Tulloch Engineering Inc.

New Water Intake and Low Lift Pumping Station, Blind River, Ontario

HYDROGEOLOGICAL INVESTIGATION

CIMA+ file number: T001592B
23 April 2025

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1. Introduction

CIMA Canada Inc. (CIMA+) was retained by Tulloch Engineering Inc. (Tulloch) on behalf of the Town of Blind River (the 'Town') to complete a Hydrogeological Investigation to support the New Water Intake and Low Lift Pumping Station (LLPS) (the 'Project') associated with the Blind River Water Treatment Plant (WTP) located in Blind River, Ontario, herein referred to as (the 'Project').

1.1 Site Description

The Project Site is approximately 0.55 hectares, located adjacent to the existing Blind River WTP, bounded by Martin Street to the north, Lake Huron to the south and residential housing to the east. The centre of the Project Site is in UTM Zone 17T, with approximate coordinates of Easting 349268 m and Northing 5116291 m.

The Study Area for the hydrogeological investigation has been established herein based on industry standard practices to include the surrounding area within a 500-meter (m) radius of the Site boundaries to support baseline characterization of Site conditions and identification of potential receptors of any expected impacts where applicable.

The Project Site and Study Area are delineated as shown on **Figure 1 (Attachment A)** and described below.

1.2 Objective

The hydrogeological investigation aims to characterize the existing hydrogeological conditions at the Project Site to inform detailed design of the Low Lift Pumping Station (LLPS) for the Project. The purpose of the hydrogeological investigation is to:

- Characterize the subsurface soil and shallow bedrock groundwater conditions at the Site and within the Study Area, consisting of a 500 m radius from the planned excavation area.
- Assess the need for groundwater control and temporary construction dewatering and evaluate permitting requirements - Ministry of the Environment, Conservation and Parks (MECP) Permit to Take Water (PTTW) Application(s) or a water taking registration on the Environmental Activity and Sector Registry (EASR).
- Identify potential receptors, evaluate potential groundwater impacts attributable to construction dewatering, and provide recommended mitigation measures for construction dewatering.

2. Methodology

The following activities were completed as part of the hydrogeological investigation provided herein for the Project:

- Desktop review of public information sources, including but not limited to online water well database maintained by the Ministry of the Environment, Conservation and Parks (MECP), geological mapping prepared by the Ontario Geological Survey (OGS), watershed impact studies, Source Water Protection Atlas, and other publicly available information;
- Coordination with Walker Drilling Ltd. (Walker Drilling) and Tulloch for the installation of a 5-inch (127 mm) open hole test well completed to a depth of approximately 10 m below ground surface (bgs) and sealed into bedrock, and two 2-inch (50.8 mm) monitoring wells, including well development and recovery observations to inform pumping test design;
- Completion of a step-rate pumping test using an electric submersible pump on the newly constructed test well to determine physical hydrogeological properties of the shallow bedrock unit across the test well interval;
- Water level monitoring within the newly constructed test well and observation wells throughout the duration of the pumping test using pressure transducers and data loggers;
- Completion of single well response tests (SWRT) at the newly constructed overburden monitoring well for evaluation of the horizontal hydraulic conductivity of the subsurface material at the Project Site;
- Collection of groundwater samples for comparison to the applicable criteria;
- Completion of a dewatering assessment;
- Development of groundwater mitigation, monitoring, and contingency plan(s), if required; and,
- Recommendations for additional studies and or assessments to support permitting and/or construction activities.

2.1 Borehole Advancement and Monitoring Well Installation

A drilling program was completed at the Project Site between October 22 and 23, 2024 by Walker Drilling under the direction of Tulloch and CIMA+. A total of three (3) boreholes were completed by Tulloch. BH-100 located adjacent to the future building footprint was advanced as a 5-inch (127 mm) borehole into bedrock to a total depth of 10.68 m bgs using PW/PQ drilling equipment. The borehole was sealed into bedrock encountered at a depth of 4.57 m bgs and completed as an open hole test well. BH-101 and BH-102 were advanced as 2-inch (50.8 mm) boreholes using HW/HQ drilling equipment. BH-101 was advanced to bedrock at 11.48 m bgs and installed as a 2-inch PVC monitoring well with a 10-foot (3.05 m) screen extending from 8.43 to 11.48 m bgs. BH-102 was advanced to 7.16 m bgs and installed as a 2-inch PVC monitoring well with a 5-foot (1.52 m) screen extending from 5.03 to 6.55 m bgs. Borehole logs including well installation details are included in **Appendix B**.

2.2 Test Well Development

Under the direction of Tulloch and CIMA+, on November 1, 2024 Walker Drilling completed well development and collection of initial recovery observations at the newly constructed BH-100 test well to determine the appropriate pumping rate for the planned pumping test. The test well was pumped manually with 5/8-inch Waterra tubing for approximately 30 minutes until the well was dry. Recovery was monitored via manual water level measurements using a Solinst® Model 101 electric water level tape for approximately 60 minutes following completion of development.

2.3 Pumping Test

On November 21, 2024, CIMA+ conducted a step-rate pumping test on the test well BH-100. The test was conducted with a stainless-steel Monsoon® submersible pump installed at a depth of 11.21 m below the top of casing. Water level information was collected using Solinst® Levelogger transducers and data loggers, as supplemented by manual water level measurements using a Solinst® Model 101 electric water level tape. A barometric transducer (Solinst® Barologger Model 3001) was utilized to permit water level data correction to changes in barometric pressure.

The test well was pumped at 3.79 L/min (1 USGPM) initially and was increased to 7.57 L/min (2 USGPM) after seven (7) minutes and was maintained for the remainder of the pumping test, which was terminated after 30 minutes when the water level had reached the pump intake. Water level recovery data was recorded until the water level reached approximately 95% of its original elevation, which was achieved after 180 minutes following pump shutoff. Results of the pumping test was analysed using the AQTESOLV Pro software and the Theis (1935) conceptual model and the Cooper-Jacob (1945) approximation.

An additional verification pumping test was performed on monitoring well BH-101 on November 22, 2024 following the methodology described above, yielding comparable results to those observed at BH-100.

2.4 Single Well Response Testing

Single well response testing (SWRT) was completed by CIMA+ personnel at the newly installed overburden monitoring well (BH-102) on November 21, 2024 to determine the horizontal hydraulic conductivity of the overburden material at the Project Site. The in-situ hydraulic testing was completed following standard slug and bail test methodology, involving the rapid raising (slug test) or lowering (bail test) of the hydraulic head using an object of known volume followed by the recording of the recovery response until the water level well has returned to within at least 90% of its original elevation.

Water level information was collected using Solinst® Levelogger transducers and data loggers, as supplemented by manual water level measurements using a Solinst® Model 101 electric water level tape. A barometric transducer (Solinst® Barologger Model 3001) was utilized to permit water level data correction to changes in barometric pressure. Results of the hydraulic testing were analysed using the AQTESOLV Pro software and the Hvorslev (1951) method.

2.5 Groundwater Level Monitoring

CIMA+ personnel conducted groundwater level monitoring at all newly constructed well locations at the Project Site on November 21, 2024. All manual water level measurements collected by CIMA+ personnel were collected using a Solinst® Model 101 electric water level tape relative to the top of casing reference elevation.

2.6 Groundwater Sampling

Groundwater samples were collected from the bedrock test well (BH-100) and overburden monitoring well BH-102 by CIMA+ personnel on November 21, 2024, for analysis of select general chemistry parameters for preliminary assessment of potential dewatering constraints in comparison to the Provincial Water Quality Objectives (PWQO) published by the Ministry of Environment and Energy (MOEE. 1994).

Samples were collected using standard groundwater sampling methodology in conjunction with parameter stabilization. Groundwater samples were collected from BH-100 using a stainless-steel Monsoon® submersible pump powered by a 12V portable battery in combination with standard Waterra® 5/8” x 1/2" LDPE tubing, while the sample collected from BH-102 was obtained the standard Waterra® LDPE tubing and inertial lift foot-valve. Groundwater quality field parameters were measured using a Horiba® U-52 multi-parameter instrument. Groundwater samples were collected once parameter stabilization was achieved.

Groundwater samples were submitted under strict chain-of-custody protocols to AGAT Laboratories Ltd. (AGAT) in Mississauga, Ontario, a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory.

3. Background

3.1 Land Use and Servicing

The Project Site is located on Martin Street and along on the shores of Lake Huron within the Town of Blind River, south of Highway 17 and east of Blind River as indicated in **Figure 1 (Appendix A)**. Existing land use within the surrounding Study Area is dominated by industrial/commercial properties to the north and west, as well as residential properties to the east.

Based on the information presented in the Town of Blind River Official Plan (2015), the Project Site is located within an area zoned as Open Space. It is noted that the Official Plan designates areas of shoreline along Lake Huron and Blind River as being Environmental Protection (EP) zones; select EP zones fall within 200 m of the Project Site.

Based on available mapping information and a reconnaissance of the Project Site and surrounding area, it's assumed that the residential areas adjoining the Project Site are fully serviced with municipal water supply and sewer services.

3.2 Aerial Photography & Satellite Imagery

Current and historical aerial photographs obtained from the Land Information Ontario (LIO) interactive map tool and Google Earth Pro (accessed January, 2025) were used to conduct a preliminary desktop review of land usage in the immediate vicinity of the Project Site for identification of potential sources of environmental impacts to groundwater.

In addition to the existing WTP adjacent to the Project Site and commercial properties to the north, information gathered from the desktop review identified a property located at 75 Causley Street, at the corner of Huron Avenue and Causley Street/Hwy 17, which appears to have contained a building which was demolished between 2009 and 2019. The nature of the former building is unknown however a series of groundwater monitoring wells appear to have been installed surrounding the property, suggesting potential environmental concern. The property is approximately 150 m northeast of the Project Site.

3.3 Topography

Review of the regional topographic and drainage mapping information presented by the Ministry of Natural Resources and Forestry (MNRF) (accessed January, 2025) indicates that topography across the Project Site slopes gradually to the south towards Lake Huron. Ground surface elevations within the Project Site range from a maximum of approximately 185 metres

(m) above sea level (asl) on the north side of the Site, decreasing to approximately 180 m asl along the shores of Lake Huron to the south. No notable topographic features are indicated on or in proximity to the Project Site based on the available mapping information. The regional topography is shown in **Figure 2 (Appendix A)**.

3.4 Geology

3.4.1 Surficial Geology

Surficial geology mapping presented by the OGS (2010) and reproduced within **Figure 3 (Appendix A)** indicates that the surficial geology over the Project Site is dominated by Pleistocene till, undifferentiated, predominantly sand to silty sand matrix, high content of clasts, often low in matrix carbonate content. Records from the Water Well Information System (WWIS) indicate that overburden material locally is generally described as sand and gravel fill material overlaying silt and clay.

Ontario Soil Surveys Report no. 50, Soils of Blind River – Sault Ste Marie Area includes some mapping of the Study Area. Available soil mapping classifies soil as orthic humo-ferric podzol, described as noncalcareous very stony sand and/or clay lacustrine. The soil type is classified as 'well' drained.

3.4.2 Bedrock Geology

Regional bedrock geology mapping information presented by the OGS (2007) indicates that the bedrock underlying the overburden material within the Project Site has been classified as the McKim Formation in the Elliot Lake Group, characteized as siltstone, wacke and argillite. OGS bedrock geology mapping is reproduced within **Figure 4 (Appendix A)**.

Observations from the November 2024 drilling program completed at the Site indicated that bedrock was encountered at depths ranging from 4.57 to 6.43 m bgs.

3.4.3 Hydrogeology

Based on the available information and watershed mapping, regional groundwater flow within the overburden and bedrock material is inferred to follow regional ground surface topography sloping to the south towards Lake Huron.

A search of the WWIS indicated a total thriteen (13) water well records for locations within a 250 meter (m) radius of the Project Site boundaries, as presented in **Figure 5 (Appendix A)**. Review of the information indicates that all records correspond with monitoring wells and test holes completed in the overburden, to depths up to approximately 4 m bgs. No static water level information or yield assessment was available.

Additional details pertaining to hydrogeological observations and results from the field investigations are included in **Section 4**.

3.5 Surface Water Features and Areas of Natural and Scientific Interest

The Project Site is not located within the jurisdiction of a Conservation Authority, however as noted in **Section 3.1**, the Town of Blind River Official Plan designates areas of shoreline along Lake Huron and Blind River as being Environmental Protection (EP) zones; select EP zones fall within 200 m of the Project Site.

Review of the Ontario Watershed Information Tool (OFAT, accessed March, 2025) presented by the MNR indicates that surficial drainage in the vicinity of the Project Site is predominantly oriented towards the south, following gently sloping topography towards Lake Huron.

3.6 Source Water Protection

Based on the online interactive mapping information included within the Source Protection Information Atlas (MECP, accessed March 2025), no Source Water Protection measures have been developed within proximity to the Project Site.

4. Field Investigation

4.1 Groundwater Level Monitoring

CIMA+ personnel conducted groundwater level monitoring at all newly constructed well locations at the Project Site during the November 21, 2024 hydrogeological investigation event. Water level depths were measured to range from 2.83 m bgs at the open hole bedrock test well (BH-100) to 3.61 m bgs at the shallow overburden monitoring well (BH-102). Calculated water level elevations were determiend to be relatively consistent between monitoring intervals, ranging from 176.75 to 176.97 m asl. Monitoring well construction details and groundwater elevations collected by CIMA+ are included below in **Table A**. Borehole locations are presented on **Figure 6 (Appendix A)**.

Table A: Monitoring Well Information

Monitoring Location	Ground Surface Elevation	Top of Bedrock		Top of Screen		Bottom of Screen		Water Level November 21, 2024	
	m asl	m asl	m bgs	m asl	m bgs	m asl	m bgs	m asl	m bgs
BH-100[1]	179.58	175.01	4.57	175.01[2]	4.57	168.90[3]	10.68	176.75	2.83
BH-101	180.38	173.95	6.43	171.95	8.43	168.90	11.48	176.97	3.41
BH-102	180.38	173.95	6.43	178.86	5.03	173.83	6.55	176.77	3.61

bgs - below ground surface
asl - above sea level
1 - open hole test well
2 - bottom of casing
3 - end of borehole

4.2 Pumping Test

On November 21, 2024 CIMA+ conducted a step-rate pumping test on the open hole bedrock test well BH-100. The test well was pumped at 3.79 L/min (1 USGPM) initially and was increased to 7.57 L/min (2 USGPM) after seven (7) minutes and was maintained for the remainder of the pumping test, which was terminated after 30 minutes when the water level had reached the pump intake. Water level recovery data was recorded until the water level reached approximately 95% of its original elevation, which was achieved after 180 minutes following pump shutoff.

Results of the pumping test were analysed using the AQTESOLV Pro software and the Theis (1935) conceptual model and the Cooper-Jacob (1945) approximation for an unconfined aquifer condition. Results from the pumping test are summarized below in **Table B**. The individual pumping test analyses are included in **Appendix C**.

An additional verification pumping test was performed on monitoring well BH-101 on November 22, 2024, yielding comparable results to those observed at BH-100.

Table B: Pumping Test Results

Monitoring Location	Analysis[1]	Calculated Transmissivity (m^2/s)	Mean Transmissivity (m^2/s)
BH-100	Theis	1.32 E-06	2.67 E-06
	Cooper-Jacob	4.02 E-06	

Notes:

1 Theis (1935) Pumping Test Solution
Cooper-Jacob (1945) Pumping Test Solution

4.3 Single Well Response Testing

Single well response testing (SWRT) was completed by CIMA+ personnel at the newly installed overburden monitoring well (BH-102) on November 21, 2024 to determine the horizontal hydraulic conductivity of the subsurface material at the Project Site. Results of the hydraulic testing were analysed using the AQTESOLV Pro software and the Hvorslev (1951) method. Results of the single well response tests are summarized below in **Table C**. The individual SWRT analyses are included in **Appendix C**.

The hydraulic testing at BH-102 yielded a mean hydraulic conductivity result of 1.54E-05 m/s, which is typical of the inferred sand to silty sand till overburden material in which the monitoring well was screened.

