																		
8																						
10				400.35																		April 19, 2021 (A) April 19, 2021 (B)
		DOLOSTONE, fresh to moderately weathered, bedded dolostone, light grey to beige grey (GASPORT FORMATION)		10.97																		
12					1										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO								
14					2										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO								Sand Screen Sand
16				394.56											BD,IR,RO							
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		16.76											BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,K BD,IR,K							Bentonite
18					3										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO							Sand Screen
				391.77																		
20		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		19.55	4										BD,IR,RO BD,IR,RO BD,IR,RO BD,UN,RO BD,UN,RO							Sand Bentonite
				390.13																		
		BOTTOM OF HOLE		21.19											BD,UN,RO BD,IR,RO BD,IR,K BD,IR,RO BD,IR,RO BD,UN,RO BD,UN,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,K							
22																						
24																						
26																						
28																						
30																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL/CS
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-11 (CAL)

SHEET 1 OF 1

LOCATION: N 4853921.4 ;E 577672.0

DRILLING DATE: March 23-24

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE	409.72																		
		(SP) GRAVELLY SAND, some cobbles; brown, no odors, no staining, non-cohesive, moist (TOPSOIL)	0.40																		
2		(SP) GRAVELLY SAND, some cobbles; brown, no odors, no staining, non-cohesive, moist	407.59																		Bentonite
		(SM) SILTY SAND, some clay, some gravel; brown, no odors, no staining, cohesive, W ~ PL	2.13																		
4		DOLOSTONE, fresh to slightly weathered, bedded dolostone, light grey to blue grey (GASPORT FORMATION)		1										BD,IR,VR							Sand
														BD,IR,VR							
														BD,IR,VR							
														BD,IR,VR							
														BD,IR,RO							Screen
														BD,IR,RO							
														BD,IR,RO							
6				2										BD,IR,VR							Sand
														BD,IR,VR							
														BD,IR,VR							
														BD,IR,RO							
														BD,IR,RO							
														BD,IR,VR							
8				3										BD,IR,VR							
														BD,IR,VR							
														BD,IR,VR							
														BD,IR,VR							
														BD,IR,RO							
10														BD,IR,VR							Bentonite
														BD,IR,VR							
														BD,IR,VR							
														BD,IR,VR							
														BD,IR,RO							
														BD,IR,RO							
12				4										BD,IR,RO							
														BD,IR,RO							
														BD,IR,RO							
														BD,IR,RO							
														BD,IR,RO							
														BD,IR,RO							
14														BD,IR,RO							Sand
														BD,IR,RO							
														BD,IR,RO							Screen
				5										BD,IR,RO							
														BD,IR,RO							Sand
														BD,IR,RO							
16														BD,IR,RO							
			393.26											BD,IR,RO							
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey	16.46											BD,IR,RO							
														BD,IR,RO							
														BD,IR,RO							Bentonite
18			391.56	6										BD,IR,RO							
		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)	18.16											BD,IR,RO							
														BD,IR,RO							
			390.33											BD,IR,RO							
		BOTTOM OF HOLE	19.39											BD,IR,VR							
20														BD,IR,VR							
														BD,IR,RO							
														BD,IR,RO							
														BD,IR,RO							
														BD,IR,RO							
														BD,IR,RO							
22														BD,IR,RO							
														BD,CU,RO							
														BD,IR,RO							
														BD,IR,K							
														BD,IR,K							
														BD,IR,K							
														BD,IR,K							
														BD,IR,K							
24																					
26																					
28																					
30																					

Bentonite
Sand
April 19, 2021 (B)
Screen
April 19, 2021 (A)
Sand
Bentonite
Sand
Screen
Sand
Bentonite

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: KS
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-12 (CAL)

SHEET 1 OF 1

LOCATION: N 4854321.4 ;E 577271.9

DRILLING DATE: March 25-26, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		412.43																		
		(ML) SANDY SILT TILL; brown, no odor, no staining, cohesive, W < PL (TOPSOIL)		0.00 0.30 411.12																		
		(ML) SANDY SILT TILL; brown, no odor, no staining, cohesive, W < PL		1.31																		
		(SP) SAND, some gravel; brown, no odors, no staining, non-cohesive, moist		1.61																		
		(ML) SANDY SILT TILL, some gravel; brown, cohesive, W < PL		408.77																		
		DOLOSTONE, fresh to moderately weathered, bedded dolostone, light grey to beige (GASPORT FORMATION)		3.66	1										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,UN,RO BD,UN,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,UN,RO FR,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,UN,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,RO						Bentonite April 19, 2021 (B) Sand Screen Sand Bentonite Sand Screen Sand Bentonite
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		392.63 19.80	2										BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,IR,RO BD,IR,VR BD,CU,VR BD,IR,RO BD,IR,RO BD,UN,RO							
		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		390.77 21.66	3										BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,VR BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,CU,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K						
		BOTTOM OF HOLE		389.78 22.65	4																	
					5																	
					6																	

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: KS/AL
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-13 (CAL)

SHEET 1 OF 2

LOCATION: N 4854473.1 ;E 576873.1

DRILLING DATE: April 7-8, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		415.53																		
0		(ML) SANDY SILT; dark brown, no odors, no straining, non-cohesive, moist (TOPSOIL)		0.00 / 0.46 / 414.31																		
		(SM) SILTY SAND; brown, no odors, no staining, non-cohesive, moist		1.22 / 413.55																		
2		(SP) SILTY GRAVELLY SAND; red/brown, no odors, no staining, non-cohesive, moist		1.98																		
		(SP) SAND, some silt; reddish brown, no odor, no staining, non-cohesive, moist		410.96																		April 19, 2021 (B) April 19, 2021 (A)
4		(CL) SILTY CLAY TILL, some gravel; grey/brown, no odors, no staining, cohesive, W < PL		4.57																		
6																						
8																						Bentonite
10																						
12				402.43																		
		DOLOSTONE, fresh, bedded dolostone, light grey to blue grey (GASPORT FORMATION)		13.10																		
14																						
16					1										BD,IR,RO							
					2										BD,IR,RO							Sand
18															BD,IR,RO							Screen
20					3										BD,IR,RO							Sand
22															BD,IR,RO / BD,IR,VR							Bentonite
24				391.61	4										BD,IR,RO							Sand
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		23.92											BD,IR,RO							Screen
26		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		389.85 / 25.68	5										BD,IR,RO / BD,IR,VR							Sand / Bentonite
28				387.30											BD,IR,RO / BD,IR,VR / BD,IR,K							
		BOTTOM OF HOLE		28.23											BD,IR,VR / BD,IR,RO							
30		*CONTINUED NEXT PAGE*													BD,IR,RO							

DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: CS/AL

CHECKED: GRP

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PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-13 (CAL)

SHEET 2 OF 2

LOCATION: N 4854473.1 ;E 576873.1

DRILLING DATE: April 7-8, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate

BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage

PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular

PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
30															BD,IR,RO							
32															BD,IR,K							
34															BD,IR,K							
36															BD,IR,K							
38															BD,IR,K							
40															BD,IR,K							
42															BD,IR,K							
44															BD,IR,K							
46															BD,IR,K							
48															BD,IR,K							
50															BD,IR,K							
52															BD,IR,K							
54															BD,IR,K							
56															BD,IR,K							
58															BD,IR,K							
60															BD,IR,K							

DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: CS/AL

CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-13 (CAL) - OFFSET

SHEET 1 OF 1

LOCATION: N 4854473.1 ;E 576873.1

DRILLING DATE: April 7-8, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

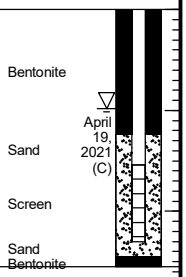
DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		415.53																		
		(ML) SANDY SILT; dark brown, no odors, no straining, non-cohesive, moist (TOPSOIL)		0.00 0.46 414.31																		
		(SM) SILTY SAND; brown, no odors, no staining, non-cohesive, moist		1.22 413.55																		
2		(SP) SILTY GRAVELLY SAND; red/brown, no odors, no staining, non-cohesive, moist		1.98																		
		(SP) SAND, some silt; reddish brown, no odor, no staining, non-cohesive, moist		410.96																		
4		(CL) SILTY CLAY TILL, some gravel; grey/brown, no odors, no staining, cohesive, W < PL		4.57 410.43																		
		BOTTOM OF HOLE		5.10																		
6																						
8																						
10																						
12																						
14																						
16																						
18																						
20																						
22																						
24																						
26																						
28																						
30																						

NOTES WATER LEVELS INSTRUMENTATION



DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: CS/AL
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-14 (CAL)

SHEET 1 OF 2

LOCATION: N 4853100.4 ;E 577576.0

DRILLING DATE: April 27-28, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		406.71																		
		(SC) SILTY CLAYEY SAND TILL; black/brown, no odors, no staining, non-cohesive, wet (TOPSOIL)		0.00																		
				0.50																		
2		(SC) SILTY CLAYEY SAND TILL; black/brown, no odors, no staining, non-cohesive, wet		404.42																		
		DOLOSTONE, fresh, bedded dolostone, light grey (GASPORT FORMATION)		2.29																		
4					1										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							
															BD,IR,RO							
															BD,IR,VR							
6					2										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							
8					3										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							
10					4										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
12															BD,IR,RO							
															BD,IR,RO							
															BD,IR,SM							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
14					5										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
16															BD,IR,VR							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							
															BD,IR,VR							
18					6										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
20															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
					7										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
22															BD,UN,RO							
				384.31											BD,IR,RO							
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		22.40											BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
24					8										BD,iR,RO							
															BD,IR,RO							
															BD,IR,RO							
				382.21											BD,IR,RO							
		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		24.50											BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
26					9										BD,IR,VR							
				380.36											BD,IR,RO							
		BOTTOM OF HOLE		26.35											BD,IR,RO							
28															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,K							
															BD,UN,RO							
															BD,IR,RO							
30															BD,IR,RO							
		CONTINUED NEXT PAGE																				

NOTES
WATER LEVELS
INSTRUMENTATION

April 19, 2021 (B)
April 19, 2021 (A)
Bentonite
Sand
Screen
Sand
Bentonite
Sand
Screen
Sand
Bentonite

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-14 (CAL)

SHEET 2 OF 2

LOCATION: N 4853100.4 ;E 577576.0

DRILLING DATE: April 27-28, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
30		*--- CONTINUED FROM PREVIOUS PAGE ---*													BD,IR,RO							
32															BD,IR,RO BD,IR,RO BD,IR,RO BD,IR,K BD,IR,RO BD,IR,RO BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,k BD,IR,k BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K BD,IR,K							
34																						
36																						
38																						
40																						
42																						
44																						
46																						
48																						
50																						
52																						
54																						
56																						
58																						
60																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-15 (CAL)

SHEET 1 OF 2

LOCATION: N 4853544.2 ;E 576576.8

DRILLING DATE: May 12, 19-20, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		417.06																		
		(SM) SILTY SAND; brown, no odors, no staining, non-cohesive, moist (TOPSOIL)		0.20																		
		(CH) SANDY CLAY TILL; brown, no odors, no staining, cohesive, W ~ PL																				
2				414.66																		
		(SC) CLAYEY SAND, some cobbles, some gravel; brown, no odors, no staining		2.40																		
				413.06																		
4		(SP) SAND, some gravel, some clay; brown, no odors, no staining, non-cohesive, moist		4.00																		
				412.46																		
		(CL) SILTY CLAY TILL, some sand, some gravel; brown, no odors, no staining, cohesive, W < PL		4.60																		
6																						
8																						
10																						
				405.46																		
12		DOLOSTONE, fresh to moderately weathered, bedded dolostone, grey to beige to blue grey (GASPORT FORMATION)		11.60	1										BD,IR,VR BD,IR,RO BD,IR,RO							
14					2										BD,PO,SM BD,PO,SM BD,IR,RO							Bentonite
16																						
					3										BD,PO,RO BD,PO,RO							
18															BD,IR,VR BD,UN,VR BD,IR,VR BD,UN,RO BD,CU,RO BD,IR,VR BD,IR,SM BD,PO,RO BD,IR,RO BD,UN,RO BD,UN,RO BD,PO,VR BD,PO,RO BD,IR,VR BD,PO,RO BD,UN,RO BD,IR,RO BD,IR,RO BD,PO,RO BD,UN,RO BD,UN,RO BD,CU,RO BD,UN,RO BD,IR,SM BD,UN,RO BD,PO,RO BD,UN,RO BD,UN,SM BD,UN,RO BD,IR,SM BD,PO,RO BD,IR,VR BD,PO,RO BD,UN,RO BD,IR,SM BD,PO,RO BD,PO,SM BD,PO,RO BD,IR,VR BD,PO,SM BD,PO,SM BD,UN,SM							
20					4																	
22																						
24					5																	
26																						
					6																	
28																						Sand
					7																	Screen
30		*CONTINUED NEXT PAGE*																				

