Water Taking and Discharge Plans

Heron Gate 5, Ottawa, Ontario

Prepared for:

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1.0 INTRODUCTION

Pinchin Ltd. (Pinchin) was retained by Hazelview Developments Inc. (Client) to complete a Water Taking and Discharge Plan Report for the proposed mixed-use development to be located at Heron Gate 5, Ottawa, Ontario (Site). The Site location is indicated on Figure 1.

The Client provided proposed future development plans for the Site, which consists of three (3), six-storey, residential apartment buildings with a single level underground parking garage (UPG) occupying the majority of the Site footprint. Based on the proposed single level UPG, Pinchin anticipates that excavations will extend approximately 3.0 metres below existing ground surface (mbgs).

In order to facilitate the required subgrade construction activities, the contractor will be required to manage surface water and infiltrated groundwater within the excavation, until the subgrade components of the construction activities are completed.

The purpose of these Water Taking and Discharge Plans are to:

- Support the registration of the water taking activity with the Ministry of the Environment Conservation and Parks (MECP) Environmental Activities & Sectors Registry (EASR);
- Confirm that the takings do not result in unacceptable impacts on the natural environment or on existing water users;
- Confirm water discharge requirements;
- Establish a monitoring program for the volume of water taken daily as required by Ontario Regulation 387/04: Water Taking and Transfer;
- Affirm any significant deviation between actual and predicted impact; and
- Trigger contingency measures, if unacceptable impacts do occur.

To fulfill these objectives, sampling frequency must be adequate, suitable sample locations must be identified, proper parameters must be monitored, and appropriate mitigation measures must be defined.

A contingency plan is required to provide recommended mitigation measures that should be implemented to protect the natural environment and existing water users, if potential impacts and/or interference associated with the permitted water-taking is suspected.

1.1 Guidelines, Standards and Acts

The following guidelines, standards and Acts have been used to prepare these Water Taking and Discharge Plans:

- The Aggregate Resources of Ontario: Provincial Standards, Version 1.0 (Ministry of Natural Resources, 1997);
- Technical Guidance Document for Hydrogeological Studies in Support of Category 3 Applications (Ministry of the Environment and Climate Change, 2016a);
- Water Management: Policies, Guidelines, Provincial Water Quality Objectives (Ministry of Environment and Energy, 1994); and
- Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (Ministry of the Environment, 2011).

1.2 Personnel

A Qualified Person should oversee the proposed water taking program. For the purposes of these plans, a Qualified Person, is a person holding a minimum of a bachelor's degree specializing in hydrogeology, water resource management, or engineering with experience and expertise in groundwater studies (Ministry of the Environment and Climate Change, 2016).

Sample Collection should be completed by a trained environmental technician.

1.3 Description of Water Taking

The Client intends to develop the Site with three (3), 6-storey, residential building complexes complete with a single level UPG extending beneath the property. The combined footprint area that the UPG will occupy is approximately 29,450 m^2. In order to facilitate the required subgrade construction activities, the contractor will be required to manage surface water and infiltrated groundwater within the excavation, until the subgrade components of the construction activities are completed. As a part of this investigation Pinchin conducted a relative elevation survey of the Site and previously installed monitoring wells. The average current local Site elevation is approximately 99.4 metres relative to local elevation (mRLE). Pinchin was not provided with a detailed topographic survey at the time of preparation of this report. The contractor intends to complete a mass excavation to an approximate local elevation of 96.4 mRLE to accommodate the single level UPG.

The UPG excavation is anticipated to be approximately 45 metres (m) long with an average width of 30 m and a depth of up to 3.0 mbgs.

The water taking should involve either the excavation of sumps on an as-needed basis during soil and bedrock excavation to collect the infiltrated water, pumping water from the excavation(s) with trash pumps or the dewatering of the workspace via a perimeter extraction well network. Both options would likely need to be equipped with on-Site treatment (for total suspended solids as a minimum) prior to discharge to the City of Ottawa Sanitary Sewer.

The water taking will be completed in two phases, initial dewatering during the excavation, and maintenance dewatering to keep the excavation dewatered during the construction process.

1.4 Physical Setting

1.4.1 Geology and Hydrogeology

Data obtained from the Ontario Geological Survey Maps, as published by the Ontario Ministry of Natural Resources, indicates that the Site is located on a fine textured glaciomarine deposit consisting of massive to well laminated silt and clay with minor sand and gravel deposits (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 Georgian Bay, Blue Mountain and Billings Formations consisting of shale, limestone, dolostone, and siltstone (Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1).

Bedrock was encountered during borehole drilling at the Site between approximately 5.2 mbgs (BH5) and 7.6 mbgs (BH2), which equates to a bedrock surface at approximately 95.19 mRLE (BH5) to 91.1 mRLE (BH2). As such, bedrock is presumed to be located beyond the proposed excavation depth of 3.0 mbgs (local elevation between 96.0 and 97.0 mRLE). The approximate spatial locations of the boreholes advanced at the Site are presented on Figure 2.

Manual measurements of stabilized groundwater levels in the monitoring wells on Site were collected periodically over the 4-month planning period. Groundwater was encountered at depths ranging from 2.14 to 3.55 mbgs within BH9 to BH1. It should be noted that the measurements taken on November 15, 2021 only include groundwater level readings at BH1, BH2 and BH11 Seasonal variations in the water table should be expected, with higher levels occurring during wet weather conditions in the spring and fall and lower levels occurring during dry weather conditions.

Based on the findings noted above, the only substantial continuous water bearing unit that will require dewatering effort during construction is the groundwater table within the overburden unit. The depth of proposed excavation is anticipated to penetrate the average groundwater table depth range by a depth of approximately 1 m.

No surface water (inflow or outflow drainage) and no groundwater (leaching, springs, seeps, etc.) were identified that would suggest a hydrological or hydrogeological connection to the surrounding area that could be impacted by the dewatering activities.

1.4.2 Surface Water Features

No surface water features were identified on-Site. The closest surface water source is the Rideau River located approximately 2.5 km northwest of the Site.

1.5 Hydrogeological Assessment Program

1.5.1 Borehole Drilling and Monitoring Well Installation

In order to acquire the Site-specific information needed to characterize the hydrogeological setting and assess the potential for environmental impacts, Pinchin relied on two previously completed intrusive drilling and soil sampling programs, including monitoring well installations.

Pinchin retained Strata Drilling Group (Strata) to complete the borehole drilling programs at the Site following the clearance of underground services in the vicinity of the work area by public utility locators, as well as a private utility locator retained by Pinchin. Strata is licensed by the MECP in accordance with Ontario Regulation 903 (as amended) to undertake borehole drilling/well installation activities.

Pinchin completed a field investigation at the Site from June 29 to July 7, 2021 by which included the advancement of a total of thirteen sampled boreholes (Boreholes BH1 to BH13) throughout the Site. The boreholes were advanced to depths ranging from approximately 5.2 to 7.6 mbgs (94.8 mRLE to 92.4 mRLE), where refusal was encountered on probable bedrock or very dense glacial till.

Boreholes BH1, BH2, BH4, BH7, BH9, BH11 and BH12 were instrumented with monitoring wells to allow measurement of groundwater levels.

The approximate spatial locations of the boreholes and monitoring wells advanced at the Site are indicated on Figure 2.

The boreholes were advanced with the use of a track mounted mobile drill rig which was equipped with standard soil sampling equipment. Soil samples were collected at 0.76 m 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.

Shear strengths of the cohesive soil were measured using the field vane shear test, as per ASTM D2573. The shear strengths measured are plotted on the appended borehole logs.

Groundwater observations and measurements were obtained from the open boreholes during and upon completion of drilling. Groundwater levels were measured periodically in the monitoring wells between August 13 and November 15, 2021. The groundwater observations and measurements recorded are included on the appended borehole logs, as well as in the table provided below in this section.

The borehole locations and ground surface elevations were located at the Site by Pinchin personnel. The ground surface elevation at each borehole location was referenced to the following temporary benchmark as shown on Figure 2:

- TBM: Top nut of fire hydrant at the approximate location shown on Figure 2; and
- Elevation: 100.00 metres (local datum).

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 an independent and accredited materials testing laboratory for detailed analysis and testing. All soil samples were classified according to visual and index properties by the project engineer.

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 pre-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. Each well screen was sealed at the bottom using a threaded cap and each riser was sealed at the top with a lockable J-plug cap. Silica sand was placed around and above the screened interval to form a filter pack around the well screen. A layer of bentonite was placed above the silica sand and was extended to just below the ground surface. A protective aboveground monument casing was installed at the ground surface over each riser pipe and outer casing and cemented in place.

A completed well record was submitted to the property owner and 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 well prior to construction according to Regulation 903 of the Ontario Water Resources Act.

The following is a summary of the monitoring well construction details which are also provided on the borehole logs included in Appendix II:

Table 1: Monitoring Well Construction Details:

Monitoring Well Location	Top of Casing (TOC) Local Elevation	Surveyed Local Ground Elevation	Calculated Difference Between Ground and TOC	Length of Screen
BH1	100.00 m	99.22 m	0.78 m	3.05 m
BH2	99.60 m	98.70 m	0.77 m	3.05 m
BH4	100.91 m	99.94 m	0.97 m	3.05 m
BH7	101.13 m	100.03 m	1.10 m	3.05 m
BH9	100.08 m	99.28 m	0.80 m	3.05 m
BH11	99.89 m	99.04 m	0.85 m	3.05 m
BH12	99.61 m	98.71 m	0.90 m	3.05 m

Manual measurements of stabilized groundwater levels in the monitoring wells on Site were collected periodically over the 4-month planning period. Groundwater was encountered at depths ranging from 2.14 mbgs (BH9) to 3.55 mbgs (BH1). Seasonal variations in the water table should be expected, with higher levels occurring during wet weather conditions in the spring and fall and lower levels occurring during dry weather conditions.