Table C: Single Well Response Test Results

Monitoring Location	Screened Interval (m bgs)	Screened Geological Unit	Test ID	Hydraulic Conductivity (K)[1] (m/s)	Mean Hydraulic Conductivity (K) (m/s)
BH-102	5.03 to 6.55	Till – sand to silty sand	Slug 1	1.82E-05	1.54E-05
			Bail 1	1.35E-05	
			Slug 2	1.52E-05	
			Bail 2	1.48E-05	

Notes:

1 - Hvorslev (1951) aquifer test solution

4.4 Groundwater Sampling

Groundwater samples were collected from the test well (BH-100) and monitoring well BH-102 by CIMA+ personnel on November 21, 2024, for analysis of select general chemistry parameters for preliminary assessment of potential dewatering constraints in comparison to the Provincial Water Quality Objectives (PWQO) published by the Ministry of Environment and Energy (MOEE. 1994). The groundwater quality results are presented in **Table 1 (Appendix D)** in comparison to the applicable criteria. Laboratory Certificates of Analysis are included as **Appendix E**.

Total cobalt and total copper were reported in exceedance of the PWQO for samples collected at both BH-100 and BH-102, while total vanadium, total phosphorous, and chromium VI at BH102, and total silver at BH-100, were also reported in exceedance of the PWQO.

5. Construction Dewatering Assessment

5.1 Excavation Parameters

It is understood that open cut construction methods will be used for excavation of the LLPS. The details of the trench excavation summarized below in **Table D** have been interpreted based on the available information in the 90% Detailed Design plans completed by CIMA+ (November 2024). Based on the available information, the base of the excavation required to support the planned work is assumed to be approximately 7.2 m bgs. To maintain dry working conditions within the excavations it is assumed water levels will have to be lowered to an elevation 1 m below the base of all excavations during the planned work.

Table D: Dewatering Assessment Parameters

Excavation Specifications	Depth m bgs	Elevation m asl
Ground Surface	-	180.56
Groundwater Elevation[1]	1.0	179.56
Bedrock Surface	4.57	175.01
Bottom of excavation - Wet Well[2]	7.17	173.39
Maximum Groundwater Elevation under Dewatering	8.17	172.39
Required Drawdown (m)	7.17	

Notes: 1 Conservative high water level estimate
2 Tulloch (November 2024)

5.2 Groundwater Infiltration

In consideration of groundwater infiltration contributions from the overburden unit, the mean hydraulic conductivity value of 1.54E-05 m/s described in **Section 4.3** above was evaluated as being representive of the inferred sand to silty sand till unit for use in the construction dewatering assessment herein.

With respect to groundwater infiltration contributions from the bedrock unit, hydraulic conductivity was estimated using the mean Transmissivity (T) m^2/s value of 2.67E-06 m^2/s calculated as described in **Section 4.2** based on the analyses of the pumping test conducted at BH-100 in conjunction with an assumed aquifer thickness of 10 m. Hydraulic conductivity is related to Transmissivity as follows:

$$K = T/b$$

Where:

K = Hydraulic conductivity of the geological unit (m/s)

T = Transmissivity (m^2/s)

b = Aquifer Thickness (m), set as 10 m

Based on the above calculation, hydraulic conductivity within the bedrock unit is estimated to be 2.67E-07 m/s. The hydraulic conductivity value is considered to be reflective of a conservative assessment of groundwater infiltration, based on comparison to typical theoretical hydraulic conductivity values for siltstone and field observations during the hydrogeological investigation.

The infiltration rate calculations provided herein are based on the following assumptions:

- The geological material on-Site is isotropic and as a result the hydraulic conductivity of the stratigraphic unit is uniform.

- Vertical flow is negligeable and there is no upward hydraulic pressure or confined/artesian conditions. The bedrock aquifer is inferred to be unconfined based on observations from the field program and aquifer testing.
- The infiltration of groundwater is isolated from other sources including nearby streams or bodies of water.
- No other dewatering or pumping activity in the vicinity of the site will impact groundwater inflow rates during the excavation.

Infiltration rate calculations were performed using the Dupuit (1863) and Forchheimer (1930) method (presented in Powers et. al., 2007) for estimating steady-state groundwater flow to a point source under unconfined aquifer conditions, as described below. The Dupuit-Forchheimer approximation assumes that for the excavation areas, the vertical flow is negligeable, and that the groundwater discharge is proportional to the saturated aquifer thickness, driven by the slope of the water table.

$$Q = \frac{\pi K * (H^2 - h_w^2)}{\ln \frac{R0 + r_w}{r_w}}$$

Where:

Q = Groundwater inflow rate into the excavation (m^3/s)

K = Hydraulic conductivity of the geological unit (m/s)

H = Saturated thickness prior to dewatering (m)

h_w = Saturated thickness after dewatering (m)

R_o = Radius of influence from point source (m)

r_w = Effective radius of point source (m)

The effective radius (r_w) is approximated by the equation below:

$$r_w = \sqrt{\frac{ab}{\pi}}$$

a = Length of the excavation, assumed to be 13.5 m

b = Width of the excavation (m), assumed to be 13 m

The radius of influence (Ro) is approximated by the method described by Sichardt et Kyrieleis (1930):

$$R_o = 3000(H - h_w)\sqrt{K}$$

Calculations and results from the dewatering assessment are included in **Appendix F**. A summary of the estimated infiltration rates is presented in **Table E** along with an applied safety factor of 3 to compensate for potential components of additional inflow not captured within the above equations, including incidental precipitation events.

Table E: Infiltration Rates into Excavation

Dewatering Assessment	Estimated infiltration rate (m^3/day)	
LLPS Excavation	Estimated infiltration rate	42
	Applied Safety Factor (x3)	127

Based on the calculations presented in **Appendix F** and summarized in **Table D** above, the vertical and lateral groundwater inflow from the walls and base of the planned excavation, with dimensions of 13 x 13.5 m and a depth of 7.17 m bgs, located within the Project Site is estimated to be approximately 127 m^3/day (23 USGPM) inclusive of the applied safety factor of 3 to compensate for potential components of additional inflow not captured within the above equations, including incidental precipitation events. The associated predicted radius of influence was estimated to be 54 m in the overburden unit, and 4 m in the bedrock unit.

5.3 Permitting

The construction dewatering assessment presented in **Section 5.2** above anticipates conservative construction dewatering needs of up to 172 m^3/day, dependent on excavation dimensions and location within the Project Site.

Based on the assessment herein, a water taking registration on the Environmental Activity and Sector Registry (EASR) would be required to facilitate Project construction dewatering activities. A Permit to Take Water (PTTW) is not anticipated to be required.

6. Impact Assessment and Proposed Mitigations

6.1 Impact Assessment

An impact assessment was completed to evaluate the potential for adverse impact resulting from the planned Project construction dewatering activities. The Site setting, land use, as well as geological and hydrogeological Site conditions were taken into consideration. The following assessment is provided based on the planned Project activities and their potential impacts:

- The predicted radius of influence associated with planned dewatering activities was estimated to be 54 m in the overburden unit, and 4 m in the bedrock unit as presented in Appendix F.
- Based on available mapping information and a reconnaissance of the Project Site and surrounding area, it's assumed that the residential areas adjoining the Project Site are fully serviced with municipal water supply and sewer services and therefore no impacts to the municipal water supply or other water users are anticipated as a result of the planned Project activities.
- Based on the online interactive mapping information included within the Source Protection Information Atlas (MECP, accessed March 2025), no Source Water Protection measures have been developed within proximity to the Project Site.
- Desktop environmental review of properties within the Study Area identified a series of groundwater monitoring wells located at 75 Causley Street suggesting potential environmental concern at the property. Given the approximately 150 m distance between the property and the Project Site, and the relatively small radius of influence calculated as part of the dewatering assessment (54 m in overburden and 4 m in bedrock), the potential for environmental concern at 75 Causley Street is not anticipated to represent a constraint or impact planned Project construction dewatering activities.
- Potential impacts to the surrounding environment related to water taking and water discharge as a result of the required dewatering activities for the Project will be addressed through the development of a Water Taking and Discharge Plan as required by the EASR registration. It is noted that select total metals and general chemistry parameters (chromium VI, cobalt, copper vanadium, silver, and total phosphorous) were reported in exceedance of the PWQO for groundwater samples collected among newly installed test and monitoring wells and should be considered as part of the anticipated Water Taking and Discharge Plan in the event of anticipated discharge to the environment.
- Geotechnical assessment of potential settlement as a result of dewatering is not anticipated to be required based on the absence of existing structures within the estimated radius of influence.

6.2 Mitigation Measures

6.2.1 Management of Discharge

It is recommended that a Water Taking and Discharge Plan be developed in advance of construction dewatering activities, as required by the EASR registration for construction dewatering, including assessment of dewatering effluent discharge location(s) and treatment requirements in consideration of the identified PWQO exceedances for select total metals and general chemistry parameters including chromium VI, cobalt, copper vanadium, silver, and total phosphorous.

6.2.2 Mitigation Measures

During dewatering discharge, it is recommended that the Contractor develop and implement best management practices to mitigate any potential impacts to the environment. Mitigation measures may include but not be limited to:

- Erosion and Sediment Control (ESC) measures (silt fences etc.);
- Stormwater management (efforts to direct surface water flow away from the excavation etc.);
- Spill containment and response plan; and,
- Proper storage and management of excavated soils for reuse and/or off-Site disposal.

6.2.3 Proposed Monitoring

It is recommended that a monitoring program (quality and quantity) be developed in advance of the construction dewatering activities in consideration of the anticipated EASR registration and associated Water Taking and Discharge Plan. The monitoring program should consider Project specific dewatering practices, the discharge location, and available intact monitoring wells.

7. Limiting Conditions

CIMA+ completed diligent and reasonable research in the conduct of this evaluation, with respect to the recognized laws and standards of practice.

The facts presented in this report are strictly limited to the period of investigation. The conclusions presented in this report are based on the available information and documents, the observations made during the Site visit and the information obtained from communications with various contacts. The interpretation presented in this report is limited to this data.

CIMA+ is not responsible for erroneous conclusions due to voluntary abstention or the non-availability of pertinent information. Any opinion expressed in relation to legal or regulatory conformity is technical and should not be, in any case, considered as legal advice.

CIMA+ has prepared this report for the sole use of the client. Any use of this report by a third party, as any decision based on this report, is the singular responsibility of the third party. CIMA+ will not be held responsible for eventual damages towards a third party resulting from decisions taken, or based, on this report.

8. References

CIMA+ (2024). Blind River Intake and LLPS Drawings Issued for 90% Detailed Design.

Ministry of Environment. (2024). Well Records. Retrieved from Ontario.ca: https://www.ontario.ca/page/map-well-records

Ministry of the Environment, Conservation and Parks (2016). Water taking user guide for Environmental Activity and Sector Registry.

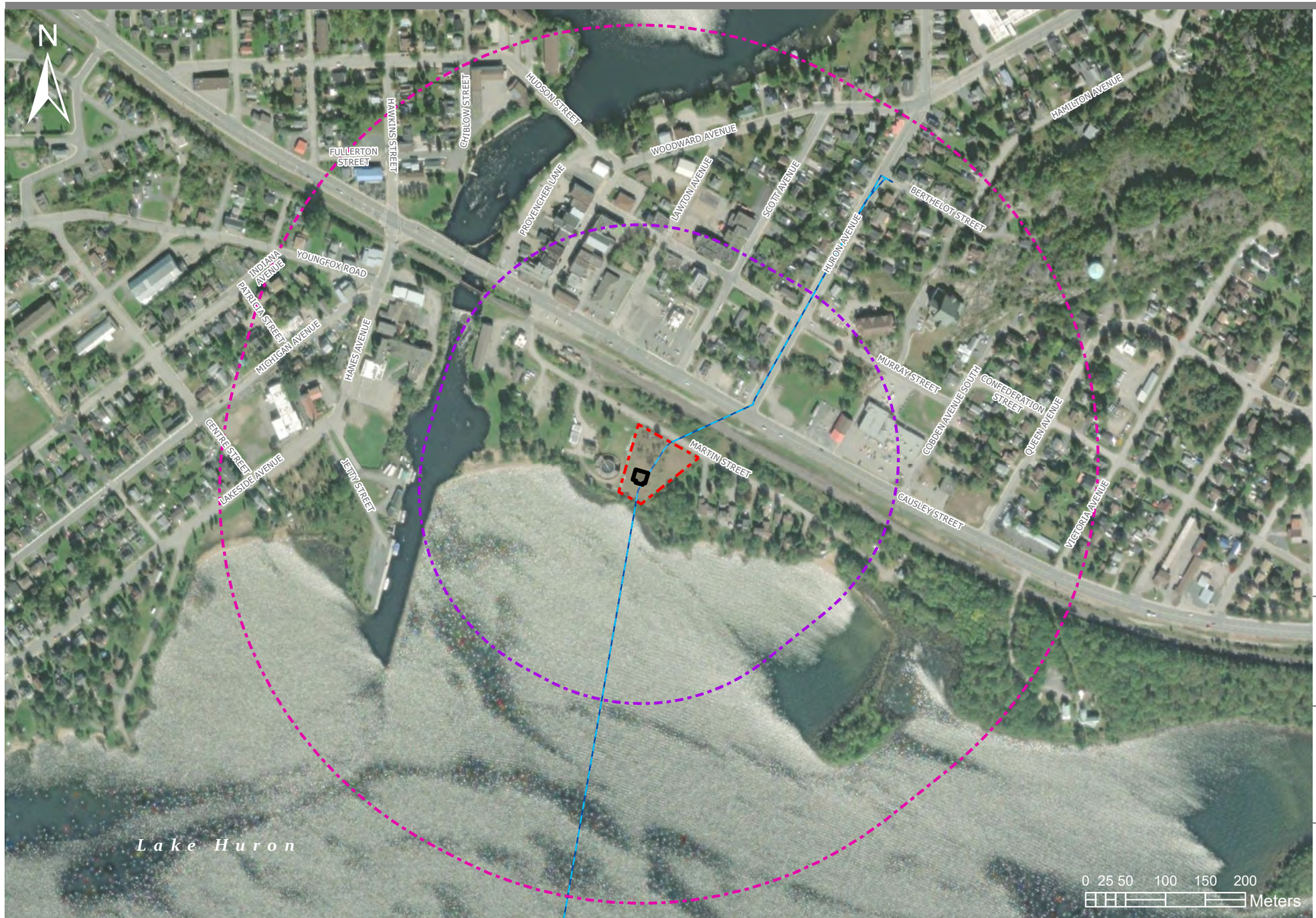
Ministry of the Environment, Conservation and Parks (2004). Ontario Regulation 387/04: Water Taking and Transfer under Ontario Water Resources Act, R.S.O, c. O.40

Part II.2 of the Environmental Protection Act (EPA or Act), Ontario Regulation (O. Reg.) 245/11 (Registrations Under II.2 of the Act – General) and O. Reg. 63/16 (Registrations under II.2 of the Act – Water Taking)

Powers et al (2007). Construction Dewatering and Groundwater Control: New Methods and Applications - Third Edition. New York, New York: John Wiley & Sons.

