FINAL

Preliminary Geotechnical Investigation and Hydrogeological Assessment – Proposed Mid to High-Rise Development

2172 Wyecroft Road, Oakville, Ontario

Prepared for:

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1.0 INTRODUCTION AND SCOPE

Pinchin Ltd. (Pinchin) was retained by Northbridge Capital Inc. (Client) to conduct a Preliminary Geotechnical Investigation and Hydrogeological Assessment, and provide subsequent preliminary geotechnical and hydrogeological design recommendations for the proposed mixed-use development to be located at 2172 Wyecroft Road, Oakville, Ontario (Site). The Site location is shown on Figure 1.

It is Pinchin's understanding that there are currently no development plans for the Site; however, future use of the Site may include a mid to high-rise building with two or more levels of underground parking.

Pinchin's geotechnical comments and recommendations are based on the results of the Preliminary Geotechnical and Hydrogeological Investigations, and our current understanding of the project scope. This report is preliminary in nature and is intended to be supplemented and updated with a future, more extensive, geotechnical investigation and hydrogeological assessment once detailed design of the proposed development has been completed.

The purpose of the Subsurface Investigation was to delineate the subsurface conditions and soil engineering characteristics by advancing a total of six (6) sampled boreholes (Boreholes BH1 to BH6) completed with monitoring wells at the Site.

The information gathered from the Subsurface Investigation will allow Pinchin to provide geotechnical and hydrogeological design recommendations for the proposed development.

Based on the results of the Subsurface Investigation, the following preliminary geotechnical data and engineering design recommendations are provided herein:

- A review of relevant area geology and Site background information;
- A detailed description of the soil and groundwater conditions;
- Open cut excavations and/or shoring requirements (where necessary);
- Anticipated groundwater management;
- Lateral earth pressure coefficients and unit densities;
- Preliminary foundation design recommendations including soil bearing resistances at Ultimate Limit States (ULS) and Serviceability Limit States (SLS) design;
- Potential total and differential settlements;
- Preliminary Seismic Site Classification for Seismic Site Response;
- Foundation frost protection and installation;
- Underground parking garage design; and,
- Potential construction concerns.

Abbreviation's terminology and principle symbols commonly used throughout the report, borehole logs and appendices are enclosed in Appendix I.

The purpose of the Hydrogeological Assessment was to characterize the soil and groundwater conditions of the Site, evaluate the dewatering requirements for the construction and operations phases of the proposed development, assess the groundwater quality of potential discharge water, identify any potential impacts on the surrounding environment due to the proposed development, and provide recommendations concerning mitigative measures, if required.

2.0 SITE DESCRIPTION AND GEOLOGICAL SETTING

The Site is located on the south quadrant of the intersection of Wyecroft Road and South Service Road West, in the Town of Oakville (Town), Regional Municipality of Halton (Region), Ontario, and consists of an irregularly shaped parcel of land with an area of approximately 18,822 m^2. The Site is currently occupied by three single-storey industrial building blocks, access driveways and at-grade asphalt parking areas.

It is Pinchin's understanding that there are currently no development plans; however, future use of the Site will include a mid to high-rise building with two or more levels of underground parking.

Data obtained from the Ontario Geological Survey Maps, as published by the Ontario Ministry of Energy, Northern Development and Mines, indicates that the Site is located on Paleozoic bedrock (Ontario Geological Survey 2010, Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV). The underlying bedrock at this Site is of the Queenston formation, consisting of shale, limestone, dolostone, siltstone (Armstrong, D.K. and Dodge, J.E.P. 2007, Paleozoic geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release-- Data 219).

3.0 PRELIMINARY GEOTECHNICAL FIELD INVESTIGATION AND METHODOLOGY

Pinchin completed the field investigations at the Site on February 24 and March 4, 2022 by advancing a total of six (6) sampled boreholes throughout the Site. The boreholes were advanced to depths ranging from approximately 6.1 to 9.6 meters below existing ground surface (mbgs). The approximate spatial locations of the boreholes advanced at the Site are shown on Figure 2.

The boreholes were advanced with the use of truck and track-mounted drill rigs which were equipped with standard soil sampling equipment. Soil samples were collected at 0.76 and 1.52 m intervals using a 51 mm outside diameter (OD) split spoon barrel in conjunction with Standard Penetration Tests (SPT) "N" values (ASTM D1586). The SPT "N" values were used to assess the compactness condition of the non-cohesive soil and to estimate the consistency of the cohesive soil. Groundwater observations and measurements were obtained from the open boreholes during and upon completion of drilling.

The in-situ testing, groundwater observations and measurements recorded are included on the appended borehole logs.

Monitoring wells were installed in each borehole to allow measurement of the groundwater levels. The monitoring wells were constructed using flush-threaded 50 mm diameter Trilock pipe with 3.0 meter long 10-slot well screens, delivered to the Site in ore-cleaned individually sealed plastic bags. The screen and riser pipes were not allowed to come into contact with the ground or drilling equipment prior to installation.

A completed well record was submitted to the Ontario Ministry of the Environment, Conservation and Parks (MECP) as per Ontario Regulation 903, as amended. A licensed well technician must properly decommission the monitoring wells prior to construction according to Regulation 903 of the Ontario Water Resources Act.

The borehole locations and ground surface elevations were surveyed by Pinchin using a Sokkia Model GCX2 Global Navigation Satellite System (GNSS) rover. The ground surface elevations are referenced to the earth's ellipsoid line (WGS84 datum), based on GNSS and local base station telemetry with a precision static of less than 20 mm.

The field investigation was monitored by experienced Pinchin personnel. Pinchin logged the drilling operations and identified the soil samples as they were retrieved. The recovered soil samples were sealed into plastic bags and carefully transported to Pinchin's laboratory in Waterloo, Ontario for detailed analysis. All soil samples were classified according to visual and index properties by the project engineer.

The field logging of the soil and groundwater conditions was performed to collect preliminary geotechnical and hydrogeological engineering design information. The borehole logs include textural descriptions of the subsoil in accordance with a modified Unified Soil Classification System (USCS) and indicate the soil boundaries inferred from non-continuous sampling and observations made during the borehole advancement. These boundaries reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The modified USCS classification is explained in further detail in Appendix I. Details of the soil and groundwater conditions encountered within the boreholes are included on the Borehole Logs within Appendix II.

4.0 PRELIMINARY HYDROGEOLOGICAL ASSESSMENT METHODOLOGY

The scope of work for the dewatering estimates and groundwater quality evaluation included the following tasks:

- Groundwater level monitoring in six newly installed monitoring wells;
- Rising head hydraulic conductivity tests and groundwater sampling of four of the monitoring wells;

- Groundwater quality assessment as per Halton Region Sewer Use bylaw;
- A review of the conceptual design and assessment of the need for dewatering during construction and operations phases of the proposed development; and
- A summary of the findings of the assessment made in this report.

5.0 SUBSURFACE CONDITIONS

5.1 Borehole Soil Stratigraphy

The following stratigraphy is based on the borehole findings. The summary provided below is for general guidance only. Detailed depths and elevations are given in the following subsections and appended borehole logs. A simplified cross-section showing the stratigraphy across the Site is presented in Figure 3. In general, the two (2) main stratigraphic units are as follows:

- Pavement structure underlain by stiff to hard clayey silt till deposits, extending to approximately 1.7 to 1.8 mbgs (i.e., Elevation 67.4 to 69.7 m); overlying
- Shale bedrock of Queenston Formation.

5.1.1 Pavement Structure

Flexible pavement structure, consisting of approximately 100 to 150 mm thick asphaltic concrete underlain by 100 to 350 mm thick aggregate layer was encountered at the ground surface in each borehole.

5.1.2 Glacial Till

Clayey silt till, with trace to some sand and trace amounts of gravel were encountered beneath the pavement structure in each borehole and extended to depths of approximately 1.7 and 1.8 mbgs.

The clayey silt till deposit has a stiff to hard consistency based on SPT ‘N’ values of 9 to more than 50 blows per 300 mm penetration of a split spoon sampler. The clayey silt till samples were generally moist at the time of sampling.

5.1.3 Bedrock

Bedrock was encountered in each borehole at depths of approximately 1.7 and 1.8 mbgs (Elevation 67.4 to 69.7 m). ‘HQ’ size rock coring was completed on the shale bedrock in Boreholes BH1 and BH6, and confirmed shale bedrock with limestone interbeds up to 200 mm in thickness of the Queenston formation.

The depth and elevation of the bedrock at the borehole locations is summarized in the following table.

Borehole ID	Ground Surface Elevation (m)	Depth to Bedrock (mbgs)	Top of Bedrock Elevation (m)
BH1	71.5	1.8[2]	69.7[2]
BH2	71.4	1.7[1]	69.7[1]
BH3	70.1	1.8[1]	68.3[1]
BH4	70.1	1.7[1]	68.4[1]
BH5	69.5	1.8[1]	67.7[1]
BH6	69.2	1.8[2]	67.4[2]

[1] Inferred top of bedrock
[2] Inferred and confirmed top of bedrock by rock coring

The Total Core Recovery (TCR) of the cored bedrock ranged from 95 to 100 percent and the Rock Quality Designation (RQD) ranged from 79 to 100 percent indicating good to excellent quality bedrock.

5.2 Hydraulic Conductivity Estimates

Rising head hydraulic conductivity (K-) tests were undertaken at four shallow monitoring wells (Boreholes BH1, BH2, BH4 and BH6). A summary of the estimated K-values are presented below.

Monitoring Well	Well Screen Interval (mbgs)	Soil Composition	K (cm/sec)
BH1	6.5 – 9.6	Shale	3.0×10^{-5}
BH2	3.0 – 6.1	Shale	1.6×10^{-4}
BH4	3.0 – 6.1	Shale	7.2×10^{-4}
BH6	6.5 – 9.6	Shale	2.3×10^{-6}
Geometric mean			5.3×10^{-5}

The estimated hydraulic conductivity of the shale bedrock ranges from 2.3×10^{-6} cm/sec to 7.2×10^{-4} cm/sec, with a geometric mean of 5.3×10^{-5} cm/sec.

5.3 Water Level Elevations and Groundwater Flow Regime

As mentioned, a total of six monitoring wells were installed at the Site, all of which were completed in shale due to the presence of shallow bedrock at depths of approximately 1.7 and 1.8 mbgs (Elevation 67.4 to 69.7 m). It should be noted that the elevations were based on WGS84 datum.

Groundwater level measurements were conducted on March 8 and 10, 2022. A summary of the well construction and measured water levels are presented below.

Monitoring Well	Ground Elevation (m)	Well Screen Interval (mbgs)	March 8, 2022		March 10, 2022	
			Groundwater Level (mbgs)	Groundwater Elevation (m)	Groundwater Level (mbgs)	Groundwater Elevation (m)
BH1	71.46	6.5 – 9.6	3.15	68.31	3.39	68.07
BH2	71.44	3.0 – 6.1	3.97	67.47	3.96	67.48
BH3	70.09	3.0 – 6.1	3.03	67.06	3.00	67.09
BH4	70.09	3.0 – 6.1	3.20	66.89	3.19	66.90
BH5	69.47	3.0 – 6.1	2.86	66.61	2.86	66.61
BH6	69.21	6.5 – 9.6	3.93	65.28	9.31	59.90

As presented above, the groundwater levels measured in shallow monitoring wells (Boreholes BH2 to BH5) ranged from 2.86 mbgs to 3.97 mbgs, with an average of 3.26 mbgs, and the converted elevations ranged from 66.61 m at Borehole BH/MW5 to 67.48 m at Borehole BH/MW2. The groundwater levels measured in the deep monitoring wells (Boreholes BH1 and BH6) ranged from 3.15 mbgs to 9.31 mbgs, and the elevations ranged from 59.90 m to 68.31 m. It should be noted that the water level measured on March 10, 2022 at BH6 may be not representative, because this well showed very slow recovery and was purged dry on March 8, 2022.

Based on the data obtained on March 10, 2022, a groundwater elevation contour map was prepared as shown on Figure 4, and the shallow groundwater flow direction was inferred to be generally to the southeast.

5.4 Groundwater Quality

One groundwater sample was obtained on March 10, 2022 from Borehole BH1 to evaluate the water quality with reference to the Halton Region Sewer Use By-Law parameter criteria, for storm sewer and sanitary sewer discharge.