April 19, 2021 (A)
April 19, 2021 (B)

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: PM/CS
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-15 (CAL)

SHEET 2 OF 2

LOCATION: N 4853544.2 ;E 576576.8

DRILLING DATE: May 12, 19-20, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
30		DOLOSTONE, fresh to moderately weathered, bedded dolostone, grey to beige to blue grey (GASPORT FORMATION)			7										BD,PO,SM BD,PO,RO BD,IR,RO BD,IR,VR BD,IR,VR BD,UN,VR							Screen Sand
32					8										BD,IR,VR BD,PO,VR BD,IR,VR BD,PO,VR BD,IR,RO BD,UN,RO							Bentonite Sand
34		SHALEY DOLOSTONE, bedded shaley dolostone, grey to brown		383.22 33.84											BD,PO,RO BD,PO,RO BD,PO,RO BD,PO,RO BD,IR,RO							Screen
36		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		381.44 35.62	9										BD,PO,RO BD,PO,RO BD,PO,RO BD,PO,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,PO,RO BD,PO,RO BD,IR,RO							Sand Bentonite
		BOTTOM OF HOLE		379.89 37.17											BD,PO,RO BD,IR,VR BD,PO,RO BD,UN,RO BD,IR,RO BD,IR,RO BD,IR,RO BD,PO,RO BD,PO,RO BD,IR,RO BD,UN,RO BD,IR,RO BD,IR,RO BD,UN,RO BD,PO,RO BD,IR,RO BD,IR,RO BD,IR,K BD,IR,RO BD,IR,RO BD,PO,K BD,PO,K BD,IR,RO BD,PO,RO BD,PO,SM BD,PO,SM BD,PO,SM BD,PO,SM BD,PO,SM BD,PO,SM BD,IR,RO BD,IR,RO BD,IR,RO BD,PO,SM BD,PO,SM BD,PO,SM BD,PO,SM BD,PO,SM							
38																						
40																						
42																						
44																						
46																						
48																						
50																						
52																						
54																						
56																						
58																						
60																						

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: PM/CS
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-15 (CAL) - OFFSET

SHEET 1 OF 1

LOCATION: N 4853544.2 ;E 576576.8

DRILLING DATE: May 12, 19-20, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

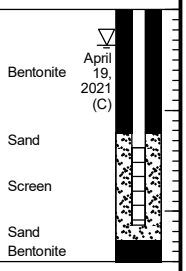
DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		417.06																		
		(SM) SILTY SAND; brown, no odors, no staining, non-cohesive, moist (TOPSOIL)		0.20																		
2		(CH) SANDY CLAY TILL; brown, no odors, no staining, cohesive, W ~ PL		414.66																		
		(SC) CLAYEY SAND, some cobbles, some gravel; brown, no odors, no staining		2.40																		
4				413.06																		
		(SP) SAND, some gravel, some clay; brown, no odors, no staining, non-cohesive, moist		4.00																		
				412.46																		
		(CL) SILTY CLAY TILL, some sand, some gravel; brown, no odors, no staining, cohesive, W < PL		4.60																		
6		BOTTOM OF HOLE		5.00																		
8																						
10																						
12																						
14																						
16																						
18																						
20																						
22																						
24																						
26																						
28																						
30																						

NOTES
WATER LEVELS
INSTRUMENTATION



DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: PM/CS
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-16 (CAL)

SHEET 1 OF 2

LOCATION: N 4853806.8 ;E 576784.6

DRILLING DATE: May 21, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
0		GROUND SURFACE		421.40																		
		(SM) SANDY SILT, some clay; dark brown, no odors, no staining, non-cohesive, moist (TOPSOIL)		0.10																		
2		(CL) SILTY CLAY TILL, some sand, some gravel; brown, no odors, no staining, cohesive, W < PL																				April 19, 2021 (B) April 19, 2021 (A)
4																						
				415.90																		
		SAND, some silt; brown/red, no odors, no staining, non-cohesive, moist		5.70																		
6		(CL) SILTY CLAY TILL, some gravel, trace sand; grey, no odors, no staining, cohesive, W < PL																				
8																						Bentonite
10																						
				409.50																		
12		DOLOSTONE, fresh, bedded dolostone, light grey to beige grey (GASPORT FORMATION)		11.90																		
14															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
					1										BD,IR,SM							
16															BD,PO,SM							
															BD,IR,RO							
															BD,PO,SM							Sand
															BD,PO,RO							
18					2										BD,CU,RO							Screen
																						Sand
															BD,PO,RO							
															BD,IR,VR							
															BD,PO,RO							
20															BD,iR,VR							
															BD,PO,RO							
															BD,iR,VR							
					3										BD,iR,VR							
															BD,PO,VR							
22															BD,iR,RO							
															BD,PO,VR							
															BD,PO,RO							
															BD,iR,RO							
															BD,IR,SM							
															BD,iR,RO							
24					4										BD,iR,RO							
															BD,PO,RO							Bentonite
															BD,iR,VR							
															BD,PO,RO							
26															BD,IR,RO							
															BD,UN,RO							
															BD,PO,RO							
															BD,PO,VR							
					5										BD,UN,RO							
															BD,UN,RO							
															BD,IR,RO							
28															BD,UN,RO							
															BD,UN,RO							
															BD,IR,RO							
															BD,PO,SM							
					6										BD,PO,RO							
															BD,PO,RO							
															BD,PO,SM							
30															BD,PO,SM							
		CONTINUED NEXT PAGE																				

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: CS
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-16 (CAL)

SHEET 2 OF 2

LOCATION: N 4853806.8 ;E 576784.6

DRILLING DATE: May 21, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
30		*--- CONTINUED FROM PREVIOUS PAGE ---*																				
		DOLOSTONE, fresh, bedded dolostone, light grey to beige grey (GASPORT FORMATION)			6																	
32					7																	Bentonite
34																						Sand
				385.88																		Screen
36		SHALEY DOLOSTONE, bedded shaley dolostone, grey to brown		35.52	8																	Sand
				384.12																		
		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		37.28																		
38																						Bentonite
				381.63																		
40		BOTTOM OF HOLE		39.77																		
42																						
44																						
46																						
48																						
50																						
52																						
54																						
56																						
58																						
60																						