A

Appendix A
Figures



Project Site
Study Area - 250 m
Study Area - 500 m
Proposed Building Footprint
Proposed Water Intake

Spatial Reference:
Name: NAD 1983 CSRS MTM 13
GCS: GCS North American 1983 CSRS
Datum: North American 1983 CSRS
Map Units: Meter
Scale: 1:5,000

Sources:
- Road Labels, ORN, 2024
- Topographic Contours, Watercourse, LIO, 2024
- Basemap : Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA,

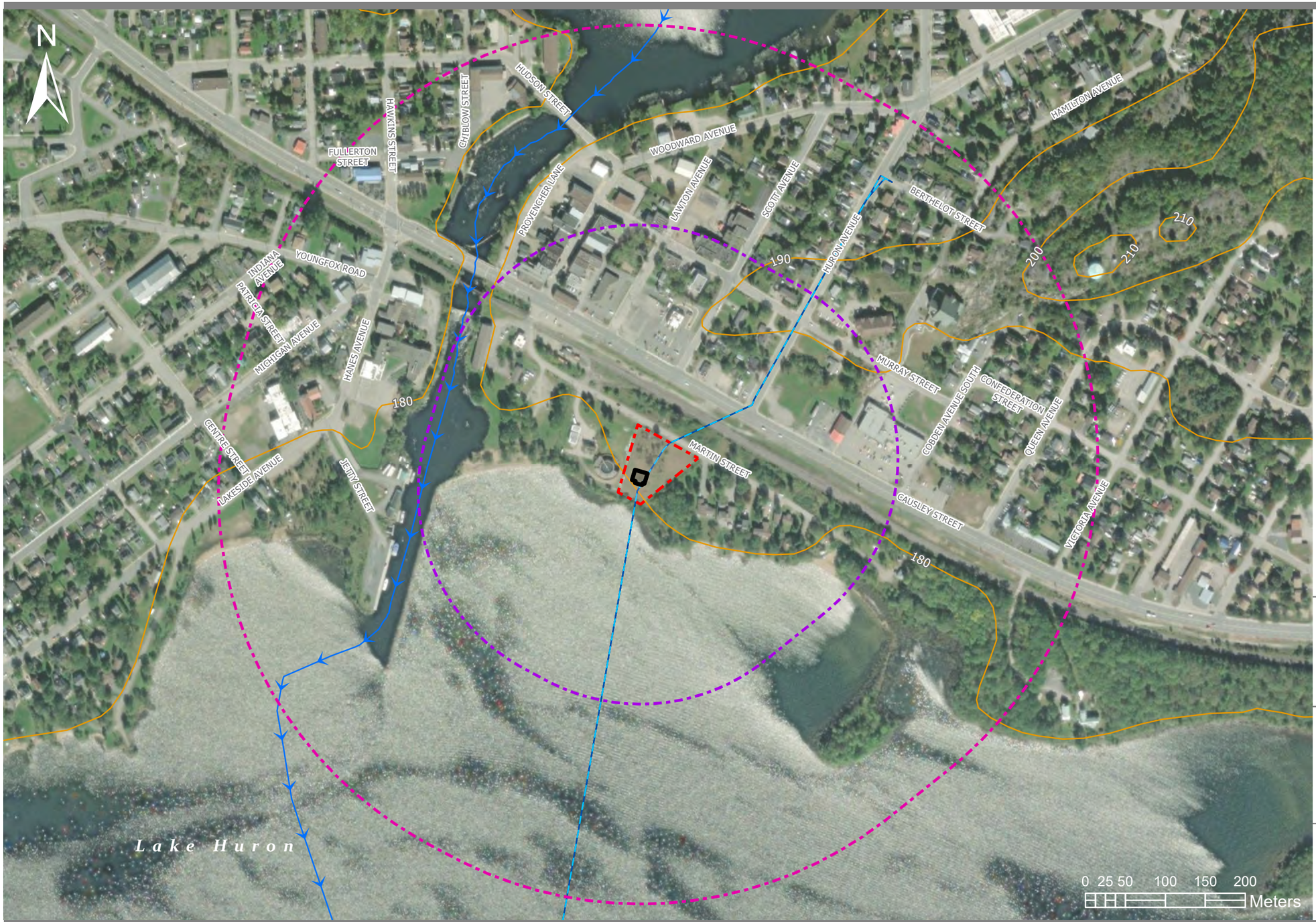
General Notes:
Dimensions on the plan should be read and not measured.
Any errors or omissions should be reported to CIMA +. The boundaries, areas, and title deeds must be verified by a surveyor.

Figure 1 - Site Location Map

Hydrogeological Investigation - New Water Intake & Huron Ave. Reconstruction
17 T 4850065 N; 5116292 E, Blind River, Ontario
Tulloch Engineering Inc.

Ref # : T001592B

Survey by : -
Figure by : S. Scott
Concept by : S. Scott
Verified by : M. Klein



Project Site
Study Area - 250 m
Study Area - 500 m
Proposed Building Footprint
Proposed Water Intake
Topographic Contours - 5 m
Watercourse

Spatial Reference:
Name: NAD 1983 CSRS MTM 13
GCS: GCS North American 1983 CSRS
Datum: North American 1983 CSRS
Map Units: Meter
Scale: 1:5,000

Sources:
- Road Labels, ORN, 2024
- Topographic Contours, Watercourse, LIO, 2024
- Basemap : Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA,

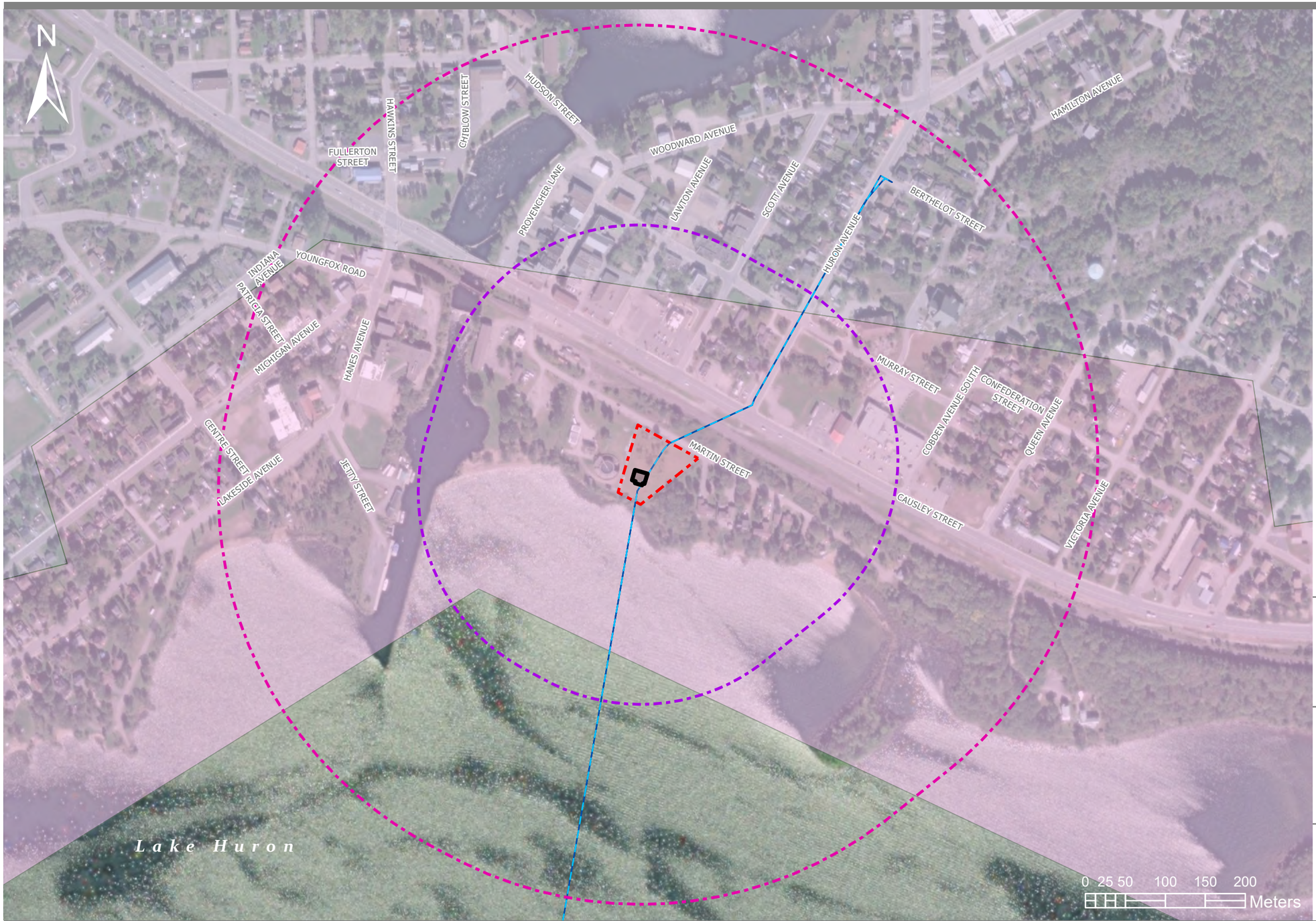
General Notes:
Dimensions on the plan should be read and not measured.
Any errors or omissions should be reported to CIMA +. The boundaries, areas, and title deeds must be verified by a surveyor.

Figure 2 - Topography & Drainage Map

Hydrogeological Investigation - New Water Intake & Huron Ave. Reconstruction
17 T 4850065 N; 5116292 E, Blind River, Ontario
Tulloch Engineering Inc.

Survey by : -
Figure by : S. Scott
Concept by : S. Scott
Verified by : M. Klein

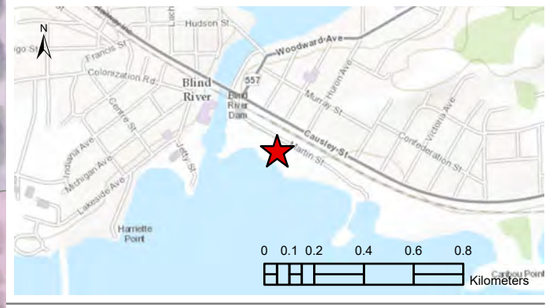
Ref # : T001592B



Project Site
Study Area - 250 m
Study Area - 500 m
Proposed Building Footprint
Proposed Water Intake

Quaternary Geology

Bedrock
Till



Spatial Reference:
Name: NAD 1983 CSRS MTM 13
GCS: GCS North American 1983 CSRS
Datum: North American 1983 CSRS
Map Units: Meter
Scale: 1:5,000

Sources:
- Road Labels, ORN, 2024
- Ontario Geological Survey 2000. Quaternary geology of Ontario; Ontario Geological Survey, ERLIS Data Set —EDS014-REV.
- Basemap : Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS,

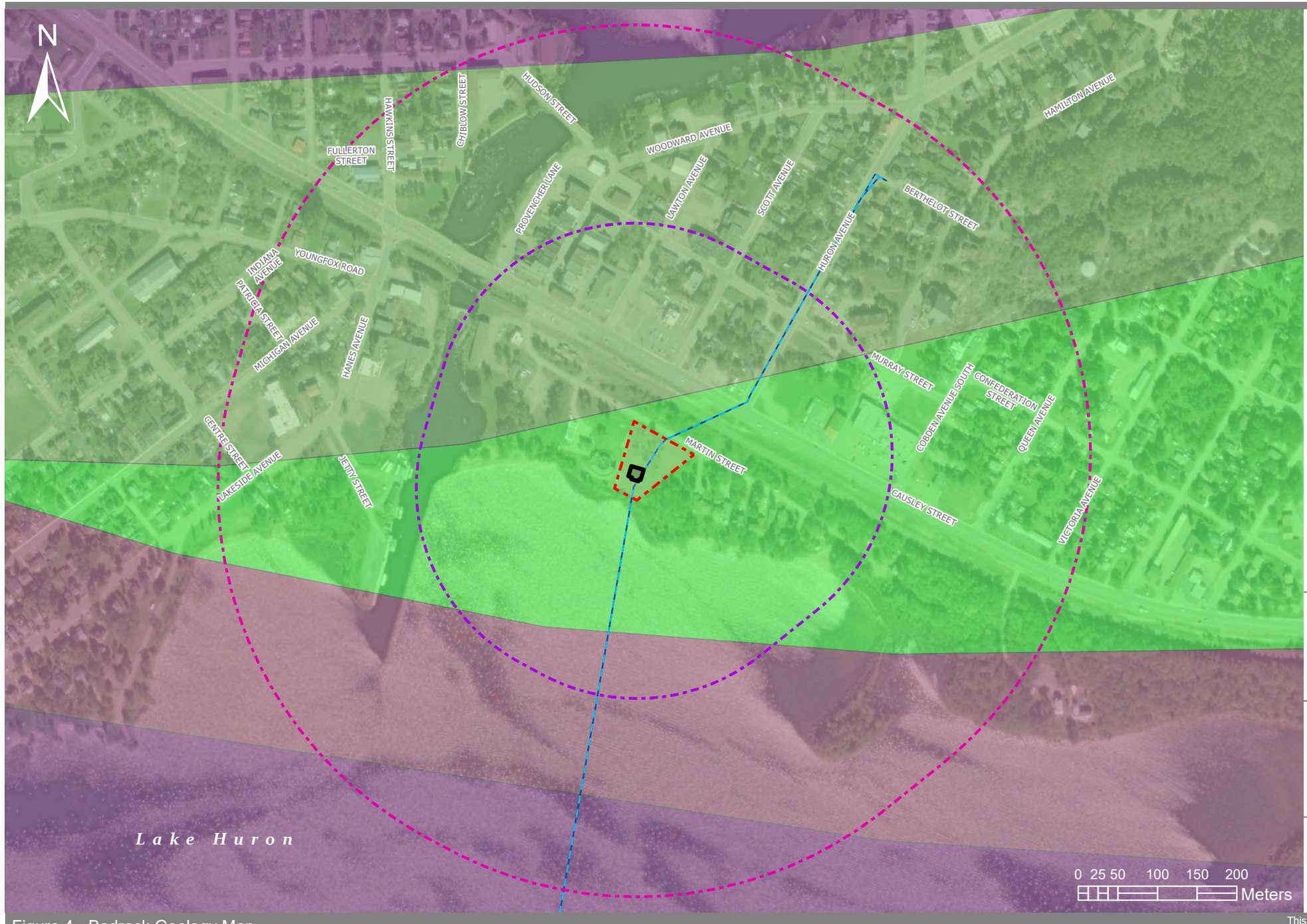
General Notes:
Dimensions on the plan should be read and not measured.
Any errors or omissions should be reported to CIMA +. The boundaries, areas, and title deeds must be verified by a surveyor.

Figure 3 - Surficial Geology Map

Hydrogeological Investigation - New Water Intake & Huron Ave. Reconstruction
17 T 4850065 N; 5116292 E, Blind River, Ontario
Tulloch Engineering Inc.

Ref # : T001592B

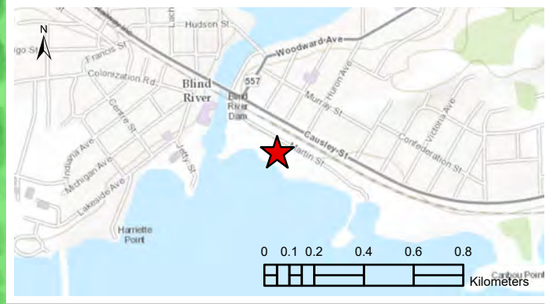
Survey by : -
Figure by : S. Scott
Concept by : S. Scott
Verified by : M. Klein



- Project Site
- Study Area - 250 m
- Study Area - 500 m
- Proposed Building Footprint
- Proposed Water Intake

Bedrock Geology

- 18a,Siltstone, wacke, argillite
- 19a,Quartz-felspar snadstone, argillite and conglomerate,19a,Quartz-felspar snadstone, argillite and conglomerate
- 19b,Siltstone, argillite, wacke, minor sandstone
- 23d,Nipissing mafic sills (2219 Ma): mafic sills, mafic dikes and related granophyre,23d,Nipissing mafic sills (2219 Ma): mafic sills, mafic dikes and related granophyre



Spatial Reference:
Name: NAD 1983 CSRS MTM 13
GCS: GCS North American 1983 CSRS
Datum: North American 1983 CSRS
Map Units: Meter
Scale: 1:5,000

Sources:
- Road Labels, ORN, 2024
- Ontario Geological Survey 2011. 1:25,000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release—Data 126 – Rev 1.
- Basemap : Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Province

General Notes:
Dimensions on the plan should be read and not measured.
Any errors or omissions should be reported to CIMA +. The boundaries, areas, and title deeds must be verified by a surveyor.

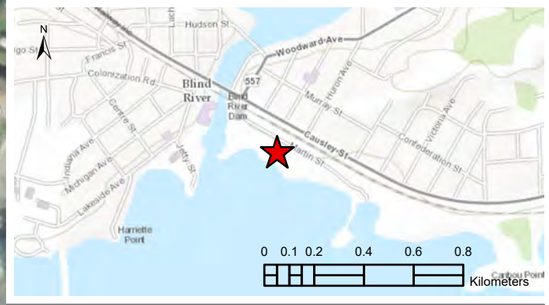
Figure 4 - Bedrock Geology Map

Hydrogeological Investigation - New Water Intake & Huron Ave. Reconstruction
17 T 4850065 N; 5116292 E, Blind River, Ontario
Tulloch Engineering Inc.