The groundwater sample was submitted to and analyzed by Bureau Veritas Laboratories (BV). BV has been accredited by Canadian Association For Laboratory Accreditation Inc. (CALA). The analytical results are provided in Appendix III.

The results were compared with the Halton Region Sewer Use Bylaw – Sanitary and Storm Sewer Discharge Limits. No exceedances of the Sanitary or Storm Sewer Discharge limits were detected in the analyzed water samples.

6.0 PRELIMINARY GEOTECHNICAL AND HYDROGEOLOGICAL DESIGN RECOMMENDATIONS

6.1 General Information

The recommendations presented in the following sections of this report are preliminary and based on the information available regarding the proposed construction, the limited results obtained from the subsurface investigation, and Pinchin's experience with similar projects.

Since the investigation only represents a portion of the subsurface conditions, it is possible that conditions may be encountered during construction that are substantially different than those encountered during the investigation. If these situations are encountered, adjustments to the design may be required.

As the design progresses, these preliminary results should be supplemented with a more detailed field investigation and the design recommendations below should be revised based on the updated information. In addition, a qualified geotechnical engineer should be on-Site during the foundation preparation to ensure the subsurface conditions are the same/similar to what was observed during the investigation.

It is Pinchin's understanding that there are currently no development plans for the Site; however, future use of the Site may include a mid to high-rise building with two or more levels of underground parking. The Site is relatively flat, with elevations ranging from 69.2 to 71.5 m as measured at the borehole locations, thus implying an average Site elevation of 70.5 ± m. It is anticipated that the finished floor elevation (FFE) of the minimum second level underground parking structure (P2) may be set at 6 ± mbgs (i.e. Elevation 64.5 ± m).

The groundwater level measured in the monitoring wells ranged from Elevation 65.3 to 68.3 m. For geotechnical and hydrogeological design purposes, the groundwater level may be taken at Elevation 68.5 ± m. It should be noted that the elevations were based on WGS84 datum.

6.2 Excavations

Based on the preliminary subsurface information obtained from within the boreholes, it is anticipated that the excavated material will consist of pavement structure, undisturbed glacial till and shale bedrock.

Where workers must enter trench excavations deeper than 1.2 m, the trench excavations should be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act (OHSA), Ontario Regulation 213/91, Construction Projects, July 1, 2011, Part III - Excavations, Section 226.

Alternatively, the excavation walls may be supported by either closed shoring, bracing, or trench boxes complying with sections 235 to 239 and 241 under O. Reg. 231/91, s. 234(1).

Based on the OHSA, the glacial till deposit would be classified as Type 2 soil. Temporary excavations in Type 2 soils may be cut near vertical in the bottom 1.2 m of the excavation and must be trimmed back at an inclination of 1 horizontal to 1 vertical (H to V) above this level.

In addition to compliance with the OHSA, the excavation procedures must also be in compliance to any potential other regulatory authorities, such as federal and municipal safety standards.

Fragments of shale and limestone may be encountered in the transition zone between the native soils and the underlying bedrock. The bedrock below the Site, while predominantly shale, contains beds of ‘harder limestone’ and ‘shaley limestone’. It is possible that some thick layers of ‘hard limestone’ may be encountered in the bedrock during excavation. The risk and responsibility associated with the removal of such layers must be addressed in the contract documents for foundations, excavation, and shoring contractors, as applicable.

The bedrock in this area is typically weathered and can usually be removed with mechanical equipment, such as a large excavator and hydraulic hammer (hoe ram) and where required, with line drilling on close centres. Often a hydraulic hammer can be utilized to create an initial opening for the excavator bucket to gain access of the layered rock. The bedrock is known to contain vertical joints and near horizontal bedding planes. Therefore, some vertical and horizontal over break of the bedrock should be expected.

In addition, Pinchin recommends that a pre-excavation survey of all neighbouring properties be undertaken prior to conducting construction activities. The preconstruction survey will serve to protect the Client from claims unrelated to the construction activities in the development of this property.

6.2.1 Shoring Requirements

It is Pinchin’s understanding that there are currently no confirmed development plans, but the proposed development is likely to consist of a mid to high-rise building, extending from two or more levels of underground parking. The perimeter of the footprint of the proposed underground parking is not available at the time of preparation of this report. The shoring requirements for the Site will have to be examined in detail with respect to the Site boundary constraints, once the development details and the building footprint are finalized.

No excavation shall extend below a line cast as one vertical to one horizontal from foundations of the existing structures without adequate alternate support being provided.

Temporary protective structures, bracing, anchors, and sheeting are the responsibility of the contractors and shall be designed by a Professional Engineer licensed in Ontario, in accordance with the Canadian Foundation Engineering Manual. All shoring, bracing, sheetpiling and cribbing shall meet all requirements of the Ontario Occupational Health and Safety Act and Regulations for Construction Projects and the Trench Excavators Protection Act. The shoring design must include appropriate factors of safety, and any possible surcharge loading must be taken into account. The support system must comply with sections 234 to 239 and 241 of Ontario Regulation 213/91.

6.2.2 Lateral Earth Pressure

The shoring system may be designed as full cantilevers or the lateral loads can be taken up to the installation of internal bracing of rakers or tie back soil anchors.

The following preliminary parameters (un-factored) should be used for the preliminary/conceptual design of the shoring system. These preliminary results should be updated with a more detailed geotechnical field investigation. It should be noted that these earth pressure coefficients assume that the back of the wall is vertical; condition of the ground surface behind the wall is assumed to be flat.

Soil Layer	Bulk Unit Weight (kN/m^3)	Angle of Internal Friction	Active Earth Pressure Coefficient	Passive Earth Pressure Coefficient
Clayey Silt Till	21	32°	0.31	3.25
Queenston Formation Bedrock	24	26°	N/A	N/A

In addition to compliance with the OHSA, the excavation procedures must also be in compliance to any potential other regulatory authorities, such as federal and municipal safety standards.

If construction proceeds in winter months, the shoring system may require frost protection to prevent frost penetration behind the shoring system, which can result in unacceptable movements.

It is recommended that the contract have a performance specification, limiting movement. The presence of sensitive structures and infrastructure, anchor spacing, elevation, and the timing of the excavation and anchoring operations are critical in determining acceptable limits. A monitoring program for shored excavations is recommended.

6.3 Dewatering Assessment

It is understood that two or more levels of underground parking will be considered for the proposed development. For the purpose of this dewatering assessment, two levels of underground parking were assumed, since no detailed design was available at the time of preparing this assessment report. As such, the assumed P2 concrete slab levels are at approximately 6 mbgs.

Based on the subsurface conditions revealed in the boreholes, the excavation for construction of the underground parking and foundation will advance into bedrock, to an assumed depth of 1 meter below the P2 level. Therefore, the bulk excavation bottom is assumed to extend to 7 mbgs.

Based on the groundwater level monitoring, the shallow groundwater levels ranged from 2.86 mbgs to 3.97 mbgs, which are above the excavation bottom. Therefore, groundwater control will be required for the short-term construction and long-term operation of the building.

6.3.1 Dewatering Estimates – Groundwater Inflow – Construction

It is understood that the Site will be divided by a roadway in the middle of the Site, and two buildings will be located on each side, which will be serviced by two separate underground structures. It could be assumed that the underground structure will cover 80% of the development area. Given the development area of 18,822 m^2, each of the underground parking structures is assumed to have a footprint of 7,530 m^2.

A conservative groundwater dewatering scenario during construction was undertaken that employed the following parameters and assumptions.

- The excavation footprint for each underground parking is 7,530 m^2;
- The excavation depth is 7 mbgs;
- The initial groundwater level is 3.26 mbgs (or the average shallow groundwater level);
- The target water level will be lowered to 0.5 m below the excavation bottom, or 7.5 mbgs; and
- The hydraulic conductivity is 5.3 x 10^{-5} cm/sec (the average of the K values estimated from the hydraulic conductivity tests).

Based on the above assumptions, the short-term construction dewatering rate and zone of influence were estimated and are presented below.

Excavation Area (m^2)	Initial Water Level (mbgs)	Target Water Level (mbgs)	K-Estimate (cm/sec)	Estimated Zone of Influence (m from Edge of Excavation)	Dewatering Rate (without Safety Factor) (L/day)	Dewatering Rate Estimate with Safety Factor of 2 or 100% (L/day)
7,530	3.26	7.5	5.3×10^{-5}	9	18,445	36,890
Total for two underground parking structures					36,890	73,780

It should be noted that the application of a Safety Factor provides a more conservative assessment for planning purposes to account for potential variabilities in the hydraulic conductivities in the soil and bedrock across the Site. In addition, during the initial stages of the construction dewatering, the dewatering volumes would be greater than those under a steady state condition, because the water stored in the soils is also being removed.

6.3.2 Stormwater Inflows – Construction

A significant amount of the dewatering demand from any construction project is the volume of water that is derived from stormwater that is generated during and after precipitation events.

For planning purposes, dewatering estimates are developed assuming the potential occurrence of "Design Storm" events, which are based upon events that have an observed "return period" or period of recurrence.

The design storms represent singular events which will entail the handling of larger volumes of water over a short period of time. In the case of the proposed development, the necessity of handling stormwater over the excavation footprint will be required.

The volume of water that can be generated within the Site at the full excavation extent of approximately 7,530 m^2 was estimated for the 2-yr., 24-hr. Design Storm.

The estimated stormwater inflow is summarized below:

Design Storm Scenario	Excavation Area (m^2)	Precipitation Depth (mm)	Stormwater Volume (L/day)
2-yr., 24-hour	7,530	30.0	225,900
Total for two underground parking structures			451,800

The dewatering requirement from the 2-year, 24-hour Design Storm was estimated to be 225,900 for one underground parking area or 451,800 L/day for two underground parking areas. It is expected that each underground structure will be constructed independently. The above scenarios generate enough water to trigger an EASR requirement with the MECP, which is required by regulation if a proponent expects to remove greater than 50,000 L of water (both groundwater and storm water) in any given day for construction purposes. One way to avoid such a requirement is to put a cap of 50,000 L of discharge on any given day on the project's dewatering capacity. That would mean, however, that a significant precipitation event may force the cessation of activity for more than one day, as dewatering proceeds with a 50,000 L/day maximum.

It should be noted that the above estimates do not take into account any infiltration or evaporation in the excavation area. However, it should also be noted that, for infrequent Design Storm events such as those itemized above, the great majority of the generated stormwater becomes run-off that will require management, due to the fixed assimilative capacity of the soils and the minimal evaporation until the cessation of the event.

6.3.3 Maximum Discharge Estimates – Construction

Based on the short-term construction dewatering calculations discussed above, the estimated construction phase dewatering rates are summarized below.

Construction Dewatering	One Underground Parking Structure	Two Underground Parking Structures
	Total Volume for Groundwater without Safety Factor (L/day)	Total Volume for Groundwater with Safety Factor of 2 (L/day)
Discharge of Groundwater	36,890	73,780
Discharge of Stormwater	225,900	451,800
Discharge of Groundwater and Stormwater	262,790	525,580

The above total volume estimates, assuming that one bulk excavation will be undertaken for one or two of the assumed two-level underground structures, and including a Safety Factor of 2 times, indicate the following:

1) The total discharge of groundwater and stormwater for one underground structure is above the threshold for an Environmental Activity Sector Registration (EASR) requirement for construction dewatering of more than 50,000 L/day (50 m^3/day) and below the threshold limit of 400,000 L/day (400 m^3/day) for a Permit-to-Taka-Water (PTTW) requirement. As a result, an EASR registration will be required for the construction of the proposed buildings with associated underground parking structures in different open-cut stages.

2) The total discharge of groundwater and stormwater for two underground structures is above the threshold for an Environmental Activity Sector Registration (EASR) requirement for construction dewatering of more than 50,000 L/day (50 m^3/day) and also above the threshold limit of 400,000 L/day (400 m^3/day) for a Permit-to-Taka-Water (PTTW) requirement. As a result, a PTTW will be required for the construction of the proposed buildings with associated underground parking structures at the same open cut stages.

As noted above, It is expected that each underground structure will be constructed independently.

6.3.4 Dewatering Estimates – Groundwater Inflow – Operations

The same calculation methodology for short-term dewatering estimate was used for the long-term dewatering estimate, except for employing a different target groundwater level approximately 0.2 m below the two-level basement slab elevation. The following parameters were employed:

- Underground Structure Footprint Area: 7,530 m^2; and
- Target Water Level: 6.2 mbgs (0.2 m below basement slab).

