



GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Preliminary Hydrogeological Assessment

Proposed 16-Storey Building Development

284 & 286 Dunlop Street West and 119 & 121 Henry Street

City of Barrie, Ontario

Prepared For:

Arten Development Group



GeoPro Project No.: 20-3280H

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Professional, Proficient, Proactive

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Limitations to the Report

1.0 INTRODUCTION

GeoPro Consulting Limited (“GeoPro”) was retained by Arten Development Group (the “Client”) to conduct a preliminary hydrogeological assessment for the proposed 16-storey building development at 284 & 286 Dunlop Street and 119 & 121 Henry Street, City of Barrie, Ontario. (the “Site”). The approximate site location is shown on Drawing No. 1.

It is understood that the Site is currently occupied by residential properties, and the client would like to carry out a development for a 16-storey building with 2 levels of underground parking.

It should be noted that the hydrogeological report was prepared based on the design information provided at the time of preparing the report. In the event the design information is modified or updated, this report should be reviewed by GeoPro and further recommendations will be provided as needed.

1.1 Purposes

The purposes of this preliminary hydrogeological assessment are to characterize the subsurface soil and groundwater conditions in the limited number of boreholes at the Site and to assess temporary dewatering and groundwater control needs (if any) in order to facilitate the design of the Project.

It should be noted that the preliminary hydrogeological assessment was completed concurrently with a geotechnical investigation carried out by GeoPro at the Site. The results of the geotechnical investigation were summarized in a separate report.

1.2 Scope of Work

In conjunction with the geotechnical investigation, the preliminary hydrogeological assessment comprised the following tasks:

- 1) Conducting a search and review of the available geology and hydrogeology data resources, including Ministry of the Environment, Conservation and Parks (“MECP”) Water Well Records (“WWR”), Ontario Geological Survey (“OGS”) and Ontario Source Water Protection Program;
- 2) Completing a borehole elevation survey, groundwater level monitoring, groundwater chemistry sampling, and in-situ hydraulic conductivity testing (slug testing); and
- 3) Data analyses, interpretation, and report preparation.

This report has been prepared for the Client. Third party use of this report without GeoPro’s consent is prohibited. The limitation conditions presented in this report form an integral part of the report and they must be considered in conjunction with this report.

1.3 Previous Investigations and Reports

1.3.1 Geotechnical Investigation by GeoPro

A geotechnical report entitled “*Geotechnical Investigation, Proposed 16-Storey Building, 284 & 286 Dunlop Street West and 119 & 121 Henry Street, City of Barrie, Ontario*” dated December 21, 2020 was prepared by GeoPro. The geotechnical investigation consisted of advancement of four (4) boreholes (BH1 to BH4) drilled to depths ranging from 11.3 to 17.2 meters below the existing ground surface (“mBGS”), and installation of three (3) monitoring wells in the advanced boreholes BH1, BH2 and BH4.

The information or data obtained from GeoPro’s geotechnical investigation has been incorporated in this preliminary hydrogeological assessment report. The approximate borehole and monitoring well locations are shown on Drawing No. 2, and the Borehole Logs are included in Appendix A.

2.0 SITE CONDITIONS

2.1 Site Feature Observations

A site visit was conducted on December 8, 2020 to observe the general site features and sources of potential contamination and/or environmental concern.

The Site is located west of Anne Street North between Henry Street and Dunlop Street West. The Site is occupied by residential properties and generally bounded by residential and commercial properties.

Catch basins and manholes were observed along the roadways on or near the Site

Bunker’s Creek was observed approximately 50 m southwest from the Site.

Dymment’s Creek was observed approximately 410 m southwest from the Site.

Gas stations, auto garages (auto service shops) and dry cleaners were noted within a 500 m radius from the Site based on Google Maps and summarized as below:

- Professional Touch Dry Cleaners (at 7 Anne Street) is approximately 120 m east of the Site
- Chem - Dry Simcoe County (at 25 Hart Drive) is approximately 180 m northwest of the Site
- J & C Dry (at 165 Wellington Street West) is approximately 470 m north of the Site
- Barrie Laundry Centre (at 304 Dunlop Street West) is approximately 60 m west of the Site
- ESSO CIRCLE K (at 7 Anne Street North) is approximately 80 m northeast of the Site
- AUTO GLASS (BARRIE)Windshield Repair, Automotive (at 19 Hart Drive) is approximately 190 m north of the Site
- Gunn's Auto Service Ltd (at 25 Hart Drive) is approximately 220 m south of the Site
- Barrie Auto Repair & Oil Change (at 11 Hart Drive Unit 6) is approximately 260 m south of the Site
- Gaunt Collision Centres (at 25A George Street) is approximately 340 m south of the Site

- J & S Auto (at 49 Anne Street South) is approximately 470 m southeast of the Site
- NAPA AUTOPRO – Northtown (at 15 George Street) is approximately 450 m south of the Site
- Kingsway Automotive (at 11 Hart Drive) is approximately 120 m south of the Site
- Lion Auto Services (Rizwan Mechanic) (at 25 Hart Drive) is approximately 210 m south of the Site
- Active Green + Ross Tire & Automotive Centre (at 38 Anne Street South) is approximately 340 m southeast of the Site

2.2 Physiography and Drainage

The Site is located within the Simcoe Lowlands and Uplands in an area comprised of Sand Plains and Drumlinized Till Plains according to the “Physiography Map of South Central Portion of Southern Ontario” prepared by the Ontario Department of Mines and Northern Affairs, and based on the Ontario Geological Survey (“OGS”) database.

The Site is located within the Barrie Creeks Subwatershed of the Lake Simcoe Watershed under the jurisdiction of the Lake Simcoe Region Conservation Authority (“LSRCA”). Bunker’s Creek is located approximately 50 m south beyond the Site, flows eastward and drains into Lake Simcoe about 1.2 km east of the Site.

2.3 Geology

2.3.1 Bedrock Geology

The bedrock at the Site consists of Middle Ordovician of limestone, dolostone, shale, arkose and sandstone, with the depths ranging from 113 to 117 mBGS, according to the “Bedrock Geology of Southern Ontario” prepared by the Ontario Department of Mines and Northern Affairs and based on the OGS database.

2.3.2 Surficial Geology

As shown on Drawing No. 3, the Site and its surrounding area are located in an area covered with coarse-textured glaciolacustrine deposits, according to the “Surficial Geology of Southern Ontario” database maintained by the OGS.

2.3.3 Site Stratigraphy

As indicated in the Borehole Logs, the soil stratigraphy at the Site generally consists of fill materials below pavement structure, underlain by cohesionless silty/sandy/gravelly soil, and cohesive clayey silt. No bedrock was encountered at the maximum drilled depth of approximately 17.2 mBGS.

Detailed description of soil strata encountered in the boreholes drilled at the Site is provided on the Borehole Logs in Appendix A.

2.4 Hydrogeology

The hydrogeological conditions at the Site were evaluated based on the information obtained from the Ministry of Natural Resources and Forestry and the Ontario Source Protection Information Atlas, the water well data collected from the MECP database, the information obtained during the geotechnical investigation, and the data collected from the additional work conducted at the Site.

2.4.1 Highly Vulnerable Aquifer (“HVA”)

Based on the Ontario Source Protection Information Atlas, the Site is located in an area with a Highly Vulnerable Aquifer (“HVA”). HVAs are delineated according to Technical Rules under the Clean Water Act. In general, an HVA will consist of source granular aquifer materials or fractured rock that have a high permeability and are exposed near the ground surface with a relatively shallow water table.

An aquifer is indicated as vulnerable if possible contaminants could quickly flow into it and impact water quality. In addition, a plume of the possible contaminants would migrate quickly in an HVA.

2.4.2 MECP WWR

A search of the MECP WWR database was conducted focusing on a 500 m radius from the Site. The locations of the MECP water wells are shown on Drawing No. 4. A summary of water well records is included in Appendix B and presented in the following table.

Type of Well Record	Number of Record
Domestic	2
Industrial	2
Municipal	3
Not Used	4
Other	2
Unknown	9
Dewatering	74
Monitoring	12
Monitoring and Test Hole	16
Total	124

Seven (7) well records are identified in the MECP WWR database as water supply wells. No bedrock was encountered at the maximum recorded depth of 115.2 mBGS, and water was reported at recorded depths ranging from 0.9 to 87.8 mBGS in overburden deposits. As the entire city is anticipated to be municipally serviced for water, it is unknown whether these wells are still in use.

The MECP WWR coordinate data was not verified by a well survey, thus the well locations and types should be considered as reference only. If more accurate information is needed for the wells, a door-to-door well survey may be considered.

2.4.3 Wellhead Protection Area (“WHPA”)

Based on the Ontario Source Protection Information Atlas, the Site and its neighboring properties are located within municipal Wellhead Protection Area WHPA-B, where water (and pollutants) move through the aquifer toward the municipal well in 2 years. The nearest municipal well is approximately 260 m east of the Site

2.4.4 Intake Protection Zone (“IPZ”)

Based on the information obtained from the Ontario Source Protection Information Atlas, the Site is located within a water intake protection zone (“IPZ”) IPZ-3 where contaminants released during an extreme event may be transported to municipal surface water intake. The nearest municipal surface water intake location is approximately 6.3 km southeast of the Site.

2.4.5 Groundwater Levels

Groundwater conditions were observed in the advanced boreholes during and immediately upon completion of drilling. The observations are included on the Borehole Logs in Appendix A.

Groundwater levels were measured on December 8, 2020 in all monitoring wells (BH1, BH2 and BH4).

The monitoring well construction details and the measured groundwater levels are recorded on the appended Borehole Logs and summarized in the following table.

Monitoring Well ID	Well Ground Elevation (mASL)	Screen Interval (mBGS)	December 8, 2020	
			Groundwater Level (mBGS)	Groundwater Elevation (mASL)
BH1	230.40	10.7 ~ 12.2	4.56	225.84
BH2	230.80	13.3 ~ 16.3	4.50	226.30
BH4	230.24	6.5 ~ 9.5	3.73	226.51

As shown in the above table, groundwater levels ranged from 3.73 to 4.56 mBGS during the monitoring period, corresponding to elevations of 225.84 to 226.51 meters above sea level (“mASL”).

Groundwater is expected to flows southwestward towards Bunker’s Creek; however, the extensive underground infrastructure in this urban setting may influence local groundwater flow patterns.

It should be noted that the groundwater levels can be expected to vary over time and are subject to seasonal fluctuations.

2.4.6 Groundwater Quality

Groundwater sampling was conducted on December 8, 2020 by GeoPro from Monitoring Well BH1. The collected groundwater sample was submitted to ALS Environmental (“ALS”) in Waterloo for chemical

analysis. The samples from BH1 were analyzed for physical, chemical and bacteriological parameters as specified in the Barrie Combined Sewer Use By-Law (the “Local Sewer Use By-Law”). The analytical results are included in Appendix C.

The results were compared with the respective criteria specified in the Local Sewer Use By-Law. Based on the comparison, exceedances of the storm standards were measured for Total Suspended Solids (“TSS”) and Biochemical Oxygen Demand (“BOD”) in the analyzed groundwater sample; no exceedance of sanitary standards were measured in the analyzed groundwater sample. A summary of the exceedances is presented in the following table.

Sample ID	Parameter	Concentration	Storm Standard	Sanitary Standard	Unit
BH1	TSS	<u>76.6</u>	15	350	mg/L
	BOD	<u>27</u>	15	300	mg/L

Notes: 76.6 = sample concentration exceeds Storm criteria

3.0 ESTIMATED HYDRAULIC CONDUCTIVITY

Hydraulic conductivity (K-value) of the soils was estimated based on the results obtained from grain size analyses of selected soil samples and from single well response tests (slug tests).

3.1 Grain Size Distribution Method

Grain size analysis (sieve and hydrometer) of three (3) soil samples collected from the borehole BH1, BH3 and BH4 were conducted, and the grain size analysis results are presented in Figure No. 1 to 3.

It is noted that the high fraction of fine-grained material in some samples resulted in a D_{10} value not being plotted on the graph. As a result, the hydraulic conductivity calculation used an approximated value for D_{10} .

The hydraulic conductivity of the selected soil samples was estimated using applicable empirical equations based on the particle size gradations. As shown in the table below, the estimated K values for the tested soil ranged from 1.1×10^{-6} cm/s to 4.2×10^{-2} cm/s.

Borehole ID	Sample #	Soil sample Depth (mBGS)	Soil Type	K Value (cm/s)
BH1	SS4	2.3 – 2.7	Fine Sand	5.3×10^{-3}
BH3	SS11	12.2 – 12.6	Silt	1.1×10^{-6}
BH4	SS8	7.6 – 8.1	Sand	4.2×10^{-2}

3.2 Single Well Response Test (Slug Test) Method

Single well response testing (slug testing) was conducted in three (3) monitoring wells BH1, BH2 and BH4. Prior to the slug testing, initial water levels in each well were measured manually using a water level tape,

and the monitoring wells were purged using Waterra inertial pumps (tubing and footvalves) to remove the sediments settled in the wells and in the sand pack around the well screens.

The field slug tests were completed using the rising head method, in which a known volume of groundwater was removed from the tested monitoring well, and the water level recovery was measured and recorded. Before purging the water, an electronic datalogger was placed in the monitoring well to record the change in water level (head) versus time through the test. The recorded water level data was plotted on a semi-logarithmic scale and analyzed using Hvorslev's method to estimate the hydraulic conductivity values.

Slug Test analysis graphs and calculations are included in Appendix D. A summary of K values estimated from the slug tests is shown in the following table.

Monitoring Well No.	Screen Depth (mBGS)	Soil Type	Estimated K-Value (cm/s)
BH1	10.7 ~ 12.2	Silty Fine Sand; Silt	7.3×10^{-5}
BH2	13.3 ~ 16.3	Silt	9.1×10^{-6}
BH4	6.5 ~ 9.5	Sand	1.7×10^{-3}

Based on the slug test results, the estimated hydraulic conductivity value of the screened soils ranged from 9.1×10^{-6} cm/s to 1.7×10^{-3} cm/s.

4.0 TEMPORARY DEWATERING REQUIREMENTS

Temporary dewatering is intended to lower the groundwater table within the excavation area in order to provide a "dry" working condition during excavation and installation operations.

The temporary dewatering flow rate generally depends on the design specifications of the proposed structures (such as invert elevation, length, depth, size, etc.), the site hydrogeological conditions (such as existing groundwater levels and flow regime), and the drawdown levels required for maintaining dry working conditions and stable excavation bottom and slopes.

4.1 The Project Concept

Based on the design drawings dated June 28, 2022 provided by the Client, the proposed development consists of a 16-storey building with 2 levels of underground parking ("P2"). The anticipated excavation size of the P2 is estimated and summarized in the following table.

Location	Anticipated Excavation Length (m)	Anticipated Excavation Width (m)	Anticipated Excavation Depth (mBGS)
P2	77	32	6.9

A copy of the design drawings is provided in Appendix E.

4.2 Excavation and Temporary Dewatering Requirements

Groundwater levels measured in the on-site monitoring wells range from 3.73 to 4.56 mBGS, corresponding to elevations of 225.84 to 226.51 mASL. Considering seasonal fluctuations, the initial water level for dewatering is assumed to be 1.5 m higher than the highest measured groundwater level, at 2.23 mBGS. As a result, the excavations for the project are anticipated to occur below the groundwater table, and temporary dewatering or groundwater control is anticipated to lower the water level to at least 1.5 m below the excavation base to achieve dry work conditions for the excavation and installation.

Dewatering involves controlling groundwater by pumping, to locally lower groundwater levels in the vicinity of the excavation. Sump pumping is the simplest form of dewatering, by which groundwater is allowed to enter the excavation, and is then collected in a sump and pumped away by robust solids-handling pumps. Sump pumping can be effective in many circumstances, but continual seepage into the excavation may create the risk of instability and other problems.

To prevent significant groundwater seepage into the excavation and ensure stability of the excavation base and side slopes, it may be necessary to lower groundwater levels prior to excavation, which is known as 'pre-drainage'. The pre-drainage methods may include deep wells, wellpoints, eductors (ejectors), vacuum wells, horizontal wells, etc.

Based on the results of the investigation, the subsurface conditions consisted of predominant water bearing sandy/silty/gravelly soils below groundwater levels. Considering the relatively high hydraulic conductivity of water bearing sandy/silty/gravelly soils in the excavation areas, pre-drainage groundwater control measures using wells and/or well points should be considered in conjunction with conventional sump pumping. Considering the heterogeneous nature of the soils at the Site, variation of the anticipated groundwater seepage should be considered in the dewatering system design.

4.3 Temporary Dewatering Estimation

The following assumptions are considered in estimating the temporary dewatering requirements:

- An initial groundwater level at 2.23 mBGS;
- A target water level 1.5 m below the excavation bottom;
- Excavation width for foundation to be 2 m plus the proposed foundation width;
- Excavation length for foundation to be 2 m plus the proposed foundation length;
- The highest calculated hydraulic conductivity obtained from slug tests (1.7×10^{-3} cm/s or 1.7×10^{-5} m/s) was used for the dewatering rate estimation, which was assumed for all water bearing soils encountered by the excavation.

The following Dupuit-Thiem equation was used to calculate radial flow to an open excavation from an unconfined aquifer under steady-state condition:

$$Q = [\pi \times K \times (H^2 - h_w^2)] / \ln(R_o/r_e)$$

Where:

Q = Flow Rate [m^3/s]

H = Initial Water Level [m]

h_w = Target water Level [m]

K = Hydraulic Conductivity [m/s]

r_e = effective radius [m], $r_e = (\text{excavation area} / \pi)^{0.5}$ [m]

$R_o = 3000 * (H - h_w) * K^{1/2}$ [m]

Based on the calculations shown above, the estimated steady-state groundwater inflow rate for the Project are summarized in the following table:

Type	Steady-State Dewatering Rate
	(L/day)
P2	2,607,224

It should be noted that the dewatering requirement is expected to be highest at the beginning of the dewatering process, when the volume of groundwater stored within the pore space of the soil matrix must be removed. The additional pumping rates to be considered to allow removal of the overburden storage within 30 days for the Project are summarized in the following table:

Type	Removal of Overburden Storage
	(L/day)
P2	643,129

During and after storm events, significantly higher dewatering flow rates are anticipated to account for direct precipitation and runoff into the excavation. The highest recorded daily rainfall at a nearby Environment Canada station (Barrie WPCC) is 96.0 mm (based on data from Environmental Canada). Assuming removal of a 96.0 mm storm event within 24 hours, the additional pumping capacities for the Project are summarized in the following table:

Type	Removal of Precipitation
	(L/day)
P2	415,107

Based on the conservative assumptions described above, a total maximum daily dewatering flow rates for the Project were summarized in the following table:

Type	Estimated Total Dewatering Rate
	(L/day)
P2	3,665,461

Based on the conservative assumptions described above, the total maximum daily dewatering flow rate for the entire site area would be more than 400,000 L/day, with consideration of removal of the aquifer storage within a 30-day period and storm events. The maximum estimated zone of influence for dewatering the entire site area would be 76 m from the edge of the excavation.

It should be noted that the assumed excavation depths and areas for the dewatering volume estimation are based on our understanding of the proposed development and the preliminary information provided by the Client. Should there be any modifications of the design or the assumed depths and areas, or if dewatering of the project is proposed to take place in phases, this office should be further consulted and the dewatering estimation will need to be revised accordingly.

It is known that the subsurface soil conditions may change significantly between and beyond the on-site boreholes. As the information obtained and assumptions made in this investigation report are based on the results obtained from a limited number of investigated locations, unexpected water bearing zones with a hydraulic conductivity higher than that used in these calculations may be present. In addition, the above estimated dewatering volumes are based on the estimated hydraulic conductivities (K-value) from grain size analysis from limited soil samples and in-situ slug tests.

Please note that it is the responsibility of the contractor to ensure dry conditions are maintained within the excavation at all time and at all costs.

4.4 Preliminary Long-term Dewatering or Under-slab Drainage

Based on the geotechnical investigation, sporadic low N values in the native soils were encountered in some of the boreholes drilled at the site, as such, consideration may be given to a raft foundation in conjunction with a sufficient water proof system wrapped the entire raft foundation and foundation walls to at least 2.5 m above the highest groundwater table at the site. Should this be the case, foundation drainage system would not be required for the proposed development.

4.5 Permit-to-Take-Water/Regulatory Registration

According to O. Reg. 387/04, any water taking over 50,000 litres per day requires a Permit to Take Water ("PTTW"), which shall be obtained in accordance with the MECP's PTTW Manual, dated April 2005.

According to O. Reg. 63/16, a PTTW will not be required for temporary dewatering at a construction site in an amount less than 400,000 L/day. However, the dewatering at a construction site in an amount between 50,000 L/day and 400,000 L/day shall be registered through the Environmental Activity and Sector Registry ("EASR").

According to the dewatering rate estimations, the total temporary dewatering rate of the proposed development would be more than 400,000 L/day, for which a PTTW will be required.

5.0 POTENTIAL TEMPORARY DEWATERING IMPACTS

5.1 Potential Sources of Contamination

Based on the observations made during the site visit, commercial property which may have potential contamination and/or environmental concern was noted to be located within the estimated zone of influence. Also, as exceedances of the local Sewer Use By-Law were measured in the on-site groundwater sample, treatment of pumped water prior to discharge may be required to satisfy the local Sewer Use By-Law should be considered when designing a dewatering system.

Please note that the level of environmental issues observation outlined herein is meant to provide a broad indication of environmental concerns based on the visual observations during the site visit. The observation results contained in this report should not be considered a warranty with respect to environmental evaluation or assessment of the subject site for any specific purpose. Furthermore, it must be noted that our scope of work was limited to the preliminary observation of potential environmental concerns. The scope of work did not include any environmental evaluation or assessment of the subject site (such as a Phase One or Phase Two Environmental Site Assessment).

5.2 Highly Vulnerable Aquifer

As discussed previously, the Site is located in an area with an HVA present beneath the Site, which indicates that contaminants could potentially affect the aquifer if contamination occurs at the Site.

Frequent monitoring of the excavation and installation activities should be carried out during the project; preventative measures (such as implementation of safe equipment fueling practices) should be in place during excavation and installation, and spill management equipment should be readily available on-site during the project.

In addition, commercial properties which may have potential contamination and/or environmental concern were noted to be located within the preliminarily estimated zone of influence during the site visit, frequent monitoring of the groundwater quality to evaluate the possibility of contaminant migration from the commercial properties with potential contamination and/or environmental concern to the Site.

5.3 Intake Protection Zone

As discussed previously, the Site and its neighboring properties are located within an Intake Protection Zone IPZ-3. Therefore, impact on a surface water intake source due to the temporary dewatering activities should be anticipated.

Frequent monitoring of the excavation and installation activities should be carried out during the project; preventative measures (such as implementation of safe equipment fueling practices) should be in place

during excavation and installation, and spill management equipment should be readily available on-site during the project.

5.4 Water Supply Wells near the Site Area

Based on the MECP water well records, no water supply wells are located within the estimated zone of influence. However, as the coordinates of the MECP WWR database are unreliable, a door-to-door well survey should be considered.

5.5 Wellhead Protection Sensitivity Area

As discussed, the Site is located within municipal Wellhead Protection Area WHPA-B. Therefore, impact on the municipal well due to the temporary dewatering activities should be anticipated.

5.6 Surface Water

As discussed previously, Bunker's Creek is located within the preliminary estimated zone of influence. Therefore, impact on Bunker's Creek due to the temporary dewatering activities should be considered.

5.7 Ground Subsidence in Adjacent Structures

Under certain conditions, dewatering activities can cause ground settlement or subsidence. When groundwater levels are lowered in the soil deposits, effective stresses will be increased and consolidation and subsequent settlement may occur.

During the site visit, catch basins and manholes were noted along the roadways on and around the Site, as well as residential houses and structures adjacent to the Site. Therefore, potential impact associated with the temporary dewatering should be considered for the buildings, structures, roadways, and underground utilities which are located within the estimated zone of influence.

6.0 RECOMMENDATIONS

6.1 PTTW Application

- Based on the preliminary dewatering calculations presented above, the total temporary dewatering rate is more than 400,000 L/day, for which a PTTW would be required.
- The PTTW application should be conducted in accordance with the Permit to Take Water Manual, dated April 2005, issued by Ministry of the Environment and Climate Change.
- The process of PTTW application will generally take a minimum of three (3) months.

6.2 Municipal Sewer Use Permit

- Should discharge of temporary dewatering effluent to the municipal sewers be desired, a Sewer Use permit would also be required for temporary construction dewatering.

- The process of obtaining a Sewer Use permit can take six to twelve months or more, depending on the review and turnaround time at the City.

6.3 Point of Discharge

As discussed above, catch basins and manholes were noted along the roadway of the Site during the site visit. Therefore, discharge to the sewer may be an option.

Prior to startup of dewatering operations, samples of groundwater should be obtained from the dewatering system and submitted for analysis of the appropriate Sewer Use By-Law parameters. Based on the chemical analysis of groundwater samples obtained during this assessment, no exceedance of the local sanitary standards was measured, and exceedance of the storm standard were measured for TSS and BOD. It should be noted that filtration and/or settlement of the pumped water prior to discharge would be expected improve the water quality.

Installation of an appropriate water filtration/treatment system designed to address any measured exceedances would be necessary prior to start-up of dewatering. Should the treated water meet the Local Sewer Use By-Law criteria, the water generated could be discharged into the local municipal sewer system provided a Municipal Sewer Use Permit is in place. In addition, during discharge, the water quality must be in compliance with the requirements set up in the Local Sewer Use By-Law.

6.4 Discharge Permit

Should discharge into the local sewer system be selected, prior to temporary dewatering consultations with the local municipality should be conducted to obtain a permit to use the selected sewer system for the water generated during the excavation and installation.

It should be noted that in support of applying for a discharge permit, a temporary dewatering plan may be required by the local municipality.

6.5 Temporary Dewatering Plan

Prior to the dewatering activities, a temporary dewatering plan shall be prepared by the selected contractor for GeoPro's review.

It should be noted that the design and installation of a temporary dewatering system is the responsibility of the construction contractor, including selection of a sump pump, wellpoint system or well system. The extent and details of the dewatering scheme (well size, spacing, pump level, screen size, wick gradation, etc.) are left solely to the contractor's discretion to achieve the performance objectives for stable slopes and dry conditions and will be based on their own interpretation and analysis of the site conditions, equipment, experience and system efficiency.

Once the pumping system, header pipes and a decanter tank/holding tank are installed, a trial dewatering for a short period of time should be conducted to obtain a representative groundwater sample from the decanting tank for chemical analysis to confirm the water quality.