The following table summarizes the water level measurements (in mbgs) over the planning period:

Date of Reading	BH1	BH2	BH4	BH7	BH9	BH11	BH12
Aug. 13, 2021	3.55	3.50	3.45	3.00	2.31	3.05	2.85
Oct. 5, 2021	3.33	3.35	3.15	2.83	2.21	2.67	2.35
Nov. 10, 2021	3.28	3.26	3.09	2.75	2.14	2.52	2.18
Nov. 15, 2021	3.18	3.16	-	-	-	2.38	-

The inferred groundwater flow vectors and calculated groundwater elevation contour intervals at the Site, based on the depth to groundwater measurements, recorded on November 10, 2021, are provided on Figure 3. The groundwater elevation contours were created with a review of the water levels and the ground surface contours and are plotted with 0.25 meter contour spacing.

As indicated on Figure 3, shallow, horizontal groundwater flow is directed towards the east-northeast. Based on the measured groundwater levels as summarized in the table presented above, in general the water levels at the Site have varied by a maximum of 0.17 m, at monitoring well BH9, to 0.67 m, at BH11, between August 12 and November 15, 2021.

1.5.2 Groundwater Hydraulic Conductivity

Hydraulic conductivity, which is a measure of water's ability to move through the aquifer medium, is one of the important factors in monitoring the fate and transport of contaminants in the subsurface and yields of the aquifer. This characteristic controls the rate and the distribution of the water within the overburden, as well as the bedrock. Hydraulic conductivity (permeability) of a geological formation is determined by the rate of the recovery of the water level after a known volume of water is added or removed.

Small scale aquifer response testing was completed in 7 on-Site monitoring wells between November 10 and 11, 2021 and involved the evacuation of a minimum of 3 standing well volumes (or to dryness). The depth to groundwater was measured at each of the monitoring wells prior to the completion of the hydraulic conductivity testing activities, in order to determine static water levels. The estimated hydraulic conductivity based on the Hvorslev formulae are provided in Appendix III. The hydraulic conductivities estimated from the small-scale aquifer test are as follows:

Well ID	Well Depth (mbTOC)	Screen Length (m)	Screened Unit	Aquifer Response Test Type (Analysis Method)	Hydraulic Conductivity (K-Value) (m/s)
BH1	6.6	3.05	Glacial Till	Recovery	5.75×10^{-8}
BH2	7.6	3.05	Glacial Till	Recovery	1.15×10^{-7}
BH4	6.4	3.05	Glacial Till	Recovery	1.51×10^{-7}
BH7	6.3	3.05	Glacial Till	Recovery	2.68×10^{-7}

Well ID	Well Depth (mbTOC)	Screen Length (m)	Screened Unit	Aquifer Response Test Type (Analysis Method)	Hydraulic Conductivity (K-Value) (m/s)
BH9	6.7	3.05	Glacial Till	Recovery	4.09×10^{-7}
BH11	6.7	3.05	Glacial Till	Recovery	1.26×10^{-7}
BH12	6.1	3.05	Glacial Till	Recovery	3.19×10^{-6}
Geometric Mean					2.39×10^{-7}

1.5.3 Groundwater Chemistry Testing

Given the setting of the Site and the surrounding environment (i.e., The Site is situated in an area that predominantly consists of residential, institutional, and commercial land uses) there is no opportunity to discharge the water taken as part of the construction dewatering exercise directly to the environment.

In order to assess the dewatering discharge/disposal options available during construction, one water quality sample was collected from BH12 on November 10, 2021, for an enhanced suite of parameters. The groundwater sample was submitted to Bureau Veritas in Ottawa, Ontario for analysis to facilitate comparison of the current groundwater quality with the City of Ottawa Sewer Use By-law Number 2003-514. Bureau Veritas is an independent laboratory accredited by the Standards Council of Canada. Formal chain of custody records of the sample submission was maintained between Pinchin and the staff at Bureau Veritas. The Laboratory Certificate of Analysis is included as Appendix IV.

The results of the laboratory analysis were evaluated by comparison with the sanitary and combined sewer discharge limits, as well as the storm sewer discharge limits presented in the City of Ottawa Sewer Use By-law Number 2003-514, Schedule A, Tables 1 & 2, respectively (Sewer Use By-law). A summary of the laboratory analyses along with the Sewer Use By-laws (Sanitary and Combined and Storm Sewer) are presented in on the Laboratory Certificates of Analysis (CofA) within Appendix IV of this report. As indicated within lab CofA, the water quality sampling results indicated all analyzed parameter concentrations satisfied the sanitary and combined discharge limits for the Sewer Use By-law. The levels

of aluminum, antimony, bismuth, boron, cobalt, molybdenum, tin, titanium and vanadium detected in the water sample taken from BH12 were less than the allowable amount outlined in the Ottawa Sanitary and Combined Sewers Discharge Limits Regulation. These metals are not considered for the Ottawa Storm Sewer Discharge Limits. The results of arsenic, cadmium, chromium, lead, nickel, selenium and silver, these metals meet the criteria for both the Ottawa Sanitary and Combined Sewers Discharge Limits and the Ottawa Storm Sewer Discharge Limits.

The quantified concentrations of manganese and zinc were detected in the water sample from BH12 and will require the water to be treated before it can be discharged. The amounts of manganese and zinc detected were 2,300 ug/L and 83 ug/L respectively. The water sample meets the discharge limit criteria for the Ottawa Sanitary and Combined Sewers as the limits for discharge are 5000 ug/L and 3,000 ug/L, respectively. However, the water sample taken from BH12 does not meet the Ottawa Storm Sewer Discharge Limits of 50 ug/L and 40 ug/L for manganese and zinc respectively. In addition, the amount of copper detected in the water sample is 40 ug/L. The discharge limit for the Ottawa Sanitary and Combined Sewers Criteria is 3,000 ug/L and the discharge limit for the Ottawa Storm Sewer By-Law is 40 ug/L. Therefore, it should be noted that the copper concentrations within the groundwater may exceed during the construction dewatering efforts.

With respect to the Sewer Use By-law discharge parameters, as noted above the current groundwater conditions confirm that pumped groundwater should not be expected to require pre-treatment prior to discharge to the City of Ottawa sanitary sewer system. However, it should be noted that the quantified manganese, zinc and possible copper concentrations exceed the acceptable storm sewer discharge limits. Given the nature of the contaminants detected within the groundwater an appropriate means of sediment removal and treatment may be required prior to discharge if the approved discharge location is to the storm sewer.

2.0 WATER TAKING PLAN

2.1 Expected Area of Influence

The proposed dewatering is not anticipated to have any impacts on existing groundwater users as there are no drinking water wells identified within 500 m of the Site, as the Site and surrounding properties are serviced via a municipal water supply. In addition, based on the information and data collected to date, the primary zone to be dewatered consists of an unconfined, overburden groundwater table.

The anticipated radius of influence from continuous dewatering of an excavation within an aquifer system (or equivalent porous medium) can be categorized by the equation:

$$R = b \times (\text{sqrt}\ (k/(2*N)))$$

Where R= Radius of influence (m)

b = depth of the excavation (m)

k = hydraulic conductivity of the formation (m/s)

N= recharge rate of the formation (m/s)

Assuming the depth of the excavation will be upwards of 6 m below the normal groundwater levels, and applying a conservative rate of recharge of approximately 2.0 m/year (6 x 10^{-8} m/s) and K-value (2.39 x 10^{-7} m/s), the anticipated theoretical radius of influence beyond the face of the excavation can be expected to extend to the order of 4.25 m.

2.2 Soil Settlement

On-Site soils consist of unsaturated thicknesses of sand and gravel fill deposits underlain by silty clay and glacial till deposits atop shale bedrock. Given the anticipated radius of influence and the assumption that the surrounding developments and infrastructure are founded on or in bedrock in is unlikely that the proposed dewatering would result in the depressurization of surrounding aquifers that would result in the consolidation of clays or other materials which could lead to soil settlement.

Care should be exercised during dewatering to ensure that areas beyond the excavation are not being significantly dewatered.

2.3 Anticipated Seepage Rates

Based on the results of the aquifer testing program, the arithmetic average hydraulic conductivity of the instrumented bedrock aquifer material is on the order of 6.17 x 10^{-7} m/s. To assist in the quantification of seepage water to be anticipated, using Darcy's Law, and applying it to a vertical excavation (i.e. slope is 1.0), the anticipated seepage during initial excavation will be approximately 27,100 l/day. During extended pumping, as the radius of influence is extended outward, the seepage rate will decline as the slope increases as it approaches its limits. During prolonged pumping, it should be anticipated that the seepage rates will drop to the order of approximately 22,000 l/day. It is proposed that the appropriate permitting process be adhered to, in order to accommodate the initial excavation seepage rate, plus 25% (33,900 l/day), to account for the effects of direct precipitation on the open excavation.

It should be noted that this dewatering estimation has been prepared for discussion purposes only. It is the responsibility of the contractor to propose a suitable dewatering system based on the groundwater elevation at the time of construction. The method used should not adversely impact any nearby structures. It is the responsibility of the contractor to make this application if required. Depending on the groundwater at the time of the excavation works, a more involved dewatering system may be required.

2.4 Potential Contaminant Migration

Pinchin previously completed a Phase I Site Assessment entitled "*Phase One Environmental Site Assessment, Heron Gate 5, Ottawa, Ontario*" for the client, dated September 15, 2021 (2021 Pinchin Phase I Report), the results of which indicated that no areas of potential environmental concern are present within the surrounding area of the Site. As described above in Section 2.1 the expected zone of influence associated with the Site dewatering is limited to approximately 4.25 m. Based on the results of the 2021 Pinchin Phase I Report, as well as the expected zone of influence associated with the Site dewatering mobilization of contaminants in the area is not anticipated.

2.5 Water Quantity Monitoring

Ontario Regulation (O. Reg.) 63/16: Registrations Under Part II.2 of the Act - Dewatering requires all registrants to measure and record the volume of water taken daily using a flow meter or another calculation method acceptable to MECP. This data must be reported to MECP annually by March 31st.

