

Geotechnical
Engineering

Environmental
Engineering

Hydrogeology

Geological
Engineering

Materials Testing

Building Science

Archaeological Services

Geotechnical Investigation

Proposed Residential Development
3604-3646 Innes Road
Ottawa, Ontario

Prepared For

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Table of Contents

	Page
1.0 Introduction.....	1
2.0 Proposed Development.....	1
3.0 Method of Investigation	
3.1 Field Investigation.....	2
3.2 Field Survey.....	3
3.3 Laboratory Testing.....	4
3.4 Analytical Testing.....	4
4.0 Observations	
4.1 Surface Conditions.....	5
4.2 Surface Profile.....	5
4.3 Groundwater.....	7
5.0 Discussion	
5.1 Geotechnical Assessment.....	8
5.2 Site Grading and Preparation.....	8
5.3 Foundation Design.....	10
5.4 Design for Earthquakes.....	11
5.5 Basement Slab/Slab on Grade Construction.....	12
5.6 Pavement Structure.....	12
6.0 Design and Construction Precautions	
6.1 Foundation Drainage and Backfill.....	15
6.2 Protection Against Frost Action.....	15
6.3 Excavation Side Slopes.....	15
6.4 Pipe Bedding and Backfill.....	16
6.5 Groundwater Control.....	17
6.6 Winter Construction.....	17
6.7 Corrosion Potential and Sulphate.....	18
6.8 Landscaping Considerations.....	18
7.0 Recommendations.....	20
8.0 Statement of Limitations.....	21

Appendices

- Appendix 1** Soil Profile and Test Data Sheets
 Boreholes by Others
 Symbols and Terms
 Atterberg Limits Testing Results
 Grain Size Testing Results
- Appendix 2** Figure 1 - Key Plan
 Drawing PG4026-1 - Test Hole Location Plan
 Drawing PG4026-2 - Permissible Grade Raise Plan

1.0 Introduction

Paterson Group (Paterson) was commissioned by Glenview Homes (Innes) Ltd. to conduct a geotechnical investigation for the proposed residential development to be located at 3604, 3636 and 3646 Innes Road, in the City of Ottawa, Ontario (Refer to Figure 1 - Key Plan in Appendix 2).

The objectives of the current geotechnical review were:

- ☐ to determine the subsurface soil and groundwater conditions based on the soils information.
- ☐ to provide geotechnical recommendations pertaining to design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. The report contains the geotechnical findings and recommendations pertaining to the design and construction of the subject development as understood at the time of writing this report.

2.0 Proposed Development

Specific details of the proposed development were not available at the time of writing this report. However it is understood that the proposed development will consist of townhouse units and residential single unit dwellings. It is also anticipated that the development will include associated car parking areas, residential driveways, access lanes and landscaped areas. It is further understood that the site will be municipally serviced.

3.0 Method of Investigation

3.1 Field Investigation

The field program for the current investigation was conducted between December 5 and December 7, 2018. At that time, a total of 10 (ten) boreholes (BH) were advanced to a maximum depth of 6.7 m. Previous field investigations were completed by Paterson between September 2014 and August 2017. During that time, a total of 6 test holes, consisting of boreholes and test pits were extended to a maximum depth of 7.1 m.

Previous geotechnical investigations were also completed by others within the area of the subject site. The results of the previous investigations by others are discussed in the current report. The locations of the test holes are shown on Drawing PG4026-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were completed using a track mounted auger drill rig operated by a two person crew. The test pits were completed using a hydraulic shovel. All fieldwork was conducted under the full-time supervision of Paterson personnel from our geotechnical division under the direction of a senior engineer. The testing procedure consisted of augering to the required depths and at the selected locations sampling the overburden.

Two (2) investigations were completed by others for environmental purposes for the subject site. The field work was conducted in 2013 and 2016. A total of 34 test holes were completed during the course of the investigations by others. The test holes were advanced to a maximum depth of 7.0 m below existing ground surface.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using a 50 mm diameter split spoon sampler. Soil samples were also recovered along the sidewalls of the test pits by hand during excavation.

All soil samples were visually inspected and initially classified on site. The split spoon samples were placed in sealed plastic bags. All samples were transported to our laboratory for examination and classification. The depths at which the split spoon, auger and grab samples were recovered from the test holes are shown as SS, AU and G, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

The Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split-spoon samples. The SPT results are recorded as “N” values on the Soil Profile and Test Data sheets. The “N” value is the number of blows required to drive the split-spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

Undrained shear strength testing was carried out at regular depth intervals in cohesive soils using a field vane apparatus.

Overburden thickness was evaluated during the course of the site investigations by dynamic cone penetration testing (DCPT) at several borehole locations. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

The subsurface conditions observed at the borehole and test pit locations were recorded in detail in the field. The soil profiles are presented on the Soil Profile and Test Data sheets and Borehole Logs by Others in Appendix 1.

Groundwater

Flexible standpipes were installed in all boreholes to monitor the groundwater levels subsequent to the completion of the sampling program. Groundwater infiltration levels were noted at the time of excavation at the test pit locations.

3.2 Field Survey

The borehole locations were determined by Paterson personnel taking into consideration the presence of underground and aboveground services. The location and ground surface elevation at each borehole location were provided by J.D. Barnes Limited. It is understood that the elevations are referenced to a geodetic datum. The test hole locations and ground surface elevations at the test hole locations are presented on Drawing PG4026-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

The soil samples recovered from the subject site were visually examined in our laboratory to review the results of the field logging. A total of two (2) Atterberg limit tests were completed on selected silty clay samples. Grain size distribution (hydrometer) testing was also completed on two (2) soil samples and one (1) soil sample was submitted for shrinkage testing. The results are presented in Subsection 4.2 of our current report and in Appendix 1.

3.4 Analytical Testing

One (1) soil sample was submitted to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The sample was analyzed to determine the concentration of sulphate and chloride, the resistivity and the pH of the sample. The results are discussed in Subsection 6.7 and shown in Appendix 1.

4.0 Observations

4.1 Surface Conditions

The north portion of the subject site is currently occupied by commercial buildings with associated paved/gravel surfaced areas used for parking and storage units. The gravel surfacing extends approximately 400 m south of Innes Road, and is relatively flat and at grade with Innes Road. The ground surface along the north portion of the site is relatively flat and at grade with Innes Road. The ground surface south of the gravel surfaced area consists of grass covered, undeveloped land with occasional trees, and slopes gradually down toward the south. The site is bordered to the north by Innes Road and to the east, south and west by undeveloped land. Additional commercial properties border the subject site to the east and west along Innes Road.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile at the borehole locations consisted of a layer of topsoil, followed by a very stiff to stiff brown silty clay crust. A stiff to firm grey silty clay deposit was encountered below the aforementioned layers. A glacial till deposit was encountered below the grey silty clay at some borehole locations. The fine matrix of the glacial till was observed to consist of grey silty clay with sand and gravel, with occasional cobbles and boulders. Practical refusal to augering was encountered at BH 2-18, BH 3-18 and BH 5-18 at depths of 3.8 to 5.6 m. Practical refusal to DCPT was encountered at a depth of 10.4 m at BH 7. Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for specific details of the soil profiles encountered at each test hole location.

Atterberg Limits Results

The results of the Atterberg Limit tests conducted within the silty clay are presented below in Table 1 - Summary of Atterberg Limits Results and are presented in Appendix 1.

Table 1 - Summary of Atterberg Limits Results				
Sample	Liquid Limit %	Plastic Limit %	Plasticity Index %	Classification
BH1-18 SS2	67	29	38	CH
BH10-18 SS3	72	29	43	CH
TP 1 G2	66	21	45	CH
TP 1 G3	71	24	47	CH
TP 2 G2	78	25	53	CH
TP 3 G2	69	25	44	CH
TP 4 G2	77	25	52	CH
TP 5 G3	70	24	46	CH

The results of the shrinkage testing of BH5 SS3 resulted in a shrinkage limit of 19% with a shrinkage ratio of 1.71.

Hydrometer Testing

Two (2) soil samples were submitted for hydrometer testing. The results are summarized in Table 2 and presented on the Grain Size Distribution sheets in Appendix 1.

Table 2 - Summary of Hydrometer Tests				
Sample	Gravel %	Sand %	Fines Content	
			Silt %	Clay %
BH4-18 SS3	0	0.6	29.9	69.5
BH6-18 SS3	0	0.5	23	76.5

Bedrock

Based on available geological mapping, the local bedrock consists of limestone and shale of the Bobcaygeon and Lindsay formations with an anticipated overburden thickness of 0 to 25 m.

4.3 Groundwater

The groundwater levels were measured in the borehole locations on December 14, 2018, and are presented in the Soil Profile and Test Data sheets in Appendix 1.

Table 3 - Summary of Groundwater Level Readings				
Test Hole Number	Ground Elevation (m)	Groundwater Levels (m)		Recording Date
		Depth	Elevation	
BH1-18	89.02	1.84	87.18	December 14, 2018
BH2-18	88.81	1.19	87.62	December 14, 2018
BH3-18	88.43	0.95	87.48	December 14, 2018
BH4-18	88.26	1.07	87.19	December 14, 2018
BH5-18	87.47	1.29	86.18	December 14, 2018
BH6-18	87.61	Damaged	n/a	December 14, 2018
BH7-18	86.93	1.02	85.91	December 14, 2018
BH8-18	87.51	Damaged	n/a	December 14, 2018
BH9-18	86.95	0.65	86.3	December 14, 2018
BH10-18	86.69	Frozen	n/a	December 14, 2018
Note: The ground surface elevations at the borehole locations were provided by JD Barnes Limited.				

It is important to note that groundwater level readings could be influenced by surface water infiltrating the backfilled borehole, which can lead to higher than typical groundwater levels. The long-term groundwater level can also be estimated based on moisture levels and colouring of the recovered soil samples. Based on these observations at the borehole locations, the long-term groundwater level is expected at a 3 to 4 m depth.

It should be noted that groundwater levels are subject to seasonal fluctuations, therefore groundwater levels could differ at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered adequate for the proposed development. It is expected that buildings can be founded by conventional style shallow foundations placed on undisturbed, stiff to firm silty clay, glacial till or a clean, surface sounded bedrock bearing surface.

Due to the presence of the silty clay deposit, the subject site will be subject to permissible grade raise recommendations.

The above and other consideration are discussed in the following paragraphs.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing organic materials, should be stripped from under any buildings, paved areas, pipe bedding, and other settlement sensitive structures.

Due to the presence of shallow bedrock, some bedrock removal may be required to construct footings and municipal services.

Bedrock Removal

Based on the bedrock encountered in the area, line drilling in conjunction with hoe-ramming or controlled blasting may be required to remove the bedrock. In areas of weathered bedrock and where only a small quantity of bedrock is to be removed, bedrock removal may be possible by hoe-ramming alone.

Prior to considering blasting operations, the blasting effects on the existing services, buildings and other structures should be addressed. A pre-blast or pre-construction survey of the existing structures located in proximity to the blasting operations should be completed prior to commencing site activities. The extent of the survey should be determined by the blasting consultant and should be sufficient to respond to any inquiries/claims related to the blasting operations.

As a general guideline, peak particle velocities (measured at the structures) should not exceed 25 mm/s during the blasting program to reduce the risks of damage to the existing structures.

The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is also an experienced blasting consultant.

Excavation side slopes in sound bedrock can be excavated almost vertical side walls. A minimum 1 m horizontal ledge, should remain between the overburden excavation and the bedrock surface. The ledge will provide an area to allow for potential sloughing or a stable base for the overburden shoring system.

Vibration Considerations

Construction operations are the cause of vibrations, and possibly sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible should be incorporated in the construction operations to maintain, as much as possible, a cooperative environment with the residents.

The following construction equipments could be the source of vibrations: hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, whether caused by blasting operations or by construction operations, could be the source of detrimental vibrations on the nearby buildings and structures. Therefore, all vibrations are recommended to be limited.

Two parameters are used to determine the permissible vibrations, namely, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). The guidelines are for current construction standards. Considering that these guidelines are above perceptible human level and, in some cases, could be very disturbing to some people, a pre-construction survey is recommended be completed to minimize the risks of claims during or following the construction of the proposed building.

Fill Placement

Fill used for grading beneath the building areas should consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II material. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the buildings should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Non-specified existing fill along with site-excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If excavated stiff brown silty clay, free of organics and deleterious materials, is to be used to build up the subgrade level for areas to be paved, the silty clay, under dry conditions, should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD. Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

5.3 Foundation Design

Bearing Resistance Values

Strip footings, up to 2 m wide, and pad footings, up to 4 m wide, founded on an undisturbed, stiff silty clay can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**.

Footings placed on a glacial till or engineered fill bearing surface can be designed using a bearing resistance value at SLS of **150 kPa** and at ULS of **225 kPa**.

A geotechnical resistance factor of 0.5 was incorporated into the abovenoted bearing resistance values at ULS.

An undisturbed soil bearing surface consists of one from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, have been removed, in the dry, prior to the placement of concrete for footings.

Footings bearing on an undisturbed soil bearing surface and designed using the bearing resistance values provided herein will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively.