The estimated long-term dewatering rate and zone of influence are presented below.

Footprint Area (m^2)	Initial Water Level (masl)	Target Water Level (masl)	K-Estimate (cm/sec)	Estimated Zone of Influence (m from edge of Excavation)	Dewatering Rate (without safety factor) (L/day)	Dewatering Rate Estimate with safety factor of 2 or 100% (L/day)
7,530	3.26	6.2	5.3×10^{-5}	6	10,087	20,174
Total for two underground parking structures					20,174	40,348

The total dewatering volume estimated for long-term building operations, including a Safety Factor of 2, is below the threshold for long-term dewatering of 50,000 L/day (50 m^3/day) that triggers a PTTW requirement from the MECP. A PTTW will not be required for the proposed building operations.

6.4 Foundation Design

It is Pinchin's understanding that the future use of the Site may include a mid to high-rise building with two or more levels of underground parking. It is anticipated that the minimum P2 FFE may be set at 6 ± mbgs (i.e. Elevation 64.5 ± m).

A total of six (6) boreholes were advanced at the Site. Inferred shale bedrock of the Queenston Formation was encountered at depths of approximately 1.7 and 1.8 mbgs (i.e Elevation 67.4 to 69.7 m).

A summary of properties with respect to the shale within the Queenston Formation was presented in the Ontario Ministry of Transportation and Communications document RR229, *Evaluation of Shales for Construction Projects* (March 1983), as follows:

	Uniaxial Compressive Strength (MPa)	Young's Modulus (GPa)	Poisson's Ratio
Average	8.7	1.3	0.32
Range	7.2 to 9.6	0.5 to 2.3	0.28 to 0.35

Blow Elevation 65 ± m, spread footing foundations bearing on the sound bedrock may be preliminarily designed using a bearing resistance for 25 mm of settlement at SLS of 2,500 kPa, and a factored geotechnical bearing resistance of 3,500 kPa at ULS.

The minimum width of the continuous strip footings must be 500 mm and the minimum size of isolated footings must be 900 mm x 900 mm regardless of loading considerations, in conjunction with the above recommended geotechnical resistances.

The preliminary bearing resistance values provided assumes the bedrock is cleaned of debris and any loose rock pieces. The bedrock should be cleaned with air or water pressure exposing the clean sound bedrock. If construction proceeds during freezing weather conditions water should not be allowed to pool and freeze in bedrock depressions.

Prior to installing foundation formwork, and after cleaning, the bedrock is to be inspected by Pinchin to ensure the slightly weathered to fresh bedrock is consistent with the findings of this report.

The bedrock surface is to be relatively level with slopes not exceeding 5 degrees from the horizontal. Shale bedrock can weather when exposed to air or water. It is therefore recommended that a 150 mm thick layer of lean concrete (mud slab) be placed in the footing excavations immediately after excavation and inspection to protect the shale bedrock from weathering. All concrete should be installed and maintained above freezing temperatures as required by the concrete supplier.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided and maintained above freezing at all times.

6.4.1 Foundations Frost Protection & Foundation Backfill

Experience suggests that the temperature in nominally unheated underground parking with two or more levels below grade and normal ventilation provisions is not as severe as the ambient open-air condition. In Oakville, the earth cover required to prevent frost effects on foundations in the lower parking levels need not be any greater than 1.2 metres, and unmonitored experience in a number of structures and industry practice indicate that perimeter foundations provided with a minimum of 600 mm of soil cover perform adequately as do the interior isolated foundations with 900 mm of soil cover.

Foundations located immediately adjacent to air shafts, entrance and exit doors shall be treated as exterior foundations and should be provided with a minimum of 1.2 m of soil cover or equivalent insulation to ensure that foundations are not affected by the cold air flow.

Where the foundations for heated buildings do not have the minimum 1.2 m of soil cover frost protection, they should be protected from frost with a combination of soil cover and rigid polystyrene insulation, such as Dow Styrofoam or equivalent product. If required, Pinchin can provide appropriate foundation frost protection recommendations as part of the design review.

6.4.2 Site Classification for Seismic Site Response & Soil Behaviour

The following information has been provided to assist the building designer from a geotechnical perspective only. These geotechnical seismic design parameters should be reviewed in detail by the structural engineer and be incorporated into the design as required.

The seismic site classification has been based on the 2012 Ontario Building Code (OBC). The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4.A of the OBC. The site classification is based on the average shear wave velocity in the top 30 m of the site stratigraphy. If the average shear wave velocity is not known, the site class can be estimated from energy corrected Standard Penetration Resistance (N60) and/or the average undrained shear strength of the soil in the top 30 m.

The boreholes advanced at this Site extended to approximately 6.1 to 9.6 mbgs. SPT "N" values within the native soil deposit ranged between 9 and greater than 50 blows per 300 mm. As such, based on Table 4.1.8.4.A of the OBC, this Site has been classified as Class C. A Site Class C has an average shear wave velocity (Vs) of between 360 and 760 m/s. There is a potential that the Site Class may be higher; however, shear wave velocity measurements would be required for the determination of a higher Site Classification, as per the OBC.

6.5 Underground Parking Garage Design

It is Pinchin's understanding that there are currently no development plans for the Site; however, future use of the Site may include a mid to high-rise building with two or more levels of underground parking. It is anticipated that the minimum P2 FFE may be set at 6 ± mbgs (i.e. Elevation 64.5 ± m).

The groundwater level measured in the monitoring wells ranged from 67.4 to 69.7 m. As such, the proposed development will extend below the prevailing groundwater levels at the Site and will have to be designed to resist hydrostatic uplift or be provided with underfloor and foundation wall drainage systems connected to a suitable frost free outlet due to the groundwater levels at the Site.

The magnitude of the hydrostatic uplift may be calculated using the following formula:

$$P = \gamma \times d$$

Where:

P = hydrostatic uplift pressure acting on the base of the structure (kPa)

γ = unit weight of water (9.8 kN/m^3)

d = depth of base of structure below the design high water level (m)

The resistance of gross uplift of the structure can be increased by simply increasing the mass of the structure, incorporating oversize footings into the structure or by installing soil anchors. The building will need to be designed as a water tight structure if no drainage systems are installed.

Alternatively, the building could be designed with a drainage system to control the groundwater. Exterior perimeter foundation drains should be installed where subsurface walls are exposed to the interior. The foundation drains should consist of a minimum 150 mm diameter fabric wrapped perforated drainage tile surrounded by 19 mm diameter clear stone (OPSS 1004) with a minimum cover of 150 mm on top and sides and 50 mm below the drainage tile. Since the natural soil contains a significant amount of silt sized particles, the clear stone gravel should be wrapped in a non-woven geotextile. The water collected from the weeping tile should be directed away from the building to appropriate drainage areas; either through gravity flow or interior sump pump systems. All subsurface walls should be water proofed.

An underfloor drainage system is recommended. The underfloor drainage system should be installed beneath the slab and should be constructed in a similar fashion to the foundation drains and be connected to a suitable frost-free outlet or sump.

The details of this foundation wall and floor slab drainage system must be reviewed by Pinchin prior to submission to the contractor.

6.5.1 Earth Pressure

The walls must also be designed to resist lateral earth pressure. Depending on the design of the building the earth pressure computations must take into account the groundwater level at the Site.

The details of this foundation wall and floor slab drainage system must be reviewed by Pinchin prior to submission to the contractor.

For calculating the lateral earth pressure, following values should be used. Hydrostatic forces still need to be considered.

Soil Layer	Bulk Unit Weight (kN/m^3)	At-Rest Earth Pressure Coefficient
Glacial Till	21	0.47
Shale Bedrock (Queenston Formation)	24	N/A

6.5.2 Rock Pressure

It is Pinchin's understanding that there are currently no development plans for the Site; however, future use of the Site may include a mid to high-rise building with more than two levels of underground parking. It is anticipated that the minimum P2 FFE may be set at 6 ± mbgs (i.e. Elevation 64.5 ± m). Inferred shale bedrock of the Queenston Formation was encountered at depths of approximately 1.7 and 1.8 mbgs (i.e Elevation 67.4 to 69.7 m). Therefore, excavations for the underground parking structures are anticipated to extend into the bedrock.

The empirical approach for the design of foundation walls below bedrock level has been to use a uniform pressure distribution for the design of the basement walls below the top of bedrock elevation, which is consistent with the maximum earth pressure calculated for the lowest level of soil in the profile. This approach is likely conservative but it recognizes the practical requirement to have a foundation wall of a consistent width through the lower reach of the building.

This approach does not recognize the potential for pressures on the basement wall due to time dependant rock swell that results when locked in horizontal stresses are released. It presupposes that there is sufficient time between the cutting of the rock face and the construction of the building structure to allow the rock to de-stress and swell. Experience suggests that if there is a 120-day period after the rock cut, before the rock is restrained by the structure, that there has been sufficient swell and no significant stresses are imposed on the structural wall. Depending on the building construction sequence some provision for compressible material at the excavation perimeter (particularly for excavations extending deeper into the rock) may be necessary, which should be assessed during the detailed design stage.

For the lower foundation walls and where pits are made for sumps, elevators or other such features are cast directly against the rock face, there must be careful consideration of the potential for rock squeeze effects. To accommodate the rock squeeze effect, a compressible layer can be placed between the rock and the concrete. A 50 mm thick 220 Ethafoam Polyethylene Foam planks are typically used in this application. Foundation walls are typically designed for the strength of the foam at the 50 percent compressive deflection. At 50 percent compressive deflection, 220 Ethafoam plank material will provide a resistance of 18 psi (124 kPa). The 10 percent deflection compressive strength of this material is 7 psi (50 kPa), which will allow for concrete placement.

In the case of sumps, elevators, etc., if the rock is over excavated by at least 600 mm and the pits and sumps are backfilled with 19 mm clear stone (OPSS.MUNI 1004), then there is sufficient give in the backfill to accommodate the rock swell.

6.5.3 Sliding Resistance

Resistance to sliding of the structures is developed by friction between the base of the footing and the bedrock. This friction **(R)** depends on the normal load on the soil contact (**N**) and the frictional resistance of the soil (**tan ϕ**) expressed as **R = N tan ϕ**. The factored geotechnical resistance at ULS is **0.8 R**. The coefficient of friction angle between the underside of a cast-in-place concrete footing and a clean sound bedrock surface may be taken as **tan 26° (0.5).**

6.6 Floor Slabs

It is understood that the building is proposed to be constructed with more than two levels of underground parking; however, at this time the final grades for the underside of the underground parking floor slab are unknown. It is anticipated that the finished floor level of the minimum proposed P2 FFE may be set at 6 ± mbgs (i.e. Elevation 64.5 ± m).

A conventional slab-on-grade basement floor may be installed on the underlying shale bedrock. Prior to the installation of the slab, all deleterious or loose materials should be removed.

Based on the in-situ soil conditions, it is recommended to establish the concrete floor slab on a minimum 200 mm thick layer of 19 mm clear stone Type I or Type II (OPSS 1004) or Granular “A” (OPSS 1010). Any required up-fill should consist of a Granular “B” Type I or Type II (OPSS 1010). It should be noted that 19 mm clear stone is vulnerable to fines migration from adjacent soils, if clear stone is to be used it should be protected by an appropriate filter cloth based on the gradation of the adjacent soils.

The installation of a vapour barrier may be required under the floor slab. If required, the vapour barrier should conform to the flooring manufacturer’s and designer’s requirements. Consideration may be given to carrying out moisture emission and/or relative humidity testing of the slab to determine the concrete condition prior to flooring installation.

The following table provides the unfactored modulus of subgrade reaction values for use in design of the floor slab:

Material Type	Modulus of Subgrade Reaction (kN/m^3)
Granular A (OPSS 1010)	85,000
Granular “B” Type I (OPSS 1010)	75,000
Granular “B” Type II (OPSS 1010)	85,000
19 Clear Stone (OPSS 1004)	30,000
Shale Bedrock	80,000

7.0 SITE SUPERVISION & QUALITY CONTROL

It is recommended that all geotechnical aspects of the project be reviewed and confirmed under the appropriate geotechnical supervision, to routinely check such items. This includes but is not limited to inspection and confirmation of the undisturbed natural subgrade material prior to subgrade preparation, pouring any foundations or footings, backfilling, or engineered fill installation to ensure that the actual conditions are not markedly different than what was observed at the borehole locations and geotechnical components are constructed as per Pinchin’s recommendations.