3.0 DISCHARGE PLAN

3.1 Discharge Location and Methods

The water will be pumped from the excavation using submersible pumps (during normal operation and in the event of a 100 year storm event), and will be conveyed to an on-Site storage vessel to facilitate precipitation of suspended solids prior to discharge to the City of Ottawa Sanitary Sewer in accordance with the limits dictated in the Sewer Use By-law. Alternatively, the contractor may wish to dewater the area in advance of excavation activities via a perimeter dewatering system compromised of extractions wells.

The final discharge location will be established through consultation with City of Ottawa.

3.2 Water Quality Monitoring

In order to ensure compliance with the standards applicable to the receiver, water quality monitoring will be required prior to discharge. As a result, water quality will need to follow the requirements of the City of Ottawa Sewer Use By-law.

Water samples will need to be collected and sent to a CALA accredited laboratory for analysis to ensure that the water discharge does not result in unacceptable impacts on the ultimate receiver. The City of Ottawa Sewer Use By-law indicates that sampling and analysis required by the by-law shall be carried out in accordance with the procedures, modified or unmodified, as described in Standard Methods, the Ministry of Energy and the Environment and Energy publication entitled "*Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater*" dated August, 1994, the United States Environmental

Protection Agency methods or analytical methods adopted by the City. The following sections outline the recommended sampling protocols and the parameters that samples should be analysed for.

3.2.1 Parameters for Laboratory Analysis

Samples need to be collected in the field, as outlined in the aforementioned publication, using appropriate equipment and sampling bottles. The appropriate sample bottles for the parameters for analysis will be provided by the analytical laboratory. In general, samples need to be accurately, clearly and concisely labelled, then packed into a cooler with ice with a chain of custody form in a waterproof bag and shipped to the laboratory as soon as possible.

It is recommended that the analytical results are compared to the Sewer Use By-law to determine if the water generated from the construction dewatering remains of acceptable quality prior to discharge.

Water quality analyses generally involve laboratory analysis of the following parameters:

3.2.1.1 Metals

Aluminum-dissolved	Chromium	Dissolved Mercury	Titanium
Antimony	Chromium (VI)	Molybdenum	Vanadium
Arsenic	Cobalt	Nickel	Zinc
Bismuth	Copper	Selenium	
Boron	Lead	Silver	
Cadmium	Manganese	Tin	

3.2.1.2 Other Parameters

Chemical Biological Oxygen Demand	Total Kjeldahl Nitrogen	Oil & Grease (Animal/Vegetable, Mineral/Synthetic, Total)
Cyanide (Total)	Total Phosphorus	Semi Volatiles
pH	Sulphide	Pesticides (Hexachlorobenzene)
Phenolics	Fluoride	Polychlorinated Biphenyls (PCB)
Total Suspended Solids	Sulphate	Volatiles

3.2.2 Field Sampling

The recommended field parameters to be measured during each sampling event are:

Dissolved oxygen (DO)	Dissolved oxygen percent	pH
Temperature	Turbidity	Electrical conductivity

It is recommended that field parameters are collected using a handheld multi-meter and turbidity is measured using a turbidity meter. Prior to using this equipment, it will need to be calibrated as outlined in the information supplied with the equipment. Calibration and usage guidelines need to be reviewed with a Qualified Person to ensure proper usage.

It is recommended that all equipment be handled with care to prevent damage to sensors, probes, housing and storage cases. It should be stored in a secure, dry, temperature controlled (i.e. above 5^{o}C) that is inaccessible to anyone other than the Qualified Person and their designate(s).

3.2.3 Sampling Locations and Frequency

The recommended sampling location is the discharge of the construction dewatering system. Sampling must be conducted in accordance with the frequency specified in the City of Ottawa Sewer Use By-law (as dictated by the Compliance Officer).

3.2.3.1 Quality Assurance and Quality Control

It is important to ensure quality of field sampling and laboratory analysis (QA/QC), as such it is recommended that field duplicate samples be collected. Field duplicate samples are two samples collected at the same time and in the same place. The frequency of field duplicate groundwater sample analysis typically includes the collection of one field duplicate sample for every ten samples submitted for analysis.

3.3 Monitoring for Impacts to the Environment

Dependant on the configuration of the discharge to the City of Ottawa Sewer, this dewatering program has the potential to cause erosion and sedimentation at the discharge point. To prevent these problems, a visual inspection along the path of the dewatering and treatment equipment and at the discharge location should be conducted at least daily during the initial dewatering. During maintenance dewatering, visual inspections should be conducted on a minimum of a weekly basis, while also following the requirements of the Sewer Use By-law (as dictated by the Compliance Officer).

The following mitigation measures should be implemented to avoid erosion (Sustainable Resource Development, 2010):

- Maintain the existing vegetation at the discharge point to prevent exposing soil;
- Avoid concentrating the flow of water to prevent the creation of rills and gullies;
- Install a flow/energy dissipation measure at the discharge point; and
- Develop and maintain a sediment and erosion control program for the duration of the construction period, including the dewatering phase.

4.0 CONTINGENCY PLAN

A contingency plan recommends mitigation measures that should be implemented to protect the natural environment and existing water users from impacts and interference associated with the permitted water-taking.

4.1 Triggers

This contingency plan should be implemented if:

- A complaint is received;
- The proponent or MECP determines interference is occurring;
- The water quality of the effluent is outside of specifications; or
- The natural environment is being degraded (e.g. erosion and sedimentation are occurring; flooding associated with water discharge is occurring, etc.).

4.2 Mitigation Measures

4.2.1 Interference with Water Users and Impacts to the Natural Environment

The following steps will be followed to prevent interference and impacts:

1. Conduct monitoring as outlined in the Plan;
2. If this contingency plan is triggered, dewatering shall cease immediately;
3. The complaint, or problem will be investigated and rectified. Rectifying the issue may involve changes to the methods or equipment, the timing of the dewatering, increased monitoring, groundwater monitoring, etc.;
4. Dewatering will recommence; and
5. The revised monitoring program will be implemented.

5.0 TERMS AND LIMITATIONS

This Plan was performed for the exclusive use of Hazelview Developments Inc. (Client) in order to evaluate the subsurface conditions at Heron Gate 5, Ottawa, 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.

Development of this Plan to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the hydrogeological conditions at the Site, and recognizes reasonable limits on time and cost.

Regardless how exhaustive an intrusive investigation is performed, the investigation cannot identify all the subsurface conditions. 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.

This report is based on the best information available to Consultant at the time of preparing this report after Consultant has used best industry practices, in the circumstances, to obtain information. To the extent that Consultant was required to rely on information from other persons, Consultant has verified such information to the extent reasonably possible in the circumstances. The material provided in this report reflects best industry judgment in light of the information available at the time of preparation of this report.