Footings placed on a clean, surface sounded bedrock surface can be designed using a factored bearing resistance value at ULS of **1,000 kPa**, incorporating a geotechnical resistance factor of 0.5.

A clean, surface-sounded bedrock bearing surface should be free of loose materials, and have no near surface seams, voids, fissures or open joints which can be detected from surface sounding with a rock hammer.

Footings bearing on surface sounded bedrock and designed using the above mentioned bearing resistance values will be subjected to negligible post-construction total and differential settlements.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to an undisturbed soil bearing surface above the groundwater table when a plane extending horizontally and vertically from the bottom edge of the footing at a minimum of 1.5H:1V passes through in situ soil of the same or higher capacity as the bearing medium soil.

Adequate lateral support is provided to a sound bedrock bearing medium when a plane extending horizontally and vertically from the bottom edge of the footing at a minimum of 1H:6V passes through in situ soil of the same or higher capacity as the bearing medium soil. A lateral support zone of 1.5H:1V is recommended for a weathered bedrock bearing medium.

Permissible Grade Raise Recommendations

Permissible grade raise restriction areas are also required due to the silty clay deposit. Refer to Drawing PG4026-2 - Permissible Grade Raise Plan in Appendix 2 for further details.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class C** for foundations to be constructed within the north portion of the subject site and a **Class D** for foundations within the south portion of the subject site. The soils underlying the proposed shallow foundations are not susceptible to liquefaction. Reference should be made to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements.

5.5 Basement Slab

With the removal of all topsoil and fill, containing deleterious or organic materials, the native soil or existing granular fill approved by the geotechnical consultant at the time of excavation will be considered to be an acceptable subgrade surface on which to commence backfilling for basement floor slab or slab on grade construction. Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular A or Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab.

It is recommended that the upper 200 mm of sub-floor fill for basement slabs consist of 19 mm clear crushed stone. The upper 300 mm of sub-floor fill below slabs on grade should consist of OPSS Granular A crushed stone. All backfill materials within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose layers and compacted to at least 98% of its SPMDD.

5.6 Pavement Structure

For design purposes, the pavement structure presented in the following tables could be used for the design of car only parking areas, local roadways and roadways on which bus traffic is anticipated.

Table 6 - Recommended Pavement Structure - Car Only Parking Areas/Driveways	
Thickness (mm)	Material Description
50	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
300	SUBBASE - OPSS Granular B Type II
SUBGRADE - Either in situ soils or OPSS Granular B Type I or II material placed over in situ soil	

Table 7 - Recommended Pavement Structure - Local Roadways	
Thickness (mm)	Material Description
40	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
50	Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
400	SUBBASE - OPSS Granular B Type II
SUBGRADE - Either in situ soils or OPSS Granular B Type I or II material placed over in situ soil	

Table 8 - Recommended Pavement Structure - Collector Roads with Bus Traffic	
Thickness (mm)	Material Description
40	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
50	Upper Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete
50	Lower Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
550	SUBBASE - OPSS Granular B Type II
SUBGRADE - Either in situ soils or OPSS Granular B Type I or II material placed over in situ soil	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type I or II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on keeping the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing its load carrying capacity.

Due to the low permeability of the subgrade materials consideration should be given to installing subdrains during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be crowned to promote water flow to the drainage lines. |

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 10 mm clear crushed stone and placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a composite drainage system, such as Delta Drain 6000 or equivalent. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material should otherwise be used for this purpose.

6.2 Protection Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover (or equivalent) should be provided in this regard.

Exterior footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of heated structures and require additional protection, such as soil cover of 2.1 m or an equivalent combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should be either cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

The pipe bedding for sewer and water pipes should consist of at least 150 mm of OPSS Granular A material. Where the bedding is located within the grey silty clay or bedrock, the thickness of the bedding material should be increased to a minimum of 300 mm. The material should be placed in maximum 225 mm thick lifts and compacted to a minimum of 95% of its SPMDD. The bedding material should extend at least to the spring line of the pipe.

The cover material, which should consist of OPSS Granular A, should extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material should be placed in maximum 225 mm thick lifts and compacted to a minimum of 95% of its SPMDD.

It should generally be possible to re-use the moist (not wet) brown silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. Wet silty clay materials will be difficult to re-use, as the high water contents make compacting impractical without an extensive drying period.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

To reduce long-term lowering of the groundwater level at this site, clay seals should be provided in the service trenches. The seals should be at least 1.5 m long and should extend from trench wall to trench wall. Generally, the seals should extend from the frost line and fully penetrate the bedding, subbedding and cover material. The barriers should consist of relatively dry and compactable brown silty clay placed in maximum 225 mm thick loose layers and compacted to a minimum of 95% of the material's SPMDD. The clay seals should be placed at the site boundaries and at strategic locations at no more than 60 m intervals in the service trenches.

6.5 Groundwater Control

The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium. It is anticipated that groundwater infiltration into the excavations should be low and controllable using conventional open sumps.

A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

For typical ground or surface water volumes, being pumped during the construction phase, between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

6.6 Winter Construction

The subsurface conditions at this site mostly consist of frost susceptible materials. In presence of water and freezing conditions ice could form within the soil mass. Heaving and settlement upon thawing could occur. Precautions should be taken if winter construction is considered for this project.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters, tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

The trench excavations should be constructed in a manner that will avoid the introduction of frozen materials into the trenches. As well, pavement construction is difficult during winter. The subgrade consists of frost susceptible soils which will experience total and differential frost heaving as the work takes place. In addition, the introduction of frost, snow or ice into the pavement materials, which is difficult to avoid, could adversely affect the performance of the pavement structure. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The results of the chloride content, pH and resistivity indicate the presence of a moderate to aggressive environment for exposed ferrous metals at this site.

6.8 Landscaping Considerations

Tree Planting Restrictions

Paterson completed a soils review of the site to determine applicable tree planting setbacks, in accordance with the City of Ottawa Tree Planting in Sensitive Marine Clay Soils (2017 Guidelines) for trees planted within a public right-of-way (ROW). Atterberg limits testing was completed for recovered silty clay samples at selected locations throughout the subject site. Sieve analysis testing was also completed on selected soil samples. The results of our testing are presented in Tables 1 and 2 in Subsection 4.2 and in Appendix 1.

Based on the results of our review, a high sensitivity clay soil was encountered between anticipated underside of footing elevations and 3.5 m below anticipated finished grade as per City Guidelines. Based on our Atterberg Limits test results, the modified plasticity limit generally exceeds 40%. The following tree planting setbacks are recommended for these high sensitivity areas.

Large trees (mature height over 14 m) can be planted within this area provided a tree to foundation setback equal to the full mature height of the tree can be provided (e.g. in a park or other green space). Tree planting setback limits is 7.5 m for small (mature tree height up to 7.5 m) and medium size trees (mature tree height 7.5 m to 14 m) provided that the following conditions are met:

- ☐ The underside of footing (USF) is 2.1 m or greater below the lowest finished grade must be satisfied for footings within 10 m from the tree, as measured from the centre of the tree trunk and verified by means of the Grading Plan as indicated procedural changes below.
- ☐ A small tree must be provided with a minimum of 25 m³ of available soil volume while a medium tree must be provided with a minimum of 30 m³ of available soil volume, as determined by the Landscape Architect. The developer is to ensure that the soil is generally un-compacted when backfilling in street tree planting locations.
- ☐ The tree species must be small (mature tree height up to 7.5 m) to medium size (mature tree height 7.5 m to 14 m) as confirmed by the Landscape Architect.
- ☐ The foundation walls are to be reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall).
- ☐ Grading surround the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan.

Aboveground Swimming Pools, Hot Tubs, Decks and Additions

The in-situ soils are considered to be acceptable for in-ground swimming pools. Above ground swimming pools must be placed at least 5 m away from the residence foundation and neighbouring foundations. Otherwise, pool construction is considered routine, and can be constructed in accordance with the manufacturer's requirements.

Additional grading around the hot tub should not exceed permissible grade raises. Otherwise, hot tub construction is considered routine, and can be constructed in accordance with the manufacturer's specifications.

Additional grading around proposed deck or addition should not exceed permissible grade raises. Otherwise, standard construction practices are considered acceptable.

7.0 Recommendations

It is a requirement for the foundation design data provided herein to be applicable that a materials testing and observation services program including the following aspects be performed by the geotechnical consultant.

- ☐ Review of the final grading plan from a geotechnical perspective, once available.
- ☐ Observation of all bearing surfaces prior to the placement of concrete.
- ☐ Sampling and testing of the concrete and fill materials used.
- ☐ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ☐ Observation of all subgrades prior to backfilling.
- ☐ Field density tests to determine the level of compaction achieved.
- ☐ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request permission to review our recommendations when the drawings and specifications are completed.

A geotechnical investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test hole locations, we request immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on our undertaking the work. The latter should evaluate the factual information provided in this report and determine the suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Glenview Homes (Innes) Ltd. or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.



Nathan F. S. Christie, P.Eng.



David J. Gilbert, P.Eng.

Report Distribution:

- ☐ Glenview Properties Inc. (3 copies)
- ☐ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

BOREHOLES BY OTHERS

SYMBOLS AND TERMS

ATTERBERG LIMITS RESULTS

HYDROMETER TESTING RESULTS

ANALYTICAL TESTING RESULTS

DATUM Ground surface elevations provided by J.D. Barnes Limited

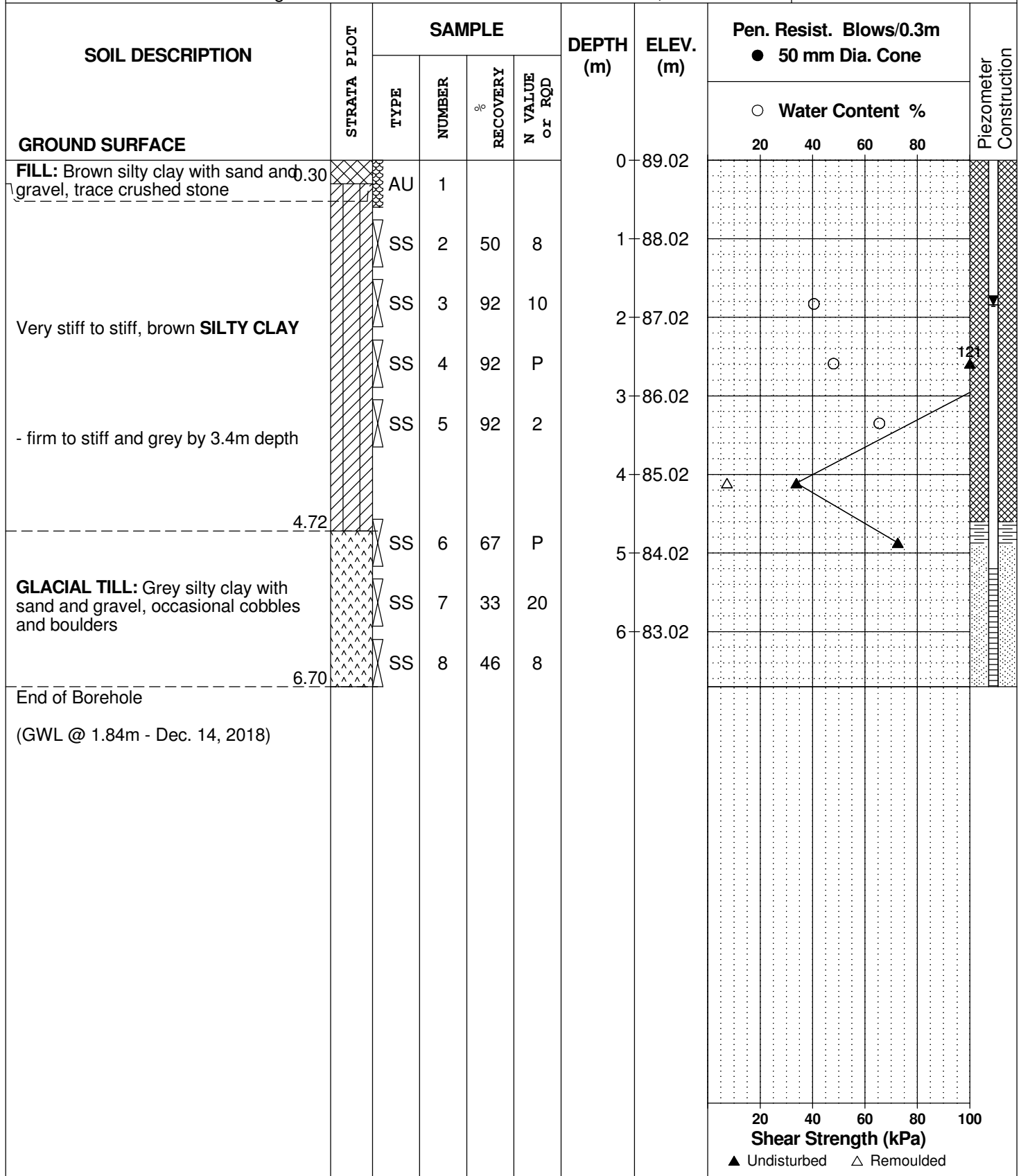
FILE NO.
PG4026

REMARKS

HOLE NO.
BH 1-18

BORINGS BY CME 55 Power Auger

DATE December 5, 2018



FILE NO. PG4026

HOLE NO. **BH 2-18**

DATE December 5, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
TOPSOIL	0.20	AU	1			0	88.81					
Very stiff, brown SILTY CLAY		SS	3	92	7	1	87.81		○			
		SS	2	75	9							
						2	86.81		○			
- grey by 2.7m depth	2.92	SS	4	100	P			△	○			▲ 105
GLACIAL TILL: Grey silty clay with sand and gravel, occasional cobbles and boulders	3.83	SS	5	50	10	3	85.81					
End of Borehole		SS	6	27	50+							
Practical refusal to augering at 3.83m depth												
(GWL @ 1.19m - Dec. 14, 2018)												