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DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: CS
CHECKED: GRP

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-17 (CAL)

SHEET 1 OF 2

LOCATION: N 4852966.4 ;E 576752.3

DRILLING DATE: May 25-26, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate; BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage; PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular; PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break; BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		406.64																		
0		(CH) SANDY CLAY; red, no odors, no staining, non-cohesive, moist (TOPSOIL)		0.00																		
				405.12																		
2		(CH) SANDY CLAY TILL, some gravel, some silt; redish brown, no odors, no staining, cos, W ~ PL		1.52																		
				404.21																		
		(SP/GP) CLAYEY SAND and GRAVEL, some cobbles; grey, no odors, no staining, non-cohesive, moist		2.44																		
				403.60																		
4		DOLOSTONE, fresh to highly weathered, bedded dolostone, light grey (GASPORT FORMATION)		3.05	1										BD,IR,RO							April 19, 2021 (A) April 19, 2021 (B)
															BD,IR,RO							
															BD,IR,RO							
															BD,UN,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
6					2										BD,IR,RO							Bentonite
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
8															BD,IR,RO							
					3										BD,IR,RO							
															BD,IR,RO							
10															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,UN,VR							
															BD,IR,VR							
12					4										BD,IR,RO							Sand
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							Screen
															BD,IR,RO							
14															BD,UN,RO							Sand
															BD,IR,RO							
					5										BD,UN,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
16															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
18					6										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
20															BD,IR,RO							Bentonite
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
					7										BD,IR,RO							
															BD,PO,RO							
22															BD,IR,VR							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							
															BD,IR,VR							
24															BD,IR,RO							
					8										BD,IR,VR							
															BD,IR,RO							
															BD,IR,RO							
				381.80											BD,IR,RO							
		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		24.84											BD,IR,RO							Sand
26															BD,IR,RO							
															BD,IR,RO							Screen
															BD,IR,RO							
															BD,IR,RO							
				379.15	9										BD,IR,RO							Sand
		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		27.49											FR,IR,RO							
28															BD,IR,RO							Bentonite
															BD,IR,RO							
				377.82											BD,IR,RO							
		BOTTOM OF HOLE		28.82											BD,IR,RO							
															BD,IR,RO							
30															BD,IR,RO							
		CONTINUED NEXT PAGE																				

DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL

CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-17 (CAL)

SHEET 2 OF 2

LOCATION: N 4852966.4 ;E 576752.3

DRILLING DATE: May 25-26, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
30															BD,IR,RO							
32															BD,IR,RO							
34															BD,IR,RO							
36															BD,IR,RO							
38															BD,IR,RO							
40															BD,IR,RO							
42															BD,IR,RO							
44															BD,IR,RO							
46															BD,IR,RO							
48															BD,IR,RO							
50															BD,IR,RO							
52															BD,IR,RO							
54															BD,IR,RO							
56															BD,IR,RO							
58															BD,IR,RO							
60															BD,IR,RO							

DEPTH SCALE
1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL
CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-18 (CAL)

SHEET 1 OF 2

LOCATION: N 4852658.8 ;E 577058.4

DRILLING DATE: June 8-9, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate; BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage; PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular; PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break; BR - Broken Rock

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DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		404.29																		
0		(SP) CLAYEY SAND; black, no odors, no staining, non-cohesive, moist (TOPSOIL)		0.00 / 403.68																		
		(SP/GP) SAND and GRAVEL, some cobbles; brown, no odors, no staining, non-cohesive,		0.61																		
2																						
4																						
				398.80																		
6		(SP) SAND; brown, no odors, no staining, non-cohesive, moist		5.49																		Bentonite
8				395.76																		
		(SP/GP) CLAYEY SAND and GRAVEL, some cobbles, some bolders; grey, no odors, no staining, non-cohesive, moist		8.53																		
10																						
				392.41																		
12		DOLOSTONE, fresh, bedded dolostone, light grey (GASPORT FORMATION)		11.88	1										BD,IR,RO							Sand
															BD,IR,RO							Screen
14															BD,IR,RO							Sand
															BD,IR,RO							
					2										BD,IR,VR							
															BD,IR,VR							
															BD,IR,VR							
16															BD,IR,VR							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							
															BD,IR,VR							
															BD,IR,RO							
18					3										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							
															BD,IR,VR							
															BD,IR,VR							
															BD,IR,RO							
20															BD,IR,RO							
															BD,IR,RO							
					4										BD,IR,VR							Bentonite
															BD,IR,VR							
															BD,IR,RO							
22															BD,IR,VR							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,VR							
															BD,IR,VR							
															BD,IR,VR							
				380.49											BD,IR,VR							
24		SHALEY DOLOSTONE, bedded shaley dolostone, slate grey		23.80	5										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
				378.23											BD,IR,RO							
26		SHALE, bedded shale, blue green (CABOT HEAD FORMATION)		26.06											BD,IR,RO							
					6										BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
28				376.14											BD,IR,RO							
		BOTTOM OF HOLE		28.15											BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
															BD,IR,RO							
30		*CONTINUED NEXT PAGE*													BD,IR,RO							

April 19, 2021

DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL

CHECKED: GRP

GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

PROJECT: 19129150

RECORD OF DRILLHOLE: MW20-18 (CAL)

SHEET 2 OF 2

LOCATION: N 4852658.8 ;E 577058.4

DRILLING DATE: June 8-9, 2020

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Sonic

DRILLING CONTRACTOR: Choice Sonic Drilling

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DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
30															BD,iR,RO							
															BD,iR,VR							
															BD,iR,RO							
32															BD,iR,RO							
															BD,iR,RO							
															BD,iR,RO							
34															BD,iR,RO							
															BD,iR,RO							
															BD,iR,RO							
36																						
38																						
40																						
42																						
44																						
46																						
48																						
50																						
52																						
54																						
56																						
58																						
60																						