6.6 Water Well Survey and Water Level Monitoring

As discussed above, some water supply wells may be located within or close to the estimated zone of influence. The construction dewatering may influence the use of the existing water wells because of the lowering of the water levels.

It would be recommended to conduct a door-to-door water well survey on the properties located adjacent to the construction site and/or within the estimated zone of influence to establish a baseline information of the water well(s) near the construction site. If agreed on with the well owners, a well water monitoring program (including water level and water quality) could be conducted on the accessible water well(s) during the construction.

In addition, the construction site contact information would be given to the well owners for emergency purposes, and temporary provision of potable water would be made available in case that the unexpected lowering of water levels causes the malfunction of the water wells near the Site.

6.7 Building/Structure Settlement Monitoring

As discussed above, structures located within the zone of influence may be susceptible to potential settlement or subsidence due to the temporary dewatering. Therefore, the following monitoring and mitigative measures are recommended to be carried out before and during the temporary dewatering:

- Complete a pre-excavation condition survey, and install settlement monitoring monuments for the existing buildings and roadways within the estimated zone of influence.
- The settlement monitoring monuments should be surveyed prior to the dewatering to establish a baseline, and surveyed on a daily basis during the dewatering. The survey results will be provided to the geotechnical engineer of GeoPro for evaluation. The estimated potential and actual settlements should also be reviewed by a structural engineer to assess the potential damage to the existing structures.
- If the settlement monitoring indicates an undesirable deformation, the dewatering will have to be reduced to a lower rate or ceased temporarily, and alternative measures may be considered for the excavation, which should be approved by the geotechnical engineer and project team.

6.8 Surface Water Monitoring and Contingency/Mitigation Measures

As discussed above, Bunker's Creek may be impacted because of its proximity from the excavation site. The following recommendations are provided for assessment of potential impacts to the Creek.

6.8.1 *Baseline Study*

A baseline study of the rivers within the estimated zone of influence should be conducted to establish the pre-dewatering water level, baseflow and water quality conditions, which may include chemical testing of surface water samples for general metals and inorganics or other parameters per recommendations from the local Conservation Authority. Staff gauges shall be installed at locations upstream and downstream from the construction area(s) to allow for during-construction monitoring of stream levels.

6.8.2 *Surface Water Level and Baseflow Monitoring*

Considering that the treated water may be discharged directly or indirectly to the Creek, the surface water level and baseflow will likely be maintained.

Visual observation of the Creek water levels should be conducted daily at a selected location during the dewatering. If significant changes are observed, the discharge method or volume may need to be evaluated and adjusted.

6.8.3 *Surface Water Quality Monitoring*

If significant water level changes occur during temporary dewatering, water sampling and chemical testing may be required to assess any change in surface water quality. Should adverse impact be observed during the temporary dewatering, the dewatering volume may need to be modified. If required, water with acceptable water quality which meets the PWQO standards may be introduced to the Creek to maintain the baseflow in the Creek.

6.9 *Groundwater Monitoring and Contingency/Mitigation Measures for Temporary Dewatering*

Prior to commencement of the temporary dewatering, water level measurements shall be obtained from all on-site monitoring wells to verify the assumed water levels used in the calculations. If significant variation occurs, the dewatering volume calculations may be reviewed and updated.

6.9.1 *Total Dewatering Volume*

- The pumping rate and discharged volume shall be measured daily using a flow measuring device to ensure that the dewatering rate/volume does not exceed the approved or accepted limits.
- If the measured daily volume exceeds the approved limit, either the dewatering methodology or the construction methodology will need to be altered to ensure the maximum permitted rate is not exceeded.
- The contractor on behalf of the Client shall maintain a record of all water takings, including the dates and durations of water takings, and the rates and total measured volumes of water pumped per day for each day that water is taken under the permit.

6.9.2 Water Quality

Depending on the selected point of discharge, water quality should be regularly monitored during the temporary dewatering to ensure that discharge meets the relevant Local Sewer Use By-Law quality criteria.

As TSS is an important parameter which may directly reflect the water quality, a treatment facility should be considered to reduce the concentration of suspended solids in the pumped water.

Prior to discharge of the treated water, a representative water sample should be collected and analyzed for the parameters specified in the applicable standards or criteria. During the temporary dewatering, daily field monitoring of the TSS/turbidity in the water to be discharged is recommended.

In addition, groundwater quality shall be monitored via chemical testing for parameters as specified in the local Sewer Use By-Law weekly for the first month. If the results demonstrate that groundwater quality consistently meets the applicable standards, the monitoring frequency can be reduced to once each month afterwards.

6.10 Monitoring Well Decommissioning

According to Ontario Regulation 903 ("O. Reg. 903"), when the monitoring wells are no longer used, they should be decommissioned by a licensed water well contractor.

7.0 CLOSURE

We trust that the information contained in this report is complete within our terms of reference. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely,

GeoPro Consulting Limited

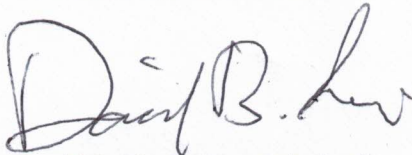
Geotechnical - Hydrogeology - Environmental - Materials Testing - Inspection



Nick Lan



Ruby Desirre E. Tagoon
Hydrogeological Specialist



David B. Liu, P.Eng., Principal

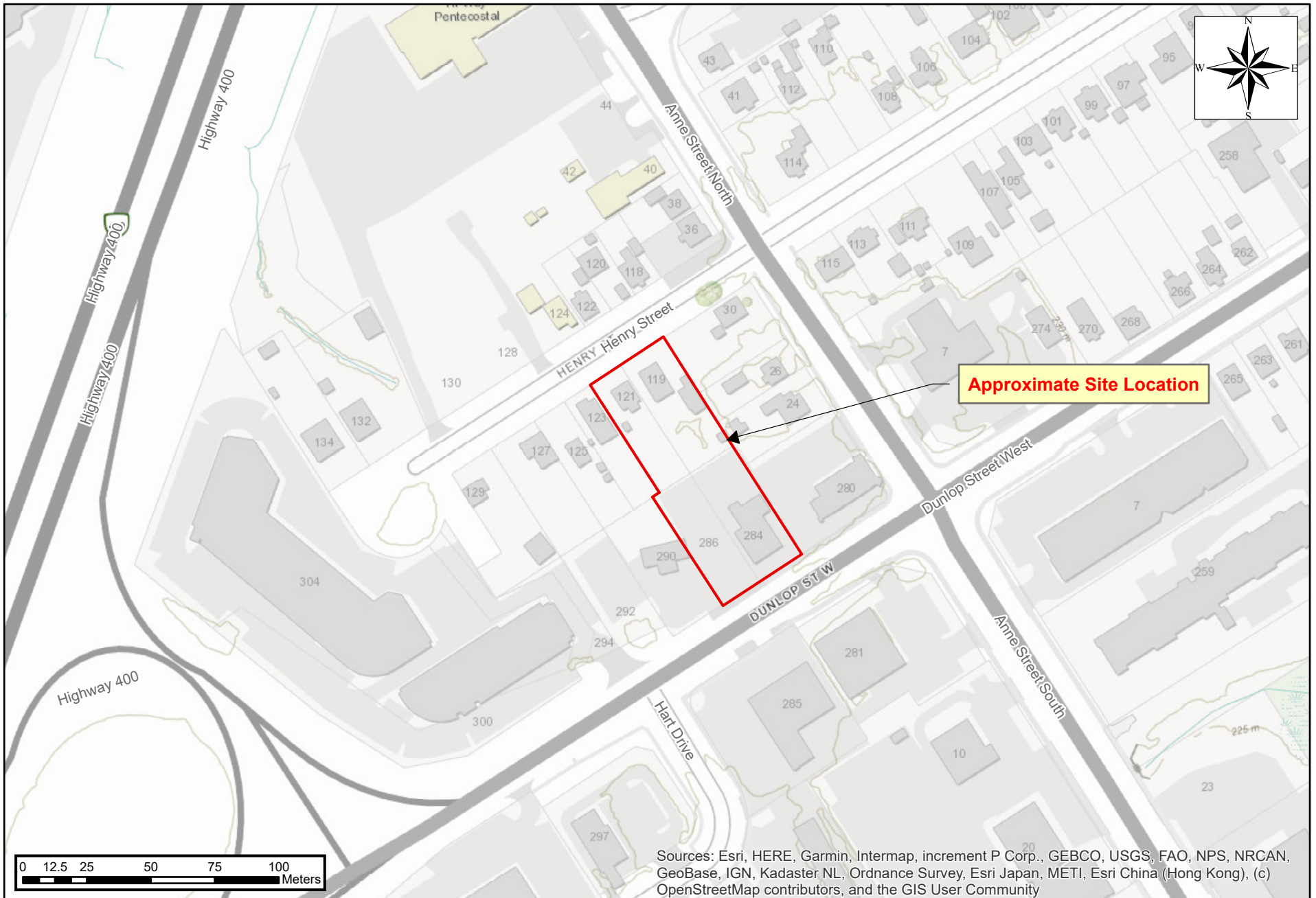




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DRAWINGS

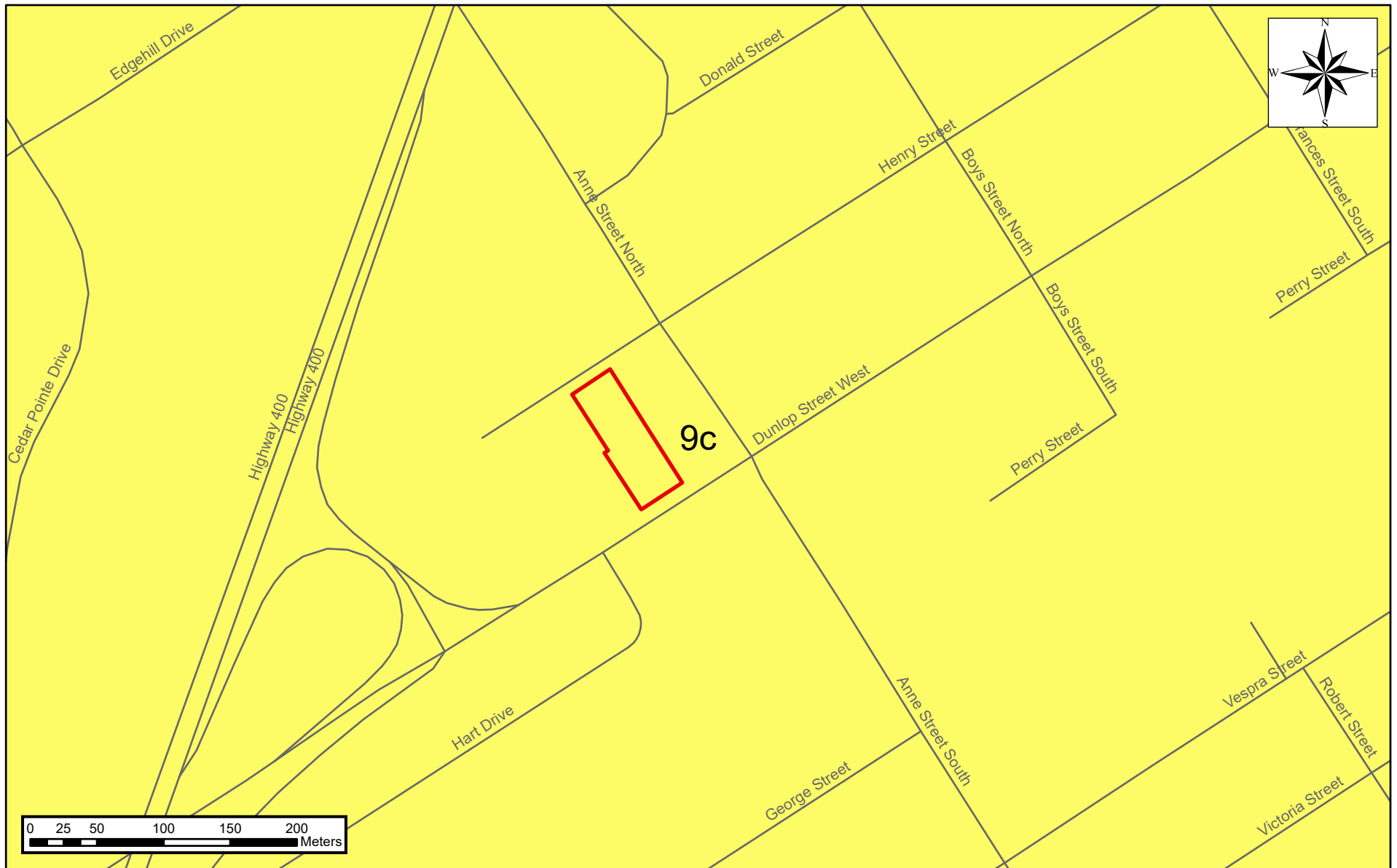


Prepared by: BN	Rev: KY	Approved: KY	Scale: As Shown	Project No.: 20-3280H	Drawing No.: 1	Original Size: Letter
Date: October 2020	Client: Arten Development Group	Title: Site Location Plan	Project: Preliminary Hydrogeological Assessment Proposed 16-Storey Building Development 284&286 Dunlop St W and 119&121 Henry St City of Barrie, Ontario		 GeoPro Consulting Limited	



Legend Site Property Borehole Location Monitoring Well Location	Client: Arten Development Group		Project No.: 20-3280H	Drawing No.: 2
	Prepared by: BN	Approved: KY	Title: Borehole/Monitoring Well Location Plan	
	Date: December 2020	Scale: As Shown	Project: Preliminary Hydrogeological Assessment Proposed 16-Storey Building Development 284 & 286 Dunlop St and 119 & 121 Henry St City of Barrie, Ontario	
	Original Size: Letter	Rev: KY	GeoPro Consulting Limited	

Note: when the monitoring wells are no longer in use, they should be decommissioned by a licensed water well contractor. per Ontario Regulation 903 ("O. Reg. 903"),



Legend

- Site Property
- 9c: Coarse-textured glaciolacustrine deposits: sand, gravel, minor silt and clay, foreshore and basinal deposits

Map Sources:

1. Surficial Geology of Southern Ontario
2. Natural Resources Canada

Prepared by: BN

Rev: KY

Approved: KY

Scale: As Shown

Project No.: 20-3280GH

Drawing No.: 3

Original Size: Letter

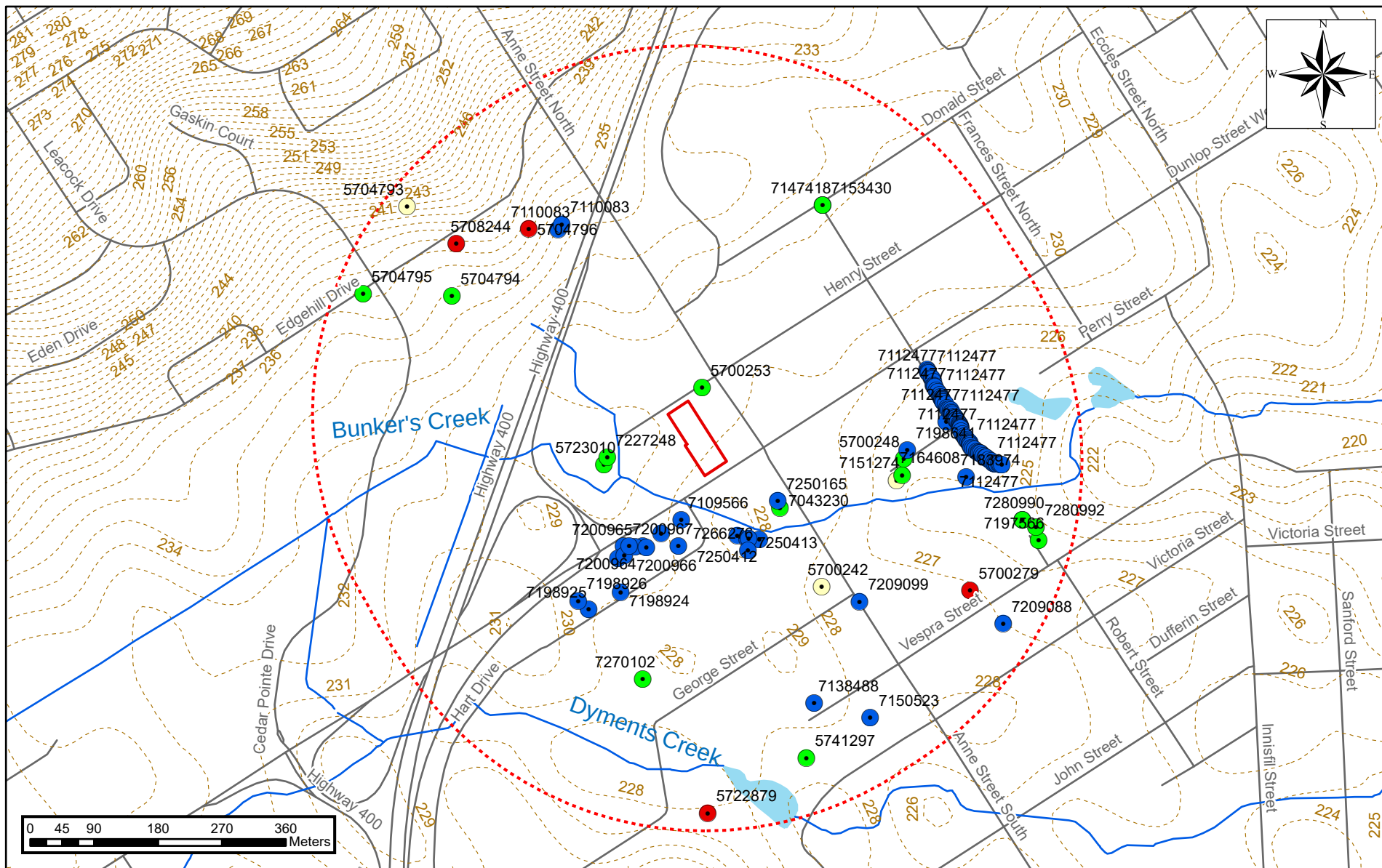
Date:
October 2020

Client:
Arten Development Group

Title:
Surficial Geology

Project: Preliminary Hydrogeological Assessment
Proposed 16-Storey Building Development
284&286 Dunlop St W and 119&121 Henry St
City of Barrie, Ontario

 **GeoPro Consulting Limited**



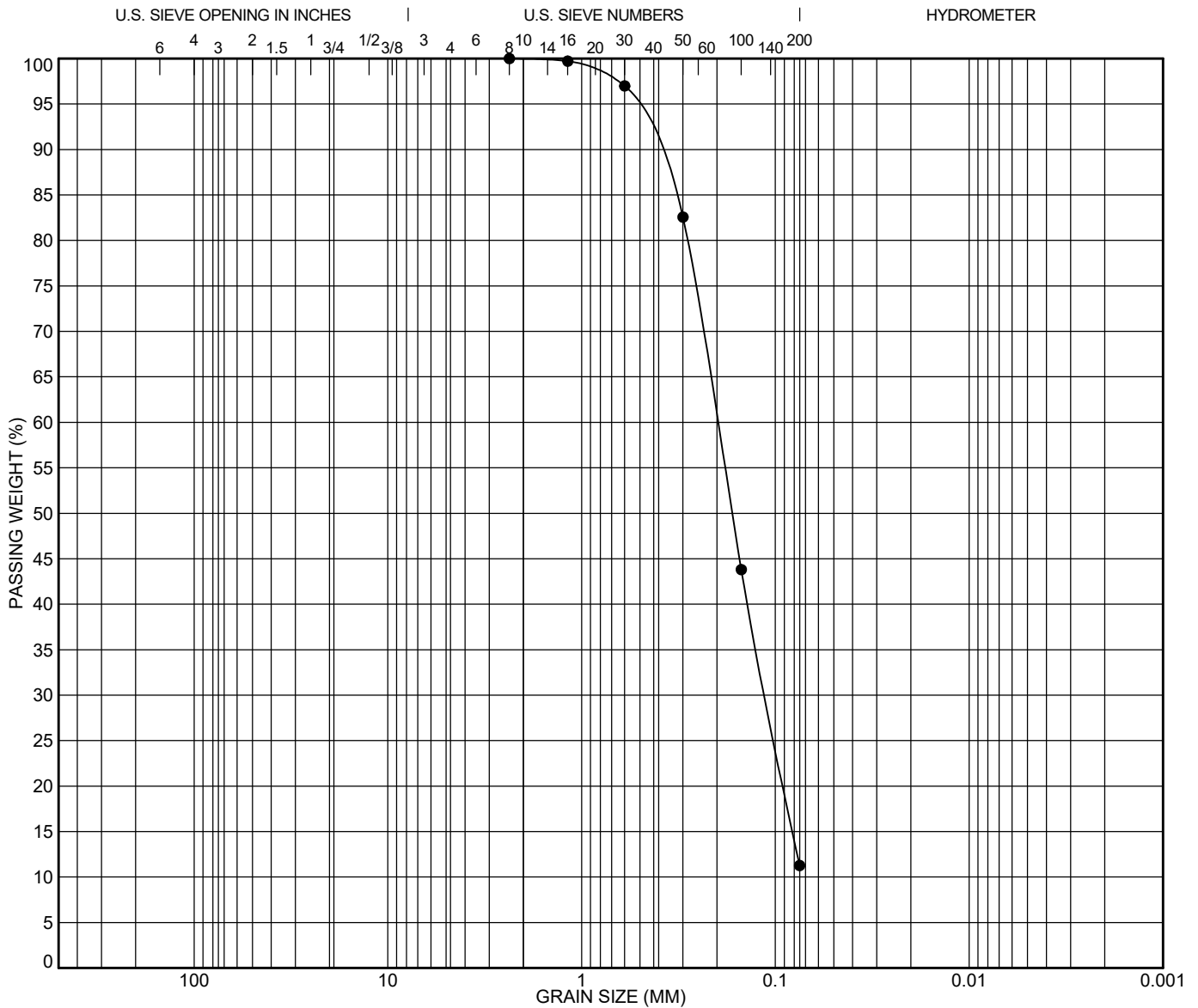
Legend Site Property 500m Radius from The Site Watercourse Domestic/Industrial Dewatering/Monitoring/Monitoring and Test Hole Not Used/Unknown/ Other Municipal Elevation Contour Waterbody					Map Sources: 1. Altas Canada - Toporama 2. MECP Water Well Database 3. Resources Canada	
Prepared by: BN	Rev: KY	Approved: KY	Scale: As Shown	Project No.: 20-3280H	Drawing No.: 4	Original Size: Letter
Date: October 2020	Client: Arten Development Group	Title: MECP Water Well Location Plan	Project: Preliminary Hydrogeological Assessment Proposed 16-Storey Building Development 284&286 Dunlop St W and 119&121 Henry St City of Barrie, Ontario		GeoPro Consulting Limited	



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FIGURES



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification				Classification				LL	PL	PI	Cc	Cu
●	BH1	SS4	2.29								0.85	2.74
Specimen Identification				D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	BH1	SS4	2.29	2.36	0.2	0.112		0.0	88.7	11.3		



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GRAIN SIZE DISTRIBUTION

PROJECT: Geotechnical Investigation for Proposed 16-Storey Residential/Commercial Building Development

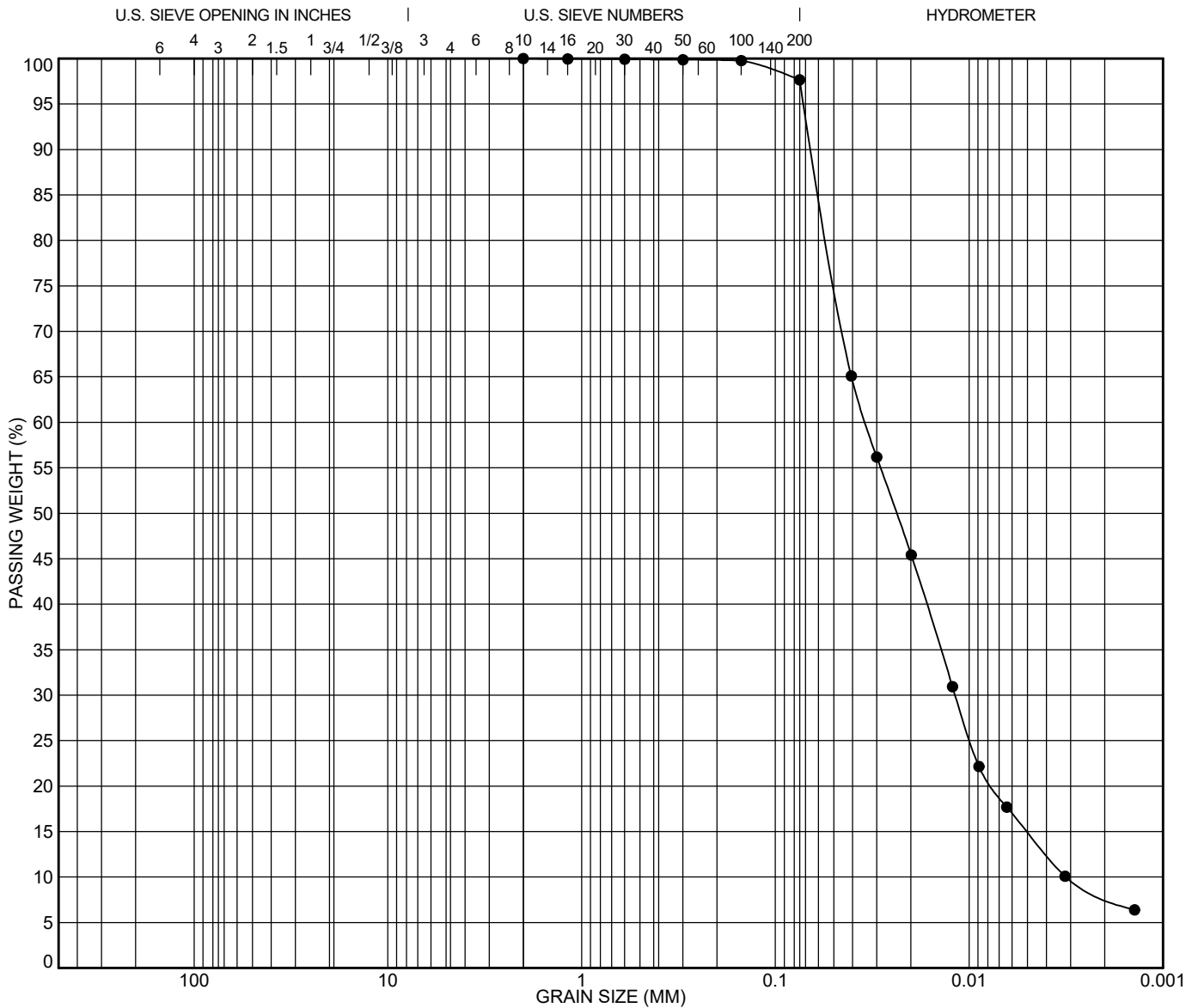
LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie

