

# 601 Scottsdale Drive, Guelph, ON

# Preliminary Hydrogeological Investigation Report

# **Project Location:** 601 Scottsdale Drive

Guelph, ON

Prepared for: Forum 601 Scottsdale LP 181 Bay Street Suite EP210 Toronto, ON M5J 2T3

Prepared by:

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MTE File No.: 49791-101

Engineers, Scientists, Surveyors.



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# **1.0 INTRODUCTION**

MTE Consultants Inc. (MTE) was retained by Forum 601 Scottsdale LP to conduct a Preliminary Hydrogeological Investigation for a proposed residential development at 601 Scottsdale Drive, Guelph, Ontario (herein referred to as the 'Site'). **Figure 1** illustrates the Site location.

The Site currently consists of a student residence building with asphalt-surfaced parking areas and access driveways on the east half of the Site, and a vacant grass field on the west half of the Site. MTE understands that the proposed development includes two 7-storey student residence buildings, and a single-storey common hub area. The development is proposed to have one level of underground parking. Further, it is understood that new asphalt-surfaced parking and access driveways will be constructed at the Site, including reworking some of the existing asphalt areas. The Site will be municipally serviced for water supply and wastewater. On-Site infiltration may be considered within the western portion of the Site in the vicinity of the north drive entrance to the underground parking.

#### 1.1 Scope and Methodology

#### 1.1.1 Background Review

- Topography, physiography, geological and hydrogeological mapping on file with the City of Guelph, Grand River Conservation Authority, the Ontario Geological Survey, and the Ministry of Natural Resources and Forestry (MNRF).
- Available nearby well records on file with the Ministry of the Environment, Conservation and Parks (MECP).

#### 1.1.2 Field Investigation

- Installation of three monitoring wells installed during the concurrent geotechnical investigation.
- Development and collection of stabilized water levels from newly constructed monitoring wells.
- In-situ single well hydraulic response testing (slug testing) of two representative monitoring wells to determine the hydraulic conductivity of the saturated soils on-Site.
- Collection of two unfiltered groundwater samples for analysis of a suite of parameters and compared to the City of Guelph Storm and Sanitary Sewer By-Laws.
- Installation of electronic data loggers to monitor groundwater on a continuous basis in two newly constructed monitoring wells.

#### 1.1.3 Preliminary Analysis and Reporting

Summarize findings in a letter report to be reviewed and signed by a Professional Geoscientist or Engineer licensed to practice in Ontario. The report will address the following items:

- The topography, physiography, and geology of the subsurface soils.
- A hydrogeologic characterization of the Site including groundwater levels, gradients, flow direction, and hydraulic conductivity.
- Assessment of potential for construction dewatering and required permitting/approvals.

- Preliminary assessment of groundwater quality for potential discharge to local storm and/or sanitary sewer should construction dewatering be required.
- Summary of identified groundwater receptors and discussion of the potential for the proposed development to impact these receptors.
- Recommendations for additional work, groundwater monitoring and/or mitigation, as appropriate.

# 2.0 SITE DESCRIPTION

The Site is approximately 6 acres in size, currently consisting of a student residence building with asphalt-surfaced parking areas and access driveways on the east half of the Site, and a vacant grass field on the west half of the Site. The Site is bordered by Stone Road West to the south, the Halon Parkway to the west, adjacent properties to the north, and Scottdale Drive to the east. The ground surface at the Site generally slopes down from the northeast end of the Site to the southwest end of the Site. Ground surface elevations measured at the borehole locations vary from Elevation 333.9 to 326.7 m above mean sea level (amsl). The Site features are shown on **Figure 2**.

A Preliminary Concept Plan for the proposed development is provided in **Appendix A**. The plan includes two 7-storey student residence buildings, a single-storey common hub area, and associated surface parking.

# 3.0 FIELD PROGRAM

#### 3.1 Borehole Advancement and Monitoring Well Construction

In conjunction with the Geotechnical investigation, boreholes were advanced and monitoring wells installed across the Site. Between February 21 and 27, 2023, London Soil Test Ltd. used a track-mounted D50 Turbo drill rig to complete the advancement and installation of monitoring wells BH102-23 to BH107-23, MW108-23, BH109-23, BH110-23 and BH112-23 to BH116-23. On March 8, 2023, Direct Environmental Drilling Inc. used a track-mounted Geoprobe 7822DT drill rig to advance boreholes and install monitoring wells MW101-23 and MW111-23. Boreholes and monitoring wells were advanced to depths ranging from 3.5 m to 11.9 m below ground surface (bgs).

The monitoring wells at the Site were surveyed by MTE to a geodetic benchmark. Borehole and monitoring well locations are illustrated on **Figure 2**. Borehole logs are provided in **Appendix B**.

## 3.2 Monitoring Well Development

The monitoring wells were developed on March 22, 2023 using Waterra<sup>™</sup> Surge Blocks to remove any accumulated sediments from the bottom of the well and to remove fine materials from the well screen and sand pack. Monitoring well development included the removal of three well volumes and/or purging the well dry on three occasions. Monitoring well development was completed prior to the installation of the data loggers.

#### 3.3 Groundwater Levels

Manual groundwater levels were collected from on-Site monitoring wells on eight occasions between March 2023 and March 2024. Manually measured groundwater levels and elevations within on-Site monitoring wells are presented in **Table 1**. In addition, data loggers were installed in two of the on-Site monitoring wells (MW101-23 and MW108-23). Data loggers measure the

pressure of water (in cm) above the logger, which can then be compensated for atmospheric pressure to determine a groundwater level. The continuous hourly groundwater level information collected by data loggers allows for an assessment of seasonal groundwater trends and responses to precipitation events. On June 29, 2023 the data logger within MW108-23 was removed and installed within MW111-23, due to silting issues within MW108-23. Hydrographs are presented in **Appendix C**.

#### 3.4 Groundwater Quality

Groundwater samples were collected from MW101-23 and MW108-23 on March 23, 2023. Prior to sampling, all monitoring wells were either purged a minimum of three standing well volumes or purged dry three times to ensure representative samples were collected from the shallow groundwater flow system. Following purging, groundwater samples were collected using dedicated Waterra tubing and foot valves, placed into laboratory supplied bottles and shipped under chain-of-custody, in an ice packed cooler to ALS Laboratory Group in Waterloo, ON. The groundwater analytical results for the Site were compared to the City of Guelph Storm and Sanitary Sewer Use By-Law (1996)-15202

# 4.0 REGIONAL GEOLOGY AND HYDROGEOLOGY

## 4.1 Physiography

The Site is located within the broad physiographic region known as the Guelph Drumlin Field. The Guelph Drumlin Field occupies an approximate area of 830 km<sup>2</sup> and these drumlins are generally broad and oval in shape. The drumlins mainly consist of loamy and calcareous till derived from the dolostone of the Amabel Formation. Within this physiographic region the materials encountered are stony tills which are sand rich based on grain sizes (Chapman and Putnam, 1984).

The Site is located in the physiographic landform known as till plains (drumlinized). The physiographic landforms are presented on **Figure 3** (Chapman and Putnam, 1984).

## 4.2 Quaternary Geology

Geology throughout the City of Guelph is generally comprised of three distinct till units identified from youngest to oldest as the Wentworth Till, the Middle Maryhill Till and the Catfish Creek Till, overlying bedrock. The Wentworth Till is described as a coarse-grained sandy to silty sand till which is often bouldery or stony (Karrow, 1968). This unit is generally found at ground surface throughout the City of Guelph and includes glacial features such as drumlins, found within the Guelph Drumlin Field, and the Galt and Paris moraines. The till thickness is described as variable, ranging between 15 to 30 m below drumlins and moraines, while thicknesses are much lower within low-lying areas.

Quaternary geology mapping (**Figure 4**) indicates that the surficial geology beneath the Site is mapped as glaciofluvial outwash and ice stratified deposits. The glaciofluvial outwash deposits are described as gravel and sand, including proglacial river and deltaic deposits (*Ontario Geologic Survey*, 2010).

#### 4.3 Paleozoic Geology

The Site is underlain by the Upper Silurian dolomite of the Guelph Formation. The Guelph formation is described as tan to brown, fine- to medium-crystalline, fossiliferous, dolostone that is locally biohermal (Armstrong and Carter, 2010). Bedrock was not encountered during the geotechnical drilling program.

Based on water well records in the area, the bedrock surface is expected to be encountered at depths of approximately 25 m to 50 m bgs. The water well records also indicate that the primary water supply aquifer in the area is bedrock.

#### 4.4 Regional Groundwater Flow

Regional shallow groundwater elevations, provided by the Grand River Conservation Authority (GRCA) (published 2009), indicate that the regional shallow groundwater elevations in the vicinity of the Site are approximately 310 m amsl. In addition, the regional shallow groundwater flow direction is interpreted as westerly towards the Speed River, located approximately 1.3 km west of the Site.

## 4.5 Water Well Record Search

Hydrogeological data related to private water supply wells within 500 m of the Site were obtained from water well records on-file with the Ministry of the Environment, Conservation and Parks (MECP). A total of 57 water well records were located within 500 m of the Site (**Figure 5**). Of the 57 water well records, the following primary use was listed on the water well record:

- 33 water supply wells;
- 14 monitoring/observation wells or test holes;
- 5 records with no use specified; and
- 4 abandonment records.

MECP water well records are summarized in **Table 2**. Based on the available water well records, there are private water supply wells within the Study Area that are used for Domestic water supply. According to the water well records, these wells are completed into the underlying bedrock.

#### 4.6 Source Water Protection

The closest municipal well to the Site is the University well, located approximately 700 m northeast of the Site. This municipal well is completed into the deep bedrock aquifer and is approximately 80 m deep. The Site is located in Wellhead Protection Area (WHPA) B which is the two to five-year time of travel capture zone (**Figure 6**), with a vulnerability score of 6 to 8. The Site is also located within a mapped Significant Groundwater Recharge Area (SGRA) and an Issue Contributing Area (ICA) for trichloroethylene.

# 5.0 LOCAL HYDROGEOLOGIC SETTING

#### 5.1 Geological Cross-Section

Boreholes and monitoring wells installed for this investigation were used to interpret local hydrostratigraphic units and generate one geological cross-section. The location of the cross-section is provided on **Figure 2**; the geological cross-section is presented in **Figure 7**.

Geological Cross-Section A-A' (Figure 7):

- Extends approximately 225 m from southwest to northeast.
- Topography slopes from southwest to northeast from approximately 327 to 334 m amsl.
- The Site is underlain by fill materials that range in thickness from approximately 1 to 3 m.

- The fill material is underlain by a sand deposit, consisting of gravelly sand to silty sand, extending to approximately 320 m amsl on the southwest and 331 m amsl on the northeast.
- The sand deposit is underlain by sandy silt deposits extending to the depth of the investigation.

The stratigraphy consists of a surficial layer of shallow fill above sand and sandy silt deposits. Bedrock was not encountered in the boreholes to the depths explored (up to 12 m bgl). The sand and sandy silt deposits are consistent with glaciofluvial outwash deposits.

#### 5.2 Groundwater Elevations and Flow Direction

**Hydrographs 1** through **3** (**Appendix C**) present groundwater elevation information for on-Site monitoring wells. Precipitation data (Environment Canada Guelph Turfgrass Station) has also been presented on the hydrographs to illustrate the relationship between the groundwater elevations in on-Site monitoring wells and precipitation events. The gap in continuous data on **Hydrograph 2** between May 12 and June 7, 2023 is a result of the data logger memory becoming full. As shown on the hydrographs groundwater levels rose in the spring and plateaued in mid-summer before decreasing throughout the fall and early winter. Data logger data from MW101-23 and MW111-23 indicate that beginning in February 2024 groundwater elevations started to increase again.

Groundwater levels in on-Site monitoring wells appear to show minor short-term responses to precipitation events. Overall groundwater levels in on-Site monitoring wells appear to follow a delayed seasonal trend in that groundwater highs on-Site occur in the summer with lows occurring in the late fall/early winter.

Based on manual and continuous groundwater elevation monitoring, the highest groundwater elevation noted on-Site was approximately 321.5m amsl, which occurred at MW108-23.

Groundwater flow mapping was created for the Site using groundwater levels measured on June 7, 2023. Interpreted shallow groundwater elevation contours are illustrated on **Figure 8**. MTE notes that on-Site monitoring wells were only completed on the western half of the Site, as such the groundwater elevation on the eastern half of the Site may differ from that shown on **Figure 8**. Groundwater on the western half of the Site is interpreted to flow from east to west.

## 5.3 Hydraulic Conductivity

#### 5.3.1 In-Situ Hydraulic Conductivity Testing

MTE conducted single well hydraulic response tests (SWRT) on two monitoring wells (MW101-23 and MW111-23) in March and June 2023. SWRTs typically involve the rapid introduction and/or removal of a slug of known displacement to raise and/or lower the water level in a monitoring well. The response of this rapid change is measured over time and used to calculate hydraulic conductivity. In wells with a water level reported within the screened interval, the response to the introduction of a solid slug can be influenced by the sand pack around the well screen. As the water level within MW101-23 on the day of testing was noted to be within the screened interval, MW101-23 was purged dry and the rate of recovery was recorded using a data logger programmed to collect a water level every second.

A representative test from each well was analyzed using the Bouwer and Rice methodology using AquiferTest© Pro Software (Waterloo Hydrogeologic Inc., 2020). A copy of the AquiferTest© data sheets are located in **Appendix D**.

#### 5.3.2 Grain Size

Selected soil samples obtained during drilling activities were submitted for gradation and hydrometer analysis, as part of the geotechnical investigation. Particle size distribution reports are provided in **Appendix E**.

#### 5.3.3 Hydraulic Conductivity Results

Based on review of the borehole logs and grain size analyses, sediment types generally range from silt to gravelly silty sand, trace clay. Altogether, five samples were analyzed with the results summarized in **Table 3**. The hydraulic conductivities of the tested soils (silt to gravelly silty sand) across the Site ranges from  $1.2 \times 10^{-8}$  m/sec to  $1.5 \times 10^{-9}$  m/sec. These results are consistent with average published values for silt and till soils (Freeze and Cherry, 1979).

The hydraulic conductivity results from the in-situ hydraulic response tests completed at MW101-23 and MW111-23 were  $9.9x10^{-7}$  m/sec and  $8.4x10^{-7}$  m/sec, respectively, with the estimated geometric hydraulic conductivity value of  $9.1x10^{-7}$  m/sec.

#### 5.4 Average Linear Groundwater Velocity

The horizontal hydraulic gradient, based on the June 7, 2023 groundwater elevations (**Figure 8**), is calculated to be 0.02 m/m.

The average linear groundwater velocity can be calculated using Darcy's Law, as follows:

$$q = (Ki)/n_e$$

Where:

q = average linear groundwater velocity (m/sec)

K = hydraulic conductivity (9.1x10<sup>-7</sup> m/sec (SWRT geometric mean))

i = horizontal hydraulic gradient (0.02 m/m)

 $n_e$  = effective sediment porosity (0.26 based on the calculations in Appendix E)

Using the above values, the average linear groundwater velocity at the Site is estimated to be approximately 2.4 m/year.

#### 5.5 Groundwater Quality

Groundwater samples were analyzed for the City of Guelph Storm and Sanitary Sewer Use By-Law (1996)-15202 criterion. Analytical results have been compared to the City of Guelph Sewer Use By-Law criterion and are presented in the appended **Table 4**. Unabbreviated laboratory certificates of analysis are presented in **Appendix F**.

**Tables 5.5.1** and **5.5.2** below indicate which parameters exceeded either the City of Guelph's Storm and/or Sanitary Sewer Use By-Law.

# Table 5.5.1 – City of Guelph Storm Sewer Exceedances for Total Suspended Solids (TSS) and Total Metals

Parameter	Storm Sewer Limit (mg/L)	MW101-23 (mg/L)	MW108-23 (mg/L)
TSS	15	738	12500
Copper	0.01	0.0122	0.118
Lead	0.05	0.00826	0.0731
Nickel	0.05	0.00749	0.111
Zinc	0.05	0.0836	0.368

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# Table 5.5.2 – City of Guelph Sanitary Sewer Exceedances for Total Suspended Solids (TSS) and Total Metals

Parameter	Sanitary Sewer Limit (mg/L)	MW101-23 (mg/L)	MW108-23 (mg/L)
TSS	350	738	12500
Iron	50	4.58	94.4

# 6.0 PRELIMINARY DESIGN CONSIDERATIONS

#### 6.1 Dewatering

The shallowest groundwater elevation measured by MTE in on-Site monitoring wells to date is approximately 321.5m amsl. To account for potential changes to the shallow groundwater level, a 0.5m safety factor was included for dewatering considerations. The current concept plan for the Site includes one level of underground parking with a proposed finished floor elevation (FFE) of 325.6m amsl. The current separation between the shallowest water level measured with 0.5m safety factor and the proposed FFE is approximately 3.6 metres (325.6m amsl – 322m amsl). Based on the estimated separation, it is not anticipated that dewatering of groundwater will be required. MTE recommends continuous groundwater monitoring occur during the Site plan approval process, as well as during final design to track seasonal changes in groundwater elevations on-Site.

# 7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on this hydrogeological investigation, MTE offers the following findings:

- The stratigraphy consists of a surficial layer of shallow fill above sand and sandy silt deposits. Bedrock was not encountered in the boreholes to the depths explored.
- The shallow groundwater flow direction beneath the Site is interpreted to be westerly.
- The horizontal hydraulic gradient of the groundwater table beneath the Site was estimated at 0.02 based on the June 7, 2023 groundwater contours (**Figure 8**).
- Hydraulic conductivity of the underlying materials on-Site is estimated to range from 9.9x10<sup>-7</sup> m/sec to 8.4x10<sup>-7</sup> m/sec with a geometric mean of 9.1x10<sup>-7</sup> m/sec.
- Based on a review of on-Site groundwater elevations and the proposed FFE there is approximately four metres of separation, as such at this time dewatering is not anticipated to be required at the Site.

#### **Recommendations**

- During the development application process, existing on-Site groundwater monitoring wells should be maintained.
- Should on-Site infiltration be considered, MTE recommends completing on-Site in-situ infiltration testing prior to final Site design.
- Upon monitoring well decommissioning, monitoring wells are to be decommissioned in accordance with Ontario Regulation 903 (as amended).
- If, upon final confirmation of building and servicing design, it is anticipated that the water table may be intercepted during construction activities, a dewatering assessment should be completed.

# 8.0 LIMITATIONS

Services performed by **MTE Consultants Inc.** (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Environmental Engineering & Consulting profession. No other warranty or representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of MTE and the Client. The assignment was carried out in accordance with the Scope of Work described in Section 1.1 as reviewed with and agreed to by the Client. MTE makes no representation that the present report has dealt with all of the important environmental issues, except as provided in the Scope of Work. This report is not intended to be exhaustive in scope or to imply a risk-free facility. As such, this report may not deal with <u>all</u> issues potentially applicable to the Site and may omit aspects which are or may be of interest to the reader.

In addition, it should be recognized that a soil sample or groundwater level measurement represents one discrete portion of the Site at the time it is collected, and that the findings of this report are based on conditions as they existed during the time period of the investigation.

Any use which another party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by another party as a result of decisions made or actions taken, based upon this report. Others with interest in the Site should undertake their own investigations and studies to determine how or if the condition affects them or their plans.

It should be recognized that the passage of time may affect the views, conclusions and recommendations (if any) provided in this report because environmental conditions of a property can change, along with regulatory requirements. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may determine whether it affects the contents of this report.

All of which is respectfully submitted,

**MTE Consultants Inc.** 



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Ministry of the Environment and Climate Change Source Protection Information Atlas:

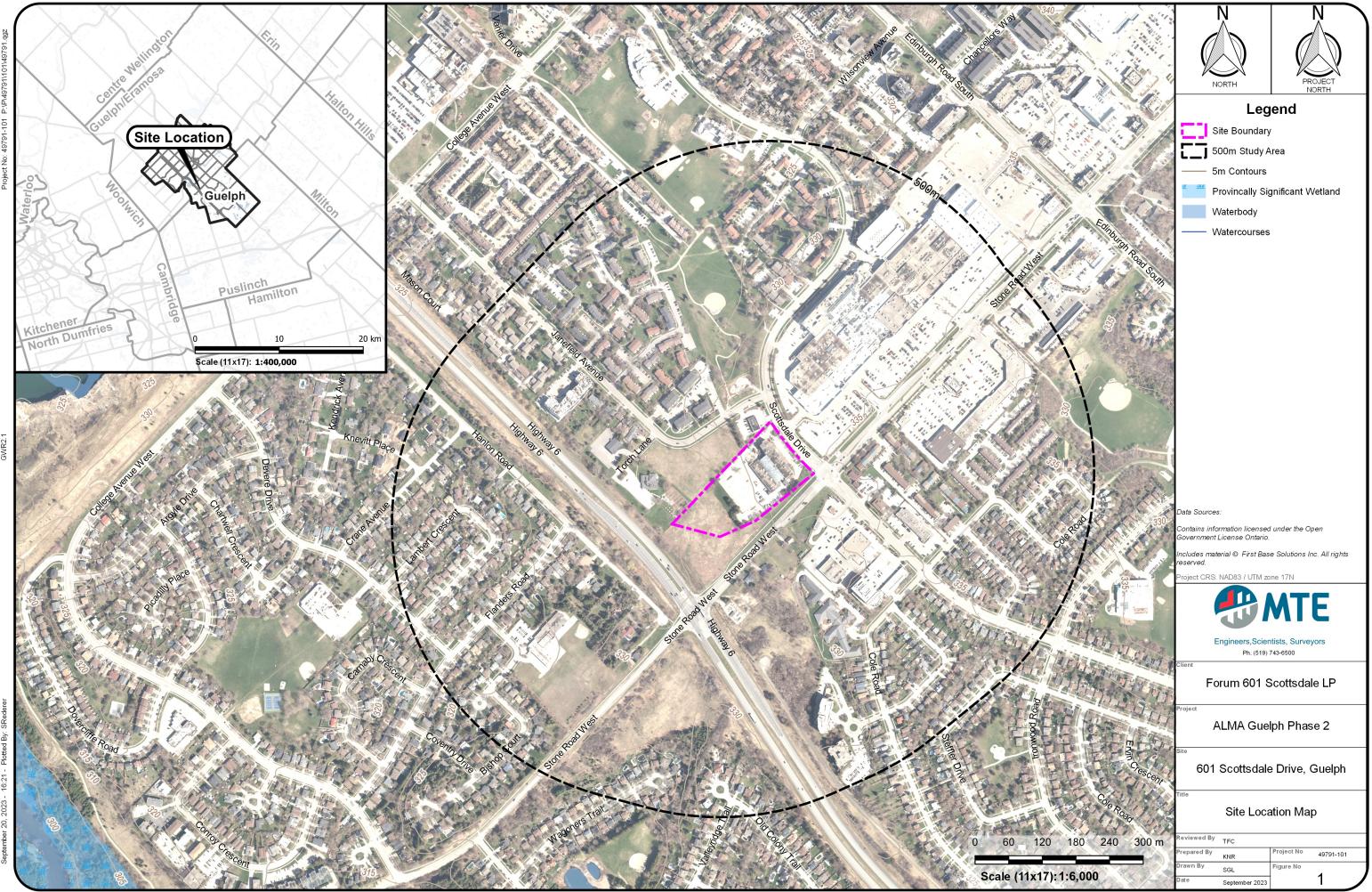
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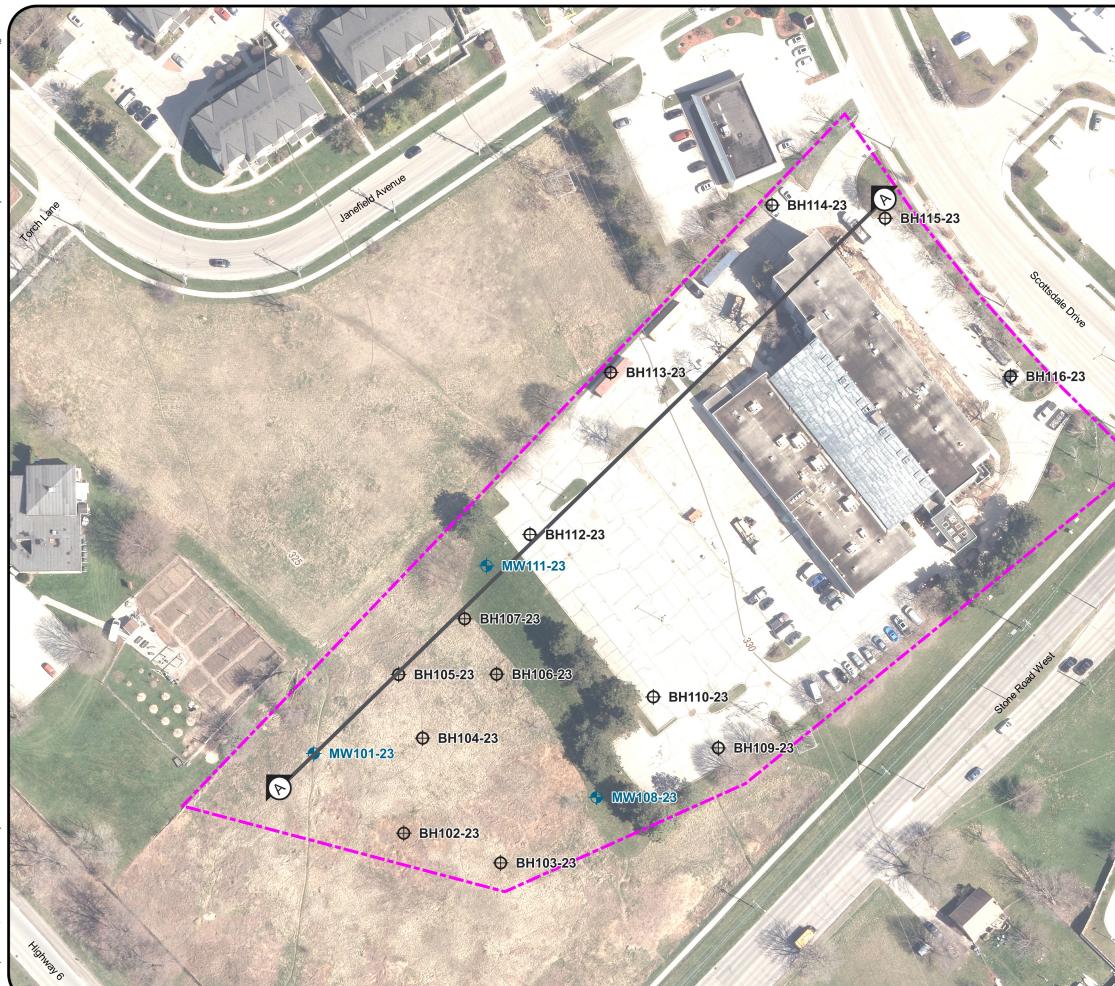
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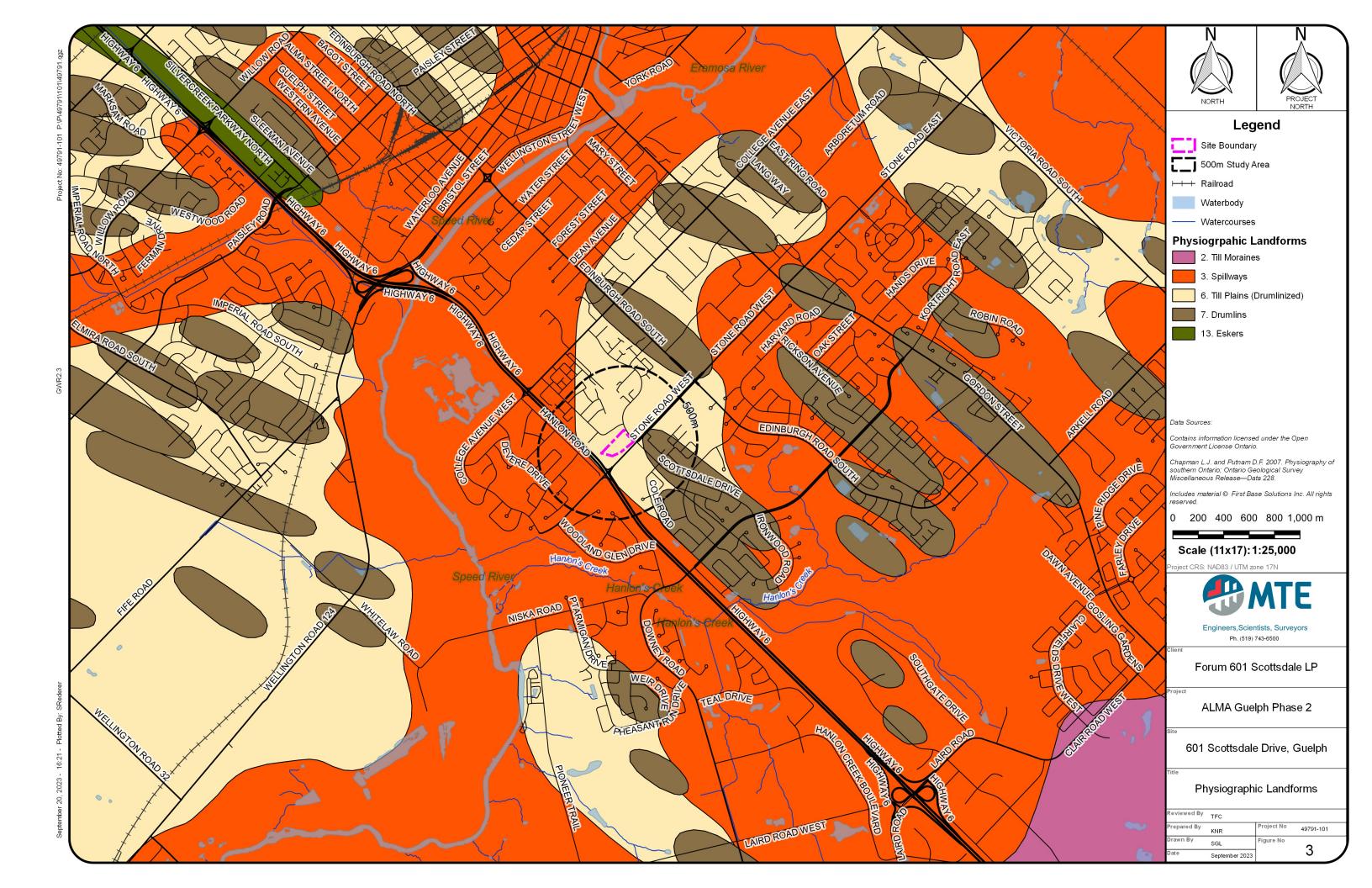