DEPTH SCALE

1 : 150

GOLDER
MEMBER OF WSP

LOGGED: AL

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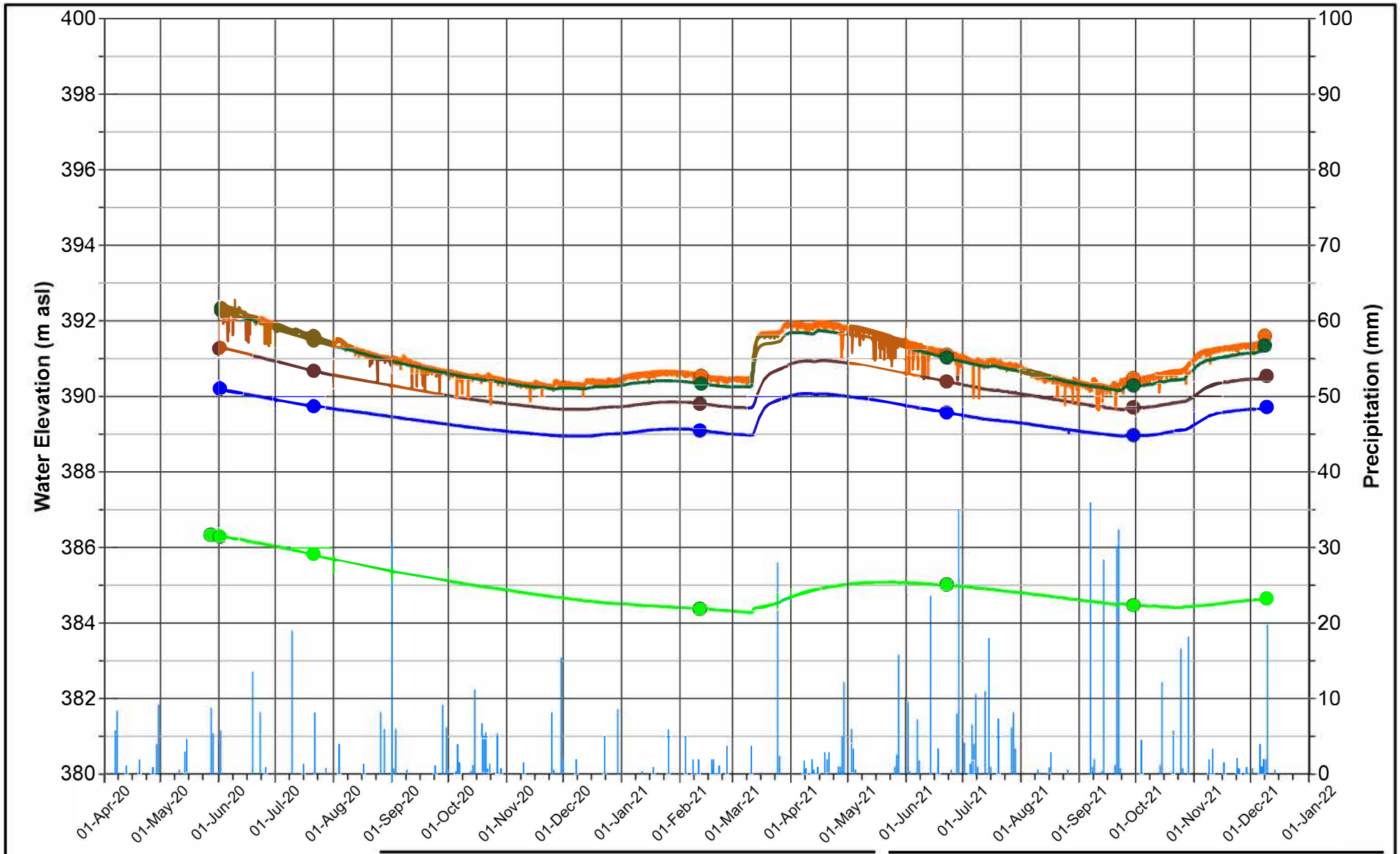
GTA-RCK 004 S:\CLIENTS\VOTORANTIM_CIMENTOS\LONG_PAR_5_CALEDON\02_DATA\GINT\LONG_PAR_5_CALEDON.GPJ GAL-MISS.GDT 1/13/22