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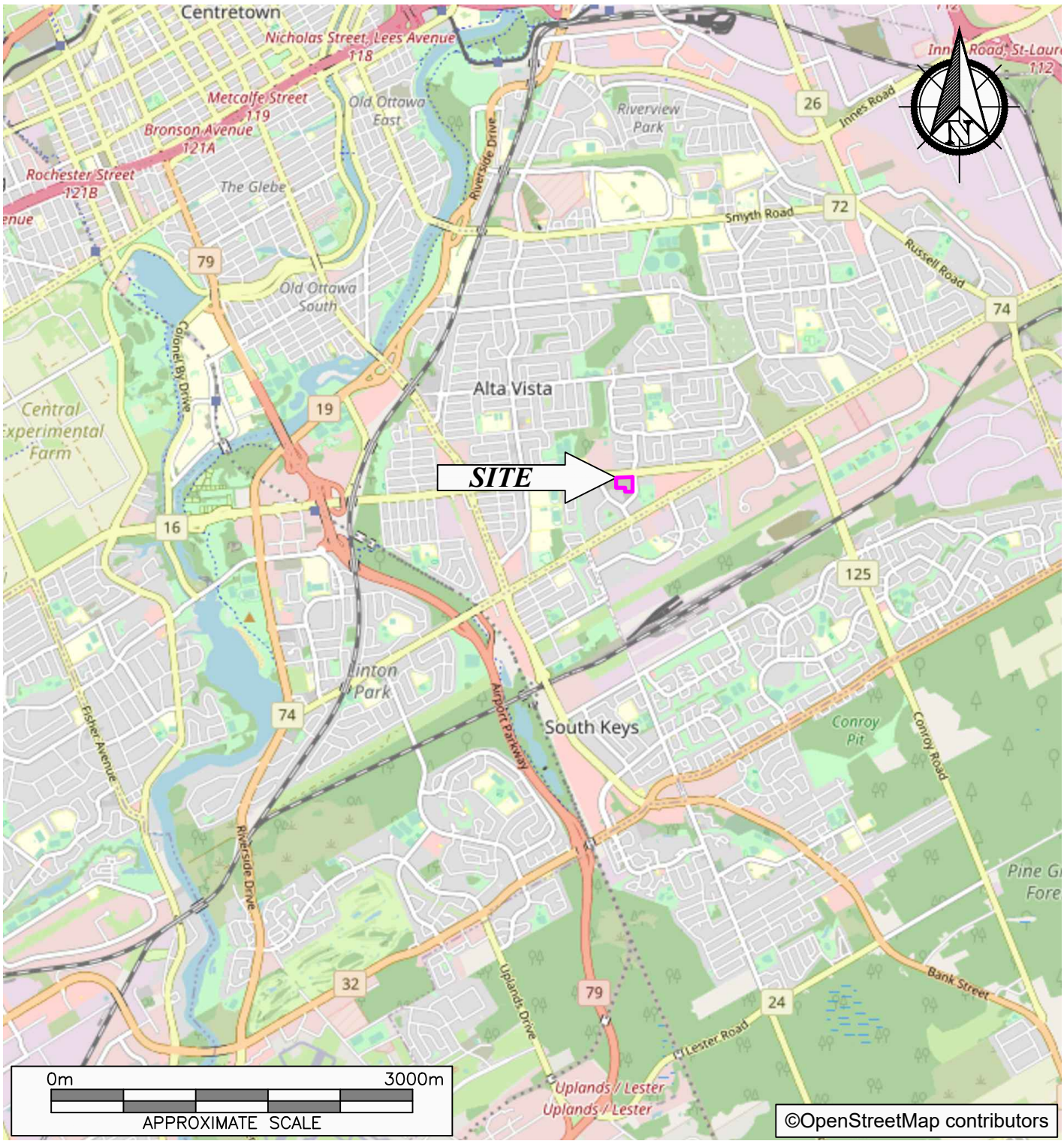
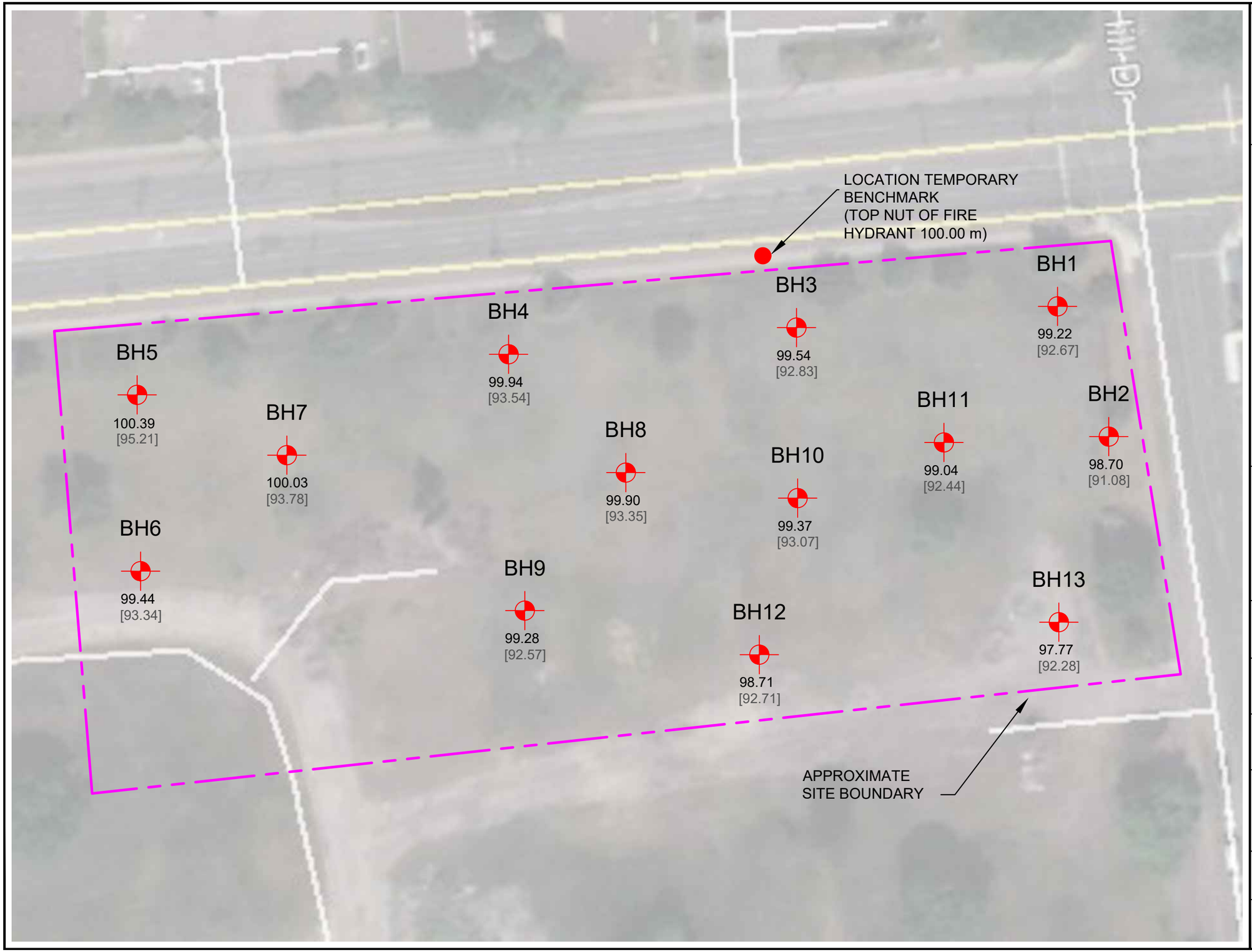
APPENDIX I
Figures



PINCHIN

PROJECT NAME: HYDROGEOTECHNICAL INVESTIGATION		
CLIENT NAME: HAZELVIEW DEVELOPMENTS INC.		
PROJECT LOCATION: HERON GATE 5, OTTAWA, ONTARIO		
FIGURE NAME: KEY MAP		FIGURE NO.: 1
APPROXIMATE SCALE: AS SHOWN	PROJECT NO.: 288344.002	DATE: DECEMBER 2021

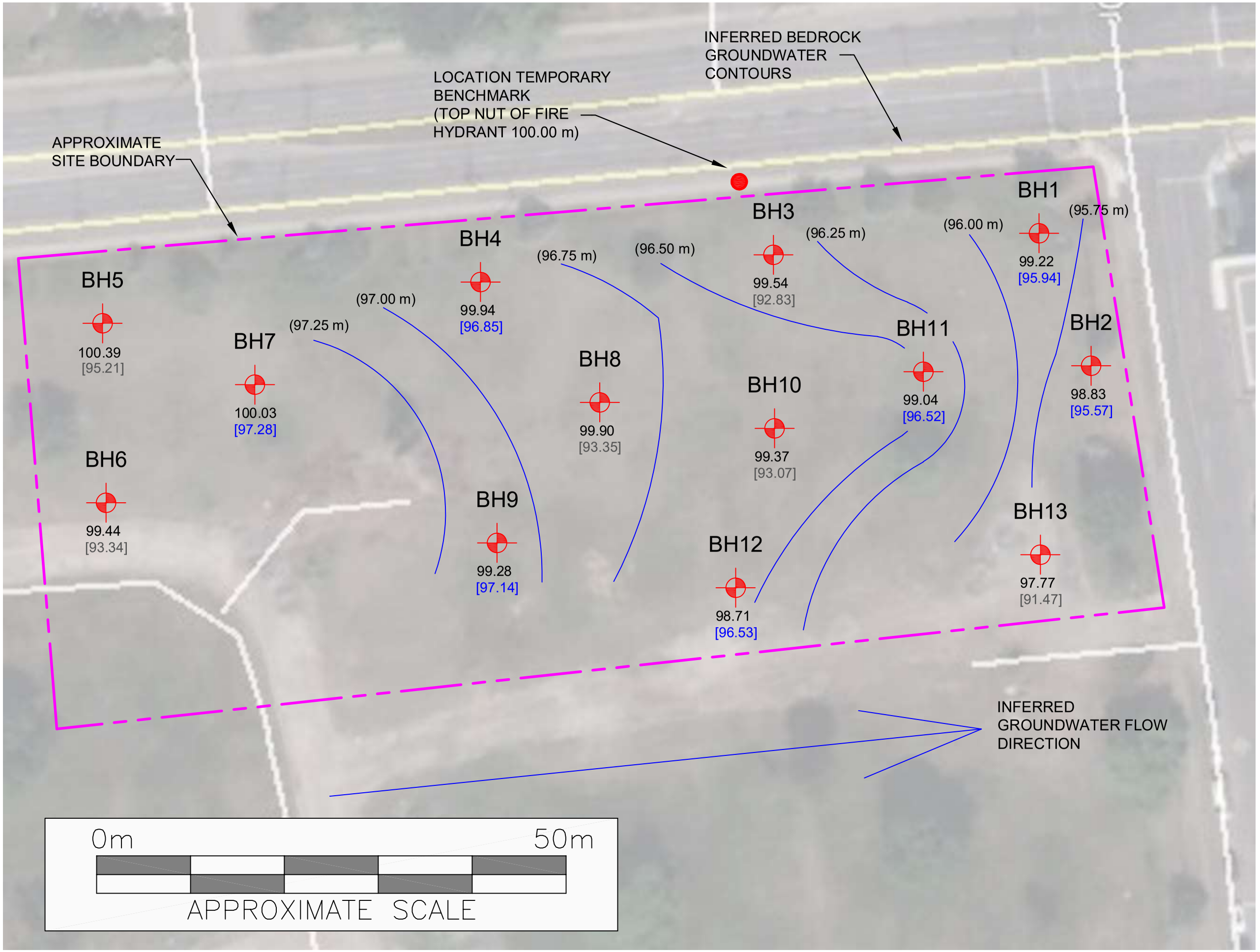


LEGEND

- BOREHOLE / MONITORING WELL LOCATION
- XX.XX APPROXIMATE LOCAL GROUND ELEVATION (m)
- [XX.XX] APPROXIMATE LOCAL REFUSAL ELEVATION (m)

PINCHIN

PROJECT NAME	HYDROGEOTECHNICAL INVESTIGATION
CLIENT NAME	HAZELVIEW DEVELOPMENTS INC.
PROJECT LOCATION	HERON GATE 5, OTTAWA, ONTARIO
FIGURE NAME	BOREHOLE/MONITORING WELL LOCATION PLAN
APPROXIMATE SCALE	AS SHOWN
PROJECT NO.	288344.002
DATE	DECEMBER 2021
FIGURE NO.	2



LEGEND

- BOREHOLE / MONITORING WELL LOCATION
- XX.XX APPROXIMATE LOCAL GROUND ELEVATION (m)
- [XX.XX] APPROXIMATE LOCAL REFUSAL ELEVATION (m)
- [XX.XX] APPROXIMATE LOCAL GROUNDWATER ELEVATION (m)

PINCHIN

PROJECT NAME
HYDROGEOTECHNICAL INVESTIGATION

CLIENT NAME
HAZELVIEW DEVELOPMENTS INC.