Survey by : -
Figure by : S. Scott
Concept by : S. Scott
Verified by : M. Klein

Ref # : T001592B

Project Site
Study Area - 250 m
Proposed Building Footprint
Proposed Water Intake
MECP Well Locations



Spatial Reference:
Name: NAD 1983 CSRS MTM 13
GCS: GCS North American 1983 CSRS
Datum: North American 1983 CSRS
Map Units: Meter
Scale: 1:2,700

Sources:
- Road Labels, ORN, 2024
- MECP Well Record Locations, LIO, 2024
- Basemap : Maxar, Microsoft, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NGA, EPA, USDA, AAFC, NRCan

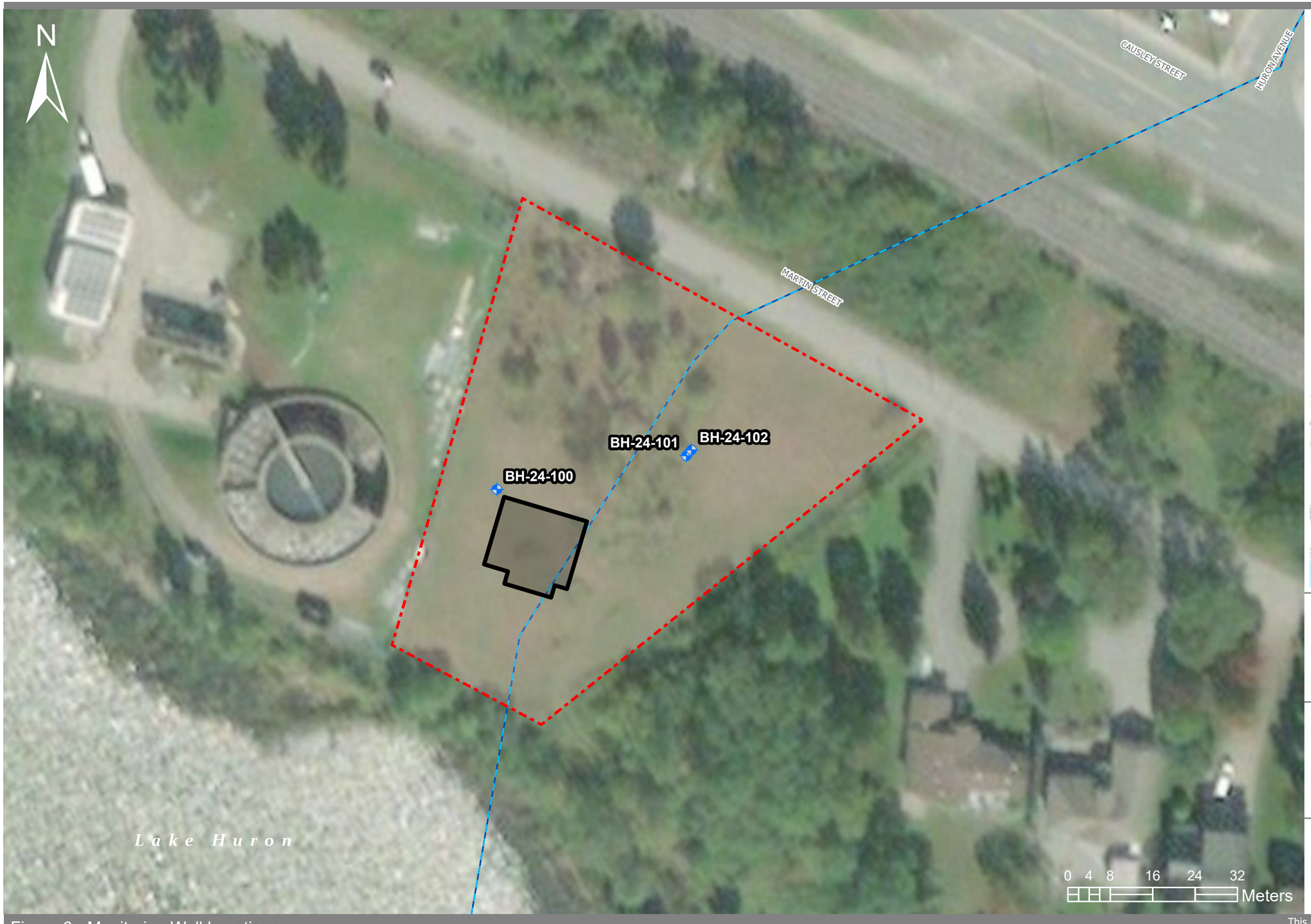
General Notes:
Dimensions on the plan should be read and not measured.
Any errors or omissions should be reported to CIMA +. The boundaries, areas, and title deeds must be verified by a surveyor.

Figure 5 - MECP Well Locations

Hydrogeological Investigation - New Water Intake & Huron Ave. Reconstruction
17 T 4850065 N; 5116292 E, Blind River, Ontario
Tulloch Engineering Inc.

Ref # : T001592B

Survey by : -
Figure by : S. Scott
Concept by : S. Scott
Verified by : M. Klein



Project Site
Proposed Building Footprint
Proposed Water Intake
Monitoring Well Locations (CIMA+, 2024)

Spatial Reference:
Name: NAD 1983 CSRS MTM 13
GCS: GCS North American 1983 CSRS
Datum: North American 1983 CSRS
Map Units: Meter
Scale: 1:750

Sources:
- Road Labels, ORN, 2024
- Basemap : Maxar, Microsoft, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NGA, EPA, USDA, AAFC, NRCan

General Notes:
Dimensions on the plan should be read and not measured.
Any errors or omissions should be reported to CIMA +. The boundaries, areas, and title deeds must be verified by a surveyor.

Figure 6 - Monitoring Well Locations

Hydrogeological Investigation - New Water Intake & Huron Ave. Reconstruction
17 T 4850065 N; 5116292 E, Blind River, Ontario
Tulloch Engineering Inc.

Ref # : T001592B

Survey by : -
Figure by : S. Scott
Concept by : S. Scott
Verified by : M. Klein

B

Appendix B
Borehole Logs

Consultant: CIMA+

Client: **Town of Blind River**

BOREHOLE LOGGING

Borehole N° BH-100

Project name : **Blind River Intake Location Study**

Applicant :

Location : **Blind River, Ontario, Canada**

Drilling contractor : **Walker Drilling Ltd.**

Type of drill : **CME**

Borehole diameter : **PW** Dip : Strike :

Executed by : **Tulloch Engineering Inc.** Core diameter : **PQ**

Compiled by : **J. Tardioli** Verified by : **M. Klein**

Coordinates (m) 17 ()
X: **349246.0**
Y: **5116289.0**
Z: **179.58**

Project No. : **T001592B**

Localization figure No. :

Drilling start date : **2024-10-22**

Total borehole depth : **10.68 m**

SAMPLE TYPE		TERMINOLOGY		ROC QUALITY DESIGNATION		COMPACTION	INDEX "N"	GROUNDWATER
SS	Split Spoon	"Traces"	1-10%	% RQD	QUALIFICATIVE	Very loose	0-4	
DC	Diamond rock core	"Some"	10-20%	<25	Very poor	Loose	4-10	Date: 2024-11-21 Date:
MA	Manual sampling	adjective (...y)	20-35%	25-50	Poor	Compact	10-30	
AS	Auger	"and"	35-50%	50-75	Fair	Dense	30-50	Depth (m): 3.82 Depth (m):
ST	Shelby tube			75-90	Good	Very dense	>50	
TW	Thin wall sampler			90-100	Excellent			

SAMPLE STATE
- Remoulded
- Intact (thin wall sampler)
- Lost
- Core (diamond rock core)

SYMBOLS
N: Standard penetration value
R: Refusal (N > 100)
WoH: Weight of Hammer / 61 cm
R.Q.D: Rock quality designation
% R.Q.D = ΣCores > 4 po. (10 cm) / Drilled length

SOIL CLASSIFICATION

Clay	< 0,002 mm
Silt	0,002 to 0,080 mm
Sand	0,080 to 5 mm
Gravel	5 to 80 mm
Cobbles	80 to 300 mm
Boulders	> 300mm

CONSISTENCY	SHEAR STRENGTH (Cu)
Very soft	<12 kPa
Soft	12-25 kPa
Firm	25-50 kPa
Stiff	50-100 kPa
Very stiff	100-200 kPa
Hard	>200 kPa

DEPTH (m)	DEPTH - ft	LEVEL (m)/ DEPTH	DESCRIPTION OF SOILS AND ROCK
		180.56	
0	0	179.58 / 0.00	Ground Surface Till Predominantly sand to silty sand matrix, high content of clasts, often low in matrix carbonate content (Ontario Geological Survey, 2000)
1	5		
2			
3	10		
4			
5	15	175.01 / 4.57	Bedrock Siltstone, wacke, argillite from the Huronian Supergroup (2.2 Ga to 2450 Ma); Elliot Lake Group; McKim Formation (Ontario Geological Survey, 2011)
6	20		
7			
8	25		
9	30		
10			
	35	168.90 / 10.68	End of Borehole at 10.68 m.

SYMBOLS: TYPE NO | SUB - SAMPLE | STATE | RECOVERY % | N, Nc or RQD | BLOWS/15cm

GRAPHIC: ▲ : N (standard pen.) △ : Nc (dynamic pen.) ● : Cu (laboratory) ▽ : Cur (laboratory) × : Cu (on-site) + : Cur (on-site) — W_P w W_L — 20 40 60 80

WATER LEVEL (m): 3.82 11-21-2024

WELL INSTALLATION

TESTS
GSA : Grain size analysis
S : Sedimentometry
Att : Atterberg limits
Wn : Water content
PAH : PAH analysis
C10 : C10-C50 analysis
MX : 14 metals analysis
UCS : Uniaxial compressive strength
To : Brasilian
CA : Chemical analysis
DUP : Duplicate sample

Remark(s):

Creation date 2025-04-22

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Consultant: CIMA+

Client: **Town of Blind River**

BOREHOLE LOGGING

Borehole N° **BH-101**

Project name :	**Blind River Intake Location Study**
Applicant :	
Location :	**Blind River, Ontario, Canada**
Drilling contractor :	**Walker Drilling Ltd.**
Type of drill :	**CME**
Borehole diameter :	**HW**
Executed by :	**Tulloch Engineering Inc.**
Compiled by :	**J. Tardioli**
Dip :	
Strike :	
Core diameter :	**HQ**
Verified by :	**M. Klein**

Coordinates (m) 17 ()
X: **349282.0**
Y: **5116294.0**
Z: **180.38**

Project No. : **T001592B**
Localization figure No. :
Drilling start date : **2024-10-22**
Total borehole depth : **11.48 m**

SAMPLE TYPE
SS Split Spoon
DC Diamond rock core
MA Manual sampling
AS Auger
ST Shelby tube
TW Thin wall sampler

TERMINOLOGY

"Traces"	1-10%
"Some"	10-20%
adjective (...y)	20-35%
"and"	35-50%

ROC QUALITY DESIGNATION

% RQD	QUALIFICATIVE
<25	Very poor
25-50	Poor
50-75	Fair
75-90	Good
90-100	Excellent

COMPACTION	INDEX "N"
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

GROUNDWATER
Date: 2024-11-21 Date:
Depth (m): 4.27 Depth (m):

SAMPLE STATE
Remoulded
Intact (thin wall sampler)
Lost
Core (diamond rock core)

SYMBOLS
N: Standard penetration value
R: Refusal (N > 100)
WoH: Weight of Hammer / 61 cm
R.Q.D: Rock quality designation
% R.Q.D = ΣCores > 4 po. (10 cm) / Drilled length

SOIL CLASSIFICATION

Clay	< 0,002 mm
Silt	0,002 to 0,080 mm
Sand	0,080 to 5 mm
Gravel	5 to 80 mm
Cobbles	80 to 300 mm
Boulders	> 300mm

CONSISTENCY	SHEAR STRENGTH (Cu)
Very soft	<12 kPa
Soft	12-25 kPa
Firm	25-50 kPa
Stiff	50-100 kPa
Very stiff	100-200 kPa
Hard	>200 kPa

DEPTH (m)	DEPTH - ft	LEVEL (m)/ DEPTH	STRATIGRAPHY: DESCRIPTION OF SOILS AND ROCK	SYMBOLS: SYMBOLS	TYPE NO	SUB - SAMPLE	STATE	RECOVERY %	N, Nc or RQD	BLOWS/15cm	GRAPHIC
		181.19									
0	0	180.38	Ground Surface								
		0.00	Till Predominantly sand to silty sand matrix, high content of clasts, often low in matrix carbonate content (Ontario Geological Survey, 2000)								
1	5										
2	10										
3											
4	15										
5											
6	20	173.95									
		6.43	Bedrock Siltstone, wacke, argillite from the Huronian Supergroup (2.2 Ga to 2450 Ma); Elliot Lake Group; McKim Formation (Ontario Geological Survey, 2011)								
7	25										
8											
9	30										
10											
11	35										
		168.90									
		11.48	End of Borehole at 11.48 m.								

GRAPHIC: ▲ : N (standard pen.) △ : Nc (dynamic pen.) ● : Cu (laboratory) ▽ : Cur (laboratory) × : Cu (on-site) + : Cur (on-site) — Wp w WL — 20 40 60 80

WATER LEVEL (m): 4.27 11-21-2024

WELL INSTALLATION

TESTS
GSA : Grain size analysis
S : Sedimentometry
Att : Atterberg limits
Wn : Water content
PAH : PAH analysis
C10 : C10-C50 analysis
MX : 14 metals analysis
UCS : Uniaxial compressive strength
To : Brasilian
CA : Chemical analysis
DUP : Duplicate sample

Remark(s):

Creation date 2025-04-22

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Consultant: CIMA+

Client: **Town of Blind River**

BOREHOLE LOGGING

Borehole N° **BH-102**

Project name :	**Blind River Intake Location Study**
Applicant :	
Location :	**Blind River, Ontario, Canada**
Drilling contractor :	**Walker Drilling Ltd.**
Type of drill :	**Unknown**
Borehole diameter :	**HW**
Executed by :	**Tulloch Engineering Inc.**
Compiled by :	**J. Tardioli**
Dip :	
Strike :	
Core diameter :	**HQ**
Verified by :	**M. Klein**

Coordinates (m) 17 ()	X: **349283.0**
	Y: **5116295.0**
	Z: **180.38**
Project No. :	**T001592B**
Localization figure No. :	
Drilling start date :	**2024-10-23**
Total borehole depth :	**6.55 m**

SAMPLE TYPE

SS	Split Spoon
DC	Diamond rock core
MA	Manual sampling
AS	Auger
ST	Shelby tube
TW	Thin wall sampler

TERMINOLOGY

"Traces"	1-10%
"Some"	10-20%
adjective (...y)	20-35%
"and"	35-50%

ROC QUALITY DESIGNATION

% RQD	QUALIFICATIVE
<25	Very poor
25-50	Poor
50-75	Fair
75-90	Good
90-100	Excellent

COMPACTION / INDEX "N"

Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

GROUNDWATER

Date: 2024-11-21 Date:

Depth (m): 4.52 Depth (m):

SAMPLE STATE

Remoulded

Intact (thin wall sampler)

Lost

Core (diamond rock core)

SYMBOLS

N: Standard penetration value
R: Refusal (N > 100)
WoH: Weight of Hammer / 61 cm
R.Q.D: Rock quality designation
% R.Q.D = ΣCores > 4 po. (10 cm) / Drilled length

SOIL CLASSIFICATION

Clay	< 0,002 mm
Silt	0,002 to 0,080 mm
Sand	0,080 to 5 mm
Gravel	5 to 80 mm
Cobbles	80 to 300 mm
Boulders	> 300mm

CONSISTENCY / SHEAR STRENGTH (Cu)

Very soft	<12 kPa
Soft	12-25 kPa
Firm	25-50 kPa
Stiff	50-100 kPa
Very stiff	100-200 kPa
Hard	>200 kPa

DEPTH (m)	DEPTH - ft	LEVEL (m)/ DEPTH	DESCRIPTION OF SOILS AND ROCK	SYMBOLS	TYPE NO	SUB - SAMPLE	STATE	RECOVERY %	N, Nc or RQD	BLOWS/15cm	GRAPHIC	WATER LEVEL (m)	WELL INSTALLATION	TESTS
		181.29									▲ : N (standard pen.) △ : Nc (dynamic pen.) ● : Cu (laboratory) ▽ : Cur (laboratory) × : Cu (on-site) + : Cur (on-site) Wp w WL 20 40 60 80			GSA : Grain size analysis S : Sedimentometry Att : Atterberg limits Wn : Water content PAH : PAH analysis C10 : C10-C50 analysis MX : 14 metals analysis UCS : Uniaxial compressive strength To : Brasilian CA : Chemical analysis DUP : Duplicate sample
0	0	180.38 / 0.00	Ground Surface Till Predominantly sand to silty sand matrix, high content of clasts, often low in matrix carbonate content (Ontario Geological Survey, 2000)									4.52 11-21-2024		
1	5													
2														
3	10													
4														
	15													
5														
6	20	173.95 / 6.43 / 173.83 / 6.55	Bedrock Siltstone, wacke, argillite from the Huronian Supergroup (2.2 Ga to 2450 Ma); Elliot Lake Group; McKim Formation (Ontario Geological Survey, 2011)											
7														
	25													

Remark(s):