APPENDIX D

Groundwater Monitoring Hydrographs



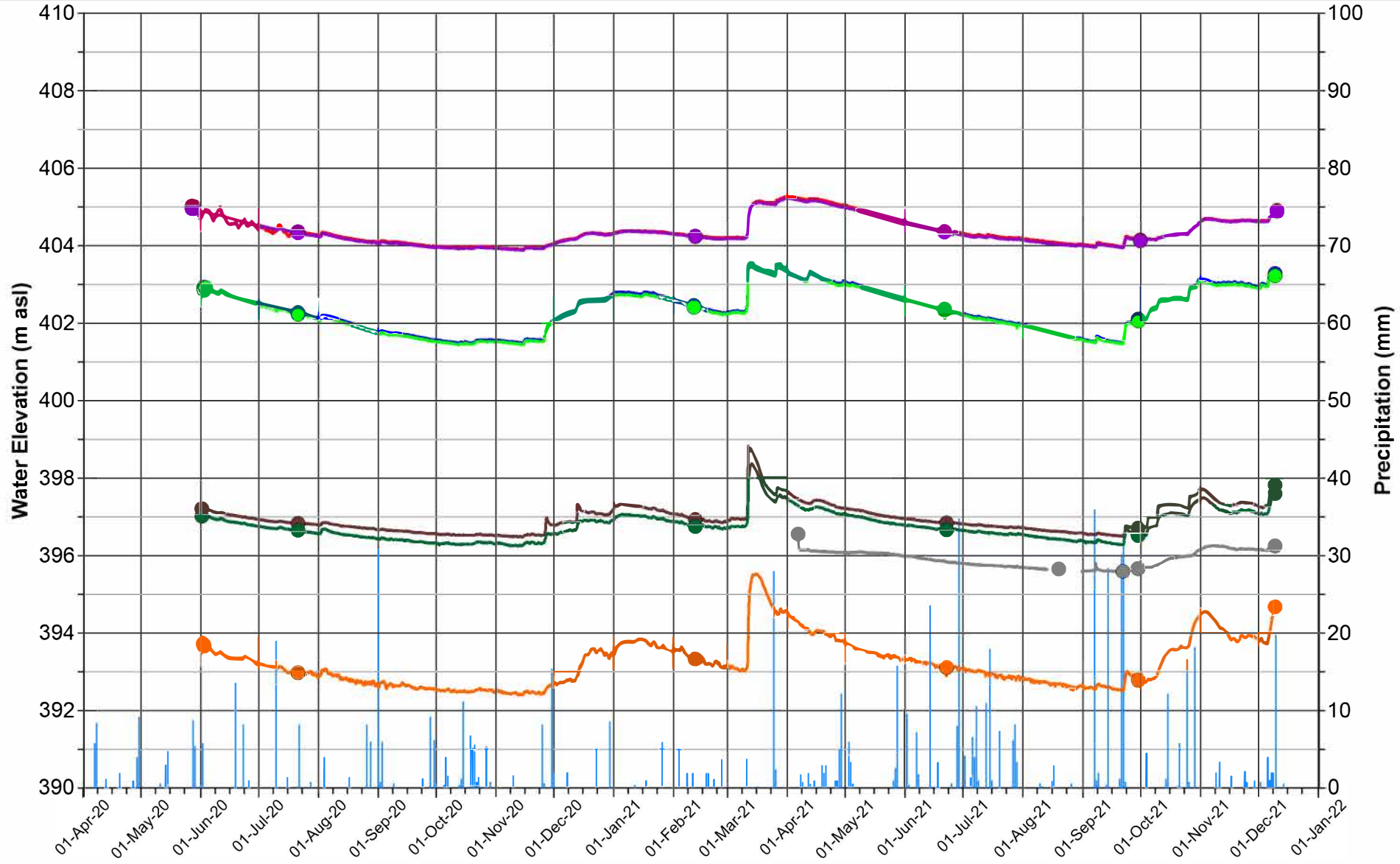
GOLDER
MEMBER OF WSP

DATE	November 2022
DESIGN	VRP
REVIEW	GRP
APPROVED	GWS

PROJECT
CBM CALEDON QUARRY

TITLE
GROUNDWATER MONITORING HYDROGRAPHS SOUTHERN AREA

PROJECT NO.	REV	FIGURE
19129150	A	D1



MW20-05A
MW20-06A
MW20-06B
MW20-07A
MW20-07B
MW20-08A
MW20-08B
PW21-3

GOLDER
MEMBER OF WSP

DATE	November 2022
DESIGN	VRP
REVIEW	GRP
APPROVED	GWS

PROJECT
CBM CALEDON QUARRY

TITLE
GROUNDWATER MONITORING HYDROGRAPHS SOUTHEASTERN AREA

PROJECT NO.	REV	FIGURE
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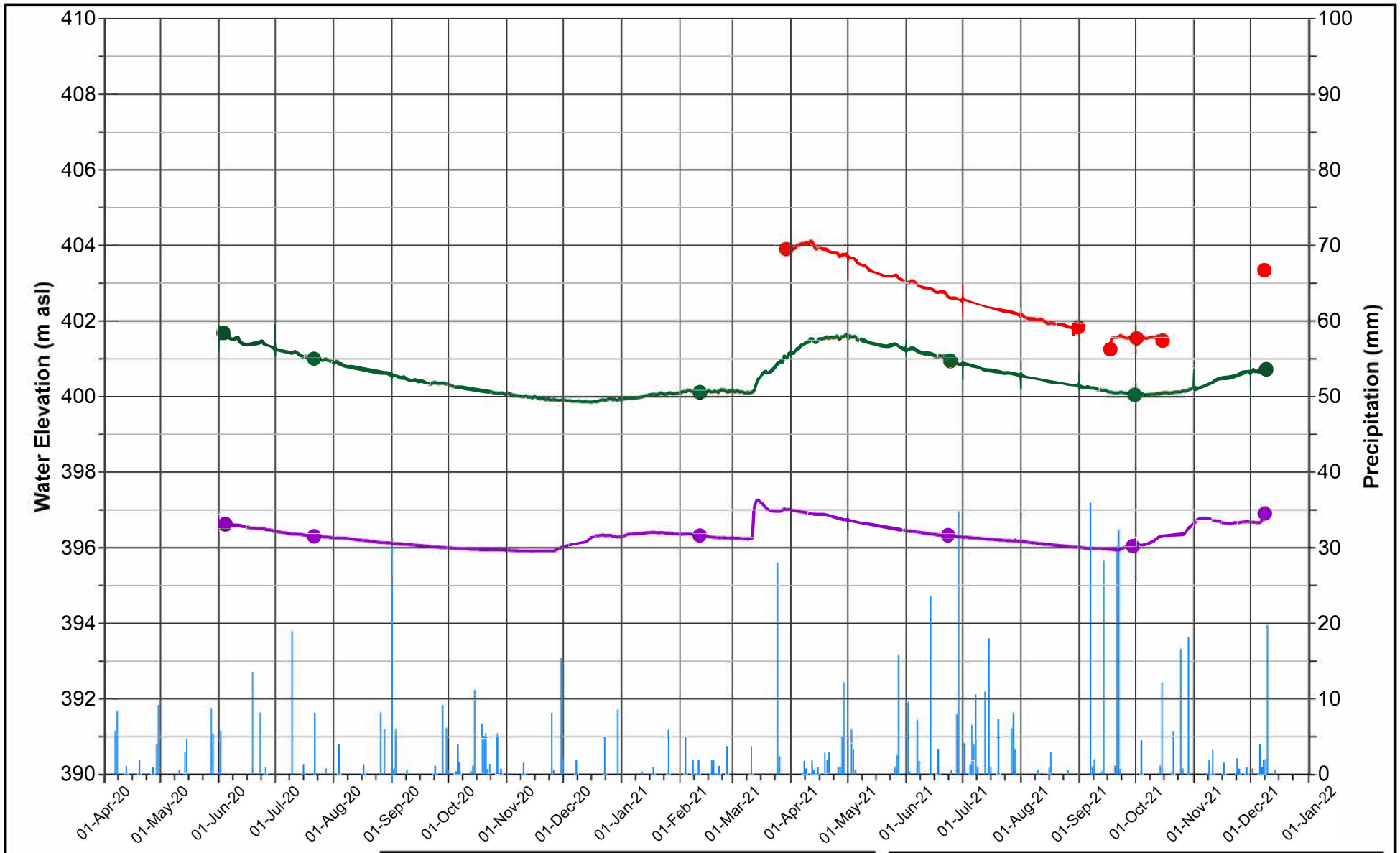