Compaction quality control of engineered fill material (full-time monitoring) is recommended as standard practice, as well as regular sampling and testing of aggregates, asphalt, and concrete, to ensure that physical characteristics of materials for compliance during installation and satisfies all specifications presented within this report.

8.0 CONCLUSIONS

It is understood that the future development at the Site would consist of a mid-rise building, resting on multi-levels of underground parking.

Based on our preliminary analysis and the subsurface information obtained at the borehole locations, the shale bedrock at the Site is favourable for a mid to high-rise development with two or more levels of underground parking, and would provide sufficient bearing resistance for conventionally loaded spread footing foundations. Therefore, from a geotechnical engineering perspective, the Site is considered to be suitable for the proposed development.

However, based on the groundwater monitoring, the shallow groundwater levels ranged from 2.86 mbgs to 3.97 mbgs. Therefore, the proposed development to be designed with underground levels will require groundwater control at the stage of construction as well as at the stage of building operations.

9.0 TERMS AND LIMITATIONS

This Preliminary Geotechnical Investigation and Hydrogeological Assessment was performed for the exclusive use of Northbridge Capital Inc. (Client) in order to evaluate the subsurface conditions at 2172 Wyecroft Road, Oakville, Ontario. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practises in the field of geotechnical engineering for the Site. Classification and identification of soil, and geologic units have been based upon commonly accepted methods employed in professional geotechnical practice. No warranty or other conditions, expressed or implied, should be understood. Conclusions derived are specific to the immediate area of study and cannot be extrapolated extensively away from sample locations.

Performance of this Preliminary Geotechnical Investigation and Hydrogeological Assessment to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the subgrade soil at the Site, and recognizes reasonable limits on time and cost.

Regardless how exhaustive a Preliminary Geotechnical Investigation and Hydrogeological Assessment is performed, the investigation cannot identify all the subsurface conditions. In addition, this report in preliminary and is intended to be supplemented and updated with a future, more extensive, geotechnical investigation. Therefore, no warranty is expressed or implied that the entire Site is representative of the subsurface information obtained at the specific locations of our investigation. If during construction, subsurface conditions differ from then what was encountered within our test location and the additional subsurface information provided to us, Pinchin should be contacted to review our recommendations. This report does not alleviate the contractor, owner, or any other parties of their respective responsibilities.

This report has been prepared for the exclusive use of the Client and their authorized agents. 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 the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time. Please refer to Appendix V, Report Limitations and Guidelines for Use, which pertains to this report.

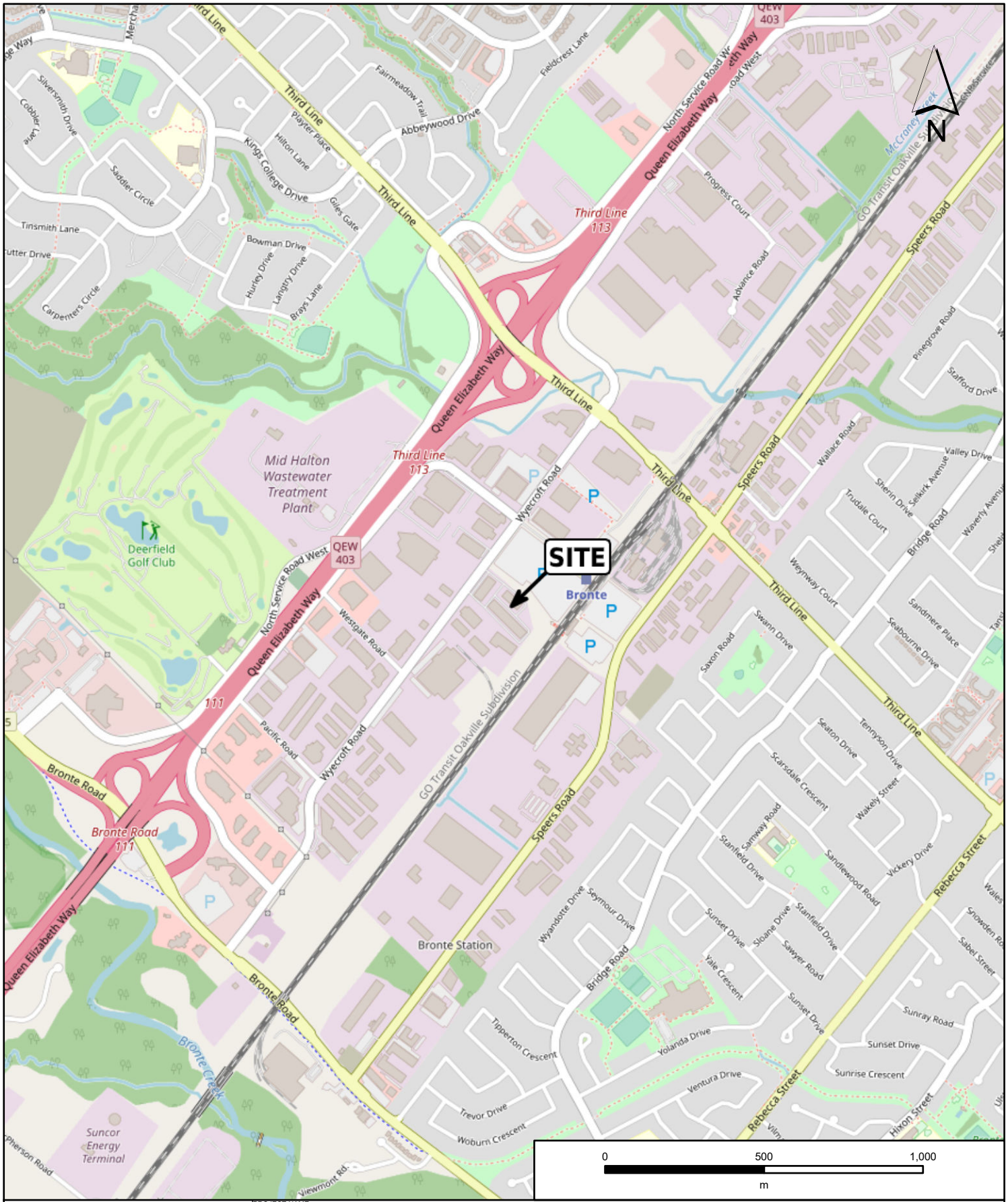
Specific limitations related to the legal and financial and limitations to the scope of the current work are outlined in our proposal, the attached Methodology and the Authorization to Proceed, Limitation of Liability and Terms of Engagement which accompanied the proposal.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

305120.001 FINAL Preliminary Geo & HydroGeo 2172 Wyecroft Road Oakville ON April 12 2022.docx

Template: Master Geotechnical Investigation Report – Ontario, GEO, April 1, 2020

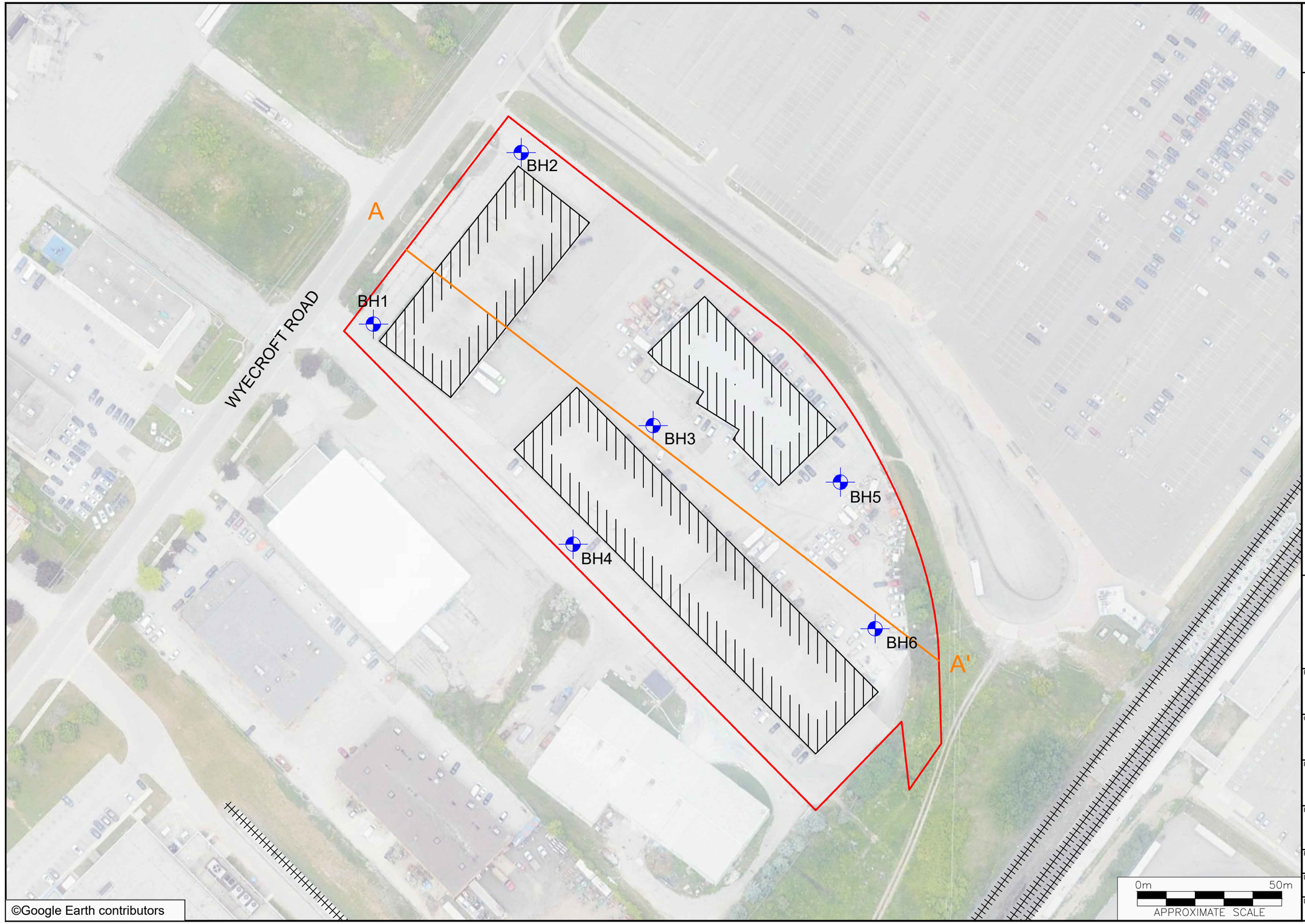
FIGURES



PINCHIN

PROJECT NAME:	PRELIMINARY GEOTECHNICAL INVESTIGATION AND HYDROGEOLOGICAL ASSESSMENT
CLIENT NAME:	NORTHBRIDGE CAPITAL INC.
PROJECT LOCATION:	2172 WYECROFT ROAD, OAKVILLE, ONTARIO
FIGURE NAME:	KEY MAP
FIGURE NUMBER	1

PROJECT NUMBER:	SCALE:	DRAWN BY:	REVIEWED BY:	DATE:
305120.001	1:22,000	YS	MB	FEBRUARY 2022



N

LEGEND

- SITE BOUNDARY
- SITE BUILDING
- RAILWAY LINE
- BOREHOLE/MONITORING WELL
- A A' CROSS-SECTION LINE

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
PRELIMINARY GEOTECHNICAL INVESTIGATION AND HYDROGEOLOGICAL ASSESSMENT

CLIENT NAME:
NORTHBRIDGE CAPITAL INC.