PROJECT NO.: 20-3280GH01

SAMPLED ON: 2020-11-19

FIGURE NO.: 1

TESTED ON: 2020-12-04



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification			Classification				LL	PL	PI	Cc	Cu
●	BH3	SS11 12.19								1.30	10.86
Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	BH3	SS11 12.19	2	0.034	0.012	0.003	0.0	2.3	89.7	8.0	



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GRAIN SIZE DISTRIBUTION

PROJECT: Geotechnical Investigation for Proposed 16-Storey Residential/Commercial Building Development

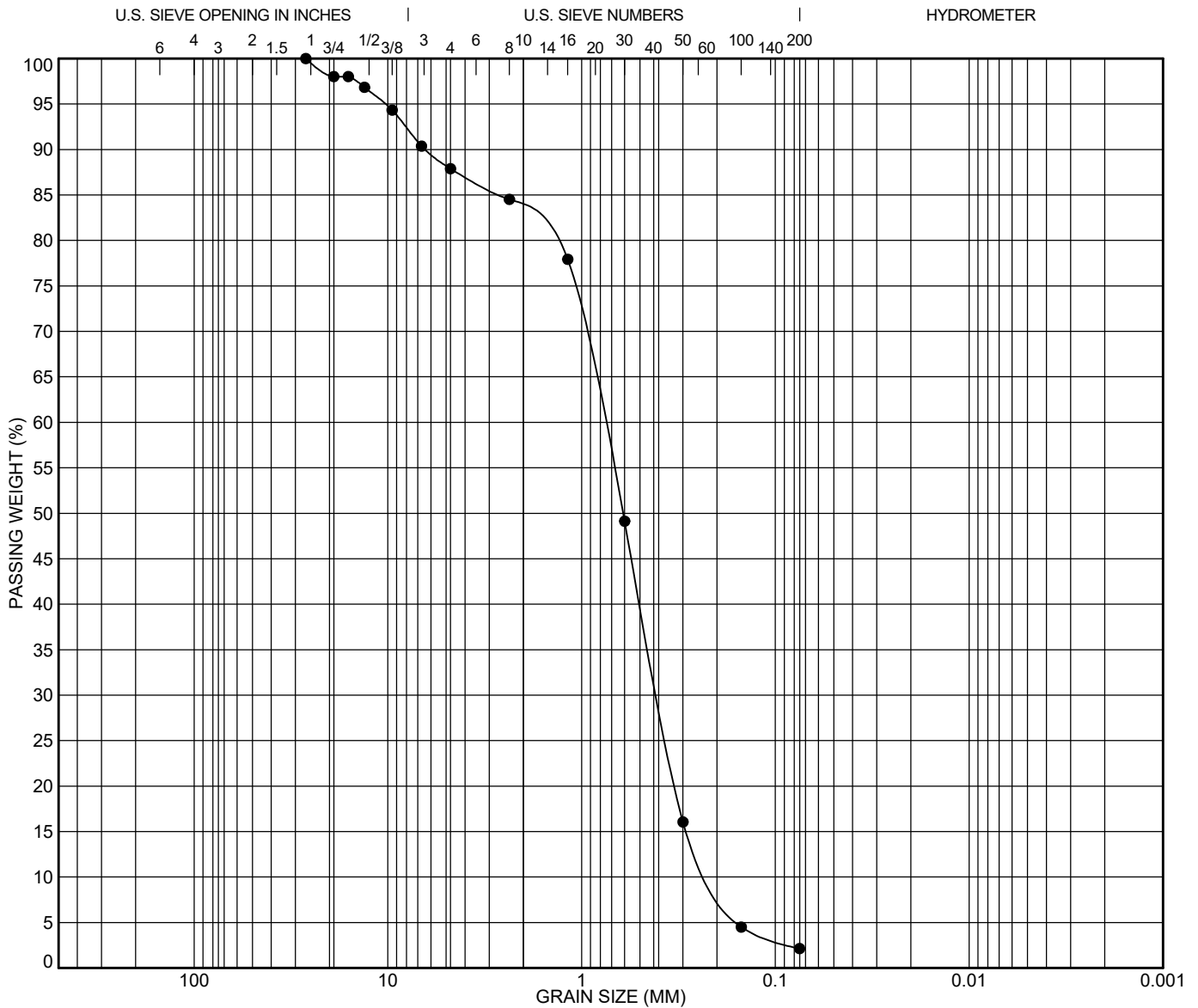
LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie

PROJECT NO.: 20-3280GH01

SAMPLED ON: 2020-11-23

FIGURE NO.: 2

TESTED ON: 2020-12-04



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification				Classification				LL	PL	PI	Cc	Cu
●	BH4	SS8	7.62								1.00	3.71
Specimen Identification				D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	BH4	SS8	7.62	26.5	0.775	0.402	0.209	12.1	85.8	2.1		



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GRAIN SIZE DISTRIBUTION

PROJECT: Geotechnical Investigation for Proposed 16-Storey Residential/Commercial Building Development

LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie

PROJECT NO.: 20-3280GH01

SAMPLED ON: 2020-10-29

FIGURE NO.: 3

TESTED ON: 2020-12-04



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APPENDIX A



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ENCLOSURES



Enclosure 1A: Notes on Sample Descriptions

1. Each soil stratum is described according to the *Modified Unified Soil Classification System*. The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined according to Canadian Foundation Engineering Manual, 4th Edition. Different soil classification systems may be used by others. Please note that a description of the soil strata is based on visual and tactile examination of the samples augmented with field and laboratory test results, such as a grain size analysis and/or Atterberg Limits testing. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.
2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.
3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.



Enclosure 1B: Explanation of Terms Used in the Record of Boreholes

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube Sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

PM – Samples advanced by manual pressure

WR – Samples advanced by weight of sampler and rod

WH – Samples advanced by static weight of hammer

Dynamic Cone Penetration Resistance, N_d :

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to “A” size drill rods for a distance of 300 mm (12 in).

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60 degree conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurement of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

Textural Classification of Soils (ASTM D2487)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm – 4.75 mm
Silt	0.002 mm-0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils(*)

Consistency Value	Undrained Shear Strength (kPa)	SPT “N”
Very soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT “N” value
5. Pocket penetrometer

b) Cohesionless Soils

Density Index (Relative Density)	SPT “N” Value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w _p	Plastic limit
w _l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D _R	Relative density (specific gravity, G _s)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

PROJECT: Geotechnical Investigation for Proposed 16-Storey Building						DRILLING DATA											
CLIENT: Arten Development Group						METHOD: Continuous Flight Auger - Auto Hammer						DIAMETER: 205 mm					
PROJECT LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie						FIELD ENGINEER: JM						DATE: 2020-11-19					
DATUM: Geodetic						SAMPLE REVIEW: CK						REF. NO.: 20-3280GH01					
BH LOCATION: See Borehole Location Plan						CHECKED: DX						ENCL. NO.: 2					
SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION TEST				Natural Moisture Content			UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3m		SHEAR STRENGTH (kPa)				Plastic Limit w _p	w	Liquid Limit w _L				
						○ SPT ≥ Cone blows/0.3m 20 40 60 80				WATER CONTENT (%)							
						● Unconfined ✕ Field Vane & Sensitivity ▲ Quick Triaxial ☒ Penetrometer + Lab Vane											
230.4	ASPHALT: (45 mm)		1A	AS													
230.3	GRANULAR BASE: (70 mm)		1B	AS													
230.3	GRANULAR SUBBASE: (180 mm)		1C	AS													
229.6	FILL: fine to medium sand, some silt, trace gravel, containing wood fragments and plastic fragments, brown, moist to wet		2	SS	3												
229.0	FILL: silty sand, trace gravel, organic inclusions, containing plastic fragments, dark brown to brown, moist, very loose		3	SS	4												
228.3	FILL: fine to medium sand, trace silt, trace gravel, brown, moist, very loose to loose																
228.3	FINE SAND: some silt, trace gravel, layers of silt, containing cobbles and boulders, brown, moist, compact		4	SS	28												
			5	SS	27												
	--- auger grinding																
226.4	SAND: some silt, trace gravel, layers/pockets of silt, brown, wet, compact																
			6	SS	28												
224.8	SILT: trace clay, trace sand, brown, wet, very dense		7	SS	96 / 250 mm												
			8	SS	51												
			9	SS	86												

01 - GEOPRO SOIL LOG - GEOPRO 20-3280GH01 BH LOG PROJECT DATA 20201217 - BN/G-PL-JB-PL-G-DX-GPJ 2020-12-18 15:08

PROJECT: Geotechnical Investigation for Proposed 16-Storey Building						DRILLING DATA															
CLIENT: Arten Development Group						METHOD: Continuous Flight Auger - Auto Hammer						DIAMETER: 205 mm									
PROJECT LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie						FIELD ENGINEER: JM						DATE: 2020-11-19									
DATUM: Geodetic						SAMPLE REVIEW: CK						REF. NO.: 20-3280GH01									
BH LOCATION: See Borehole Location Plan						CHECKED: DX						ENCL. NO.: 2									
SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION TEST								REMARKS AND GRAIN SIZE DISTRIBUTION (%)						
ELEV DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3m		SPT				Cone					Plastic Limit W _p	Natural Moisture Content W	Liquid Limit W _L			
							blows/0.3m				blows/0.3m										
							20 40 60 80				20 40 60 80										
SHEAR STRENGTH (kPa)						WATER CONTENT (%)															
● Unconfined X Field Vane & Sensitivity																					
▲ Quick Triaxial □ Penetrometer + Lab Vane																					
20 40 60 80						10 20 30 40								UNIT WT (kN/m ³)							
GR SA SI CL																					
220.3	SILTY FINE SAND: trace gravel, brown to grey, wet, dense						220														
10.1			10	SS	44		219														
11																					
218.7	SILT: trace clay, trace sand, grey, wet, compact to dense						218														
11.7			11	SS	36		217														
12																					
13																					
14																					
15	--- layers of clayey silt		12	SS	21		216														
214.7	END OF BOREHOLE						215														
15.7			13	SS	48																
Notes: 1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling. 2) 51 mm dia. monitoring well was installed in borehole upon completion of drilling. Water Level Reading Date W.L. Depth (mBGS) Dec. 8, 2020 4.56																					

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

 +³, ×³: Numbers refer to Sensitivity

▲ s=3% Strain at Failure

PROJECT: Geotechnical Investigation for Proposed 16-Storey Building						DRILLING DATA													
CLIENT: Arten Development Group						METHOD: Continuous Flight Auger - Auto Hammer						DIAMETER: 205 mm							
PROJECT LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie						FIELD ENGINEER: JM						DATE: 2020-10-28 & 11-09							
DATUM: Geodetic						SAMPLE REVIEW: CK						REF. NO.: 20-3280GH01							
BH LOCATION: See Borehole Location Plan						CHECKED: DX						ENCL. NO.: 3							
SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION TEST				Natural Moisture Content				UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3m		SHEAR STRENGTH (kPa)				WATER CONTENT (%)								
						○ SPT	⌢ Cone	blows/0.3m		Plastic Limit	Natural Moisture Content	Liquid Limit							
						20	40	60	80	W _p	W	W _L							
						● Unconfined X Field Vane & Sensitivity													
						▲ Quick Triaxial □ Penetrometer + Lab Vane													
						20	40	60	80	10	20	30	40						
230.8	ASPHALT: (70 mm)		1A	AS															
230.3	GRANULAR BASE/SUBBASE: (450 mm)		1B	AS															
230.0	FILL: silty sand, trace gravel, organic inclusions, rootlet inclusions, containing shale fragments and glass fragments, dark brown to brown, moist		2	SS	4														
229.4	FILL: fine sand, some silt, trace gravel, organic inclusions, pockets of organic silt, containing rubber fragments, brown, moist, very loose to loose		3A	SS															
229.1			3B	SS	23														
228.9	FILL: sandy silt to sand and silt, trace clay, trace gravel, layers of silty sand, brown, moist, compact		4	SS	41														
227.9	SAND: some silt, trace gravel, pockets of sandy silt, brown, moist, compact to dense																		
227.9	FINE TO MEDIUM SAND: some silt, trace gravel, brown, moist, dense		5	SS	31														
226.8	SILT: trace clay, trace sand, containing cobbles and boulders, brown to grey, moist to wet, dense																		
226.8	--- grey		6	SS	37														
226.3																			
225.0			7	SS	47														
224.0																			
223.0	--- layers of silty sand --- auger grinding		8	SS	33														
222.2	SILTY FINE SAND: grey, saturated, compact																		
221.4			9A	SS	24														
221.4	SILT: trace clay, interlayers of clayey silt, grey, moist, compact		9B	SS															
221.0																			

01 - GEOPRO SOIL LOG - GEOPRO 20-3280GH01 BH LOG PROJECT DATA 20201217 - BN/G-PL-JB-PL/G-DX-GPJ 2020-12-18 15:08

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

▲ s=3% Strain at Failure

PROJECT: Geotechnical Investigation for Proposed 16-Storey Building										DRILLING DATA																			
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PROJECT LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie										FIELD ENGINEER: JM										DATE: 2020-10-28 & 11-09									
DATUM: Geodetic										SAMPLE REVIEW: CK										REF. NO.: 20-3280GH01									
BH LOCATION: See Borehole Location Plan										CHECKED: DX										ENCL. NO.: 3									
SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION TEST								Natural Moisture Content				UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)									
ELEV DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3m		SHEAR STRENGTH (kPa)				WATER CONTENT (%)																		
							SPT Cone blows/0.3m 20 40 60 80				Plastic Limit Natural Moisture Content Liquid Limit W _p W W _L																		
							● Unconfined X Field Vane & Sensitivity ▲ Quick Triaxial ▣ Penetrometer + Lab Vane																						
220.7	SILTY FINE SAND: containing cobbles and boulders, grey, saturated, compact --- auger grinding																												
10.1																													
			10	SS	27		220																						
219.1	FINE SAND AND SILT: trace clay, grey, wet, very loose																												
11.7																													
218.3	CLAYEY SILT: trace sand, interlayers/zones of silt, grey, moist to wet, soft		11A	SS	3																								
12.5			11B	SS																									
217.6	SILT: trace clay, trace sand, containing cobbles and boulders, grey, wet, dense --- auger grinding --- auger grinding from 15.5 m to 15.9 m --- layers of clayey silt, layers/zones of silty fine sand																												
13.2																													
			12	SS	47		217																						
																</													

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

▲ s=3% Strain at Failure

01 - GEOPRO SOIL LOG GEOPRO 20-3280GH01 BH LOG PROJECT DATA 20201217 - BN/G-PL-JB-PL-G-DX-GPJ 2020-12-18 15:08

PROJECT: Geotechnical Investigation for Proposed 16-Storey Building							DRILLING DATA								
CLIENT: Arten Development Group				METHOD: Continuous Flight Auger - Auto Hammer				DIAMETER: 155 mm							
PROJECT LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie				FIELD ENGINEER: JM				DATE: 2020-11-23							
DATUM: Geodetic				SAMPLE REVIEW: CK				REF. NO.: 20-3280GH01							
BH LOCATION: See Borehole Location Plan				CHECKED: DX				ENCL. NO.: 4							
SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION TEST				Natural Moisture Content	Plastic Limit	Liquid Limit	REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3m		SHEAR STRENGTH (kPa)								WATER CONTENT (%)
							○ SPT	≧ Cone	blows/0.3m						
							20	40	60	80					
230.3	GRANULAR BASE/SUBBASE: (110 mm) FILL: sand, trace to some silt, trace to some gravel, organic inclusions, brown, moist, loose		1A	AS											
230.0			1B	AS											
229.3	FILL: gravelly sand, trace silt, brown, moist, loose		2A	SS	6										
228.9			2B	SS											
228.1	FINE TO MEDIUM SAND: some silt, trace gravel, layers of fine sand and silt, brown, moist, compact														
227.4			3	SS	21										
226.9	SAND: some silt, trace gravel, brown, moist, compact														
226.2			4	SS	32										
225.7	CLAYEY SILT: trace sand, trace gravel, zones/interlayers of silty sand, brown, moist, very stiff														
225.0			5A	SS	27										
224.3	SAND: some silt, trace gravel, layers of silty sand, brown, wet, dense														
223.6			5B	SS											
222.9	SILTY FINE SAND: brown, wet, compact to dense														
222.2			6	SS	28										
221.5	--- zones of fine sand and silt														
220.8			7	SS	32										
220.1	--- layers/pockets of sand														
219.4			8	SS	48										
218.7															
218.0			9	SS	50										
217.3															
216.6															
215.9															
215.2															
214.5															
213.8															
213.1															
212.4															
211.7															
211.0															
210.3															
209.6															
208.9															
208.2															
207.5															
206.8															
206.1															
205.4															
204.7															
204.0															
203.3															
202.6															
201.9															
201.2															
200.5															
199.8															
199.1															
198.4															
197.7															
197.0															
196.3															
195.6															
194.9															
194.2															
193.5															
192.8															
192.1															
191.4															
190.7															
190.0															
189.3															
188.6															
187.9															
187.2															
186.5															
185.8															
185.1															
184.4															
183.7															
183.0															
182.3															
181.6															
180.9															
180.2															
179.5															
178.8															
178.1															
177.4															
176.7															
176.0															
175.3															
174.6															
173.9															
173.2															
172.5															
171.8															
171.1															
170.4															
169.7															
169.0															
168.3															
167.6															
166.9															
166.2															
165.5															
164.8															
164.1															
163.4															
162.7															
162.0															
161.3															
160.6															
159.9															
159.2															
158.5															
157.8															
157.1															
156.4															
155.7															
155.0															
154.3															
153.6															
152.9															
152.2															
151.5															
150.8															
150.1															
149.4															
148.7															
148.0															
147.3															
146.6															
145.9															
145.2															
144.5															
143.8															
143.1															
142.4															
141.7															
141.0															
140.3															
139.6															
138.9															
138.2															
137.5															
136.8															
136.1															
135.4															
134.7															
134.0															
133.3															
132.6															
131.9							</								

01 - GEOPRO SOIL LOG - GEOPRO 20-3280GH01 BH LOG PROJECT DATA 20201217 - BN/G-PL-JB-PL/G-DX-GPJ 2020-12-18 15:08

PROJECT: Geotechnical Investigation for Proposed 16-Storey Building										DRILLING DATA																			
CLIENT: Arten Development Group										METHOD: Continuous Flight Auger - Auto Hammer										DIAMETER: 155 mm									
PROJECT LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie										FIELD ENGINEER: JM										DATE: 2020-11-23									
DATUM: Geodetic										SAMPLE REVIEW: CK										REF. NO.: 20-3280GH01									
BH LOCATION: See Borehole Location Plan										CHECKED: DX										ENCL. NO.: 4									
SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION TEST										Natural Moisture Content			Liquid Limit			REMARKS AND GRAIN SIZE DISTRIBUTION (%)							
ELEV DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER	ELEVATION	SPT				Cone				Plastic Limit w _p	Natural Moisture Content w	Liquid Limit w _L	UNIT WT (kN/m ³)			GR SA SI CL							
								20	40	60	80	blows/0.3m	20	40	60										80				
								SHEAR STRENGTH (kPa)								WATER CONTENT (%)													
								● Unconfined ✕ Field Vane & Sensitivity																					
								▲ Quick Triaxial ☒ Penetrometer + Lab Vane																					
								20 40 60 80								10 20 30 40													
218.6	SILTY FINE SAND: brown, wet, compact to dense(Continued) --- grey		10	SS	48		220																						
219																													
218	SILT: trace to some clay, trace sand, layers of clayey silt, grey, wet, compact to very dense		11	SS	23		218															0 2 90 8							
217																													
216																													
215																													
214.6			12	SS	58		216																						
214.6			13	SS	35		215																						
15.7	END OF BOREHOLE																												
	Note: 1) Water encountered at a depth of 3.4 m below ground surface (mBGS) during drilling.																												

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

 +³, ×³: Numbers refer to Sensitivity

▲ s=3% Strain at Failure

PROJECT: Geotechnical Investigation for Proposed 16-Storey Building				DRILLING DATA				
CLIENT: Arten Development Group		METHOD: Continuous Flight Auger - Auto Hammer		DIAMETER: 205 mm				
PROJECT LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie		FIELD ENGINEER: JM		DATE: 2020-10-29 & 11-09				
DATUM: Geodetic		SAMPLE REVIEW: CK		REF. NO.: 20-3280GH01				
BH LOCATION: See Borehole Location Plan		CHECKED: DX		ENCL. NO.: 5				
SOIL PROFILE			SAMPLES		DYNAMIC PENETRATION TEST		REMARKS AND GRAIN SIZE DISTRIBUTION (%)	
ELEV. DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3m	ELEVATION		
230.2	PORTLAND CEMENT CONCRETE: (75 mm) GRANULAR BASE/SUBBASE: (210 mm) FILL: silty fine sand, trace gravel, organic inclusions, dark brown to brown, moist FILL: sand, trace silt, trace gravel, organic inclusions, brown, moist, compact SAND: some silt, trace gravel, pockets of sand and silt, brown, moist, compact		1A	AS		230		
230.0			1B	AS				
0.3			2	SS	15			
229.5	SAND: some silt, trace gravel, pockets of sand and silt, brown, moist, compact FINE TO MEDIUM SAND: some silt, trace gravel, pockets of sandy silt, containing cobbles and boulders, brown, moist, compact to dense --- auger grinding		3	SS	20	229		
0.8								
1.4			4	SS	24			
228.9	SAND: trace to some silt, trace to some gravel, containing cobbles and boulders, brown, wet, loose to dense		5	SS	35	228		
2.1								
228.1								
226.2			6	SS	49	227		
4.0								
			7	SS	10	226		
			8	SS	24	225		
			9	SS	9	224		
						223		
						222		
						221		

01 - GEOPRO SOIL LOG - GEOPRO 20-3280GH01 BH LOG PROJECT DATA 20201217 - BN/G-PL-JB-PL/G-DX-GPJ 2020-12-18 15:08

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

 +³, ×³: Numbers refer to Sensitivity

▲ s=3% Strain at Failure

PROJECT: Geotechnical Investigation for Proposed 16-Storey Building						DRILLING DATA											
CLIENT: Arten Development Group			METHOD: Continuous Flight Auger - Auto Hammer			DIAMETER: 205 mm											
PROJECT LOCATION: 284&286 Dunlop St W and 119&121 Henry St, Barrie			FIELD ENGINEER: JM			DATE: 2020-10-29 & 11-09											
DATUM: Geodetic			SAMPLE REVIEW: CK			REF. NO.: 20-3280GH01											
BH LOCATION: See Borehole Location Plan			CHECKED: DX			ENCL. NO.: 5											
SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION TEST			SHEAR STRENGTH (kPa)			WATER CONTENT (%)			REMARKS AND GRAIN SIZE DISTRIBUTION (%)		
ELEV. DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3m	ELEVATION	SPT	Cone	blows/0.3m	Plastic Limit	Natural Moisture Content	Liquid Limit	UNIT WT (kN/m ³)	GR	SA	SI	CL
220.0	SILTY GRAVELLY SAND: grey, wet, compact		10	SS	25	220											
219.0																	
11.3	END OF BOREHOLE																
Notes: 1) Water encountered at a depth of 4.0 m below ground surface (mBGS) during drilling. 2) 51 mm dia. monitoring well was installed in borehole upon completion of drilling. Water Level Reading Date W.L. Depth (mBGS) Dec. 8, 2020 3.73																	

GROUNDWATER ELEVATIONS

Measurement    

GRAPH NOTES

+³, ×³: Numbers refer to Sensitivity

▲ s=3% Strain at Failure



GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

APPENDIX B

Water Well Records

Thursday, October 29, 2020

10:59:19 AM

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BARRIE CITY	17 602848 4915493 W	2008/05 7201				MO		7110083 (M02616) A060469	BRWN PEAT 0002 BRWN SAND SILT 0030
BARRIE CITY	17 602876 4914970 W	2013/02 7241	1.5			MT	0010 10	7198926 (Z165431) A117693	BRWN SAND 0020
BARRIE CITY	17 603218 4914990 W	1955/10 2801	2	FR	2/7/45/:	MN	0189 21	5700242 ()	LOAM 0001 BRWN FSND 0012 MSND GRVL 0042 GREY CLAY MSND 0096 MSND CLAY 0141 GRVL MSND 0156 GRVL MSND CLAY 0171 GRVL MSND 0218
BARRIE CITY	17 603287 4914806 W	2010/06 7190	2	UT 0010		MO	0010 10	7150523 (Z82526) A066624	BRWN FILL LOOS 0006 BRWN SAND PCKD 0020
BARRIE CITY	17 603394 4915222 W	2008/09 6926	1.61	0006		DE		7112477 (M03455) A066188	BRWN FILL 0003 BRWN SAND SLTY 0008 GREY SAND GRVL 0022
BARRIE CITY	17 603017 4915047 W	2007/10 7320	2.00	FR 0015		MO	0010 10	7109566 (M00517) A064268	BRWN SAND GRVL 0010 BRWN SAND SILT 0015 GREY SILT SAND 0020
BARRIE CITY	17 603160 4915101 W	2007/03 7241	1.5				0006 10	7043230 (Z58182) A050238 A	BRWN FILL GRVL 0003 SAND GRVL 0011 SAND SILT 0016
BARRIE CITY	17 603407 4915228 W	2007/01 2663	6.25		30//2/1:0		0016 10	7041131 (Z59973) A053432	BRWN SAND 0016 GREY SAND 0026 0026
BARRIE CITY	17 602704 4915473 W	1971/06 3203	4	FR 0090	13/80/5/0:45	DO	0093 3	5708244 ()	BLCK LOAM 0001 BRWN SAND 0008 BRWN SAND BLDR 0020 BRWN CLAY SAND 0025 BLUE CLAY 0038 BLUE CLAY SAND STNS 0041 BLUE CLAY 0090 GREY SAND SILT 0093 GREY SAND 0099
BARRIE CITY	17 603427 4914985 W	1965/08 3414	6	FR 0084	7/35/70/4:0	IN	0076 8	5700279 ()	BRWN MSND 0017 SILT 0070 MSND 0084
BARRIE CITY	17 603050 4915270 W	1960/09 2801	2	FR 0223	14/15/30/2:30	NU	0307 44	5700253 ()	SAND GRVL 0006 BLUE CLAY SILT SAND 0068 BLUE CLAY 0082 BLUE CLAY SILT SAND 0100 CLAY SAND GRVL 0129 GRVL SAND CLAY 0137 BLUE CLAY GRVL 0163 FSND CLAY 0192 SAND GRVL CLAY 0271 GRVL SAND CLAY 0351 WHIT CLAY SAND 0354 GRVL SAND CLAY 0359 WHIT CLAY GRVL 0371 WHIT CLAY GRVL SAND 0377 ROCK 0378
BARRIE CITY	17 603334 4915170 W	1959/07 2801	2	FR 0055	10/11/42/4:0	NU	0190 16	5700248 ()	MSND SILT 0031 BLUE CLAY 0048 CLAY MSND 0055 MSND SILT GRVL 0061 GRVL MSND 0086 BLUE CLAY 0095 SILT MSND CLAY 0130 SILT MSND GRVL 0141 GRVL 0163 CLAY GRVL BLDR 0165 BLUE CLAY 0167 GRVL MSND CLAY 0189 CLAY GRVL 0242