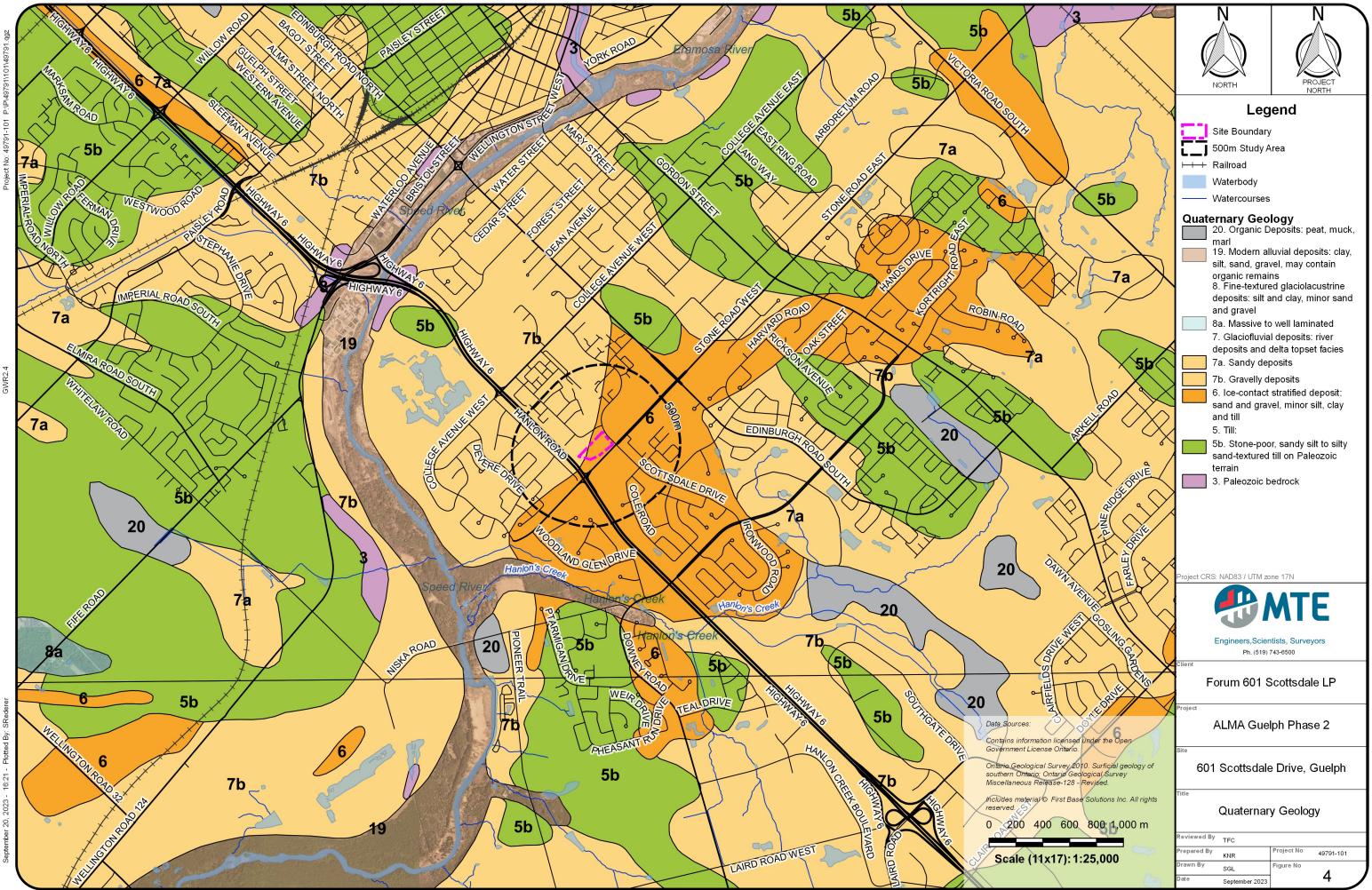
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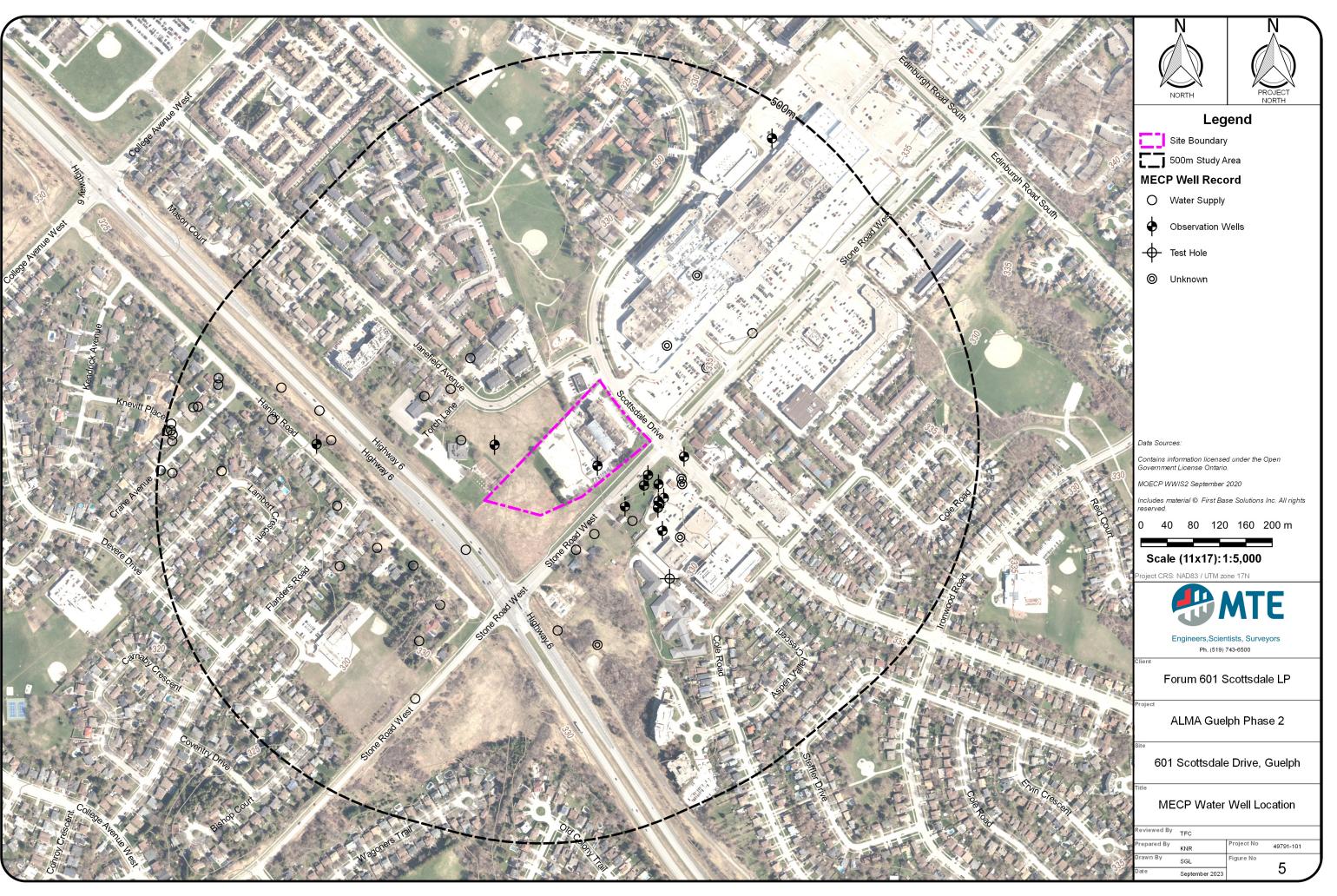
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	NORTH NORTH
Plant of P	Legend
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	Geological Cross Section Location
	—— 5m Contours
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	Watercourses
33	
Stone Road west	
stone Road V.	
	Data Sources:
	Contains information licensed under the Open
	Government License Ontario. Contains Information made available under Grand River
	Conservation Authority's Open Data Licence v2.0
	Includes material © First Base Solutions Inc. All rights reserved.
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	Seels (11)(17)(1:1,000
	Scale (11x17):1:1,000 Project CRS: NAD83 / UTM zone 17N
	MTE
	Engineers, Scientists, Surveyors
	Ph. (519) 743-6500
	Forum 601 Scottsdale LP
	ALMA Guelph Phase 2
	<sup>site</sup> 601 Scottsdale Drive, Guelph
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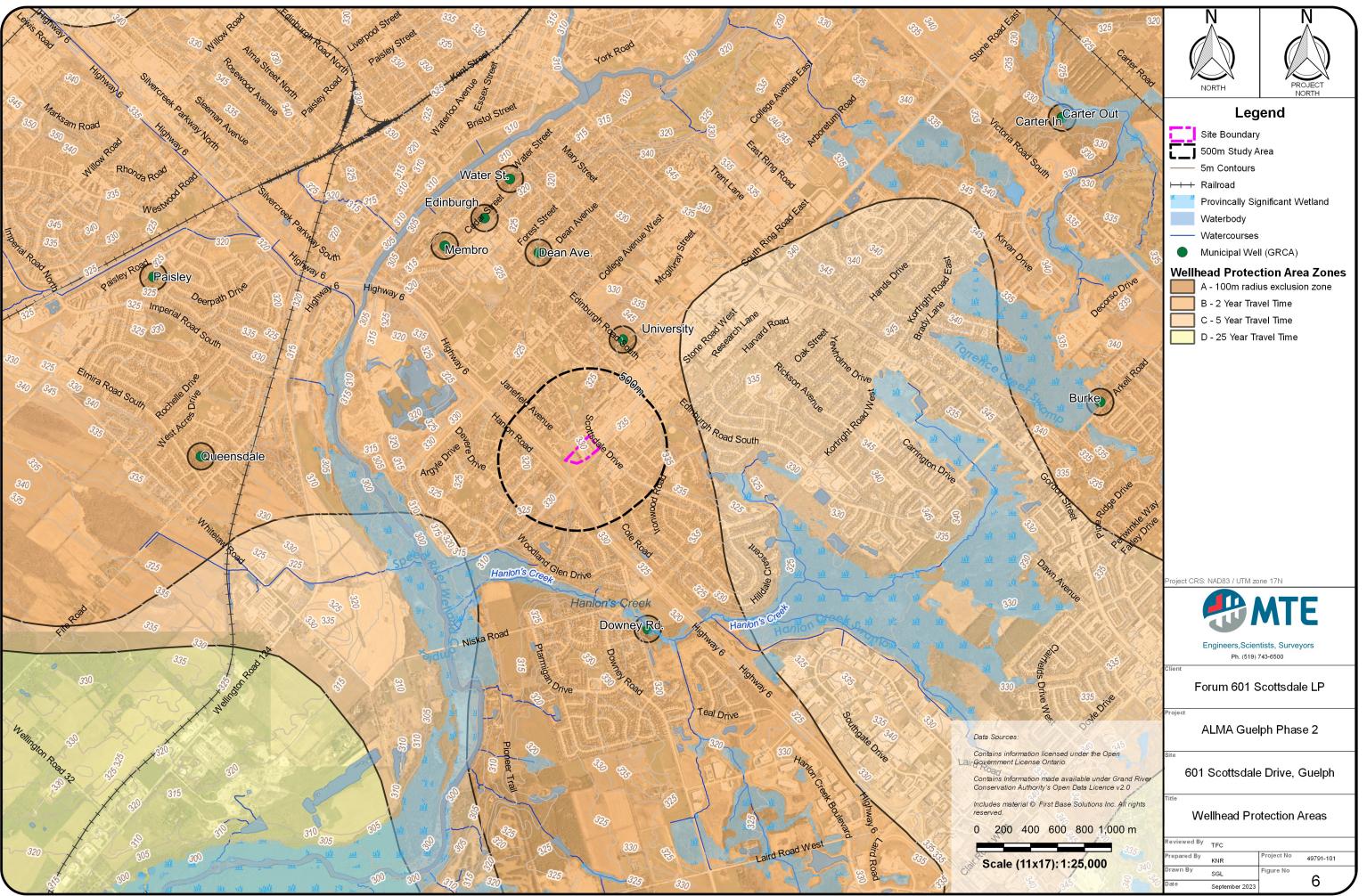






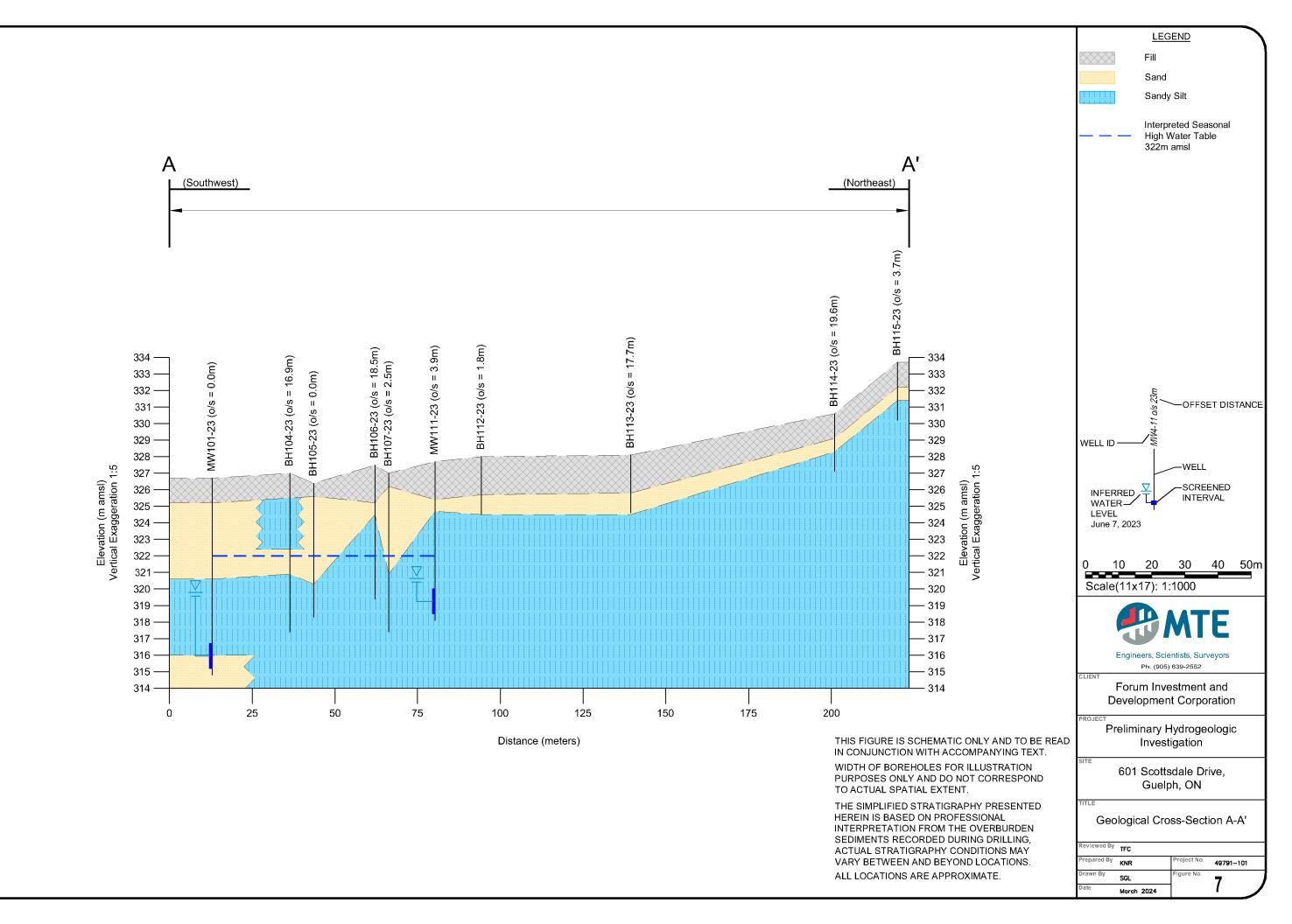


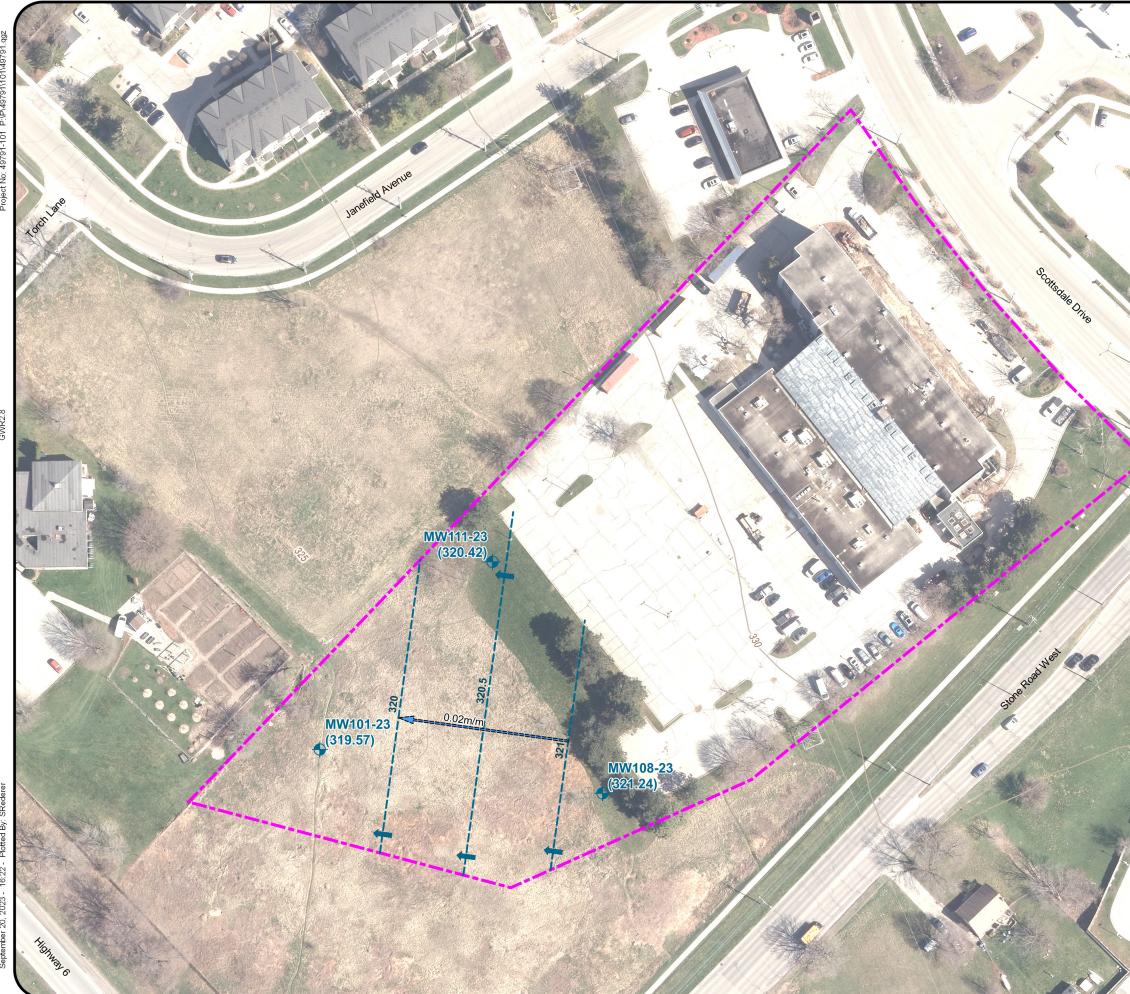




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	NORTH NORTH	
Plate of the	Legend	
	<ul> <li>Site Boundary</li> <li>Monitoring Well (Groundwater Elevation (mAMSL))</li> <li>Groundwater Contours (0.5m Interval Groundwater Flow Direction (Inferred Horizontal Gradient (m/m)</li> <li>5m Contours</li> </ul>	
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	reserved.         0       9       18       27       36       45 m         Scale (11x17): 1:1,000         Project CRS: NAD83 / UTM zone 17N         Engineers, Scientists, Surveyors         Ph. (519) 743-6500	
	reserved. 0 9 18 27 36 45 m Scale (11x17): 1:1,000 Project CRS: NAD83 / UTM zone 17N Forject CRS: NAD83 / UTM zone 17N Client Forum 601 Scottsdale LP Project ALMA Guelph Phase 2	
	reserved.         0       9       18       27       36       45 m         Scale (11x17): 1:1,000         Project CRS: NAD83 / UTM zone 17N         Engineers, Scientists, Surveyors         Engineers, Scientists, Surveyors         Ph. (619) 743-6500         Client         Forum 601 Scottsdale LP         Project         ALMA Guelph Phase 2         Site         601 Scottsdale Drive, Guelph         Title         Interpreted Groundwater Flow Map (June 7, 2023)	
	reserved.         0       9       18       27       36       45 m         Scale (11x17): 1:1,000         Project CRS: NAD83 / UTM zone 17N         Finite CRS: NAD83 / UTM zone 17N         Engineers, Scientists, Surveyors         Ph. (519) 743-6500         Client         Forum 601 Scottsdale LP         Project         ALMA Guelph Phase 2         Site         601 Scottsdale Drive, Guelph         Title         Interpreted Groundwater Flow Map (June 7, 2023)	





# **MTE**

# Table 1: Manual Groundwater Elevations (m amsl)

Date	MW101-23	MW108-23	MW111-23
TOC Elevation	327.75	329.10	328.53
2023-03-22	317.91	319.48	dry
2023-03-23	317.90	319.54	dry
2023-06-07	319.57	321.24	320.42
2023-06-29	319.67	321.32	320.50
2023-06-30	319.69	321.33	320.54
2023-09-14	319.68	321.23	320.49
2023-12-19	319.05	320.50	319.98
2024-03-20	319.08	320.68	320.01

Notes:

m amsl = metres above sea level

TOC = top of casing

MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)		Material 1	Material 2	Material 3
														1.8		Gravel	Clay	
														9.1		Medium Sand	Stones	
														24.4		Medium Sand		
6700935	561096.3	4818426	1967	101.6	56.7	Cable Tool	Water Supply	Domestic	Fresh	51.8	56.69	13.7	68.2	33.8		Clay		
0700300	001000.0	4010420	1307	101.0	50.7			Domestic	110311	01.0	00.00	10.7	00.2	47.5		Clay	Medium Sand	
														50.3		Limestone		
															Black	Limestone		
														56.7	Grey	Limestone		
														0.6		Topsoil		
														4.9		Medium Sand		
														10.7		Gravel	Medium Sand	
														13.7		Clay	Medium Sand	
														15.5		Medium Sand		
6701/60	561596.3	1818522	1955	127	47.2	Cable Tool	Water Supply	Domestic	Fresh	38.1	47.24	10.7	31.8	16.5		Hardpan		
0701409	501590.5	4010022	1955	127	41.Z	Cable 100	water Suppry	Domestic	FIESH	30.1	47.24	10.7	51.0	17.4		Coarse Sand		
														21.6		Hardpan	Medium Sand	
														24.4		Clay	Stones	
														33.5	Brown	Limestone		
														38.1	Grey	Limestone		
														47.2	Black	Limestone		
														0.3		Topsoil		
														4.9		Medium Sand		
														10.7		Medium Sand	Gravel	
														13.7		Medium Sand	Clay	
														16.2		Medium Sand		
6701470	560054.2	4040250	1055	101.6	47.0	Cable Teal	Water Supply	Domostia	Freeb	01.0	47.04	0.1	26.4	18.3		Hardpan		
6701470	560954.3	4818359	1955	101.6	47.2	Cable Tool	Water Supply	Domestic	Fresh	21.3	47.24	9.1	36.4	19.5		Fine Sand		
														28.7	Brown	Limestone		
														32	Grey	Limestone		
														39.6	Black	Limestone		
														45.7	Grey	Limestone		
														47.2	Brown	Limestone		
														0.6		Topsoil		
														12.2		Gravel	Medium Sand	
														24.7		Medium Sand	Gravel	Clay
														29.6		Gravel		-
6701471	561152.3	4818359	1956	101.6	54.3	Cable Tool	Water Supply	Domestic	Sulphur	45.1	54.25	12.8	68.2	33.2		Clay	Gravel	
							,							34.1		Medium Sand		
														42.4		Clay		
															Brown	Limestone		
														54.3		Limestone		
0704470	F00000 0	4040404	4057	404.0	00.0				E a a a l	00.0	00.40	0.7		9.8		Fine Sand		
0/014/2	560936.3	4818404	1957	101.6	30.2	Cable I ool	Water Supply	Domestic	Fresh	30.2	30.18	3.7	45.5		Grey	Limestone		



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
6701472	E60070 2	4818439	1057	101.6	22 E	Cable Teel	Matar Supply	Domostio	Freeh	22 F	22 E2	4	07.0	10.4		Fine Sand		
0/014/3	560878.3	4010439	1957	101.6	33.5		Water Supply	Domestic	Fresh	33.5	33.53	4	27.3	33.5	Grey	Limestone		
														0.6		Topsoil		
														5.2		Medium Sand	Gravel	
														9.1		Gravel		
														16.5		Medium Sand	Clay	
														18.3		Gravel	Medium Sand	
6701474	561166.3	4818484	1958	101.6	51.2	Cable Tool	Water Supply	Domestic	Fresh	43.3	51.21	13.7	68.2	29.3		Clay	Gravel	
0101414	001100.0	-010-0-1	1000	101.0	01.2		Water Cappiy	Domostio	110011	-10.0	01.21	10.7	00.2			Clay	Gravel	
														37.8	Grey	Clay		
														39.3		Coarse Sand		
														42.7		Gravel		
														44.5		Limestone		
														51.2		Limestone		
														12.2		Fine Sand		
														12.8		Gravel		
6701478	561136.3	4818437	1964	101.6	41.5	Cable Tool	Water Supply	Domestic	Fresh	24.4	41.45	9.1	45.5	15.5	_	Fine Sand		
															Brown	Limestone		
														41.5	Black	Limestone		
												<b>a</b> (		12.8		Gravel	Medium Sand	
6701486	560711.3	4818379	1964	101.6	31.1	Cable I ool	Water Supply	Domestic	Fresh	31.1	31.09	9.1	18.2		Grey	Limestone		
															Brown	Limestone		
6701490	560712.3	4818364	1964	101.6	29.6	Cable Tool	Water Supply	Domestic	Fresh	29.6	29.57	9.1	27.3	12.8		Gravel		
														29.6	Grey	Limestone		
6701491	560709.3	4818379	1958	101.6	27.7	Cable Tool	Water Supply	Domestic	Fresh	27.7	27.74	8.2	45.5	8.8		Gravel		
							,							27.7	Grey	Limestone		
6701492	560751.3	4818410	1963	101.6	29.3	Cable Tool	Water Supply	Domestic	Fresh	29.3	29.26	9.1	18.2	11.3	Dussia	Gravel		
															Brown	Limestone		
														1.2		Topsoil Medium Sand	Croval	
														6.4 8.5		Clay	Gravel Medium Sand	
6701505	560744.3	4818409	1956	127	25.9	Cable Teel	Water Supply	Domostio	Fresh	24.4	25.91	4.9	45.5	10.1		Fine Sand	Weulum Sanu	
0701505	500744.5	4010409	1950	127	20.9		water Suppry	Domestic	FIESH	24.4	20.91	4.9	45.5		Brown	Limestone		
														23.8		Limestone		
															White	Limestone		
														9.8	VVIIIC		Gravel	
6701506	561120.3	4818108	1958	101.6	28	Cable Tool	Water Supply	Domestic	Fresh	24.4	28.04	6.1	45.5		White	Limestone		
0/01000	001120.0	4010100	1000	101.0	20		Water Cappiy	Domostio	110011	27.7	20.04	0.1	-10.0		Brown	Limestone		
														9.1	Biotin	Gravel		
6701507	560787.3	4818312	1958	101.6	28.7	Cable Tool	Water Supply	Domestic	Fresh	28.7	28.65	7.6	45.5	28.7	Grev	Limestone		
														12.2	,	Gravel		
6701509	560712.3	4818361	1961	101.6	30.8	Cable Tool	Water Supply	Domestic	Fresh	30.8	30.78	7.6	45.5	30.8	Grev	Limestone		