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

DATUM Ground surface elevations provided by J.D. Barnes Limited

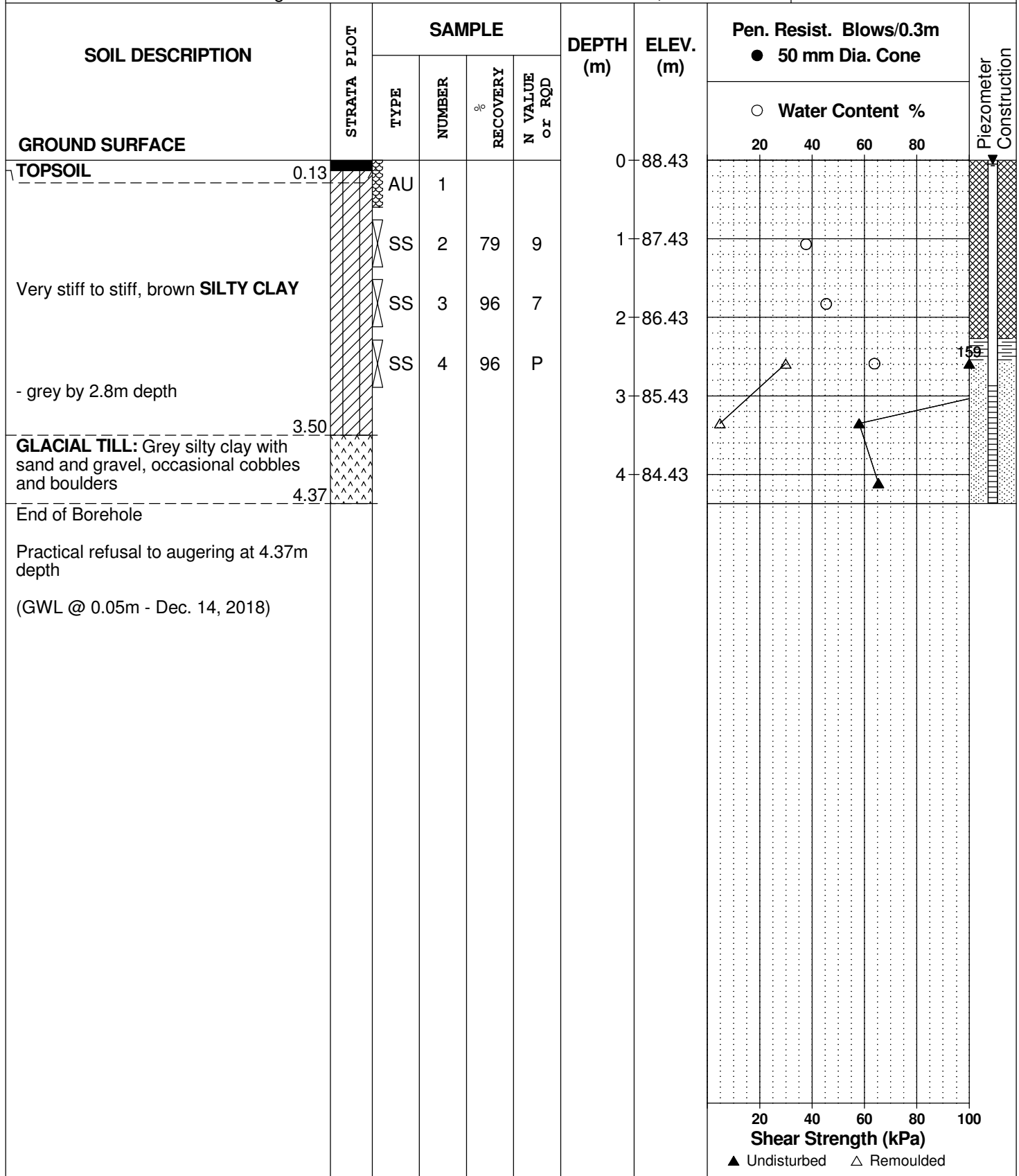
FILE NO.
PG4026

REMARKS

HOLE NO.
BH 3-18

BORINGS BY CME 55 Power Auger

DATE December 5, 2018



DATUM Ground surface elevations provided by J.D. Barnes Limited

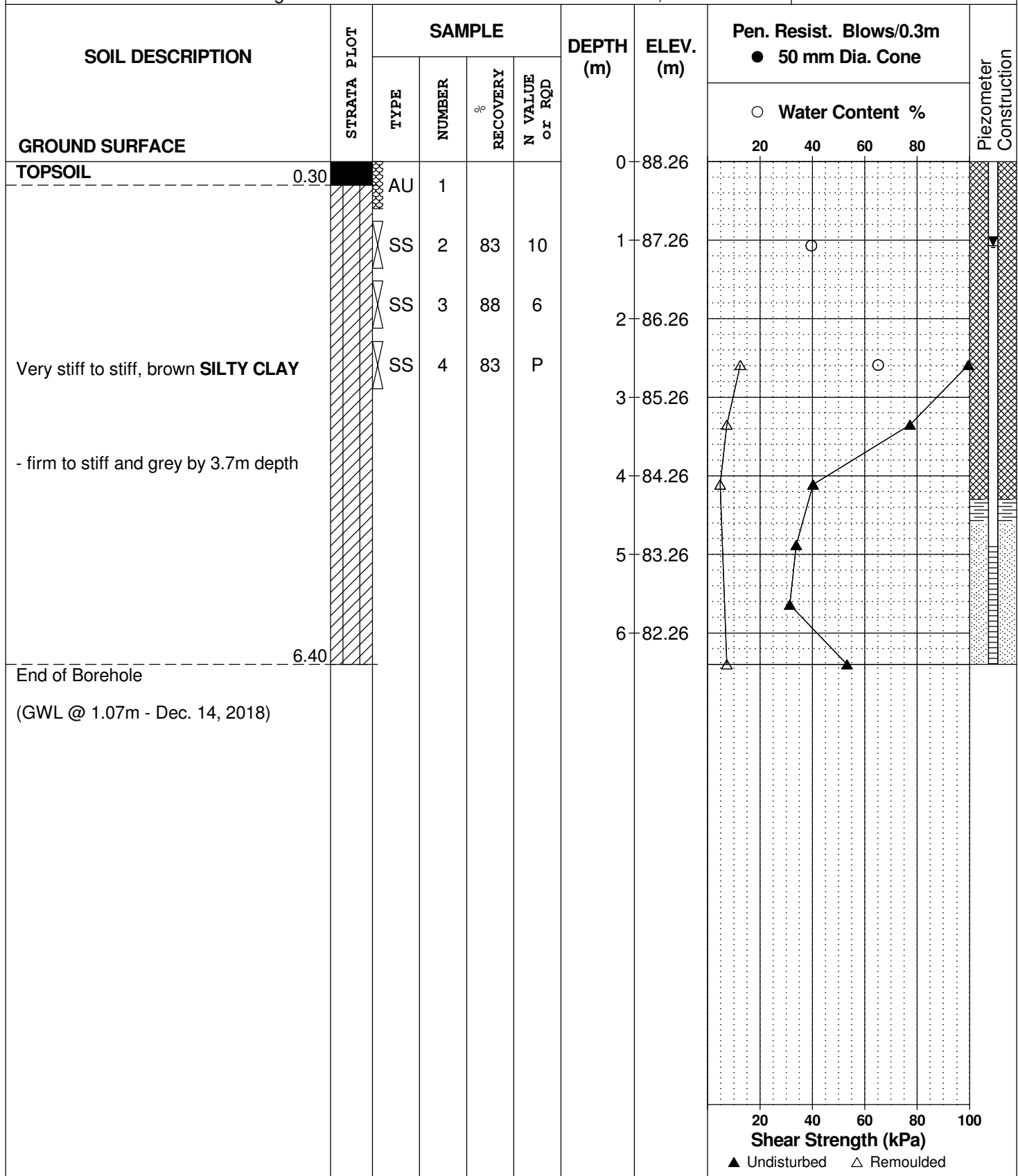
FILE NO.
PG4026

REMARKS

HOLE NO.
BH 4-18

BORINGS BY CME 55 Power Auger

DATE December 5, 2018



DATUM Ground surface elevations provided by J.D. Barnes Limited

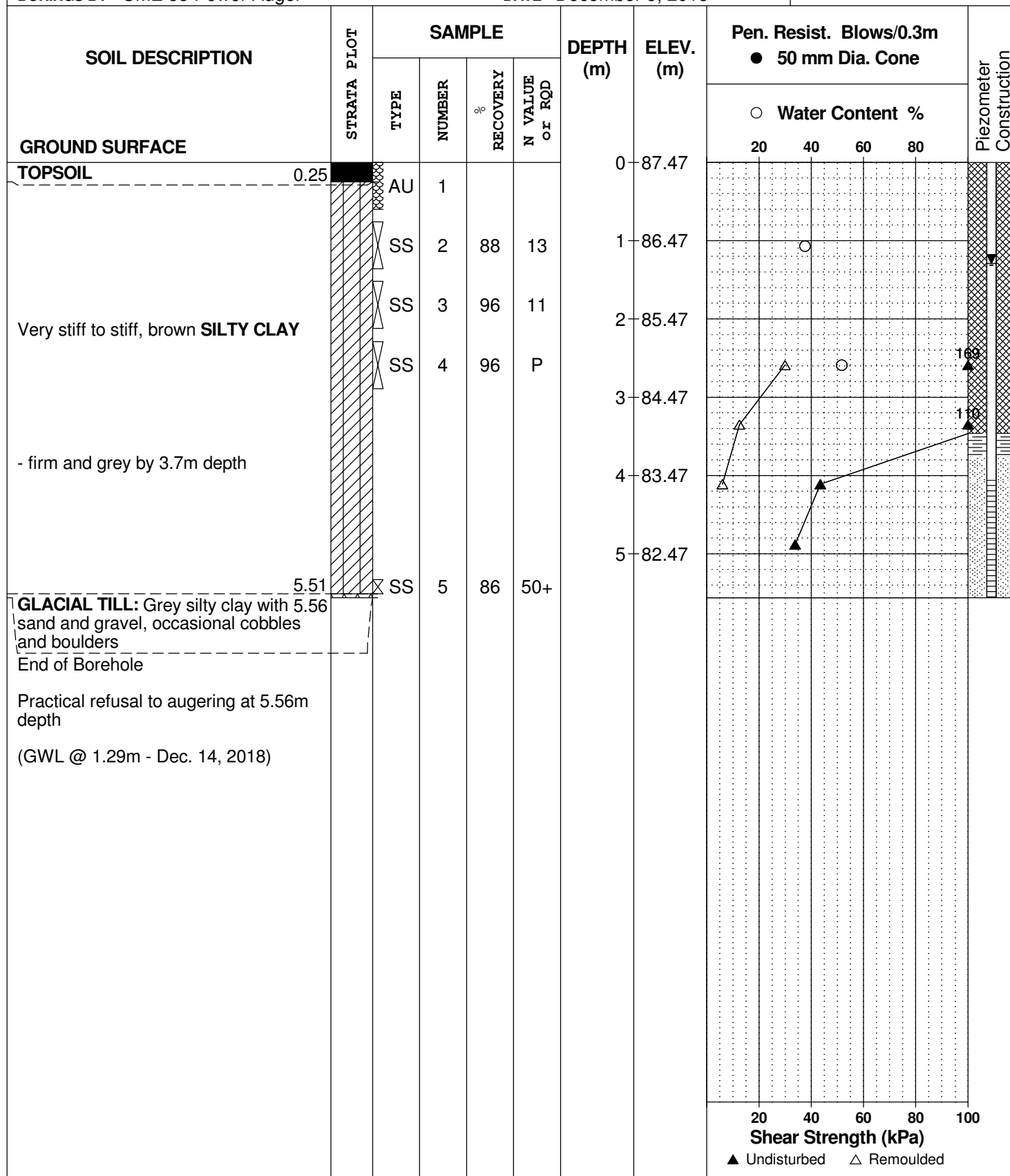
FILE NO. **PG4026**

REMARKS

HOLE NO. **BH 5-18**