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BARRIE CITY (VESPra)	17 603197 4914749 W	2006/09 6809	0.79				0016 33	5741297 (Z51213) A035689	BRWN FSND 0038 GREY FSND 0049
BARRIE CITY (VESPra)	17 603524 4915055 W	2012/12 7282						7197566 (C20700) A143846 P	
BARRIE CITY (VESPra)	17 602936 4914982 W	2013/02 7241	1.5			MT	0010 10	7198924 (Z165429) A117631 A	BRWN SAND 0020
BARRIE CITY (VESPra)	17 603422 4915144 W	2012/06 7282	2.24			MO		7183974 (Z62884) A132059	GREY GRVL DNSE 0007 BRWN MSND SILT DNSE 0024
BARRIE CITY (VESPra)	17 603520 4915074 W	2016/07 7282				OT		7280992 (Z249316) A	
BARRIE CITY (VESPra)	17 603339 4915182 W	2013/02 7472	2.04			MO	0010 10	7198641 (Z166625) A144256	SAND 0013 SAND WBRG 0020
BARRIE CITY (VESPra)	17 602940 4915047 W	2013/02 7241	1.5			MT	0010 10	7198923 (Z165432) A117632 A	BRWN SAND 0020
BARRIE CITY (VESPra)	17 603208 4914826 W	2010/01 7241	1			MO	0003 10	7138488 (Z106642) A084249	BRWN FILL ROCK DNSE 0002 GREY SAND SILT DNSE 0010 GREY SAND SILT WBRG 0013
BARRIE CITY (VESPra)	17 603131 4915056 W	2015/09 7241	1.25			MT	0004 10	7250164 (Z216651) A188530	BRWN LOAM LOAM 0000 GREY SAND DNSE 0004 GREY SAND DNSE 0008 BRWN SAND WBRG LOOS 0012 BRWN SAND WBRG LOOS 0014
BARRIE CITY (VESPra)	17 602967 4914860 W	7391						7270102 (C29152) A181527 P	
BARRIE CITY (VESPra)	17 603115 4915041 W	2015/09 7241	1.25			MT		7266276 (Z216652) A188531	BRWN LOAM 0002 GREY SAND DNSE 0006 GREY SAND DNSE 0010
BARRIE CITY (VESPra)	17 603116 4915058 W	2015/09 7244	2			MT	0005 10	7250413 (Z212479) A188552	BRWN SAND GRVL 0011 BRWN SAND SILT WBRG 0015
BARRIE CITY (VESPra)	17 603114 4915057 W	2015/09 7241	1.25			MT		7250412 (Z212478) A188531	BRWN
BARRIE CITY (VESPra)	17 603100 4915062 W	2015/09 7241	1.25			MT	0003 10	7250193 (Z216653) A188532	BRWN LOAM 0002 GREY SAND LOOS 0006 GREY SAND LOOS 0010 GREY SAND WBRG LOOS 0013

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BARRIE CITY (VESPRA)	17 603501 4915084 W	2012/02 7282	2			MO	0014 10	7180075 (Z125506) A120803	BRWN GRVL SAND PCKD 0002 BRWN GRVL SAND HARD 0014 GREY SILT SAND SOFT 0023 BLCK PEAT WDFR SOFT 0024
BARRIE CITY (VESPRA)	17 603157 4915111 W	2015/09 7241	1.25			MT	0005 10	7250165 (Z216654) A188533	BRWN LOAM LOOS 0002 GREY SAND DNSE 0006 GREY SAND DNSE 0010 GREY SAND DNSE 0014 GREY SAND LOOS 0016
BARRIE CITY (VESPRA)	17 602891 4914958 W	2013/02 7241	1.5			MT	0010 10	7198925 (Z165430) A117633	BRWN SAND 0020
BARRIE CITY (VESPRA)	17 603272 4914969 W	2013/07 7282	2.04	FR		MO	0004 10	7209099 (Z174573) A143858	BRWN SAND SILT DRY 0006 BRWN SAND SILT WBRG 0014
BARRIE CITY (VESPRA)	17 603474 4914938 W	2013/07 7282	2.04			MO	0003 10	7209088 (Z161876) A150956	BRWN SAND SILT LOOS 0010 BRWN SAND SILT WBRG 0013
BARRIE CITY (VESPRA)	17 602967 4915047 W	2013/04 7241	1.5			MT	0010 10	7200964 (Z165284) A098608	BLCK 0000 BRWN SAND GRVL LOOS 0001 BRWN SAND SILT LOOS 0020
BARRIE CITY (VESPRA)	17 602948 4915047 W	2013/04 7241	1.5			MT	0010 10	7200967 (Z165283) A098649	BLCK 0000 BRWN SAND GRVL LOOS 0001 BRWN SAND SILT LOOS 0020
BARRIE CITY (VESPRA)	17 602932 4915030 W	2013/04 7241	1.5			MT	0010 10	7200909 (Z165287) A098606	BLCK 0000 BRWN SAND GRVL LOOS 0001 BRWN SAND SILT LOOS 0020
BARRIE CITY (VESPRA)	17 602941 4915034 W	2013/04 7241	1.5			MT	0010 10	7200910 (Z165285) A098607	BLCK 0000 BRWN SAND GRVL LOOS 0001 BRWN SAND SILT LOOS 0020
BARRIE CITY (VESPRA)	17 602972 4915045 W	2013/04 7241	1.5			MT	0010 10	7200966 (Z160743) A098645	BLCK 0000 BRWN SAND GRVL LOOS 0001 BRWN SAND SILT LOOS 0020
BARRIE CITY (VESPRA)	17 602956 4915046 W	2013/04 7241	1.5			MT	0010 10	7200965 (Z165286) A098644	BLCK 0000 BRWN SAND GRVL LOOS 0001 BRWN SAND SILT LOOS 0020
BARRIE CITY (VESPRA) 06 024	17 603058 4914671 W	1988/01 2801	42 24 12	FR 0288	24/90/750/6:0	IN AC	0292 35	5722879 (23775)	LOAM 0001 BRWN SAND 0004 MSND CSND FGVL 0029 MGVL CGVL SAND 0039 GREY CLAY STKY 0074 FSND CSND FGVL 0132 GREY CLAY STKY 0146 FSND MSND 0158 FGVL CGVL BLDR 0202 GREY CLAY FGVL SNDY 0223 CLAY GRVL PCKD 0243 FGVL CLAY BLDR 0263 CLAY GRVL SNDY 0271 FSND PCKD 0288 FSND FGVL 0292 FGVL CGVL CLAY 0299 FGVL CGVL PCKD 0309 CLAY PCKD 0313 GRVL CLAY CMTD 0316 FGVL CGVL 0319 GREY CLAY SNDY 0323 FGVL MGVL CLAY 0338 FGVL CGVL PCKD 0341 GRVL CMTD 0344

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
BARRIE CITY (VESPRA) 06 024	17 602912 4915162 W	1988/02 2801	2 1	FR 0138	29/30/40/4:0	NU	0152 20	5723010 (23783)	RED SAND LOOS 0023 BRWN SAND SAND LOOS 0051 GREY CLAY SLTY SOFT 0130 SAND GRVL LYRD 0175 GREY CLAY HARD 0192 CLAY SAND SNDY 0228 SAND GRVL LYRD 0244 CLAY SNDY HARD 0267 GREY CLAY VERY HARD 0289 CLAY GRVL SNDY 0306
BARRIE CITY (VESPRA) CON 05 024	17 603220 4915527 W	2010/06 7341	2.13	FR 0010		DE		7147418 (Z112432) A065456	BRWN SAND 0023
BARRIE CITY (VESPRA) CON 05 024	17 603332 4915147 W	2011/05 2801						7164608 (Z115276) A	
BARRIE CITY (VESPRA) CON 05 024	17 603220 4915527 W	2010/10 7341		0003				7153430 (Z112417) A065456 A	FILL 0002
BARRIE CITY (VESPRA) CON 05 024	17 603324 4915140 W	2010/07 2801	21.2 15.3	FR	31///:	MN	0144 31	7151274 (Z115267) A011255	FSND 0030 GREY CLAY 0045 CLAY 0050 FSND 0060 SAND FGVL CLAY 0081 GREY CLAY SAND LYRD 0102 FSND CLAY LYRD 0121 CLAY SAND GRVL 0136 GRVL SAND BLDR 0181
BARRIE CITY (VESPRA) CON 05 024	17 603501 4915084 W	2016/07 7282		0011		OT		7280990 (Z249317) A	
BARRIE CITY (VESPRA) CON 06 023	17 602573 4915402 W	1959/06 2801	5					5704795 ()	BLCK MUCK 0004 MSND SILT BLDR 0013 BRWN CLAY 0033 CLAY MSND 0045 BLUE CLAY 0162 CLAY MSND SILT 0216 BLUE CLAY 0233 SILT MSND CLAY 0265 BLUE CLAY 0276 BLUE CLAY GRVL 0289
BARRIE CITY (VESPRA) CON 06 023	17 602698 4915399 W	1959/06 2801	5	UK 0047		NU		5704794 ()	LOAM 0001 MSND SILT 0033 BLUE CLAY 0047 GRVL 0050 BLUE CLAY 0162 BLUE CLAY GRVL 0205 BLUE CLAY 0221 CLAY MSND GRVL 0256 BLUE CLAY 0271 BLUE CLAY BLDR 0275 BLUE CLAY 0318
BARRIE CITY (VESPRA) CON 06 023	17 602635 4915525 W	1955/07 2529	6 6	UK 0014 FR 0084	28/50/50/12:0	MN		5704793 ()	MSND 0030 CLAY MSND 0060 CSND 0090 GRVL MSND 0096
BARRIE CITY (VESPRA) CON 06 024	17 602917 4915172 W	2014/08 2801			5///:			7227248 (Z174076) A	
BARRIE CITY (VESPRA) CON 06 024	17 602806 4915494 W	1953/05 5510	4	FR 0046	8/36/3/1:0	DO	0046 9	5704796 ()	LOAM 0001 MSND STNS 0045 MSND 0055

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
------------------	-----	-----------	------------	-------	-----------	----------	--------	------	-----------

Notes:
UTM: ☐TM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: ☐ate Work Completedand ☐Well Contractor Licence Number
CASING DIA: ☐asing diameter in inches
WATER: ☐nit of Depth in Fee. ☐ee Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / ☐ump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: ☐ee Table 3 for Meaning of Code
SCREEN: ☐creen Depth and Length in feet
WELL: ☐VEL (☐AUDIT #) Well Tag . ☐: Abandonment; P: Partial Data Entry Only
FORMATION: ☐ee Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE ☐	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLV	GRAVELLY	OBDN	OVERBURDEN ☐	SLTE	SLATE ☐		
DNSE	DENSE	GYPG	GYPGUM	PCKD	PACKED	SLTY	SILTY ☐		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE ☐		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal ☐		
PS	Public ☐		
AC	Cooling And A/C ☐		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur ☐		
MN	Mineral ☐		
UK	Unknown		

20-3280H

Well ID	East	North	Use Type
7112477	603394	4915222	Dewatering
7147418	603220	4915527	Dewatering
7112477	603367	4915296	Dewatering
7112477	603368	4915294	Dewatering
7112477	603368	4915292	Dewatering
7112477	603369	4915291	Dewatering
7112477	603373	4915284	Dewatering
7112477	603374	4915283	Dewatering
7112477	603376	4915279	Dewatering
7112477	603376	4915274	Dewatering
7112477	603377	4915273	Dewatering
7112477	603378	4915271	Dewatering
7112477	603380	4915266	Dewatering
7112477	603382	4915264	Dewatering
7112477	603385	4915260	Dewatering
7112477	603386	4915257	Dewatering
7112477	603387	4915255	Dewatering
7112477	603388	4915254	Dewatering
7112477	603388	4915253	Dewatering
7112477	603389	4915251	Dewatering
7112477	603390	4915250	Dewatering
7112477	603393	4915247	Dewatering
7112477	603395	4915242	Dewatering
7112477	603396	4915240	Dewatering
7112477	603398	4915240	Dewatering
7112477	603400	4915239	Dewatering
7112477	603401	4915236	Dewatering
7112477	603402	4915235	Dewatering
7112477	603403	4915233	Dewatering
7112477	603405	4915230	Dewatering
7112477	603406	4915229	Dewatering
7112477	603406	4915228	Dewatering
7112477	603407	4915227	Dewatering
7112477	603408	4915225	Dewatering
7112477	603408	4915224	Dewatering
7112477	603410	4915222	Dewatering
7112477	603410	4915222	Dewatering
7112477	603412	4915219	Dewatering
7112477	603413	4915218	Dewatering
7112477	603413	4915216	Dewatering
7112477	603414	4915215	Dewatering
7112477	603414	4915214	Dewatering
7112477	603414	4915213	Dewatering
7112477	603415	4915209	Dewatering

7112477	603417	4915205	Dewatering
7112477	603419	4915202	Dewatering
7112477	603421	4915200	Dewatering
7112477	603422	4915197	Dewatering
7112477	603424	4915196	Dewatering
7112477	603425	4915194	Dewatering
7112477	603427	4915193	Dewatering
7112477	603427	4915192	Dewatering
7112477	603427	4915191	Dewatering
7112477	603428	4915189	Dewatering
7112477	603429	4915186	Dewatering
7112477	603431	4915185	Dewatering
7112477	603434	4915183	Dewatering
7112477	603437	4915180	Dewatering
7112477	603439	4915179	Dewatering
7112477	603440	4915178	Dewatering
7112477	603442	4915178	Dewatering
7112477	603444	4915176	Dewatering
7112477	603446	4915174	Dewatering
7112477	603449	4915172	Dewatering
7112477	603450	4915172	Dewatering
7112477	603454	4915169	Dewatering
7112477	603457	4915167	Dewatering
7112477	603460	4915164	Dewatering
7112477	603462	4915163	Dewatering
7112477	603464	4915163	Dewatering
7112477	603465	4915163	Dewatering
7112477	603468	4915163	Dewatering
7112477	603470	4915162	Dewatering
7112477	603472	4915162	Dewatering
Total: 74			
5704796	602806.4	4915494	Domestic
5708244	602704.4	4915473	Domestic
Total: 2			
5700279	603427.4	4914985	Industrial
5722879	603058.3	4914671	Industrial
Total: 2			
7109566	603017	4915047	Monitoring
7110083	602848	4915493	Monitoring
7109566	603021	4915084	Monitoring
7109566	602993	4915065	Monitoring
7110083	602853	4915500	Monitoring
7138488	603208	4914826	Monitoring
7150523	603287	4914806	Monitoring
7180075	603501	4915084	Monitoring
7183974	603422	4915144	Monitoring

7198641	603339	4915182	Monitoring
7209088	603474	4914938	Monitoring
7209099	603272	4914969	Monitoring
Total: 12			
7198923	602940	4915047	Monitoring and Test Hole
7198924	602936	4914982	Monitoring and Test Hole
7198925	602891	4914958	Monitoring and Test Hole
7198926	602876	4914970	Monitoring and Test Hole
7200909	602932	4915030	Monitoring and Test Hole
7200910	602941	4915034	Monitoring and Test Hole
7200964	602967	4915047	Monitoring and Test Hole
7200965	602956	4915046	Monitoring and Test Hole
7200966	602972	4915045	Monitoring and Test Hole
7200967	602948	4915047	Monitoring and Test Hole
7250164	603131	4915056	Monitoring and Test Hole
7250165	603157	4915111	Monitoring and Test Hole
7250193	603100	4915062	Monitoring and Test Hole
7250412	603114	4915057	Monitoring and Test Hole
7250413	603116	4915058	Monitoring and Test Hole
7266276	603115	4915041	Monitoring and Test Hole
Total: 16			
5700242	603218.4	4914990	Municipal
5704793	602635.4	4915525	Municipal
7151274	603324	4915140	Municipal
Total: 3			
5700248	603334.4	4915170	Not Used
5700253	603050.4	4915270	Not Used
5704794	602698.4	4915399	Not Used
5723010	602912.3	4915162	Not Used
Total: 4			
7280990	603501	4915084	Other
7280992	603520	4915074	Other
Total: 2			
5704795	602573.4	4915402	Unknown
5741297	603197	4914749	Unknown
7041131	603407	4915228	Unknown
7043230	603160	4915101	Unknown
7153430	603220	4915527	Unknown
7164608	603332	4915147	Unknown
7197566	603524	4915055	Unknown
7227248	602917	4915172	Unknown
7270102	602967	4914860	Unknown
Total: 9			

Summary of Well Types within 500 m Radius from the Site			
Well Types	Number of Records		Total
Domestic	2	4	124
Industrial	2		
Municipal	3	3	
Dewatering	74	102	
Monitoring	12		
Monitoring and Test Hole	16		
Not Used	4	15	
Other	2		
Unknown	9		



GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

APPENDIX C



GeoPro Consulting Limited (Richmond Hill)
ATTN: Sarena Medina
40 Vogell Road
Unit 22
Richmond Hill ON L4B 3N6

Date Received: 09-DEC-20
Report Date: 18-DEC-20 08:31 (MT)
Version: FINAL

Client Phone: 905-237-8336

Certificate of Analysis

Lab Work Order #: L2538729
Project P.O. #: NOT SUBMITTED
Job Reference: 1117-20-3280GH01
C of C Numbers: 20-3280GH01
Legal Site Desc:

Jennifer Barkshire-Paterson
Account Manager

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

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ANALYTICAL GUIDELINE REPORT

L2538729 CONTD....

Page 2 of 7

18-DEC-20 08:31 (MT)

1117-20-3280GH01

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	
L2538729-1	BH 1									
Sampled By:	CLIENT on 08-DEC-20 @ 12:00									
Matrix:	WATER									
Physical Tests										
pH		8.08		0.10	pH units	11-DEC-20	6.5-8.5	6.0-9.5	6.0-9.5	
Total Suspended Solids		76.6		3.0	mg/L	15-DEC-20		*15	350	
Anions and Nutrients										
Chloride (Cl)		43.5		0.50	mg/L	11-DEC-20			1500	
Fluoride (F)		0.542		0.020	mg/L	11-DEC-20			10	
Total Kjeldahl Nitrogen		0.610		0.050	mg/L	14-DEC-20			100	
Phosphorus, Total		0.0462		0.0030	mg/L	14-DEC-20	*0.01		10	
Sulfate (SO4)		65.3		0.30	mg/L	11-DEC-20			1500	
Sulphide (as S)		<0.018		0.018	mg/L	11-DEC-20				
Sulphide (as H2S)		<0.019		0.019	mg/L	11-DEC-20			1	
Cyanides										
Cyanide, Total		<0.0020	SP	0.0020	mg/L	11-DEC-20			1.2	
Total Metals										
Aluminum (Al)-Total		0.916		0.010	mg/L	10-DEC-20	*0.015		50	
Antimony (Sb)-Total		0.00036		0.00010	mg/L	10-DEC-20	0.02		5	
Arsenic (As)-Total		0.00116		0.00010	mg/L	10-DEC-20	0.005		1	
Barium (Ba)-Total		0.0706		0.00020	mg/L	10-DEC-20			5	
Bismuth (Bi)-Total		0.000100		0.000050	mg/L	10-DEC-20			5	
Cadmium (Cd)-Total		0.000027		0.000010	mg/L	10-DEC-20	0.0001	0.001	0.7	
Chromium (Cr)-Total		0.00229		0.00050	mg/L	10-DEC-20		0.08	2	
Cobalt (Co)-Total		0.00059		0.00010	mg/L	10-DEC-20	0.0009		5.0	
Copper (Cu)-Total		0.0099		0.0010	mg/L	10-DEC-20	*0.001	0.01	2.0	
Iron (Fe)-Total		1.09		0.050	mg/L	10-DEC-20	*0.3		50	
Lead (Pb)-Total		0.00297		0.00010	mg/L	10-DEC-20	*0.001	0.05	0.7	
Manganese (Mn)-Total		0.0353		0.00050	mg/L	10-DEC-20			5	
Mercury (Hg)-Total		0.0000078		0.000005	mg/L	10-DEC-20	0.0002		0.01	
				0						
Molybdenum (Mo)-Total		0.00835		0.000050	mg/L	10-DEC-20	0.04		5	
Nickel (Ni)-Total		0.00257		0.00050	mg/L	10-DEC-20	0.025	0.05	2	
Selenium (Se)-Total		0.000311		0.000050	mg/L	10-DEC-20	0.1		1.0	
Silver (Ag)-Total		0.000483		0.000050	mg/L	10-DEC-20	*0.0001		0.4	
Tin (Sn)-Total		0.00351		0.00010	mg/L	10-DEC-20			5	
Titanium (Ti)-Total		0.0330		0.00030	mg/L	10-DEC-20				
Vanadium (V)-Total		0.00241		0.00050	mg/L	10-DEC-20	0.006		5.0	
Zinc (Zn)-Total		0.0235		0.0030	mg/L	10-DEC-20	*0.02	0.04	2.0	
Aggregate Organics										
BOD		27		10	mg/L	10-DEC-20		*15	300	
COD		60		10	mg/L	15-DEC-20			600	
Oil and Grease, Total		<5.0		5.0	mg/L	11-DEC-20				
Animal/Veg Oil & Grease		<5.0		5.0	mg/L	14-DEC-20			150	
Mineral Oil and Grease		<2.5		2.5	mg/L	11-DEC-20			15	
Phenols (4AAP)		<0.0010		0.0010	mg/L	11-DEC-20	0.001		0.1	
Volatile Organic Compounds										
Acetone		<20		20	ug/L	14-DEC-20				
Benzene		<0.50		0.50	ug/L	14-DEC-20	100		10	

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

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

Ontario PWQO (JULY 1994) + Barrie Sanitary Sewer Use By-Law (2012-172) = [Suite] - ON-PWQO+SAN+STORM-BARRIE

#1: Ontario PWQO

#2: Barrie Storm Sewer

#3: Barrie Sanitary Sewer



ANALYTICAL GUIDELINE REPORT

1117-20-3280GH01

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	
L2538729-1	BH 1									
Sampled By:	CLIENT on 08-DEC-20 @ 12:00									
Matrix:	WATER									
Volatile Organic Compounds										
	Bromodichloromethane	5.6		1.0	ug/L	14-DEC-20	200			
	Bromoform	<1.0		1.0	ug/L	14-DEC-20	60			
	Bromomethane	<0.50		0.50	ug/L	14-DEC-20				
	Carbon Disulfide	<1.0		1.0	ug/L	14-DEC-20				
	Carbon tetrachloride	<0.20		0.20	ug/L	14-DEC-20				
	Chlorobenzene	<0.50		0.50	ug/L	14-DEC-20	15			
	Dibromochloromethane	3.7		1.0	ug/L	14-DEC-20	40			
	Chloroethane	<1.0		1.0	ug/L	14-DEC-20				
	Chloroform	7.9		1.0	ug/L	14-DEC-20				
	Chloromethane	<1.0		1.0	ug/L	14-DEC-20	700			
	1,2-Dibromoethane	<0.20		0.20	ug/L	14-DEC-20	5			
	1,2-Dichlorobenzene	<0.50		0.50	ug/L	14-DEC-20	2.5		50	
	1,3-Dichlorobenzene	<0.50		0.50	ug/L	14-DEC-20	2.5			
	1,4-Dichlorobenzene	<0.50		0.50	ug/L	14-DEC-20	4		80	
	Dichlorodifluoromethane	<1.0		1.0	ug/L	14-DEC-20				
	1,1-Dichloroethane	<0.50		0.50	ug/L	14-DEC-20	200			
	1,2-Dichloroethane	<0.50		0.50	ug/L	14-DEC-20	100			
	1,1-Dichloroethylene	<0.50		0.50	ug/L	14-DEC-20	40			
	cis-1,2-Dichloroethylene	<0.50		0.50	ug/L	14-DEC-20				
	trans-1,2-Dichloroethylene	<0.50		0.50	ug/L	14-DEC-20				
	Dichloromethane	<2.0		2.0	ug/L	14-DEC-20	100		90	
	1,2-Dichloropropane	<0.50		0.50	ug/L	14-DEC-20	0.7			
	cis-1,3-Dichloropropene	<0.30		0.30	ug/L	14-DEC-20				
	trans-1,3-Dichloropropene	<0.30		0.30	ug/L	14-DEC-20	7			
	Ethylbenzene	<0.50		0.50	ug/L	14-DEC-20	8		60	
	n-Hexane	<0.50		0.50	ug/L	14-DEC-20				
	2-Hexanone	<20		20	ug/L	14-DEC-20				
	Methyl Ethyl Ketone	<20		20	ug/L	14-DEC-20	400			
	Methyl Isobutyl Ketone	<20		20	ug/L	14-DEC-20				
	MTBE	<0.50		0.50	ug/L	14-DEC-20				
	Styrene	<0.50		0.50	ug/L	14-DEC-20	4			
	1,1,1,2-Tetrachloroethane	<0.50		0.50	ug/L	14-DEC-20	20.0			
	1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L	14-DEC-20	70		60	
	Tetrachloroethylene	<0.50		0.50	ug/L	14-DEC-20	50		60	
	Toluene	0.40		0.40	ug/L	14-DEC-20	0.8		20	
	1,1,1-Trichloroethane	<0.50		0.50	ug/L	14-DEC-20	10			
	1,1,2-Trichloroethane	<0.50		0.50	ug/L	14-DEC-20	800			
	Trichloroethylene	<0.50		0.50	ug/L	14-DEC-20	20		50	
	Trichlorofluoromethane	<1.0		1.0	ug/L	14-DEC-20				
	Vinyl chloride	<0.50		0.50	ug/L	14-DEC-20	600			
	o-Xylene	<0.30		0.30	ug/L	14-DEC-20	40			
	m+p-Xylenes	<0.40		0.40	ug/L	14-DEC-20	2			
	Xylenes (Total)	<0.50		0.50	ug/L	14-DEC-20			300	
	Surrogate: 4-Bromofluorobenzene	86.8		70-130	%	14-DEC-20				
	Surrogate: 1,4-Difluorobenzene	101.4		70-130	%	14-DEC-20				
Polycyclic Aromatic Hydrocarbons										