PROJECT

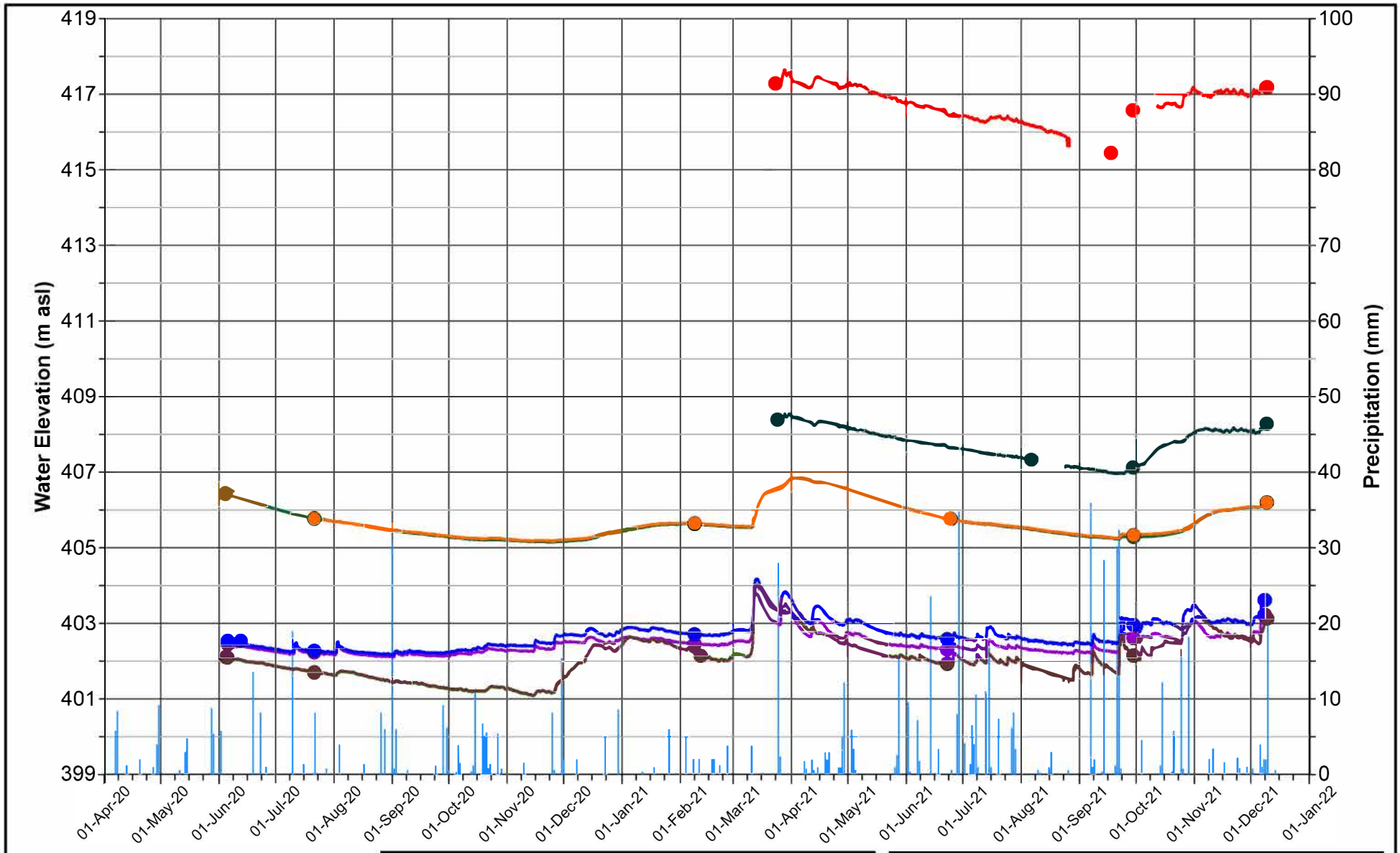
CBM CALEDON QUARRY

TITLE **GROUNDWATER MONITORING HYDROGRAPHS EASTERN AREA**

GOLDER
MEMBER OF WSP

DATE	November 2022
DESIGN	VRP
REVIEW	GRP
APPROVED	GWS

PROJECT NO.	REV	FIGURE
19129150	A	D3



MW20-11A
MW20-11B
MW20-14A
MW20-14B
MW20-17A
MW20-17B
PW21-1
PW21-2

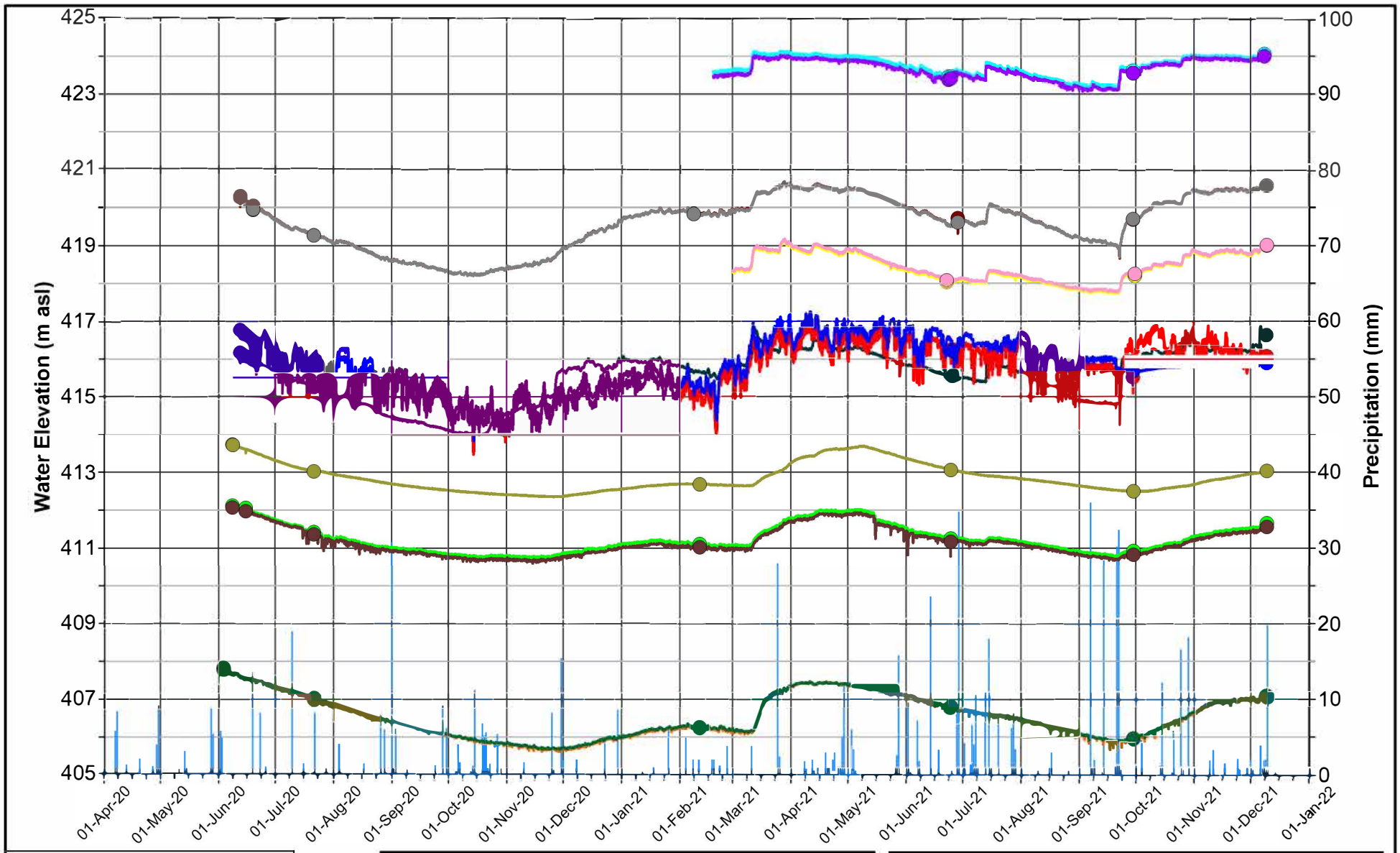
GOLDER
MEMBER OF WSP

DATE	November 2022
DESIGN	VRP
REVIEW	GRP
APPROVED	GWS

PROJECT
CBM CALEDON QUARRY

TITLE
GROUNDWATER MONITORING HYDROGRAPHS CENTRAL AREA