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)		Material 1	Material 2	Material 3
														10.7		Gravel		
6701510	560712.3	4818309	1961	101.6	29	Cable Tool	Water Supply	Domestic	Fresh	29	28.96	7.9	36.4	12.5		Medium Sand		
0701510	500712.5	4010309	1901	101.0	29	Cable 100	water Suppry	Domestic	FIESH	29	20.90	7.9	30.4	24.4	Grey	Limestone		
														29	Brown	Limestone		
														6.7		Gravel		
6701511	560783.3	4818447	1959	101.6	28.7	Cable Tool	Water Supply	Domestic	Fresh	28.7	28.65	9.1	31.8	9.4		Fine Sand		
															Brown	Limestone		
6701513	560781.3	4818450	1965	101.6	29.6	Cable Tool	Water Supply	Domestic	Fresh	29.6	29.57	7	45.5	12.2		Gravel	Stones	
0/01010	000701.0	4010400	1900	101.0	20.0			Domestic	110311	20.0	20.01	'	40.0		Brown	Limestone		
														0.6		Topsoil		
														2.4		Gravel		
														4.3		Medium Sand	Gravel	
6701515	561024.3	4818195	1953	101.6	25.6	Cable Tool	Water Supply	Domestic	Fresh	22.3	25.6	4.3	18.2	8.5		Clay		
0101010	001021.0	1010100	1000	101.0	20.0		Water eapply	Benneedle	110011	22.0	20.0	1.0	10.2	9.1		Gravel		
															White	Limestone		
															Yellow	Medium Sand	Limestone	
														25.6	Grey	Limestone		
														0.6		Topsoil		
														2.7		Gravel		
														4.3		Medium Sand	Gravel	
6701516	560963.3	4818259	1953	101.6	27.4	Cable Tool	Water Supply	Domestic	Fresh	19.5	27.43	5.2	22.7	8.8		Clay		
							11.5				-	-		9.8		Gravel	Medium Sand	
															White	Limestone		
															Yellow	Limestone		
														27.4		Limestone		
														22.9		Medium Sand		
0704547	500004.0	4040004	4050	101.0	54.0			Demonstie	Enclo	54.0	F4 04	4.4		38.1		Clay		
6701517	560864.3	4818391	1956	101.6	51.2	Cable Tool	Water Supply	Domestic	Fresh	51.2	51.21	11	45.5	38.7		Gravel		
															Black	Limestone		
														51.2 0.9		Limestone		
														3.4		Topsoil Gravel	Stones	
														7.3		Clay	Siones	
														8.8		Medium Sand	Gravel	
														21.9		Clay	Hardpan	
														21.5		Medium Sand	Gravel	
6701519	561088.3	4818053	1953	101.6	61.6	Cable Tool	Water Supply	Domestic	Sulphur	54.9	61.57	14.3	22.7	23.0		Gravel		
														36		Clay	Medium Sand	
														47.9		Clay		
														50.3		Fine Sand		
														51.2		Hardpan		
															Black	Limestone		}



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
														1.2		Fill		
														5.5		Gravel		
6701520	561079.3	4818168	1955	101.6	39.6	Cable Tool	Water Supply	Domestic	Fresh	39.6	39.62	8.5	31.8	16.8		,	Medium Sand	
							11 5							25.9		Gravel	01	
														38.7		Clay	Stones	
														39.6		Gravel	Ctones	
														2.7		Fill	Stones	
														7.6		Clay	Stones	
														9.1 24.4		Hardpan Silt		
6701521	561082.3	1817065	1957	101.6	61.6	Cable Tool	Water Supply	Domestic	Fresh	57.9	61.57	11.3	54.6	30.5		Gravel		
0701521	301002.3	4017903	1957	101.0	01.0	Cable 100	Water Suppry	Domestic	116311	57.5	01.57	11.5	54.0	31.7		Medium Sand		
														46.9		Hardpan		
														59.4	Black	Limestone		
															Brown	Limestone		
														0.9	Bronn	Topsoil		
														6.7			Gravel	
														8.2		Gravel	_	
0704500		1010100	4050	101.0				<b>_</b>						15.8		Silt		
6701522	561159.3	4818192	1958	101.6	41.8	Cable I ool	Water Supply	Domestic	Fresh	41.8	41.76	11.6	45.5	22.9			Gravel	
														24.4		Medium Sand		
														41.1		Clay	Stones	
														41.8		Medium Sand	Gravel	
														2.1		Previously Dug		
														3.7		Gravel		
														16.5		Clay	Medium Sand	
6701523	560967.3	4818167	1962	101.6	44.5	Cable Tool	Water Supply	Domestic	Fresh	44.2	44.5	11	45.5	17.1		Boulders		
0101020	000007.0	4010107	1002	101.0				Domestic	110311	77.2	0		40.0	21.3			Gravel	
														24.4		Gravel		
															Brown	Limestone		
															Black	Limestone		
														0.6		Fill		
														2.4		Stones		
														4.9		Fine Sand		
6702405	561327.3	4818192	1960	101.6	42.4	Cable Tool	Water Supply	Domestic	Fresh	38.1	42.37	8.5	45.5	6.7		-	Gravel	
							,							20.4	0	Gravel		
														24.4		Clay		
															Brown	Limestone		
														42.4	ыаск	Limestone		



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
														0.3		Topsoil		()
														6.1		Medium Sand	Gravel	
														13.7	Grey	Clay	Gravel	
														18.3	-	Clay	Stones	
6702406	561355.3	4818216	1962	101.6	43.6	Cable Tool	Water Supply	Domestic	Fresh	43	43.59	7.6	22.7	20.7		Gravel	Stones	
														22.9		Medium Sand		
														41.1	Brown	Limestone		
														43.3	Grey	Limestone		
														43.6	Black	Limestone		
														13.7		Gravel	Medium Sand	
0700407	504440.0	4040000	4000	101.0	40.7				<b>F</b>	40.7	40.07	0.4	04.0	18.3	Grey	Clay	Stones	
6702407	561413.3	4818236	1962	101.6	42.7	Cable Tool	Water Supply	Domestic	Fresh	42.7	42.67	6.1	31.8	41.1	Brown	Limestone		
														42.7	Black	Limestone		
														6.1		Previously Dug		
6702408	561299.3	4818069	1962	152.4	31.4	Cable Tool	Water Supply	Domestic	Fresh	29	31.39	9.8	90.9	21.3		Clay	Medium Sand	
														31.4		Limestone		
														6.1		Gravel		
6703289	560694.3	4818313	1968	101.6	22.9	Cable Tool	Water Supply	Domestic	Fresh	15.2	22.86	8.2	68.2	10.7		Medium Sand		
														22.9	Brown	Limestone		
0702504	560704.0	4040070	1000	101.0	45.0		Mater Cumply	Demestic	Freeb	474	47.07	7.0		9.8		Gravel	Medium Sand	1
6703584	560704.3	4818373	1969	101.6	15.2	Cable 100	Water Supply	Domestic	Fresh	17.1	17.07	7.9	45.5	17.1		Limestone		
0745454	560000	4040050	2004	50.0	70.0	Other	Observation				70.05			10.7	Brown	Silt	Clay	Till
6715151	560932	4818353	2004	50.8	76.2	Method	Wells	-	-	-	79.25	-	-	79.2	Red	Rock		1
														0.2	Black	Topsoil		1
														1.8	Brown	Gravel	Clay	
														5.5	Brown	Sand	Clay	Gravel
						Deter								6.7	Brown	Clay		
6715259	561360	4818047	2004	1500	20	Rotary (Convent.)	-	Not Used	-	-	19.5	-	-	7.9	Brown	Gravel		
						(Convent.)								8.2	Red	Clay	Gravel	1
														10.7	Grey	Clay	Gravel	Boulders
														15.5	Grey	Clay	Stones	
														19.5	Grey	Silt	Clay	Gravel
							Observation							0.2	Black			
6715306	561461	4818271	2005	50	7.6	Boring	Wells	-	-	10.6	13.6	-	-	4.5	Brown	Sand		
							VV CIIS							13.6	Brown	Sand		1
							Observation							8	Brown	Silt	Gravel	
6715372	561437	4818306	2005	51	7.5	Boring	Wells	-	-	10.5	13.68	-	-	10.1	Brown	Silt	Coarse Gravel	
							VV CIIS							13.7	Brown	Silt	Coarse Gravel	
							Observation							4.5		Sand	Gravel	
6715793	561492	4818334	2006	51	6.1	Boring	Observation Wells	-	Fresh	9.7	12.1	-	-	9.7	Brown	Silt	Sand	Gravel
							VV CIIS							12.1	2	Silt	Sand	Gravel
							Observation							0.5	Brown	Sand	Gravel	
7118617	561453	4818292	2008	51	9.1	Boring	Wells	Monitoring	-	8	13.5	-	-			Sand		
							VV CIIS							13.5	Grey	Sand	Silt	I



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)		Material 1	Material 2	Material 3
										(					Brown	Sand	Gravel	Fill
7118618	561451	4818261	2008	51	8.2	Boring	Observation	Monitoring	-	9	13.6	-	-		Brown	Sand		1
						J	Wells							13.6	Brown	Sand	Silt	1
														1.5	Brown	Sand	Gravel	1
7118619	561431	4818290	2008	51	7.6	Boring	Observation	Monitoring	-	8	12	-	-	7.6	Brown	Sand		1
							Wells							12	Brown	Sand	Silt	
7118620	561388	4818232	2008	-	-	Boring	Abandoned- Supply	-	-	-	-	-	-					
7118621	561422	4818226	2008	-	-	Boring	Abandoned- Supply	-	-	-	-	-	-					
							Observation							0.5	Brown	Sand	Gravel	
7118622	561459	4818221	2008	51	15.1	Boring	Wells	Monitoring	-	14	16.1	-	-	12	Brown	Sand		
							vvens							16.1	Grey	Sand	Silt	
														1.5	Brown	Sand	Gravel	
7118623	561454	4818261	2008	51	13.2	Boring	Observation	Test Hole	-	7.5	13.2			6	Brown	Sand		
1110023	501454	4010201	2008	51	13.2	Bonng	Wells	Test Hole	-	7.5	13.2	-	-	10	Brown	Sand	Gravel	
														13.2	Grey	Sand	Silt	
														1.5	Brown	Sand	Gravel	
7110604	561360	4818320	2008	51	6	Boring	Observation	Monitoring			12			6	Brown	Sand		
7118624	501500	4010320	2008	51	0	Бонну	Wells	Monitoring	-	-	12	-	-	7.6	Brown	Sand	Gravel	
														12	Brown	Sand	Silt	
														1.5	Brown	Sand	Gravel	Fill
7110605	561400	1010050	2008	51	6	Poring	Observation	Monitoring	Untostad	0	10			3	Brown	Sand		
7118625	561402	4818258	2008	51	0	Boring	Wells	Monitoring	Uniesieu	8	12	-	-	7.6	Brown	Sand	Gravel	
														12	Brown	Sand	Silt	
7223568	561486	4818211	2014	-	-	-	-	-	-	-	-	-	-					
7232304	561203	4818347	2014	50.8	7.6	Rotary	Observation	Monitoring	-	5.5	9.14	-	-		Brown	Sand	Gravel	Dense
1202004	001200	4010047	2014	00.0	7.0	(Reverse)	Wells	Wormoning		0.0	0.14	_	_		Grey	Silt	Gravel	Dense
															Brown	Clay	Silt	Soft
7244083	561470	4818148	2015	51	4.5	Boring	Test Hole	Test Hole	Intested	6.9	7.6	_	-	5.4	Brown	Silt	Sand	Packed
1244000	501470	-0101-0	2013	51	4.0	Doning	103111010	restrict	Onicolcu	0.5	7.0	_			Brown	Sand	Silt	
														7.6	Brown	Sand		Dense
7249783	561474	4818312	2015	-	-	-	Abandoned- Other	-	-	-	-	-	-					
7249852	561466	4818503	2015	-	-	-	-	-	-	-	-	-	-					
7249891	561489	4818292	2015	-	-	-	-	-	-	-	-	-	-					
7251638	561488	4818300	2015	-	-	-	-	-	-	-	-	-	-					
7269451	561203	4818347	2016	-	-	-	Abandoned- Other	Monitoring	-	-	-	-	-					
7328109	561626	4818819	2018	50.8	4.3	Auger	Observation Wells	Monitoring	-	-	6.1	-	-	6.1	Brown	Sand	Gravel	
7404590		4818469	2021	-	-	-	-	-	-	-	-	-	-					
7405425	561512	4818610	2021	-	-	-	-	-	-	-	-	-	-					



#### Table 3: Hydraulic Conductivity Summary (m/sec)



In-Situ Hydraulic Conductivity						
Monitoring Well	Ground Surface Elevation	Screened Interval (m bgs/ m amsl)	Soil Description	Hydraulic Conductivity (m/sec)	Method	Calculation
MW101-23	326.70	9.9 - 11.4 316.8 - 315.3	Gravelly Silty SAND, some Clay	9.9 X 10 <sup>-7</sup>	Recovery	Bouwer & Rice
MW111-23	327.70	5.7 - 7.2 322.0 - 320.5	SILT, some Clay, trace Sand	8.4 X 10 <sup>-7</sup>	Rising Head	Bouwer & Rice

Particle Size Distribution						
Monitoring Well / Borehole Name	Ground Surface Elevation	Sample Identification and Depth (m bgs)	Screened Interval (m bgs/ m amsl)	Soil Description	Hydraulic Conductivity Range (m/sec)	Formula
MW101-23	326.70	SS-11 10.7-11.1	9.9 - 11.4 316.8 - 315.3	Gravelly Silty SAND, some Clay	3.0 x 10 <sup>-9</sup>	Kozeny Carmen
MW108-23	328.50	SS-8 9.1- 9.8	9.7 - 11.2 318.8 - 317.3	SILT, some Clay, trace Sand	1.5 x 10 <sup>-9</sup>	Kozeny Carmen
MW111-23	327.70	SS-5 3.0-3.7	5.7 - 7.2 322.0 - 320.5	SILT, some Clay and Gravel, trace Sand	1.6 x 10 <sup>-9</sup>	Kozeny Carmen
MW111-23	327.70	SS-9 7.6-8.2	5.7 - 7.2 322.0 - 320.5	SILT, some Clay, trace Sand	3.7 x 10 <sup>-9</sup>	Kozeny Carmen
BH115-23	333.70	SS-3 1.5-2.1	NA	Gravelly Silty SAND, trace Clay	1.2 x 10 <sup>-8</sup>	Kozeny Carmen

Notes: In-Situ testing not completed at MW108-23 due to lack of water

#### **Table 4: Groundwater Quality Summary** City of Guelph Sewer Use By-Law



	Client San	nple ID			MW101-23	MW108-23
Date Sampled					23-Mar-2023	23-Mar-2023
ALS Sample ID				WT2307174-001	WT2307174-002	
Parameter	Detection Limit	City of Guelph	Guelph Sewer Use Limit Units		Water	Water
		Sanitary	Storm			
		Physical T	ests			L.
pH	0.10	5.5-9.5	6.0-9.0	pH units	7.78	7.71
Total Suspended Solids	2.0	350	15	mg/L	738	12500
· · · ·		Anions and N	utrients			-
Chloride (CI)	0.50	1500	-	mg/L	193	404
Fluoride (F)	0.020	10	-	mg/L	<0.100	<0.100
Total Kjeldahl Nitrogen	0.15	100	-	mg/L	0.422	0.646
Phosphorus, Total	0.0030	10	-	mg/L	0.141	1.24
Sulfate (SO <sub>4</sub> )	0.30	1500	-	mg/L	16.9	41.6
		Bacteriologic	al Tests			
Fecal Coliforms	0	-	200	CFU/100mL	0	0
		Cyanide				£
Cyanide, Total	0.002	2	-	mg/L	< 0.0020	< 0.0020
		Total Met	als	2		8
Aluminum (Al)-Total	0.010	50	-	mg/L	2.93	47.9
Antimony (Sb)-Total	0.00010	5	-	mg/L	< 0.0010	< 0.0010
Arsenic (As)-Total	0.00010	1	-	mg/L	0.00156	0.0216
Bismuth (Bi)-Total	0.000050	5	-	mg/L	< 0.0005	0.000532
Cadmium (Cd)-Total	0.000010	1	0.001	mg/L	0.000208	0.000892
Chromium (Cr)-Total	0.00050	5	0.2	mg/L	0.00567	0.084
Cobalt (Co)-Total	0.00010	5	-	mg/L	0.0022	0.0468
Copper (Cu)-Total	0.0010	3	0.01	mg/L	0.0122	0.118
Iron (Fe)-Total	0.050	50	-	mg/L	4.58	94.4
Lead (Pb)-Total	0.00010	5	0.05	mg/L	0.00826	0.0731
Manganese (Mn)-Total	0.00050	5	-	mg/L	0.159	4.93
Mercury (Hg)- Total	<0.000010	0.1	0.001	mg/L	<0.000005	0.0000061
Molybdenum (Mo)-Total	0.000050	5	-	mg/L	<0.0005	0.00108
Nickel (Ni)-Total	0.00050	3	0.05	mg/L	0.00749	0.111
Selenium (Se)-Total	0.00050	5	-	mg/L	< 0.0005	0.000512
Silver (Ag)-Total	0.00050	5	-	mg/L	< 0.0010	0.000228
Tin (Sn)-Total	0.00010	5	-	mg/L	0.00298	0.00389
Titanium (Ti)-Total	0.00050	5	-	mg/L	0.107	1.66
Vanadium (V)-Total	0.00050	5	-	mg/L	0.00648	0.109
Zinc (Zn)-Total	0.0030	÷	0.05	mg/L	0.0836	0.368
BOD Cost	0.0	Aggregate O	-	ж <i>И</i>	-0.0	-5.0
BOD Carbonaceous	3.0	300	15	mg/L	<3.0	<5.0
Oil and Grease, Total	5.0	-	-	mg/L	<5.0	<5.0
Animal/Veg Oil & Grease	5.0	100	-	mg/L	<5.0	<5.0
Mineral Oil and Grease	2.5	15	-	mg/L	<5.0	<5.0
Phenols (4AAP)	0.0010	1	-	mg/L	< 0.0050	< 0.0050

Notes:

Results highlighted yellow and **bold** exceed City of Guelph Sanitary Sewer Use By-Law (1996)
 Results highlighted blue and **bold** exceed City of Guelph Storm Sewer Use By-Law (1996)

3. Cells highlighted in grey indicate parameter was not analyzed



# Site Concept Plan





# **ALMA GUELPH - PHASE 2**

601 SCOTTSDALE DR, GUELPH, ON, CANADA

23-09-15 11:46:50 AM

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PROJ. NAME ALMA GUELPH Phase 2 601 Scottsdale Dr Guelph, ON

owner **Forum** 

DWG TITLE Cover Page

 DATE:
 08/24/23

 SCALE :
 NTS

 DRAWN :
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 JG/AJH

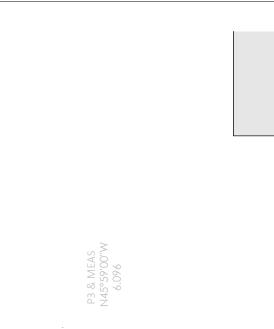
 PROJ. No. :
 2305

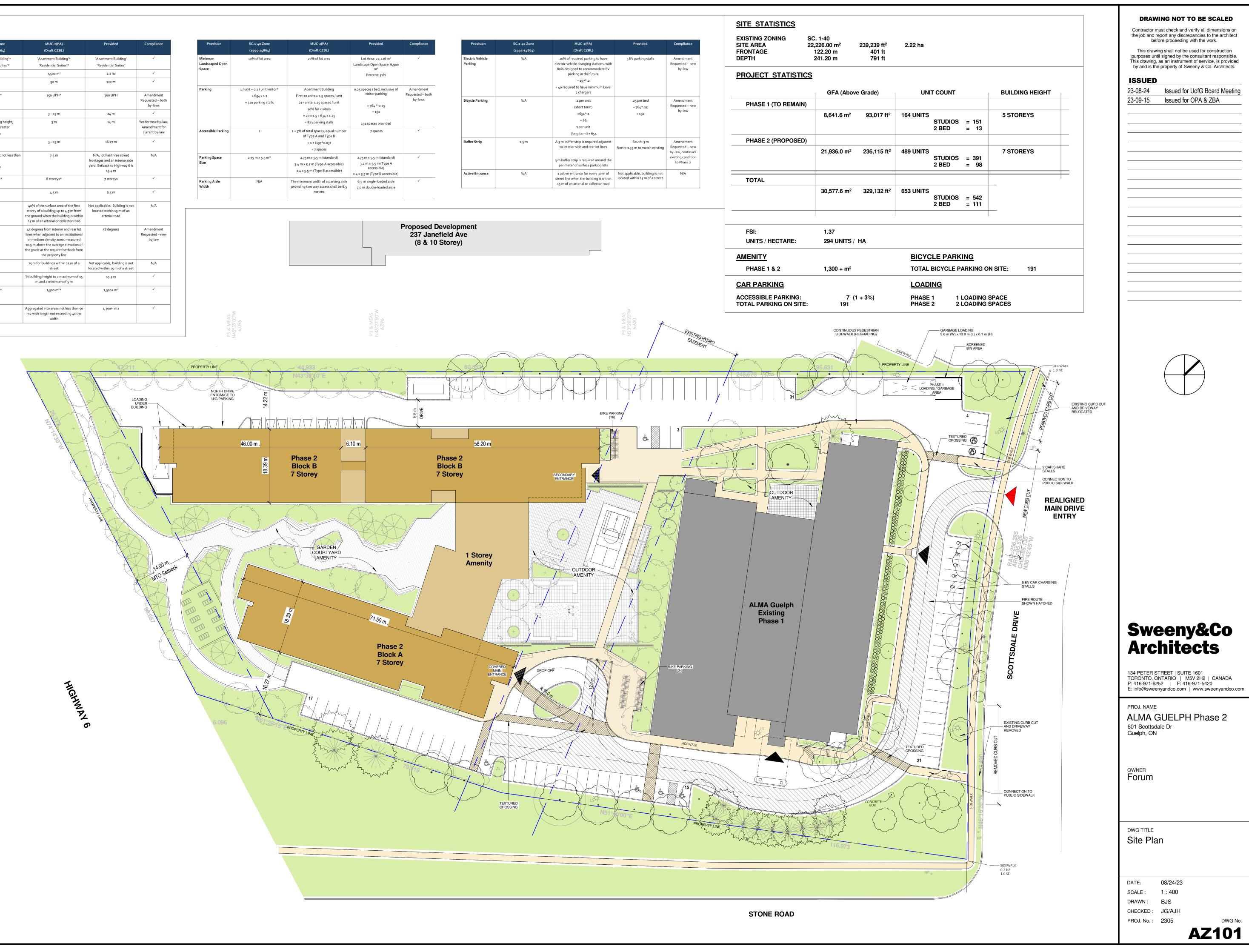


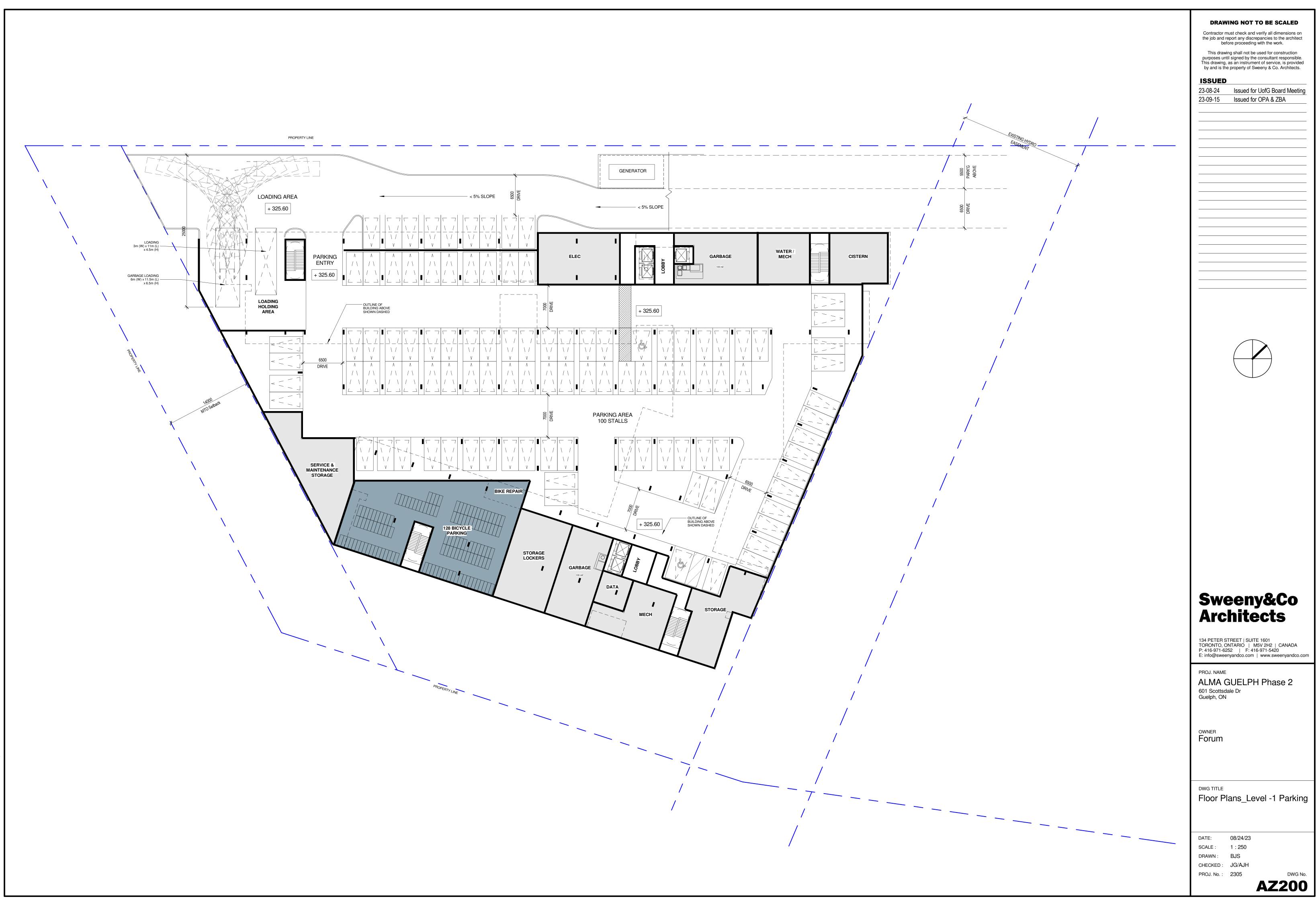
# **ZONING MATRIX**

Provision	SC.1-40 Zone	MUC-2(PA)	Provided	Compliance
	(1995-14864)	(Draft CZBL)		
Permitted Uses	'Apartment Building'*	'Apartment Building'*	'Apartment Building'	~
	'Residential Suites'*	idential Suites'* 'Residential Suites'* 'Residential Suites'		
Minimum Lot Area	N/A	7,500 m²	2.2 ha	~
Minimum Lot Frontage	30 m	50 M	122 M	1
Maximum Density	150 UPH*	150 UPH*	300 UPH	Amendment Requested – both by-laws
Front Yard	6 m	3 – 13 m	24 M	~
Minimum Interior Side Yard	55,		14 M	Yes for new by-law Amendment for current by-law
Minimum Exterior Side Yard	6 m	3 – 13 m	16.27 m	~
Minimum Rear Yard	1⁄2 building height but not less than 6 m = 14.5 m	7.5 M	N/A, lot has three street frontages and an interior side yard. Setback to Highway 6 is 15.4 m	N/A
Maximum Building Height	8 storeys*	8 storeys*	7 storeys	~
Minimum First Storey Height	N/A	4.5 m	6.5 m	~
First Storey Transparency	N/A	40% of the surface area of the first storey of a building up to 4.5 m from the ground when the building is within 15 m of an arterial or collector road	Not applicable. Building is not located within 15 m of an arterial road	N/A
Angular Plane	N/A	45 degrees from interior and rear lot lines when adjacent to an institutional or medium density zone, measured 10.5 m above the average elevation of the grade at the required setback from the property line	58 degrees	Amendment Requested – new by-law
Maximum Building Length	N/A	75 m for buildings within 15 m of a street	Not applicable, building is not located within 15 m of a street	N/A
Minimum Distance Between Buildings	N/A	½ building height to a maximum of 15 m and a minimum of 5 m	15.3 M	~
Minimum Common Amenity Area	1,300 m²*	1,300 m²*	1,300+ m²	~
Minimum Common Amenity Area Location	N/A	Aggregated into areas not less than 50 m2 with length not exceeding 4x the width	1,300+ m2	~