Creation date 2025-04-22

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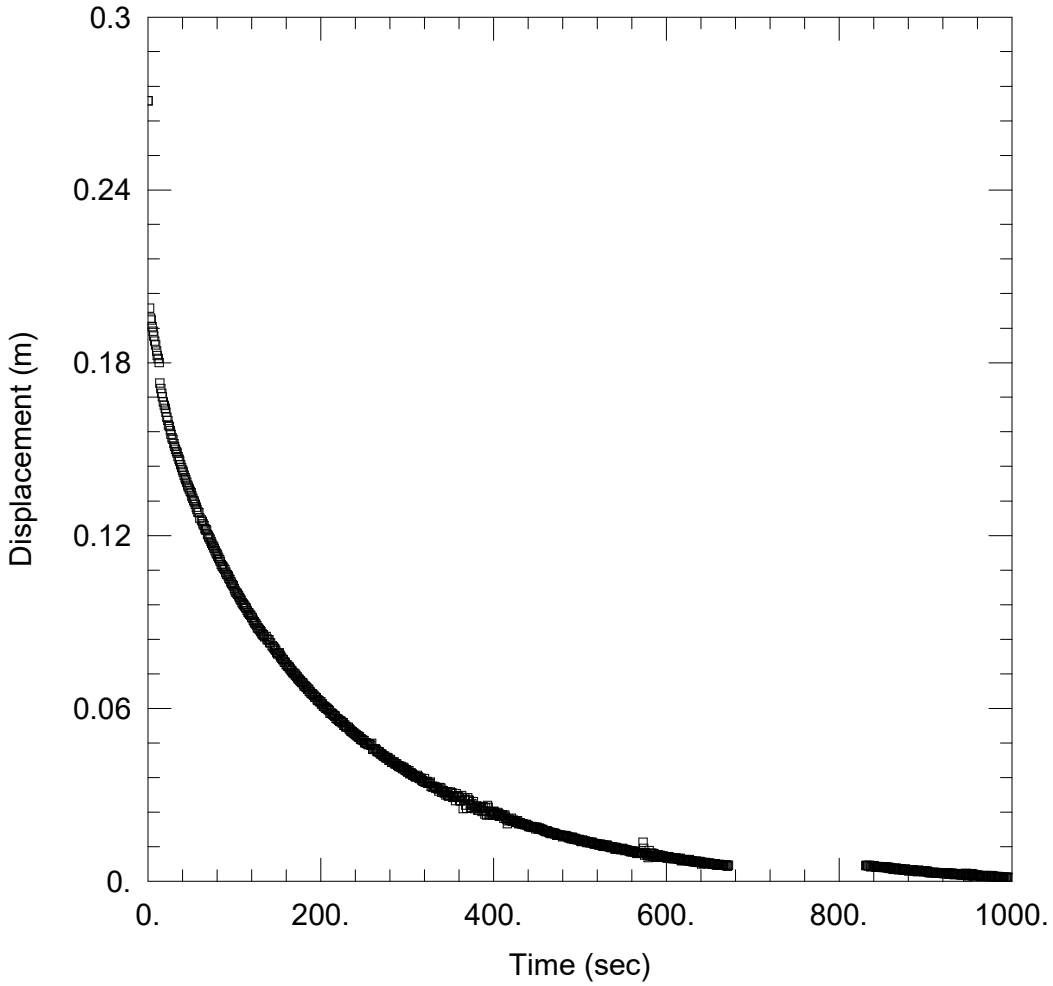
C

Appendix C
Single Well Response Test Analyses



WELL TEST ANALYSIS

Data Set: C:\...\BH-102 Slug 1 Linear vs draw.aqt
Date: 03/31/25 Time: 10:58:25

PROJECT INFORMATION

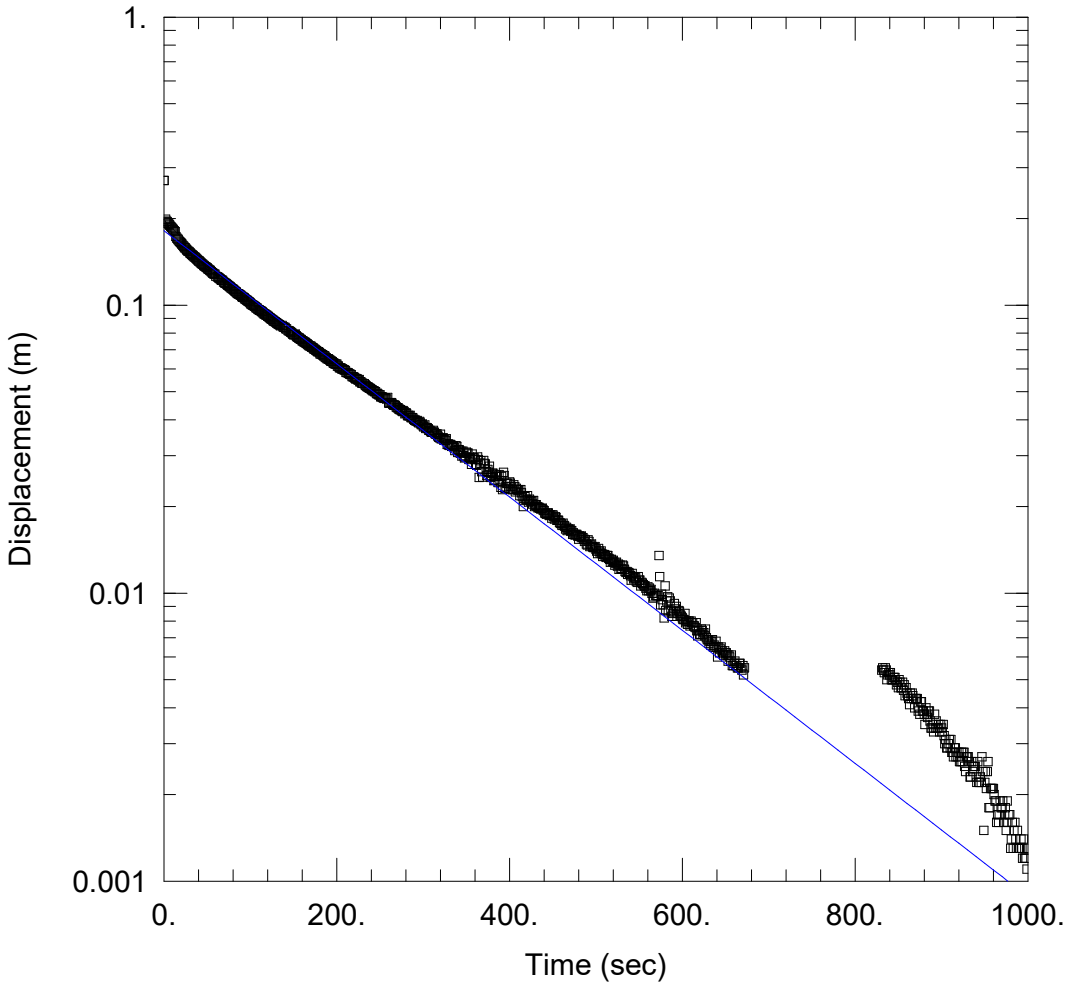
Company: CIMA+
Project: T001592B
Location: Blind River, ON
Test Well: BH-102
Test Date: 2024-11-21

AQUIFER DATA

Saturated Thickness: 3.57 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-102)

Initial Displacement: 0.271 m
Total Well Penetration Depth: 2.034 m
Casing Radius: 0.0505 m
Static Water Column Height: 3.57 m
Screen Length: 1.524 m
Well Radius: 0.0254 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-102 Slug 1 Hvorslev unconfined.aqt
Date: 03/31/25 Time: 11:00:49

PROJECT INFORMATION

Company: CIMA+
Project: T001592B
Location: Blind River, ON
Test Well: BH-102
Test Date: 2024-11-21

AQUIFER DATA

Saturated Thickness: 3.57 m Anisotropy Ratio (Kz/Kr): 1.

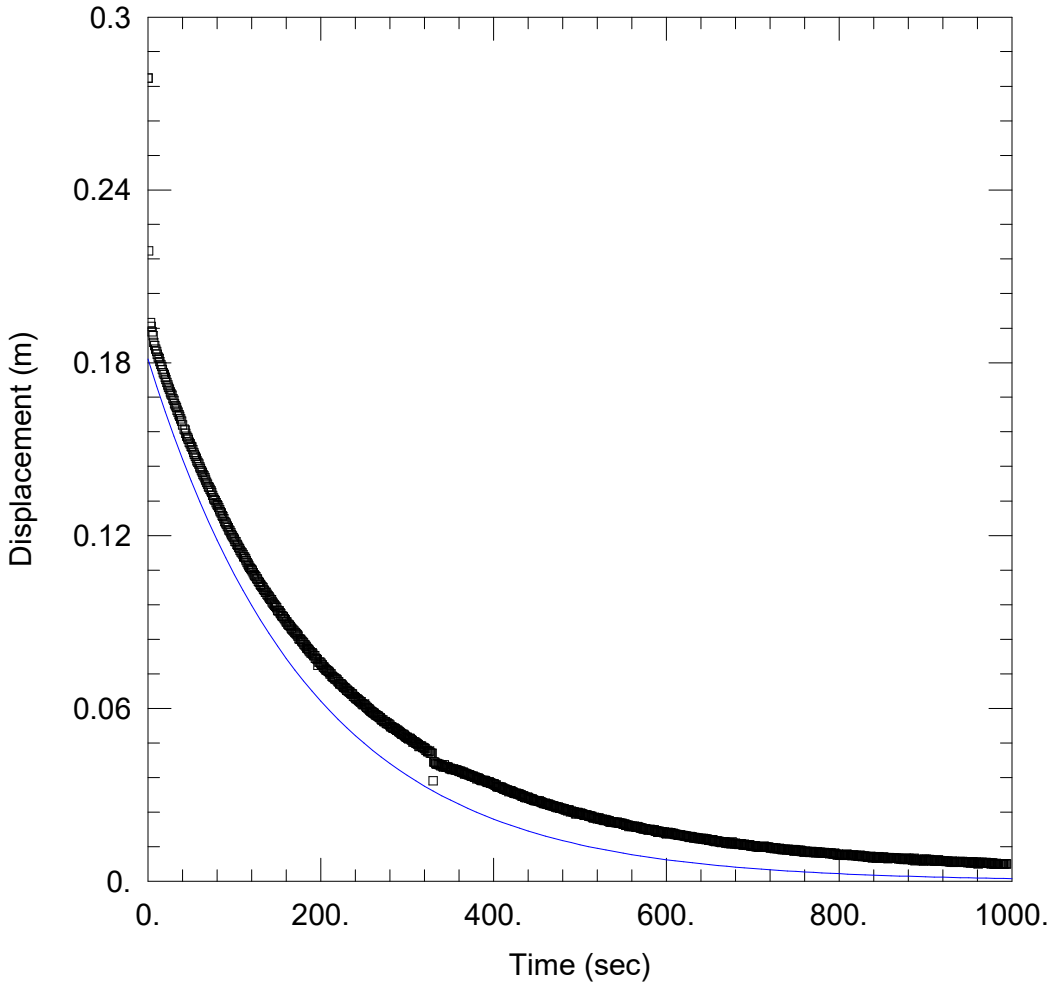
WELL DATA (BH-102)

Initial Displacement: 0.271 m
Total Well Penetration Depth: 2.034 m
Casing Radius: 0.0505 m
Static Water Column Height: 3.57 m
Screen Length: 1.524 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 1.824E-5 m/sec y0 = 0.1812 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-102 Bail 1 Linear vs draw.aqt
Date: 03/31/25 Time: 11:03:30

PROJECT INFORMATION

Company: CIMA+
Project: T001592B
Location: Blind River, ON
Test Well: BH-102
Test Date: 2024-11-21

AQUIFER DATA

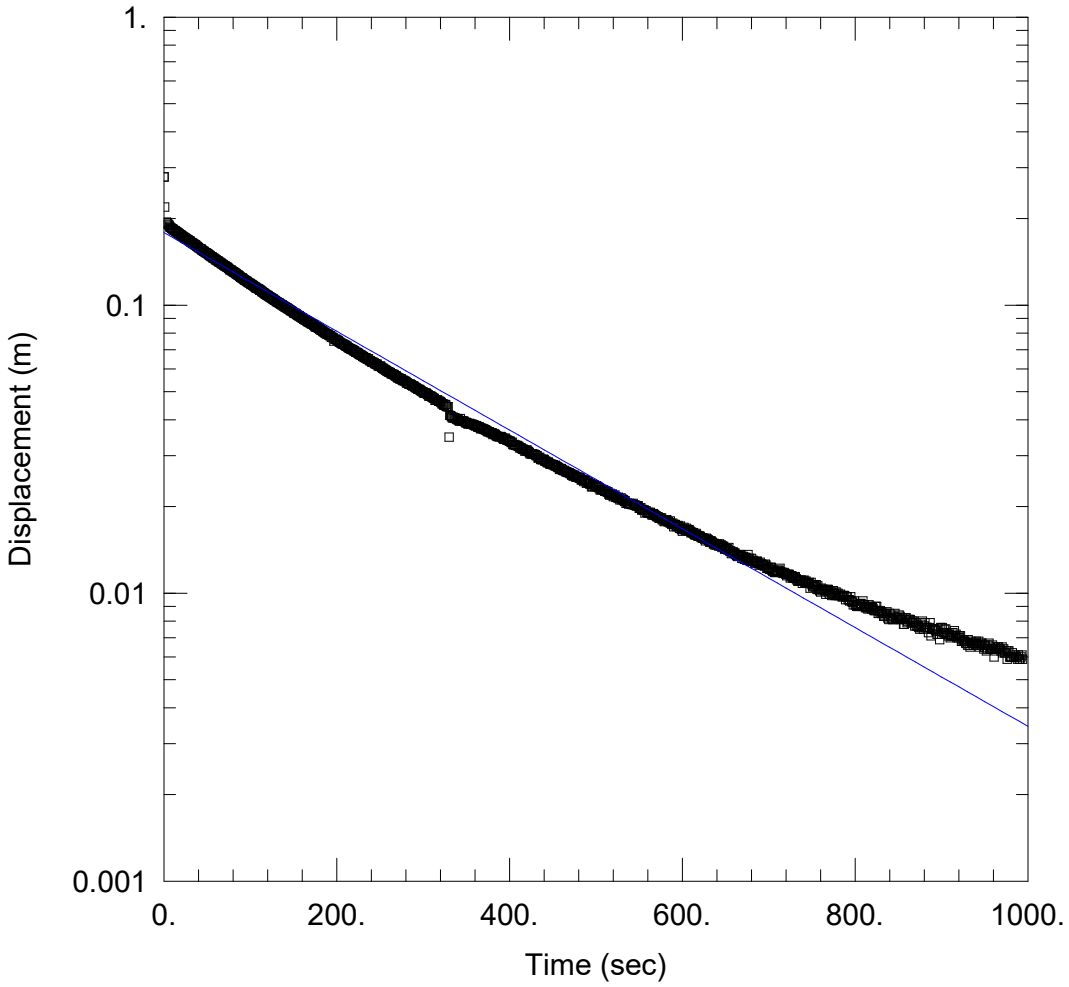
Saturated Thickness: 3.57 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-102)

Initial Displacement: 0.2788 m Static Water Column Height: 3.57 m
Total Well Penetration Depth: 2.034 m Screen Length: 1.524 m
Casing Radius: 0.0505 m Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 1.824E-5 m/sec y0 = 0.1812 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-102 Bail 1 Hvorslev unconfined.aqt
Date: 03/31/25 Time: 11:09:09

PROJECT INFORMATION

Company: CIMA+
Project: T001592B
Location: Blind River, ON
Test Well: BH-102
Test Date: 2024-11-21