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

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

Ontario PWQO (JULY 1994) + Barrie Sanitary Sewer Use By-Law (2012-172) = [Suite] - ON-PWQO+SAN+STORM-BARRIE

#1: Ontario PWQO

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ANALYTICAL GUIDELINE REPORT

1117-20-3280GH01

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	
L2538729-1	BH 1									
Sampled By: CLIENT on 08-DEC-20 @ 12:00										
Matrix: WATER										
Polycyclic Aromatic Hydrocarbons										
	Acenaphthene	<0.020		0.020	ug/L	14-DEC-20				
	Acenaphthylene	<0.020		0.020	ug/L	14-DEC-20				
	Anthracene	<0.020		0.020	ug/L	14-DEC-20	**0.0008			
	Benzo(a)anthracene	<0.020		0.020	ug/L	14-DEC-20	**0.0004			
	Benzo(a)pyrene	<0.010		0.010	ug/L	14-DEC-20				
	Benzo(b)fluoranthene	<0.020		0.020	ug/L	14-DEC-20				
	Benzo(g,h,i)perylene	<0.020		0.020	ug/L	14-DEC-20	**0.00002			
	Benzo(k)fluoranthene	<0.020		0.020	ug/L	14-DEC-20	**0.0002			
	Chrysene	<0.020		0.020	ug/L	14-DEC-20	**0.0001			
	Dibenzo(ah)anthracene	<0.020		0.020	ug/L	14-DEC-20	**0.002			
	Fluoranthene	<0.020		0.020	ug/L	14-DEC-20	**0.008			
	Fluorene	<0.020		0.020	ug/L	14-DEC-20	0.2			
	Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	14-DEC-20				
	1-Methylnaphthalene	<0.020		0.020	ug/L	14-DEC-20	2			
	2-Methylnaphthalene	<0.020		0.020	ug/L	14-DEC-20	2			
	Naphthalene	<0.050		0.050	ug/L	14-DEC-20	7			
	Phenanthrene	<0.020		0.020	ug/L	14-DEC-20	0.03			
	Pyrene	<0.020		0.020	ug/L	14-DEC-20				
	Surrogate: d10-Acenaphthene	73.6		60-140	%	14-DEC-20				
	Surrogate: d12-Chrysene	69.1		60-140	%	14-DEC-20				
	Surrogate: d8-Naphthalene	73.2		60-140	%	14-DEC-20				
	Surrogate: d10-Phenanthrene	73.2		60-140	%	14-DEC-20				
	Total PAHs	<0.095		0.095	ug/L	09-DEC-20			5	
Organochlorine Pesticides										
	Hexachlorobenzene	<0.0080		0.0080	ug/L	11-DEC-20	**0.0065		0.1	
	Surrogate: Tetrachloro-m-xylene	81.6		40-130	%	11-DEC-20				

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

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

Ontario PWQO (JULY 1994) + Barrie Sanitary Sewer Use By-Law (2012-172) = [Suite] - ON-PWQO+SAN+STORM-BARRIE

#1: Ontario PWQO

#2: Barrie Storm Sewer

#3: Barrie Sanitary Sewer

Reference Information

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

Reference Information

PAH-511-WT	Water	PAH-O. Reg 153/04 (July 2011)	SW846 3510/8270
Aqueous samples, fortified with surrogates, are extracted using liquid/liquid extraction technique. The sample extracts are concentrated and then analyzed using GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).			
PAH-SUM-CALC-WT	Water	TOTAL PAH's	CALCULATION
Total PAH represents the sum of all PAH analytes reported for a given sample. Note that regulatory agencies and criteria differ in their definitions of Total PAH in terms of the individual PAH analytes to be included.			
PH-WT	Water	pH	APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
S2-T>H2S-CALC-WT	Water	Total Sulphide Calculated as H2S	Calculation
This calculation converts Total Sulphide as (S2-) and reports it as Total Sulphide as (H2S). Total Sulphide as (S2-) is determined using procedures adapted from APHA 4500-S2 "Sulphide".			
SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.			
SULPHIDE-WT	Water	Sulphide (as S)	APHA 4500S2D
This analysis is carried out using procedures adapted from APHA Method 4500-S2-D "Methylene Blue Method". Sulphide is determined colourmetrically.			
TKN-F-WT	Water	TKN in Water by Fluorescence	J. ENVIRON. MONIT., 2005,7,37-42,RSC
Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection			
VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260
Aqueous samples are analyzed by headspace-GC/MS.			
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION
Total xylenes represents the sum of o-xylene and m&p-xylene.			

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

Chain of Custody numbers:			
20-3280GH01			
The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:			
Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

Reference Information

GLOSSARY OF REPORT TERMS

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

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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



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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT		Water						
Batch	R5314476							
WG3460614-19	DUP	WG3460614-18						
Fluoride (F)		0.118	0.116		mg/L	1.3	20	11-DEC-20
WG3460614-17	LCS							
Fluoride (F)			103.1		%		90-110	11-DEC-20
WG3460614-16	MB							
Fluoride (F)			<0.020		mg/L		0.02	11-DEC-20
WG3460614-20	MS	WG3460614-18						
Fluoride (F)			99.8		%		75-125	11-DEC-20
HG-T-CVAA-WT		Water						
Batch	R5310686							
WG3459673-4	DUP	WG3459673-3						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	10-DEC-20
WG3459673-2	LCS							
Mercury (Hg)-Total			95.8		%		80-120	10-DEC-20
WG3459673-1	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	10-DEC-20
WG3459673-6	MS	WG3459673-5						
Mercury (Hg)-Total			93.4		%		70-130	10-DEC-20
MET-T-CCMS-WT		Water						
Batch	R5310530							
WG3459515-4	DUP	WG3459515-3						
Aluminum (Al)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	10-DEC-20
Antimony (Sb)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-DEC-20
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-DEC-20
Barium (Ba)-Total		0.0344	0.0347		mg/L	1.0	20	10-DEC-20
Bismuth (Bi)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	10-DEC-20
Cadmium (Cd)-Total		0.000068	0.000060		mg/L	13	20	10-DEC-20
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	10-DEC-20
Cobalt (Co)-Total		0.0061	0.0062		mg/L	2.0	20	10-DEC-20
Copper (Cu)-Total		0.0149	0.0143		mg/L	4.3	20	10-DEC-20
Iron (Fe)-Total		2.42	2.44		mg/L	0.6	20	10-DEC-20
Lead (Pb)-Total		0.00191	0.00193		mg/L	1.1	20	10-DEC-20
Manganese (Mn)-Total		0.372	0.371		mg/L	0.4	20	10-DEC-20
Molybdenum (Mo)-Total		0.00890	0.00883		mg/L	0.7	20	10-DEC-20
Nickel (Ni)-Total		0.0072	0.0070		mg/L	3.2	20	10-DEC-20
Selenium (Se)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	10-DEC-20

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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT		Water						
Batch	R5310530							
WG3459515-4 DUP		WG3459515-3						
Silver (Ag)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	10-DEC-20
Tin (Sn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-DEC-20
Titanium (Ti)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	10-DEC-20
Vanadium (V)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	10-DEC-20
Zinc (Zn)-Total		0.073	0.074		mg/L	0.8	20	10-DEC-20
WG3459515-2 LCS								
Aluminum (Al)-Total			102.9		%		80-120	10-DEC-20
Antimony (Sb)-Total			106.2		%		80-120	10-DEC-20
Arsenic (As)-Total			104.8		%		80-120	10-DEC-20
Barium (Ba)-Total			104.6		%		80-120	10-DEC-20
Bismuth (Bi)-Total			102.4		%		80-120	10-DEC-20
Cadmium (Cd)-Total			102.8		%		80-120	10-DEC-20
Chromium (Cr)-Total			102.4		%		80-120	10-DEC-20
Cobalt (Co)-Total			102.8		%		80-120	10-DEC-20
Copper (Cu)-Total			103.3		%		80-120	10-DEC-20
Iron (Fe)-Total			106.0		%		80-120	10-DEC-20
Lead (Pb)-Total			103.6		%		80-120	10-DEC-20
Manganese (Mn)-Total			104.6		%		80-120	10-DEC-20
Molybdenum (Mo)-Total			103.3		%		80-120	10-DEC-20
Nickel (Ni)-Total			103.6		%		80-120	10-DEC-20
Selenium (Se)-Total			103.4		%		80-120	10-DEC-20
Silver (Ag)-Total			100.7		%		80-120	10-DEC-20
Tin (Sn)-Total			99.6		%		80-120	10-DEC-20
Titanium (Ti)-Total			100.6		%		80-120	10-DEC-20
Vanadium (V)-Total			105.0		%		80-120	10-DEC-20
Zinc (Zn)-Total			104.1		%		80-120	10-DEC-20
WG3459515-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	10-DEC-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	10-DEC-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	10-DEC-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	10-DEC-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	10-DEC-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	10-DEC-20
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	10-DEC-20



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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT		Water						
Batch	R5310530							
WG3459515-1 MB								
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	10-DEC-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	10-DEC-20
Iron (Fe)-Total			<0.010		mg/L		0.01	10-DEC-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	10-DEC-20
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	10-DEC-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	10-DEC-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	10-DEC-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	10-DEC-20
Silver (Ag)-Total			<0.000050		mg/L		0.00005	10-DEC-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	10-DEC-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	10-DEC-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	10-DEC-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	10-DEC-20
WG3459515-5 MS		WG3459515-6						
Aluminum (Al)-Total			113.2		%		70-130	10-DEC-20
Antimony (Sb)-Total			102.9		%		70-130	10-DEC-20
Arsenic (As)-Total			105.0		%		70-130	10-DEC-20
Barium (Ba)-Total			N/A	MS-B	%		-	10-DEC-20
Bismuth (Bi)-Total			95.2		%		70-130	10-DEC-20
Cadmium (Cd)-Total			93.1		%		70-130	10-DEC-20
Chromium (Cr)-Total			103.1		%		70-130	10-DEC-20
Cobalt (Co)-Total			99.5		%		70-130	10-DEC-20
Copper (Cu)-Total			93.7		%		70-130	10-DEC-20
Iron (Fe)-Total			N/A	MS-B	%		-	10-DEC-20
Lead (Pb)-Total			95.4		%		70-130	10-DEC-20
Manganese (Mn)-Total			N/A	MS-B	%		-	10-DEC-20
Molybdenum (Mo)-Total			109.4		%		70-130	10-DEC-20
Nickel (Ni)-Total			98.6		%		70-130	10-DEC-20
Selenium (Se)-Total			89.2		%		70-130	10-DEC-20
Silver (Ag)-Total			96.9		%		70-130	10-DEC-20
Tin (Sn)-Total			99.8		%		70-130	10-DEC-20
Titanium (Ti)-Total			107.6		%		70-130	10-DEC-20
Vanadium (V)-Total			109.7		%		70-130	10-DEC-20
Zinc (Zn)-Total			N/A	MS-B	%		-	10-DEC-20



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40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OCP-ROUTINE-WT		Water						
Batch	R5311699							
WG3459589-2	LCS							
Hexachlorobenzene			94.2		%		50-150	11-DEC-20
WG3459589-1	MB							
Hexachlorobenzene			<0.0080		ug/L		0.008	11-DEC-20
Surrogate: Tetrachloro-m-xylene			81.5		%		40-130	11-DEC-20
OGG-SPEC-WT		Water						
Batch	R5312920							
WG3460270-2	LCS							
Oil and Grease, Total			90.5		%		70-130	11-DEC-20
Mineral Oil and Grease			86.4		%		70-130	11-DEC-20
WG3460270-1	MB							
Oil and Grease, Total			<5.0		mg/L		5	11-DEC-20
Mineral Oil and Grease			<2.5		mg/L		2.5	11-DEC-20
P-T-COL-WT		Water						
Batch	R5314636							
WG3460700-3	DUP	WG3460700-5						
Phosphorus, Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	14-DEC-20
WG3460700-2	LCS							
Phosphorus, Total			98.1		%		80-120	14-DEC-20
WG3460700-1	MB							
Phosphorus, Total			<0.0030		mg/L		0.003	14-DEC-20
WG3460700-4	MS	WG3460700-5						
Phosphorus, Total			98.1		%		70-130	14-DEC-20
PAH-511-WT		Water						
Batch	R5310425							
WG3459364-2	LCS							
1-Methylnaphthalene			98.1		%		50-140	14-DEC-20
2-Methylnaphthalene			95.4		%		50-140	14-DEC-20
Acenaphthene			107.0		%		50-140	14-DEC-20
Acenaphthylene			100.5		%		50-140	14-DEC-20
Anthracene			95.0		%		50-140	14-DEC-20
Benzo(a)anthracene			110.5		%		50-140	14-DEC-20
Benzo(a)pyrene			90.5		%		50-140	14-DEC-20
Benzo(b)fluoranthene			79.3		%		50-140	14-DEC-20
Benzo(g,h,i)perylene			120.1		%		50-140	14-DEC-20
Benzo(k)fluoranthene			93.0		%		50-140	14-DEC-20



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40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT		Water						
Batch	R5310425							
WG3459364-2	LCS							
Chrysene			107.4		%		50-140	14-DEC-20
Dibenzo(ah)anthracene			106.6		%		50-140	14-DEC-20
Fluoranthene			107.4		%		50-140	14-DEC-20
Fluorene			100.4		%		50-140	14-DEC-20
Indeno(1,2,3-cd)pyrene			130.2		%		50-140	14-DEC-20
Naphthalene			100.1		%		50-140	14-DEC-20
Phenanthrene			107.0		%		50-140	14-DEC-20
Pyrene			109.8		%		50-140	14-DEC-20
WG3459364-1	MB							
1-Methylnaphthalene			<0.020		ug/L		0.02	14-DEC-20
2-Methylnaphthalene			<0.020		ug/L		0.02	14-DEC-20
Acenaphthene			<0.020		ug/L		0.02	14-DEC-20
Acenaphthylene			<0.020		ug/L		0.02	14-DEC-20
Anthracene			<0.020		ug/L		0.02	14-DEC-20
Benzo(a)anthracene			<0.020		ug/L		0.02	14-DEC-20
Benzo(a)pyrene			<0.010		ug/L		0.01	14-DEC-20
Benzo(b)fluoranthene			<0.020		ug/L		0.02	14-DEC-20
Benzo(g,h,i)perylene			<0.020		ug/L		0.02	14-DEC-20
Benzo(k)fluoranthene			<0.020		ug/L		0.02	14-DEC-20
Chrysene			<0.020		ug/L		0.02	14-DEC-20
Dibenzo(ah)anthracene			<0.020		ug/L		0.02	14-DEC-20
Fluoranthene			<0.020		ug/L		0.02	14-DEC-20
Fluorene			<0.020		ug/L		0.02	14-DEC-20
Indeno(1,2,3-cd)pyrene			<0.020		ug/L		0.02	14-DEC-20
Naphthalene			<0.050		ug/L		0.05	14-DEC-20
Phenanthrene			<0.020		ug/L		0.02	14-DEC-20
Pyrene			<0.020		ug/L		0.02	14-DEC-20
Surrogate: d8-Naphthalene			102.2		%		60-140	14-DEC-20
Surrogate: d10-Phenanthrene			96.3		%		60-140	14-DEC-20
Surrogate: d12-Chrysene			91.1		%		60-140	14-DEC-20
Surrogate: d10-Acenaphthene			100.1		%		60-140	14-DEC-20

PH-WT **Water**

Quality Control Report

Workorder: L2538729

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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SULPHIDE-WT		Water						
Batch	R5311398							
WG3460309-2	LCS							
Sulphide (as S)			99.6		%		75-125	11-DEC-20
WG3460309-1	MB							
Sulphide (as S)			<0.018		mg/L		0.018	11-DEC-20
WG3460309-4	MS	WG3460309-5						
Sulphide (as S)			N/A	MS-B	%		-	11-DEC-20
TKN-F-WT		Water						
Batch	R5315561							
WG3460690-3	DUP	WG3460690-5						
Total Kjeldahl Nitrogen		2.46	2.08		mg/L	17	20	14-DEC-20
WG3460690-2	LCS							
Total Kjeldahl Nitrogen			97.3		%		75-125	14-DEC-20
WG3460690-1	MB							
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	14-DEC-20
WG3460690-4	MS	WG3460690-5						
Total Kjeldahl Nitrogen			94.6		%		70-130	14-DEC-20
VOC-ROU-HS-WT		Water						
Batch	R5314058							
WG3460329-4	DUP	WG3460329-3						
1,1,1,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,1,1-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,1,2-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,2-Dibromoethane		<0.20	<0.20	RPD-NA	ug/L	N/A	30	14-DEC-20
1,1-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,1-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,2-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,2-Dichloropropane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,3-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
2-Hexanone		<20	<20	RPD-NA	ug/L	N/A	30	14-DEC-20
Acetone		<20	<20	RPD-NA	ug/L	N/A	30	14-DEC-20
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
Bromodichloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20

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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R5314058							
WG3460329-4	DUP	WG3460329-3						
Bromoform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20
Bromomethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
Carbon Disulfide		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20
Carbon tetrachloride		<0.20	<0.20	RPD-NA	ug/L	N/A	30	14-DEC-20
Chlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
Chloroethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20
Chloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
cis-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	14-DEC-20
Dibromochloromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20
Dichlorodifluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	14-DEC-20
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	14-DEC-20
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	14-DEC-20
Methyl Isobutyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	14-DEC-20
n-Hexane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
MTBE		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	14-DEC-20
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
Toluene		<0.40	<0.40	RPD-NA	ug/L	N/A	30	14-DEC-20
trans-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	14-DEC-20
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
Trichlorofluoromethane		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-DEC-20
Vinyl chloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-DEC-20
WG3460329-1	LCS							
1,1,1,2-Tetrachloroethane			95.4		%		70-130	11-DEC-20
1,1,2,2-Tetrachloroethane			101.1		%		70-130	11-DEC-20
1,1,1-Trichloroethane			103.9		%		70-130	11-DEC-20
1,1,2-Trichloroethane			96.1		%		70-130	11-DEC-20

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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R5314058							
WG3460329-1	LCS							
1,2-Dibromoethane			95.5		%		70-130	11-DEC-20
1,1-Dichloroethane			104.7		%		70-130	11-DEC-20
1,1-Dichloroethylene			101.9		%		70-130	11-DEC-20
1,2-Dichlorobenzene			99.4		%		70-130	11-DEC-20
1,2-Dichloroethane			97.9		%		70-130	11-DEC-20
1,2-Dichloropropane			100.8		%		70-130	11-DEC-20
1,3-Dichlorobenzene			99.6		%		70-130	11-DEC-20
1,4-Dichlorobenzene			97.7		%		70-130	11-DEC-20
2-Hexanone			91.8		%		60-140	11-DEC-20
Acetone			109.2		%		60-140	11-DEC-20
Benzene			100.2		%		70-130	11-DEC-20
Bromodichloromethane			102.3		%		70-130	11-DEC-20
Bromoform			106.2		%		70-130	11-DEC-20
Bromomethane			87.4		%		60-140	11-DEC-20
Carbon Disulfide			90.2		%		70-130	11-DEC-20
Carbon tetrachloride			96.7		%		70-130	11-DEC-20
Chlorobenzene			95.1		%		70-130	11-DEC-20
Chloroethane			106.6		%		70-130	11-DEC-20
Chloroform			100.8		%		70-130	11-DEC-20
Chloromethane			84.0		%		60-140	11-DEC-20
cis-1,2-Dichloroethylene			110.6		%		70-130	11-DEC-20
cis-1,3-Dichloropropene			99.8		%		70-130	11-DEC-20
Dibromochloromethane			92.7		%		70-130	11-DEC-20
Dichlorodifluoromethane			62.2		%		50-140	11-DEC-20
Dichloromethane			99.5		%		70-130	11-DEC-20
Ethylbenzene			95.2		%		70-130	11-DEC-20
m+p-Xylenes			95.4		%		70-130	11-DEC-20
Methyl Ethyl Ketone			107.1		%		60-140	11-DEC-20
Methyl Isobutyl Ketone			97.5		%		50-150	11-DEC-20
n-Hexane			99.3		%		70-130	11-DEC-20
MTBE			99.5		%		70-130	11-DEC-20
o-Xylene			102.9		%		70-130	11-DEC-20
Styrene			100.3		%		70-130	11-DEC-20



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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R5314058							
WG3460329-1	LCS							
Tetrachloroethylene			97.5		%		70-130	11-DEC-20
Toluene			96.3		%		70-130	11-DEC-20
trans-1,2-Dichloroethylene			101.2		%		70-130	11-DEC-20
trans-1,3-Dichloropropene			91.0		%		70-130	11-DEC-20
Trichloroethylene			106.6		%		70-130	11-DEC-20
Trichlorofluoromethane			93.0		%		60-140	11-DEC-20
Vinyl chloride			90.6		%		60-140	11-DEC-20
WG3460329-2	MB							
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	14-DEC-20
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	14-DEC-20
1,1,1-Trichloroethane			<0.50		ug/L		0.5	14-DEC-20
1,1,2-Trichloroethane			<0.50		ug/L		0.5	14-DEC-20
1,2-Dibromoethane			<0.20		ug/L		0.2	14-DEC-20
1,1-Dichloroethane			<0.50		ug/L		0.5	14-DEC-20
1,1-Dichloroethylene			<0.50		ug/L		0.5	14-DEC-20
1,2-Dichlorobenzene			<0.50		ug/L		0.5	14-DEC-20
1,2-Dichloroethane			<0.50		ug/L		0.5	14-DEC-20
1,2-Dichloropropane			<0.50		ug/L		0.5	14-DEC-20
1,3-Dichlorobenzene			<0.50		ug/L		0.5	14-DEC-20
1,4-Dichlorobenzene			<0.50		ug/L		0.5	14-DEC-20
2-Hexanone			<20		ug/L		20	14-DEC-20
Acetone			<20		ug/L		20	14-DEC-20
Benzene			<0.50		ug/L		0.5	14-DEC-20
Bromodichloromethane			<1.0		ug/L		1	14-DEC-20
Bromoform			<1.0		ug/L		1	14-DEC-20
Bromomethane			<0.50		ug/L		0.5	14-DEC-20
Carbon Disulfide			<1.0		ug/L		1	14-DEC-20
Carbon tetrachloride			<0.20		ug/L		0.2	14-DEC-20
Chlorobenzene			<0.50		ug/L		0.5	14-DEC-20
Chloroethane			<1.0		ug/L		1	14-DEC-20
Chloroform			<1.0		ug/L		1	14-DEC-20
Chloromethane			<1.0		ug/L		1	14-DEC-20
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	14-DEC-20
cis-1,3-Dichloropropene			<0.30		ug/L		0.3	14-DEC-20



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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R5314058							
WG3460329-2 MB								
Dibromochloromethane			<1.0		ug/L		1	14-DEC-20
Dichlorodifluoromethane			<1.0		ug/L		1	14-DEC-20
Dichloromethane			<2.0		ug/L		2	14-DEC-20
Ethylbenzene			<0.50		ug/L		0.5	14-DEC-20
m+p-Xylenes			<0.40		ug/L		0.4	14-DEC-20
Methyl Ethyl Ketone			<20		ug/L		20	14-DEC-20
Methyl Isobutyl Ketone			<20		ug/L		20	14-DEC-20
n-Hexane			<0.50		ug/L		0.5	14-DEC-20
MTBE			<0.50		ug/L		0.5	14-DEC-20
o-Xylene			<0.30		ug/L		0.3	14-DEC-20
Styrene			<0.50		ug/L		0.5	14-DEC-20
Tetrachloroethylene			<0.50		ug/L		0.5	14-DEC-20
Toluene			<0.40		ug/L		0.4	14-DEC-20
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	14-DEC-20
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	14-DEC-20
Trichloroethylene			<0.50		ug/L		0.5	14-DEC-20
Trichlorofluoromethane			<1.0		ug/L		1	14-DEC-20
Vinyl chloride			<0.50		ug/L		0.5	14-DEC-20
Surrogate: 1,4-Difluorobenzene			101.3		%		70-130	14-DEC-20
Surrogate: 4-Bromofluorobenzene			86.9		%		70-130	14-DEC-20
WG3460329-5 MS		WG3460329-3						
1,1,1,2-Tetrachloroethane			93.8		%		50-150	14-DEC-20
1,1,2,2-Tetrachloroethane			96.9		%		50-150	14-DEC-20
1,1,1-Trichloroethane			103.2		%		50-150	14-DEC-20
1,1,2-Trichloroethane			94.6		%		50-150	14-DEC-20
1,2-Dibromoethane			94.4		%		50-150	14-DEC-20
1,1-Dichloroethane			104.5		%		50-150	14-DEC-20
1,1-Dichloroethylene			101.1		%		50-150	14-DEC-20
1,2-Dichlorobenzene			99.8		%		50-150	14-DEC-20
1,2-Dichloroethane			97.6		%		50-150	14-DEC-20
1,2-Dichloropropane			99.6		%		50-150	14-DEC-20
1,3-Dichlorobenzene			102.6		%		50-150	14-DEC-20
1,4-Dichlorobenzene			101.0		%		50-150	14-DEC-20
2-Hexanone			85.6		%		50-150	14-DEC-20

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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6