Provision	SC.1-40 Zone (1995-14864)	M (E
Minimum Landscaped Open Space	10% of lot area	20
Parking	1/unit + 0.1/unit visitor*	Apar
	= 654 × 1.1	First 20 un
	= 720 parking stalls	21+ units
		20
		= 20 ×
		= 82
Accessible Parking	2	1 + 3% of tota of Typ
		= 1
Parking Space	2.75 m x 5.5 m*	2.75 m
Size		3.4 m x 5.5
		2.4 x 5.5 m
Parking Aisle Width	N/A	The minimum providing two









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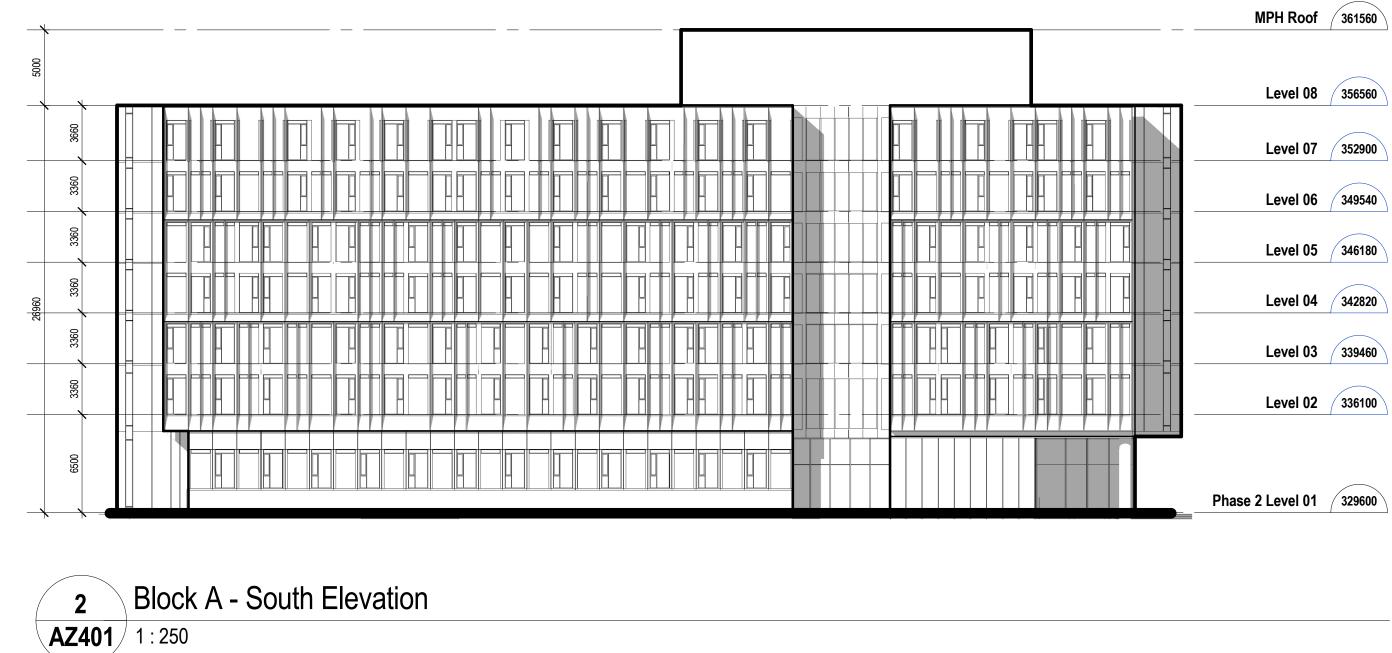


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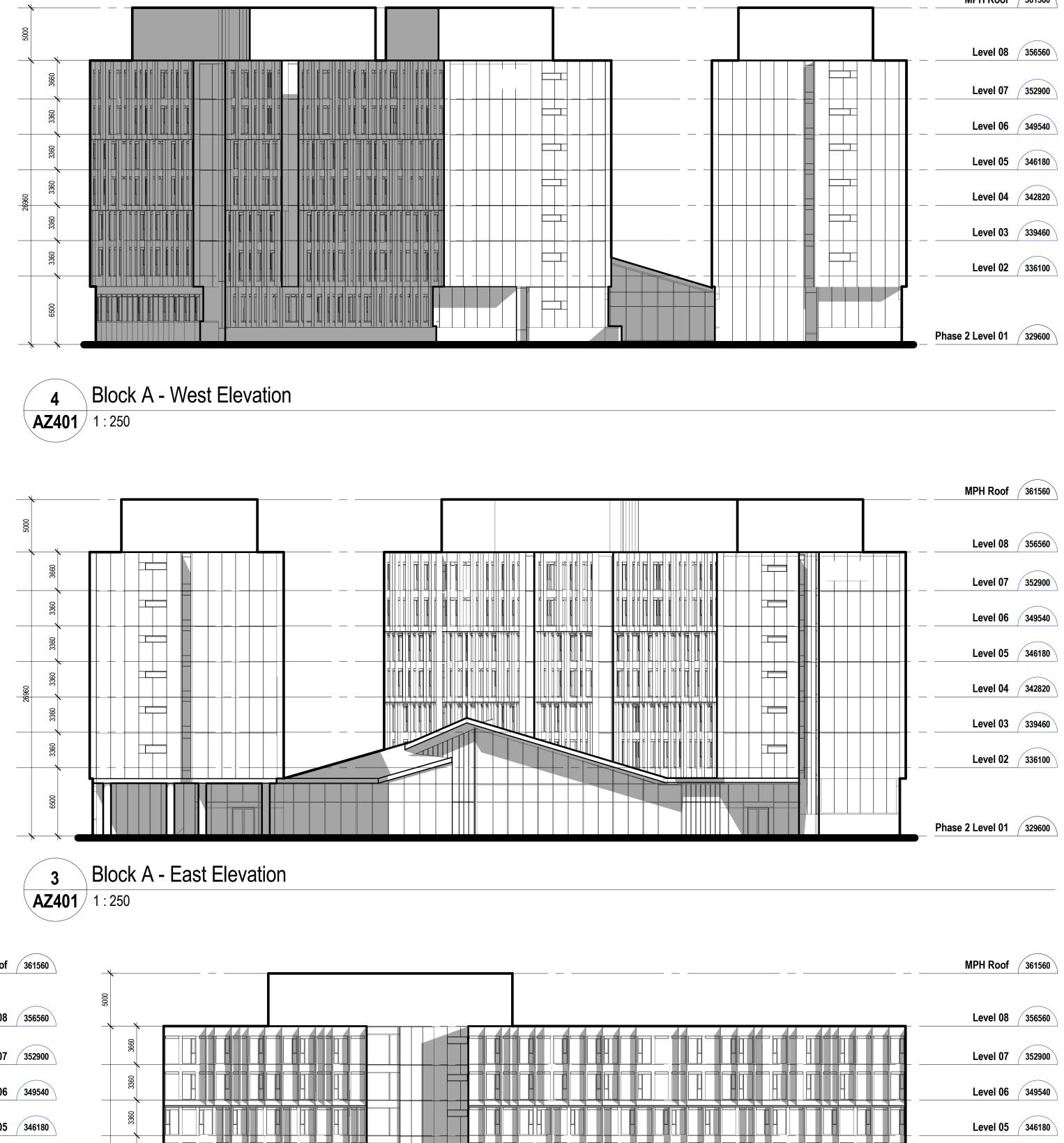


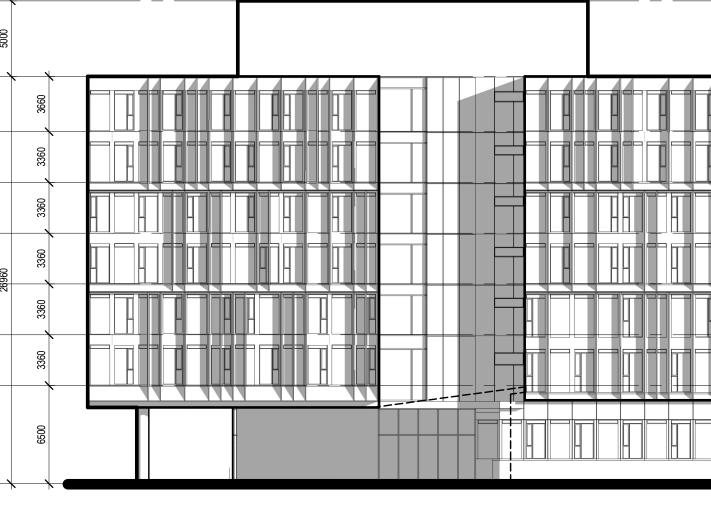
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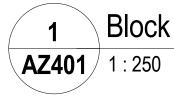
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Block A - North Elevation

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361560	MPH Roof			 						
356560	Level 08	_	 			 		,		
352900	Level 07									I
349540	Level 06									
346180	Level 05									
342820	Level 04									
339460	Level 03									
336100	Level 02									
329600	Phase 2 Level 01	<u> </u>	4U		1		<u> </u>	لــــــــــــــــــــــــــــــــــــــ	μ	μ]





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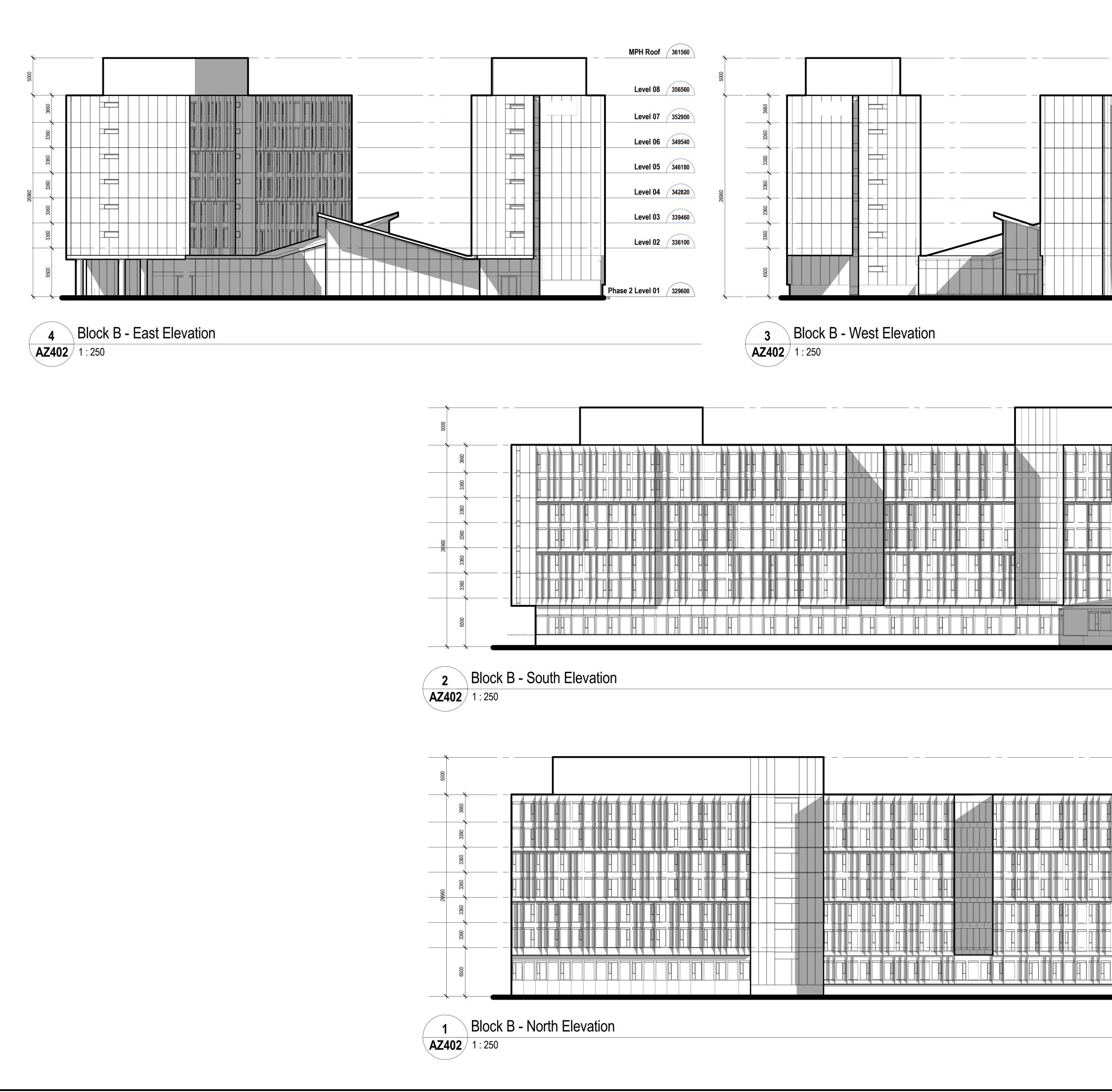
OWNER Forum

DWG TITLE Building Elevations\_Block A

YY-MM-DD DATE: SCALE : 1 : 250 Author DRAWN : CHECKED : Checker PROJ. No. : 2305

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Level 07	352900
Level 06	349540
Level 05	346180
Level 04	342820
Level 03	339460
Level 02	336100
Phase 2 Level 01	329600

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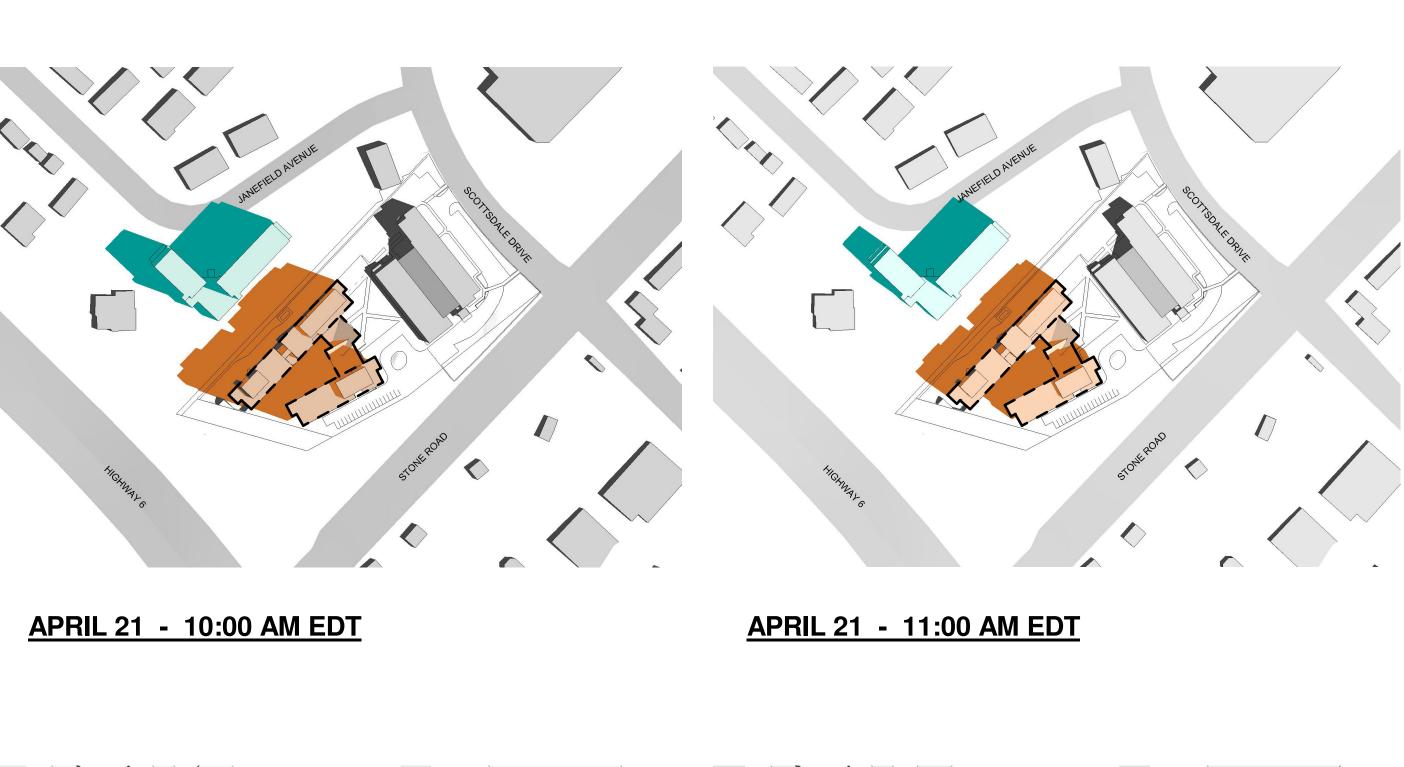
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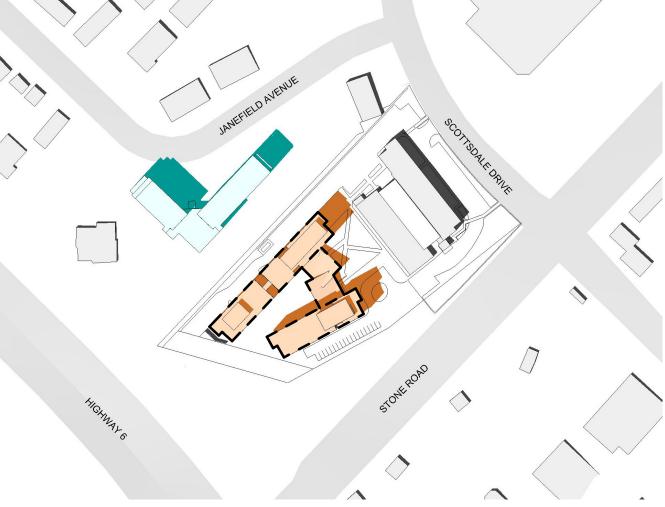
DWG TITLE Building Elevations\_Block B

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DWG No. AZ402



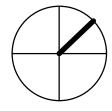




## APRIL 21 - 3:00 PM EDT

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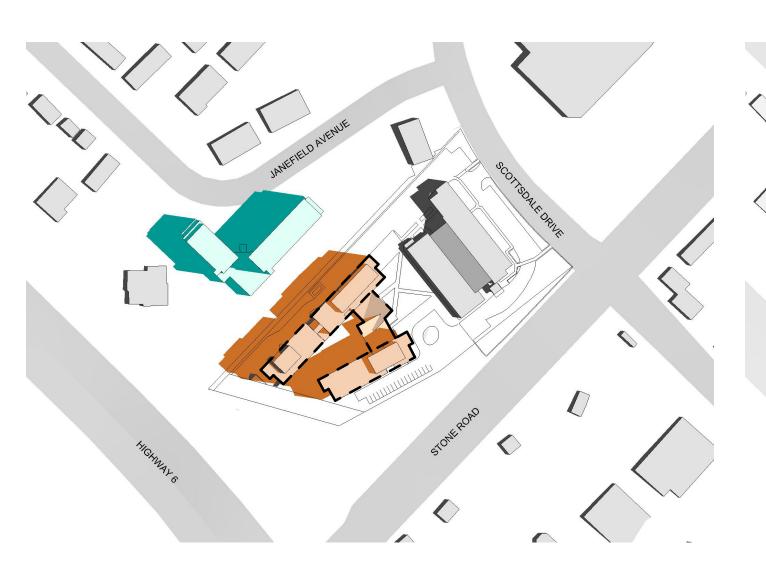
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DWG TITLE Shadow Studies April

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DWG No. AZ1101





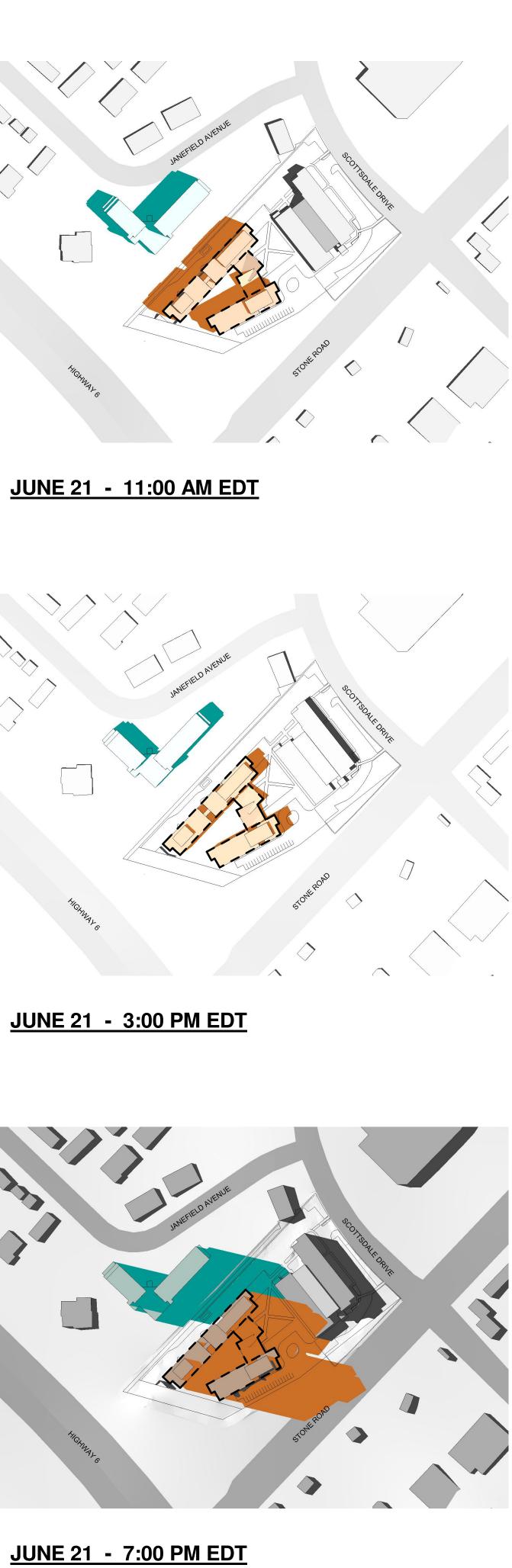
JUNE 21 - 10:00 AM EDT



## JUNE 21 - 2:00 PM EDT



JUNE 21 - 6:00 PM EDT



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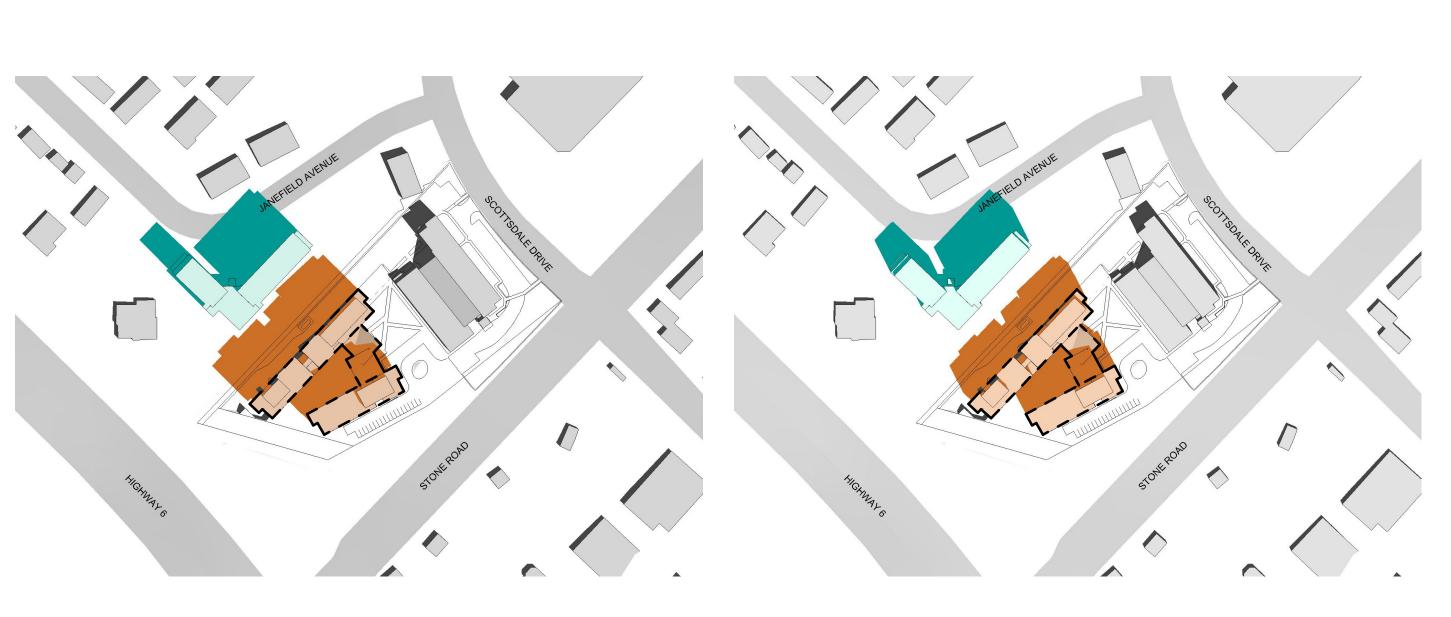
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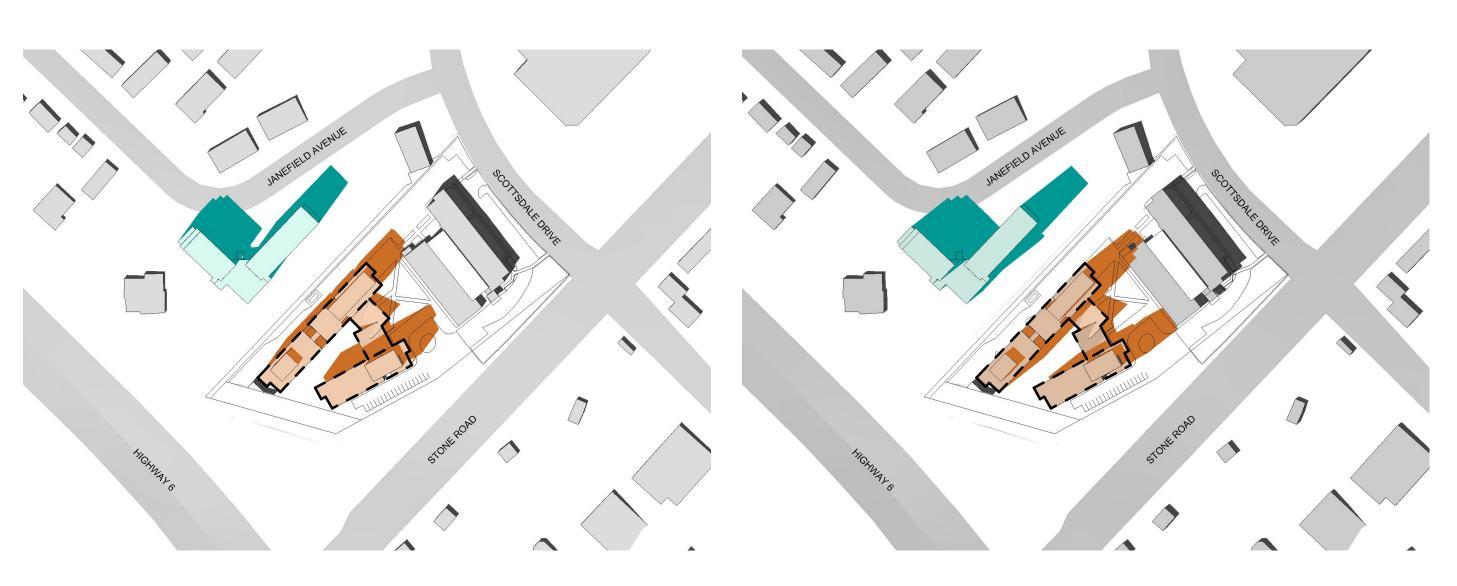
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SEPTEMBER 21 - 5:00 PM EDT