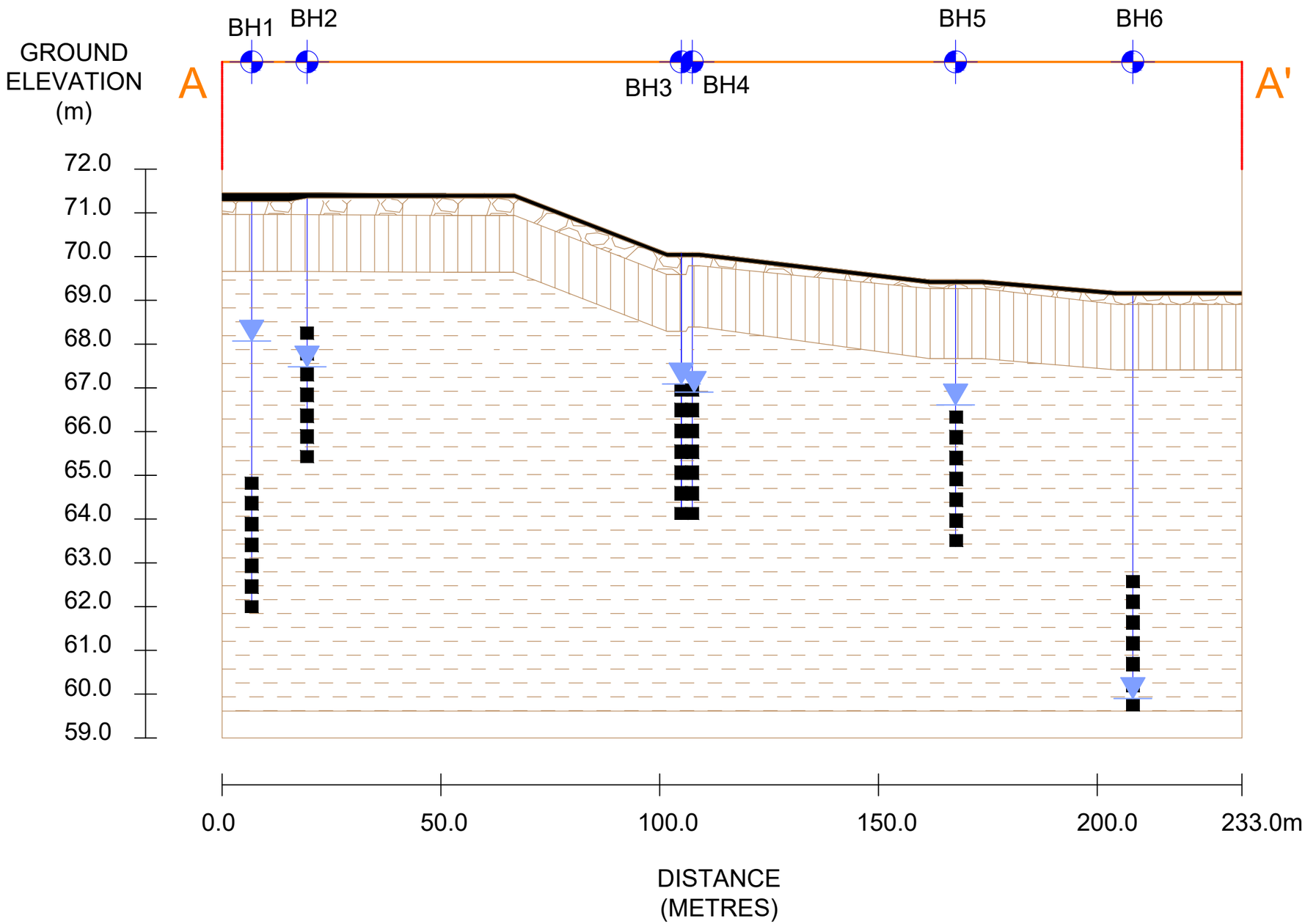
PROJECT LOCATION:
2172 WYECROFT ROAD, OAKVILLE, ONTARIO

FIGURE NAME:
BOREHOLE/MONITORING WELL LOCATION PLAN

PROJECT NUMBER:	SCALE:
305120.001	AS SHOWN
DRAWN BY: KP	REVIEWED BY: BG
DATE: MARCH 2022	FIGURE NUMBER: 2

NORTHWEST

SOUTHEAST



N

LEGEND

- SITE BOUNDARY
- BOREHOLE/MONITORING WELL
- A A' CROSS-SECTION LINE
- ASPHALT
- FILL (AGGREGATE)
- SILT TILL
- SHALE
- WELL CASING/ BENTONITE
- MEASURED GROUNDWATER ELEVATION (MARCH 10, 2022)
- WELL SCREEN
- m METRES

NOTE: GROUND ELEVATION IN METER (m) BASED ON WGS84 DATUM

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

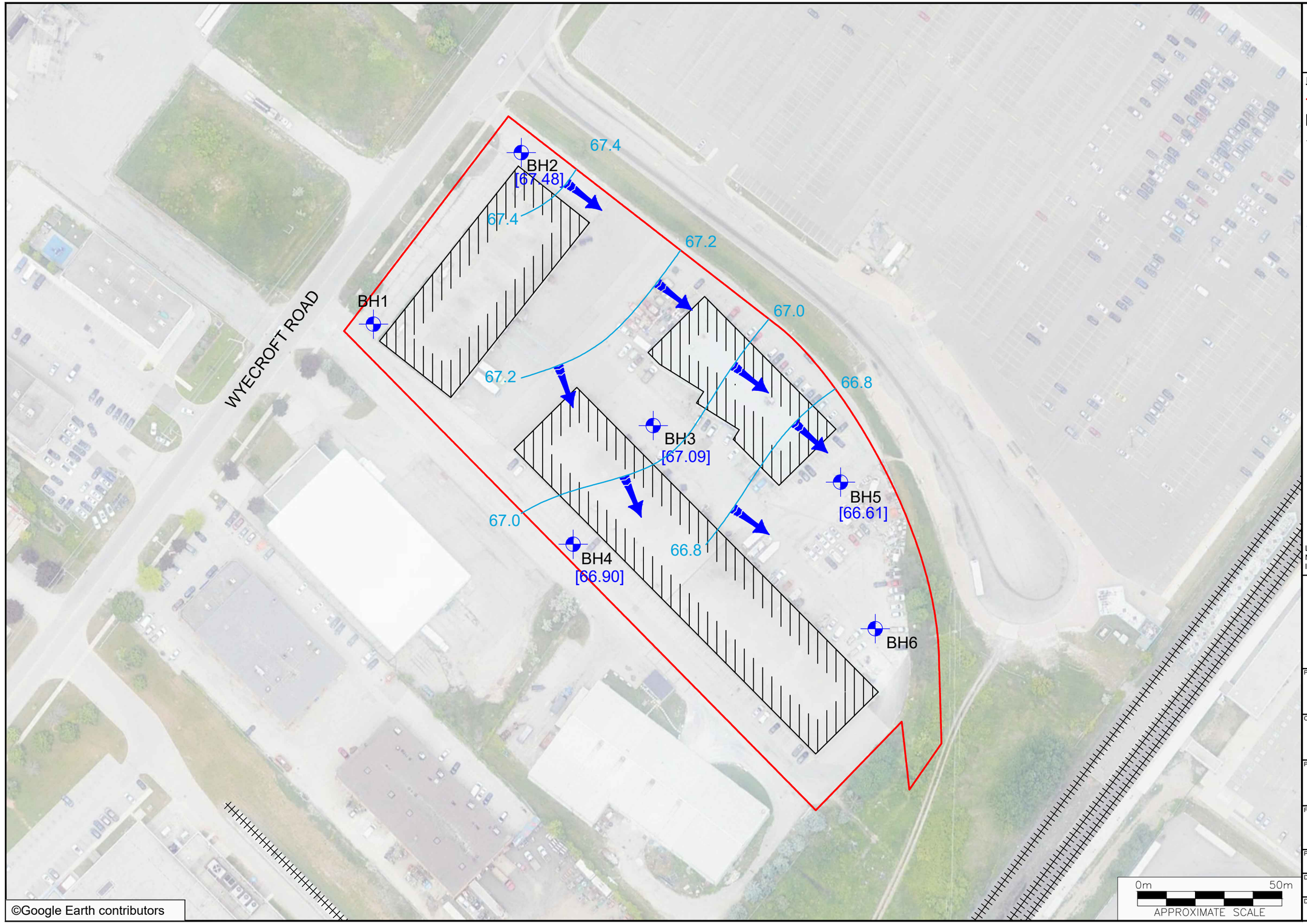
PROJECT NAME:
PRELIMINARY GEOTECHNICAL INVESTIGATION AND HYDROGEOLOGICAL ASSESSMENT

CLIENT NAME:
NORTHBRIDGE CAPITAL INC.

PROJECT LOCATION:
2172 WYECROFT ROAD, OAKVILLE, ONTARIO

FIGURE NAME:
CROSS-SECTION A-A'

PROJECT NUMBER:	SCALE:
305120.001	AS SHOWN
DRAWN BY: KP	REVIEWED BY: BG
DATE: MARCH 2022	FIGURE NUMBER: 3



N

LEGEND

- SITE BOUNDARY
- SITE BUILDING
- RAILWAY LINE
- BOREHOLE/MONITORING WELL
- [#] GROUNDWATER ELEVATION IN METRES (m)
- 67.0 GROUNDWATER CONTOUR ELEVATION IN METRES (m)
- GROUNDWATER FLOW DIRECTION

NOTE: GROUNDWATER ELEVATION IN METER (m) BASED ON WGS84 DATUM

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
PRELIMINARY GEOTECHNICAL INVESTIGATION AND HYDROGEOLOGICAL ASSESSMENT

CLIENT NAME:
NORTHBRIDGE CAPITAL INC.

PROJECT LOCATION:
2172 WYECROFT ROAD, OAKVILLE, ONTARIO

FIGURE NAME:
SHALLOW GROUNDWATER ELEVATIONS AND INFERRED FLOW DIRECTION

PROJECT NUMBER:	SCALE:
305120.001	AS SHOWN
DRAWN BY:	REVIEWED BY:
KP	BG
DATE:	FIGURE NUMBER:
MARCH 2022	4

APPENDIX I

Abbreviations, Terminology and Principle Symbols used in Report and Borehole Logs

ABBREVIATIONS, TERMINOLOGY & PRINCIPAL SYMBOLS USED

Sampling Method

AS	Auger Sample	**w**	Washed Sample
SS	Split Spoon Sample	**HQ**	Rock Core (63.5 mm diam.)
ST	Thin Walled Shelby Tube	**NQ**	Rock Core (47.5 mm diam.)
BS	Block Sample	**BQ**	Rock Core (36.5 mm diam.)

In-Situ Soil Testing

Standard Penetration Test (SPT), "N" value is the number of blows required to drive a 51 mm outside diameter spilt barrel sampler into the soil a distance of 300 mm with a 63.5 kg weight free falling a distance of 760 mm after an initial penetration of 150 mm has been achieved. The SPT, "N" value is a qualitative term used to interpret the compactness condition of cohesionless soils and is used only as a very approximation to estimate the consistency and undrained shear strength of cohesive soils.

Dynamic Cone Penetration Test (DCPT) is the number of blows required to drive a cone with a 60 degree apex attached to "A" size drill rods continuously into the soil for each 300 mm penetration with a 63.5 kg weight free falling a distance of 760 mm.

Cone Penetration Test (CPT) is an electronic cone point with a 10 cm2 base area with a 60 degree apex pushed through the soil at a penetration rate of 2 cm/s.

Field Vane Test (FVT) consists of a vane blade, a set of rods and torque measuring apparatus used to determine the undrained shear strength of cohesive soils.

Soil Descriptions

The soil descriptions and classifications are based on an expanded Unified Soil Classification System (USCS). The USCS classifies soils on the basis of engineering properties. The system divides soils into three major categories; coarse grained, fine grained and highly organic soils. The soil is then subdivided based on either gradation or plasticity characteristics. The classification excludes particles larger than 75 mm. To aid in quantifying material amounts by weight within the respective grain size fractions the following terms have been included to expand the USCS:

Soil Classification		Terminology	Proportion
Clay	< 0.002 mm		
Silt	0.002 to 0.06 mm	“trace”, trace sand, etc.	1 to 10%
Sand	0.075 to 4.75 mm	“some”, some sand, etc.	10 to 20%
Gravel	4.75 to 75 mm	Adjective, sandy, gravelly, etc.	20 to 35%
Cobbles	75 to 200 mm	And, and gravel, and silt, etc.	>35%
Boulders	>200 mm	Noun, Sand, Gravel, Silt, etc.	>35% and main fraction

Notes:

- Soil properties, such as strength, gradation, plasticity, structure, etcetera, dictate the soils engineering behaviour over grain size fractions; and
- With the exception of soil samples tested for grain size distribution or plasticity, all soil samples have been classified based on visual and tactile observations. The accuracy of visual and tactile observation is not sufficient to differentiate between changes in soil classification or precise grain size and is therefore an approximate description.