BORINGS BY CME 55 Power Auger

DATE December 5, 2018



DATUM Ground surface elevations provided by J.D. Barnes Limited

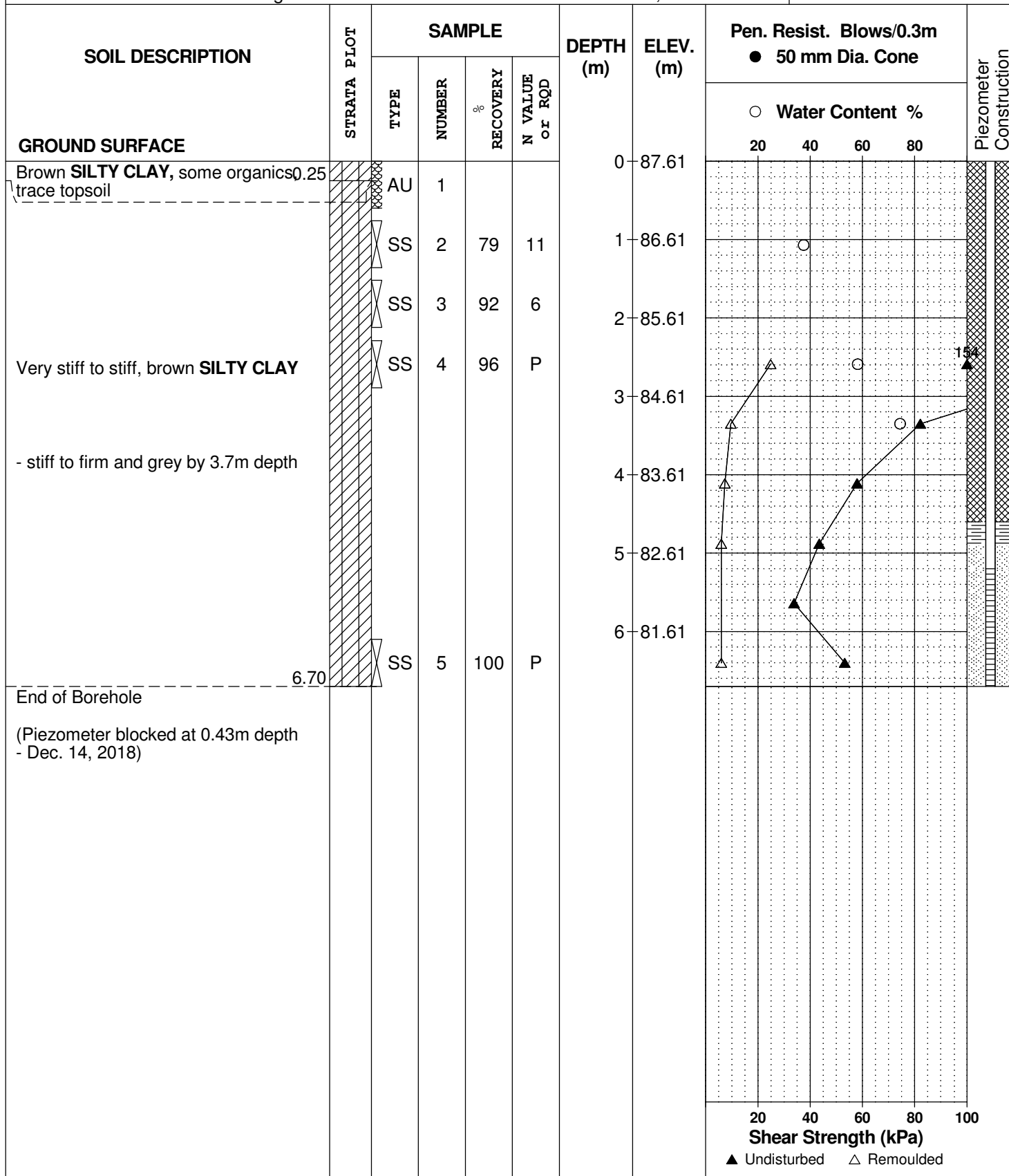
FILE NO.
PG4026

REMARKS

HOLE NO.
BH 6-18

BORINGS BY CME 55 Power Auger

DATE December 6, 2018



DATUM Ground surface elevations provided by J.D. Barnes Limited

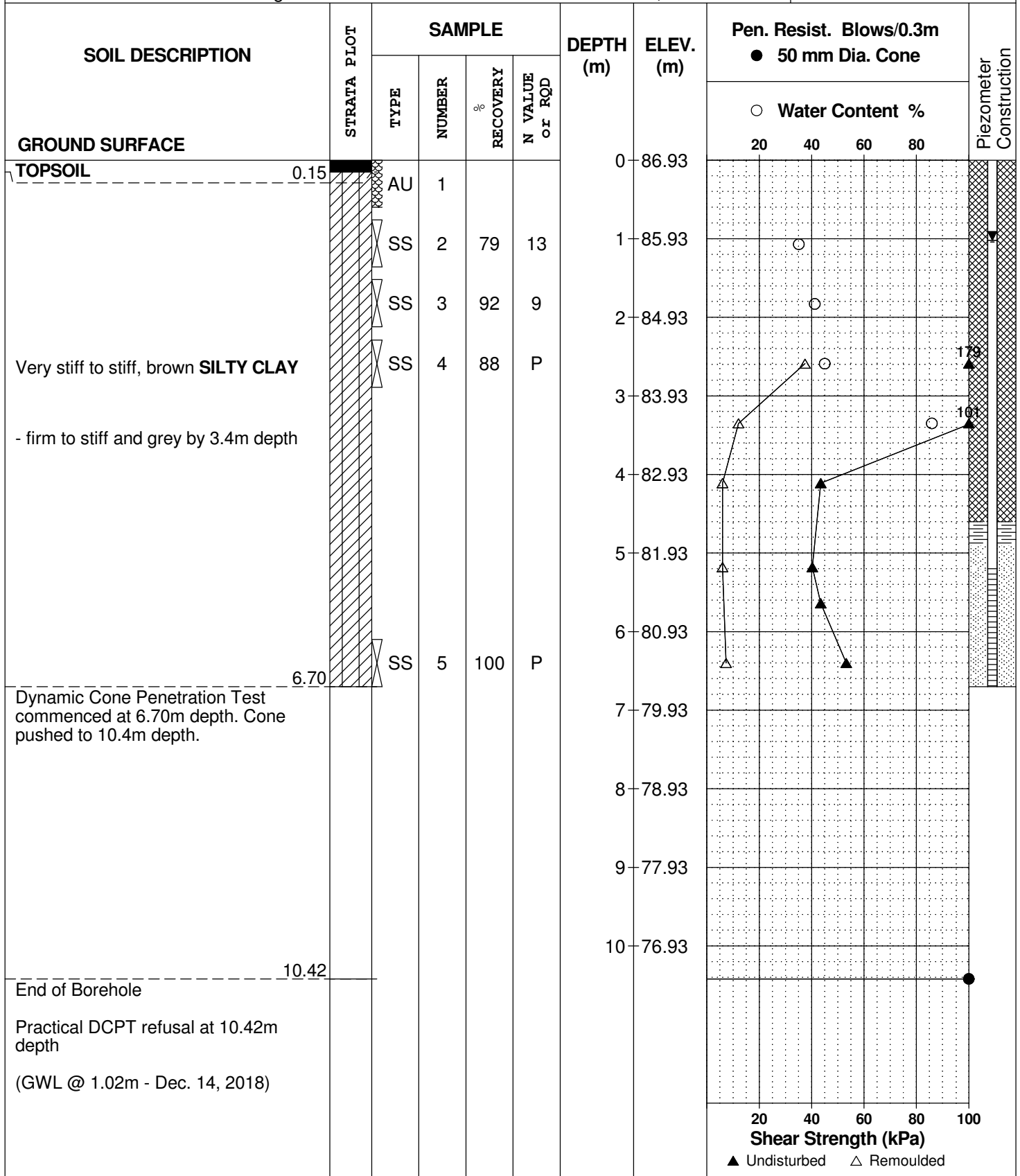
FILE NO. **PG4026**

REMARKS

HOLE NO. **BH 7-18**

BORINGS BY CME 55 Power Auger

DATE December 6, 2018



DATUM Ground surface elevations provided by J.D. Barnes Limited

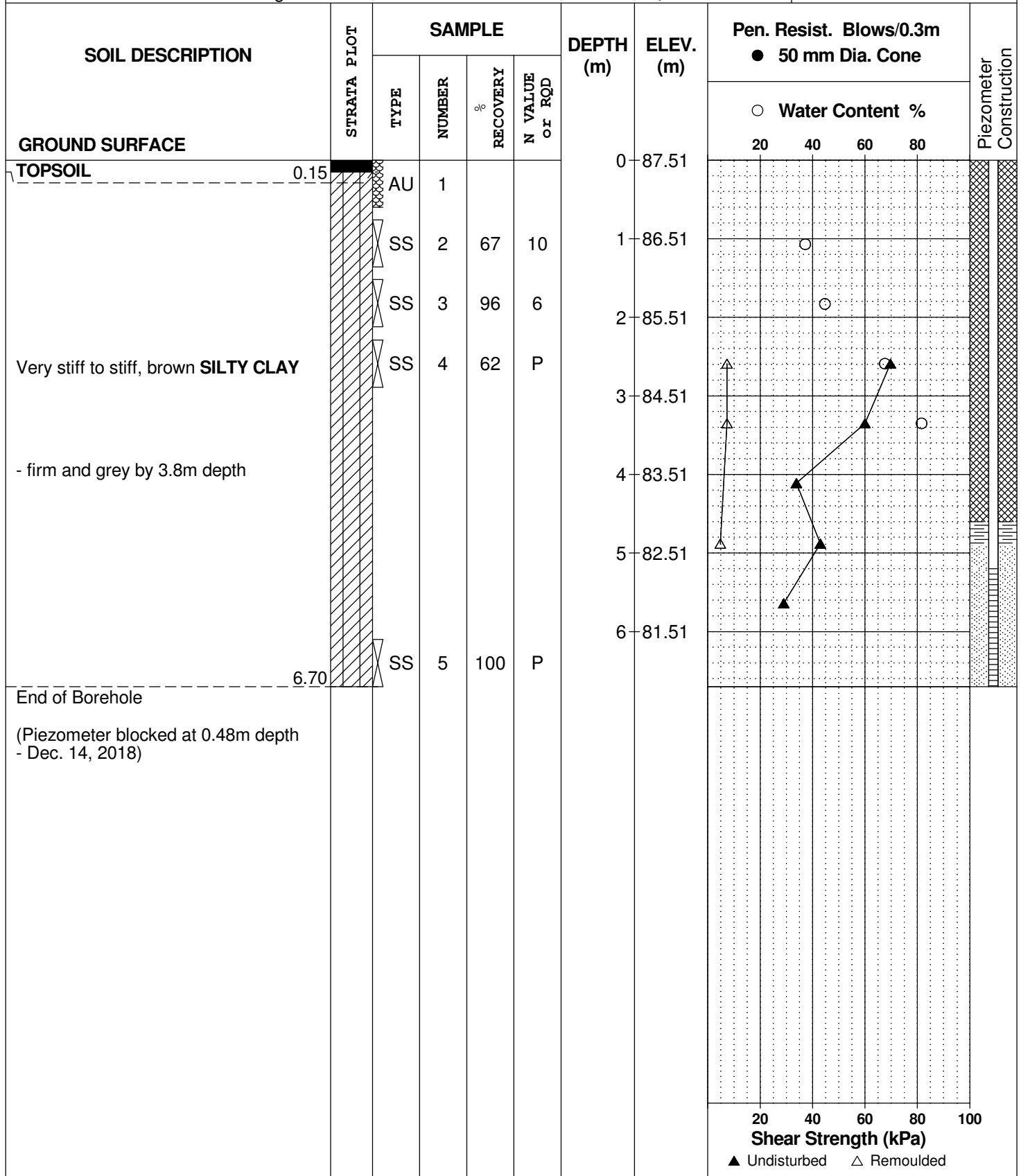
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REMARKS