**SEPTEMBER 21 - 11:00 AM EDT** 



SEPTEMBER 21 - 3:00 PM EDT

### **SEPTEMBER 21 - 12:00 PM EDT**

## SEPTEMBER 21 - 4:00 PM EDT

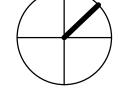
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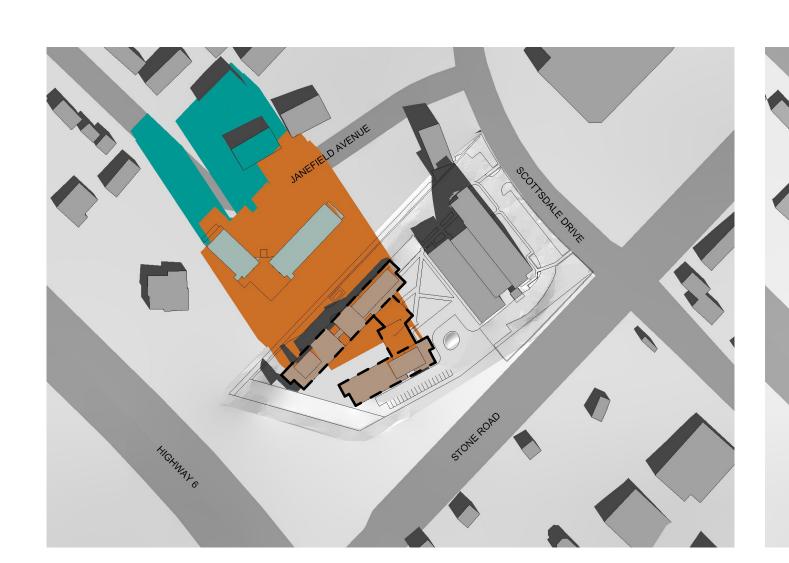
PROJ. NAME ALMA GUELPH Phase 2 601 Scottsdale Dr Guelph, ON

owner **Forum** 

DWG TITLE Shadow Studies September

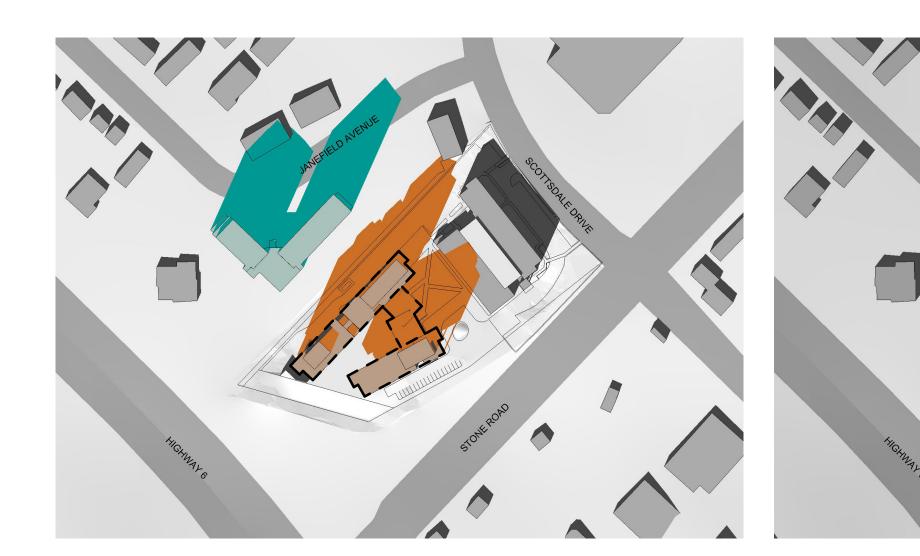
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DWG No. AZ1103



DECEMBER 21 - 10:00 AM EST

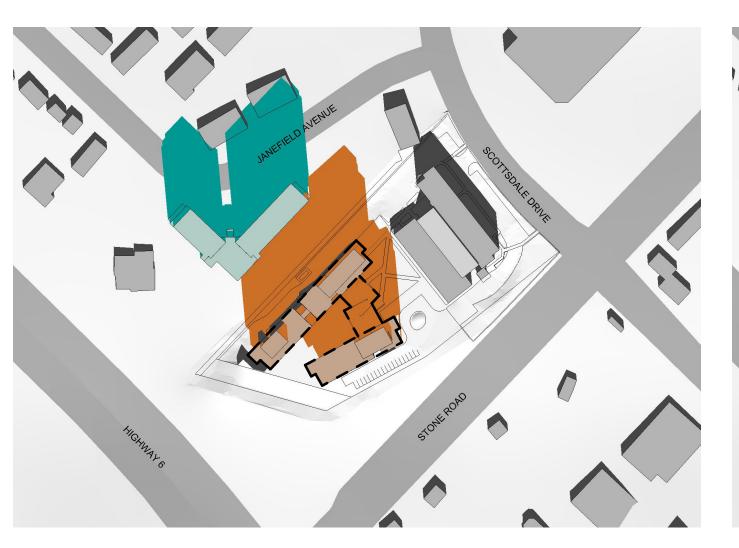
DECEMBER 21 - 11:00 AM EST



DECEMBER 21 - 2:00 PM EST

DECEMBER 21 - 3:00 PM EST





DECEMBER 21 - 12:00 PM EST



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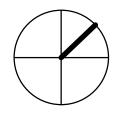
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## DECEMBER 21 - 1:00 PM EST





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owner **Forum** 

DWG TITLE Shadow Studies December

07/28/23 DATE: SCALE : DRAWN : Author CHECKED : Checker PROJ. No. : 2305

DWG No. **AZ1104** 



**Borehole Logs** 



#### ID No.: MW101-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 3/8/2023

Drilling Contractor: Direct Environmental Drilling

Drill Rig: Geoprobe 7822DT

Drill Method: Hollow Stem Augers

Protective Cover: Stickup

		Subsurface Profile		Sa	mple					
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	×	Standard Penetration	Shear Strength (PP)	<b>Water Content</b> % 10 20 30	Groundwater Observations and Standpipe Details
$0 \frac{\text{ft}}{1} \text{m}$	VVVV	Ground Surface	326.7						10	
		<b>FILL</b> very loose brown sandy silt (topsoil),		1	SS	4			_13	ete
		trace organics and rootlets, frozen	325.9 0.8	2	SS		15		10	Concrete
4		sand, some gravel, trace silt, occasional cobbles, very moist	325.2	2	33					U U
0 <sup>ft</sup> m0 2 <sup>th</sup> muhuhuhuhuhuhuhuhuhuhuhuhuhuhuhuhuhuhu		compact, moist	1.5	3	ss		18		<b>8</b>	
		some silt	324.4				<u> </u>			
		SAND compact brown sand, trace silt and	2.3	4	SS		>75		3	Bentonite
10		gravel, moist					16		2	Bent
		damp		5	SS					
				6	SS		25		4	
14			322.1		00		$\mathbf{h}$			
16		dense, some gravel, occasional	4.6	7	SS		39		<b>9</b>	
		cobbles, moist				_				
18-										
20 6		SANDY SILT	320.6 6.1				12		_21	51 mm PVC Riser
22		compact brown sandy silt, trace		8	SS	ł				SVC
		gravel and clay, saturated								E E
24			319.1							51 r
26 8		trace to some clay	7.6	9	SS		19		19	
30				10	SS		20		<b>1</b> 8	
32					00					
			316.0				21			Pacl
34 36		SILTY SAND compact brown gravelly silty sand,	10.7	11	SS	_			-9	Sand Pack
		some clay, saturated		<u> </u>			15		12	Slott
			314.8	12	SS					Sand Pack - Entrinition 51mm Slotted Screen
38 40 40		Drilling Terminated								511
			•					•		

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 6.1 mbgs (Elevation 320.6 masl) during drilling. Water measured at 9.8 mbgs (Elevation 316.9 masl) on March 22, 2023

#### ID No.: BH102-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

			Subsurface Profile		Sar	nple							
Depth		Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	×	Sta Pene	anda etrat	ion	Shear Strength (PP)	Water Content • % 10 20 30	Groundwater Observations and Standpipe Details
$0\frac{\text{ft}}{\pm}0$	>	xxx	Ground Surface FILL	327.3 0.0			2					>40	
2			loose dark brown sandy silt (topsoil), trace organics and rootlets, wet	326.5 0.8	1	SS SS	3	18				6	
4	Ş		compact brown gravelly sand, trace silt, numerous cobbles, moist	325.8		00		$\square$					
6 2			sandy silt, trace to some gravel, very moist	1.5 325.0	3	SS		14				_14	<ul> <li>Cuttings</li> </ul>
8			sand, some silt, trace to some gravel	2.3 324.3	4	SS		12				_13	
ft         m         0           0         1	4		SANDY SILT compact brown sandy silt, trace to some clay, moist to wet	3.0	5	SS		13				9 20	
14				322.7									Bentonite
	•		SAND dense brown sand, some gravel, trace silt, numerous cobbles, damp	4.6	6	SS		/	46			<b>3</b>	Dentonite
20 - 6				321.2									
22			SANDY SILT compact sandy silt, trace to some gravel, saturated, occasional gravelly sand seams	6.1	7	SS		/12				26	- Wet Cave
24												14	
26 8			SILT	319.5 7.8	8	SS		16				20	
28			compact brown silt, some sand, trace clay, saturated										
30			Drilling Terminated										
30 32 32 10													
34													
34 10 34 11 36 11 38 11 38 11 40 11 40 11	2												

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 6.1 mbgs (Elevation 321.2 masl) during drilling.

#### ID No.: BH103-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sa	mple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Dynamic Cone × × Standard Penetration 20 40 60 80	Shear Strength (PP)	Water Content • % • 10 20 30	Groundwater Observations and Standpipe Details
ft m		Ground Surface	327.2						
		FILL loose brown sandy silt (topsoil), trace organics and rootlets, frozen	0.0 <u>326.4</u> 0.8	1	SS	5		22	
4		compact brown gravelly sand, trace silt, occasional cobbles, moist	325.7	2	SS			-7	Cuttings
6 2		loose	1.5	3	SS	9		-7	← Cuttings
8				4	SS	10		<b>6</b>	
ft         m         0           2         2         4           6         8         10           12         14         14           14         16         18           20         22         24           20         22         24           20         22         24           20         28         28		SILTY SAND compact brown silty fine sand, trace gravel and clay, very moist	324.2 3.0	5	SS	13		<b>1</b> 4	
14			322.6						Dentenite
		SAND very dense brown sand, some gravel, trace silt, numerous cobbles, damp	4.6	6	SS	74		<b>3</b>	Bentonite
			321.1						
		SANDY SILT compact brown sandy silt, trace to some clay, saturated	6.1	7	SS	12		28	
24				8	SS	17		19	- Wet Cave
26 - 8				0	33				
30			<u>318.1</u> 9.1			15		25	
30 31 32 10		grey Drilling Terminated	9.1 317.6 9.6	9	SS			25	
34 10		-							
36									
34 34 36 38 38 38 40 12									

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 6.1 mbgs (Elevation 321.1 masl) during drilling.

#### ID No.: BH104-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sa	mple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Dynamic Cone × × Standard Penetration 20 40 60 80	Shear Strength (PP)	Water Content • % • 10 20 30	Groundwater Observations and Standpipe Details
ft m		Ground Surface	327.0						
$ \begin{array}{c} \frac{m}{4} \\ 0 \\ 2 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$		FILL loose dark brown sandy silt (topsoil), trace organics, wet sandy silt, trace gravel	0.0 <u>326.2</u> 0.8 325.5	2	SS SS	8		21 28	
		SANDY SILT	1.5	3	ss	20		<b>1</b> 3	Cuttings
2		compact brown sandy silt, trace gravel, very moist	324.7			_/			
8	•	loose, occasional saturated sand	2.3	4	SS	1 /9		<b>1</b> 9	
		seams, wet	324.0						
		compact	3.0	5	SS	13		20	
12 4 14									
		GRAVELLY SAND	322.4	6	ss	20		2	Bentonite
	, • , • , • ,	compact brown gravelly sand, some silt, occasional cobbles, wet		0	33				
20 = 6	<u>.</u>		320.9			12		22	✓ Wet Cave
22111 22111 24111		SANDY SILT compact brown sandy silt, trace gravel, saturated	0.1	7	SS				
26 8				8	SS	18		_22	
28									
30		trace clay	317.9 9.1 317.4		SS	13		<b>1</b> 8	
32 - 10		Drilling Terminated	9.6						
34 34 36 38 38 38 40 12									

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 6.1 mbgs (Elevation 320.9 masl) during drilling.

#### ID No.: BH105-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

tag     Soil Description     Image: Second s	er Content % 20 30 Groundwater Observations and Standpipe Details
t     o     t     t     Penetration     Shear Strength (FV)     Wat       t <th></th>	
Ground Surface 326.4	
0       film       Ground Surface       326.4         2       FilL       loose dark brown sandy silt (topsoil), trace organics and rootlets, wet       0.0         4       SiLTY SAND       loose brown silty sand, trace gravel, moist to wet       0.8       2       SS         6       -       2	•17
SILTY SAND	
4     Ioose brown silty sand, trace gravel, moist to wet       6     2	19 Cuttings
324.1	
8 compact, damp 2.3 4 SS 14 2 SAND 2.3 4 SS 14	
10 10 23 23 23	
gravel, damp	
321.8	
16 SILTY SAND 4.6 6 SS 31 4	Bentonite
dense brown silty sand, trace gravel, damp	
20 = 6 $320.3$ $8$ $8$	25 Wet Cave
SANDY SILT loose to compact brown sandy silt,	
<sup>22</sup> trace gravel, saturated	
26 8 318.3 8 SS 18	_22
Drilling Terminated	
34 🛓	

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 6.1 mbgs (Elevation 320.3 masl) during drilling.

#### ID No.: BH106-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sai	nple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Dynamic Cone × × × Standard Penetration 20 40 60 80	Shear Strength (PP)	Water Content • % • 10 20 30	Groundwater Observations and Standpipe Details
$\int_{0}^{\text{ft}} m$		Ground Surface	327.5						
		FILL loose dark brown sandy silt (topsoil), trace organics, wet	0.0	1	SS SS	6		17 19	
4			226.0		55	T		•	
		compact, occasional cobbles and rootlets	326.0 1.5 325.2	3	SS	12		<b>1</b> 5	← Cuttings
8		SILTY SAND compact brown silty sand, very moist	2.3	4	SS	20		<b>1</b> 5	
10		SANDY SILT	324.5 3.0	5	SS	14		18	
		compact brown sandy silt, wet, occasional saturated sand seams			00				
			322.9						- Bentonite
ft         m         0           0         2         2           4         10         2           8         10         12           12         14         14           16         18         2           20         18         10		trace gravel, saturated	4.6	6	SS	18		<b>8</b>	
20 6				7	SS	16		21	- Wet Cave
22 24 24 24 24 26 8					33				
24								00	
26 8			319.4 8.1	8	SS	14		_23	
28		Drilling Terminated	0.1						
30									
32 10									
34									
36									
38									
38 40 40									

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 4.6 mbgs (Elevation 322.9 masl) during drilling.

#### ID No.: BH107-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sai	mple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number Type		Dynamic Cone Standard Penetration 20 40 60 80	<ul> <li>▲ kPa ▲</li> <li>Shear Strength (FV)</li> </ul>		Groundwater Observations and Standpipe Details
$\begin{array}{c} \mathbf{a} \\ 0 \\ \hline 1 \\ 0 \\ \hline 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$		Ground Surface FILL loose brown sandy silt (topsoil), trace organics, very moist SANDY SILT compact brown sandy silt, trace gravel, occasional cobbles, moist GRAVELLY SAND compact brown gravelly sand, some silt, damp SANDY SILT dense brown sandy silt, some gravel, occasional cobbles, moist  Compact, trace gravel and clay, saturated Drilling Terminated	<b>ū č</b> <u>327.0</u> 0.0 <u>326.2</u> 0.8 <u>325.5</u> 1.5 <u>320.9</u> 6.1 <u>319.4</u> 7.6 <u>319.4</u> 9.6	1       2       3       4       5       6       7       8       9	▲			10 20 30 14 10 10 14 10 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4	Cuttings  Bentonite  Wet Cave

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 7.6 mbgs (Elevation 319.4 masl) during drilling.

#### ID No.: MW108-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 3/8/2023

Drilling Contractor: London Soil Test

Drill Rig: Geoprobe 7822DT

Drill Method: Hollow Stem Augers

Protective Cover: Stickup

		Subsurface Profile		Sai	nple																
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Number Type		Number Type		Number Type		Sta Pen	anda etra	Cone ard tion	Shea	kPa <b>r Stre</b> i kPa	ngth (FV)	Wa •	ater Co % 0 20	•	0	roundwater bservations d Standpipe Details
ft m		Ground Surface	328.5																		
0 ft 0 2 1 1 1 1 1 1 1 1 1 1 1 1 1		FILL loose dark brown sandy silt (topsoil), trace organics and rootlets, frozen	0.0	1	SS	•	7								23	Concrete					
4		SILTY SAND	0.8	2	SS		122							17 •		Ö					
	<u></u>	compact brown to grey silty sand, trace gravel, frozen	<u>327.0</u> 1.5		SS		20						4								
		SAND compact brown sand, some gravel,		3	55		Ī														
8		trace to some silt, occasional cobbles, damp	325.5													Bentonite <sup>–</sup>					
		SILTY SAND	3.0	4	ss		20						3			Bei					
12		compact to dense brown silty fine sand, trace to some gravel,				_	$\mathbf{h}$														
14 <b>4</b>		occasional cobbles, moist to wet																			
16				5	SS			40	6				-7								
18								/								-					
20 <b>1</b> 6				6	SS	-	24	1						11		-	Rise				
22				0	33												51 mm PVC Riser				
24 26 28 28 30 30 32 31 10			320.9											47			51 mi				
26 8		SILT compact brown silt, some clay, trace sand. wet	7.6	7	SS		2	9						<b>1</b> 7		-					
28																					
30		saturated	<u>319.4</u> 9.1	8	SS	4	14							2	1						
34			317.8			$\parallel$										ack					
34 36 38 38 40 40		loose to compact, grey	10.7	9	SS	I T	B								23	Sand Pack	51mm Slotted Screen				
38			316.8	10	SS		13								24		n Slot				
40 = 12		Drilling Terminated	11.7														51mn				

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 9.1 mbgs (Elevation 319.4 masl) during drilling. Water measured at 9.6 mbgs (Elevation 318.9 masl) on March 22, 2023

#### ID No.: BH109-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sar	nple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Dynamic Cone × × Standard Penetration 20 40 60 80	Shear Strength (PP)	<b>Water Content</b> % 10 20 30	Groundwater Observations and Standpipe Details
$\begin{array}{c} 0 \\ 1 \\ 0 \\ 2 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$		Ground Surface ASPHALT 75 mm GRANULAR FILL compact brown sand and gravel, some silt, moist gravelly sand, occasional cobbles FILL loose to compact dark brown sandy silt, wet GRAVELLY SAND compact brown gravelly sand, some silt, occasional cobbles, damp SILTY SAND compact brown silty sand, trace gravel, moist GRAVELLY SAND very dense brown gravelly sand, some silt, occasional cobbles, damp SANDY SILT compact brown sandy silt, trace to some gravel, saturated, occasional silty sand seams grey Drilling Terminated	328.0 0.0 327.2 0.8 325.7 2.3 325.0 3.0 323.4 4.6 321.9 6.1 320.4 7.6 318.4 9.6	1 2 3 4 5 5 6 7 7 8 8 9	SS SS SS SS SS SS SS				Cuttings     Bentonite     Wet Cave

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 6.1 mbgs (Elevation 321.9 masl) during drilling.

#### ID No.: BH110-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sar	nple					
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Dynamic Cor × Standard Penetration 20 40 60 8			Shear Strength (PP)	ear Strength (FV) kPa	
ft m		Ground Surface	328.0			T				
$ \begin{array}{c} \begin{array}{c} m \\ 0 \\ 2 \\ 4 \\ 6 \\ 8 \\ 10 \\ 12 \\ 14 \\ 16 \\ 18 \\ 20 \\ 22 \\ 24 \\ 26 \\ 28 \\ 30 \\ 32 \\ 34 \\ 36 \\ 38 \\ 40 \\ 10 \\ 12 \\ 14 \\ 16 \\ 18 \\ 20 \\ 22 \\ 24 \\ 26 \\ 28 \\ 30 \\ 32 \\ 33 \\ 32 \\ 34 \\ 36 \\ 38 \\ 38 \\ 40 \\ 11 \\ 12 \\ 14 \\ 16 \\ 18 \\ 20 \\ 22 \\ 24 \\ 26 \\ 28 \\ 30 \\ 32 \\ 33 \\ 33 \\ 33 \\ 36 \\ 38 \\ 38 \\ 40 \\ 11 \\ 12 \\ 12 \\ 12 \\ 12 \\ 12 \\ 12 \\ 1$		Ground Surface ASPHALT 75 mm GRANULAR FILL compact brown sand and gravel, some silt, moist gravely sand, occasional cobbles FILL loose dark brown sandy silt, trace gravel, wet SANDY SILT compact brown sandy silt, trace gravel, wet SILTY SAND compact brown silty sand, trace gravel, moist Drilling Terminated		1 2 3 4 5	SS SS SS SS SS					<ul> <li>Cuttings</li> <li>Dry Cave</li> </ul>
	Teel	hnician: HYS							1	

Field Technician: HXS

Drafted by: KRD



#### ID No.: MW111-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 3/8/2023

Drilling Contractor: Direct Environmental Drilling

Drill Rig: Geoprobe 7822DT

Drill Method: Hollow Stem Augers

Protective Cover: Stickup

		Subsurface Profile		Sa	mple				
Depth	Symbol	Soil Description Ground Surface 327.7		Number	Type	Dynamic Cone × × Standard Penetration 20 40 60 80	Shear Strength (PP)	<b>Water Content</b> % 10 20 30	Groundwater Observations and Standpipe Details
ft m		Ground Surface	327.7						
0 10 2 10 12 10 12 10 12 10 12 10 12 14 14 16 18 10 10 12 10 12 10 12 12 10 10 10 10 10 10 10 10 10 10		FILL loose dark brown sandy silt (topsoil), trace organics, frozen wet	0.0 <u>326.9</u> 0.8	1	SS SS	6		19 30	Concrete
		brown	325.9 1.8 325.4	3	SS	6		27	
	•	GRAVELLY SAND compact brown gravelly sand, some	2.3	4	SS	26		3	Bentonite
10	•	silt, occasional cobbles, damp	324.7 3.0			12		10	Bente
		SILT compact brown silt, some clay and gravel, trace sand, moist	0.0	5	SS	12		14	
14			202.4	6	SS				
		occasional silty sand seams, very moist	<u>323.1</u> 4.6	7	SS	20		<b>1</b> 3	
		some gravel, occasional cobbles saturated	321.6 6.1	- 8	SS	26		<b>1</b> 2	51 mm PVC Riser
24 26 26		some clay, trace sand	<u>320.1</u> 7.6	9	SS	14		25	
									Sand Pacl
			318.1	10	SS	20		21	Sand IIIIIIIIII 51mm Slotted Screen
32 - 10 34 - 10		Drilling Terminated	9.6						51mm
38 12 40 12									

Field Technician: HXS

Drafted by: KRD

Reviewed by: DG



Groundwater encountered at 6.1 mbgs (Elevation 321.6 masl) during drilling. Dry conditions measured on March 22, 2023

#### ID No.: BH112-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sai	mple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Dynamic Cone × Standard Penetration 20 40 60 80	Shear Strength (PP)	Water Content • % • 10 20 30	Groundwater Observations and Standpipe Details
ft m		Ground Surface	328.0						
0 10 10 10 10 10 10 10 10 10 1		Ground Surface ASPHALT 90 mm GRANULAR FILL compact brown sand and gravel, some silt, moist gravelly sand, occasional cobbles FILL loose brown to dark brown sandy silt, trace gravel, wet GRAVELLY SAND compact brown gravelly sand, some silt, occasional cobbles, moist Drilling Terminated		1 2 3 4 5	SS SS SS SS				<ul> <li>Cuttings</li> <li>Dry Cave</li> </ul>

Field Technician: HXS

Drafted by: KRD



#### ID No.: BH113-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sa	nple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Dynamic Cone × × Standard Penetration 20 40 60 80	Shear Strength (PP)	Water Content • % • 10 20 30	Groundwater Observations and Standpipe Details
ft m		Ground Surface	328.1						
6 10		Ground Surface ASPHALT 75 mm GRANULAR FILL compact brown sand and gravel, some silt, wet gravelly sand, occasional cobbles FILL compact to loose dark brown sandy silt, trace gravel, moist to very moist GRAVELLY SAND compact brown silty gravelly sand, occasional cobbles, mosit to very moist Drilling Terminated		1 2 3 4	SS SS SS SS				<ul> <li>Cuttings</li> <li>Dry Cave</li> </ul>
	Too	hnician: HXS							

Field Technician: HXS

Drafted by: KRD



#### ID No.: BH114-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

		Subsurface Profile		Sar	nple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Dynamic Cone × × Standard Penetration 20 40 60 80	Shear Strength (PP)	Water Content • % • 10 20 30	Groundwater Observations and Standpipe Details
ft m		Ground Surface	330.6						
m         0         2           0         2         4         6         8         10         12         14         16         18         20         22         24         26         28         30         32         34         36         38         40           12         14         16         18         20         22         24         26         28         30         32         34         36         38         40           12         12         14         16         18         20         22         24         26         28         30         32         34         36         38         40         12		ASPHALT 75 mm GRANULAR FILL compact brown sand and gravel, some silt, moist gravelly sand, occasional cobbles FILL loose dark brown sandy silt, trace gravel, wet SILTY SAND loose brown silty sand, trace gravel, moist SANDY SILT compact to dense brown sandy silt, trace gravel, occasional cobbles, moist Drilling Terminated	330.6 0.0 329.8 0.8 329.1 1.5 328.3 2.3 327.1 3.5	1 2 3 4 5	SS SS SS SS				<ul> <li>Cuttings</li> <li>Dry Cave</li> </ul>

Field Technician: HXS

Drafted by: KRD



#### ID No.: BH115-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

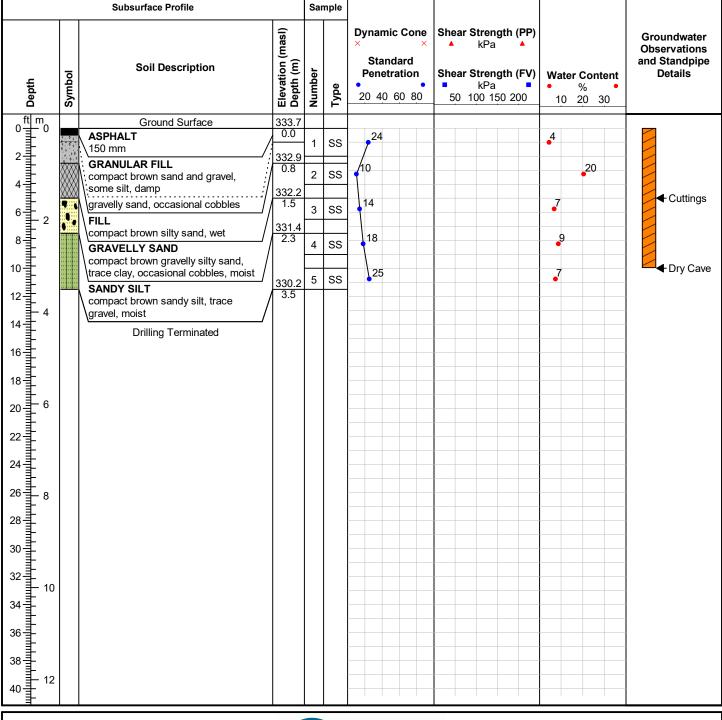
Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A