Contact: Sarena Medina

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT		Water						
Batch	R5314058							
WG3460329-5	MS	WG3460329-3						
Acetone			109.1		%		50-150	14-DEC-20
Benzene			99.8		%		50-150	14-DEC-20
Bromodichloromethane			101.0		%		50-150	14-DEC-20
Bromoform			101.7		%		50-150	14-DEC-20
Bromomethane			88.3		%		50-150	14-DEC-20
Carbon Disulfide			91.1		%		50-150	14-DEC-20
Carbon tetrachloride			96.5		%		50-150	14-DEC-20
Chlorobenzene			95.2		%		50-150	14-DEC-20
Chloroethane			105.7		%		50-150	14-DEC-20
Chloroform			100.4		%		50-150	14-DEC-20
Chloromethane			82.2		%		50-150	14-DEC-20
cis-1,2-Dichloroethylene			110.3		%		50-150	14-DEC-20
cis-1,3-Dichloropropene			103.2		%		50-150	14-DEC-20
Dibromochloromethane			90.1		%		50-150	14-DEC-20
Dichlorodifluoromethane			57.6		%		50-150	14-DEC-20
Dichloromethane			99.2		%		50-150	14-DEC-20
Ethylbenzene			95.5		%		50-150	14-DEC-20
m+p-Xylenes			96.5		%		50-150	14-DEC-20
Methyl Ethyl Ketone			105.4		%		50-150	14-DEC-20
Methyl Isobutyl Ketone			91.7		%		50-150	14-DEC-20
n-Hexane			98.0		%		50-150	14-DEC-20
MTBE			100.1		%		50-150	14-DEC-20
o-Xylene			102.3		%		50-150	14-DEC-20
Styrene			99.1		%		50-150	14-DEC-20
Tetrachloroethylene			100.3		%		50-150	14-DEC-20
Toluene			96.7		%		50-150	14-DEC-20
trans-1,2-Dichloroethylene			103.1		%		50-150	14-DEC-20
trans-1,3-Dichloropropene			95.3		%		50-150	14-DEC-20
Trichloroethylene			107.2		%		50-150	14-DEC-20
Trichlorofluoromethane			91.9		%		50-150	14-DEC-20
Vinyl chloride			88.8		%		50-150	14-DEC-20

Quality Control Report

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Client: GeoPro Consulting Limited (Richmond Hill)
40 Vogell Road Unit 22
Richmond Hill ON L4B 3N6
Contact: Sarena Medina

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Legend:

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

Sample Parameter Qualifier Definitions:

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

Hold Time Exceedances:

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

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

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

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

**SGS Canada Inc.**

P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

ALS Laboratory (Waterloo)

Attn : Mary-Lynn Pike

60 Northland Road, Unit # 1
Waterloo, ON
N2V 2B8, Canada

Phone: 519-866-6910
Fax:

17-December-2020

Date Rec. : 14 December 2020
LR Report: CA13443-DEC20
Reference: Submission#: L2538729

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Sample Date & Time	Temperature Upon Receipt °C	Gold (total) mg/L	Platinum (total) mg/L	Rhodium (total) mg/L
1: Analysis Start Date		---	16-Dec-20	16-Dec-20	16-Dec-20
2: Analysis Start Time		---	11:43	11:43	11:43
3: Analysis Completed Date		---	17-Dec-20	17-Dec-20	17-Dec-20
4: Analysis Completed Time		---	13:14	13:14	13:14
5: QC - Blank		---	0	< 0.0001	< 0.0001
6: QC - STD % Recovery		---	102%	99%	96%
7: QC - DUP % RPD		---	3%	5%	ND
8: RL		---	0.00001	0.0001	0.00001
9: L2538729-1	08-Dec-20 12:00	13.0	0.00001	< 0.0001	< 0.00001

RL - SGS Reporting Limit
ND - Not Detected

Kimberley Didsbury
Project Specialist,
Environment, Health & Safety



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

NOV 2018 FROM



GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

APPENDIX D

Slug Test: BH1**(Based on data from Datalogger - Rising Head Method - December 8, 2020)**

284&286 Dunlop St W and 119&121 Henry St, Barrie, Ontario

Project No. : 20-3280H

H = Assumed Initial Water Head

Conducted by: FB

Ho = Water Head at time = 0

Interpreted by: BN

h = Water Head/Level at time t

Well Number: BH1

Screen Depth (mBGS): 10.7 ~ 12.2

Well Elevation (mASL): -

L = 150 cm

Well Diameter: 2.0" ID

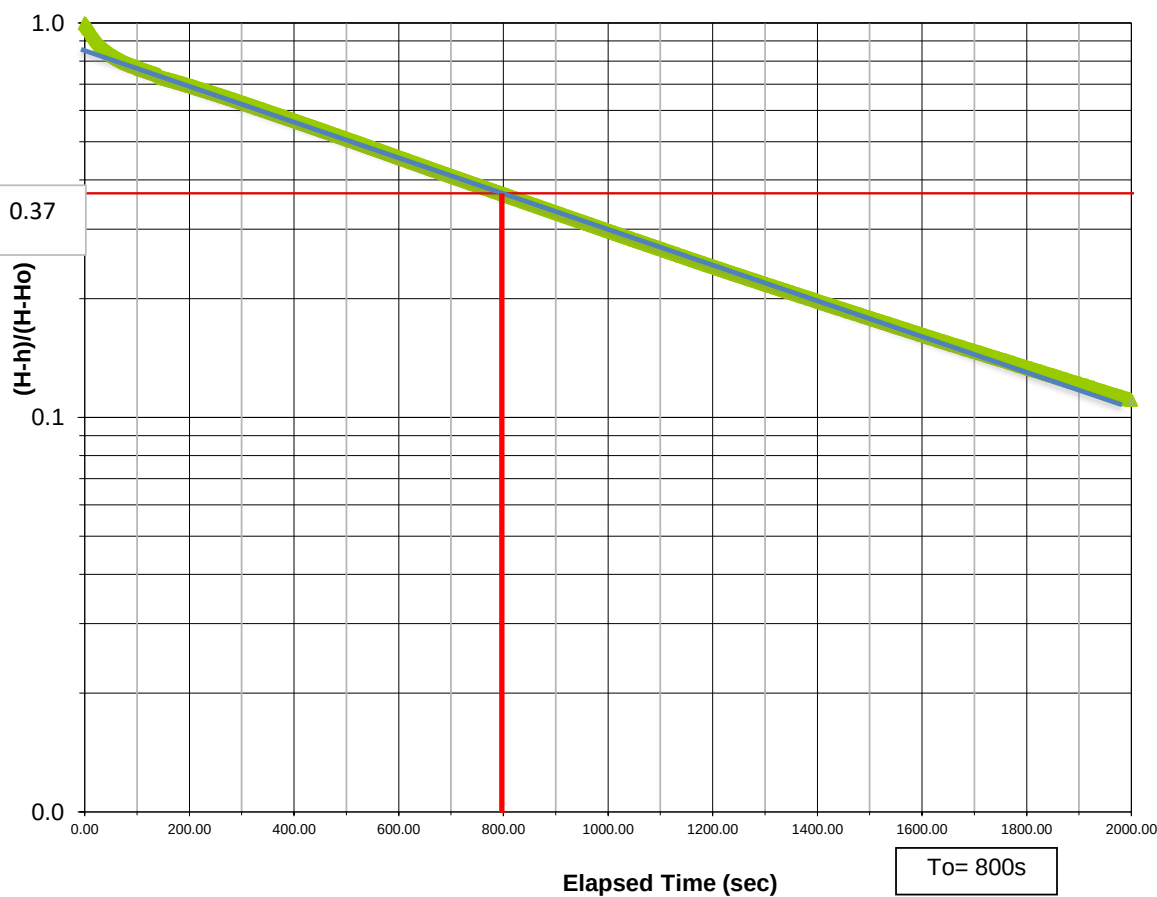
R = 10.25 cm

Static Water Level (mBGS): 4.56

r = 2.55 cm

Finish Reading (H) 17.6148 m

To = 800 sec

Start Reading (h₀) 14.682 m $K = r^2 \ln(L/R) / (2LT_o) = 7.3E-05$ cm/s**Slug Test Result (Hvorslev Method)**
Based on Datalogger ReadingsGeoPro Consulting Limited
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Slug Test: BH2**(Based on data from Datalogger - Rising Head Method - December 8, 2020)**

284&286 Dunlop St W and 119&121 Henry St, Barrie, Ontario

Project No. : 20-3280H

H = Assumed Initial Water Head

Conducted by: FB

Ho = Water Head at time = 0

Interpreted by: BN

h = Water Head/Level at time t

Well Number: BH2

Screen Depth (mBGS): 13.3 ~ 16.3

Well Elevation (mASL): -

L = 300 cm

Well Diameter: 2.0" ID

R = 10.25 cm

Static Water Level (mBGS): 4.50

r = 2.55 cm

Finish Reading (H) 21.8261 m

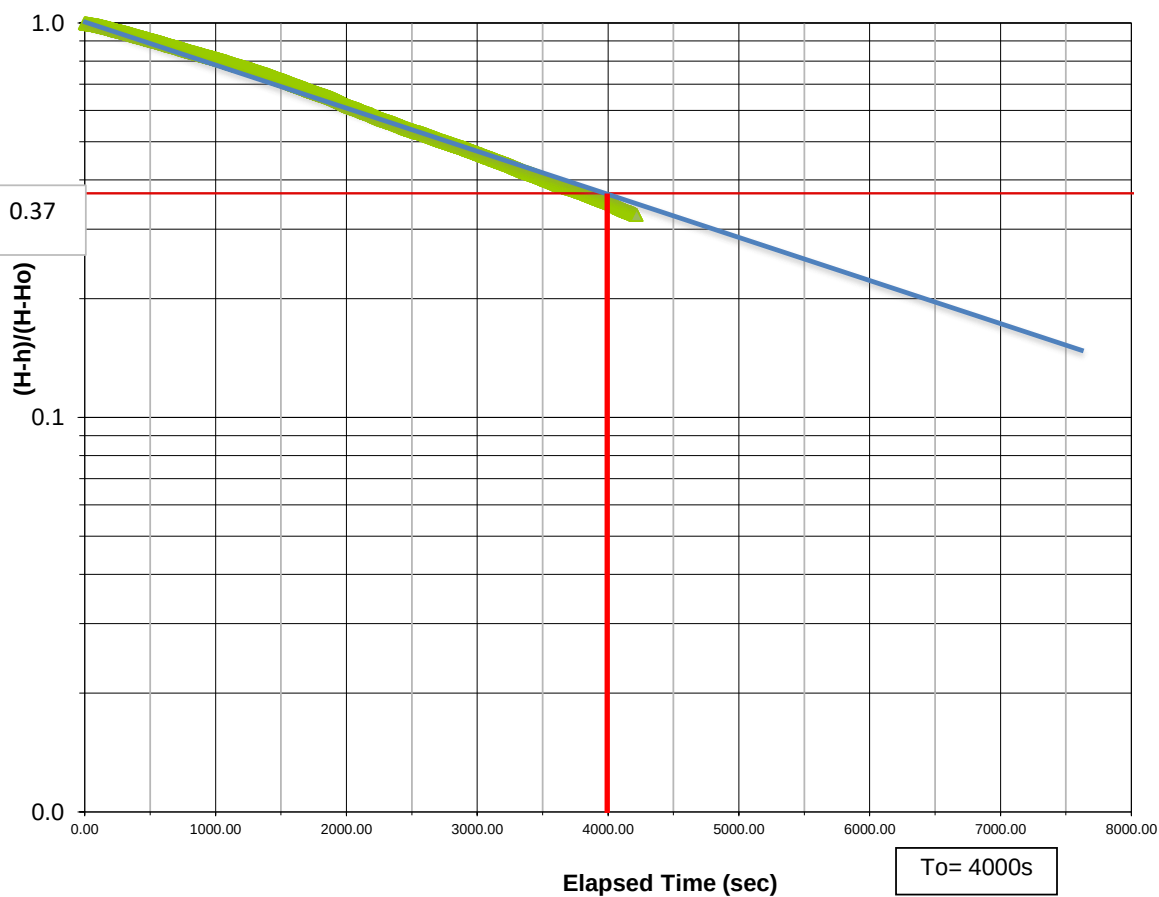
To = 4000 sec

Start Reading (h₀) 20.2805 m $K = r^2 \ln(L/R) / (2LT_o) = 9.1E-06$ cm/s

Slug Test Result (Hvorslev Method)
Based on Datalogger Readings



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Slug Test: BH4**(Based on data from Datalogger - Rising Head Method - December 8, 2020)**

284&286 Dunlop St W and 119&121 Henry St, Barrie, Ontario

Project No. : 20-3280H

H = Assumed Initial Water Head

Conducted by: FB

Ho = Water Head at time = 0

Interpreted by: BN

h = Water Head/Level at time t

Well Number: BH4

Screen Depth (mBGS): 6.5 ~ 9.5

Well Elevation (mASL): -

L = 300 cm

Well Diameter: 2.0" ID

R = 10.25 cm

Static Water Level (mBGS): 3.73

r = 2.55 cm

Finish Reading (H) 13.8727 m

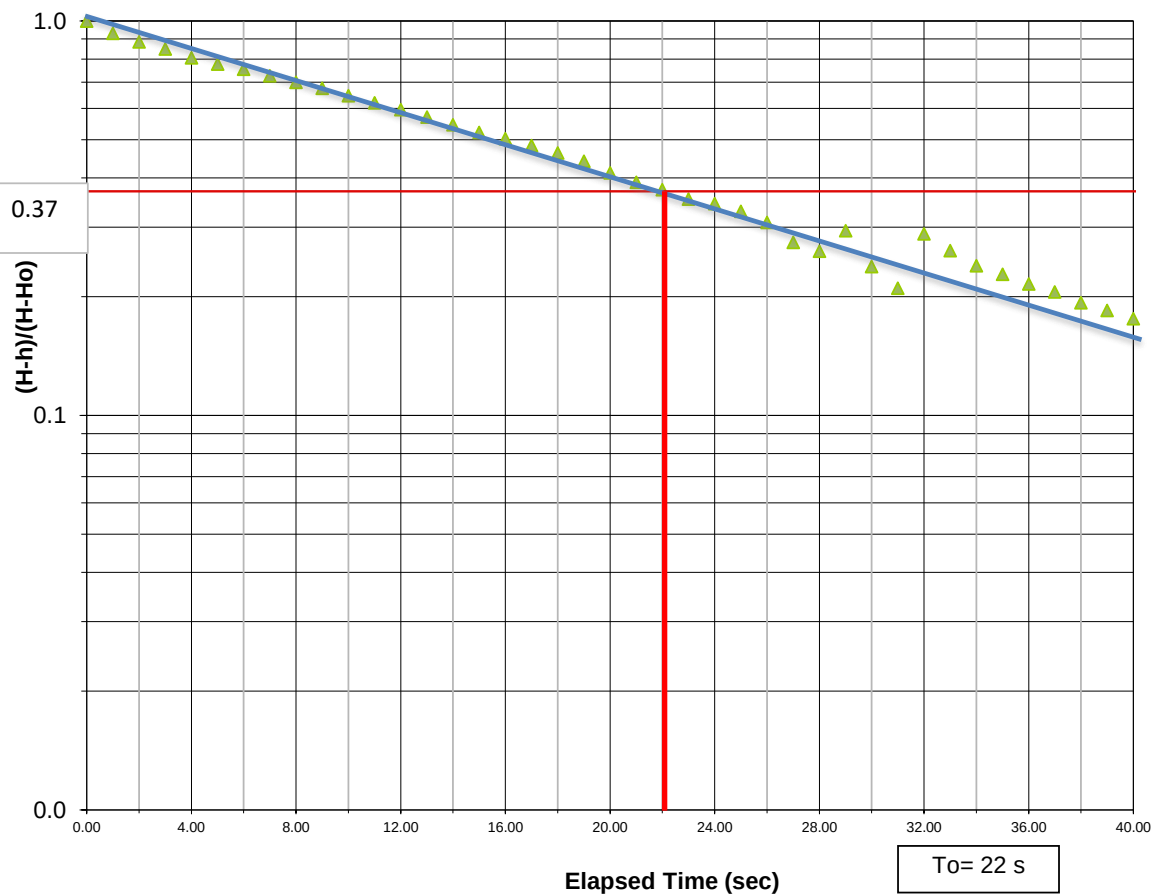
To = 22 sec

Start Reading (h₀) 13.0921 m $K = r^2 \ln(L/R) / (2LT_o) =$ **1.7E-03** cm/s

Slug Test Result (Hvorslev Method)
Based on Datalogger Readings



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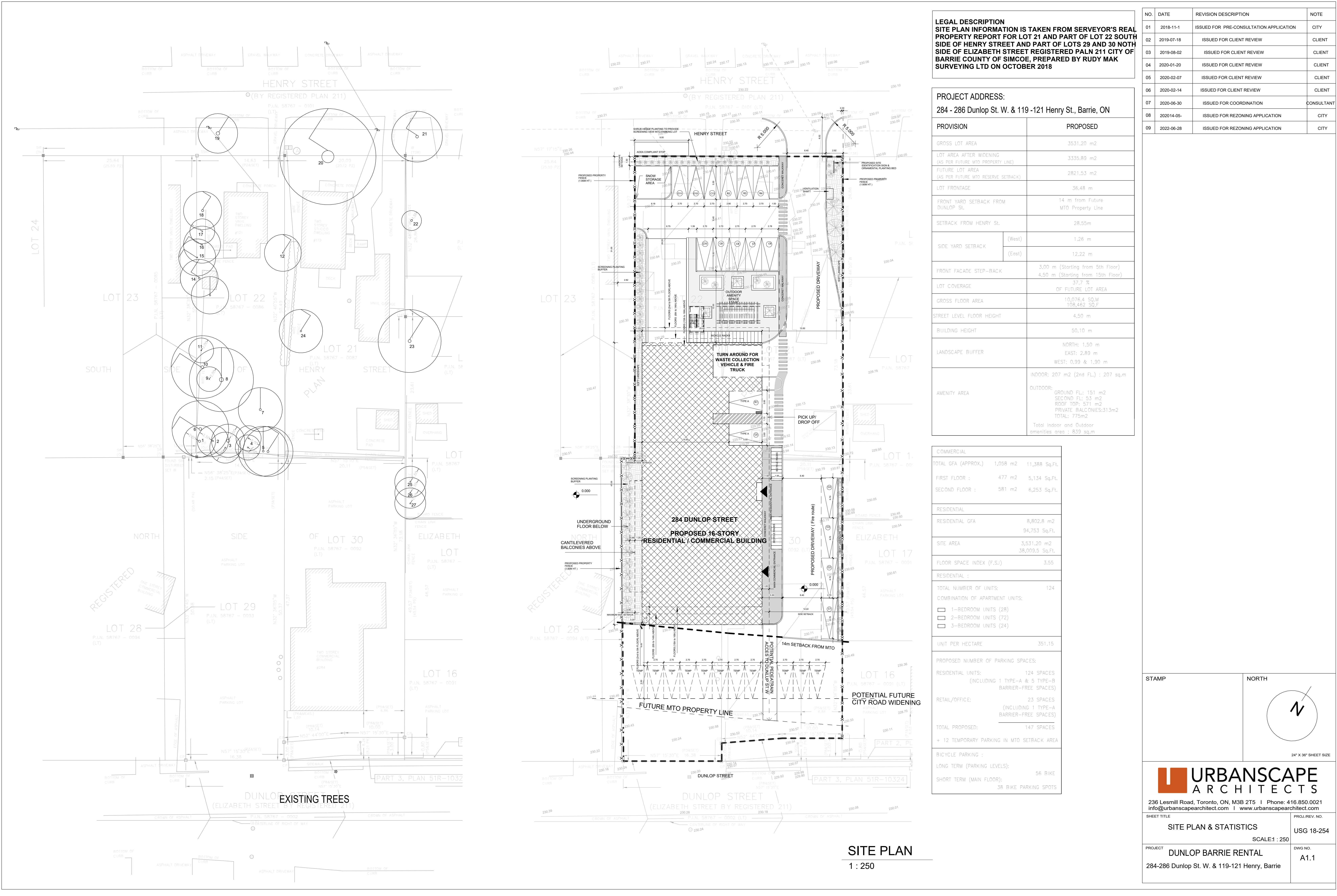




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APPENDIX E



LEGAL DESCRIPTION
SITE PLAN INFORMATION IS TAKEN FROM SURVEYOR'S REAL PROPERTY REPORT FOR LOT 21 AND PART OF LOT 22 SOUTH SIDE OF HENRY STREET AND PART OF LOTS 29 AND 30 NORTH SIDE OF ELIZABETH STREET REGISTERED PALN 211 CITY OF BARRIE COUNTY OF SIMCOE, PREPARED BY RUDY MAK SURVEYING LTD ON OCTOBER 2018

PROJECT ADDRESS:
284 - 286 Dunlop St. W. & 119 -121 Henry St., Barrie, ON

PROVISION	PROPOSED
GROSS LOT AREA	3531.20 m ²
LOT AREA AFTER WIDENING (AS PER FUTURE MTO PROPERTY LINE)	3335.89 m ²
FUTURE LOT AREA (AS PER FUTURE MTO RESERVE SETBACK)	2821.53 m ²
LOT FRONTAGE	36.48 m
FRONT YARD SETBACK FROM DUNLOP ST.	14 m from Future MTO Property Line
SETBACK FROM HENRY ST.	28.55m
SIDE YARD SETBACK	(West) 1.26 m (East) 12.22 m
FRONT FACADE STEP-BACK	3.00 m (Starting from 5th Floor) 4.50 m (Starting from 15th Floor)
LOT COVERAGE	37.7 % OF FUTURE LOT AREA
GROSS FLOOR AREA	10,076.4 SQ.M 108,462 SQ.F
STREET LEVEL FLOOR HEIGHT	4.50 m
BUILDING HEIGHT	50.10 m
LANDSCAPE BUFFER	NORTH: 1.50 m EAST: 2.89 m WEST: 0.99 & 1.90 m
AMENITY AREA	INDOOR: 207 m ² (2nd FL.) : 207 sq.m OUTDOOR: GROUND FL: 151 m ² SECOND FL: 53 m ² ROOF TOP: 571 m ² PRIVATE BALCONIES:313m ² TOTAL: 775m ² Total Indoor and Outdoor amenities area : 839 sq.m

COMMERCIAL	
TOTAL GFA (APPROX.)	1,058 m ² 11,388 Sq.Ft.
FIRST FLOOR :	477 m ² 5,134 Sq.Ft.
SECOND FLOOR :	581 m ² 6,253 Sq.Ft.
RESIDENTIAL	
RESIDENTIAL GFA	8,802.8 m ² 94,753 Sq.Ft.
SITE AREA	3,531.20 m ² 38,009.5 Sq.Ft.
FLOOR SPACE INDEX (F.S.I.)	3.55
RESIDENTIAL :	
TOTAL NUMBER OF UNITS:	124
COMBINATION OF APARTMENT UNITS:	
1-BEDROOM UNITS (28)	
2-BEDROOM UNITS (72)	
3-BEDROOM UNITS (24)	
UNIT PER HECTARE	351.15
PROPOSED NUMBER OF PARKING SPACES:	
RESIDENTIAL UNITS: 124 SPACES (INCLUDING 1 TYPE-A & 5 TYPE-B BARRIER-FREE SPACES)	
RETAIL/OFFICE: 23 SPACES (INCLUDING 1 TYPE-A BARRIER-FREE SPACES)	
TOTAL PROPOSED: 147 SPACES	
+ 12 TEMPORARY PARKING IN MTO SETBACK AREA	
BICYCLE PARKING :	
LONG TERM (PARKING LEVELS): 56 BIKE	
SHORT TERM (MAIN FLOOR): 38 BIKE PARKING SPOTS	

NO.	DATE	REVISION DESCRIPTION	NOTE
01	2018-11-1	ISSUED FOR PRE-CONSULTATION APPLICATION	CITY
02	2019-07-18	ISSUED FOR CLIENT REVIEW	CLIENT
03	2019-08-02	ISSUED FOR CLIENT REVIEW	CLIENT
04	2020-01-20	ISSUED FOR CLIENT REVIEW	CLIENT
05	2020-02-07	ISSUED FOR CLIENT REVIEW	CLIENT
06	2020-02-14	ISSUED FOR CLIENT REVIEW	CLIENT
07	2020-06-30	ISSUED FOR COORDINATION	CONSULTANT
08	202014-05-	ISSUED FOR REZONING APPLICATION	CITY
09	2022-06-28	ISSUED FOR REZONING APPLICATION	CITY

STAMP

NORTH

24" X 36" SHEET SIZE

URBANSCAPE ARCHITECTS

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SHEET TITLE

SITE PLAN & STATISTICS

SCALE1 : 250

PROJECT

DUNLOP BARRIE RENTAL

284-286 Dunlop St. W. & 119-121 Henry, Barrie

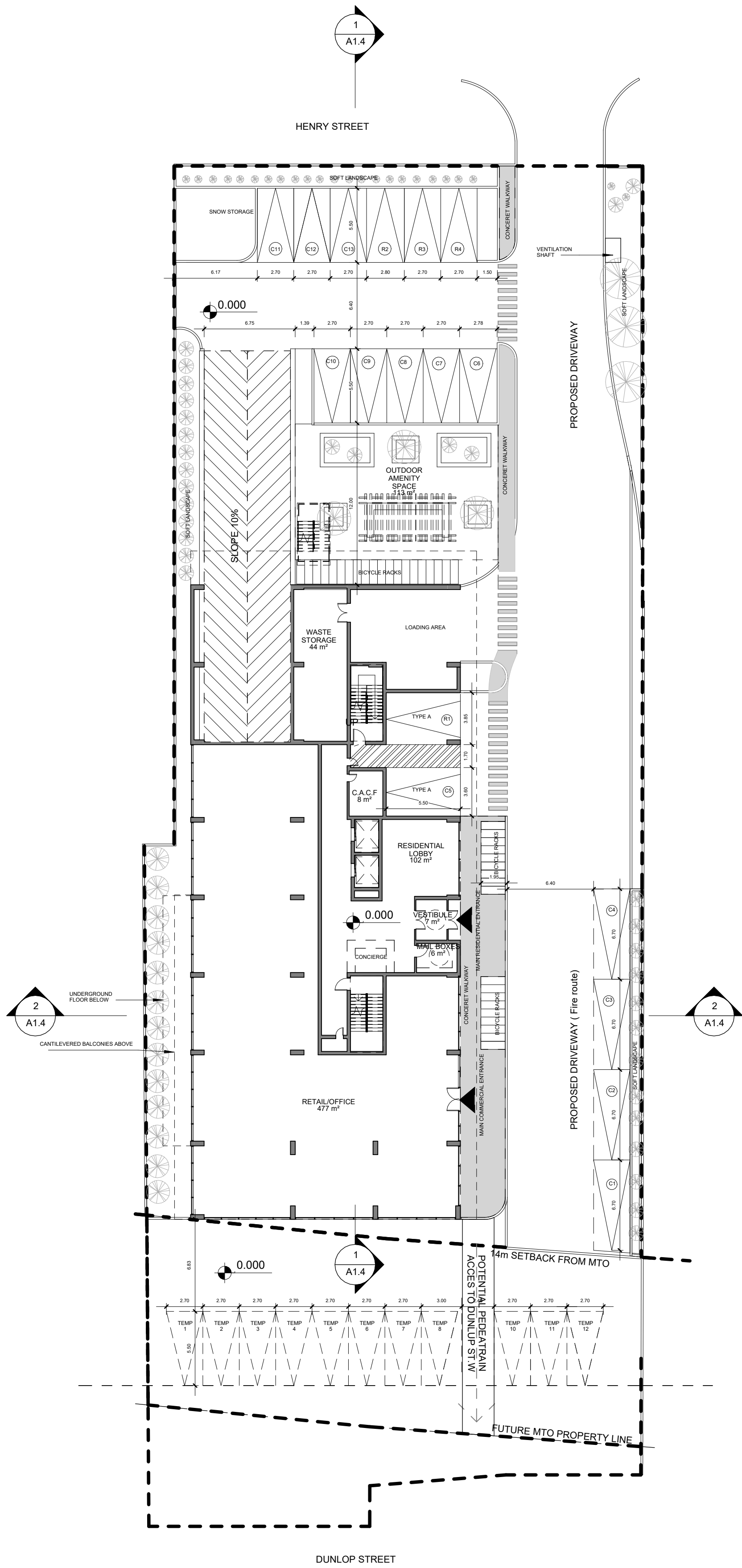
PROJ./REV. NO.