AQUIFER DATA

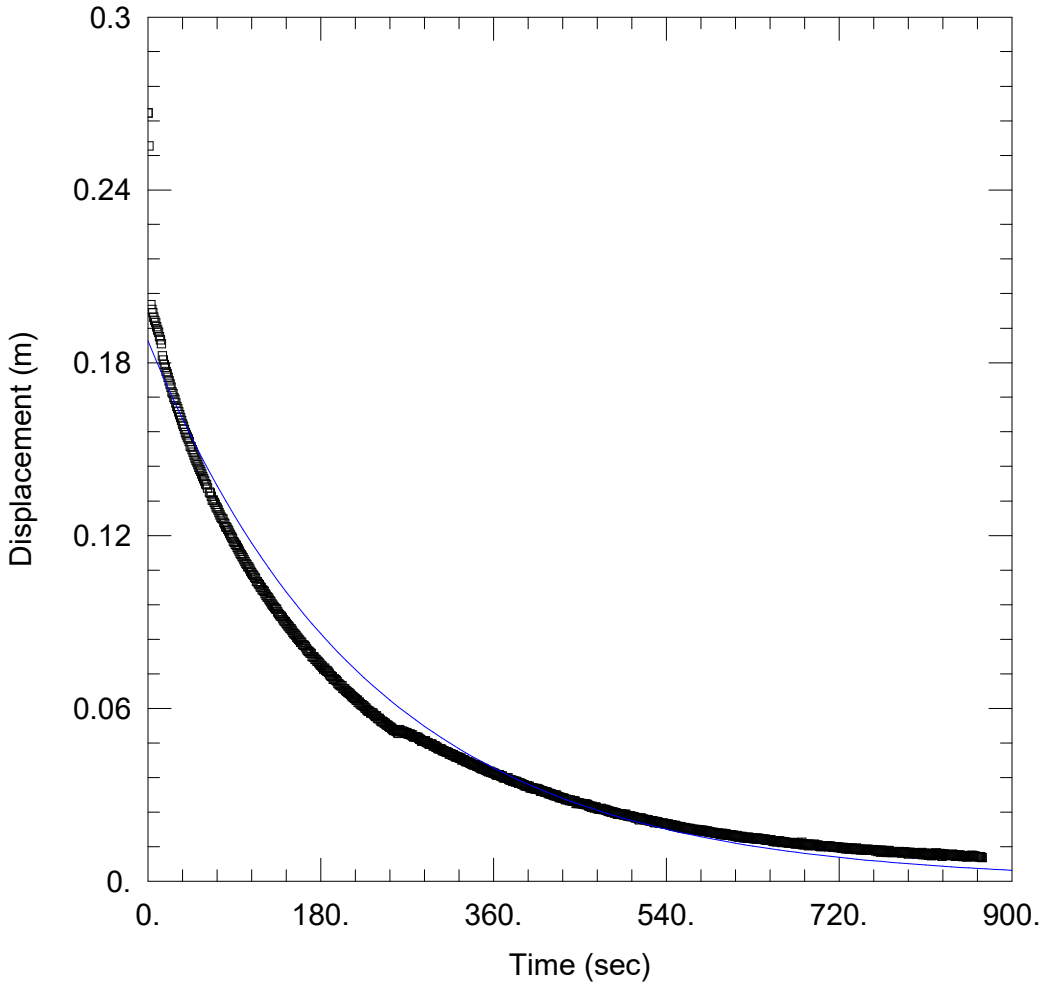
Saturated Thickness: 3.57 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-102)

Initial Displacement: 0.2788 m
Total Well Penetration Depth: 2.034 m
Casing Radius: 0.0505 m
Static Water Column Height: 3.57 m
Screen Length: 1.524 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.353E-5 m/sec
y0 = 0.1786 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-102 Slug 2 Linear vs draw.aqt
Date: 03/31/25 Time: 11:11:53

PROJECT INFORMATION

Company: CIMA+
Project: T001592B
Location: Blind River, ON
Test Well: BH-102
Test Date: 2024-11-21

AQUIFER DATA

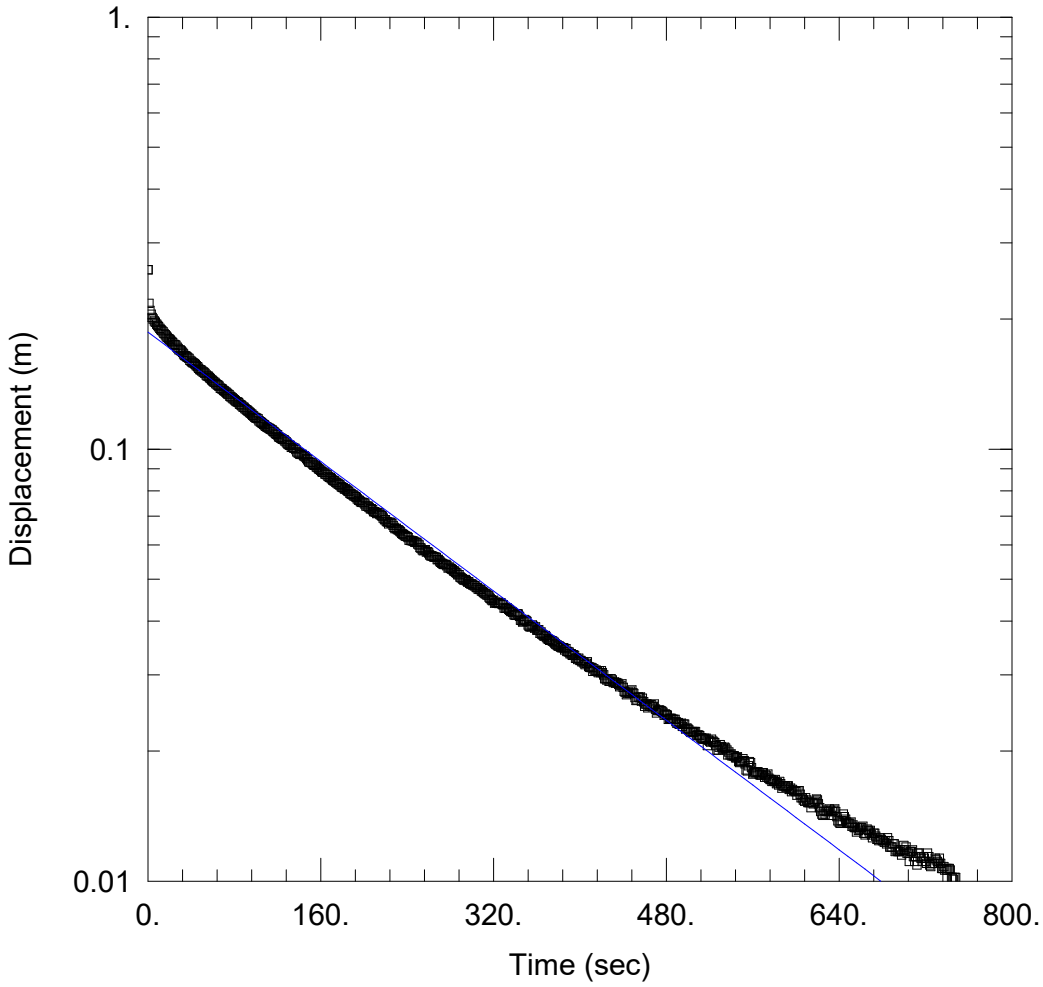
Saturated Thickness: 3.57 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-102)

Initial Displacement: 0.2667 m
Total Well Penetration Depth: 2.034 m
Casing Radius: 0.0505 m
Static Water Column Height: 3.57 m
Screen Length: 1.524 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.487E-5 m/sec
y0 = 0.1876 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-102 Bail 2 Hvorslev unconfined.aqt
Date: 03/31/25 Time: 11:19:58

PROJECT INFORMATION

Company: CIMA+
Project: T001592B
Location: Blind River, ON
Test Well: BH-102
Test Date: 2024-11-21

AQUIFER DATA

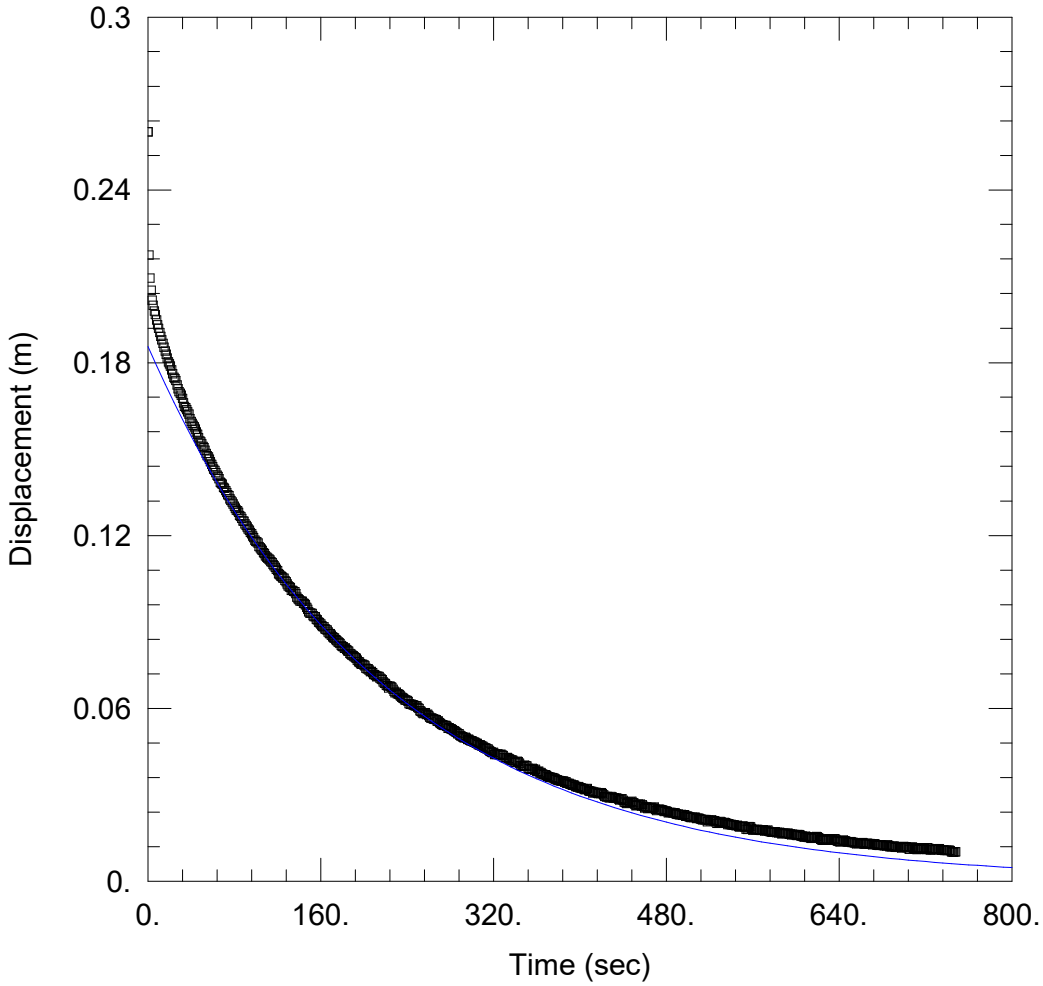
Saturated Thickness: 3.57 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-102)

Initial Displacement: 0.2602 m
Total Well Penetration Depth: 2.034 m
Casing Radius: 0.0505 m
Static Water Column Height: 3.57 m
Screen Length: 1.524 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.477E-5 m/sec
y0 = 0.1866 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-102 Bail 2 Linear vs draw.aqt
Date: 03/31/25 Time: 11:17:12

PROJECT INFORMATION

Company: CIMA+
Project: T001592B
Location: Blind River, ON
Test Well: BH-102
Test Date: 2024-11-21

AQUIFER DATA

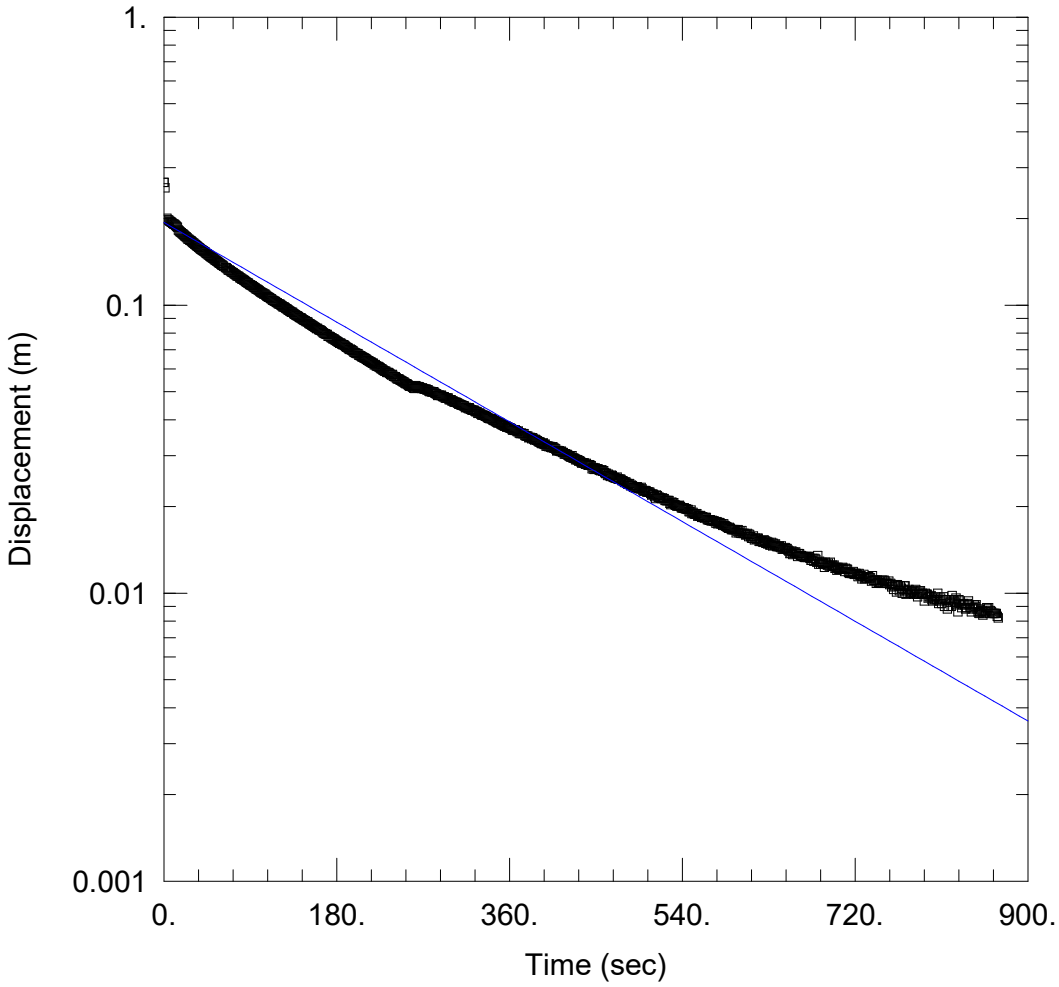
Saturated Thickness: 3.57 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-102)

Initial Displacement: 0.2602 m
Total Well Penetration Depth: 2.034 m
Casing Radius: 0.0505 m
Static Water Column Height: 3.57 m
Screen Length: 1.524 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.574E-5 m/sec
y0 = 0.1856 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-102 Slug 2 Hvorslev unconfined.aqt
Date: 03/31/25 Time: 11:13:43

PROJECT INFORMATION

Company: CIMA+
Project: T001592B
Location: Blind River, ON
Test Well: BH-102
Test Date: 2024-11-21

AQUIFER DATA

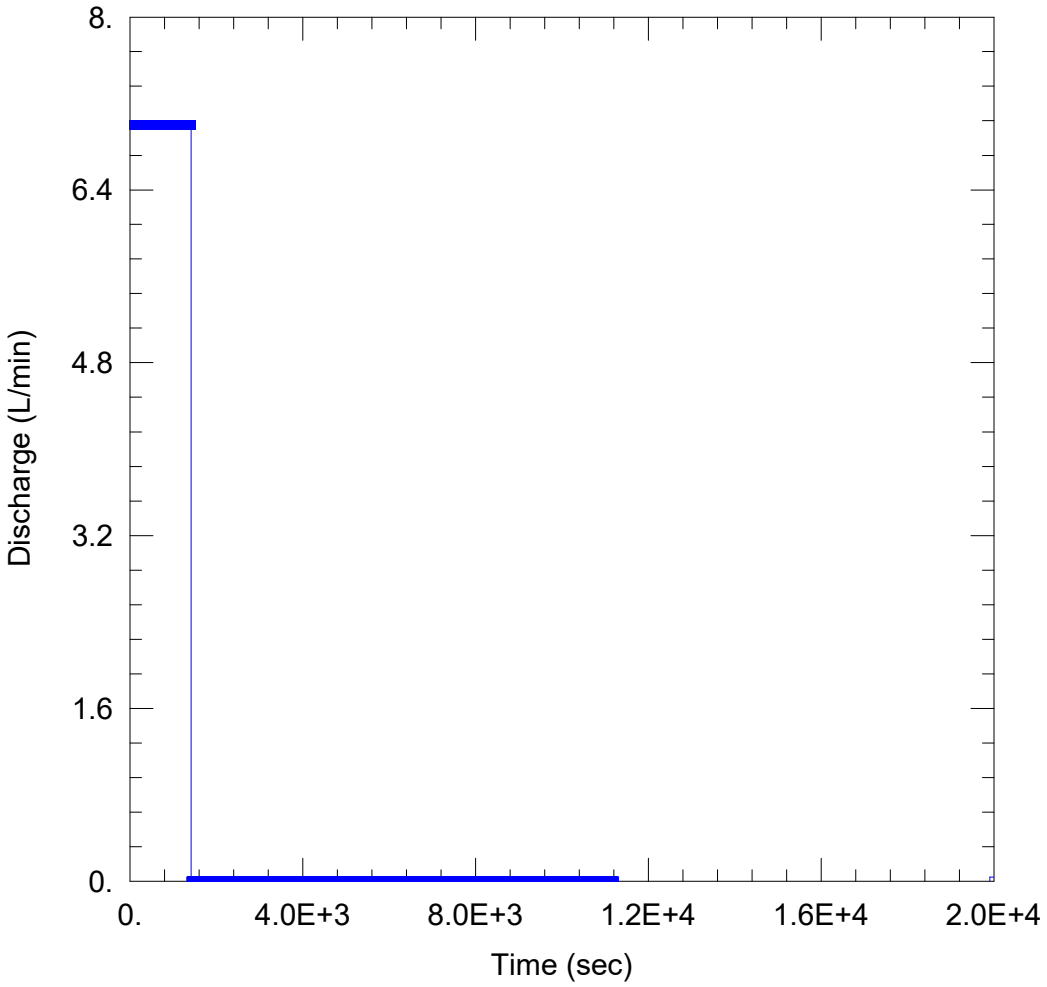
Saturated Thickness: 3.57 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-102)

Initial Displacement: 0.2667 m
Total Well Penetration Depth: 2.034 m
Casing Radius: 0.0505 m
Static Water Column Height: 3.57 m
Screen Length: 1.524 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.517E-5 m/sec
y0 = 0.1937 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-100 Pumping Test - Theis Recovery.aqt
Date: 04/02/25 Time: 14:23:13

PROJECT INFORMATION

Company: CIMA+
Project: T00159B
Location: Blind River
Test Well: BH-100
Test Date: 2024-11-21

AQUIFER DATA

Saturated Thickness: 7.99 m Anisotropy Ratio (Kz/Kr): 1.