Field Technician: HXS

Drafted by: KRD



#### ID No.: BH116-23

Project Name: ALMA Guelph Phase 2

MTE File No.: 49791-200

Client: Forum 601 Scottsdale LP

Site Location: 601 Scottsdale Drive, Guelph, Ontario

Date Completed: 2/27/2023

Drilling Contractor: London Soil Test

Drill Rig: D50 Turbo

Drill Method: Hollow Stem Augers

Protective Cover: N/A

	Subsurface Profile			Sar	nple				
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Dynamic Cone × × Standard Penetration 20 40 60 80	Shear Strength (PP)	<b>Water Content</b> • % • 10 20 30	Groundwater Observations and Standpipe Details
ft m		Ground Surface	333.9						
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Ground Surface ASPHALT 190 mm GRANULAR FILL compact brown sand and gravel, some silt, moist FILL compact brown sandy silt, trace gravel, moist GRAVELLY SAND compact to dense brown gravelly sand, some silt, occasional cobbles, damp to moist Drilling Terminated	333.9 0.0 333.1 0.8 330.4 3.5	1 2 3 4 5	SS SS SS SS SS			9 4 4 4 4 4 4 4 4 4 4 4 4 4	Cuttings Dry Cave
					I		1		

Field Technician: HXS

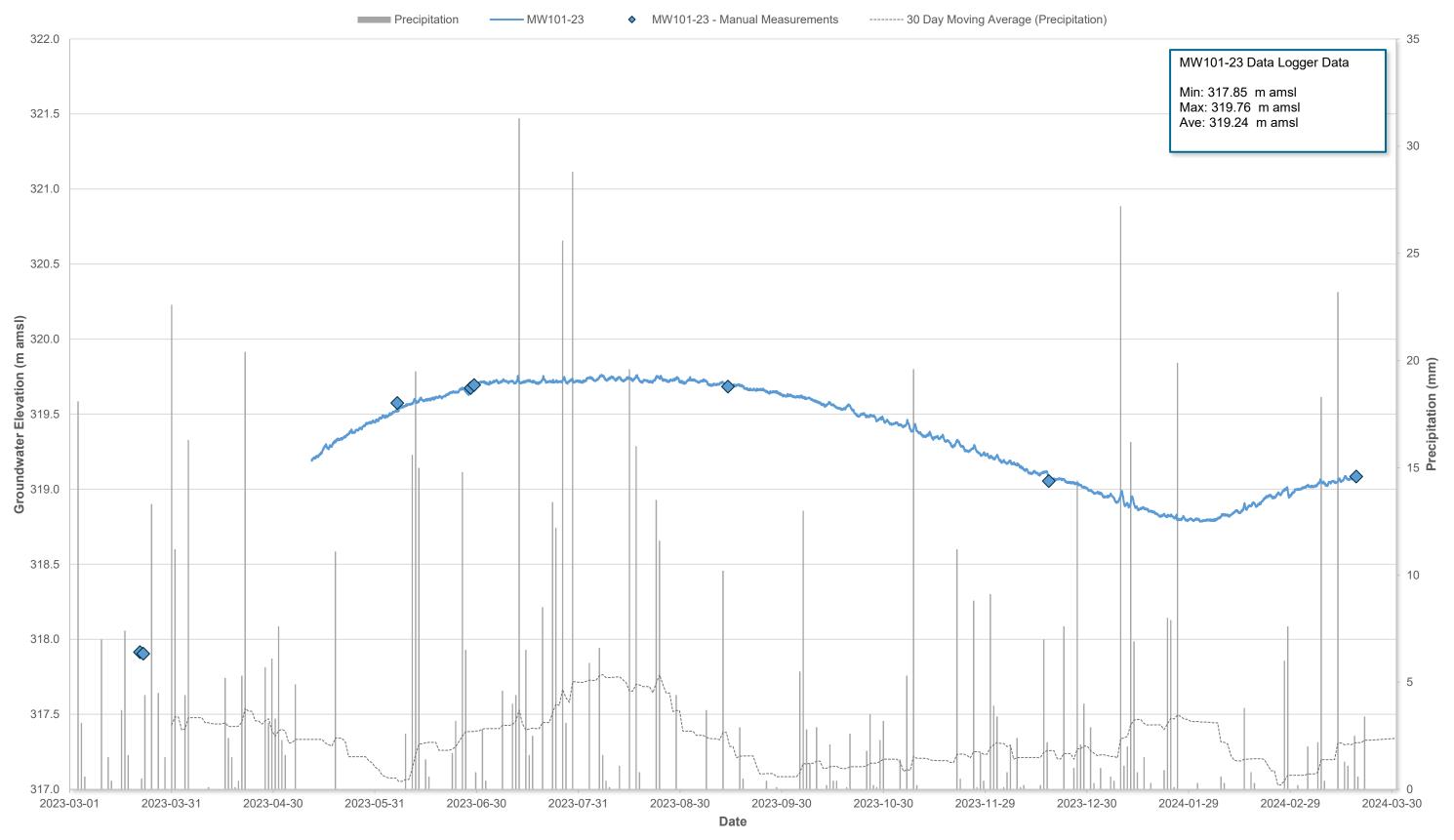
Drafted by: KRD





# Hydrographs



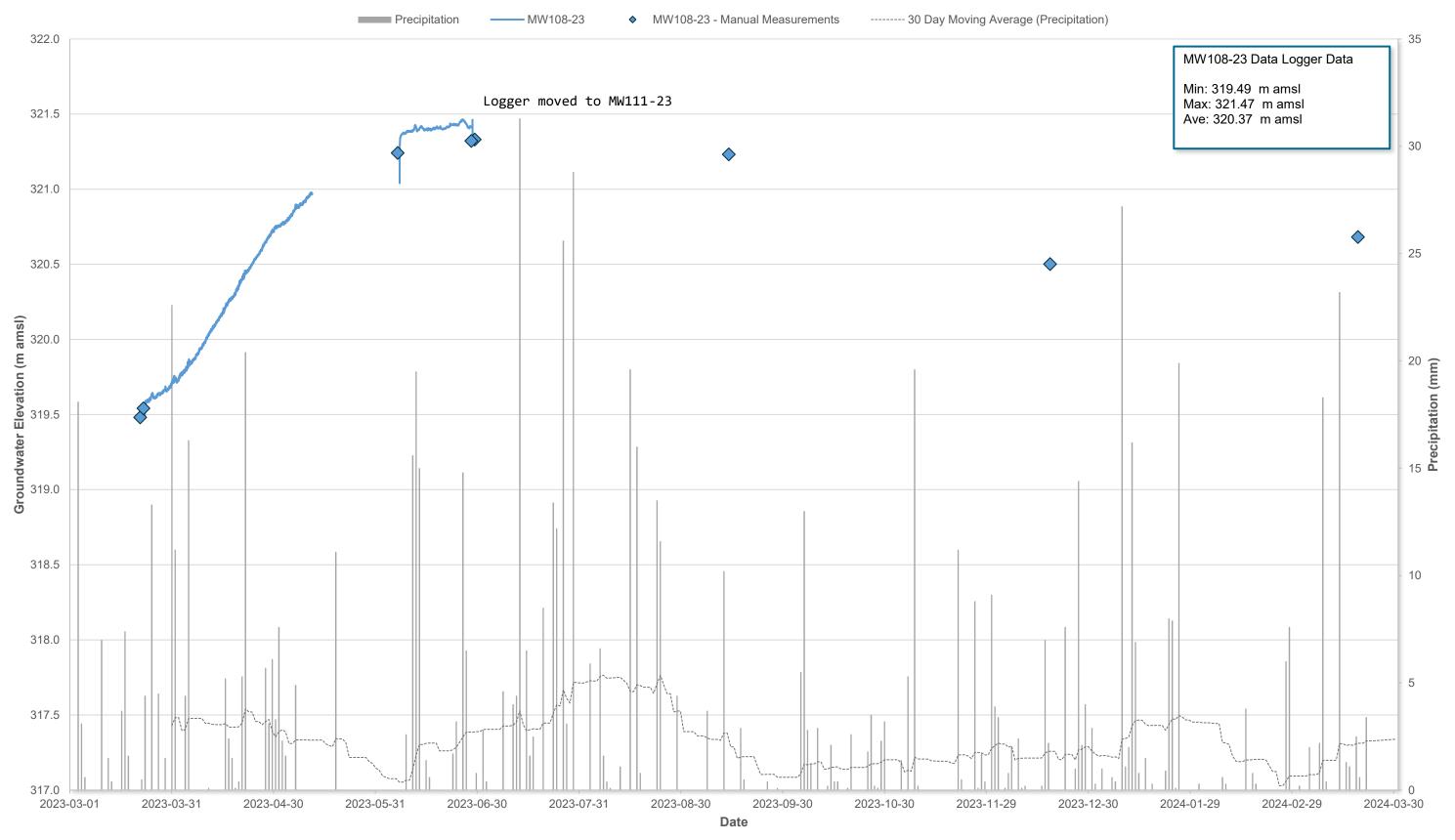


### Hydrograph 1: Groundwater Elevations (m amsl) - MW101-23

Preliminary Hydrogeological Assessment 601 Scottsdale Drive City of Guelph



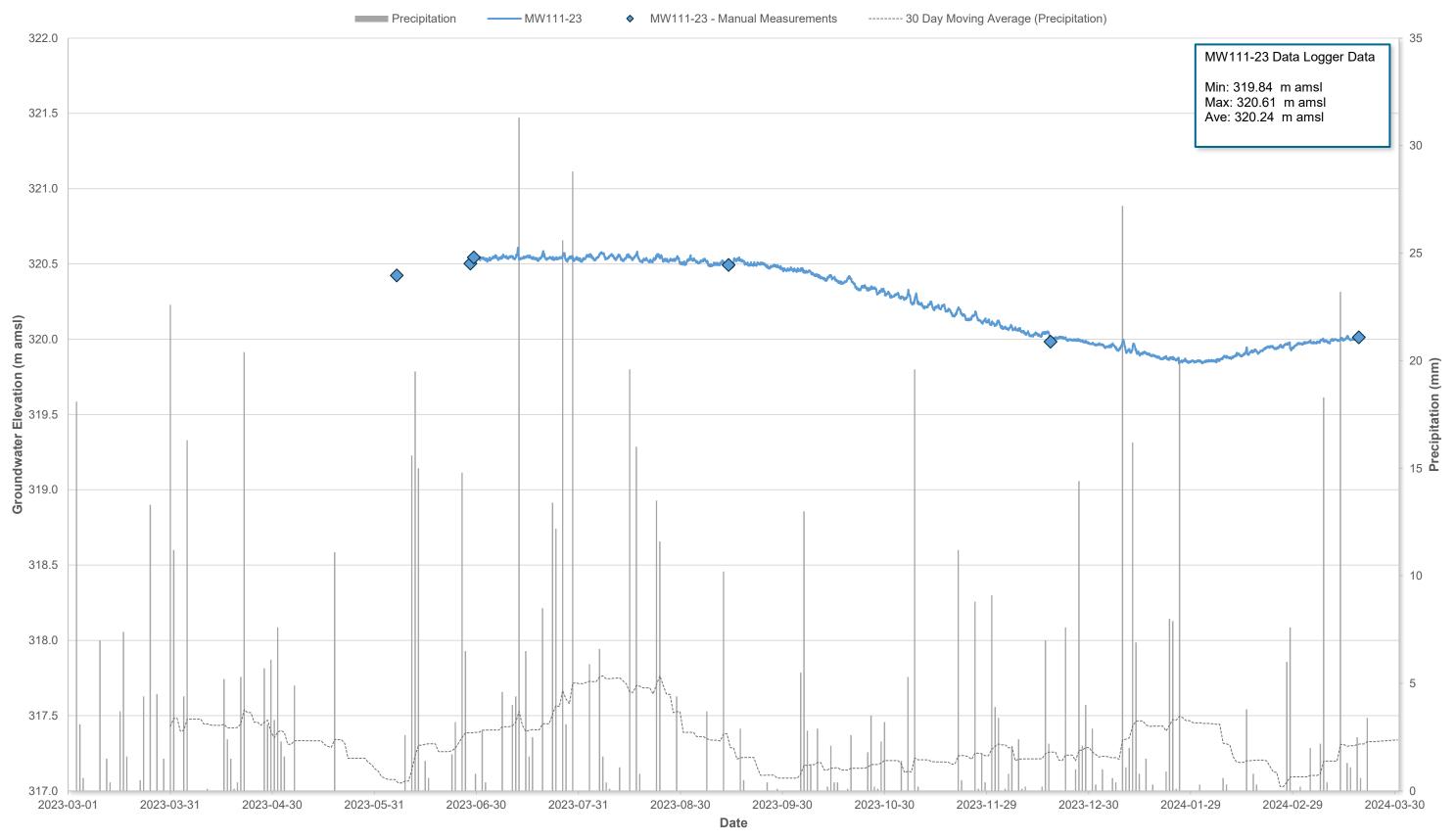
MTE File No: 49791-101 Printed On: 3/27/2024 Q:\49791\101\Hydrogeology\excel\_data\_model\results\49791\_101\_data\_logger\_data\_hydrographs\_folder\_selection\_v1.2.xlsm



### Hydrograph 2: Groundwater Elevations (m amsl) - MW108-23

Preliminary Hydrogeological Assessment 601 Scottsdale Drive City of Guelph





### Hydrograph 3: Groundwater Elevations (m amsl) - MW111-23

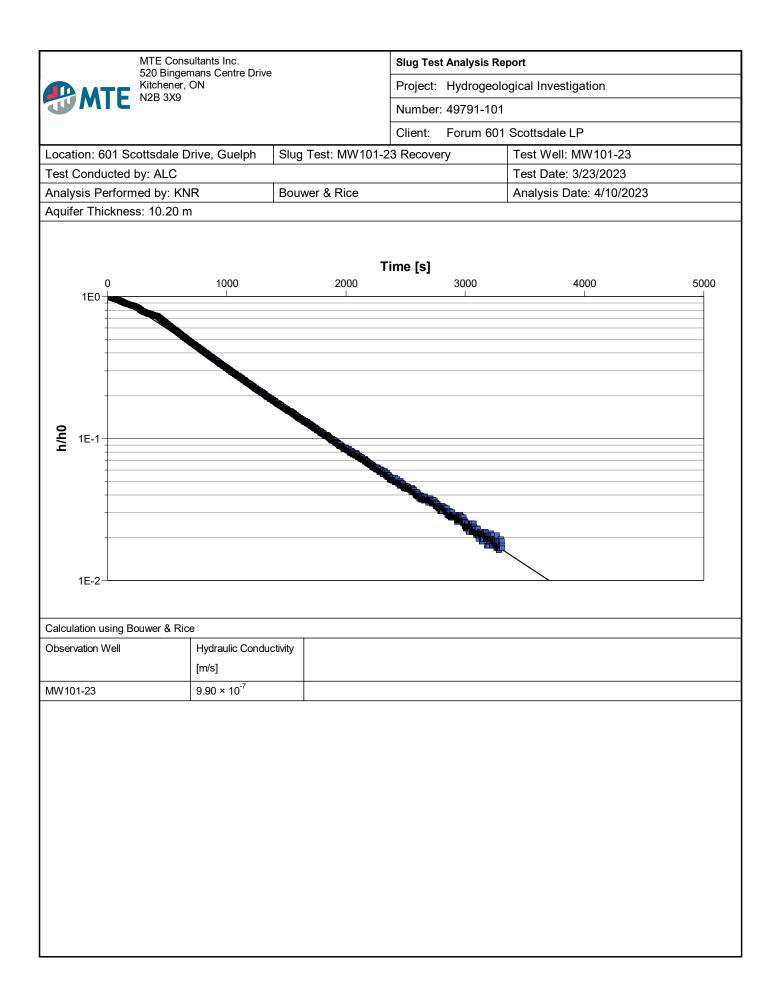
Preliminary Hydrogeological Assessment 601 Scottsdale Drive City of Guelph

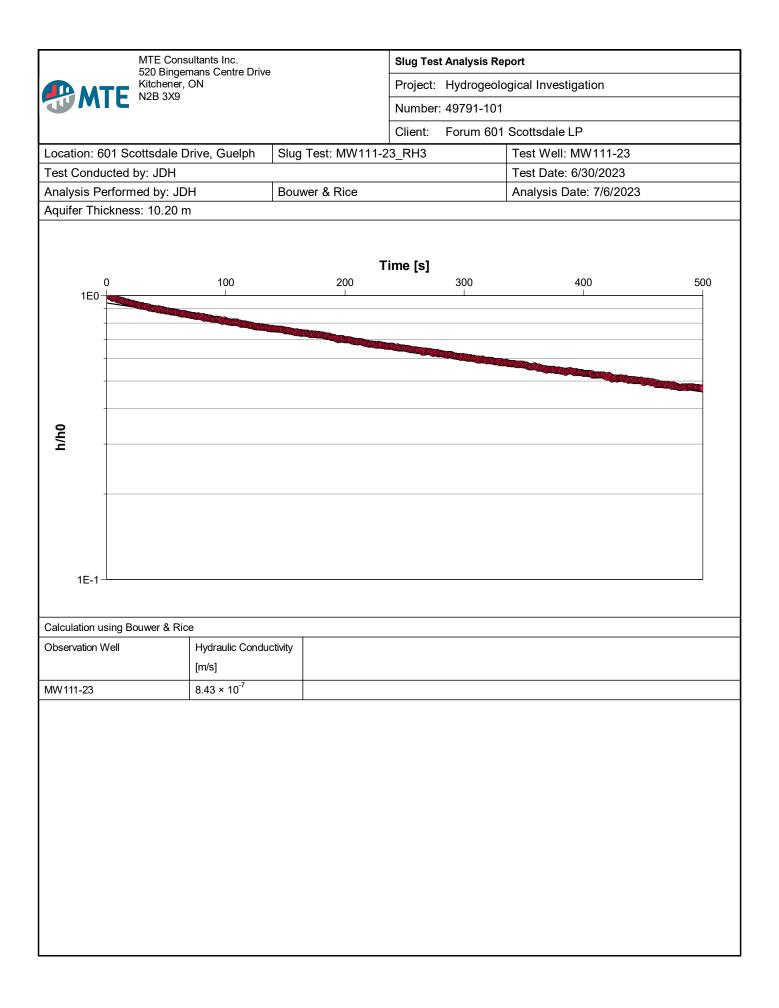




# **AquiferTest Results**









# Particle Size Distribution and Hydraulic Conductivity Estimates





### Particle Size Distribution Analysis Test Results

Date Sampled: Feb. 21 to Mar. 8, 2023

Date Tested: March 20 to 22, 2023

MTE File No.: 49791-200

101

For specific tests as listed on www.ccil.com

Table No:

Project Name: Geotechnical Investigation Client: Forum Asset Management Project Location: 601 Scottsdale Drive, Guelph, Ontario

**Sieve Opening In Inches** US Standard Sieve Numbers 3" 3/4" #10 #200 #4 #20 #40 #60 100 0 10 90 20 80 30 70 60 40 % Passing by Weight 50 50 40 60 30 70 20 80 90 10 100 0 10.000 Particle Size (mm) 0.100 0.010 0.001 100.000 1.000 Coarse Fine Coarse Medium Fine Silt Clay % Gravel % Sand % Fines

**Unified Soil Classification** 

#### Symbol Sample Depth Description Borehole ID Sample # MW101-23 10.7 - 11.1 mbgs Gravelly Silty SAND, some Clay -SS-11 **CERTIFIED BY** \_ MW108-23 SS-8 9.1 - 9.8 mbgs SILT, some Clay, trace Sand MW111-23 SS-5 3.0 - 3.7 mbgs SILT, some Clay and Gravel, trace Sand MW111-23 SS-9 7.6 - 8.2 mbgs SILT, some Clay, trace Sand BH115-23 SS-3 Gravelly Silty SAND, trace Clay -----1.5 - 2.1 mbgs Canadian Council of Independent Laboratories

% Retained by Weight

NOTES:

#### Hydraulic Conductivity, Porosity, and Infiltration Rate Estimated from Particle Distribution Analysis

Depth Top (m)	Depth Bottom (m)			which 60% is finer (mm)	% passing .02mm sieve %	% passing .06mm sieve %	Hazen Coefficient (-)	Uniformity Index <sup>1</sup> (-)	Porosity <sup>2</sup> (-)		Hydr		-			Infiltration Rate <sup>5</sup>
		туре	d <sub>10</sub>	d <sub>60</sub>	P <sub>1</sub>	P <sub>2</sub>	с	C <sub>u</sub> = d <sub>60</sub> /d <sub>10</sub>	n=0.255(1+0.83 <sup>Cu</sup> )	Hazen <sup>3</sup>	Beyer <sup>3</sup>	Kozeny- Carmen <sup>3</sup>	Wang <sup>3</sup>	Kaubisch <sup>4</sup>	Geometric Mean	(mm/hr)
10.7	11.1	Gravelly Silty SAND, some Clay	0.0015	0.24	27	37	-	160.0	0.255	N/A	N/A	3.0E-09	N/A	4.5E-08	1.2E-08	0
9.1	9.8	SILT, some Clay, trace Sand	0.001	0.02	60	95	-	20.0	0.261	N/A	N/A	1.5E-09	N/A	N/A	1.5E-09	0
3.0	3.7	SILT, some Clay and Gravel, trace Sand	0.001	0.017	67	78	-	17.0	0.266	N/A	N/A	1.6E-09	N/A	N/A	1.6E-09	0
7.6	8.2	SILT, some Clay, trace Sand	0.0015	0.024	51	95	-	16.0	0.268	N/A	N/A	3.7E-09	N/A	N/A	3.7E-09	0
1.5	2.1	Gravelly Silty SAND, trace Clay	0.003	0.31	27	38	-	103.3	0.255	N/A	N/A	1.2E-08	N/A	3.7E-08	2.1E-08	0
	Top (m)           10.7           9.1           3.0           7.6	Top (m)         Bottom (m)           10.7         11.1           9.1         9.8           3.0         3.7           7.6         8.2	Top (m)Bottom (m)Dominant Soil Type(m)(m)Dominant Soil Type10.711.1Gravelly Silty SAND, some Clay9.19.8SILT, some Clay, trace Sand3.03.7SILT, some Clay and Gravel, trace Sand7.68.2SILT, some Clay, trace Sand1.52.1Gravelly Silty SAND, trace	Top (m)Bottom (m)Dominant Soil Typewhich 10% is finer (mm)(m)Dominant Soil Typed1010.711.1Gravelly Silty SAND, some Clay0.00159.19.8SILT, some Clay, trace Sand0.0013.03.7SILT, some Clay and Gravel, trace Sand0.0017.68.2SILT, some Clay, trace Sand0.00151.52.1Gravelly Silty SAND, trace0.003	Top (m)Bottom (m)Dominant Soil Typewhich 10% is finer (mm)finer (mm)(m)Dominant Soil Typed10d60d10d10d6010.711.1Gravelly Silty SAND, some Clay0.00150.249.19.8SILT, some Clay, trace 	Top (m)Bottom (m)Dominant Soil Typewhich 10% is finer (mm)finer (mm).02mm sieve % $(m)$ $Dominant SoilTyped_{10}d_{60}P_1(m)IGravelly SiltySAND, someClay0.00150.242710.711.1Gravelly SiltySAND, someClay, traceSand0.00150.24279.19.8SILT, someClay, traceSand0.0010.02603.03.7SILT, someClay andGravel, traceSand0.0010.017677.68.2SILT, someClay, traceSand0.00150.024511.52.1Gravelly SiltySAND, trace0.0030.3127$	Top (m)Bottom (m)Dominant Soil Typewhich 10% is finer (mm)finer (mm).02mm sieve %.06mm sieve %(m)(m)d10d60P1P210.711.1Gravelly Silty SAND, some Clay0.00150.2427379.19.8SILT, some Clay and Gravel, trace Sand0.0010.0260953.03.7SILT, some Clay and Gravel, trace Sand0.0010.01767787.68.2SILT, some Clay, trace Sand0.00150.02451951.52.1Gravelly Silty SAND, trace0.0030.312738	Top (m)Bottom (m)Dominant Soil Typewhich 10% is finer (mm)finer (mm).02mm sieve %.06mm sieve %Coefficient (.)10.711.1Gravelly Silty SAND, some Clay0.00150.242737-9.19.8SILT, some Clay and Gravel, trace Sand0.0010.026095-3.03.7SILT, some Clay and Gravel, trace Sand0.0010.0176778-7.68.2SILT, some Clay, trace Sand0.00150.0245195-1.52.1Gravelly Silty SAND, trace0.0030.312738-	Top (m)Bottom (m)Dominant Soil Typewhich 10% is finer (mm)finer (mm).02mm sieve $\%$ .06mm sieve $\%$ Coefficient $(\cdot)$ Index1 $(\cdot)$ 10.7(m)Gravelly Silty SAND, some Clay0.00150.242737-160.09.19.8SILT, some Clay, trace Sand0.0010.026095-20.03.03.7SILT, some Clay and Gravel, trace Sand0.0010.0176778-17.07.68.2SILT, some Clay, trace Sand0.00150.0245195-16.07.68.2SILT, some Clay, trace Sand0.00150.0245195-16.01.52.1Gravelly Silty SAND, trace0.0030.312738-103.3	Top (m)Bottom (m)Dominant Soil Typewhich 10% is finer (mm)finer (mm).02mm sieve %.06mm sieve %Coefficient (.)Index1 (.)Porosity2 (.)10.711.1Gravelly Silty SAND, some Clay0.00150.242737-160.00.2559.19.8SILT, some Clay trace Sand0.0010.026095-20.00.2613.03.7SILT, some Clay and Gravel, trace Sand0.0010.0176778-17.00.2667.68.2SILT, some Clay and Gravel, trace Sand0.00150.0245195-16.00.2687.68.2SILT, some Clay and Gravel, trace Sand0.00150.0245195-16.00.2687.68.2SILT, some Clay and Gravel, trace Sand0.00150.0245195-16.00.2687.68.2SILT, some Clay trace Sand0.00150.0245195-16.00.2681.52.1Gravely Silty SAND, trace0.0030.312738-103.30.255	Top (m)Bottom (m)Dominant Soilwhich 10% is finer (mm)finer (mm).02mm sieve %.06mm sieve %Coefficient %Index1 (,)Porosity2 (,)Hazen310.711.1Gravelly Silty Clay0.00150.2427337160.00.255N/A9.19.8Sill, some Clay race Sand0.0010.02609520.00.261N/A3.03.7Sill, some Clay race Sand0.0010.0176778110.00.266N/A7.68.2Sill, some Clay, race Sand0.00150.024519516.00.268N/A1.52.1Gravelly Silty SAND, race0.0030.312738103.30.255N/A	Top (m)Bottom (m)Dominant Sol Typewhich 10% is finer (mm)finer (mm).02mm sieve $%$ .06mm sieve $%$ Coefficient $(-)$ Index! $(-)$ Porosity2 $(-)$ Hazen3Beyer310.711.1Gravely Silty SAND, some Clay, trace Sand0.00150.2427337160.00.255N/AN/A9.19.8SILT, some Clay, trace Sand0.0010.02609520.00.261N/AN/A3.03.7SILT, some Clay, trace Sand0.0010.0176777816.00.268N/AN/A7.68.2SILT, some Clay, trace Sand0.00150.024519516.00.268N/AN/A1.52.1Gravely Silty SAND, trace0.0030.312738103.30.255N/AN/A	Top (m)Bottom (m)Dominant Soil Typewhich 10% is finer (mm)finer (mm).02mm sieve %.06mm sieve %Coefficient (·)Index1 (·)Porosity2 (·)Porosity2 (·)Hazen3Beyer3Kozeny- (m/sec)10.711.1Gravelly Silty SAND, some Clay0.00150.242737-160.00.255N/AN/A3.0E-099.19.8SILT, some Clay and Gravelly Silty Sand0.0010.026095-20.00.261N/AN/A1.5E-093.03.7SILT, some Clay and Gravelly Silty Sand0.0010.0176778-17.00.266N/AN/A1.6E-097.68.2SILT, some Clay and Gravelly Silty Sand0.00150.0242738-16.00.266N/AN/A3.0E-091.52.1SAND, frace Sand0.0010.01767781.610.00.266N/AN/A3.7E-091.52.1Gravelly Silty SAND, frace0.0030.012.738-103.30.255N/AN/A1.2E-08	Top (m)Bottom (m)Dominant Signwhich 10% is finer (mm)finer (mm).02mm sieve %.06mm sieve %Coefficient (1)Index (1)Porosity² (1)Porosity² (1)IndexPorosity² (1)IndexIndex (mm)Porosity² (1)IndexIndex (mm)Porosity² (1)IndexIndex (mm)Porosity² (1)IndexIndex (mm)Porosity² (1)IndexPorosity² (1)IndexPorosity² (1)IndexIndex (mm)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)Porosity² (1)IndexIndex (1)In	Top (m)         Bottom (m)         Bottom (m)         Main to 10% is finer (mm)         finer (mm)         0.02m sieve (mm)         0.06m sieve %         Coefficient (s)         Index1 (s)         Porosity <sup>2</sup> (f)         Image: construction of the cons	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$

 $\ensuremath{\mathsf{N/A}}$  The entry is not appropriate to use for grain size distribution of the sample

Hazen Formula:

$$= Cd_{10}^{2}$$

Where:	
K	Hydraulic conductivity (cm/sec)
d <sub>10</sub>	Grain size at which 10% is finer (cm)
C	Coefficient as follows:
	Very fine sand, poorly sorted
	Fine sand with appreciable fines
	Medium sand, well sorted
	Coarse sand, poorly sorted
	Coarse sand, well sorted

Applicability: where 0.1 < d<sub>10</sub> < 3.0 mm

K

#### Wang Et Al. Formula:

$$K = 2.9 \times 10^{-3} \frac{g}{v} \left( \log \frac{g d_{60}^3}{v^2} \right)^{-1} d_{10}^2$$

Where:

ł

- K Hydraulic conductivity (m/sec)
- g Gravitational acceleration (9.8 m/s<sup>2</sup>)
- $\nu\,$  Kinematic viscosity of water(1.2 x 10^{-6}\,m^2/s)
- $\rm d_{10}$  Grain size at which 10% is finer (m)
- $d_{\rm 60}\,$  Grain size at which60% is finer (m)
- Applicability: where 0.05 <  $d_{10}$  < 0.83 mm, 0.09 <  $d_{60}$  < 4.29 mm, AND 1.3 < CU < 18.3%

Beyer Formula:

$$\overline{K} = 6 \times 10^{-4} \frac{g}{v} ln\left(\frac{500}{Cu}\right) d_{10}^2$$

 Where:

 K Hydraulic conductivity (m/sec)

 g Gravitational acceleration (9.8 m/s<sup>2</sup>)

 v Kinematic viscosity of water(1.2 x 10<sup>-6</sup> m<sup>2</sup>/s)

 d<sub>10</sub> Grain size at which 10% is finer (m)

Applicability: where  $0.06 < d_{10} < 0.6 \text{ mm}$  AND  $C_u <= 20$ 

#### Kaubisch Formula:

$$K = 10^{0.0005P_2^2 - 0.12P_2 - 3.59}$$

Applicability: where  $5 < C_u < 400 \text{ AND } 10\% < P_2 > 60\%$ 

<sup>1</sup> Craig, R.F. 1992. "Soil Mechanics, Fifth Edition". Chapman and Hill.