USG 18-254

DWG NO.

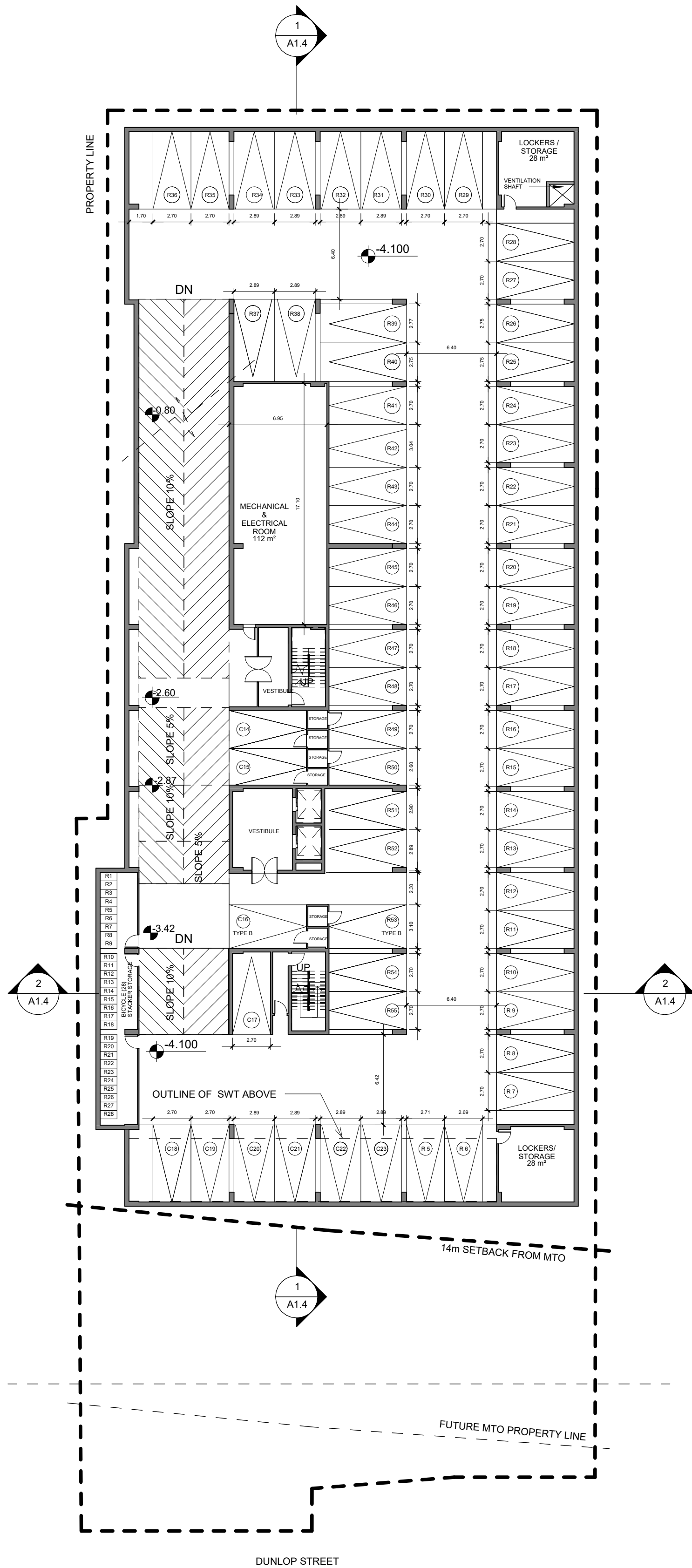
A1.1

SITE PLAN
1 : 250



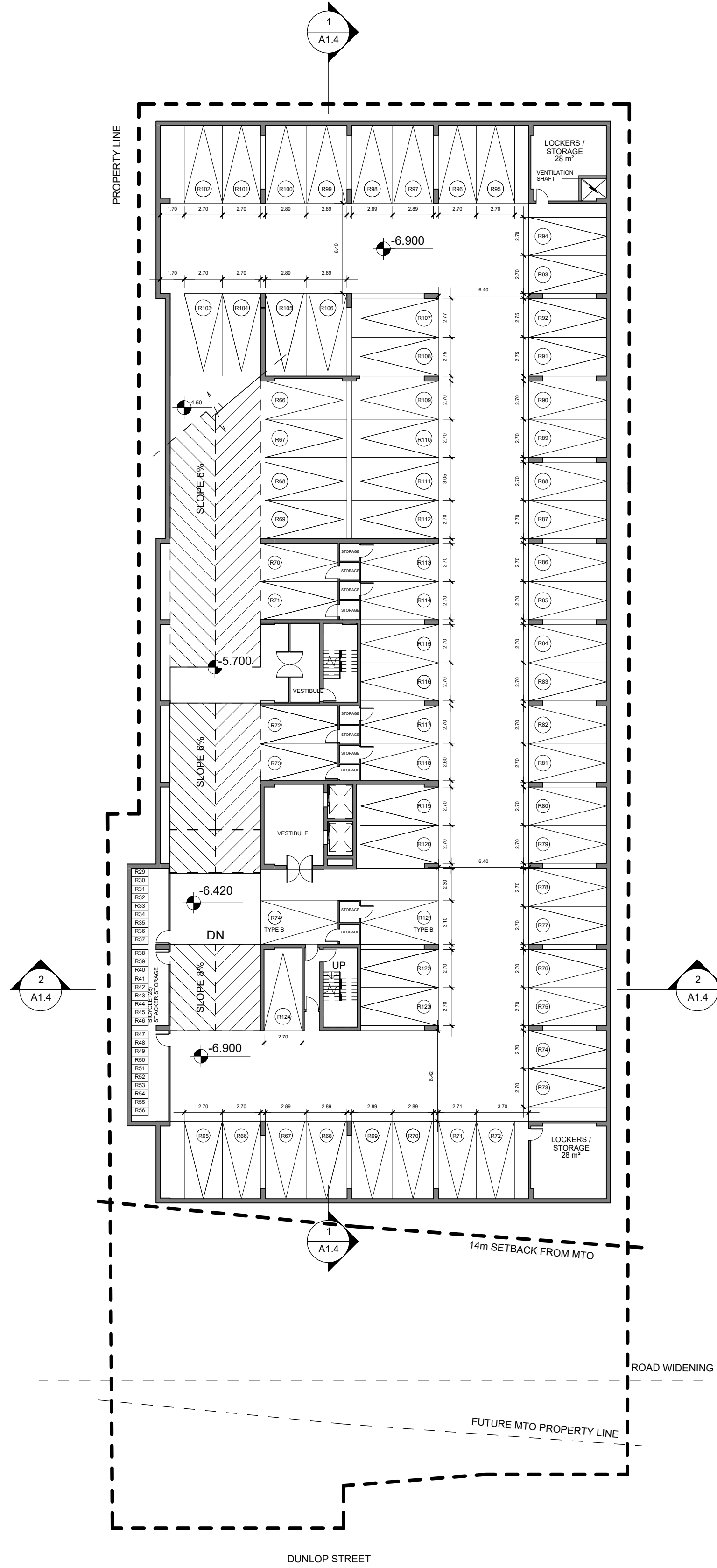
GROUND FLOOR PLAN

1 : 250



UNDERGROUND PARKING PLAN _ P1

1 : 250



UNDERGROUND PARKING PLAN _ P2

1 : 250

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SHEET TITLE

CONCEPTUAL FLOOR PLANS

SCALE: 1 : 250

PROJECT

DUNLOP BARRIE RENTAL

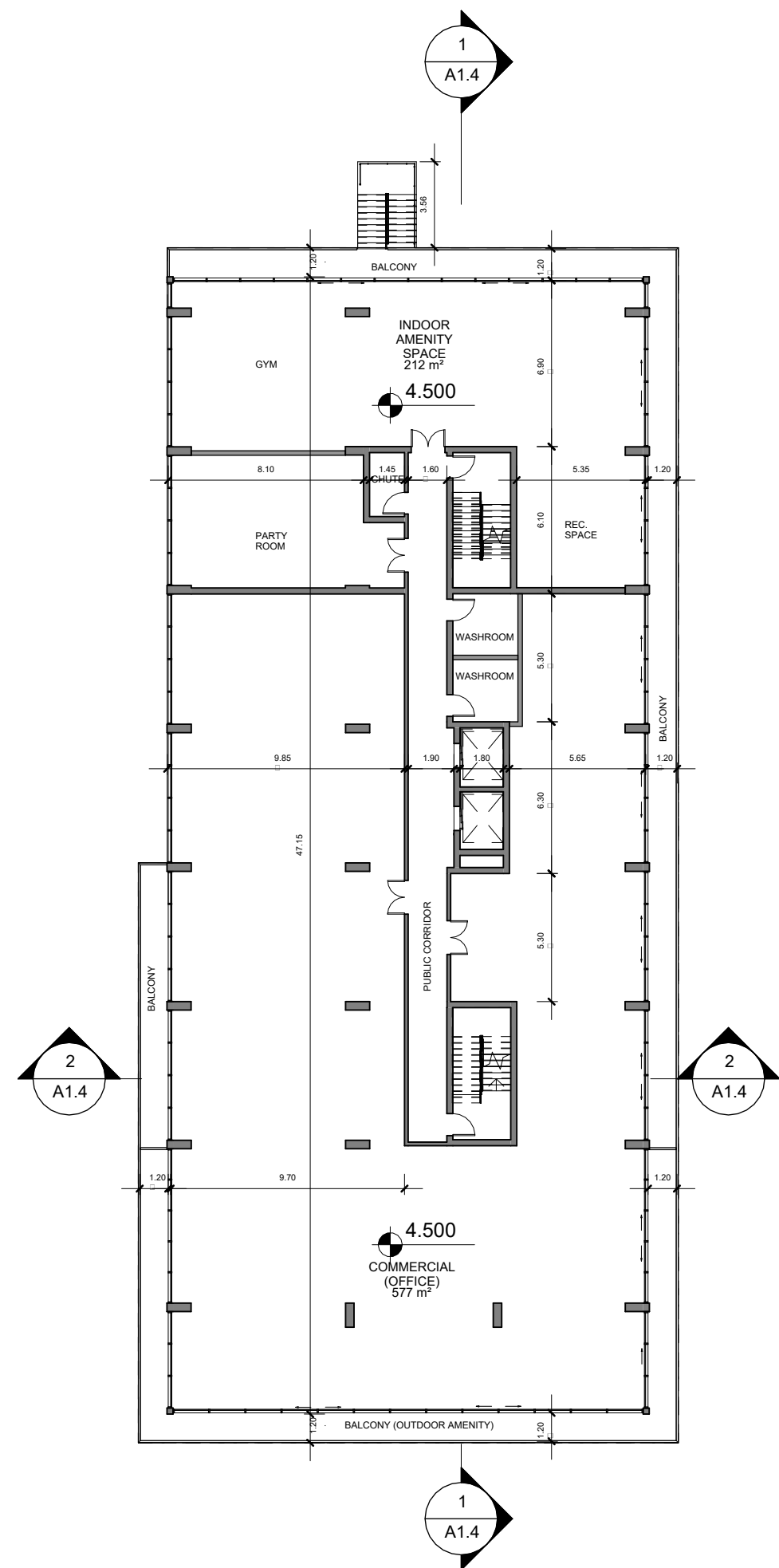
284-286 Dunlop St. W. & 119-121 Henry, Barrie

PROJ./REV. NO.

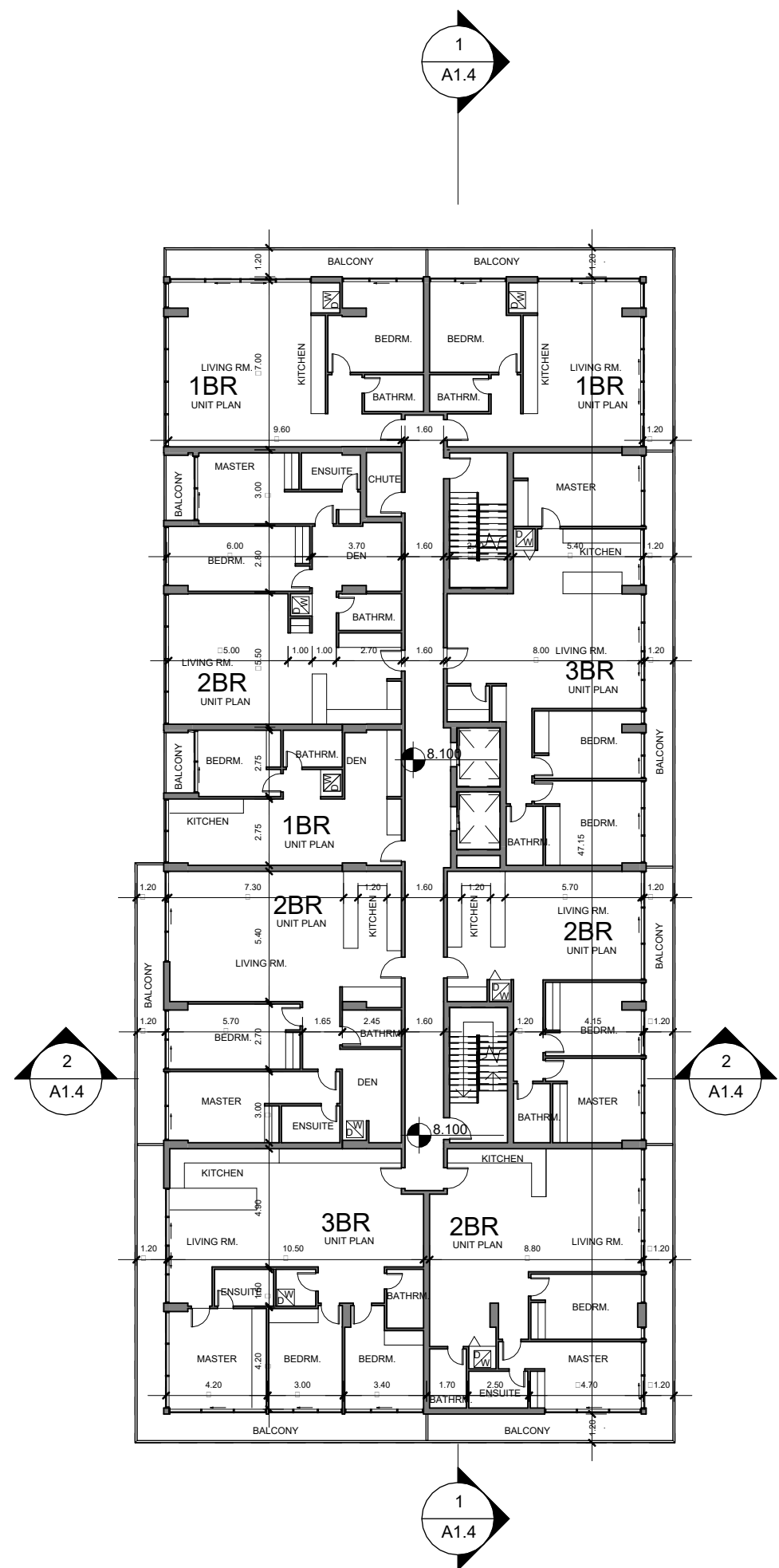
USG 18-254

DWG NO.

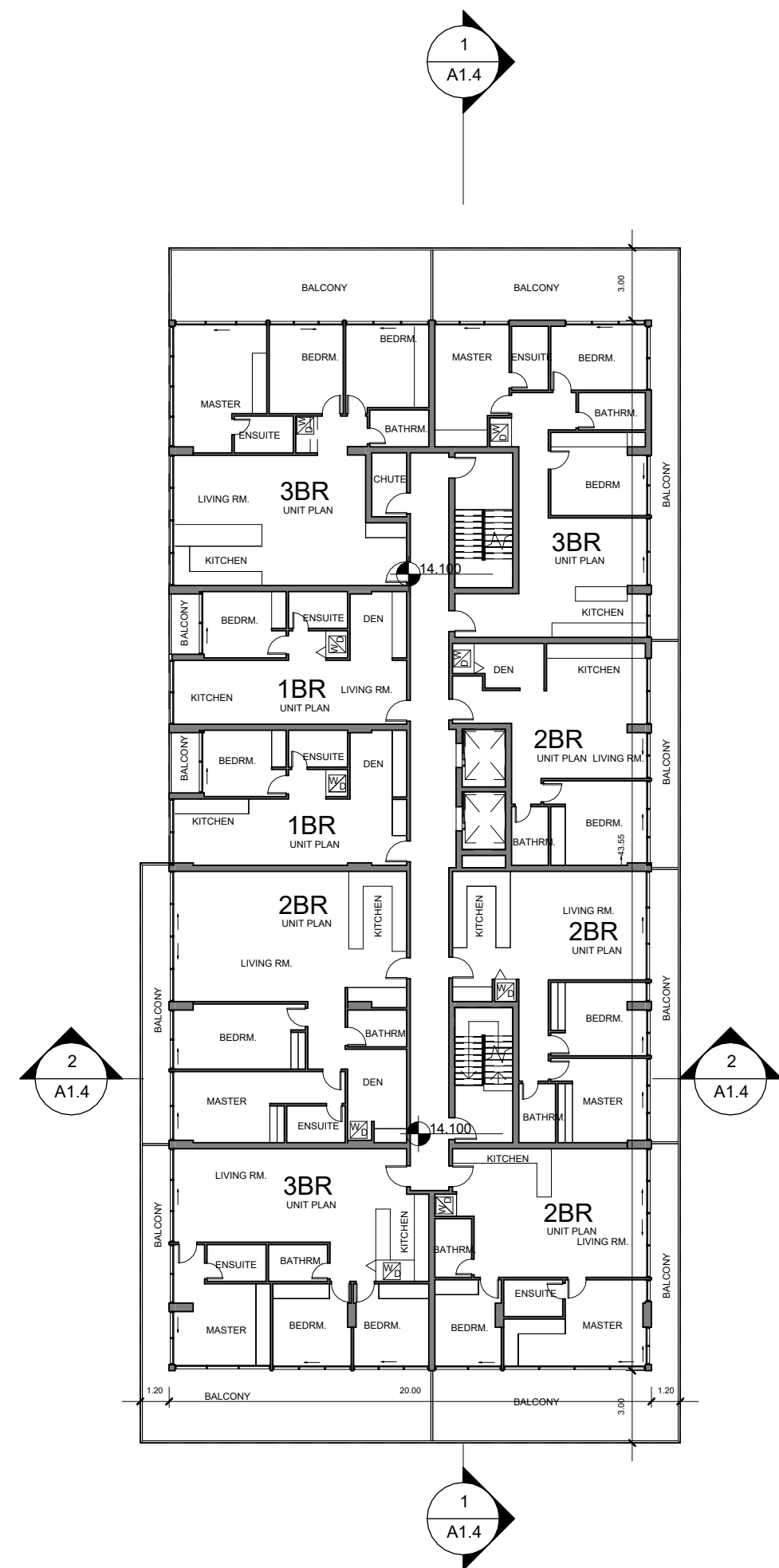
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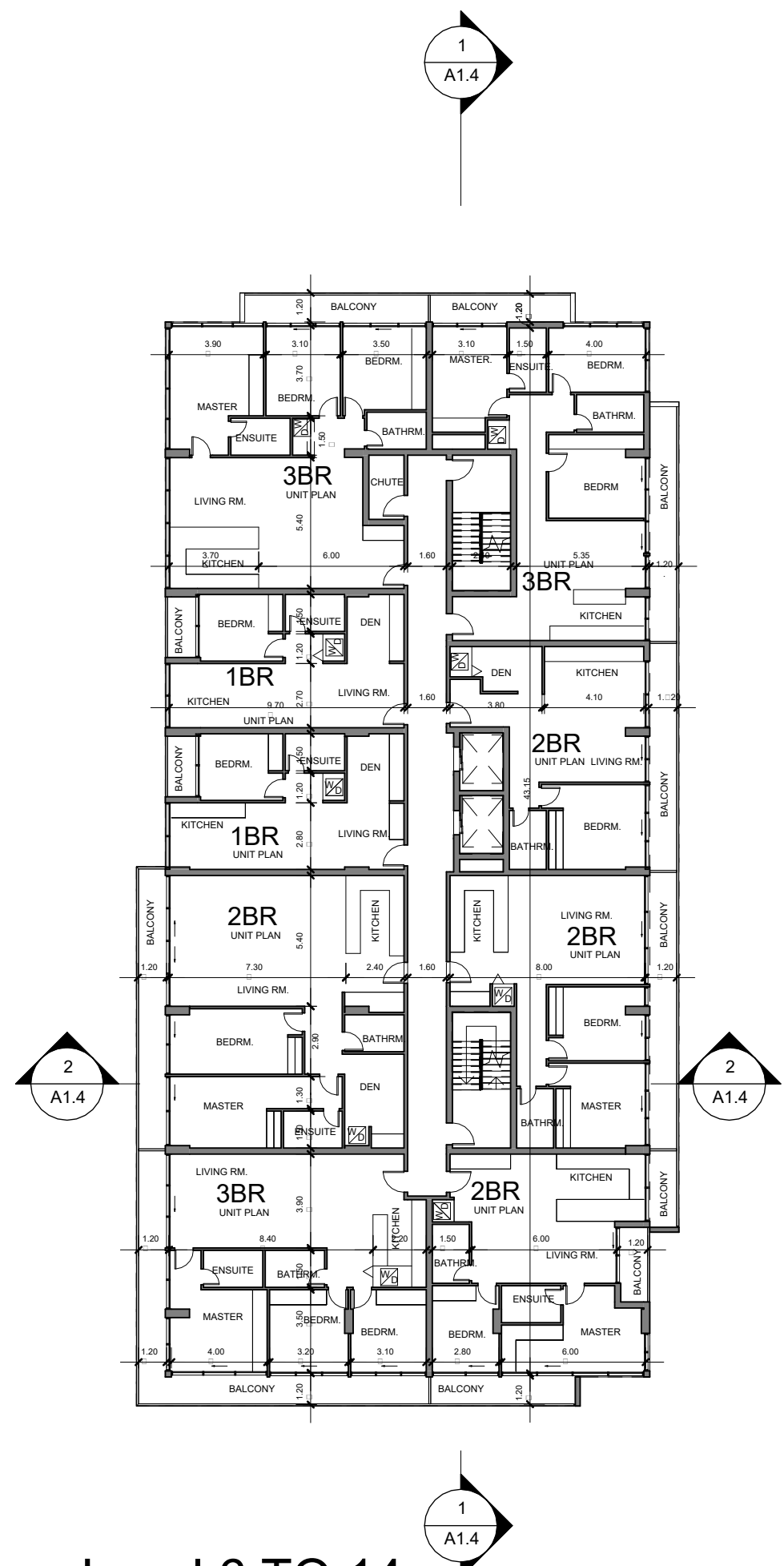
Level 2
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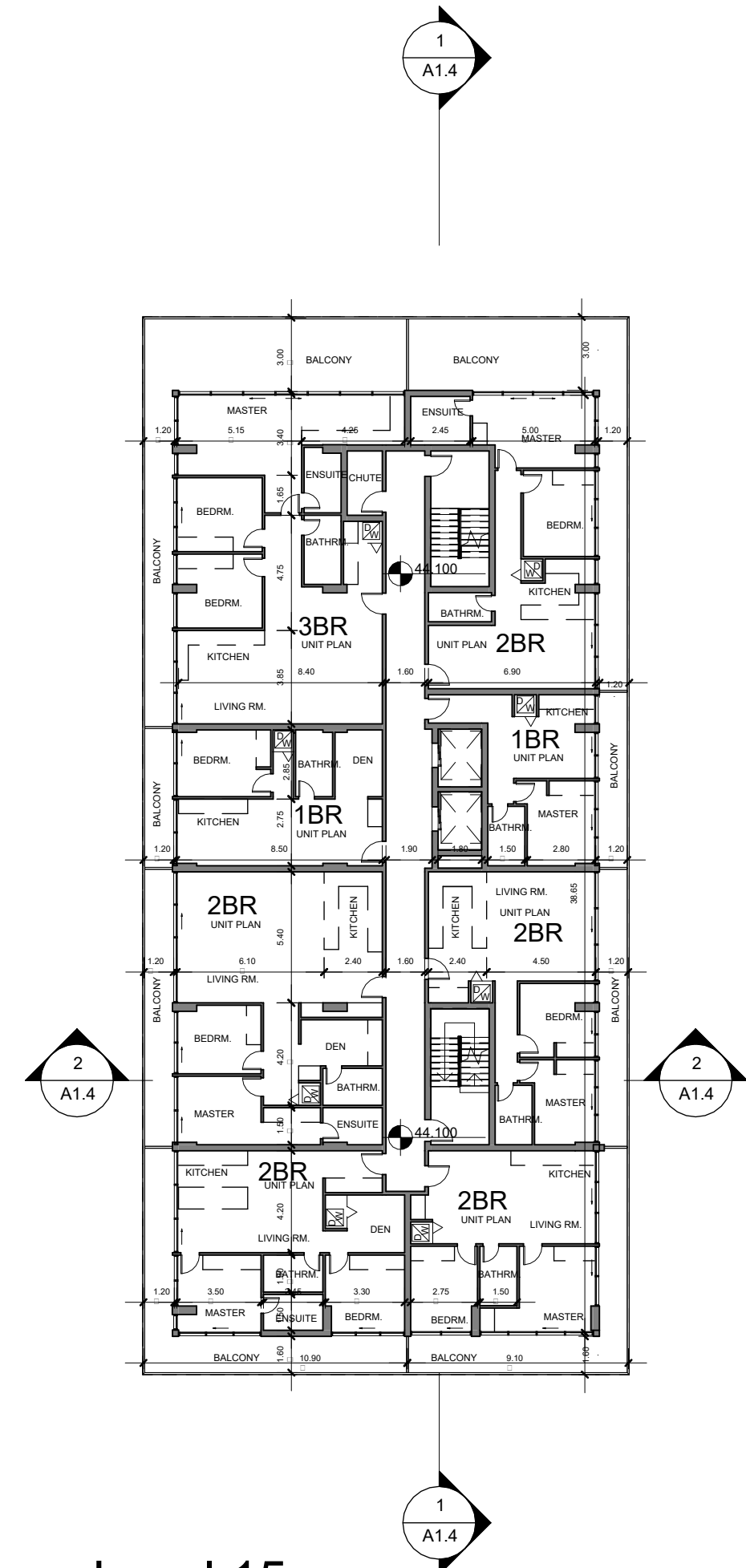
Level 3 & 4
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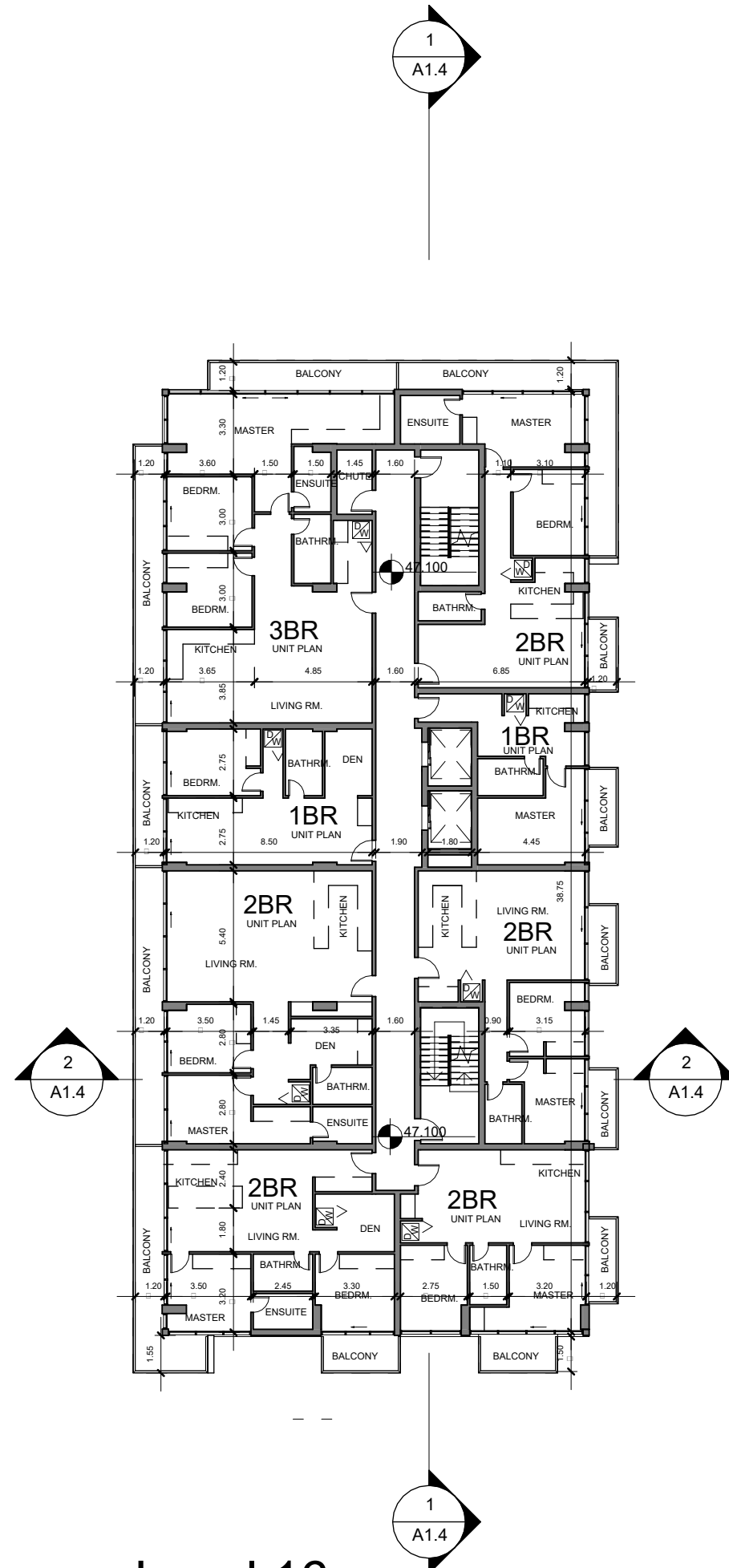
Level 5
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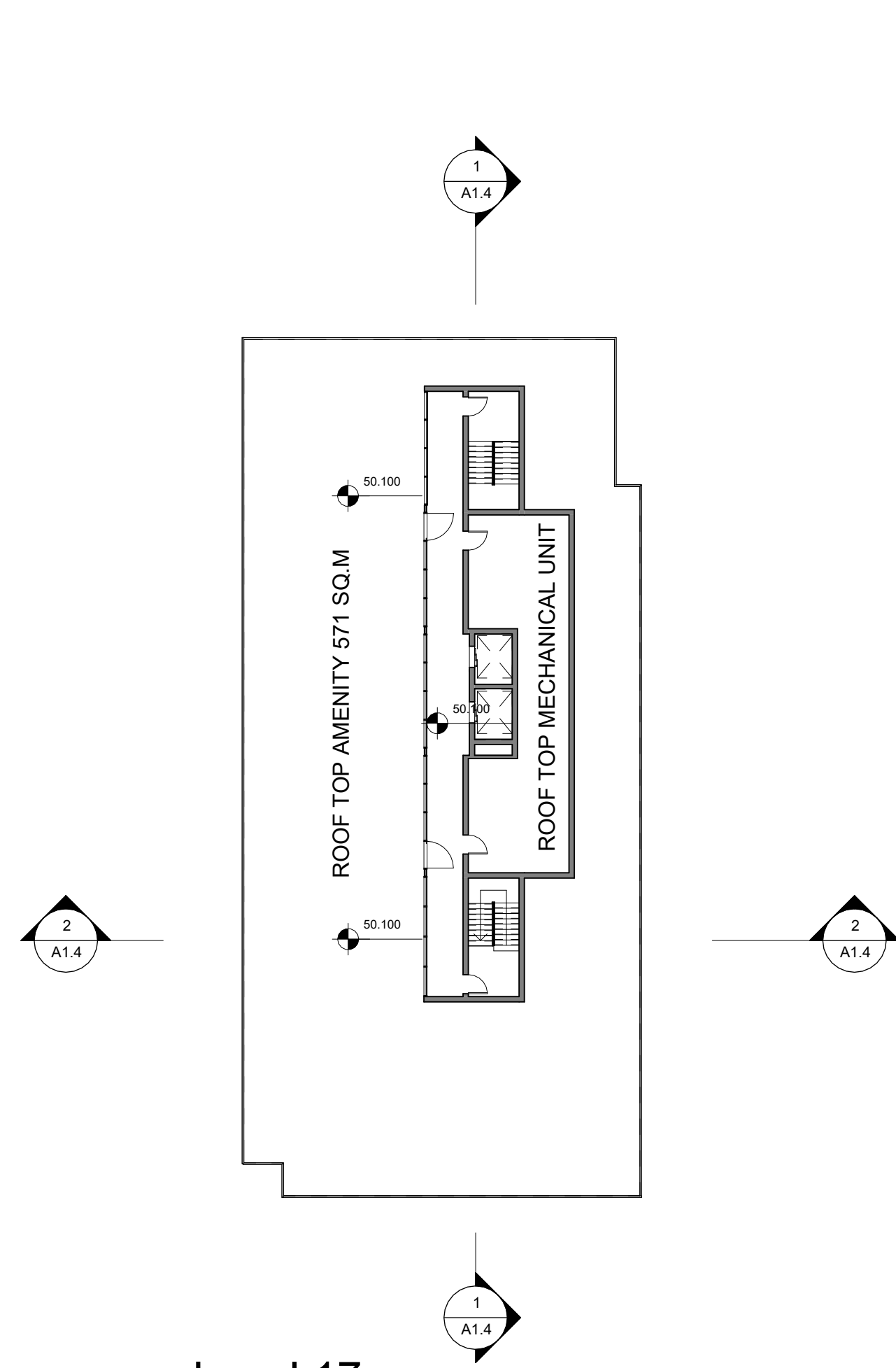
Level 6 TO 14
1 : 250