PROJECT LOCATION
HERON GATE 5, OTTAWA, ONTARIO

FIGURE NAME
INFERRED BEDROCK GROUNDWATER CONTOURS (NOVEMBER 10, 2021)

APPROXIMATE SCALE	PROJECT NO.
AS SHOWN	288344.002
DATE	FIGURE NO.
DECEMBER 2021	3

APPENDIX II
Borehole Logs

Log of Borehole: BH1

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Description	Elevation (m)
	Ground Surface	99.22
0	**Organics** ~ 200 mm	
	Fill Brown sand and gravel, trace to some silt, loose, damp	98.46
1	Very loose	
	Trace rootlets, loose	97.70
2		96.93
	Glacial Till Grey silty sand, some gravel, trace to some clay, dense, damp	96.17
3	Compact	
4		94.65
	Moist	
5		
6		93.12
	Dense	92.67
7	End of Borehole Borehole terminated at 6.6 mbgs due to auger refusal on probable bedrock or very dense glacial till.	
8		

Monitoring Well Details: Riser; Bentonite; Silica Sand; Screen

Groundwater level = 3.55 mbgs, as measured on August 13, 2021.

Sample Type	Sampler #	Recovery (%)	SPT N-values	Lab Analysis	Moisture (%)	Plasticity Index
AS	1	100	N/A			
SS	2	10	4			
SS	3	10	6			
SS	4	80	35			
SS	5	100	16	Hyd.	7.8	
SS	6	100	21			
SS	7	100	46			

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Contractor: Strata Drilling Group **Grade Elevation:** 99.22 m

Drilling Method: Hollow Stem / Split Spoon **Top of Casing Elevation:** 100.00 m

Well Casing Size: 5.08 cm **Sheet:** 1 of 1

Log of Borehole: BH2

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-values
0	Ground Surface	98.70				
0	**Organics** ~ 150 mm	97.94	AS	1	100	N/A
1	**Fill** Brown sand and gravel, trace to some silt, loose, damp	97.18	SS	2	80	11
1	Brown silty sand, some gravel, compact, damp		SS	3	60	12
2	**Glacial Till** Brown silty sand, some gravel, trace clay, compact, damp	96.41	SS	4	10	54
3	Very dense, moist		SS	5	5	61
4		94.13				
5	Grey, loose, wet		SS	6	30	7
6		92.60				
6	Grey, very dense, wet		SS	7	80	>50
7		91.08				
8	End of Borehole		SS	8	N/A	>50
8	Borehole terminated at 7.6 mbgs due to auger refusal on probable bedrock or very dense glacial till.					

Monitoring Well Details: Riser, Bentonite, Screen, Silica Sand

Groundwater level = 3.50 mbgs, as measured on August 13, 2021.

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Lab Analysis | Moisture (%) | Plasticity Index

Contractor: Strata Drilling Group

Drilling Method: Hollow Stem / Split Spoon

Well Casing Size: 5.08 cm

Grade Elevation: 98.70 m

Top of Casing Elevation: 99.60 m

Sheet: 1 of 1

Log of Borehole: BH3

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-values
0	Ground Surface	99.54				
	Organics ~ 150 mm.		AS	1	100	N/A
	Fill Brown sand and gravel, trace to some silt, loose, damp	98.78	SS	2	30	6
1	**Glacial Till** Brown, silty sand, some gravel, trace to some clay, loose, damp	98.02	SS	3	40	13
2	Compact	97.25				
	Dense		SS	4	100	34
3			SS	5	100	45
4		94.97				
	Grey, compact, wet		SS	6	50	12
5						
6		93.44				
	Grey, very dense, wet		SS	7	100	>50
		92.83				
7	End of Borehole Borehole terminated at 6.7 mbgs due to auger refusal on probable bedrock or very dense glacial till.					
8						
9						

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Lab Analysis | Moisture (%) | Plasticity Index

Contractor: Strata Drilling Group

Drilling Method: Hollow Stem Auger / Split Spoon

Well Casing Size: N/A

Grade Elevation: N/A

Top of Casing Elevation: N/A

Sheet: 1 of 1

Log of Borehole: BH4

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

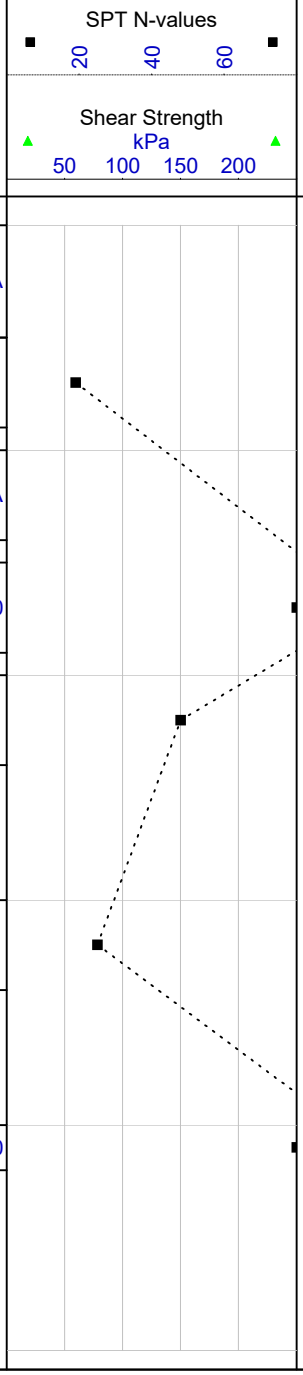
Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Description	Elevation (m)
0	Ground Surface	99.94
	Organics ~ 150 mm.	99.79
	Fill Brown sand and gravel, trace silt, trace brick pieces, loose, damp	99.18
1	**Glacial Till** Grey silty sand, some gravel, trace clay, compact, damp	98.42
	Some clay, very loose	
2		97.65
	Grey silty sand and gravel, trace clay, very dense, damp	
3		96.89
	Dense	
4		95.37
	Compact, wet	
5		
6		93.84
	Very dense, wet.	93.54
	End of Borehole	
7	Borehole terminated at 6.4 mbgs due to auger refusal on probable bedrock or very dense glacial till.	

Monitoring Well Details: Riser, Bentonite, Silica Sand, Screen

Groundwater level = 3.45 mbgs, as measured on August 13, 2021.

Sample Type	Sampler #	Recovery (%)	SPT N-values
AS	1	100	N/A
SS	2	25	19
SS	3	100	N/A
SS	4	100	>50
SS	5	50	48
SS	6	65	25
SS	7	-	>50



Lab Analysis | Moisture (%) | Plasticity Index

Contractor: Strata Drilling Group

Grade Elevation: 99.94 m

Drilling Method: Hollow Stem Auger / Split Spoon

Top of Casing Elevation: 100.91 m

Well Casing Size: 5.08 cm

Sheet: 1 of 1

Log of Borehole: BH5

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-values
0	Ground Surface	100.39				
	Organics ~ 200 mm	100.19	AS	1	100	15
	Glacial Till Brown silty sand and gravel, trace clay, compact, damp	99.63				
1	Loose, moist		SS	2	75	6
			SS	3	30	9
2	Dense	98.10				
			SS	4	100	36
3						
			SS	5	30	47
4						
			SS	6	45	43
5		95.21				
	End of Borehole Borehole terminated at 5.2 mbgs due to auger refusal on probable bedrock or very dense glacial till.					
6						

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Lab Analysis | Moisture (%) | Plasticity Index

Contractor: Strata Drilling Group **Grade Elevation:** 100.39 m

Drilling Method: Hollow Stem / Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH6

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-values	Lab Analysis	Moisture (%)	Plasticity Index
0	Ground Surface	99.44							
	Organics ~ 200 mm.	99.24	AS	1	100	N/A			
	Fill Brown sand and gravel, trace silt, dense, damp	98.68	SS	2	70	30			
1	**Glacial Till** Brown sand, some gravel, some silt, trace to some clay, dense, damp	97.92							
	Very dense		SS	3	30	>50			
2		97.15							
	Grey, dense, moist		SS	4	100	31			
3			SS	5	80	32			
4		94.87							
	Very dense		SS	6	100	>50	Hyd.	7.3	
5									
6		93.34							
	End of Borehole								
	Borehole terminated at 6.1 mbgs due to auger refusal on probable bedrock or very dense glacial till.								
7									
8									

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Contractor: Strata Drilling Group **Grade Elevation:** 99.44 m

Drilling Method: Hollow Stem / Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH7

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

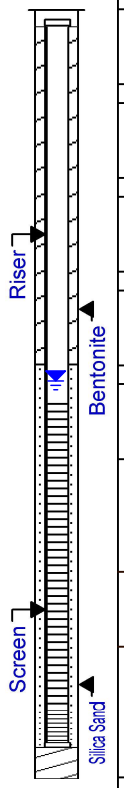
Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

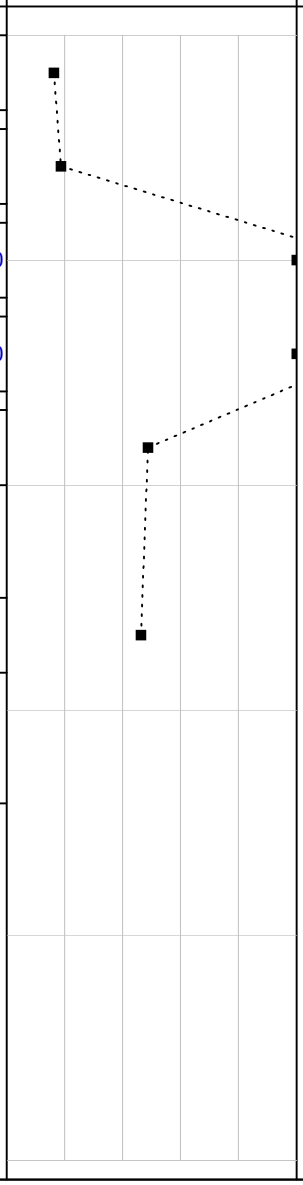
Drill Date: June 30, 2021 **Project Manager:** WT

SUBSURFACE PROFILE | **SAMPLE**

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-values
0	Ground Surface	100.03				
	Organics ~ 200 mm	99.83				
1	**Glacial Till** Brown silty sand and gravel, trace clay, compact, damp		SS	1	50	13
			SS	2	80	15
		98.51				
2	Very dense, moist		SS	3	100	>50
			SS	4	100	>50
3		96.98				
	Dense, wet		SS	5	80	39
4						
5			SS	6	100	37
6		93.78				
	End of Borehole					
7	Borehole terminated at 6.3 mbgs due to auger refusal on probable bedrock or very dense glacial till.					
8						
9						



Groundwater level = 3.0 mbgs, as measured on August 13, 2021.