HOLE NO.
BH 8-18

BORINGS BY CME 55 Power Auger

DATE December 6, 2018



DATUM Ground surface elevations provided by J.D. Barnes Limited

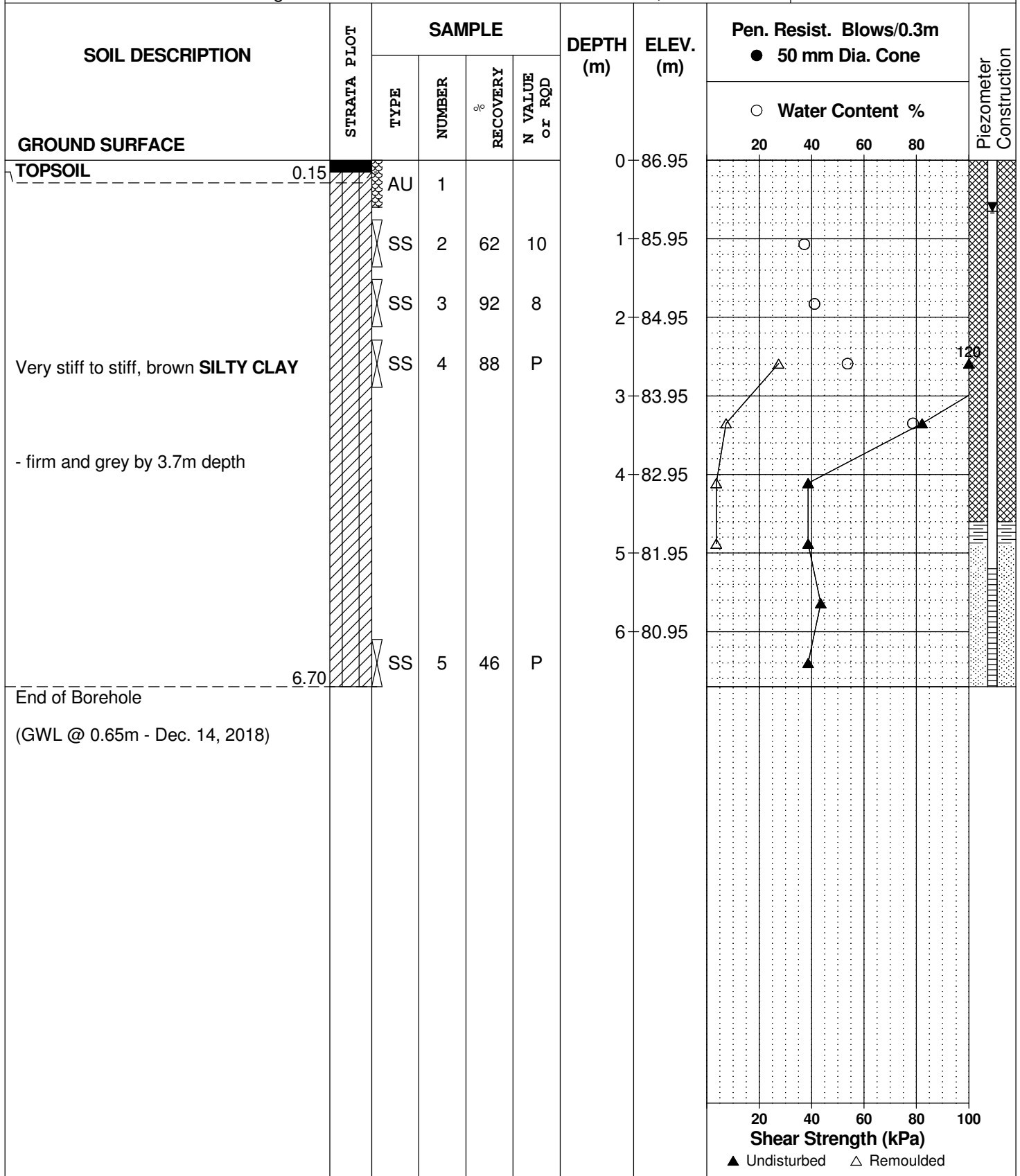
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REMARKS

HOLE NO.
BH 9-18

BORINGS BY CME 55 Power Auger

DATE December 7, 2018



DATUM Ground surface elevations provided by J.D. Barnes Limited

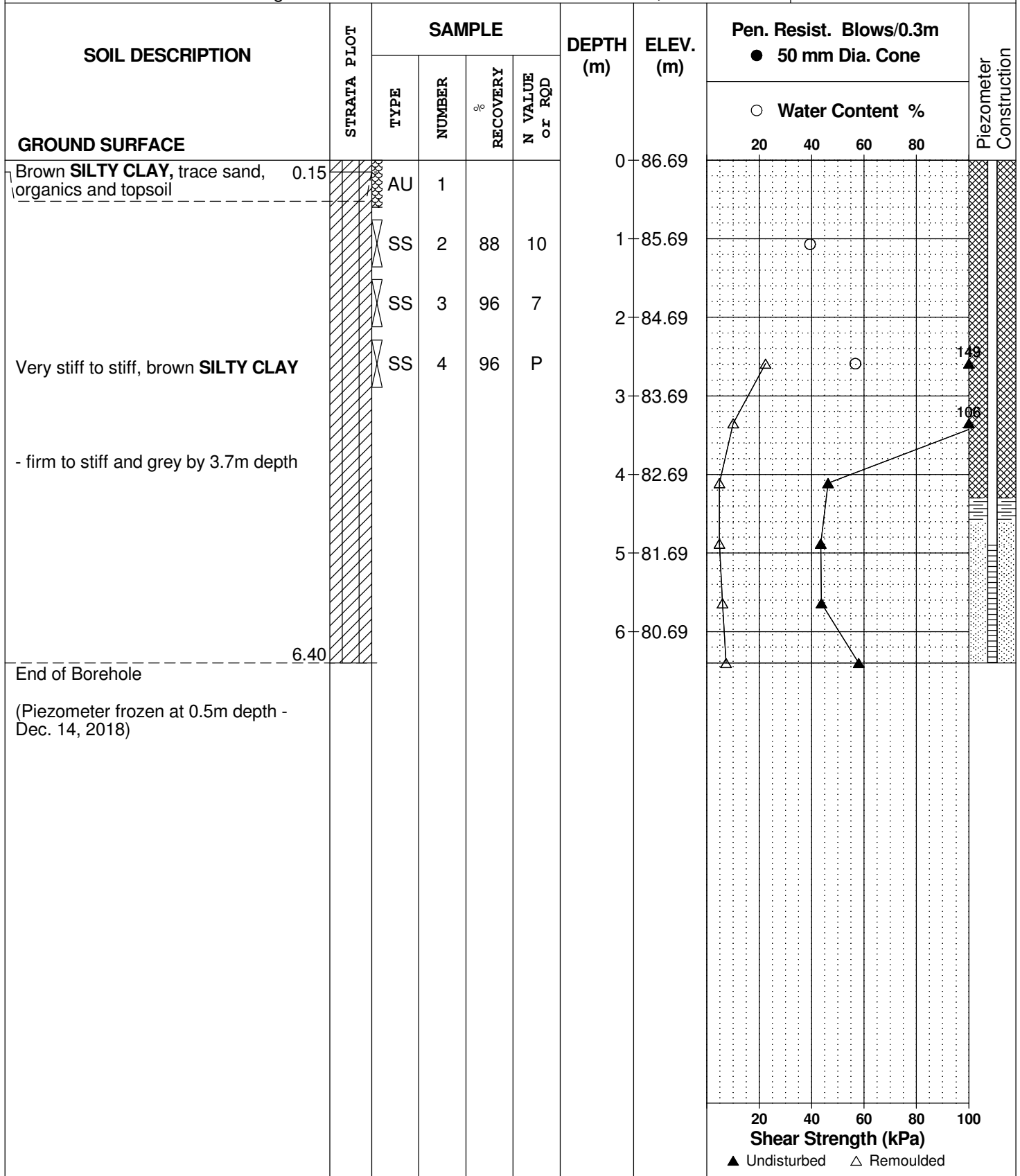
FILE NO.
PG4026

REMARKS

HOLE NO.
BH10-18

BORINGS BY CME 55 Power Auger

DATE December 7, 2018



DATUM

REMARKS

BORINGS BY Backhoe

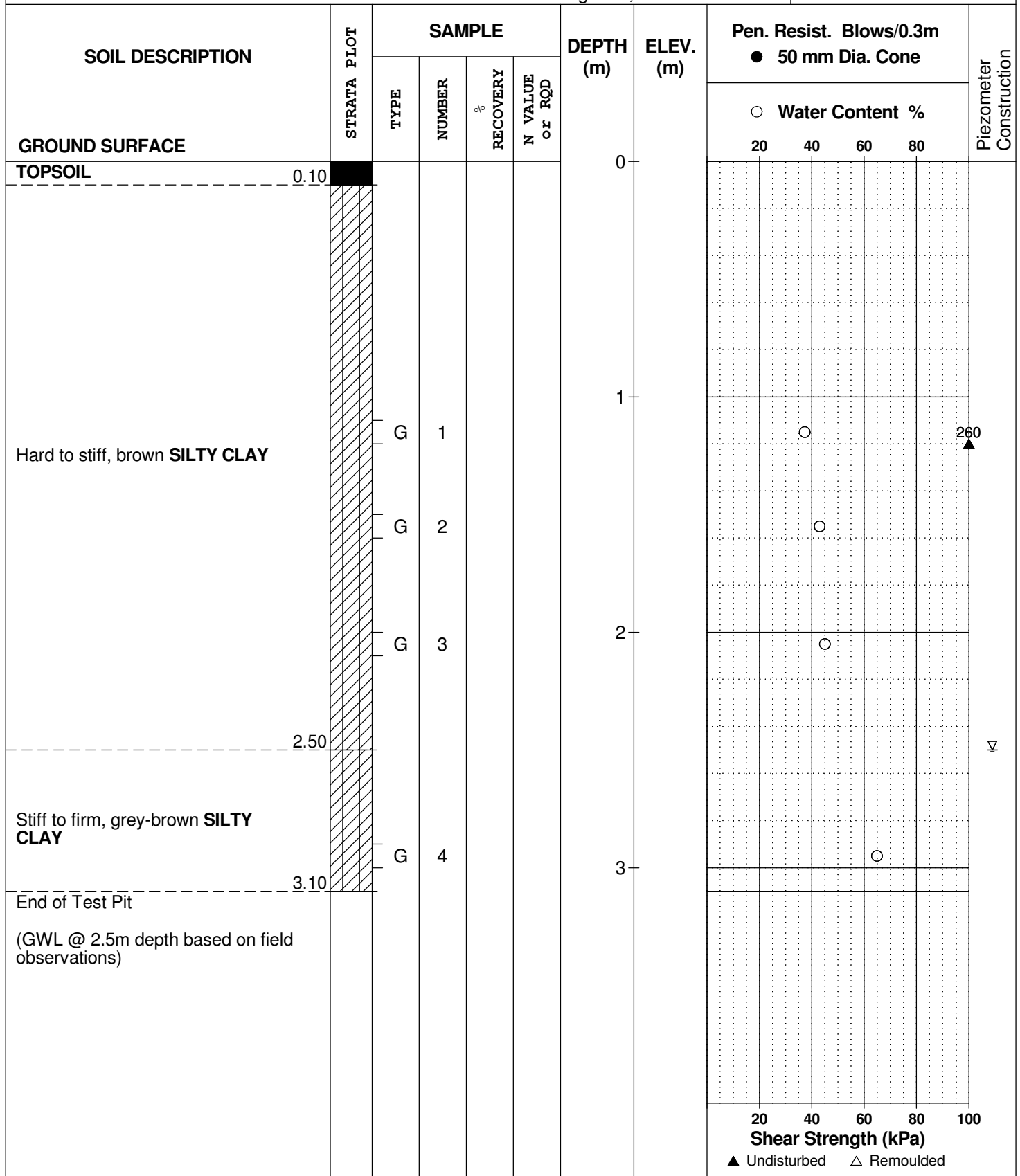
DATE August 1, 2017

FILE NO.

PG4026

HOLE NO.

TP 1



DATUM

REMARKS

BORINGS BY Backhoe

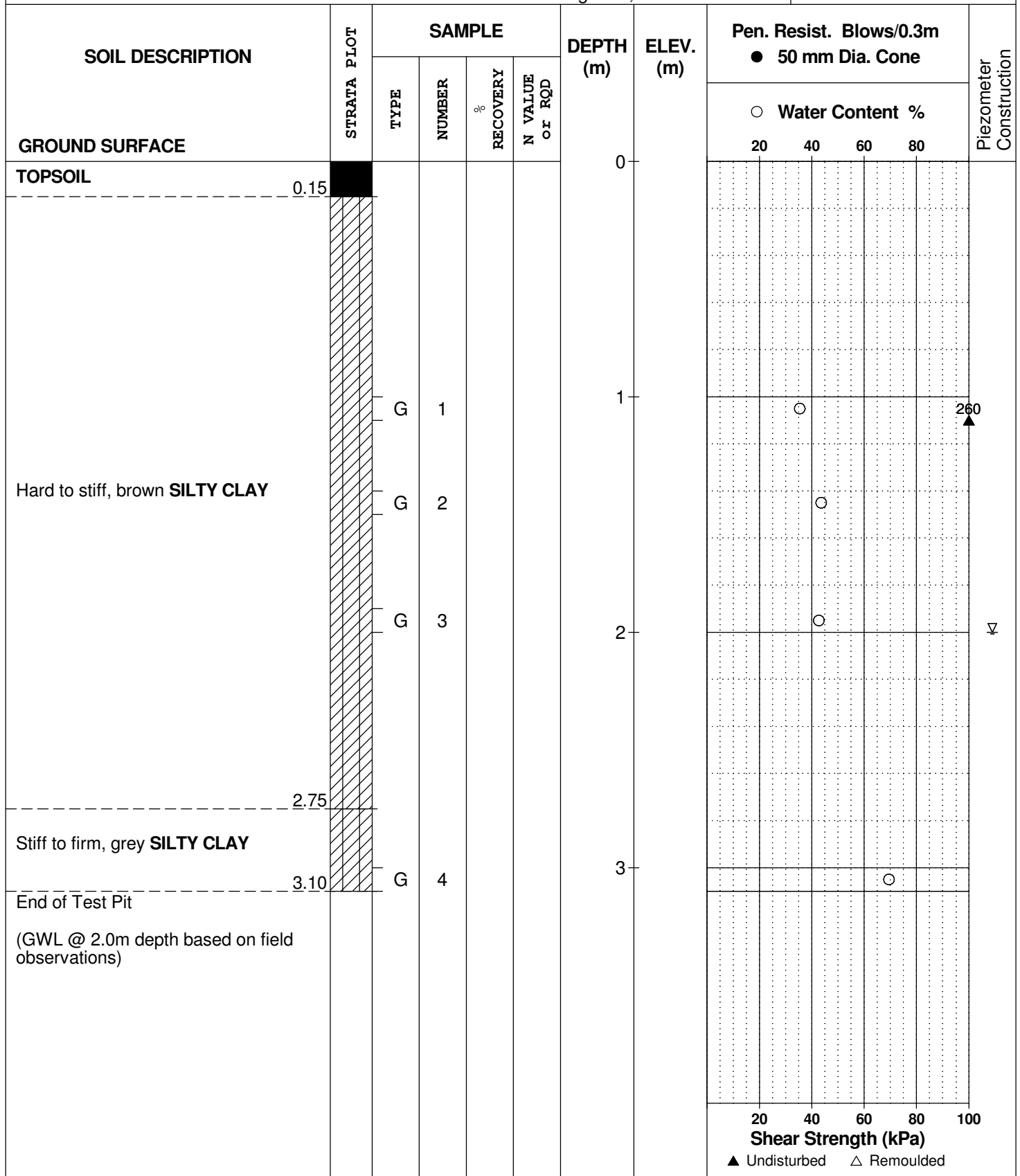
DATE August 1, 2017

FILE NO.