Level 15
1 : 250



Level 16
1 : 250



Level 17
1 : 250

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SHEET TITLE

FLOOR PLANS

SCALE: 1 : 250

PROJ./REV. NO.

USG 18-254

PROJECT

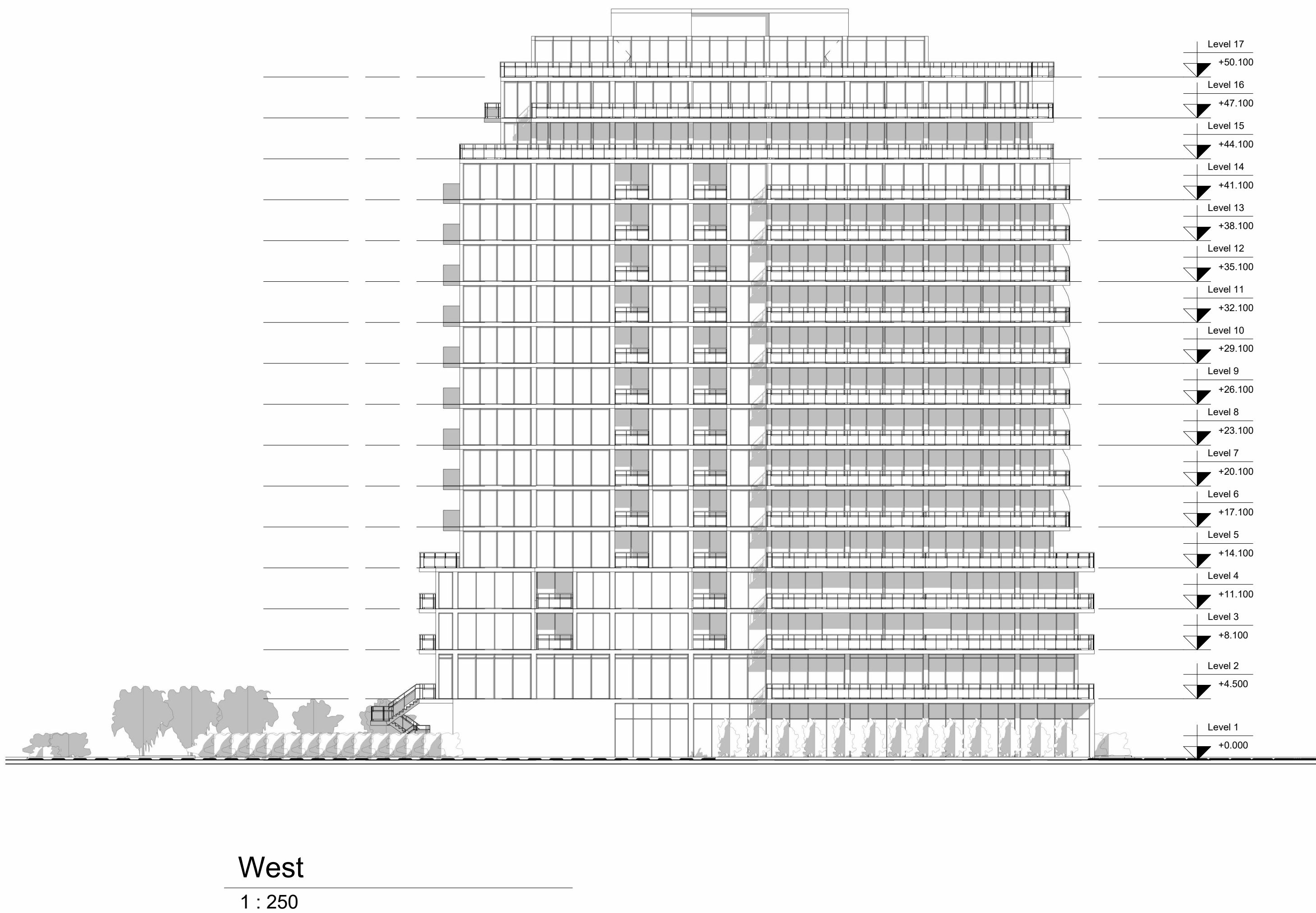
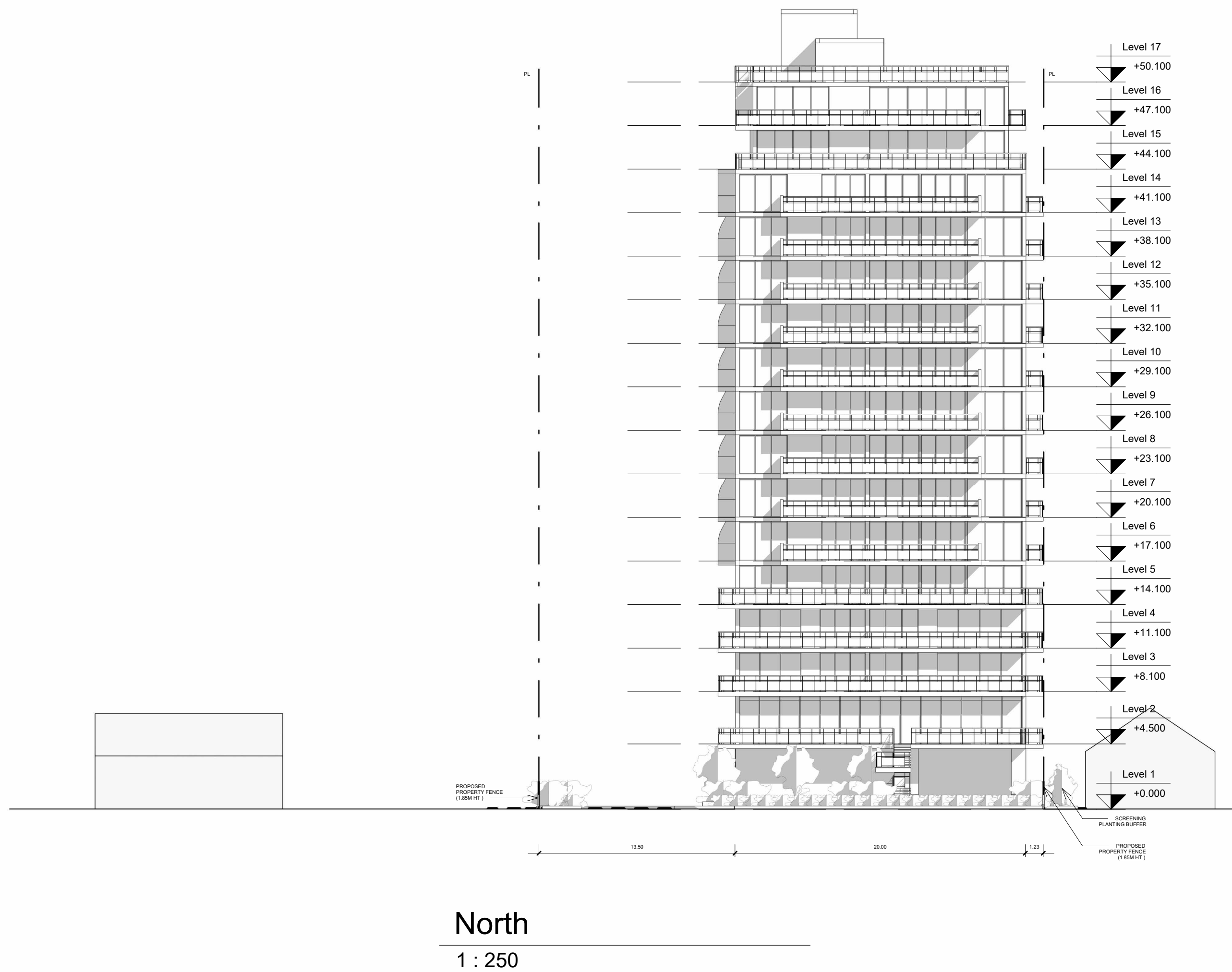
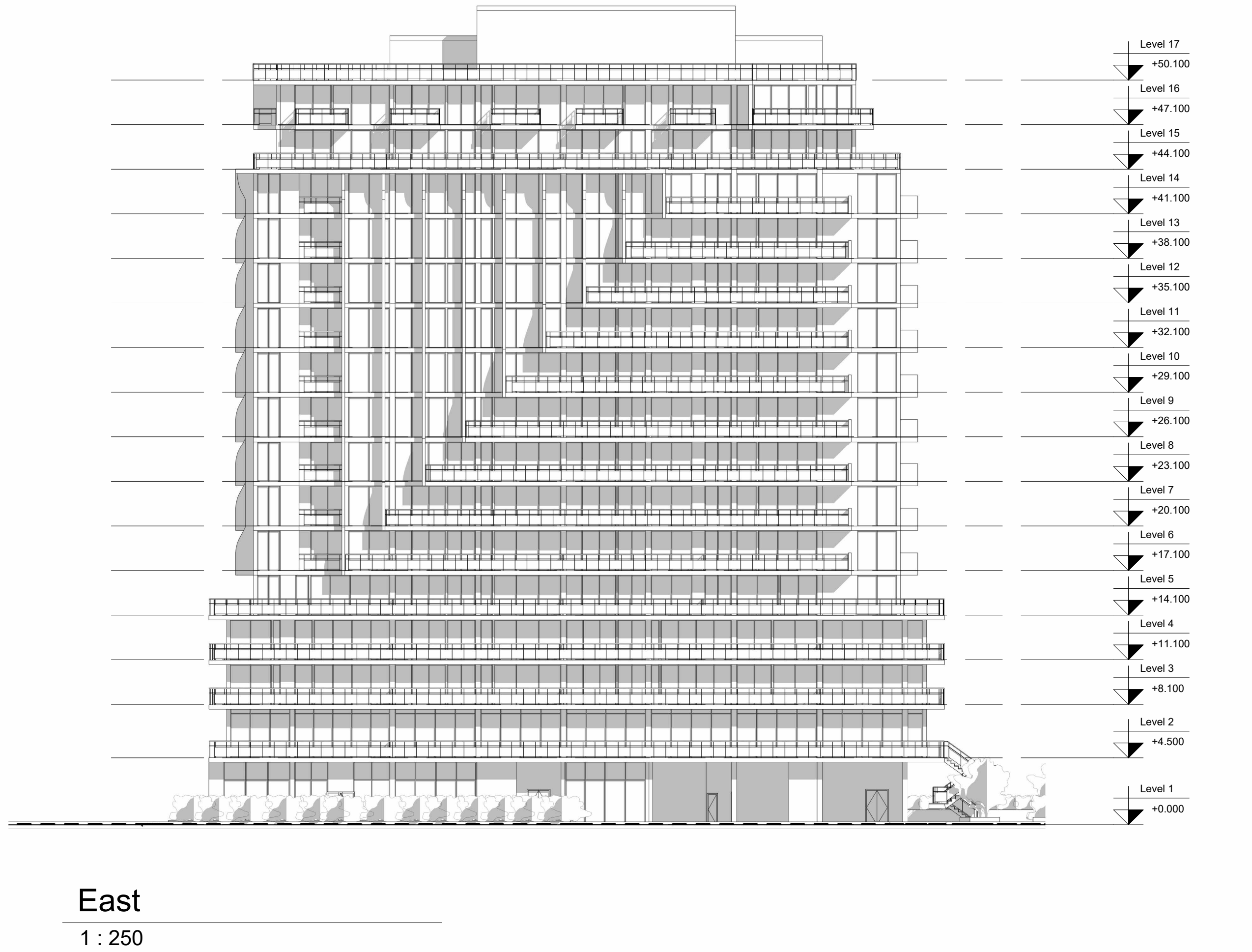
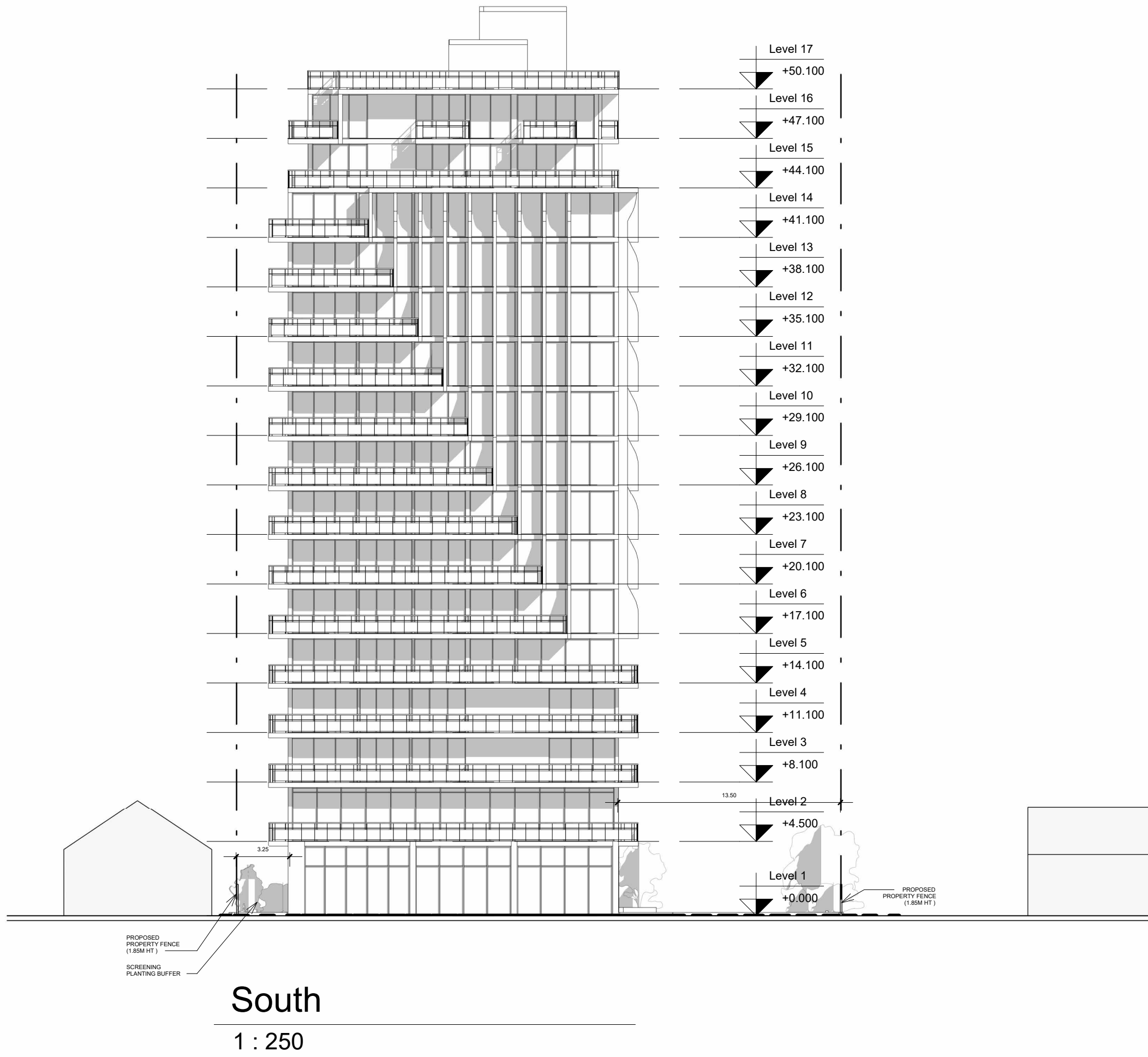
DUNLOP BARRIE RENTAL

284-286 Dunlop St. W. & 119-121 Henry, Barrie

DWG NO.

A1.3

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STAMP

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SHEET TITLE

ELEVATIONS

PROJECT

DUNLOP BARRIE RENTAL
284-286 Dunlop St. W. & 119-121 Henry, Barrie

PROJ./REV. NO.

USG 18-254

DWG NO.

A1.5

SCALE: 1 : 250

This report is intended solely for the Client named. The report is prepared based on the work has been undertaken in accordance with normally accepted geotechnical engineering practices in Ontario.

The comments and recommendations given in this report are based on information determined at the limited number of the test hole and test pit locations. The boundaries between the various strata as shown on the borehole logs are based on non-continuous sampling and represent an inferred transition between the various strata and their lateral continuation rather than a precise plane of geological change. Subsurface and groundwater conditions between and beyond the test holes and test pits may differ significantly from those encountered at the test hole and test pit locations. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole and test pit locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

It should be noted that the results of the chemical analysis refer only to the sample analyzed which was obtained from specific sampling location and sampling depth, which may vary between and beyond the location and depth of the sample taken. Please note that the level of chemical testing outlined herein is meant to provide a broad indication of groundwater quality based on the limited sample(s) tested. The analytical results contained in this report should not be considered a warranty with respect to the groundwater quality for any specific purpose or the acceptability of the groundwater discharge.

It should be noted that not all of the well screens and sealed in the saturated zone of unconfined aquifer, and are not necessarily screened in the same unconfined aquifer. Therefore, the groundwater table contour lines based on limited number of groundwater level measurements in limited number of monitoring wells should be considered to be very approximate.

The report reflects our best judgment based on the information available to GeoPro Consulting Limited at the time of preparation. Unless otherwise agreed in writing by GeoPro Consulting Limited, it shall not be used to express or imply warranty as to any other purposes. No portion of this report shall be used as a separate entity, it is written to be read in its entirety. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated.

The design recommendations given in this report are applicable only to the project designed and constructed completely in accordance with the details stated in this report. Otherwise, our responsibility is limited to interpreting the subsurface information at the borehole or test pit locations.

Should any comments and recommendations provided in this report be made on any construction related issues, they are intended only for the guidance of the designers. The number of test holes and test pits may not be sufficient to determine all the factors that may affect construction activities, methods and costs. Such as, the thickness of surficial topsoil or fill layers may vary significantly and unpredictably; the amount of the cobbles and boulders may vary significantly than what described in the report; unexpected water bearing zones/layers with various thickness and extent may be encountered in the fill and native soils. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and make their own conclusions as to how the subsurface conditions may affect their work and determine the proper construction methods.

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

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.