Lab Analysis | Moisture (%) | Plasticity Index

Contractor: Strata Drilling Group

Grade Elevation: 100.03 m

Drilling Method: Hollow Stem / Split Spoon

Top of Casing Elevation: 101.13 m

Well Casing Size: 5.08 cm

Sheet: 1 of 1

Log of Borehole: BH8

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-values
0	Ground Surface	99.90				
	Organics ~ 200 mm	99.70				
	Glacial Till Brown silty sand and gravel, trace clay, loose, damp		AS	1	100	N/A
1			SS	2	40	6
		98.38				
	Compact, moist		SS	3	60	14
2		97.61				
	Very dense		SS	4	100	>50
3		96.85				
	Grey, compact, moist		SS	5	90	28
4						
			SS	6	80	17
5						
6		93.80				
	Grey, very dense, wet		SS	7	100	>50
		93.35				
7	End of Borehole Borehole terminated at 6.6 mbgs due to auger refusal on probable bedrock or very dense glacial till.					
8						
9						

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Lab Analysis | Moisture (%) | Plasticity Index

Contractor: Strata Drilling Group **Grade Elevation:** 99.90 m

Drilling Method: Hollow Stem / Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH9

Project #: 288344.001 **Logged By:** WT

Project: Geotecchnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Description	Elevation (m)
0	Ground Surface	99.28
	Organics ~ 100 mm	
1	**Fill** Brown sand and gravel, trace silt, dense, damp	98.21
	Glacial Till Brown silty sand, some gravel, trace clay, compact, damp	97.76
2	Very dense	96.99
	Grey, dense	
3		96.23
	Grey, compact	
4		94.71
	Grey, compact, wet	
5		
6		93.18
	Gravelly sand, some silt, trace clay, very dense, wet	92.57
7	End of Borehole	
	Borehole terminated at 6.7 mbgs due to auger refusal on probable bedrock or very dense glacial till.	
8		
9		

Monitoring Well Details: Riser; Bentonite; Silica Sand; Screen

Groundwater level = 2.31 mbgs, as measured on August 13, 2021.

Sample Type	Sampler #	Recovery (%)	SPT N-values	Lab Analysis	Moisture (%)	Plasticity Index
SS	1	40	33			
SS	2	80	15			
SS	3	70	53			
SS	4	80	36			
SS	5	60	19			
SS	6	30	20			
SS	7	30	>50	Hyd.	9.3	

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Contractor: Strata Drilling Group **Grade Elevation:** 99.28 m

Drilling Method: Hollow Stem / Split Spoon **Top of Casing Elevation:** 100.08 m

Well Casing Size: 5.08 cm **Sheet:** 1 of 1

Log of Borehole: BH10

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE							
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-values	SPT N-values / Shear Strength kPa	Lab Analysis	Moisture (%)	Plasticity Index
0		Ground Surface	99.37									
		Organics ~ 150 mm			SS	1	60	29				
		Fill Brown sand and gravel, trace silt, compact, damp.	98.61		SS	2	50	12				
1		**Glacial Till** Brown silty sand, some gravel, trace clay, compact, damp			SS	3	80	23				
			97.08									
2		Dense			SS	4	80	49				
			96.32									
3		Grey, dense			SS	5	30	34				
			94.80									
4		Grey, compact, wet			SS	6	40	18				
			93.07									
5		End of Borehole										
		Borehole terminated at 6.3 mbgs due to auger refusal on probable bedrock or very dense glacial till.										
6												
7												
8												
9												

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Contractor: Strata Drilling Group

Drilling Method: Hollow Stem Auger / Split Spoon

Well Casing Size: N/A

Grade Elevation: 99.37 m

Top of Casing Elevation: N/A

Sheet: 1 of 1

Log of Borehole: BH11

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

SUBSURFACE PROFILE

Depth (m)	Description	Elevation (m)
0	Ground Surface	99.04
	Organics ~ 200 mm	98.84
	Fill Brown sand and gravel, trace silt, dense, damp	98.28
1	**Glacial Till** Brown gravelly silty sand, trace to some clay, compact, damp	97.52
	Dense	
2	Compact	96.75
	Grey, compact	95.99
3		
4		94.47
	Grey, compact, moist	
5		
6		92.94
	Grey, very dense	
		92.44
7	End of Borehole Borehole terminated at 6.7 mbgs due to auger refusal on probable bedrock or very dense glacial till.	
8		
9		

Monitoring Well Details: Riser, Bentonite, Silica Sand, Screen

Groundwater level = 3.05 mbgs, as measured on August 13, 2021.

SAMPLE

Sample Type	Sampler #	Recovery (%)	SPT N-values
SS	1	40	32
SS	2	70	14
SS	3	70	31
SS	4	60	27
SS	5	80	21
SS	6	60	39
SS	7	60	70

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Lab Analysis | Moisture (%) | Plasticity Index

Contractor: Strata Drilling Group

Drilling Method: Hollow Stem / Split Spoon

Well Casing Size: N/A

Grade Elevation: 99.04 m

Top of Casing Elevation: 99.89 m

Sheet: 1 of 1

Log of Borehole: BH12

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

SUBSURFACE PROFILE | **SAMPLE**

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-values
0	Ground Surface	98.71				
	Organics ~ 150 mm		SS	1	30	19
1	**Glacial Till** Brown gravelly silty sand, trace to some clay, compact, damp	97.19	SS	2	50	16
	Very dense		SS	3	100	50
2	Compact	96.42	SS	4	80	24
3	Grey, dense	95.66	SS	5	60	32
4		94.14				
	Grey, compact, wet		SS	6	45	35
5						
6		92.71				
	End of Borehole					
	Borehole terminated at 6.1 mbgs due to auger refusal on probable bedrock or very dense glacial till.					

Monitoring Well Details: Riser, Bentonite, Screen, Silica Sand

Groundwater level = 2.85 mbgs, as measured on August 13, 2021.

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Lab Analysis | Moisture (%) | Plasticity Index

Contractor: Strata Drilling Group **Grade Elevation:** 98.71 m

Drilling Method: Hollow Stem / Split Spoon **Top of Casing Elevation:** 99.61 m

Well Casing Size: 5.08 cm **Sheet:** 1 of 1

Log of Borehole: BH13

Project #: 288344.001 **Logged By:** WT

Project: Geotechnical Investigation

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario

Drill Date: June 30, 2021 **Project Manager:** WT

Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-values	Lab Analysis	Moisture (%)	Plasticity Index
		Ground Surface	97.77								
0		**Fill** Brown sand and gravel, trace silt, loose, damp.	97.01		AS	1	100	N/A			
1		**Glacial Till** Grey gravelly sitly sand, trace to some clay, compact, damp			SS	2	40	26			
2					SS	3	80	27			
		Moist	95.48		SS	4	70	15	Hyd.	8.3	
3					SS	5	60	10			
4											
5					SS	6	60	27			
			92.28								
		End of Borehole Borehole terminated at 5.5 mbgs due to auger refusal on probable bedrock or very dense glacial till.									
6											
7											

SPT N-values: 20, 40, 60

Shear Strength kPa: 50, 100, 150, 200

Contractor: Strata Drilling Group **Grade Elevation:** 97.77 m

Drilling Method: Hollow Stem Auger / Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

APPENDIX III
Hydraulic Conductivity Data

Slug Test - Water Level Data

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH1 Recovery Test	Test Well: BH1
Test Conducted by: Megan Keon	Test Date: 11/10/2021	
Water level at t=0 [m]: 6.38	Static Water Level [m]: 4.11	Water level change at t=0 [m]: 2.27

	Time [s]	Water Level [m]	WL Change [m]
1	60	6.30	2.19
2	120	6.25	2.14
3	240	6.09	1.98
4	480	5.94	1.83
5	960	5.48	1.37
6	1920	5.46	1.35
7	3840	4.97	0.86
8	7620	4.76	0.65
9	14416	4.54	0.43

Slug Test - Analyses Report

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH1 Recovery Test	Test Well: BH1
Test Conducted by: Megan Keon		Test Date: 11/10/2021
Aquifer Thickness: 3.32 m		

	Analysis Name	Analysis Performed b	Analysis Date	Method name	Well	T [m²/s]	K [m/s]	S
1	BH1 Recovery Test	Evan Westad	11/29/2021	Hvorslev	BH1		5.75×10^{-8}	

Slug Test - Water Level Data

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH2 Recovery Test	Test Well: BH2
Test Conducted by: Megan Keon	Test Date: 11/10/2021	
Water level at t=0 [m]: 7.11	Static Water Level [m]: 4.12	Water level change at t=0 [m]: 2.99

	Time [s]	Water Level [m]	WL Change [m]
1	60	6.72	2.60
2	120	6.52	2.40
3	240	6.20	2.08
4	480	5.73	1.61
5	960	5.29	1.17
6	1920	4.97	0.85
7	3840	4.73	0.61
8	7620	4.57	0.45

Slug Test - Analyses Report

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH2 Recovery Test	Test Well: BH2
Test Conducted by: Megan Keon		Test Date: 11/10/2021
Aquifer Thickness: 3.14 m		

	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [m²/s]	K [m/s]	S
1	BH2 Recovery Test	Evan Westad	11/29/2021	Hvorslev	BH2		1.15×10^{-7}	

Slug Test - Water Level Data

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH4 Recovery Test	Test Well: BH4
Test Conducted by: Megan Keon	Test Date: 11/11/2021	
Water level at t=0 [m]: 6.85	Static Water Level [m]: 4.15	Water level change at t=0 [m]: 2.70