PG4026

HOLE NO.

TP 2



DATUM

REMARKS

BORINGS BY Backhoe

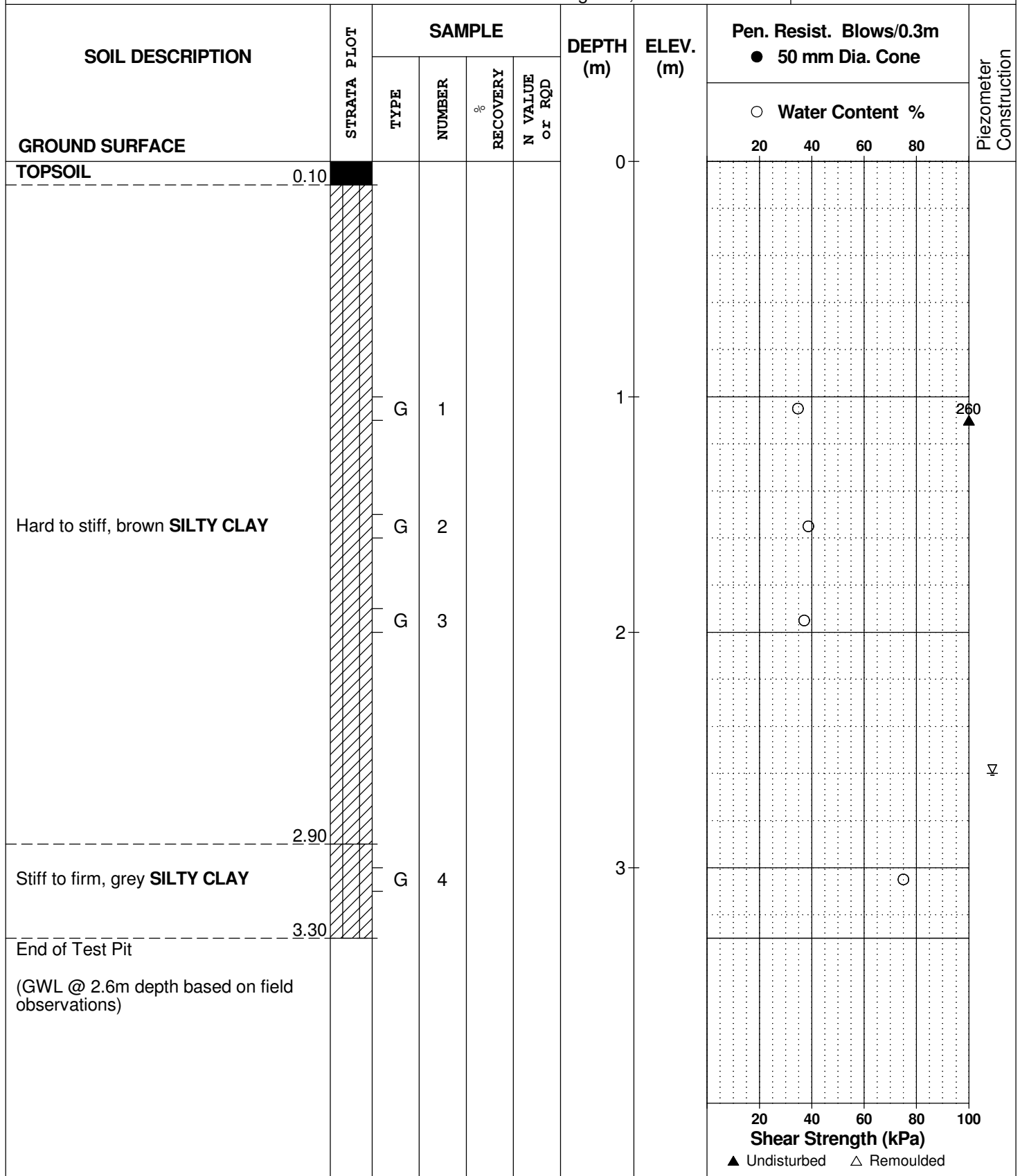
DATE August 1, 2017

FILE NO.

PG4026

HOLE NO.

TP 3



DATUM

REMARKS

BORINGS BY Backhoe

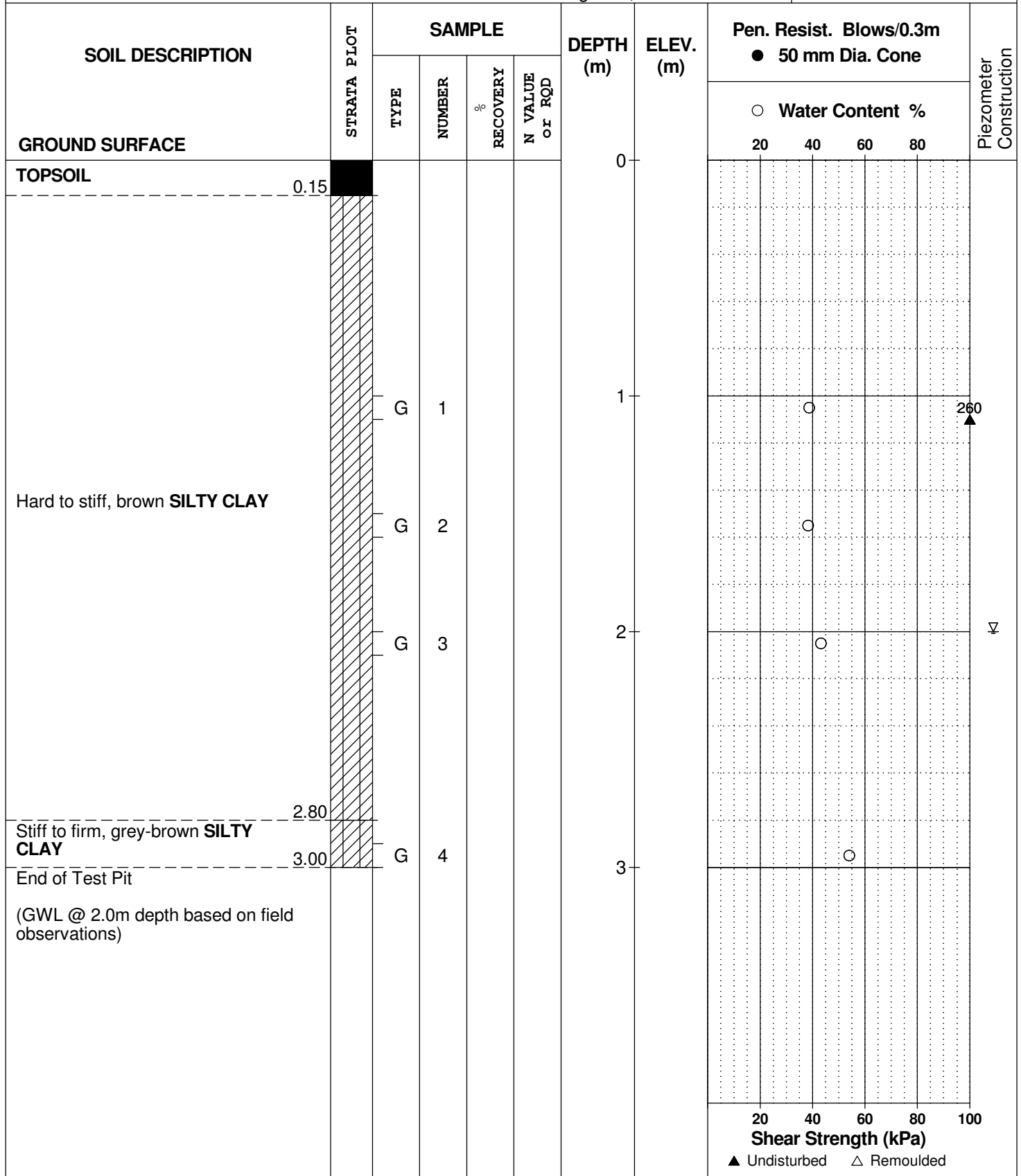
DATE August 1, 2017

FILE NO.

PG4026

HOLE NO.

TP 4



DATUM

REMARKS

BORINGS BY Backhoe

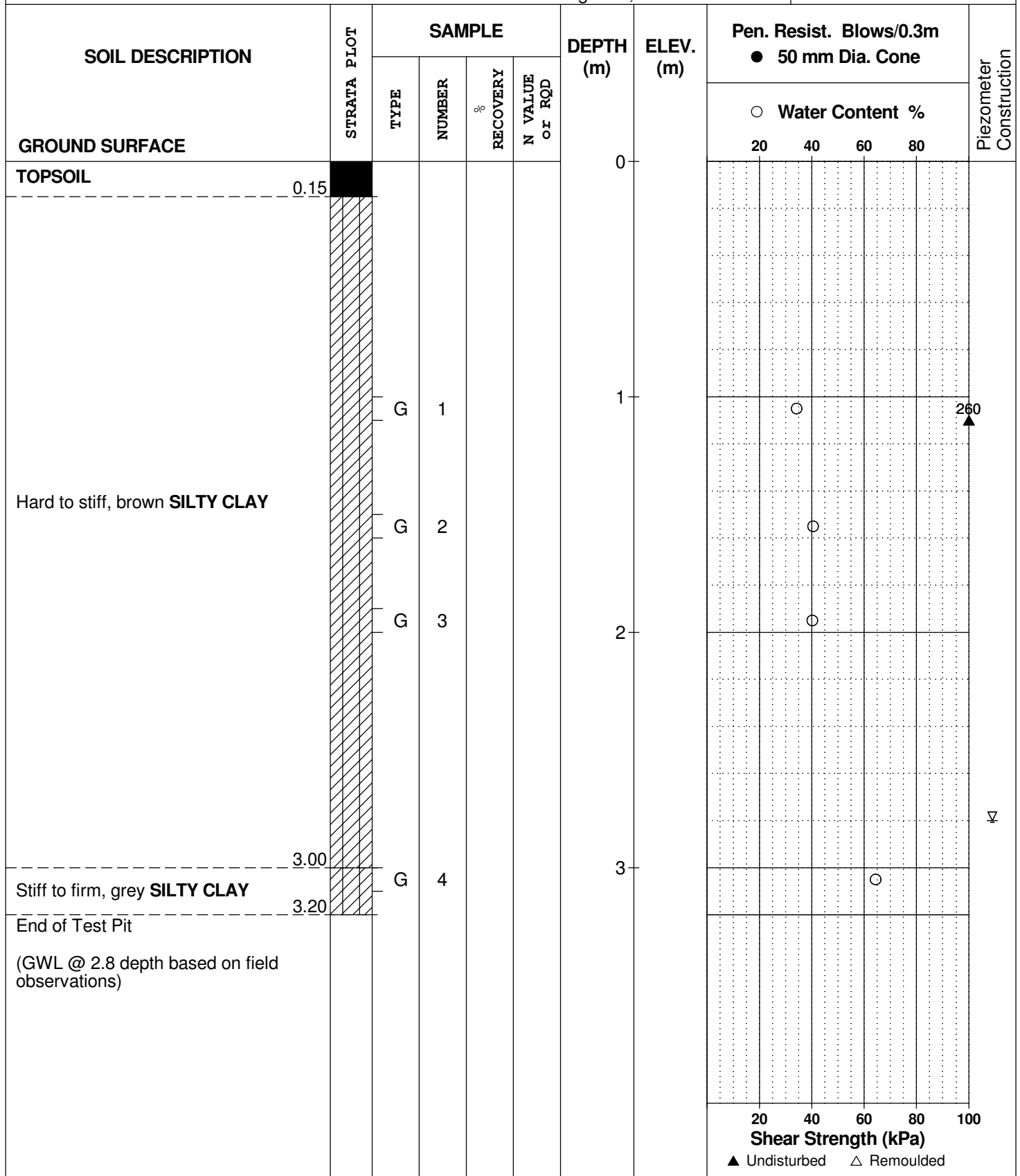
DATE August 1, 2017

FILE NO.