The following table outlines the qualitative terms used to describe the compactness condition of cohesionless soil:

Cohesionless Soil	
Compactness Condition	**SPT N-Index (blows per 300 mm)**
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	> 50

The following table outlines the qualitative terms used to describe the consistency of cohesive soils related to undrained shear strength and SPT, N-Index:

Cohesive Soil		
Consistency	**Undrained Shear Strength (kPa)**	**SPT N-Index (blows per 300 mm)**
Very Soft	<12	<2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

Note: Utilizing the SPT, N-Index value to correlate the consistency and undrained shear strength of cohesive soils is only very approximate and needs to be used with caution.

Soil & Rock Physical Properties

General

W Natural water content or moisture content within soil sample

γ Unit weight

γ' Effective unit weight

γ_d Dry unit weight

γ_{sat} Saturated unit weight

ρ Density

ρ_s Density of solid particles

ρ_w Density of Water

ρ_d Dry density

ρ_{sat} Saturated density e Void ratio

n Porosity

S_r Degree of saturation

E_{50} Strain at 50% maximum stress (cohesive soil)

Consistency

W_L	Liquid limit
W_P	Plastic Limit
I_P	Plasticity Index
W_S	Shrinkage Limit
I_L	Liquidity Index
I_C	Consistency Index
e_{max}	Void ratio in loosest state
e_{min}	Void ratio in densest state
I_D	Density Index (formerly relative density)

Shear Strength

C_u, S_u	Undrained shear strength parameter (total stress)
C'_d	Drained shear strength parameter (effective stress)
r	Remolded shear strength
τ_p	Peak residual shear strength
τ_r	Residual shear strength
ø’	Angle of interface friction, coefficient of friction = tan ø’

Consolidation (One Dimensional)

C_C	Compression index (normally consolidated range)
C_r	Recompression index (over consolidated range)
C_S	Swelling index
m_V	Coefficient of volume change
c_V	Coefficient of consolidation
T_V	Time factor (vertical direction)
U	Degree of consolidation
σ'_O	Overburden pressure
σ'_p	Preconsolidation pressure (most probable)
OCR	Overconsolidation ratio

Permeability

The following table outlines the terms used to describe the degree of permeability of soil and common soil types associated with the permeability rates**:**

Permeability (k cm/s)	Degree of Permeability	Common Associated Soil Type
$> 10^{-1}$	Very High	Clean gravel
10^{-1} to 10^{-3}	High	Clean sand, Clean sand and gravel
10^{-3} to 10^{-5}	Medium	Fine sand to silty sand
10^{-5} to 10^{-7}	Low	Silt and clayey silt (low plasticity)
$>10^{-7}$	Practically Impermeable	Silty clay (medium to high plasticity)

Rock Coring

Rock Quality Designation (RQD) is an indirect measure of the number of fractures within a rock mass, Deere et al. (1967). It is the sum of sound pieces of rock core equal to or greater than 100 mm recovered from the core run, divided by the total length of the core run, expressed as a percentage. If the core section is broken due to mechanical or handling, the pieces are fitted together and if 100 mm or greater included in the total sum**.**

RQD is calculated as follows:

$$\text{RQD (\%)} = \frac{\Sigma \text{ Length of core pieces} > 100 \text{ mm} \times 100}{\text{Total length of core run}}$$

The following is the Classification of Rock with Respect to RQD Value:

RQD Classification	RQD Value (%)
Very poor quality	**<25**
Poor quality	25 to 50
Fair quality	50 to 75
Good quality	75 to 90
Excellent quality	90 to 100

APPENDIX II

Pinchin’s Borehole Logs

Log of Borehole: BH1 (MW)

Project #: 305120.001 **Logged By:** HE

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: March 4, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (%)	Laboratory Analysis and Comments
0		Ground Surface	71.5								
		Pavement Structure Asphaltic concrete: 150 mm Aggregate layer: 300 mm	0.0 71.0		SS	1	35	9			
		Silt Till Reddish brown clayey silt till, trace to some sand, trace gravel, stiff to hard, moist	0.5		SS	2	30	10			
1											
					SS	3	20	>50			
		Inferred Bedrock Reddish brown weathered shale with limestone/dolostone stringers (Queenston Formation)	69.7 1.8								
2					SS	4	20	>50			
				Bentonite							
3											
4											
				Riser							
5											

Rig Type: Track-mount

Grade Elevation: 71.5 m

Drilling Method: Split Spoon / Solid Stem Auger, HQ-rock Coring

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 1 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH1 (MW)

Project #: 305120.001 **Logged By:** HE

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: March 4, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE | **SAMPLE**

Depth (mbgs)	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (%)	Laboratory Analysis and Comments
6		65.4								
	Queenston Formation Reddish brown shale, laminated to thinly bedded, weak, joints are horizontal, closed to gapped, planar, clean; interbedded with limestone, light grey, strong	6.1		HQ	1	95				
		64.9								
7	Total Core Recovery = 95% Solid Core Recovery = 93% Rock Quality Designation = 79% 9% Limestone Total Core Recovery = 95% Solid Core Recovery = 93% Rock Quality Designation = 87%	6.6	Silica Sand	HQ	2	95				
8	~10% Limestone Total Core Recovery = 100% Solid Core Recovery = 100% Rock Quality Designation = 95% ~7% Limestone	63.4 8.1	Screen	HQ	3	100				
9										
		61.9								
	End of Borehole Borehole terminated at approximately 9.6 mbgs. Borehole contained drill water upon completion of drilling. Unstabilized groundwater level and cave were not measured. Water Level Readings Date Water Depth (mbgs) Mar 8, 2022 3.2 Mar 10, 2022 3.4	9.6								
10										
11										

Rig Type: Track-mount

Grade Elevation: 71.5 m

Drilling Method: Split Spoon / Solid Stem Auger, HQ-rock Coring

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 2 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH2 (MW)

Project #: 305120.001 **Logged By:** MYB

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: February 24, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (○ % ○)	Laboratory Analysis and Comments
0		Ground Surface	71.4								
		Pavement Structure Asphaltic concrete: 100 mm Aggregate layer: 100 mm	0.0								
		Silt Till Reddish brown clayey silt till, trace to some sand, trace gravel, very stiff to hard, moist			SS	1	100	19			
1					SS	2	80	22			
			69.7								
		Inferred Bedrock Reddish brown weathered shale with limestone/dolostone stringers (Queenston Formation)	1.7	Riser	SS	3	70	>50			
2					SS	4	40	>50			
				Bentonite							
3					AS	5					
				Silica Sand							
4											
				Screen	AS	6					
5											

Rig Type: Track-mount

Drilling Method: Split Spoon / Solid Stem Auger

Well Diameter: 51 mm

Grade Elevation: 71.4 m

Top of Casing Elevation: N/A

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH2 (MW)

Project #: 305120.001 **Logged By:** MYB

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: February 24, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value □ 20 40 60 □	Water Content ○ % ○	Laboratory Analysis and Comments
6			65.3								
			6.1								
		End of Borehole									
		Borehole terminated at approximately 6.1 mbgs. Borehole was open and dry upon completion of drilling.									
		Water Level Readings Date Water Depth (mbgs) Mar 8, 2022 4.0 Mar 10, 2022 4.0									
7											
8											
9											
10											
11											

Rig Type: Track-mount

Grade Elevation: 71.4 m

Drilling Method: Split Spoon / Solid Stem Auger

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 2 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH3 (MW)

Project #: 305120.001 **Logged By:** MYB

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: February 24, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (% ○ ○)	Laboratory Analysis and Comments
0		Ground Surface	70.1								
		Pavement Structure Asphaltic concrete: 110 mm Aggregate layer: 350 mm	0.0 69.6		SS	1	80	17			
		Silt Till Reddish brown clayey silt till, trace to some sand, trace gravel, very stiff to hard, moist	0.5		SS	2	100	24			
1					SS	3	100	>50			
		Inferred Bedrock Reddish brown weathered shale with limestone/dolostone stringers (Queenston Formation)	68.3 1.8	Riser	AS	4					
2				Bentonite							
					AS	5					
3											
				Silica Sand							
4											
				Screen	AS	6					
5											

Rig Type: Truck-mount

Grade Elevation: 70.1 m

Drilling Method: Split Spoon / Solid Stem Auger

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 1 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH3 (MW)

Project #: 305120.001 **Logged By:** MYB

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: February 24, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value □ 20 40 60 □	Water Content ○ % ○	Laboratory Analysis and Comments
6			64.0								
			6.1								
		End of Borehole Borehole terminated at approximately 6.1 mbgs. Borehole was open and dry upon completion of drilling. Water Level Readings Date Water Depth (mbgs) Mar 8, 2022 3.0 Mar 10, 2022 3.0									
7											
8											
9											
10											
11											

Rig Type: Truck-mount

Grade Elevation: 70.1 m

Drilling Method: Split Spoon / Solid Stem Auger

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 2 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH4 (MW)

Project #: 305120.001 **Logged By:** MYB

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: February 24, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (% ○ ○)	Laboratory Analysis and Comments
0		Ground Surface	70.1								
		Pavement Structure Asphaltic concrete: 100 mm Aggregate layer: 150 mm	0.0 69.9 0.2		SS	1	80	12			
1		**Silt Till** Reddish brown clayey silt till, trace to some sand, trace gravel, stiff to hard, moist			SS	2	100	23			
			68.4 1.7		SS	3	100	>50			
2		**Inferred Bedrock** Reddish brown weathered shale with limestone/dolostone stringers (Queenston Formation)		Riser							
				Bentonite	AS	4					
3					AS	5					
4				Silica Sand							
				Screen	AS	6					
5											

Rig Type: Truck-mount

Grade Elevation: 70.1 m

Drilling Method: Split Spoon / Solid Stem Auger

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 1 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH4 (MW)

Project #: 305120.001 **Logged By:** MYB

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: February 24, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value □20 40 60□	Water Content ○ % ○	Laboratory Analysis and Comments
6			64.0								
			6.1								
		End of Borehole Borehole terminated at approximately 6.1 mbgs. Borehole was open and dry upon completion of drilling. Water Level Readings Date Water Depth (mbgs) Mar 8, 2022 3.2 Mar 10, 2022 3.2									
7											
8											
9											
10											
11											

Rig Type: Truck-mount

Grade Elevation: 70.1 m

Drilling Method: Split Spoon / Solid Stem Auger

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 2 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH5 (MW)

Project #: 305120.001 **Logged By:** MYB

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: February 24, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (% ○ ○)	Laboratory Analysis and Comments
0		Ground Surface	69.5								
		Pavement Structure Asphaltic concrete: 100 mm Aggregate layer: 100 mm	0.0		SS	1	100	13			
		Silt Till Reddish brown clayey silt till, trace to some sand, trace gravel, stiff to hard, moist									
1					SS	2	100	27			
					SS	3	100	>50			
2		**Inferred Bedrock** Reddish brown weathered shale with limestone/dolostone stringers (Queenston Formation)	67.7 1.8	Riser							
				Bentonite	AS	4					
3					AS	5					
4				Silica Sand							
				Screen	AS	6					
5											

Rig Type: Truck-mount

Grade Elevation: 69.5 m

Drilling Method: Split Spoon / Solid Stem Auger

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 1 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH5 (MW)

Project #: 305120.001 **Logged By:** MYB

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: February 24, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (% ○ ○)	Laboratory Analysis and Comments
6			63.4								
			6.1								
		End of Borehole Borehole terminated at approximately 6.1 mbgs. Borehole was open and dry upon completion of drilling. Water Level Readings Date Water Depth (mbgs) Mar 8, 2022 2.9 Mar 10, 2022 2.9									
7											
8											
9											
10											
11											

Rig Type: Truck-mount

Grade Elevation: 69.5 m

Drilling Method: Split Spoon / Solid Stem Auger

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 2 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH6 (MW)

Project #: 305120.001 **Logged By:** HE

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: March 4, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE					SAMPLE						
Depth (mbgs)	Graphic Log	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (%)	Laboratory Analysis and Comments
0		Ground Surface	69.2								
		Pavement Structure Asphaltic concrete: 130 mm Aggregate layer: 170 mm	0.0 68.9 0.3		SS	1	20	12			
1		**Silt Till** Reddish brown clayey silt till, trace to some sand, trace gravel, stiff to hard, moist			SS	2	15	17			
			67.4 1.8		SS	3	100	48			
2		**Inferred Bedrock** Reddish brown weathered shale with limestone/dolostone stringers (Queenston Formation)			SS	4	NR	>50			
3				Bentonite							
4											
5				Riser							

Rig Type: Track-mount

Grade Elevation: 69.2 m

Drilling Method: Split Spoon / Solid Stem Auger, HQ-rock Coring

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 1 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

Log of Borehole: BH6 (MW)

Project #: 305120.001 **Logged By:** HE

Project: Preliminary Geotechnical Investigation

Client: Northbridge Capital Inc.