	Time [s]	Water Level [m]	WL Change [m]
1	60	6.64	2.49
2	120	6.50	2.35
3	240	6.29	2.14
4	480	5.93	1.78
5	960	5.52	1.37
6	1920	5.07	0.92
7	5580	4.62	0.47

Slug Test - Analyses Report

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH4 Recovery Test	Test Well: BH4
Test Conducted by: Megan Keon		Test Date: 11/11/2021
Aquifer Thickness: 4.51 m		

	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [m²/s]	K [m/s]	S
1	BH4 Recovery Test	Evan Westad	11/29/2021	Hvorslev	BH4		1.51×10^{-7}	

Slug Test - Water Level Data

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH7 Recovery Test	Test Well: BH7
Test Conducted by:	Test Date: 11/11/2021	
Water level at t=0 [m]: 6.57	Static Water Level [m]: 3.82	Water level change at t=0 [m]: 2.75

	Time [s]	Water Level [m]	WL Change [m]
1	60	6.15	2.33
2	120	6.03	2.21
3	240	5.79	1.97
4	480	5.18	1.36
5	960	4.81	0.99
6	1920	4.40	0.58
7	3840	4.15	0.33

Slug Test - Analyses Report

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH7 Recovery Test	Test Well: BH7
Test Conducted by:		Test Date: 11/11/2021
Aquifer Thickness: 3.55 m		

	Analysis Name	Analysis Performed b	Analysis Date	Method name	Well	T [m²/s]	K [m/s]	S
1	New analysis 1		11/29/2021	Hvorslev	BH7		2.68×10^{-7}	

Slug Test - Water Level Data

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH9 Recovery Test	Test Well: BH9
Test Conducted by: Megan Keon	Test Date: 11/11/2021	
Water level at t=0 [m]: 6.21	Static Water Level [m]: 2.95	Water level change at t=0 [m]: 3.26

	Time [s]	Water Level [m]	WL Change [m]
1	60	5.95	3.00
2	120	5.81	2.86
3	240	5.64	2.69
4	480	5.35	2.40
5	960	4.84	1.89
6	1920	3.64	0.69
7	2520	3.39	0.44

Slug Test - Analyses Report

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH9 Recovery Test	Test Well: BH9
Test Conducted by: Megan Keon		Test Date: 11/11/2021
Aquifer Thickness: 3.58 m		

	Analysis Name	Analysis Performed b	Analysis Date	Method name	Well	T [m²/s]	K [m/s]	S
1	New analysis 1		11/29/2021	Hvorslev	BH9		4.09×10^{-7}	

Slug Test - Water Level Data

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH11 Recovery Test	Test Well: BH11
Test Conducted by:	Test Date: 11/10/2021	
Water level at t=0 [m]: 6.63	Static Water Level [m]: 3.46	Water level change at t=0 [m]: 3.17

	Time [s]	Water Level [m]	WL Change [m]
1	60	6.54	3.08
2	120	6.48	3.02
3	240	6.39	2.93
4	480	6.21	2.75
5	960	5.92	2.46
6	1920	5.47	2.01
7	3840	4.86	1.40
8	9480	3.76	0.30

Slug Test - Analyses Report

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH11 Recovery Test	Test Well: BH11
Test Conducted by:		Test Date: 11/10/2021
Aquifer Thickness: 3.58 m		

	Analysis Name	Analysis Performed b	Analysis Date	Method name	Well	T [m²/s]	K [m/s]	S
1	New analysis 1		11/29/2021	Hvorslev	BH11		1.26×10^{-7}	

Slug Test - Water Level Data

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH12 Recovery Test	Test Well: BH12
Test Conducted by:	Test Date: 11/10/2021	
Water level at t=0 [m]: 6.27	Static Water Level [m]: 3.06	Water level change at t=0 [m]: 3.21

	Time [s]	Water Level [m]	WL Change [m]
1	60	3.96	0.90
2	120	3.90	0.84
3	240	3.18	0.12
4	480	3.14	0.08

Slug Test - Analyses Report

Project: Water Taking and Discharge Plans

Number: 288344.003

Client: Hazelview Developments Inc.

Location: Heron Gate 5, Ottawa, Ontario	Slug Test: BH12 Recovery Test	Test Well: BH12
Test Conducted by:		Test Date: 11/10/2021
Aquifer Thickness: 4.52 m		

	Analysis Name	Analysis Performed b	Analysis Date	Method name	Well	T [m²/s]	K [m/s]	S
1	New analysis 1		11/29/2021	Hvorslev	BH12		3.19×10^{-6}	

APPENDIX IV
Groundwater Data

Your P.O. #: 288344
Your Project #: OTTAWA SEWER USE TESTING
Site Location: HERON GATE
Your C.O.C. #: 857305-01-01

Attention: Ryan Laronde

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2021/12/14
Report #: R6920343
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C1Y1075
Received: 2021/11/18, 15:15

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Chromium (VI) in Water	1	N/A	2021/11/22	CAM SOP-00436	EPA 7199 m
Total Metals Analysis by ICPMS	1	N/A	2021/12/02	CAM SOP-00447	EPA 6020B m
Nitrosamines in Water	1	2021/11/23	2021/11/30	BRL SOP-00012	EPA M 607/1625B mod

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.

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.

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.

Your P.O. #: 288344
Your Project #: OTTAWA SEWER USE TESTING
Site Location: HERON GATE
Your C.O.C. #: 857305-01-01

Attention: Ryan Laronde

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2021/12/14
Report #: R6920343
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C1Y1075
Received: 2021/11/18, 15:15

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
==========
BV Labs 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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Bureau Veritas Job #: C1Y1075
Report Date: 2021/12/14

Pinchin Ltd
Client Project #: OTTAWA SEWER USE TESTING
Site Location: HERON GATE
Your P.O. #: 288344
Sampler Initials: MK

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID			RGW510		
Sampling Date			2021/11/18 14:15		
COC Number			857305-01-01		
	UNITS	Criteria	BH12	RDL	QC Batch
Semivolatile Organics					
N-Nitrosodimethylamine	ng/L	400000	<8.00	8.00	7714769
Surrogate Recovery (%)					
D10-N-nitrosodiethylamine	%	-	91		7714769
D14-N-Nitrosodi-n-propylamine	%	-	97		7714769
D6-N-Nitrosodimethylamine	%	-	47		7714769
D8-N-Nitrosomorpholine	%	-	71		7714769

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ottawa Sanitary and Combined Sewers Discharge Limits.

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Pinchin Ltd
Client Project #: OTTAWA SEWER USE TESTING
Site Location: HERON GATE
Your P.O. #: 288344
Sampler Initials: MK

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				RGW510		
Sampling Date				2021/11/18 14:15		
COC Number				857305-01-01		
	UNITS	Criteria	Criteria-2	BH12	RDL	QC Batch
Metals						
Chromium (VI)	ug/L	-	-	<0.50	0.50	7710140
Total Aluminum (Al)	ug/L	50000	-	18000	25	7719501
Total Antimony (Sb)	ug/L	5000	-	<0.50	0.50	7719501
Total Arsenic (As)	ug/L	1000	20	11	1.0	7719501
Total Barium (Ba)	ug/L	-	-	290	2.0	7719501
Total Beryllium (Be)	ug/L	-	-	1.1	0.40	7719501
Total Bismuth (Bi)	ug/L	5000	-	<1.0	1.0	7719501
Total Boron (B)	ug/L	25000	-	300	10	7719501
Total Cadmium (Cd)	ug/L	20	8	0.22	0.090	7719501
Total Calcium (Ca)	ug/L	-	-	610000	1000	7719501
Total Chromium (Cr)	ug/L	5000	80	53	5.0	7719501
Total Cobalt (Co)	ug/L	5000	-	25	0.50	7719501
Total Copper (Cu)	ug/L	3000	40	40	0.90	7719501
Total Iron (Fe)	ug/L	-	-	49000	100	7719501
Total Lead (Pb)	ug/L	5000	120	31	0.50	7719501
Total Lithium (Li)	ug/L	-	-	160	5.0	7719501
Total Magnesium (Mg)	ug/L	-	-	150000	50	7719501
Total Manganese (Mn)	ug/L	5000	50	2300	2.0	7719501
Total Molybdenum (Mo)	ug/L	5000	-	4.8	0.50	7719501
Total Nickel (Ni)	ug/L	3000	80	51	1.0	7719501
Total Potassium (K)	ug/L	-	-	20000	200	7719501
Total Selenium (Se)	ug/L	5000	20	<2.0	2.0	7719501
Total Silicon (Si)	ug/L	-	-	37000	50	7719501
Total Silver (Ag)	ug/L	5000	120	<0.090	0.090	7719501
Total Sodium (Na)	ug/L	-	-	280000	100	7719501
Total Strontium (Sr)	ug/L	-	-	9600	1.0	7719501
Total Tellurium (Te)	ug/L	-	-	<1.0	1.0	7719501
Total Thallium (Tl)	ug/L	-	-	0.40	0.050	7719501
Total Tin (Sn)	ug/L	5000	-	1.1	1.0	7719501
Total Titanium (Ti)	ug/L	5000	-	300	5.0	7719501
Total Tungsten (W)	ug/L	-	-	5.6	1.0	7719501

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ottawa Sanitary and Combined Sewers Discharge Limits.
Criteria-2: Ottawa Storm Sewer Discharge Limits

Bureau Veritas Job #: C1Y1075
Report Date: 2021/12/14

Pinchin Ltd
Client Project #: OTTAWA SEWER USE TESTING
Site Location: HERON GATE
Your P.O. #: 288344
Sampler Initials: MK

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				RGW510		
Sampling Date				2021/11/18 14:15		
COC Number				857305-01-01		
	UNITS	**Criteria**	**Criteria-2**	**BH12**	**RDL**	**QC Batch**
Total Uranium (U)	ug/L	-	-	3.0	0.10	7719501
Total Vanadium (V)	ug/L	5000	-	41	0.50	7719501
Total Zinc (Zn)	ug/L	3000	40	83	5.0	7719501
Total Zirconium (Zr)	ug/L	-	-	4.8	1.0	7719501