PG4026

HOLE NO.

TP 5



Préparé par : Catherine Tardy Laporte
Vérifié par : Annie GauthierDate début : 2013-06-27
Date fin : 2013-06-27

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Client : La Coop fédérée

Numéro de projet :

131-13558-00

Coordonnées géographiques : X = 75.5191369842 °O

Y = 45.4458564224 °N

Élévation surface :

90.69 m ()

Élévation marginale :

Entrepreneur forage : Marathon Drilling Co. Ltd.

Type de foreuse : CME 75

Équipement de forage : Tarière tige pleine /

Diamètre du forage : 200 mm

Fluide forage : Aucun

Équip. d'échantillonnage : Carottier fendu

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

Niveau d'eau

Phase libre

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Mercure

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.

Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)		STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE	DESCRIPTION	OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION			REMARQUES
					CONC. VAPEUR (ppm OU % LIE)	ODEUR			VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	
						F	M	P										
				Surface du terrain.														
0.10 90.59				Asphalte.														
				Remblai : Gravier sableux sec.														
0.50 90.19				Sol naturel : Gravier sableux.														
1.06 89.63				Fin du forage à 1.06 m de profondeur.														
		</																



Préparé par : Catherine Tardy Laporte
Vérifié par : Annie Gauthier

Date début : 2013-06-27
Date fin : 2013-06-27

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Client : La Coop fédérée

Numéro de projet :

131-13558-00

Coordonnées géographiques : X = 75.5189257577 °O

Y = 45.445930007 °N

Élévation surface :

90.64 m ()

Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.

Type de foreuse : CME 75

Équipement de forage : Tarière tige pleine /

Diamètre du forage : 200 mm

Fluide forage : Aucun

Équip. d'échantillonnage : Carottier fendu

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTEX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercur

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀

Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.

Lixiviation (mat. dangereuses)

▽ Niveau d'eau

▽ Phase libre

PROFONDEUR ÉLÉVATION (m)		STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE DESCRIPTION	OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION		REMARQUES	
				CONC. VAPEUR (ppm OU % LIE)	ODEUR			VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coupes/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME		DESCRIPTION
					F	M	P										
			Surface du terrain.														
0.10			Asphalte.														
90.54			Remblai : Gravier sableux brun gris sec.														
0.45									CF	41	3 11 6	F-02 (0.30-0.45)	HP F1-F4 HAP Métaux (R153) HP F1-F4 HAP BTEX				0.5
0.55			Sol naturel : Sable silteux noir.									F-02 (0.45-0.55)					
90.09			Sol naturel : Sable silteux brun sec.									F-02 (0.55-0.75)					
0.75			Sol naturel : Sable graveleux.									F-02 (0.75-0.91)					
89.89																	
1.0									CF	66	3 6 R/1.2	F-02 (0.91-1.02)					1.0
1.21			Fin du forage à 1.21 m de profondeur.									F-02 (1.02-1.12)					
89.43																	



Préparé par : Catherine Tardy Laporte
Vérifié par : Annie Gauthier

Date début : 2013-06-27
Date fin : 2013-06-27

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Client : La Coop fédérée

Numéro de projet : 131-13558-00
Coordonnées géographiques : X = 75.5196137735 °O
Y = 45.4456012321 °N

Élévation surface : 90.39 m ()

Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.

Type de foreuse : CME 75

Équipement de forage : Tarière tige pleine /

Diamètre du forage : 200 mm

Fluide forage : Aucun

Équip. d'échantillonnage : Carottier fendu

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTEX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀

Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Mercure

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc,

Lixiviation (mat. dangereuses)

▽ Niveau d'eau

▽ Phase libre

PROFONDEUR ÉLÉVATION (m)		STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE DESCRIPTION	OBSERVATIONS CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION			REMARQUES	
					ODEUR					VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME		DESCRIPTION
					F	M	P	D	S										
			Surface du terrain.																
0.10 90.29			Asphalte.																
0.30 90.09			Remblai : Gravier sableux sec.																
0.50 89.89			Sol naturel : Sable graveleux gris.																
0.50 89.89			Sol naturel : Sable silteux avec trace de gravier.																0.5
0.91 89.48			Sol naturel : Sable silteux.																1.0
1.0 89.48			Sol naturel : Sable silteux.																1.0
1.52 88.87			Fin du forage à 1.52 m de profondeur.																1.5
2.0 88.87			Fin du forage à 1.52 m de profondeur.																2.0
2.5 88.87			Fin du forage à 1.52 m de profondeur.																2.5
3.0 88.87			Fin du forage à 1.52 m de profondeur.																3.0
3.5 88.87			Fin du forage à 1.52 m de profondeur.																3.5
4.0 88.87			Fin du forage à 1.52 m de profondeur.																4.0



Page 1 de 1

Date début : 2013-06-27
Date fin : 2013-06-27

Numéro de projet : **131-13558-00**
 Coordonnées géographiques : X = 75.5201167458 °O
 Y = 45.4451939281 °N
 Élévation surface : 89.29 m (l)
 Élévation marquée :

ODEUR F - Faible odeur M - Odeur moyenne P - Odeur persistante	TYPE D'ÉCHANTILLON CD - Carottier à diamants CF - Cuillère fendue PS - Échantillonneur à piston TC - Tube creux TM - Tarière manuelle TR - Truelle TS - Tube Shelby TT - Tube transparent
 Niveau d'eau	 Phase libre

ANALYSES CHIMIQUES	HAC	Hydrocarb. aliphatiques chlorés
BPC	HAM	Hydrocarbures aromatiques
BTEX	HAP	monocycliques
		Hydrocarbures aromatiques
		polycycliques
COT	Carbone organique total	
C. Inorg.	H C ₁₀ -C ₅₀	Hydrocarbures pétroliers C ₁₀ -C ₅₀
	H F1-F14	Hydrocarb. pétrol. F1-F4 (C ₉ -C ₃₀)
	(cyanure, fluorure, bromure, soufre total)	
	Mercurie	Mercurie
C. Phénol.	Métaux	Argent, arsenic, baryum, cadmium
COV	Hydrocarbures HAM et HAC	cobalt, chrome, cuivre, étain,
Diox. & Fur.	Dioxines et furanes	manganèse, molybdène, nickel,
		plomb, sélénium, zinc.
	RMD	Lixiviation (mat. dangereuses)

[illegible]



GENIVAR

RAPPORT DE FORAGE : F-05

Page 1 de 1

Préparé par : **Catherine Tardy Laporte**
Vérifié par : **Annie Gauthier**

Date début : **2013-06-27**
Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**

Site : **Site # 38 Orléans**

Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**

Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**

Coordonnées géographiques : **X = 75.5198284892 °O**

Y = 45.4453512328 °N

Élévation surface : **89.21 m ()**

Élévation margelle :

Entrepreneur forage : **Marathon Drilling Co. Ltd.**

Type de foreuse : **CME 75**

Équipement de forage : **Tarière tige pleine /**

Diamètre du forage : **200 mm**

Fluide forage : **Aucun**

Équip. d'échantillonnage : **Carottier fendu**

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

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ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTEX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercur

Métaux

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀

Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc,

Lixiviation (mat. dangereuses)

RMD

▽ Niveau d'eau

▽ Phase libre

PROFONDEUR ÉLÉVATION (m)		STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION			REMARQUES
					ODEUR	VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION				
															F	M	P	
			Surface du terrain.															
89.21			Remblai : Sable et gravier sec					CF	66	58 20 18	F-05 (0.00-0.20)							
0.20																		
89.01			Sol naturel : Gravier noir et saturé avec un peu de sable.								F-05 (0.20-0.61)							
0.5																	0.5	
0.61			Sol naturel : Argile silteuse brune-beige et humide.					CF	100	1 1 6	F-05 (0.61-1.22)							
88.60																	1.0	
1.0																		
1.5								CF	100		F-05 (1.22-1.32) F-05 (1.32-1.83)	HP F1-F4 HAP BTEX Métaux (R153)					1.5	
1.83			Sol naturel : Argile silteuse grise humide.					CF	82	3 22 8	F-05 (1.83-2.10)							
87.38																	2.0	
2.0																		
2.10			Sol naturel : Gravier sableux gris.								F-05 (2.10-2.34)							
87.11																		
2.34			Fin du forage à 2.34 m de profondeur.															
86.87																	2.5	
2.5																		
3.0																	3.0	
3.5																	3.5	
4.0																		



Préparé par : Catherine Tardy Laporte
Vérifié par : Annie Gauthier

Date début : 2013-06-27
Date fin : 2013-06-27

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Client : La Coop fédérée

Numéro de projet : 131-13558-00
Coordonnées géographiques : X = 75.5200570318 °O
Y = 45.4478309683 °N

Élévation surface : 89.22 m ()

Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.

Type de foreuse : CME 75

Équipement de forage : Tarière tige pleine /

Diamètre du forage : 200 mm

Fluide forage : Aucun

Équip. d'échantillonnage : Carottier fendu

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTEX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₅₀

HP F1-F4

Mercur

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₅₀

Hydrocarb. pétrol. F1-F4 (C₁₀-C₅₀)

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc,

Lixiviation (mat. dangereuses)

▽ Niveau d'eau

▽ Phase libre

PROFONDEUR ÉLÉVATION (m)		STRATIGRAPHIE		GÉOLOGIE / STRATIGRAPHIE		DESCRIPTION		OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION		REMARQUES	
								CONC. VAPEUR (ppm OU % LIE)	ODEUR			VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME		DESCRIPTION
									F	M	P										
	89.22																				
0.5	0.61																		0.5		
	88.61																				
1.0																			1.0		
1.5	87.70																		1.5		
	1.83																				
2.0																			2.0		
2.5																			2.5		
3.0																			3.0		
3.5																			3.5		
4.0																			4.0		


Préparé par : **Catherine Tardy Laporte**
Vérifié par : **Annie Gauthier**

Date début : **2013-06-27**
Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**

Numéro de projet : **131-13558-00**

Site : **Site # 38 Orléans**

Coordonnées géographiques : **X = 75.5199577902 °O**

Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Y = 45.4476971365 °N

Client : **La Coop fédérée**

Élévation surface : **89.47 m ()**

Élévation margelle :

Entrepreneur forage : **Marathon Drilling Co. Ltd.**

Type de foreuse : **CME 75**

Équipement de forage : **Tarière tige pleine /**

Diamètre du forage : **200 mm**

Fluide forage : **Aucun**

Équip. d'échantillonnage : **Carottier fendu**

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

▽ Niveau d'eau

▽ Phase libre

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀

Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc,

Lixiviation (mat. dangereuses)

PROFONDEUR ÉLEVATION (m)		STRATIGRAPHIE		GÉOLOGIE / STRATIGRAPHIE		DESCRIPTION		OBSERVATIONS				ÉCHANTILLONS				PUITS D'OBSERVATION			REMARQUES		
								CONC. VAPEUR (ppm OU % LIE)	ODEUR			VISUEL	TYPE ÉCHANTILLON	% Récupération	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA		DIAGRAMME	DESCRIPTION
									F	M	P										
	89.47																				
	0.50																				
	0.60																				
	88.87																				


Préparé par : **Catherine Tardy Laporte**
Vérifié par : **Annie Gauthier**

Date début : **2013-06-27**
Date fin : **2013-06-27**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**

Numéro de projet : **131-13558-00**

Site : **Site # 38 Orléans**

Coordonnées géographiques : **X = 75.5196453839 °O**

Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**
Y = 45.4472729549 °N

Client : **La Coop fédérée**

Élévation surface : **89.2 m ()**

Élévation margelle :

Entrepreneur forage : **Marathon Drilling Co. Ltd.**

Type de foreuse : **CME 75**

Équipement de forage : **Tarière tige pleine /**

Diamètre du forage : **200 mm**

Fluide forage : **Aucun**

Équip. d'échantillonnage :

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

Niveau d'eau

Phase libre

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

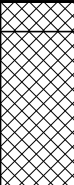
Hydrocarbures pétroliers C₁₀-C₂₀

Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Mercure

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc,

Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)		GÉOLOGIE / STRATIGRAPHIE		OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION			REMARQUES
				CONC. VAPEUR (ppm OU % LIE)	ODEUR			VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	
					F	M	P										
				Surface du terrain.													
0.10 89.10				Remblai : Argile graveleuse.					CF	41	2 11 8 22		HP F1-F4 HAP BTEX				
			Remblai : Sable graveleux gris.														
0.5 0.61 88.59				Fin du forage à 0.61 m de profondeur.													Refus à 0.61 m sur bloc ou roc.
1.0																	
1.5																	
2.0																	
2.5																	
3.0																	
3.5																	
4.0																	

Préparé par : Catherine Tardy Laporte
Vérifié par : Annie GauthierDate début : 2013-06-27
Date fin : 2013-06-27

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Client : La Coop fédérée

Numéro de projet :

131-13558-00

Coordonnées géographiques : X = 75.5190143537 °O

Y = 45.4460829513 °N

Élévation surface :

89.71 m ()

Élévation margelle :

Entrepreneur forage : Marathon Drilling Co. Ltd.