Location: 2172 Wyecroft Road, Oakville, Ontario

Drill Date: March 4, 2022 **Project Manager:** MYB

SUBSURFACE PROFILE | **SAMPLE**

Depth (mbgs)	Description	Elevation (m) / Depth (mbgs)	Monitoring Well Details	Sample Type	Sampler Number	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20 40 60)	Water Content (%)	Laboratory Analysis and Comments
6		63.1								
	Queenston Formation Reddish brown shale, laminated to thinly bedded, weak, joints are horizontal, closed to gapped, planar, clean; interbedded with limestone, light grey, strong	6.1		HQ	1	100				
	Total Core Recovery = 100% Solid Core Recovery = 100% Rock Quality Designation = 100% ~2% Limestone	62.6 6.6		HQ	2	100				
7		61.9 7.3	Silica Sand							
	Total Core Recovery = 100% Solid Core Recovery = 100% Rock Quality Designation = 90% ~3% Limestone			HQ	3	100				
8		61.2 8.0								
	Total Core Recovery = 100% Solid Core Recovery = 100% Rock Quality Designation = 90% ~5% Limestone		Screen							
9	Total Core Recovery = 100% Solid Core Recovery = 100% Rock Quality Designation = 100% ~5% Limestone			HQ	4	100				
		59.6 9.6								
	End of Borehole Borehole terminated at approximately 9.6 mbgs. Borehole contained drill water upon completion of drilling. Unstabilized groundwater level and cave were not measured. Water Level Readings Date Water Depth (mbgs) Mar 8, 2022 3.9 Mar 10, 2022 N/A									
10										
11										

Rig Type: Track-mount

Grade Elevation: 69.2 m

Drilling Method: Split Spoon / Solid Stem Auger, HQ-rock Coring

Top of Casing Elevation: N/A

Well Diameter: 51 mm

Sheet: 2 of 2

mbgs - meters below ground surface
mbfs - meters below basement floor slab
masl - meters above elllipsoid line

APPENDIX III

Laboratory Testing Reports for Groundwater Samples

Your Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Your C.O.C. #: 869111-01-01

Attention: Craig Kelly

Pinchin Ltd
2360 Meadowpine Blvd
Unit # 2
Mississauga, ON
CANADA L5N 6S2

Report Date: 2022/03/17
Report #: R7047321
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C264137
Received: 2022/03/10, 19:34

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonaceous BOD	1	2022/03/12	2022/03/17	CAM SOP-00427	SM 23 5210B m
Total Cyanide	1	2022/03/12	2022/03/12	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2022/03/11	2022/03/14	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2022/03/16	2022/03/16	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by Axial ICP	1	2022/03/15	2022/03/16	CAM SOP-00408	EPA 6010D m
E.coli, (CFU/100mL)	1	N/A	2022/03/10	CAM SOP-00552	MOE LSB E3371
Animal and Vegetable Oil and Grease	1	N/A	2022/03/15	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2022/03/15	2022/03/15	CAM SOP-00326	EPA1664B m,SM5520B m
PAH Compounds in Water by GC/MS (SIM)	1	2022/03/15	2022/03/16	CAM SOP-00318	EPA 8270D m
pH	1	2022/03/11	2022/03/14	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2022/03/14	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2022/03/15	CAM SOP-00464	EPA 375.4 m
Total Kjeldahl Nitrogen in Water	1	2022/03/11	2022/03/14	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (1)	1	2022/03/15	2022/03/15	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2022/03/12	2022/03/15	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2022/03/14	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

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

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

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Your Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Your C.O.C. #: 869111-01-01

Attention: Craig Kelly

Pinchin Ltd
2360 Meadowpine Blvd
Unit # 2
Mississauga, ON
CANADA L5N 6S2

Report Date: 2022/03/17
Report #: R7047321
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C264137
Received: 2022/03/10, 19:34

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: Antonella.Brasil@bureauveritas.com
Phone# (905)817-5817
==========
This report has been generated and distributed using a secure automated process.
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For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C264137
Report Date: 2022/03/17

Pinchin Ltd
Client Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Sampler Initials: JP

HALTON SANITARY & COMBINED SEWER (2-03)

Bureau Veritas ID				SBF779			
Sampling Date				2022/03/10 16:30			
COC Number				869111-01-01			
	UNITS	Criteria	Criteria-2	BH 1	RDL	MDL	QC Batch
Calculated Parameters							
Total Animal/Vegetable Oil and Grease	mg/L	-	150	<0.50	0.50	0.10	7876686
Inorganics							
Total Carbonaceous BOD	mg/L	-	300	<2	2	0.2	7879274
Fluoride (F-)	mg/L	-	10	0.12	0.10	0.020	7878993
Total Kjeldahl Nitrogen (TKN)	mg/L	-	100	1.0	0.10	0.060	7877905
pH	pH	6.5:8.5	6.0:10.0	7.53			7878965
Phenols-4AAP	mg/L	-	1	<0.0010	0.0010	0.00030	7880175
Total Suspended Solids	mg/L	-	350	<10	10	2.0	7878846
Dissolved Sulphate (SO4)	mg/L	-	1500	120	1.0	0.10	7878910
Total Cyanide (CN)	mg/L	-	2	<0.0050	0.0050	0.00010	7879613
Petroleum Hydrocarbons							
Total Oil & Grease	mg/L	-	-	<0.50	0.50	0.10	7883636
TPH - Heavy Oils	mg/L	-	-	<0.50	0.50	0.10	7883643
Metals							
Total Aluminum (Al)	mg/L	-	50	<0.1	0.1	0.03	7882243
Total Antimony (Sb)	mg/L	-	5	<0.02	0.02	N/A	7882243
Total Arsenic (As)	mg/L	-	1	<0.01	0.01	N/A	7882243
Total Beryllium (Be)	mg/L	-	5	<0.0005	0.0005	N/A	7882243
Total Cadmium (Cd)	mg/L	-	1	<0.002	0.002	N/A	7882243
Total Chromium (Cr)	mg/L	-	3	<0.01	0.01	N/A	7882243
Total Cobalt (Co)	mg/L	-	5	<0.002	0.002	N/A	7882243
Total Copper (Cu)	mg/L	-	3	<0.01	0.01	N/A	7882243
Total Iron (Fe)	mg/L	-	50	0.25	0.02	N/A	7882243
Total Lead (Pb)	mg/L	-	3	<0.01	0.01	N/A	7882243
Total Manganese (Mn)	mg/L	-	5	0.57	0.001	N/A	7882243
Mercury (Hg)	mg/L	-	0.05	<0.00010	0.00010	0.000050	7885045
Total Molybdenum (Mo)	mg/L	-	5	<0.005	0.005	N/A	7882243
Total Nickel (Ni)	mg/L	-	3	<0.005	0.005	N/A	7882243

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Halton Storm Sewer ByLaw
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C264137
Report Date: 2022/03/17

Pinchin Ltd
Client Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Sampler Initials: JP

HALTON SANITARY & COMBINED SEWER (2-03)

Bureau Veritas ID				SBF779			
Sampling Date				2022/03/10 16:30			
COC Number				869111-01-01			
	UNITS	Criteria	Criteria-2	BH 1	RDL	MDL	QC Batch
Total Phosphorus (P)	mg/L	-	10	<0.05	0.05	N/A	7882243
Total Selenium (Se)	mg/L	-	5	<0.02	0.02	N/A	7882243
Total Silver (Ag)	mg/L	-	5	<0.01	0.01	N/A	7882243
Total Tin (Sn)	mg/L	-	5	<0.02	0.02	N/A	7882243
Total Titanium (Ti)	mg/L	-	5	<0.005	0.005	N/A	7882243
Total Zinc (Zn)	mg/L	-	3	0.017	0.005	N/A	7882243
Polyaromatic Hydrocarbons							
Naphthalene	ug/L	-	140	<0.050	0.050	0.0030	7883689
Volatile Organics							
Benzene	ug/L	-	10	<0.40	0.40	0.040	7877248
Chloroform	ug/L	-	40	<0.40	0.40	0.10	7877248
1,4-Dichlorobenzene	ug/L	-	80	<0.80	0.80	0.10	7877248
Ethylbenzene	ug/L	-	160	<0.40	0.40	0.020	7877248
Methylene Chloride(Dichloromethane)	ug/L	-	2000	<4.0	4.0	0.20	7877248
Tetrachloroethylene	ug/L	-	1000	<0.40	0.40	0.10	7877248
Toluene	ug/L	-	16	<0.40	0.40	0.020	7877248
Trichloroethylene	ug/L	-	400	<0.40	0.40	0.10	7877248
Surrogate Recovery (%)							
D10-Anthracene	%	-	-	85			7883689
D14-Terphenyl (FS)	%	-	-	95			7883689
D8-Acenaphthylene	%	-	-	83			7883689
4-Bromofluorobenzene	%	-	-	93			7877248
D4-1,2-Dichloroethane	%	-	-	102			7877248
D8-Toluene	%	-	-	95			7877248

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Halton Storm Sewer ByLaw
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C264137
Report Date: 2022/03/17

Pinchin Ltd
Client Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Sampler Initials: JP

MICROBIOLOGY (WATER)

Bureau Veritas ID			SBF779			
Sampling Date			2022/03/10 16:30			
COC Number			869111-01-01			
	UNITS	Criteria	BH 1	RDL	MDL	QC Batch
Microbiological						
Escherichia coli	CFU/100mL	200	<10	10	N/A	7876748

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Halton Storm Sewer ByLaw
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C264137
Report Date: 2022/03/17

Pinchin Ltd
Client Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Sampler Initials: JP

TEST SUMMARY

Bureau Veritas ID: SBF779
Sample ID: BH 1
Matrix: Water

Collected: 2022/03/10
Shipped:
Received: 2022/03/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	7879274	2022/03/12	2022/03/17	Surleen Kaur Romana
Total Cyanide	SKAL/CN	7879613	2022/03/12	2022/03/12	Aditiben Patel
Fluoride	ISE	7878993	2022/03/11	2022/03/14	Surinder Rai
Mercury in Water by CVAA	CV/AA	7885045	2022/03/16	2022/03/16	Prempal Bhatti
Total Metals Analysis by Axial ICP	ICPX	7882243	2022/03/15	2022/03/16	Gagandeep Rai
E.coli, (CFU/100mL)	PL	7876748	N/A	2022/03/10	Sirimathie Aluthwala
Animal and Vegetable Oil and Grease	BAL	7876686	N/A	2022/03/15	Automated Statchk
Total Oil and Grease	BAL	7883636	2022/03/15	2022/03/15	Himanshu Patel
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7883689	2022/03/15	2022/03/16	Jonghan Yoon
pH	AT	7878965	2022/03/11	2022/03/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7880175	N/A	2022/03/14	Louise Harding
Sulphate by Automated Colourimetry	KONE	7878910	N/A	2022/03/15	Avneet Kour Sudan
Total Kjeldahl Nitrogen in Water	SKAL	7877905	2022/03/11	2022/03/14	Rajni Tyagi
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	7883643	2022/03/15	2022/03/15	Himanshu Patel
Total Suspended Solids	BAL	7878846	2022/03/12	2022/03/15	Shaneil Hall
Volatile Organic Compounds in Water	GC/MS	7877248	N/A	2022/03/14	Manpreet Sarao

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GENERAL COMMENTS

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

Package 1	4.0°C

Sample SBF779 [BH 1] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Bureau Veritas Job #: C264137
Report Date: 2022/03/17