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ottawa Sanitary and Combined Sewers Discharge Limits.
Criteria-2: Ottawa Storm Sewer Discharge Limits

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Bureau Veritas Job #: C1Y1075
Report Date: 2021/12/14

Pinchin Ltd
Client Project #: OTTAWA SEWER USE TESTING
Site Location: HERON GATE
Your P.O. #: 288344
Sampler Initials: MK

TEST SUMMARY

Bureau Veritas ID: RGW510
Sample ID: BH12
Matrix: Water

Collected: 2021/11/18
Shipped:
Received: 2021/11/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chromium (VI) in Water	IC	7710140	N/A	2021/11/22	Lang Le
Total Metals Analysis by ICPMS	ICP/MS	7719501	N/A	2021/12/02	Arefa Dabhad
Nitrosamines in Water	GCTQ/MS	7714769	2021/11/23	2021/11/30	Wenhui (Susie) Shi

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Bureau Veritas Job #: C1Y1075
Report Date: 2021/12/14

Pinchin Ltd
Client Project #: OTTAWA SEWER USE TESTING
Site Location: HERON GATE
Your P.O. #: 288344
Sampler Initials: MK

GENERAL COMMENTS

Sample RGW510 [BH12] : NDMA Analysis: Due to the nature of sample matrix, a smaller amount of sample was extracted. DLs were adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7710140	LLE	Matrix Spike	Chromium (VI)	2021/11/22		102	%	80 - 120
7710140	LLE	Spiked Blank	Chromium (VI)	2021/11/22		103	%	80 - 120
7710140	LLE	Method Blank	Chromium (VI)	2021/11/22	<0.50		ug/L	
7710140	LLE	RPD	Chromium (VI)	2021/11/22	NC		%	20
7714769	WSS	Spiked Blank	D10-N-nitrosodiethylamine	2021/11/30		100	%	10 - 150
			D14-N-Nitrosodi-n-propylamine	2021/11/30		107	%	10 - 150
			D6-N-Nitrosodimethylamine	2021/11/30		54	%	10 - 80
			D8-N-Nitrosomorpholine	2021/11/30		79	%	10 - 150
			N-Nitrosodimethylamine	2021/11/30		106	%	65 - 135
7714769	WSS	RPD	N-Nitrosodimethylamine	2021/11/30	2.9		%	25
7714769	WSS	Method Blank	D10-N-nitrosodiethylamine	2021/11/30		95	%	10 - 150
			D14-N-Nitrosodi-n-propylamine	2021/11/30		100	%	10 - 150
			D6-N-Nitrosodimethylamine	2021/11/30		48	%	10 - 80
			D8-N-Nitrosomorpholine	2021/11/30		73	%	10 - 150
			N-Nitrosodimethylamine	2021/11/30	<2.00		ng/L	
7719501	ADA	Spiked Blank	Total Aluminum (Al)	2021/12/02		97	%	80 - 120
			Total Antimony (Sb)	2021/12/02		101	%	80 - 120
			Total Arsenic (As)	2021/12/02		99	%	80 - 120
			Total Barium (Ba)	2021/12/02		95	%	80 - 120
			Total Beryllium (Be)	2021/12/02		96	%	80 - 120
			Total Bismuth (Bi)	2021/12/02		99	%	80 - 120
			Total Boron (B)	2021/12/02		89	%	80 - 120
			Total Cadmium (Cd)	2021/12/02		98	%	80 - 120
			Total Calcium (Ca)	2021/12/02		99	%	80 - 120
			Total Chromium (Cr)	2021/12/02		95	%	80 - 120
			Total Cobalt (Co)	2021/12/02		99	%	80 - 120
			Total Copper (Cu)	2021/12/02		92	%	80 - 120
			Total Iron (Fe)	2021/12/02		97	%	80 - 120
			Total Lead (Pb)	2021/12/02		96	%	80 - 120
			Total Lithium (Li)	2021/12/02		100	%	80 - 120
			Total Magnesium (Mg)	2021/12/02		99	%	80 - 120
			Total Manganese (Mn)	2021/12/02		97	%	80 - 120
			Total Molybdenum (Mo)	2021/12/02		94	%	80 - 120
			Total Nickel (Ni)	2021/12/02		98	%	80 - 120
			Total Potassium (K)	2021/12/02		95	%	80 - 120
			Total Selenium (Se)	2021/12/02		103	%	80 - 120
			Total Silicon (Si)	2021/12/02		97	%	80 - 120
			Total Silver (Ag)	2021/12/02		96	%	80 - 120
			Total Sodium (Na)	2021/12/02		98	%	80 - 120
			Total Strontium (Sr)	2021/12/02		98	%	80 - 120
			Total Tellurium (Te)	2021/12/02		100	%	80 - 120
			Total Thallium (Tl)	2021/12/02		99	%	80 - 120
			Total Tin (Sn)	2021/12/02		97	%	80 - 120
			Total Titanium (Ti)	2021/12/02		98	%	80 - 120
			Total Tungsten (W)	2021/12/02		96	%	80 - 120
			Total Uranium (U)	2021/12/02		99	%	80 - 120
			Total Vanadium (V)	2021/12/02		97	%	80 - 120
			Total Zinc (Zn)	2021/12/02		100	%	80 - 120
			Total Zirconium (Zr)	2021/12/02		98	%	80 - 120
7719501	ADA	Method Blank	Total Aluminum (Al)	2021/12/02	<4.9		ug/L	

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

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Antimony (Sb)	2021/12/02	<0.50		ug/L	
			Total Arsenic (As)	2021/12/02	<1.0		ug/L	
			Total Barium (Ba)	2021/12/02	<2.0		ug/L	
			Total Beryllium (Be)	2021/12/02	<0.40		ug/L	
			Total Bismuth (Bi)	2021/12/02	<1.0		ug/L	
			Total Boron (B)	2021/12/02	<10		ug/L	
			Total Cadmium (Cd)	2021/12/02	<0.090		ug/L	
			Total Calcium (Ca)	2021/12/02	<200		ug/L	
			Total Chromium (Cr)	2021/12/02	<5.0		ug/L	
			Total Cobalt (Co)	2021/12/02	<0.50		ug/L	
			Total Copper (Cu)	2021/12/02	<0.90		ug/L	
			Total Iron (Fe)	2021/12/02	<100		ug/L	
			Total Lead (Pb)	2021/12/02	<0.50		ug/L	
			Total Lithium (Li)	2021/12/02	<5.0		ug/L	
			Total Magnesium (Mg)	2021/12/02	<50		ug/L	
			Total Manganese (Mn)	2021/12/02	<2.0		ug/L	
			Total Molybdenum (Mo)	2021/12/02	<0.50		ug/L	
			Total Nickel (Ni)	2021/12/02	<1.0		ug/L	
			Total Potassium (K)	2021/12/02	<200		ug/L	
			Total Selenium (Se)	2021/12/02	<2.0		ug/L	
			Total Silicon (Si)	2021/12/02	<50		ug/L	
			Total Silver (Ag)	2021/12/02	<0.090		ug/L	
			Total Sodium (Na)	2021/12/02	<100		ug/L	
			Total Strontium (Sr)	2021/12/02	<1.0		ug/L	
			Total Tellurium (Te)	2021/12/02	<1.0		ug/L	
			Total Thallium (Tl)	2021/12/02	<0.050		ug/L	
			Total Tin (Sn)	2021/12/02	<1.0		ug/L	
			Total Titanium (Ti)	2021/12/02	<5.0		ug/L	
			Total Tungsten (W)	2021/12/02	<1.0		ug/L	
			Total Uranium (U)	2021/12/02	<0.10		ug/L	
			Total Vanadium (V)	2021/12/02	<0.50		ug/L	
			Total Zinc (Zn)	2021/12/02	<5.0		ug/L	
			Total Zirconium (Zr)	2021/12/02	<1.0		ug/L	

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.

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 (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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Bureau Veritas Job #: C1Y1075
Report Date: 2021/12/14

Pinchin Ltd
Client Project #: OTTAWA SEWER USE TESTING
Site Location: HERON GATE
Your P.O. #: 288344
Sampler Initials: MK

VALIDATION SIGNATURE PAGE

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

Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

M Di Grazia

Melissa DiGrazia, Operations Manager, HRMS Department

BV Labs 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.

BV Labs - Partial/Rush Results

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18-Nov-21 15:15

Antonella Brasil

C1Y1075

KTN ENV-1655

C#857305-01-01

Antonella Brasil

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#982 Pinchin Ltd	Company Name:	Pinchin Ltd.	Quotation #:	A70927
Attention:	Accounts Payable	Attention:	Ryan LaRonde	P.O. #:	288344
Address:	1 Hines Road Suite 200 Kanata ON K2K 3C7	Address:	1 Hines Rd Kanata, Ontario	Project:	Ottawa Sewer Use Testing
Tel:	(613) 592-3387 Fax: (613) 592-5897	Tel:	613-592-3387 Fax:	Project Name:	Heron Gate
Email:	ap@pinchin.com	Email:		Site #:	
				Sampled By:	Megan Keon

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 ☑ Sanitary Sewer Bylaw ☐ Reg 558 ☑ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___

Special Instructions

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

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	Total Metals Analysis by ICP/MS	Mercury in Water by CVAA	Chromium (VI) in Water	# of Bottles	Comments
1		BH12	2021/11/18	2:15 pm			✓	✓	✓	4	NDMA, $3, other bottles listed for test NOT field filtered. Bottle order # 857305 # 856279
2											
3											
4											
5											
6											
7											
8											
9											
10											

RECEIVED IN OTTAWA
NO cooling media

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Megan Keon	21/11/18	3:15pm		21/11/18	15:15	
					08:00	

Laboratory Use Only: Time Sensitive | Temperature (°C) on Recei: 10, 11, 9 | Custody Seal Present: Yes ✓ | Custody Seal Intact: No

* 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.BVLABS.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.BVLABS.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.

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