<sup>2</sup> Vukovic, M., and Soro, A. 1992. "Determination of Hydraulic Conductivity of Porous Media from Grain-Size Composition"

<sup>3</sup> Duffield, G.M. "Representative Values of Hydraulic Properties" http://www.aqtesolv.com/aquifer-tests/aquifer\_properties.htm

40-80

40-80

80-120

80-120

120-150

<sup>4</sup> Cai, Jialiang, Taute, Thomas, Hamann, Enrico, and Schneider, Michael. 2013. " An Integrated Laboratory Method to Measure and Verify Directional Hydraulic conductivity in Fine-to-Medium Sandy Sediments". Groundwater. <sup>5</sup> Sustainable Technologies Evaluation Program (STEP), 2020.

#### Kozeny-Carmen Formula:

$$K = \frac{1}{180} \frac{g}{v} \left( \frac{n^3}{(1-n)^2} \right) d_{10}^2$$

 Where:

 K

 g Gravitational acceleration (9.8 m/s<sup>2</sup>)

 v Kinematic viscosity of water(1.2 x 10<sup>-6</sup> m<sup>2</sup>/s)

 d<sub>10</sub> Grain size at which 10% is finer (m)

Applicability: silts, sands, gravelly sands





## **Laboratory Certificates of Analysis**



# ALS Canada Ltd.



# CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: WT2307174	Page	: 1 of 6
Client	: MTE Consultants Inc.	Laboratory	: Waterloo - Environmental
Contact	: Fraser Cummings	Account Manager	Emily Hansen
Address	520 Bingemans Centre Drive Kitchener ON Canada N2B 3X9	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 519 743 6500	Telephone	+1 519 886 6910
Project	: 49791-200	Date Samples Received	: 23-Mar-2023 12:35
PO	:	Date Analysis Commenced	: 23-Mar-2023
C-O-C number	: 20-1048805	Issue Date	: 03-Apr-2023 13:41
Sampler	:		
Site	:		
Quote number	: Standing Offer 2023		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Marsha Calero	Laboratory Assistant	Organics, Calgary, Alberta
Nguyen Tran	Laboratory Analyst	Organics, Calgary, Alberta

### **General Comments**

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

Key : LOR: Limit of Reporting (detection limit).

Unit	Description
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
pH units	pH units

<: less than.

Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit. For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit .

### **Qualifiers**

Qualifier	Description
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample
	tested.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical
	Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference,
	colour, turbidity).
SP	Sample was preserved at the laboratory.



# Analytical Results

,, <b>,</b>			Client sample ID	MW101-23					
Sub-Matrix: Water		Si	ampling date/time	23-Mar-2023					
(Matrix: Water)			, ,	10:35					
Analyte	Method	LOR	Unit	WT2307174-001		GUESUB	GUESUB		
						SAN	STM		
Physical Tests									
рН	E108	0.10	pH units	7.78		5.5 - 9.5 pH units	6 - 9 pH units	 	 
Solids, total suspended [TSS]	E160	3.0	mg/L	738	DLHC	350 mg/L	15 mg/L	 	 
Anions and Nutrients									
Chloride	E235.CI	0.50	mg/L	193	DLDS	1500 mg/L		 	 
Fluoride	E235.F	0.020	mg/L	<0.100	DLDS	10 mg/L		 	 
Kjeldahl nitrogen, total [TKN]	E318	0.050	mg/L	0.422		100 mg/L		 	 
Phosphorus, total	E372-U	0.0020	mg/L	0.141	DLM	10 mg/L		 	 
Sulfate (as SO4)	E235.SO4	0.30	mg/L	16.9	DLDS	1500 mg/L		 	 
Cyanides									
Cyanide, strong acid dissociable (Total)	E333	0.0020	mg/L	<0.0020		2 mg/L		 	 
Microbiological Tests									
Coliforms, thermotolerant	E012.FC	1	CFU/100mL	Not Detected			200	 	 
[fecal]							CFU/100mL		
Total Metals									
Aluminum, total	E420	0.0030	mg/L	2.93	DLHC	50 mg/L		 	 
Antimony, total	E420	0.00010	mg/L	<0.00100	DLHC	5 mg/L		 	 
Arsenic, total	E420	0.00010	mg/L	0.00156	DLHC	1 mg/L		 	 
Bismuth, total	E420	0.000050	mg/L	<0.000500	DLHC	5 mg/L		 	 
Cadmium, total	E420	0.0000050	mg/L	0.000208	DLHC	1 mg/L	0.001 mg/L	 	 
Chromium, total	E420	0.00050	mg/L	0.00567	DLHC	5 mg/L	0.2 mg/L	 	 
Cobalt, total	E420	0.00010	mg/L	0.00220	DLHC	5 mg/L		 	 
Copper, total	E420	0.00050	mg/L	0.0122	DLHC	3 mg/L	0.01 mg/L	 	 
Iron, total	E420	0.010	mg/L	4.58	DLHC	50 mg/L		 	 
Lead, total	E420	0.000050	mg/L	0.00826	DLHC	5 mg/L	0.05 mg/L	 	 
Manganese, total	E420	0.00010	mg/L	0.159	DLHC	5 mg/L		 	 
Mercury, total	E508	0.0000050	mg/L	<0.000050		0.1 mg/L	0.001 mg/L	 	 
Molybdenum, total	E420	0.000050	mg/L	<0.000500	DLHC	5 mg/L		 	 
Nickel, total	E420	0.00050	mg/L	0.00749	DLHC	3 mg/L	0.05 mg/L	 	 
Selenium, total	E420	0.000050	mg/L	<0.000500	DLHC	5 mg/L		 	 
Silver, total	E420	0.000010	mg/L	<0.000100	DLHC	5 mg/L		 	 

Page	:	4 of 6
Work Order	:	WT2307174
Client	:	MTE Consultants Inc.
Project	:	49791-200



Analyte	Method	LOR	Unit	WT2307174-001 (Continued)		GUESUB SAN	GUESUB STM					
Total Metals - Continued	tal Metals - Continued											
Tin, total	E420	0.00010	mg/L	0.00298	DLHC	5 mg/L						
Titanium, total	E420	0.00030	mg/L	0.107	DLHC	5 mg/L						
Vanadium, total	E420	0.00050	mg/L	0.00648	DLHC	5 mg/L						
Zinc, total	E420	0.0030	mg/L	0.0836	DLHC	3 mg/L	0.05 mg/L					
Aggregate Organics												
Carbonaceous biochemical oxygen demand [CBOD]	E555	2.0	mg/L	<3.0	BODL	300 mg/L	15 mg/L					
Oil & grease (gravimetric)	E567	5.0	mg/L	<5.0								
Oil & grease, animal/vegetable (gravimetric)	EC567A.SG	5.0	mg/L	<5.0		100 mg/L						
Oil & grease, mineral (gravimetric)	E567SG	5.0	mg/L	<5.0		15 mg/L						
Phenols, total (4AAP)	E562	0.0010	mg/L	<0.0050	DLM	1 mg/L						

Please refer to the General Comments section for an explanation of any qualifiers detected.

### Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
MW101-23	Water	Solids, total suspended [TSS]		GUESUB	SAN	738 mg/L	350 mg/L
	Water	Solids, total suspended [TSS]		GUESUB	STM	738 mg/L	15 mg/L
	Water	Copper, total		GUESUB	STM	0.0122 mg/L	0.01 mg/L
	Water	Zinc, total		GUESUB	STM	0.0836 mg/L	0.05 mg/L

Key:

GUESUB	Ontario Guelph Sanitary and Storm Sewer By-Law 15202 (1996)
SAN	Ontario City of Guelph Sanitary Sewer Use By-Law 15202
STM	Ontario City of Guelph Storm Sewer Use By-Law 15202



# Analytical Results

-			Client sample ID	MW108-23					
Sub-Matrix: Water		S	ampling date/time	23-Mar-2023					
(Matrix: Water)			, <u> </u>	10:25				_	
Analyte	Method	LOR	Unit	WT2307174-002		GUESUB	GUESUB		
						SAN	STM		
Physical Tests									
рН	E108	0.10	pH units	7.71		5.5 - 9.5 pH units	6 - 9 pH units	 	 
Solids, total suspended [TSS]	E160	3.0	mg/L	12500	DLHC	350 mg/L	15 mg/L	 	 
Anions and Nutrients									
Chloride	E235.Cl	0.50	mg/L	404	DLDS	1500 mg/L		 	 
Fluoride	E235.F	0.020	mg/L	<0.100	DLDS	10 mg/L		 	 
Kjeldahl nitrogen, total [TKN]	E318	0.050	mg/L	0.646		100 mg/L		 	 
Phosphorus, total	E372-U	0.0020	mg/L	1.24	DLM	10 mg/L		 	 
Sulfate (as SO4)	E235.SO4	0.30	mg/L	41.6	DLDS	1500 mg/L		 	 
Cyanides									
Cyanide, strong acid dissociable (Total)	E333	0.0020	mg/L	<0.0020		2 mg/L		 	 
Microbiological Tests									
Coliforms, thermotolerant	E012.FC	1	CFU/100mL	Not Detected	DLM		200	 	 
[fecal]							CFU/100mL		
Total Metals									
Aluminum, total	E420	0.0030	mg/L	47.9	DLHC	50 mg/L		 	 
Antimony, total	E420	0.00010	mg/L	<0.00100	DLHC	5 mg/L		 	 
Arsenic, total	E420	0.00010	mg/L	0.0216	DLHC	1 mg/L		 	 
Bismuth, total	E420	0.000050	mg/L	0.000532	DLHC	5 mg/L		 	 
Cadmium, total	E420	0.0000050	mg/L	0.000892	DLHC	1 mg/L	0.001 mg/L	 	 
Chromium, total	E420	0.00050	mg/L	0.0840	DLHC	5 mg/L	0.2 mg/L	 	 
Cobalt, total	E420	0.00010	mg/L	0.0468	DLHC	5 mg/L		 	 
Copper, total	E420	0.00050	mg/L	0.118	DLHC	3 mg/L	0.01 mg/L	 	 
Iron, total	E420	0.010	mg/L	94.4	DLHC	50 mg/L		 	 
Lead, total	E420	0.000050	mg/L	0.0731	DLHC	5 mg/L	0.05 mg/L	 	 
Manganese, total	E420	0.00010	mg/L	4.93	DLHC	5 mg/L		 	 
Mercury, total	E508	0.0000050	mg/L	0.0000061		0.1 mg/L	0.001 mg/L	 	 
Molybdenum, total	E420	0.000050	mg/L	0.00108	DLHC	5 mg/L		 	 
Nickel, total	E420	0.00050	mg/L	0.111	DLHC	3 mg/L	0.05 mg/L	 	 
Selenium, total	E420	0.000050	mg/L	0.000512	DLHC	5 mg/L		 	 
Silver, total	E420	0.000010	mg/L	0.000228	DLHC	5 mg/L		 	 

Page	:	6 of 6
Work Order	:	WT2307174
Client	:	MTE Consultants Inc.
Project	:	49791-200



Analyte	Method	LOR	Unit	WT2307174-002 (Continued)	GUESUB SAN	GUESUB STM		
Total Metals - Continued								
Tin, total	E420	0.00010	mg/L	0.00389 DL	<sup>HC</sup> 5 mg/L		 	 
Titanium, total	E420	0.00030	mg/L	1.66 DL	<sup>HC</sup> 5 mg/L		 	 
Vanadium, total	E420	0.00050	mg/L	0.109 DL	<sup>HC</sup> 5 mg/L		 	 
Zinc, total	E420	0.0030	mg/L	0.368 DL	HC 3 mg/L	0.05 mg/L	 	 
Aggregate Organics								
Carbonaceous biochemical oxygen demand [CBOD]	E555	2.0	mg/L	<3.0 BC	DL 300 mg/L	15 mg/L	 	 
Oil & grease (gravimetric)	E567	5.0	mg/L	<5.0			 	 
Oil & grease, animal/vegetable (gravimetric)	EC567A.SG	5.0	mg/L	<5.0	100 mg/L		 	 
Oil & grease, mineral (gravimetric)	E567SG	5.0	mg/L	<5.0	15 mg/L		 	 
Phenols, total (4AAP)	E562	0.0010	mg/L	<0.0050 DLM	<sup>SP</sup> 1 mg/L		 	 

Please refer to the General Comments section for an explanation of any qualifiers detected.

### Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
MW108-23	Water	Solids, total suspended [TSS]		GUESUB	SAN	12500 mg/L	350 mg/L
	Water	Iron, total		GUESUB	SAN	94.4 mg/L	50 mg/L
	Water	Solids, total suspended [TSS]		GUESUB	STM	12500 mg/L	15 mg/L
	Water	Copper, total		GUESUB	STM	0.118 mg/L	0.01 mg/L
	Water	Lead, total		GUESUB	STM	0.0731 mg/L	0.05 mg/L
	Water	Nickel, total		GUESUB	STM	0.111 mg/L	0.05 mg/L
	Water	Zinc, total		GUESUB	STM	0.368 mg/L	0.05 mg/L

### Key:

GUESUB	Ontario Guelph Sanitary and Storm Sewer By-Law 15202 (1996)
SAN	Ontario City of Guelph Sanitary Sewer Use By-Law 15202
STM	Ontario City of Guelph Storm Sewer Use By-Law 15202



	QUALITY CONT	<b>ROL INTERPRETIVE REI</b>	PORT
Work Order	WT2307174	Page	: 1 of 11
Client	MTE Consultants Inc.	Laboratory	: Waterloo - Environmental
Contact	: Fraser Cummings	Account Manager	: Emily Hansen
Address	520 Bingemans Centre Drive Kitchener ON Canada N2B 3X9	Address	∺60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 519 743 6500	Telephone	: +1 519 886 6910
Project	: 49791-200	Date Samples Received	: 23-Mar-2023 12:35
PO	:	Issue Date	: 03-Apr-2023 13:41
C-O-C number	: 20-1048805		
Sampler	:		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

### Key

Quote number

No. of samples received

No. of samples analysed

Site

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

· \_\_\_\_

:2

:2

: Standing Offer 2023

**RPD: Relative Percent Difference.** 

### Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

### Summary of Outliers **Outliers : Quality Control Samples**

### No Method Blank value outliers occur.

- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

### **Outliers: Reference Material (RM) Samples**

<u>No</u> Reference Material (RM) Sample outliers occur.

# Outliers : Analysis Holding Time Compliance (Breaches) • • No Analysis Holding Time Outliers exist.

### **Outliers : Frequency of Quality Control Samples**

• Quality Control Sample Frequency Outliers occur - please see following pages for full details.



### **Outliers : Quality Control Samples**

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

### Matrix: Water

Analyte Group		Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment	
Laboratory Control Sam	ple (LCS) Recover	ries								
Total Metals		QC-874409-002		Nickel, total	7440-02-0	E420	123 % <sup>MES</sup>	80.0-120%	Recovery greater than upper control limit	
Result Qualifiers										
Qualifier	Descrip	tion								
MES Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a										
	Multi-El	lement Scan / Multi-Pai	r OMOE & CCME).							

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### Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Water					E١	valuation: × =	Holding time exce	edance ; 🔹	<pre>&lt; = Within</pre>	Holding Time
Analyte Group	Method	Sampling Date	Ext	raction / Pi	reparation		Analys		is	
Container / Client Sample ID(s)			Preparation	Holdin	g Times	Eval	Analysis Date	Holding	Times	Eval
			Date	Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT-4d]										
MW108-23	E555	23-Mar-2023					24-Mar-2023	4 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT-4d]										
MW101-23	E555	23-Mar-2023					27-Mar-2023	4 days	4 days	1
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
MW101-23	E567SG	23-Mar-2023	27-Mar-2023	28	4 days	1	28-Mar-2023	40 days	1 days	✓
				days						
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)						_				
MW108-23	E567SG	23-Mar-2023	27-Mar-2023	28	4 days	~	28-Mar-2023	40 days	1 days	1
				days						
Aggregate Organics : Oil & Grease by Gravimetry								_		
Amber glass (hydrochloric acid)										,
MW101-23	E567	23-Mar-2023	27-Mar-2023	28	4 days	~	27-Mar-2023	40 days	0 days	1
				days						
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)	<b>FF07</b>		07.14 0000				07.14 0000		<u>.</u>	,
MW108-23	E567	23-Mar-2023	27-Mar-2023	28	4 days	1	27-Mar-2023	40 days	0 days	1
				days						
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)	5500		0414 0000				04.04			,
MW101-23	E562	23-Mar-2023	24-Mar-2023				24-Mar-2023	28 days	1 days	1



Matrix: Water					E	valuation: × =	Holding time exce	edance ; •	<pre>/ = Within</pre>	Holding Tir
Analyte Group	Method	Sampling Date	Ext	traction / Pr	eparation			Analys	is	
Container / Client Sample ID(s)			Preparation	Holding	g Times	Eval	Analysis Date	Holding	, Times	Eval
			Date	Rec	Actual		, i i	Rec	Actual	
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) MW108-23	E562	23-Mar-2023	24-Mar-2023				24-Mar-2023	28 days	1 days	~
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] MW101-23	E235.Cl	23-Mar-2023	24-Mar-2023				27-Mar-2023	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] MW108-23	E235.CI	23-Mar-2023	24-Mar-2023				27-Mar-2023	28 days	4 days	1
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] MW101-23	E235.F	23-Mar-2023	24-Mar-2023				27-Mar-2023	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] MW108-23	E235.F	23-Mar-2023	24-Mar-2023				27-Mar-2023	28 days	4 days	~
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] MW101-23	E235.SO4	23-Mar-2023	24-Mar-2023				27-Mar-2023	28 days	4 days	~
Anions and Nutrients : Sulfate in Water by IC					1					
HDPE [ON MECP] MW108-23	E235.SO4	23-Mar-2023	24-Mar-2023				27-Mar-2023	28 days	4 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)					I			I		
Amber glass total (sulfuric acid) MW101-23	E318	23-Mar-2023	27-Mar-2023				27-Mar-2023	28 days	4 days	*
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) MW108-23	E318	23-Mar-2023	27-Mar-2023				27-Mar-2023	28 days	4 days	✓



Analytic Group         Method         Sampling Date (Container (Clein Sample D(s))         Editor (The section Container)         Analysis Date (Perparation Date         Hodding Times (Perparation Date         Hodding Times (Perparation Date)         Hodding Times (Perparation Date)         Hodding Times (Perparation Date)           Aniona and Nutrients : Total Phosphorus by Colourinetry (0.002 mg/L)         E372-U         23-Mar-2023         24-Mar-2023           27-Mar-2023         28 day         4 days           Aniona and Nutrients : Total Opendie         E333         23-Mar-2023         24-Mar-2023           27-Mar-2023         14 days         7 days           Cyanides : Total Cyanide         E333         23-Mar-2023         30-Mar-2023           30-Mar-2023         14 days         7 days           Microbiological Tests : Thermotolerant (Fecal) Collform (MF-mFC)         E33         23-Mar-2023          -	Matrix: Water					E	valuation: × =	Holding time exce	edance ; •	🗸 = Within	Holding Tir
Container / Clear Sample D(s)         Preparation Date         Preparation Date         Preparation Date         Preding Times Rate         Eval Analysis Det Actual         Problem Times         Eval Actual         Analysis Det Times         Problem Times         Problem Times         Eval Actual         Analysis Det Times         Problem Times	Analyte Group	Method	Sampling Date	Ex	traction / Pi	reparation			Analys	sis	
Image and Nutrients - Total Phosphorus by Colourinetry (0.002 mg/L)       Rec       Actual       Rec       Actual         Ambor gless total (suffure acid)       E372-U       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Anions and Nutrients - Total Phosphorus by Colourinetry (0.002 mg/L)       E372-U       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Ambor gless total (suffure acid)       MW106-23       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Cyanides - Total Cyanide       E333       23-Mar-2023       30-Mar-2023         30-Mar-2023       14 days       7 days         Cyanides - Total Cyanide       E333       23-Mar-2023       30-Mar-2023         30-Mar-2023       14 days       7 days         MW101-23       E333       23-Mar-2023       30-Mar-2023         30-Mar-2023       14 days       7 days         MW101-23       E012 FC       23-Mar-2023       30-Mar-2023         30-Mar-2023       48 hrs       24 hrs         Sterile HOPE (Sodium thiosulphato) [ON MECP]       E012 FC	Container / Client Sample ID(s)			Preparation	Holdin	g Times	Eval	Analysis Date	Holding	g Times	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       E372-U       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       E372-U       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       E372-U       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Amber glass total (suffuric acid)       MV108-23       E372-U       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Cyanides : Total Cyanide       HDPE-total (sodium hydroxide)       MW101-23       30-Mar-2023          30-Mar-2023       14 days       7 days         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-MFC)       E333       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-MFC)       Sterlie HDPE (Sodium thiosulphate) [ON MECP]       MW108-23          24-Mar-2023       48 hrs       24 hrs				1					Rec	Actual	
Amber glass total (sulfuric acid) MW101-23       E372-U       23-Mar-2023       24-Mar-2023        Set of the set of th	Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/l.)										
MW101-23       E372-U       23-Mar-2023       24-Mar-2023        27-Mar-2023       28 days       4 days         Annors and Mutrients : Total Phosphorus by Colourinetry (0.002 mg/L)       E372-U       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Amber glass total (sulfuric acid) MW108-23       E372-U       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Cyanides : Total Cyanide       E       E       23-Mar-2023       24-Mar-2023         27-Mar-2023       28 days       4 days         Cyanides : Total Cyanide       E       E       E       23-Mar-2023       30-Mar-2023         30-Mar-2023       14 days       7 days         Cyanides : Total Cyanide       E       E       E       23-Mar-2023       30-Mar-2023         30-Mar-2023       14 days       7 days         MV108-23       E       E       E       23-Mar-2023       30-Mar-2023         24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E       E       E       E       E       E											
Anional and Nutrients: Total Phosphorus by Colourinetry (0.002 mg/L)         Amber glass total (sulfurica acid)       Z1-Mar.2023       Z4-Mar.2023       Z4-Mar.2023 <thz4-mar.2023< th="">       Z4-Mar.2023       <thz< td=""><td></td><td>E372-U</td><td>23-Mar-2023</td><td>24-Mar-2023</td><td></td><td></td><td></td><td>27-Mar-2023</td><td>28 days</td><td>4 days</td><td>1</td></thz<></thz4-mar.2023<>		E372-U	23-Mar-2023	24-Mar-2023				27-Mar-2023	28 days	4 days	1
Amber glass total (sulfuric acid) MW108-23       E372-U       23-Mar-2023       24-Mar-2023        Image: Comparison of Co				21 1101 2020				27 1100 2020	20 00,0	. aajo	
Amber glass total (sulfuric acid) MW108-23       E372-U       23-Mar-2023       24-Mar-2023        Image: Comparison of Co	Anions and Nutriants : Total Phosphorus by Colourimetry (0.002 mg/l.)										
MW108-23       E372-U       23-Mar-2023       24-Mar-2023       24-Mar-2023       24 days       4 days         Cyanides : Total Cyanide       E333       23-Mar-2023       30-Mar-2023       30-Mar-2023       14 days       7 days         MW101-23       Common Mydroxide)       Solar - 2023       30-Mar-2023         Sol-Mar-2023       14 days       7 days         Cyanides : Total Cyanide       E333       23-Mar-2023       30-Mar-2023        Sol-Mar-2023       14 days       7 days         Cyanides : Total Cyanide       E333       23-Mar-2023       30-Mar-2023        Image: Sol-Mar-2023       14 days       7 days         Cyanides : Total Cyanide       E333       23-Mar-2023       30-Mar-2023       Image: Sol-Mar-2023       <											
Cyanidas : Total Cyanida         Cyanida		E372-U	23-Mar-2023	24-Mar-2023				27-Mar-2023	28 days	4 days	1
HDPE - total (sodium hydroxide) MV101-23       E333       23-Mar-2023       30-Mar-2023         Sol-Mar-2023       14 day       7 days         Cyanides : Total Cyanide       E333       23-Mar-2023       30-Mar-2023         Sol-Mar-2023       14 day       7 days         MV108-23       E333       23-Mar-2023       30-Mar-2023         Sol-Mar-2023       14 day       7 days         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E333       23-Mar-2023       30-Mar-2023         Sol-Mar-2023       14 day       7 days         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E333       23-Mar-2023       30-Mar-2023         Sol-Mar-2023       14 day       7 days         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E333       23-Mar-2023       30-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E334       E334-2023          24-Mar-2023       48 hrs       24 hrs         Physical Tests : Ph by Meter       E108       23-Mar-2023       24-Mar-2023       24-Mar-2023	WW 100-20	2012 0	20 1101 2020	21 1101 2020				27 11101 2020	20 duyo	1 dayo	
HDPE - total (sodium hydroxide) MV101-23       E333       23-Mar-2023       30-Mar-2023         30-Mar-2023       14 day       7 days         Cyanides : Total Cyanide       E333       23-Mar-2023       30-Mar-2023         So-Mar-2023       14 day       7 days         MV108-23       E333       23-Mar-2023       30-Mar-2023         30-Mar-2023       14 day       7 days         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E333       23-Mar-2023       30-Mar-2023         30-Mar-2023       14 day       7 days         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E333       23-Mar-2023       30-Mar-2023          30-Mar-2023       14 day       7 days         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E333       23-Mar-2023       30-Mar-2023         24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E333       E334-2023         24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : The Moter       E334       E334-2023       24-Mar-2023       24-Mar-2023       14	Cvanides : Total Cvanide										
MW101-23       E333       23-Mar-2023       30-Mar-2023        30-Mar-2023       14 days       7 days         Cyanides : Total Cyanide       MV108-23       E333       23-Mar-2023       30-Mar-2023        Image: Comparison of the com											
Image: Constraint of the state of the s		E333	23-Mar-2023	30-Mar-2023				30-Mar-2023	14 days	7 days	1
HDPE - total (sodium hydroxide) MVV108-23       E333       23-Mar-2023       30-Mar-2023        Image: Sodium stress in the sodium st									,		
MW108-23       E333       23-Mar-2023       30-Mar-2023        30-Mar-2023       14 days       7 days         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Physical Tests : ph by Meter       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Physical Tests : ph by Meter       E108       23-Mar-2023       24-Mar-2023          26-Mar-2023       14 days       3 days         Physical Tests : ph by Meter       HDPE [ON MECP]       I       I       I       I       I       I       I	Cyanides : Total Cyanide										
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)         Sterile HDPE (Sodium thiosulphate) [ON MECP]         MW101-23         E012.FC       23-Mar-2023         24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E012.FC       23-Mar-2023         24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E012.FC       23-Mar-2023         24-Mar-2023       48 hrs       24 hrs         MW108-23       E012.FC       23-Mar-2023         24-Mar-2023       48 hrs       24 hrs         Physical Tests : pH by Meter       E012.FC       23-Mar-2023       24-Mar-2023       48 hrs       24 hrs         MW101-23       MW101-23       E108       23-Mar-2023       24-Mar-2023       14 day       3 days         Physical Tests : pH by Meter       E108       23-Mar-2023       24-Mar-2023       14 day       3 days         Physical Tests : pH by Meter       HDPE [ON MECP]       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I	HDPE - total (sodium hydroxide)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW101-23       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       E012.FC       23-Mar-2023          Image: Colorer Color	MW108-23	E333	23-Mar-2023	30-Mar-2023				30-Mar-2023	14 days	7 days	✓
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW101-23         ED12.FC         23-Mar-2023            24-Mar-2023         48 hrs         24 hrs           Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)         ED12.FC         23-Mar-2023             24-Mar-2023         48 hrs         24 hrs           Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)         ED12.FC         23-Mar-2023             24-Mar-2023         48 hrs         24 hrs           MW108-23         ED12.FC         23-Mar-2023             24-Mar-2023         48 hrs         24 hrs           Physical Tests : pH by Meter         E108         23-Mar-2023         24-Mar-2023         48 hrs         24 hrs           Physical Tests : pH by Meter         E108         23-Mar-2023         24-Mar-2023               Multiple           Physical Tests : pH by Meter         E108											
MW101-23       E012.FC       23-Mar-2023         24-Mar-2023       48 hrs       24 hrs         Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       Sterile HDPE (Sodium thiosulphate) [ON MECP]       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Physical Tests : pH by Meter       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Physical Tests : pH by Meter       E108       23-Mar-2023       24-Mar-2023          26-Mar-2023       14 days       3 days         Physical Tests : pH by Meter       HDPE [ON MECP]       MW101-23       C       I	Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)									1	
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)       Sterile HDPE (Sodium thiosulphate) [ON MECP]       E012.FC       23-Mar-2023         24-Mar-2023       48 hrs       24 hrs         Physical Tests : pH by Meter       E108       23-Mar-2023       24-Mar-2023        Image: Color Co	Sterile HDPE (Sodium thiosulphate) [ON MECP]										
Sterile HDPE (Sodium thiosulphate) [ON MECP]       E012.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Physical Tests : pH by Meter       E108       23-Mar-2023       24-Mar-2023           26-Mar-2023       14 days       3 days         Physical Tests : pH by Meter       Physical Tests	MW101-23	E012.FC	23-Mar-2023					24-Mar-2023	48 hrs	24 hrs	✓
Sterile HDPE (Sodium thiosulphate) [ON MECP]       ED12.FC       23-Mar-2023          24-Mar-2023       48 hrs       24 hrs         Physical Tests : pH by Meter       ED12.FC       23-Mar-2023       24-Mar-2023           24-Mar-2023       48 hrs       24 hrs         Physical Tests : pH by Meter       E108       23-Mar-2023       24-Mar-2023         26-Mar-2023       14 days       3 days         Physical Tests : pH by Meter       HDPE [ON MECP]       E108       Cal-Mar-2023       24-Mar-2023         26-Mar-2023       14 days       3 days         Physical Tests : pH by Meter       E108       E108       E108       E108       Cal-Mar-2023       Cal-Mar-2023       14 days       3 days         Physical Tests : pH by Meter       E108       E108 <td></td>											
MW108-23       E012.FC       23-Mar-2023         24-Mar-2023       48 hrs       24 hrs         Physical Tests : pH by Meter         MW101-23       E108       23-Mar-2023       24-Mar-2023         26-Mar-2023       14 days       3 days         Physical Tests : pH by Meter         HDPE [ON MECP]       MW101-23       Compared to the test of test o	Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Physical Tests : pH by Meter         E108         23-Mar-2023         24-Mar-2023           26-Mar-2023         14 days         3 days           Physical Tests : pH by Meter         E108         23-Mar-2023           26-Mar-2023         14 days         3 days											
HDPE [ON MECP] MW101-23       E108       23-Mar-2023       24-Mar-2023         26-Mar-2023       14 days       3 days         Physical Tests : pH by Meter         HDPE [ON MECP]       Image: Control of the second seco	MW108-23	E012.FC	23-Mar-2023					24-Mar-2023	48 hrs	24 hrs	✓
HDPE [ON MECP] MW101-23       E108       23-Mar-2023       24-Mar-2023         26-Mar-2023       14 days       3 days         Physical Tests : pH by Meter         HDPE [ON MECP]       Image: Control of the second seco											
MW101-23       E108       23-Mar-2023       24-Mar-2023         26-Mar-2023       14 days       3 days         Physical Tests : pH by Meter         HDPE [ON MECP]       Image: Mare test in the second sec											
Physical Tests : pH by Meter         Image: Second sec	• •	=									,
HDPE [ON MECP]	MW101-23	E108	23-Mar-2023	24-Mar-2023				26-Mar-2023	14 days	3 days	1
HDPE [ON MECP]											
MW108-23     E108     23-Mar-2023     24-Mar-2023      26-Mar-2023     14 days     3 days			00.14					00.14			
	MW108-23	E108	23-Mar-2023	24-Mar-2023				26-Mar-2023	14 days	3 days	1
Physical Tests : TSS by Gravimetry											
HDPE [ON MECP]         E160         23-Mar-2023           24-Mar-2023         7 days         1 days		E160	23_Mar 2022					24 Mar 2022	7 dovo	1 dovo	1
MW101-23     E160     23-Mar-2023       24-Mar-2023     7 days     1 days		E 100	20-IVIAI-2023					24-ivid1-2023	ruays	Tuays	•