PROJECT NO.	REV	FIGURE
19129150	A	D4



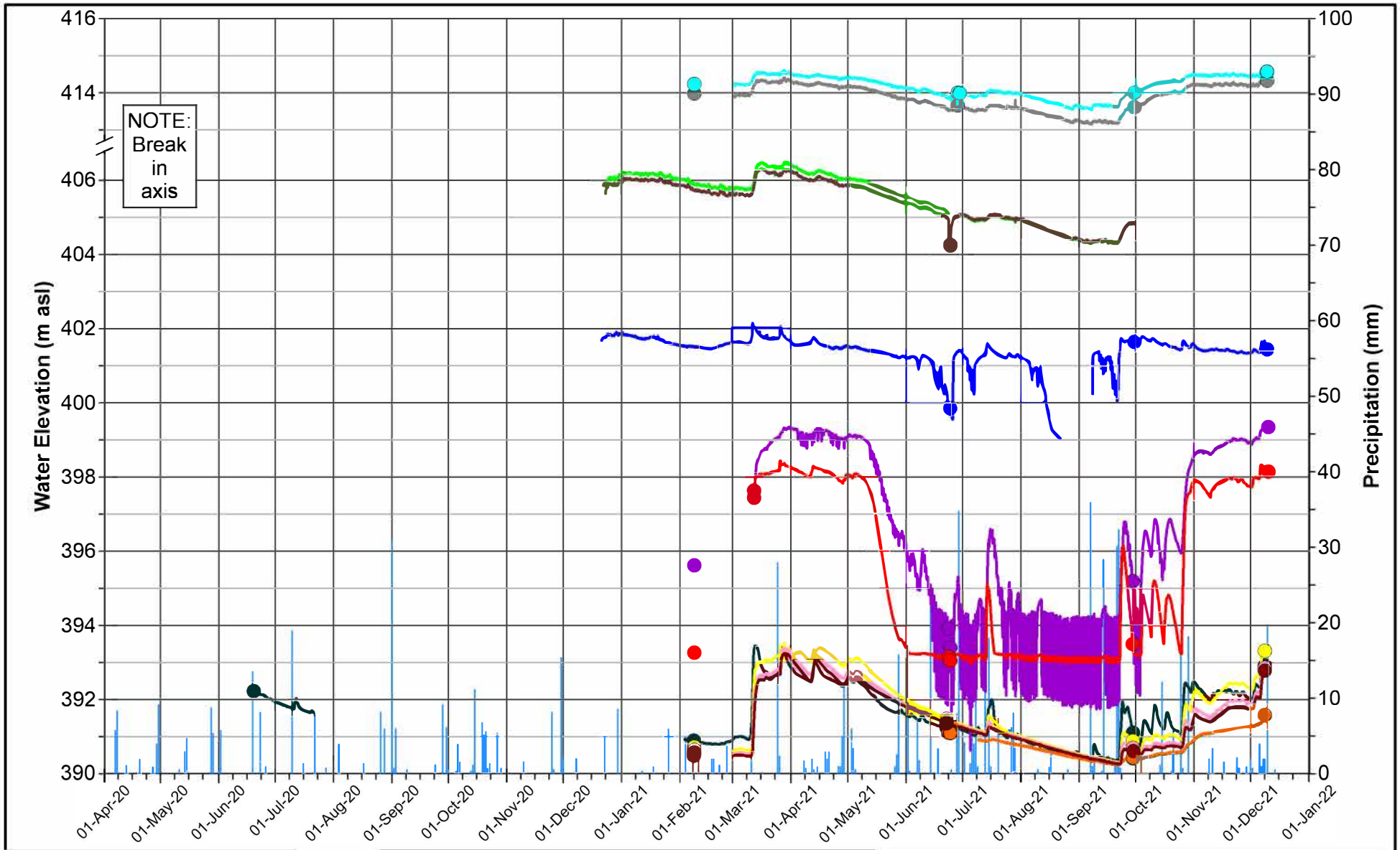
GOLDER
MEMBER OF WSP

DATE	November 2022
DESIGN	VRP
REVIEW	GRP
APPROVED	GWS

PROJECT
CBM CALEDON QUARRY

TITLE
GROUNDWATER MONITORING HYDROGRAPHS NORTHERN AREA

PROJECT NO.	REV	FIGURE
19129150	A	D5



GOLDER
MEMBER OF WSP

DATE	November 2022
DESIGN	VRP
REVIEW	GRP
APPROVED	GWS

PROJECT
CBM CALEDON QUARRY

TITLE
GROUNDWATER MONITORING HYDROGRAPHS WESTERN AREA

PROJECT NO.	REV	FIGURE
19129150	A	D6

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