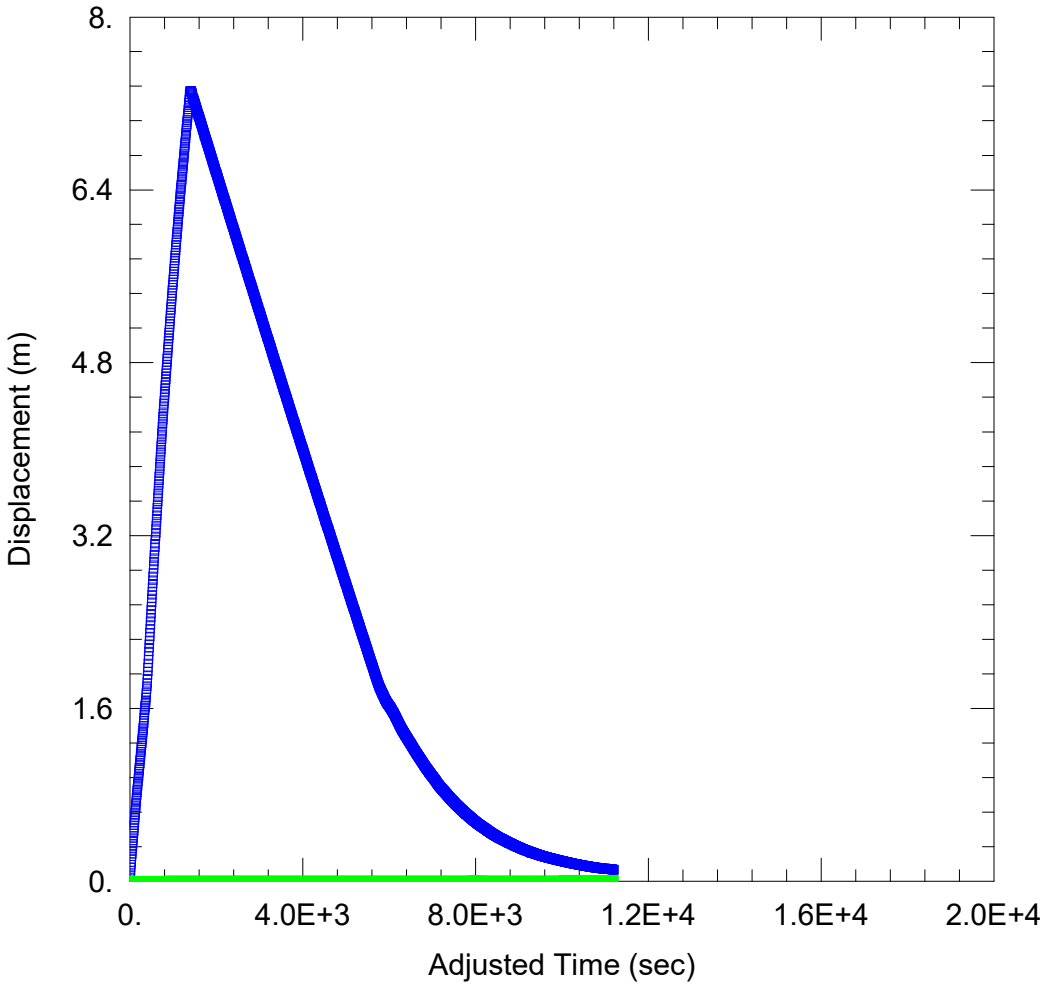
WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BH-100	349246	5116289

Observation Wells

Well Name	X (m)	Y (m)
BH-100	349246	5116289
BH-101	349282	5116294



WELL TEST ANALYSIS

Data Set: C:\...\BH-100 Pumping Test - Theis Recovery.aqt
Date: 04/02/25 Time: 14:24:29

PROJECT INFORMATION

Company: CIMA+
Project: T00159B
Location: Blind River
Test Well: BH-100
Test Date: 2024-11-21

AQUIFER DATA

Saturated Thickness: 7.99 m Anisotropy Ratio (Kz/Kr): 1.

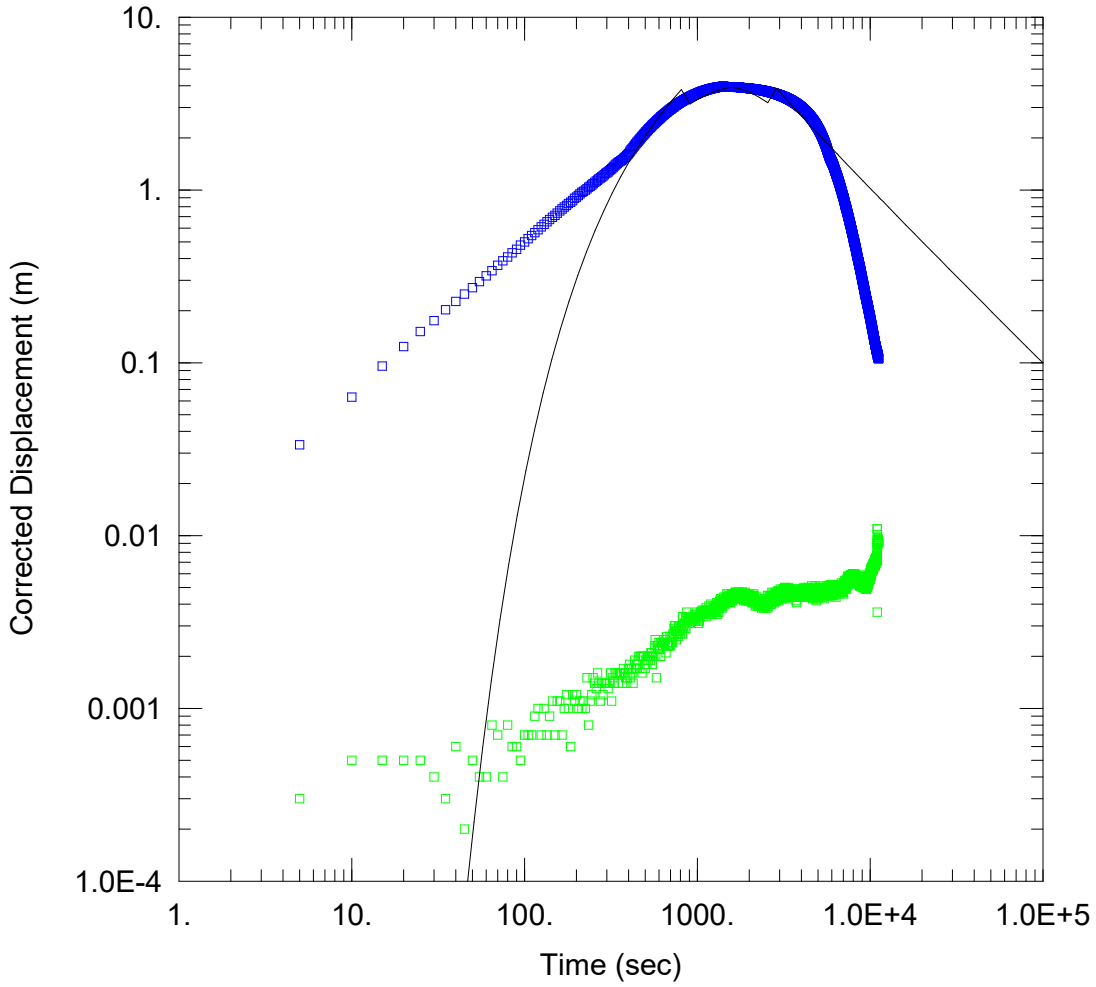
WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BH-100	349246	5116289

Observation Wells

Well Name	X (m)	Y (m)
BH-100	349246	5116289
BH-101	349282	5116294



WELL TEST ANALYSIS

Data Set: C:\...\BH-100 Pumping Test 2 - with Pumping and Recovery.aqt
Date: 04/15/25 Time: 13:57:12

PROJECT INFORMATION

Company: CIMA+
Project: T00159B
Location: Blind River
Test Well: BH-100
Test Date: 2024-11-21

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BH-100	349246	5116289

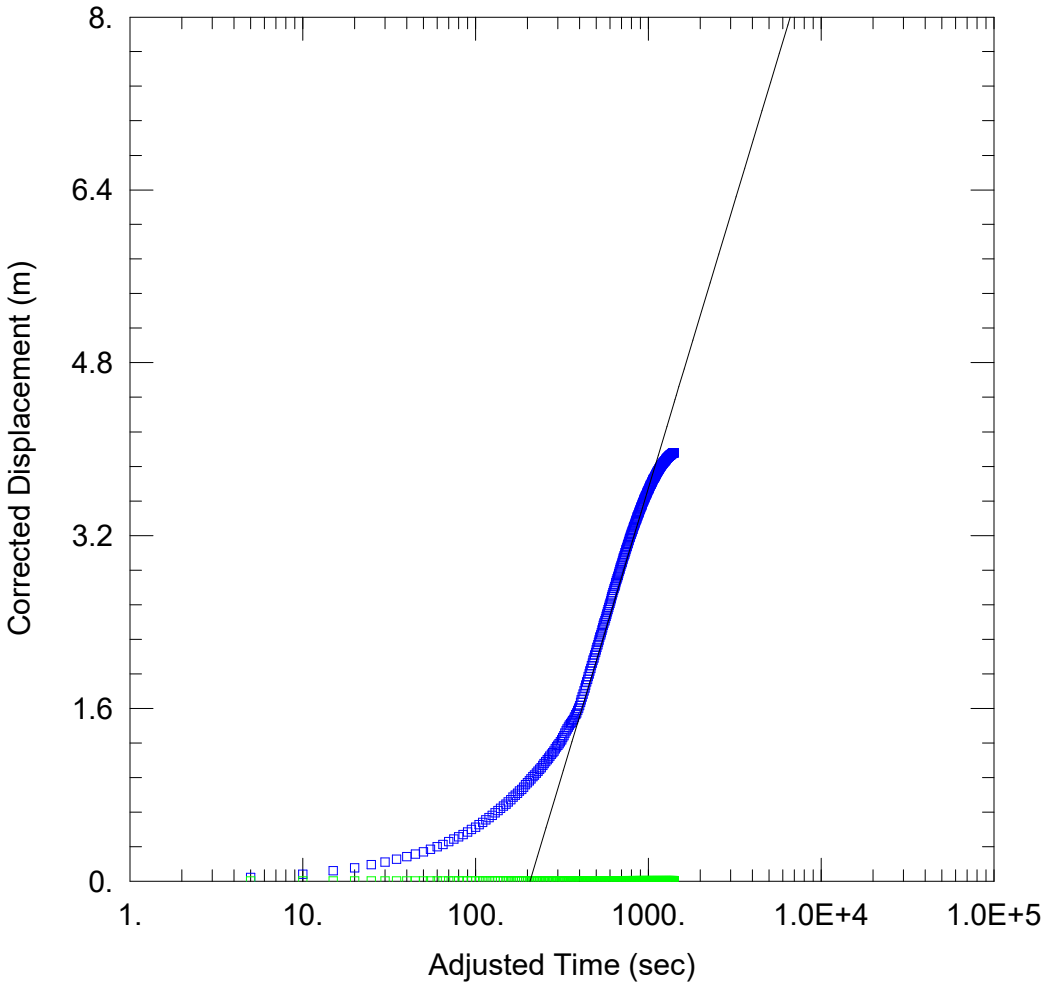
Observation Wells

Well Name	X (m)	Y (m)
BH-100	349246	5116289
BH-101	349282	5116294

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1.322E-6 m^2/sec
S = 0.5468
Kz/Kr = 1583.2
b = 7.99 m



WELL TEST ANALYSIS

Data Set: C:\...\BH-100 Pumping Test 2 - with Pumping and Recovery.aqt
Date: 04/15/25 Time: 13:59:29

PROJECT INFORMATION

Company: CIMA+
Project: T00159B
Location: Blind River
Test Well: BH-100
Test Date: 2024-11-21

AQUIFER DATA

Saturated Thickness: 7.99 m Anisotropy Ratio (Kz/Kr): 1583.2

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BH-100	349246	5116289

Observation Wells

Well Name	X (m)	Y (m)
BH-100	349246	5116289
BH-101	349282	5116294

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 4.027E-6 m^2/sec S = 0.4633

D

Appendix D
Tables

Appendix D, Table 1 - Soil Quality Analytical Results
T001592B - Hydrogeological Investigation - New Water Intake & Huron Street Reconstruction, Blind River, ON

Parameter	Units	RDL	PWQO and IPWQOs[1]	Sample ID	BH-100	BH-102
				Date	2024-11-21	2024-11-21
Parameters						
Total Antimony	mg/L	0.003	0.02		<0.003	<0.003
Total Arsenic	mg/L	0.003c - 0.006d	0.1		<0.003	0.013
Total Barium	mg/L	0.002c - 0.004d	-		0.016	0.197
Total Beryllium	mg/L	0.001c - 0.002d	0.011[a]		<0.001	<0.002
Total Boron	mg/L	0.01c - 0.02d	0.2[b]		0.052	0.08
Total Cadmium	mg/L	0.0001c - 0.0002d	0.0002		<0.0001	<0.0002
Total Chromium	mg/L	0.003c - 0.006d	-		0.011	0.019
Total Cobalt	mg/L	0.0005c - 0.0010d	0.0009[b]		**0.0051**	**0.04**
Total Copper	mg/L	0.002c - 0.004d	0.005		**0.007**	**0.033**
Total Lead	mg/L	0.0005c - 0.0010d	0.025[b]		<0.0005	0.0085
Total Molybdenum	mg/L	0.002c - 0.004d	0.04[b]		0.017	<0.004
Total Nickel	mg/L	0.003c - 0.006d	0.025		0.016	0.019
Total Selenium	mg/L	0.002c - 0.004d	0.1		<0.002	<0.004
Total Silver	mg/L	0.0001c - 0.0002d	0.0001		**0.0002**	<0.0002
Total Thallium	mg/L	0.0003c - 0.0006d	0.0003[b]		<0.0003	<0.0006
Total Uranium	mg/L	0.0005c - 0.0010d	0.005[b]		<0.0005	0.0014
Total Vanadium	mg/L	0.002c - 0.004d	0.006[b]		<0.002	**0.037**
Total Zinc	mg/L	0.02c - 0.04d	0.03		<0.020	<0.040
Chromium VI	mg/L	0.001	0.001		<0.001	**0.003**
Total Mercury	mg/L	0.0001	0.0002		<0.0001	<0.0001
Chloride	mg/L	0.10c - 0.12d	-		78	160
Total Phosphorus	mg/L	0.02c - 0.06d	0.02[b]		<0.02	**0.61**
Phenols	mg/L	0.001	0.001		0.001	0.001
Cyanide, WAD	mg/L	0.002c - 0.005d	0.005		<0.002	<0.002
Hardness (as CaCO3) (Calculated)	mg/L	0.5	-		33.7	85.7
Total Sodium	mg/L	0.10	-		49.5	78.8
Electrical Conductivity	uS/cm	2	-		388	838
pH	ph Units	NA	6.5 to 8.5		7.16	6.87
Total Suspended Solids	mg/L	10	-		51	3800
Alkalinity (as CaCO3)	mg/L	5	-		98	193

Notes:

1 - Reproduced from the Ontario Ministry of Environment and Energy (MOEE, 1994) Water Management Policies, Guidelines, Provincial Water Quality Objectives
a - Value calculated using equation outlined in the PWQO and IPWQO Guidelines
b - Interim PWQO
c - Reported Detection Limit for samples collected at BH-100
d - Reported Detection Limit for samples collected at BH-102
RDL - Reported Detection Limit
PWQO - Provincial Water Quality Objectives
IPWQO - Interim Provincial Water Quality Objectives
123 - Exceeds Provinvial Water Quality or Interim Provincial Water Quality Objectives

E

Appendix E
Laboratory Certificate of Analysis

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: CIMA CANADA INC.
600-1400 BLAIR TOWERS PLACE
OTTAWA, ON K1J 9B8
(613) 860-1870
ATTENTION TO: Mathieu Klein
PROJECT: T001592B
AGAT WORK ORDER: 24Z224690
WATER ANALYSIS REVIEWED BY: Nivine Basily, Inorganic Team Lead
DATE REPORTED: Dec 03, 2024
PAGES (INCLUDING COVER): 7
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24Z224690

PROJECT: T001592B

CLIENT NAME: CIMA CANADA INC.