Matrix: Water					E	valuation: × =	Holding time exce	edance ; •	= Within	Holding Tim
Analyte Group	Method	Sampling Date	Ext	raction / Pi	reparation		Analysis			
Container / Client Sample ID(s)			Preparation	Holdin	g Times	Eval	Analysis Date	Holding	, Times	Eval
			Date	Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
MW108-23	E160	23-Mar-2023					24-Mar-2023	7 days	1 days	1
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
MW101-23	E508	23-Mar-2023	24-Mar-2023				24-Mar-2023	28 days	1 days	1
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
MW108-23	E508	23-Mar-2023	24-Mar-2023				24-Mar-2023	28 days	1 days	~
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
MW101-23	E420	23-Mar-2023	23-Mar-2023				24-Mar-2023	180	2 days	1
								days		
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
MW108-23	E420	23-Mar-2023	23-Mar-2023				24-Mar-2023	180	2 days	1
								days		

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

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# **Quality Control Parameter Frequency Compliance**

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: Water Quality Control Sample Type	·			ount	specification; ✓ = QC frequency within sp Frequency (%)		
	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Analytical Methods	Method	QC L01 #	40	riogului	Actual	Lxpecieu	Evaluation
Laboratory Duplicates (DUP)		074005		0.4	5.0	50	
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	874985	2	34	5.8	5.0	<u> </u>
Chloride in Water by IC	E235.Cl	875267	1	17	5.8	5.0	<u>√</u>
Fluoride in Water by IC	E235.F	875264	1	14	7.1	5.0	✓
pH by Meter	E108	875263	1	16	6.2	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	874756	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	875268	1	16	6.2	5.0	✓
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	874957	0	2	0.0	5.0	x
Total Cyanide	E333	881027	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	874759	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	874693	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	874409	1	17	5.8	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	874757	1	20	5.0	5.0	~
TSS by Gravimetry	E160	875240	1	19	5.2	4.7	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	874985	2	34	5.8	5.0	✓
Chloride in Water by IC	E235.Cl	875267	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	875264	1	14	7.1	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	877188	1	18	5.5	5.0	✓
Oil & Grease by Gravimetry	E567	877187	1	18	5.5	5.0	✓
pH by Meter	E108	875263	1	16	6.2	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	874756	1	13	7.6	5.0	~
Sulfate in Water by IC	E235.SO4	875268	1	16	6.2	5.0	1
Total Cyanide	E333	881027	1	11	9.0	5.0	~
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	874759	1	13	7.6	5.0	<ul> <li>Image: A start of the start of</li></ul>
Total Mercury in Water by CVAAS	E508	874693	1	19	5.2	5.0	~
Total metals in Water by CRC ICPMS	E420	874409	1	17	5.8	5.0	~
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	874757	1	20	5.0	5.0	√
TSS by Gravimetry	E160	875240	1	19	5.2	4.7	✓
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	874985	2	34	5.8	5.0	✓
Chloride in Water by IC	E235.CI	875267	1	17	5.8	5.0	1
Fluoride in Water by IC	E235.F	875264	1	14	7.1	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	877188	1	18	5.5	5.0	~
Oil & Grease by Gravimetry	E567	877187	1	18	5.5	5.0	√
Phenols (4AAP) in Water by Colorimetry	E562	874756	1	13	7.6	5.0	

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Matrix: Water		Evaluati			pecification; $\checkmark$ = QC frequency within specification;				
Quality Control Sample Type			Count			)			
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation		
Method Blanks (MB) - Continued									
Sulfate in Water by IC	E235.SO4	875268	1	16	6.2	5.0	1		
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	874957	1	2	50.0	5.0	✓		
Total Cyanide	E333	881027	1	11	9.0	5.0	✓		
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	874759	1	13	7.6	5.0	✓		
Total Mercury in Water by CVAAS	E508	874693	1	19	5.2	5.0	✓		
Total metals in Water by CRC ICPMS	E420	874409	1	17	5.8	5.0	✓		
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	874757	1	20	5.0	5.0	✓		
TSS by Gravimetry	E160	875240	1	19	5.2	4.7	✓		
Matrix Spikes (MS)									
Chloride in Water by IC	E235.Cl	875267	1	17	5.8	5.0	1		
Fluoride in Water by IC	E235.F	875264	1	14	7.1	5.0	✓		
Phenols (4AAP) in Water by Colorimetry	E562	874756	1	13	7.6	5.0	✓		
Sulfate in Water by IC	E235.SO4	875268	1	16	6.2	5.0	✓		
Total Cyanide	E333	881027	1	11	9.0	5.0	✓		
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	874759	1	13	7.6	5.0	✓		
Total Mercury in Water by CVAAS	E508	874693	1	19	5.2	5.0	✓		
Total metals in Water by CRC ICPMS	E420	874409	1	17	5.8	5.0	~		
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	874757	1	20	5.0	5.0	1		



### Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	Water	APHA 9222 D (mod)	Following filtration (0.45 µm), and incubation at 44.5 ±0.2°C for 22-26 hours, colonies
				exhibiting characteristic morphology of the target organism are enumerated and
	Waterloo -			confirmed.
	Environmental			
pH by Meter	E108	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted
				at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results,
	Waterloo -			pH should be measured in the field within the recommended 15 minute hold time.
	Environmental			
TSS by Gravimetry	E160	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre
				filter, following by drying of the filter at $104 \pm 1^{\circ}$ C, with gravimetric measurement of the
	Waterloo -			filtered solids. Samples containing very high dissolved solid content (i.e. seawaters,
	Environmental			brackish waters) may produce a positive bias by this method. Alternate analysis
				methods are available for these types of samples.
Chloride in Water by IC	E235.Cl	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV
				detection.
	Waterloo -			
	Environmental			
Fluoride in Water by IC	E235.F	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV
				detection.
	Waterloo -			
	Environmental			
Sulfate in Water by IC	E235.SO4	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV
				detection.
	Waterloo -			
	Environmental			
Total Kjeldahl Nitrogen by Fluorescence (Low	E318	Water	Method Fialab 100,	TKN in water is determined by automated continuous flow analysis with membrane
Level)			2018	diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde).
	Waterloo -			This method is approved under US EPA 40 CFR Part 136 (May 2021).
Table	Environmental		100.44400 (	
Total Cyanide	E333	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow
				Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis.
	Waterloo -			
	Environmental			Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up
Table Discussion in the (0.000	E070 H	Water	APHA 4500-P E (mod).	to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002	E372-U	vvaler		Total Phosphorus is determined colourimetrically using a discrete analyzer after heated
mg/L)	\\/ot!			persulfate digestion of the sample.
	Waterloo -			
	Environmental			

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Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total metals in Water by CRC ICPMS	E420 Waterloo -	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
	Environmental			Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
	Waterloo - Environmental			
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Waterloo -	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only
	Environmental			carbonaceous oxygen demand being reported by this method.
				Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Phenols (4AAP) in Water by Colorimetry	E562	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K3Fe(CN)6) and 4-amino-antipyrine (4-AAP) to
	Waterloo - Environmental			form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 Calgary - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG Calgary - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)
	Calgary - Environmental			
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the
	Waterloo -			analytical method as TKN. This method is unsuitable for samples containing high levels
	Environmental			of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
	Waterloo - Environmental			
Oil & Grease Extraction for Gravimetry	EP567	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
	Calgary - Environmental			

# **ALS Canada Ltd.**



#### **QUALITY CONTROL REPORT** Work Order Page WT2307174 : 1 of 10 : MTE Consultants Inc. Laboratory : Waterloo - Environmental Account Manager : Emily Hansen : Fraser Cummings Address : 520 Bingemans Centre Drive : 60 Northland Road, Unit 1 Kitchener ON Canada N2B 3X9 Waterloo, Ontario Canada N2V 2B8 Telephone Telephone :+1 519 886 6910 :49791-200 Date Samples Received :23-Mar-2023 12:35 Date Analysis Commenced :23-Mar-2023 :----C-O-C number Issue Date :20-1048805 :03-Apr-2023 13:41 :----519 743 6500

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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: 2

2

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Standing Offer 2023

### Signatories

Client

Contact

Address

Project

Sampler

Quote number

No. of samples received

No. of samples analysed

PO

Site

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
Cynthia Bauer	Organic Supervisor	Calgary Organics, Calgary, Alberta
Greg Pokocky	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Marsha Calero	Laboratory Assistant	Calgary Organics, Calgary, Alberta
Nguyen Tran	Laboratory Analyst	Calgary Organics, Calgary, Alberta

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### **General Comments**

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

# = Indicates a QC result that did not meet the ALS DQO.

### Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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### Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water							Labora	tory Duplicate (D	UP) Report		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC	Lot: 875240)										
WT2307157-001	Anonymous	Solids, total suspended [TSS]		E160	3.0	mg/L	30.5	30.7	0.654%	20%	
Physical Tests (QC	Lot: 875263)										
HA2300093-001	Anonymous	рН		E108	0.10	pH units	6.03	6.07	0.661%	4%	
Anions and Nutrien	ts (QC Lot: 874757)										
WT2306672-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	6.87	6.83	0.617%	20%	
Anions and Nutrien	ts (QC Lot: 874759)										
WT2306908-027	Anonymous	Kjeldahl nitrogen, total [TKN]		E318	0.050	mg/L	0.863	0.909	5.19%	20%	
Anions and Nutrien	ts (QC Lot: 875264)										
WT2307133-001	Anonymous	Fluoride	16984-48-8	E235.F	0.100	mg/L	1.59	1.61	0.793%	20%	
Anions and Nutrien	ts (QC Lot: 875267)										
WT2307133-001	Anonymous	Chloride	16887-00-6	E235.Cl	2.50	mg/L	5.98	5.80	0.17	Diff <2x LOR	
Anions and Nutrien	ts (QC Lot: 875268)										
WT2307133-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	1490	1500	0.439%	20%	
Cyanides (QC Lot:	881027)										
WT2307170-001	Anonymous	Cyanide, strong acid dissociable (Total)		E333	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	
Total Metals (QC L	ot: 874409)										
WT2307055-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0300	mg/L	4.97	4.94	0.556%	20%	
		Antimony, total	7440-36-0	E420	0.00100	mg/L	0.00126	0.00126	0.000003	Diff <2x LOR	
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	0.00360	0.00378	0.00018	Diff <2x LOR	
		Bismuth, total	7440-69-9	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	0.000108	0.000110	0.0000021	Diff <2x LOR	
		Chromium, total	7440-47-3	E420	0.00500	mg/L	0.0873	0.0868	0.615%	20%	
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	0.00436	0.00442	0.00006	Diff <2x LOR	
		Copper, total	7440-50-8	E420	0.00500	mg/L	0.0304	0.0302	0.00013	Diff <2x LOR	
		Iron, total	7439-89-6	E420	0.100	mg/L	7.16	7.19	0.492%	20%	
		Lead, total	7439-92-1	E420	0.000500	mg/L	9.38 µg/L	0.00936	0.182%	20%	
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.255	0.256	0.466%	20%	
		Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.0145	0.0146	0.629%	20%	
		Nickel. total	7440-02-0	E420	0.00500	mg/L	0.0135	0.0137	0.00017	Diff <2x LOR	

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Sub-Matrix: Water				Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lo	ot: 874409) - continued										
WT2307055-001	Anonymous	Selenium, total	7782-49-2	E420	0.000500	mg/L	0.000821	0.000709	0.000112	Diff <2x LOR	
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	
		Tin, total	7440-31-5	E420	0.00100	mg/L	0.00177	0.00182	0.00005	Diff <2x LOR	
		Titanium, total	7440-32-6	E420	0.00300	mg/L	0.209	0.210	0.632%	20%	
		Vanadium, total	7440-62-2	E420	0.00500	mg/L	0.0176	0.0173	0.00030	Diff <2x LOR	
		Zinc, total	7440-66-6	E420	0.0300	mg/L	0.0509	0.0527	0.0018	Diff <2x LOR	
Total Metals (QC Lo	ot: 874693)										
TY2302290-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	
Aggregate Organics	Gige Contemporary (Contemporary 1975)										
TY2302280-001	Anonymous	Phenols, total (4AAP)		E562	0.0500	mg/L	1.44	1.51	4.64%	20%	
Aggregate Organics	(QC Lot: 874985)										
WT2307173-003	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]		E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	
Aggregate Organics	Gige Content (Content to the second s										
WT2307174-001	MW101-23	Carbonaceous biochemical oxygen demand [CBOD]		E555	3.0	mg/L	<3.0	<3.0	0.0%	30%	

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### Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 875240)						
Solids, total suspended [TSS]		E160	3	mg/L	<3.0	
Anions and Nutrients (QCLot: 874757)					1 1	
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	
Anions and Nutrients (QCLot: 874759)						
Kjeldahl nitrogen, total [TKN]		E318	0.05	mg/L	<0.050	
nions and Nutrients (QCLot: 875264)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	
nions and Nutrients (QCLot: 875267)						
Chloride	16887-00-6	E235.CI	0.5	mg/L	<0.50	
Anions and Nutrients (QCLot: 875268)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	
Cyanides (QCLot: 881027)						
Cyanide, strong acid dissociable (Total)		E333	0.002	mg/L	<0.0020	
/licrobiological Tests (QCLot: 874957)						
Coliforms, thermotolerant [fecal]		E012.FC	1	CFU/100mL	<1	
otal Metals (QCLot: 874409)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.000050	
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	

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### Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 874409) - continued						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	
Total Metals (QCLot: 874693)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.000050	
Aggregate Organics (QCLot: 874756)						
Phenols, total (4AAP)		E562	0.001	mg/L	<0.0010	
Aggregate Organics (QCLot: 874985)						
Carbonaceous biochemical oxygen demand [CBOD]		E555	2	mg/L	<2.0	
Aggregate Organics (QCLot: 877034)						
Carbonaceous biochemical oxygen demand [CBOD]		E555	2	mg/L	<2.0	
Aggregate Organics (QCLot: 877187)						
Oil & grease (gravimetric)		E567	5	mg/L	<5.0	
Aggregate Organics (QCLot: 877188)						
Oil & grease, mineral (gravimetric)		E567SG	5	mg/L	<5.0	



### Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water						Laboratory Control Sample (LCS) Report										
					Spike	Recovery (%)	Recovery	Limits (%)								
Analyte	CAS Number Me	ethod	LOR	Unit	Concentration	LCS	Low	High	Qualifier							
Physical Tests (QCLot: 875240)																
Solids, total suspended [TSS]	E1	60	3	mg/L	150 mg/L	110	85.0	115								
Physical Tests (QCLot: 875263)																
pH	E1	08		pH units	7 pH units	101	98.0	102								
Anions and Nutrients (QCLot: 874757)																
Phosphorus, total	7723-14-0 E3	572-U	0.002	mg/L	0.845 mg/L	98.9	80.0	120								
Anions and Nutrients (QCLot: 874759)																
Kjeldahl nitrogen, total [TKN]	E3	18	0.05	mg/L	4 mg/L	101	75.0	125								
Anions and Nutrients (QCLot: 875264)																
Fluoride	16984-48-8 E2	35.F	0.02	mg/L	1 mg/L	101	90.0	110								
Anions and Nutrients (QCLot: 875267)																
Chloride	16887-00-6 E2	35.Cl	0.5	mg/L	100 mg/L	103	90.0	110								
Anions and Nutrients (QCLot: 875268)																
Sulfate (as SO4)	14808-79-8 E2	35.SO4	0.3	mg/L	100 mg/L	103	90.0	110								
Cyanides (QCLot: 881027)																
Cyanide, strong acid dissociable (Total)	E3	33	0.002	mg/L	0.25 mg/L	93.6	80.0	120								
Total Metals (QCLot: 874409)	7429-90-5 E4	20	0.003	ma/l	o.t. "	40.4	80.0	120								
Aluminum, total	7429-90-5 E4		0.0001	mg/L	0.1 mg/L	104	80.0	120								
Antimony, total Arsenic, total	7440-38-2 E4		0.0001	mg/L mg/L	0.05 mg/L	106	80.0	120								
Bismuth, total	7440-58-2 E4 7440-69-9 E4		0.00005	mg/L	0.05 mg/L	111 106	80.0	120								
Cadmium, total	7440-03-3 E4		0.000005	mg/L	0.05 mg/L 0.005 mg/L	108	80.0	120								
Chromium, total	7440-47-3 E4		0.0005	mg/L	0.0125 mg/L	108	80.0	120								
Cobalt, total	7440-48-4 E4		0.0001	mg/L	0.0125 mg/L	108	80.0	120								
Copper, total	7440-50-8 E4		0.0005	mg/L	0.0125 mg/L	106	80.0	120								
Iron, total	7439-89-6 E4		0.01	mg/L	0.05 mg/L	109	80.0	120								
Lead, total	7439-92-1 E4		0.00005	mg/L	0.025 mg/L	108	80.0	120								
, Manganese, total	7439-96-5 E4		0.0001	mg/L	0.0125 mg/L	108	80.0	120								
Molybdenum, total	7439-98-7 E4	20	0.00005	mg/L	0.0125 mg/L	106	80.0	120								
Nickel, total	7440-02-0 E4	20	0.0005	mg/L	0.025 mg/L	# 123	80.0	120	MES							
	7782-49-2 E4	~~	0.00005	mg/L	0.05 mg/L	105	80.0	120								

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Sub-Matrix: Water						Laboratory Control Sample (LCS) Report									
					Spike	Recovery (%)	Recovery	Limits (%)							
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifie						
Total Metals (QCLot: 874409) - continued															
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120							
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	106	80.0	120							
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	105	80.0	120							
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	108	80.0	120							
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	107	80.0	120							
Total Metals (QCLot: 874693)															
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	94.7	80.0	120							
Aggregate Organics (QCLot: 874756)															
Phenols, total (4AAP)		E562	0.001	mg/L	0.02 mg/L	105	85.0	115							
Aggregate Organics (QCLot: 874985)															
Carbonaceous biochemical oxygen demand [CBOD]		E555	2	mg/L	198 mg/L	96.3	85.0	115							
Aggregate Organics (QCLot: 877034)															
Carbonaceous biochemical oxygen demand [CBOD]		E555	2	mg/L	198 mg/L	100	85.0	115							
Aggregate Organics (QCLot: 877187)															
Oil & grease (gravimetric)		E567	5	mg/L	100 mg/L	84.1	70.0	130							
Aggregate Organics (QCLot: 877188)							·								
Oil & grease, mineral (gravimetric)		E567SG	5	mg/L	50 mg/L	85.5	70.0	130							
Qualifiers															
Qualifier Descr	iption														
		s marginally exceeded (b		(-) (				., ,							

acceptable as per OMOE & CCME).



### Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report									
					Sp	ike	Recovery (%)	Recovery	Limits (%)					
aboratory sample	Client sample ID	Analyte	CAS Number	Method	Concentration Target		MS	Low	High	Qualifier				
	ents (QCLot: 874757)													
WT2306672-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	ND mg/L	0.1 mg/L	ND	70.0	130					
Anions and Nutri	ents (QCLot: 874759)													
WT2306908-027	Anonymous	Kjeldahl nitrogen, total [TKN]		E318	2.78 mg/L	2.5 mg/L	111	70.0	130					
Anions and Nutri	ents (QCLot: 875264)						1 1							
WT2307133-001	Anonymous	Fluoride	16984-48-8	E235.F	5.08 mg/L	5 mg/L	102	75.0	125					
nions and Nutri	ents (QCLot: 875267)						1 1							
WT2307133-001	Anonymous	Chloride	16887-00-6	E235.CI	506 mg/L	500 mg/L	101	75.0	125					
	ents (QCLot: 875268)				000	000 mg/2		10.0	120					
WT2307133-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	500 mg/L	ND	75.0	125					
Cyanides (QCLo			14000-73-0	2203.004	ND IIIg/L	300 mg/L	ND	10.0	125					
WT2307170-001	Anonymous	Cyanide, strong acid dissociable (Total)		5000	0.040	0.05	00.0	75.0	405					
	-	Cyanide, strong acid dissociable (Total)		E333	0.242 mg/L	0.25 mg/L	96.8	75.0	125					
Total Metals (QC	í literatura de la companya de						1 1							
WT2307055-002	Anonymous	Aluminum, total	7429-90-5	E420	ND mg/L	0.1 mg/L	ND	70.0	130					
		Antimony, total	7440-36-0	E420	0.0535 mg/L	0.05 mg/L	107	70.0	130					
		Arsenic, total	7440-38-2	E420	0.0547 mg/L	0.05 mg/L	109	70.0	130					
		Bismuth, total	7440-69-9	E420	0.0508 mg/L	0.05 mg/L	102	70.0	130					
		Cadmium, total	7440-43-9	E420	0.00519 mg/L	0.005 mg/L	104	70.0	130					
		Chromium, total	7440-47-3	E420	ND mg/L	0.0125 mg/L	ND	70.0	130					
		Cobalt, total	7440-48-4	E420	0.0131 mg/L	0.0125 mg/L	105	70.0	130					
		Copper, total	7440-50-8	E420	0.0126 mg/L	0.0125 mg/L	100	70.0	130					
		Iron, total	7439-89-6	E420	0.052 mg/L	0.05 mg/L	103	70.0	130					
		Lead, total	7439-92-1	E420	0.0257 mg/L	0.025 mg/L	103	70.0	130					
		Manganese, total	7439-96-5	E420	ND mg/L	0.0125 mg/L	ND	70.0	130					
		Molybdenum, total	7439-98-7	E420	ND mg/L	0.0125 mg/L	ND	70.0	130					
		Nickel, total	7440-02-0	E420	0.0256 mg/L	0.025 mg/L	102	70.0	130					
		Selenium, total	7782-49-2	E420	0.0230 mg/L	0.05 mg/L	102	70.0	130					
		Silver, total	7440-22-4	E420	0.00478 mg/L	0.005 mg/L	95.6	70.0	130					
		Tin, total			Ū.	-								
		Titanium, total	7440-31-5	E420	0.0259 mg/L	0.025 mg/L	104	70.0	130					
			7440-32-6	E420	0.0122 mg/L	0.0125 mg/L	97.7	70.0	130					
		Vanadium, total	7440-62-2	E420	0.0269 mg/L	0.025 mg/L	107	70.0	130					

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#### Matrix Spike (MS) Report Sub-Matrix: Water Recovery (%) Recovery Limits (%) Spike Laboratory sample Analyte Method Client sample ID CAS Number MS Qualifier Concentration Target Low High ID Total Metals (QCLot: 874409) - continued WT2307055-002 Anonymous Zinc, total E420 7440-66-6 ND mg/L 0.025 mg/L ND 70.0 130 ----Total Metals (QCLot: 874693) TY2302290-002 Anonymous Mercury, total 0.0001 mg/L 7439-97-6 E508 0.0000982 mg/L 98.2 70.0 130 ----Aggregate Organics (QCLot: 874756) TY2302280-001 Anonymous Phenols, total (4AAP) E562 ----ND mg/L 0.02 mg/L ND 75.0 125 ----

Chain of Custody (COC) / Analytical Request Form

COC Number: 2

Environmental Division

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