QUALITY ASSURANCE REPORT

Pinchin Ltd
Client Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Sampler Initials: JP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7877248	4-Bromofluorobenzene	2022/03/14	102	70 - 130	103	70 - 130	101	%				
7877248	D4-1,2-Dichloroethane	2022/03/14	101	70 - 130	96	70 - 130	101	%				
7877248	D8-Toluene	2022/03/14	98	70 - 130	101	70 - 130	95	%				
7883689	D10-Anthracene	2022/03/15	88	50 - 130	89	50 - 130	104	%				
7883689	D14-Terphenyl (FS)	2022/03/15	89	50 - 130	99	50 - 130	98	%				
7883689	D8-Acenaphthylene	2022/03/15	86	50 - 130	94	50 - 130	81	%				
7877248	1,4-Dichlorobenzene	2022/03/14	107	70 - 130	109	70 - 130	<0.40	ug/L	NC	30		
7877248	Benzene	2022/03/14	91	70 - 130	91	70 - 130	<0.20	ug/L	NC	30		
7877248	Chloroform	2022/03/14	96	70 - 130	96	70 - 130	<0.20	ug/L	NC	30		
7877248	Ethylbenzene	2022/03/14	86	70 - 130	91	70 - 130	<0.20	ug/L	NC	30		
7877248	Methylene Chloride(Dichloromethane)	2022/03/14	110	70 - 130	107	70 - 130	<2.0	ug/L	NC	30		
7877248	Tetrachloroethylene	2022/03/14	90	70 - 130	96	70 - 130	<0.20	ug/L	NC	30		
7877248	Toluene	2022/03/14	88	70 - 130	91	70 - 130	<0.20	ug/L	NC	30		
7877248	Trichloroethylene	2022/03/14	103	70 - 130	104	70 - 130	<0.20	ug/L	NC	30		
7877905	Total Kjeldahl Nitrogen (TKN)	2022/03/14	NC	80 - 120	107	80 - 120	<0.10	mg/L	4.9	20	104	80 - 120
7878846	Total Suspended Solids	2022/03/15					<10	mg/L	18	25	95	85 - 115
7878910	Dissolved Sulphate (SO4)	2022/03/15	87	75 - 125	98	80 - 120	<1.0	mg/L	1.7	20		
7878965	pH	2022/03/14			102	98 - 103			0.89	N/A		
7878993	Fluoride (F-)	2022/03/14	100	80 - 120	99	80 - 120	<0.10	mg/L	15	20		
7879274	Total Carbonaceous BOD	2022/03/17					<2	mg/L	9.5	30	94	85 - 115
7879613	Total Cyanide (CN)	2022/03/12	97	80 - 120	99	80 - 120	<0.0050	mg/L	NC	20		
7880175	Phenols-4AAP	2022/03/14	95	80 - 120	95	80 - 120	<0.0010	mg/L	0	20		
7882243	Total Aluminum (Al)	2022/03/16	NC	80 - 120	107	80 - 120	<0.1	mg/L				
7882243	Total Antimony (Sb)	2022/03/16	110	80 - 120	105	80 - 120	<0.02	mg/L				
7882243	Total Arsenic (As)	2022/03/16	109	80 - 120	102	80 - 120	<0.01	mg/L				
7882243	Total Beryllium (Be)	2022/03/16	102	80 - 120	102	80 - 120	<0.0005	mg/L				
7882243	Total Cadmium (Cd)	2022/03/16	106	80 - 120	101	80 - 120	<0.002	mg/L				
7882243	Total Chromium (Cr)	2022/03/16	118	80 - 120	108	80 - 120	<0.01	mg/L				
7882243	Total Cobalt (Co)	2022/03/16	94	80 - 120	101	80 - 120	<0.002	mg/L				
7882243	Total Copper (Cu)	2022/03/16	104	80 - 120	102	80 - 120	<0.01	mg/L				
7882243	Total Iron (Fe)	2022/03/16	99	80 - 120	106	80 - 120	<0.02	mg/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7882243	Total Lead (Pb)	2022/03/16	92	80 - 120	100	80 - 120	<0.01	mg/L				
7882243	Total Manganese (Mn)	2022/03/16	98	80 - 120	105	80 - 120	<0.001	mg/L				
7882243	Total Molybdenum (Mo)	2022/03/16	100	80 - 120	102	80 - 120	<0.005	mg/L				
7882243	Total Nickel (Ni)	2022/03/16	NC	80 - 120	100	80 - 120	<0.005	mg/L				
7882243	Total Phosphorus (P)	2022/03/16	NC	80 - 120	105	80 - 120	<0.05	mg/L				
7882243	Total Selenium (Se)	2022/03/16	108	80 - 120	102	80 - 120	<0.02	mg/L				
7882243	Total Silver (Ag)	2022/03/16	100	80 - 120	100	80 - 120	<0.01	mg/L				
7882243	Total Tin (Sn)	2022/03/16	95	80 - 120	102	80 - 120	<0.02	mg/L				
7882243	Total Titanium (Ti)	2022/03/16	103	80 - 120	103	80 - 120	<0.005	mg/L				
7882243	Total Zinc (Zn)	2022/03/16	NC	80 - 120	106	80 - 120	<0.005	mg/L	1.6	20		
7883636	Total Oil & Grease	2022/03/15			99	85 - 115	<0.50	mg/L	0.25	25		
7883643	TPH - Heavy Oils	2022/03/15			99	85 - 115	<0.50	mg/L	0.51	25		
7883689	Naphthalene	2022/03/16	87	50 - 130	88	50 - 130	<0.050	ug/L	NC	30		
7885045	Mercury (Hg)	2022/03/16	87	75 - 125	94	80 - 120	<0.00010	mg/L	NC	20		

N/A = Not Applicable

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

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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

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

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FUNDAMENTAL LABORATORY ACCEPTANCE GUIDELINE

Invoice To:
Pinchin Ltd
ATTN: Accounts Payable
2360 Meadowpine Blvd
Unit # 2
Mississauga, ON
CANADA L5N 6S2
Client Contact:
Craig Kelly

Bureau Veritas Job #:	C264137
Date Received:	2022/03/10
Your C.O.C. #:	869111-01-01
Your Project #:	305120.001
Bureau Veritas Project Manager:	Antonella Brasil
Quote #:	C20345

No discrepancies noted.

Report Comments

Received Date:	**2022/03/10**	**Time:**	**19:34**	**By:**	
Inspected Date:		**Time:**		**By:**	
FLAG Created Date:		**Time:**		**By:**	

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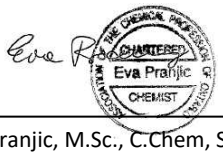
Bureau Veritas Job #: C264137
Report Date: 2022/03/17

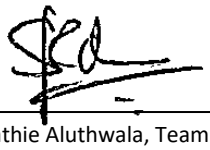
Pinchin Ltd
Client Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Sampler Initials: JP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



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



Sirimathie Aluthwala, Team Lead

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Page 1 of 1

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#3103 Pinchin Ltd	Company Name:		Quotation #:	C20345	Bureau Veritas Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:	Craig Kelly, Jenny Park	P.O. #:			869111
Address:	2360 Meadowpine Blvd Unit # 2 Mississauga ON L5N 6S2	Address:		Project:	305120-001	COC #:	Project Manager:
Tel:	(905) 363-0678 Fax: (905) 363-0681	Tel:	905-363-1352 Fax:	Project Name:		C#869111-01-01	Antonella Brasil
Email:	ap@pinchin.com	Email:	CKelly@Pinchin.com, JPark@Pinchin.com	Site #:	272 Wyecroft Rd, Oakville		
				Sampled By:	JP		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- [ ] Table 1 [ ] Res/Park [ ] Medium/Fine
- [ ] Table 2 [ ] Ind/Comm [ ] Coarse
- [ ] Table 3 [ ] Agri/Other [ ] For RSC
- [ ] Table —

Other Regulations
- [ ] CCME [x] Sanitary Sewer Bylaw
- [ ] Reg 558 [x] Storm Sewer Bylaw City of Oakville
- [ ] MISA Municipality Halton Region,
- [ ] PWQO [ ] Reg 406 Table
- [ ] Other

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? Y

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ✓
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Halton Sanitary & Combined Sewer (2-03)	E.coli, (CFU/100mL)	# of Bottles	Comments
1		BH 1	2022/03/10	4:30pm	GW	N	✓	✓	14	
2										
3										
4										
5										
6										
7										
8										
9										
10										

10-Mar-22 19:34
Antonella Brasil
C264137
NP4 ENV-1439

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Jenny Park	22/03/10	6:00pm	Roy Mercuri	2022/03/10	1934	0

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	3/4/5	Present	—	
		Intact	—	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Job #: C264137
Report Date: 2022/03/17

Pinchin Ltd
Client Project #: 305120.001
Site Location: 2172 WYCROFT RD, OAKVILLE
Sampler Initials: JP

Exceedance Summary Table – Halton Storm Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

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

Exceedance Summary Table – Halton Sanitary Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

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

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APPENDIX IV
Report Limitations and Guidelines for Use

REPORT LIMITATIONS & GUIDELINES FOR USE

This information has been provided to help manage risks with respect to the use of this report.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS

This report was prepared for the exclusive use of the Client and their authorized agents, subject to the conditions and limitations contained within the duly authorized work plan. 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 the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice.

SUBSURFACE CONDITIONS CAN CHANGE

This geotechnical report is based on the existing conditions at the time the study was performed, and Pinchin's opinion of soil conditions are strictly based on soil samples collected at specific test hole locations. The findings and conclusions of Pinchin's reports may be affected by the passage of time, by manmade events such as construction on or adjacent to the Site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations.

LIMITATIONS TO PROFESSIONAL OPINIONS

Interpretations of subsurface conditions are based on field observations from test holes that were spaced to capture a 'representative' snap shot of subsurface conditions. Site exploration identifies subsurface conditions only at points of sampling. Pinchin reviews field and laboratory data and then applies professional judgment to formulate an opinion of subsurface conditions throughout the Site. Actual subsurface conditions may differ, between sampling locations, from those indicated in this report.

LIMITATIONS OF RECOMMENDATIONS

Subsurface soil conditions should be verified by a qualified geotechnical engineer during construction. Pinchin should be notified if any discrepancies to this report or unusual conditions are found during construction.

Sufficient monitoring, testing and consultation should be provided by Pinchin during construction and/or excavation activities, to confirm that the conditions encountered are consistent with those indicated by the test hole investigation, and to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated. In addition, monitoring, testing and consultation by Pinchin should be completed to evaluate whether or not earthwork activities are completed in

accordance with our recommendations. Retaining Pinchin for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions. However, please be advised that any construction/excavation observations by Pinchin is over and above the mandate of this geotechnical evaluation and therefore, additional fees would apply.

MISINTERPRETATION OF GEOTECHNICAL ENGINEERING REPORT

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having Pinchin confer with appropriate members of the design team after submitting the report. Also retain Pinchin to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having Pinchin participate in pre-bid and preconstruction conferences, and by providing construction observation. Please be advised that retaining Pinchin to participation in any 'other' activities associated with this project is over and above the mandate of this geotechnical investigation and therefore, additional fees would apply.

CONTRACTORS RESPONSIBILITY FOR SITE SAFETY

This geotechnical report is not intended to direct the contractor's procedures, methods, schedule or management of the work Site. The contractor is solely responsible for job Site safety and for managing construction operations to minimize risks to on-Site personnel and to adjacent properties. It is ultimately the contractor's responsibility that the Ontario Occupational Health and Safety Act is adhered to, and Site conditions satisfy all 'other' acts, regulations and/or legislation that may be mandated by federal, provincial and/or municipal authorities.

SUBSURFACE SOIL AND/OR GROUNDWATER CONTAMINATION

This report is geotechnical in nature and was not performed in accordance with any environmental guidelines. As such, any environmental comments are very preliminary in nature and based solely on field observations. Accordingly, the scope of services do not include any interpretations, recommendations, findings, or conclusions regarding the, assessment, prevention or abatement of contaminants, and no conclusions or inferences should be drawn regarding contamination, as they may relate to this project. The term "contamination" includes, but is not limited to, molds, fungi, spores, bacteria, viruses, PCBs, petroleum hydrocarbons, inorganics, pesticides/insecticides, volatile organic compounds, polycyclic aromatic hydrocarbons and/or any of their by-products.

Pinchin will not be responsible for any consequential or indirect damages. Pinchin will only be held liable for damages resulting from the negligence of Pinchin. Pinchin will not be liable for any losses or damage if the Client has failed, within a period of two years following the date upon which the claim is discovered within the meaning of the Limitations Act, 2002 (Ontario), to commence legal proceedings against Pinchin to recover such losses or damage.