SAMPLING SITE:

ATTENTION TO: Mathieu Klein

SAMPLED BY:Jeremy T.

Inorganic Chemistry (Water)

DATE RECEIVED: 2024-11-22

DATE REPORTED: 2024-12-03

		SAMPLE DESCRIPTION:		BH24-100		BH24-102
		SAMPLE TYPE:		Water		Water
		DATE SAMPLED:		2024-11-21		2024-11-21
Parameter	Unit	G / S	RDL	6357630	RDL	6357647
Total Antimony	mg/L	0.020	0.003	<0.003	0.003	<0.003
Total Arsenic	mg/L	0.1	0.003	<0.003	0.006	0.013
Total Barium	mg/L		0.002	0.016	0.004	0.197
Total Beryllium	mg/L	*	0.001	<0.001	0.002	<0.002
Total Boron	mg/L	0.2	0.010	0.052	0.020	0.080
Total Cadmium	mg/L	0.0002	0.0001	<0.0001	0.0002	<0.0002
Total Chromium	mg/L		0.003	0.011	0.006	0.019
Total Cobalt	mg/L	0.0009	0.0005	**0.0051**	**0.0010**	**0.0400**
Total Copper	mg/L	0.005	0.002	**0.007**	0.004	**0.033**
Total Lead	mg/L	*	0.0005	<0.0005	0.0010	0.0085
Total Molybdenum	mg/L	0.040	0.002	0.017	0.004	<0.004
Total Nickel	mg/L	0.025	0.003	0.016	0.006	0.019
Total Selenium	mg/L	0.1	0.002	<0.002	0.004	<0.004
Total Silver	mg/L	0.0001	0.0001	**0.0002**	**0.0002**	<0.0002
Total Thallium	mg/L	0.0003	0.0003	<0.0003	**0.0006**	<0.0006
Total Uranium	mg/L	0.005	0.0005	<0.0005	0.0010	0.0014
Total Vanadium	mg/L	0.006	0.002	<0.002	0.004	**0.037**
Total Zinc	mg/L	0.030	0.020	<0.020	**0.040**	<0.040
Chromium VI	mg/L	0.001	0.001	<0.001	0.001	**0.003**
Total Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001
Chloride	mg/L		0.10	78.0	0.12	160
Total Phosphorus	mg/L	*	0.02	<0.02	0.06	0.61
Phenols	mg/L	0.001	0.001	0.001	0.001	0.001
Cyanide, WAD	mg/L	0.005	0.002	<0.002	0.002	<0.002
Hardness (as CaCO3) (Calculated)	mg/L		0.5	33.7	0.5	85.7
Total Sodium	mg/L		0.10	49.5	0.20	78.8
Electrical Conductivity	uS/cm		2	388	2	838
pH	pH Units	6.5-8.5	NA	7.16	NA	6.87
Total Suspended Solids	mg/L		10	51	10	3800
Alkalinity (as CaCO3)	mg/L		5	98	5	193

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24Z224690

PROJECT: T001592B

CLIENT NAME: CIMA CANADA INC.

ATTENTION TO: Mathieu Klein

SAMPLING SITE:

SAMPLED BY:Jeremy T.

Inorganic Chemistry (Water)

DATE RECEIVED: 2024-11-22

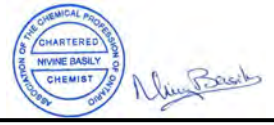
DATE REPORTED: 2024-12-03

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO * Variable - refer to guideline reference document
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

6357647 Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



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Exceedance Summary

AGAT WORK ORDER: 24Z224690

PROJECT: T001592B

CLIENT NAME: CIMA CANADA INC.

ATTENTION TO: Mathieu Klein

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
6357630	BH24-100	ON PWQO	Inorganic Chemistry (Water)	Total Cobalt	mg/L	0.0009	0.0051
6357630	BH24-100	ON PWQO	Inorganic Chemistry (Water)	Total Copper	mg/L	0.005	0.007
6357630	BH24-100	ON PWQO	Inorganic Chemistry (Water)	Total Silver	mg/L	0.0001	0.0002
6357647	BH24-102	ON PWQO	Inorganic Chemistry (Water)	Chromium VI	mg/L	0.001	0.003
6357647	BH24-102	ON PWQO	Inorganic Chemistry (Water)	Total Cobalt	mg/L	0.0009	0.0400
6357647	BH24-102	ON PWQO	Inorganic Chemistry (Water)	Total Copper	mg/L	0.005	0.033
6357647	BH24-102	ON PWQO	Inorganic Chemistry (Water)	Total Vanadium	mg/L	0.006	0.037

AGAT Laboratories

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http://www.agatlabs.com

Quality Assurance

CLIENT NAME: CIMA CANADA INC.

AGAT WORK ORDER: 24Z224690

PROJECT: T001592B

ATTENTION TO: Mathieu Klein

SAMPLING SITE:

SAMPLED BY:Jeremy T.

Water Analysis

RPT Date: Dec 03, 2024			DUPLICATE				REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Inorganic Chemistry (Water)															
Total Antimony	6354888		<0.003	<0.003	NA	< 0.003	104%	70%	130%	101%	80%	120%	102%	70%	130%
Total Arsenic	6354888		<0.003	<0.003	NA	< 0.003	100%	70%	130%	98%	80%	120%	103%	70%	130%
Total Barium	6354888		<0.002	<0.002	NA	< 0.002	105%	70%	130%	103%	80%	120%	107%	70%	130%
Total Beryllium	6354888		<0.001	<0.001	NA	< 0.001	105%	70%	130%	96%	80%	120%	94%	70%	130%
Total Boron	6354888		<0.010	<0.010	NA	< 0.010	103%	70%	130%	100%	80%	120%	99%	70%	130%
Total Cadmium	6354888		<0.0001	<0.0001	NA	< 0.0001	99%	70%	130%	97%	80%	120%	99%	70%	130%
Total Chromium	6354888		<0.003	<0.003	NA	< 0.003	99%	70%	130%	103%	80%	120%	104%	70%	130%
Total Cobalt	6354888		<0.0005	<0.0005	NA	< 0.0005	104%	70%	130%	98%	80%	120%	102%	70%	130%
Total Copper	6354888		<0.002	<0.002	NA	< 0.002	99%	70%	130%	99%	80%	120%	102%	70%	130%
Total Lead	6354888		<0.0005	<0.0005	NA	< 0.0005	96%	70%	130%	93%	80%	120%	98%	70%	130%
Total Molybdenum	6354888		<0.002	<0.002	NA	< 0.002	102%	70%	130%	82%	80%	120%	102%	70%	130%
Total Nickel	6354888		<0.003	<0.003	NA	< 0.003	94%	70%	130%	101%	80%	120%	100%	70%	130%
Total Selenium	6354888		<0.002	<0.002	NA	< 0.002	103%	70%	130%	103%	80%	120%	106%	70%	130%
Total Silver	6354888		<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	94%	80%	120%	104%	70%	130%
Total Thallium	6354888		<0.0003	<0.0003	NA	< 0.0003	108%	70%	130%	99%	80%	120%	104%	70%	130%
Total Uranium	6354888		<0.0005	<0.0005	NA	< 0.0005	102%	70%	130%	99%	80%	120%	108%	70%	130%
Total Vanadium	6354888		<0.002	<0.002	NA	< 0.002	99%	70%	130%	106%	80%	120%	107%	70%	130%
Total Zinc	6354888		<0.020	<0.020	NA	< 0.020	101%	70%	130%	99%	80%	120%	99%	70%	130%
Chromium VI	6358830		0.003	0.005	NA	< 0.001	98%	70%	130%	88%	80%	120%	92%	70%	130%
Total Mercury	6354888		<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	102%	80%	120%	101%	70%	130%
Chloride	6364160		365	360	1.4%	< 0.10	96%	70%	130%	101%	80%	120%	NA	70%	130%
Total Phosphorus	6356285		0.11	0.10	NA	0.03	100%	70%	130%	97%	80%	120%	NA	70%	130%
Phenols	6362562		<0.001	<0.001	NA	< 0.001	94%	90%	110%	94%	90%	110%	100%	80%	120%
Cyanide, WAD	6357630	6357630	<0.002	<0.002	NA	< 0.002	90%	70%	130%	94%	80%	120%	104%	70%	130%
Total Sodium	6354888		33.7	33.6	0.3%	< 0.10	105%	70%	130%	103%	80%	120%	121%	70%	130%
Electrical Conductivity	6361855		1600	1600	0.0%	< 2	98%	80%	120%						
pH	6361855		7.69	7.72	0.4%	NA	100%	90%	110%						
Total Suspended Solids	6362562		<10	<10	NA	< 10	102%	80%	120%						
Alkalinity (as CaCO3)	6361855		242	248	2.4%	< 5	100%	80%	120%						

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

Certified By:

AGAT Laboratories

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MISSISSAUGA, ONTARIO
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Method Summary

CLIENT NAME: CIMA CANADA INC.

AGAT WORK ORDER: 24Z224690

PROJECT: T001592B

ATTENTION TO: Mathieu Klein

SAMPLING SITE:

SAMPLED BY:Jeremy T.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Beryllium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Thallium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Vanadium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Chromium VI	INOR-93-6073	modified from SM 3500-CR B	SPECTROPHOTOMETER
Total Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Phenols	INOR-93-6072	mod from SM 510C, EPA 420.2, ISO 3696, ASTM D1193	SEGMENTED FLOW ANALYSIS
Cyanide, WAD	INOR-93-6052	modified from ON MOECC E3015,SM 4500-CN- I, G-387	SEGMENTED FLOW ANALYSIS
Hardness (as CaCO3) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Sodium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Total Suspended Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540B,C,D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE

AGAT Laboratories

Have feedback? Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 24Z2241690

Cooler Quantity: one - bagged ice

Arrival Temperatures: 4.4 | 4.6 | 4.3

~~Depot~~ Temperatures: 2.3 | 2.5 | 2.9

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: B I I

Report Information:

Company: CIMA CANADA INC
Contact: Mathieu Klein
Address: 600-1400 Blair Towers Place
Ottawa, ON K1J 9B8
Phone: 613-860-2462 Fax:
Reports to be sent to:
1. Email: mathieu.klein@cima.ca
2. Email:

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Regulation 406
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture

☐ Regulation 558
☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
Region
☑ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition (RSC)**? ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays

For 'Same Day' analysis, please contact your AGAT CSR

Project Information:

Project: T001592B
Site Location:
Sampled By: Jeremy T.
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company: Bill to CIMA+ Ottawa
Contact:
Address:
Email:

Legal Sample ☐

Sample Matrix Legend

GW	Ground Water	SD	Sediment
O	Oil	SW	Surface Water
P	Paint	R	Rock/Shale
S	Soil		

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y/N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	VOC	PAHs	PCBs: Aroclors ☐	O. Reg 406: Regulation 406 Characterization Package pH, Metals, BTEX, F1-F4	O. Reg 406: Nitrogen Species	O. Reg 406: Regulation 406 SPLP Rainwater Leach mSPLP: ☐ Metals ☐ VOCs ☐ SVOCs ☐ OC	O. Reg 558: Landfill Disposal Characterization TCLP: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Corrosivity: ☐ Moisture ☐ Sulphide	93855	Phenols	Total Phosphorous	Unionized Ammonia	TSS	Hardness	ATTENUATION
1. BH24-100	24/11/21	4PM AM PM	21	W	Hold VOC, PCB, PAH and Nitrogen Species (NO3, NO2, TKN, Ammonia) for Both samples.					✓	✓	✓		✓				✓	✓	✓	✓	✓	✓
2. BH24-102	↓	↓	21	W						✓	✓	✓		✓				✓	✓	✓	✓	✓	✓
3.		AM PM																					
4.		AM PM																					
5.		AM PM																					
6.		AM PM																					
7.		AM PM																					
8.		AM PM																					
9.		AM PM																					
10.		AM PM																					
11.		AM PM																					

Samples Relinquished By (Print Name and Sign): Jeremy T	Date: 24/11/22	Time: 4h00	Samples Received By (Print Name and Sign):	Date: 11/22/24	Time: 16h05
Samples Relinquished By (Print Name and Sign): Jeremy T	Date: 24/11/22	Time: 4h00	Samples Received By (Print Name and Sign):	Date: Nov 27	Time: 8:54 AM
Samples Relinquished By (Print Name and Sign): Client to Pick	Date: 11/25/24	Time: 15h00	Samples Received By (Print Name and Sign):	Date:	Time:

Page ____ of ____

N°: T - 164639

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

F

Appendix F
Dewatering Calculations

Appendix F.1: Infiltration Rates - Blind River LLPS

Overburden Unit			Bedrock Unit		
Datum			**Datum**		
Ground Surface Elevation (m asl)	180.56	m asl	Bedrock Surface Elevation (m asl)	175.01	m asl
Bottom excavation elevation (m asl)	175.01	m asl	Bottom excavation elevation (m asl)	173.39	m asl
Groundwater elevation (m)	179.56	masl	Groundwater elevation (m)	175.01	masl
Required drawdown from bottom of excavation (m)	0.0	m	Drawdown from bottom of excavation (m)	1	m
Elevation at required drawdown (m asl)	175.01	m asl	Elevation at required drawdown (m asl)	172.39	m asl
INPUTS			**INPUTS**		
Dimensions			**Dimensions**		
Length excavation (m):	13.5	m	Length excavation (m):	13.5	m
Width excavation (m):	13	m	Width excavation (m):	13	m
Area of excavation :	176	m^2	Area of excavation :	176	m^2
Hydraulic Conductivity			**Hydraulic Conductivity**		
hydraulic conductivity:	1.54E-05	m/s	hydraulic conductivity:	2.67E-07	m/s
Drawdown			Drawdown		
total drawdown (m)	4.55	m	total drawdown (m)	2.62	m
Radius of influence			**Radius of influence**		
Radius of influence (Ro1) :	53.6	m	Radius of influence (Ro1) :	4.1	m
Effective Radius			**Effective Radius**		
Effective radius of point source (rw1) :	7.5	m	Effective radius of point source (rw1) :	7.5	m
RESULTS			**RESULTS**		
Infiltration rates			**Infiltration rates**		
Infiltration rate in excavation:	4.77E-04	m^3/s	Infiltration rate in excavation:	1.33E-05	m^3/s
Infiltration rate in excavation :	41.21	m3/day	Infiltration rate in excavation :	1.15	m3/day
	28.6	L/min		0.8	L/min
Safety factor of 3 on K			**Safety factor of 3 on K**		
Safety factor on K :	3		Safety factor on K :	3	
Infiltration rate in excavation (Q) :	1.43E-03	m^3/s	Infiltration rate in excavation (Q) :	3.98E-05	m^3/s
Infiltration rate in excavation (Q) :	123.62	m3/day	Infiltration rate in excavation (Q) :	3.44	m3/day

Total Excavation Infiltration Rate	42.35	m3/day
	29.4	L/min
Safety factor of 3 on K	127.06	m3/day
	88.2	L/min