Type de foreuse : CME 75

Équipement de forage : Tarière tige pleine /

Diamètre du forage : 200 mm

Fluide forage : Aucun

Équip. d'échantillonnage :

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

Niveau d'eau

Phase libre

ANALYSES CHIMIQUES

BPC

Biphényles polychlorés

BTEX

Benzène, toluène, éthylbenzène, xylène

COT

Carbone organique total

C. Inorg.

Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol.

Composés phénoliques

COV

Hydrocarbures HAM et HAC

Diox. & Fur.

Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

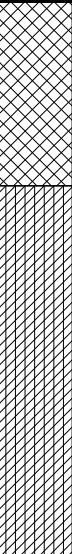
Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Mercure

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.

Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE DESCRIPTION	OBSERVATIONS CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION		REMARQUES
				ODEUR	VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION			
														F	M	
		Surface du terrain.														
89.71		Remblai : Sable et gravier. Gris blanc sec devenant humide.						CF	74	64 60 24 16		HP F1-F4 HAP BTEX	DUP7			
0.5 89.10		Sol naturel : Argile silteuse avec un peu de sable humide.						CF	25	1 2 3 4						
1.0									CF	100	2 3 5					
1.5 88.19																
1.83		Fin du forage à 1.52 m de profondeur.														
2.0																
2.5																
3.0																
3.5																
4.0																

Préparé par : Catherine Tardy Laporte
Vérifié par : Annie GauthierDate début : 2013-06-27
Date fin : 2013-06-27

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Client : La Coop fédérée

Numéro de projet : 131-13558-00

Coordonnées géographiques : X = 75.5189110706 °O

Y = 45.446095328 °N

Élévation surface : 89.99 m ()

Élévation margelle : 89.99 m ()

Entrepreneur forage : Marathon Drilling Co. Ltd.

Type de foreuse : CME 75

Équipement de forage : Tarière tige pleine /

Diamètre du forage : 200 mm

Fluide forage : Aucun

Équip. d'échantillonnage : Carottier fendu

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

ANALYSES CHIMIQUES

BPC

Biphényles polychlorés

BTX

Benzène, toluène, éthylbenzène, xylène

COT

Carbone organique total

C. Inorg.

Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol.

Composés phénoliques

COV

Hydrocarbures HAM et HAC

Diox. & Fur.

Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Lixiviation (mat. dangereuses)

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Mercure

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.

Lixiviation (mat. dangereuses)

Niveau d'eau

Phase libre

PROFONDEUR ÉLÉVATION (m)		STRATIGRAPHIE		GÉOLOGIE / STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION					REMARQUES
												TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION			
																				ODEUR	VISUEL	
								F	M	P	D	S										
				Surface du terrain.																		
89.99				Remblai : Sable graveleux gris avec trace d'oxydation.									CF	57	60 22	PO-01 (0.00-0.61)						
0.61				Sol naturel : Argile silteuse brune.									CF	90	2 00	PO-01 (0.61-0.86)	HP F1-F4 HAP BTEX Métaux (R153)					
0.86				Sol naturel : Sable silteux humide.												PO-01 (0.86-1.22)						
89.13				Sol naturel : Argile silteuse grise et humide.									CF	100	2 24 6	PO-01 (1.22-1.83)						
1.22				Fin du forage à 2.08 m de profondeur.																		
88.77																						
1.83																						
87.91																						
2.08																						
2.5																						
3.0																						
3.5																						
4.0																						


Préparé par : **Catherine Tardy Laporte**
Vérifié par : **Annie Gauthier**

Date début : **2013-07-02**
Date fin : **2013-07-02**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**

Site : **Site # 38 Orléans**

Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**

Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**

Coordonnées géographiques : **X = 75.5199533185 °O**
Y = 45.4457572743 °N

Élévation surface : **89.57 m ()**

Élévation margelle :

Entrepreneur forage : **Denis Ladouceur Excavation Ltée**

Type de foreuse : **Rétrocaveuse**

Équipement de forage : **Manuelle /**

Diamètre du forage :

Fluide forage :

Équip. d'échantillonnage : **Carottier fendu**

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

Niveau d'eau

Phase libre

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀

Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc,

Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE DESCRIPTION	CONC. VAPEUR (ppm OU % LIÉ)	OBSERVATIONS					ÉCHANTILLONS					PUITS D'OBSERVATION		REMARQUES
				ODEUR	VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coupes/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION			
														F	M	
		Surface du terrain.														
89.57		Remblai : Gravier sableux avec trace de silt. Gris et humide.					TR			TE-01 (0.00-0.30)						
0.30																
89.27		Remblai : Silt sableux brun avec trace de matière résiduelle (bois brûlé).								TE-01 (0.30-0.60)	HP F1-F4 HAP BTEX Métaux (R153)					0.5
0.60																
88.97		Infiltration d'eau à 0.6 m.														
		Sol naturel : Silt argileux gris humide.								TE-01 (0.60-1.00)						
1.00																
88.57		Sol naturel : Silt sableux graveleux avec trace d'argile. Gris humide.								TE-01 (1.00-3.50)						1.0
1.5																1.5
2.0																2.0
2.5																2.5
3.0																3.0
3.5																
3.50		Infiltration d'eau.														3.5
86.07		Fin de la tranchée														
		Roc atteint														
4.0																


Préparé par : **Catherine Tardy Laporte**
Vérifié par : **Annie Gauthier**

Date début : **2013-07-02**
Date fin : **2013-07-02**

Nom du projet : **Évaluation Environnementale de site (ÉES) Phase II**

Site : **Site # 38 Orléans**

Secteur : **3636-3646, chemin Innes, Orléans (Ontario)**

Client : **La Coop fédérée**

Numéro de projet : **131-13558-00**
Coordonnées géographiques : **X = 75.5205637155 °O**
Y = 45.4458202359 °N

Élévation surface : **89.59 m ()**

Élévation margelle :

Entrepreneur forage : **Denis Ladouceur Excavation Ltée**

Type de foreuse : **Rétrocaveuse**

Équipement de forage : **Manuelle /**

Diamètre du forage :

Fluide forage :

Équip. d'échantillonnage : **Carottier fendu**

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

▽ Niveau d'eau

▽ Phase libre

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTEX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀

Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc,

Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE DESCRIPTION	OBSERVATIONS					ÉCHANTILLONS				PUITS D'OBSERVATION		
			CONC. VAPEUR (ppm ou % Lie)	ODEUR	VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coupes/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.												
89.59		Remblai : Matière résiduelle (55%) (brique, bois, bois brûlé et plastique) et silt sableux avec trace de matière organique. Brun humide.				TR			TE-02 (0.00-0.35)	HP F1-F4 HAP BTEX Métaux (R153)				
0.35														
89.24		Sol naturel : Silt avec un peu de sable et trace de matière organique.							TE-02 (0.35-1.00)	HP F1-F4 HAP BTEX Métaux (R153)				0.5
1.00														
88.59		Sol naturel : Silt argileux avec traces de gravier brun-beige.							TE-02 (1.00-1.45)	HP F1-F4 HAP BTEX Métaux (R153)				1.0
1.45														
88.14		Sol naturel : Silt argileux gris avec traces de gravier.							TE-02 (1.45-3.30)					1.5
2.0														2.0
2.5														2.5
3.0														3.0
3.30		Infiltration d'eau.												
86.29		Fin de la tranchée												
		Roc atteint												3.5
4.0														4.0



Préparé par : Catherine Tardy Laporte
Vérifié par : Annie Gauthier

Date début : 2013-07-02
Date fin : 2013-07-02

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Cient : La Coop fédérée

Numéro de projet : 131-13558-00

Coordonnées géographiques : X = 75.5206801071 °O

Y = 45.4461519033 °N

Élévation surface : 88.98 m ()

Élévation marginale :

Entrepreneur forage : Denis Ladouceur Excavation Ltée

Type de foreuse : Rétrocaveuse

Équipement de forage : Manuelle /

Diamètre du forage :

Fluide forage :

Équip. d'échantillonnage : Carottier fendu

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

ANALYSES CHIMIQUES

BPC Biphényles polychlorés

BTEX Benzène, toluène, éthylbenzène, xylène

COT Carbone organique total

C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol. Composés phénoliques

COV Hydrocarbures HAM et HAC

Diox. & Fur. Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₅₀

HP F1-F4

Mercur

Métaux

RMD

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₅₀

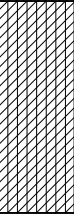
Hydrocarb. pétrol. F1-F4 (C₁₀-C₅₀)

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.

Lixiviation (mat. dangereuses)

▽ Niveau d'eau

▽ Phase libre

PROFONDEUR ÉLÉVATION (m)		STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE DESCRIPTION	OBSERVATIONS					ÉCHANTILLONS				PUITS D'OBSERVATION		REMARQUES		
				CONC. VAPEUR (ppm OU % LIE)	ODEUR			VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA		DIAGRAMME	DESCRIPTION
					F	M	P										
			Surface du terrain.														
88.98			Remblai : Gravier sableux gris saturé. <i>Eau à la surface.</i>						TR			TE-03 (0.00-0.30)					
0.30													TE-03 (0.30-1.00)	HP F1-F4 HAP	DUP8		
88.68			Sol naturel : Silt argileux gris humide.														
0.5																	
1.00			Sol naturel : Silt avec un peu d'argile gris humide.									TE-03 (1.00-2.60)					1.0
87.98																	
1.5																	1.5
2.0																	2.0
2.5																	2.5
2.60			Fin de la tranchée														
86.38																	
		 Roc atteint															
3.0																	3.0
3.5																	3.5
4.0																	4.0

Préparé par : Catherine Tardy Laporte
Vérifié par : Annie GauthierDate début : 2013-07-02
Date fin : 2013-07-02

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Client : La Coop fédérée

Numéro de projet : 131-13558-00

Coordonnées géographiques : X = 75.5202005926 °O

Y = 45.4465543177 °N

Élévation surface : 90.77 m ()

Élévation margelle :

Entrepreneur forage : Denis Ladouceur Excavation Ltée

Type de foreuse : Rétrocaveuse

Équipement de forage : Manuelle /

Diamètre du forage :

Fluide forage :

Équip. d'échantillonnage : Carottier fendu

ODEUR

F - Faible odeur

M - Odeur moyenne

P - Odeur persistante

VISUEL

D - Produit disséminé

S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants

CF - Cuillère fendue

PS - Échantillonneur à piston

TC - Tube creux

TM - Tarière manuelle

TR - Truelle

TS - Tube Shelby

TT - Tube transparent

▽ Niveau d'eau

▽ Phase libre

ANALYSES CHIMIQUES

BPC

Biphényles polychlorés

BTEX

Benzène, toluène, éthylbenzène, xylène

COT

Carbone organique total

C. Inorg.

Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)

C. Phénol.

Composés phénoliques

COV

Hydrocarbures HAM et HAC

Diox. & Fur.

Dioxines et furanes

HAC

HAM

HAP

HP C₁₀-C₂₀

HP F1-F4

Mercure

Métaux

RMD

Lixiviation (mat. dangereuses)

Hydrocarb. aliphatiques chlorés

Hydrocarbures aromatiques monocycliques

Hydrocarbures aromatiques polycycliques

Hydrocarbures pétroliers C₁₀-C₂₀Hydrocarb. pétrol. F1-F4 (C₁₀-C₂₀)

Mercure

Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.

Lixiviation (mat. dangereuses)

GÉOLOGIE / STRATIGRAPHIE			OBSERVATIONS					ÉCHANTILLONS				PUITS D'OBSERVATION		REMARQUES		
PROFONDEUR ÉLÉVATION (m)	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR			VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA		DIAGRAMME	DESCRIPTION
				F	M	P										
		Surface du terrain.														
90.77		Remblai : Sable graveleux avec trace de matière organique. Brun sec.						TR			TE-04 (0.00-1.00)					
0.5																
1.00																
89.77		Remblai : Silt argileux avec trace de matière organique. Brun noir humide.									TE-04 (1.00-2.30)	HP F1-F4 HAP Métaux (R153)				
1.5																
2.0																
2.30		Sol naturel : Silt avec un peu d'argile gris humide.									TE-04 (2.30-3.20)					
88.47																
2.5																
3.0																
3.20		Infiltration d'eau														
87.57		Fin de la tranchée														
3.5																
4.0																


Préparé par : Catherine Tardy Laporte
Vérifié par : Annie Gauthier

Date début : 2013-07-02
Date fin : 2013-07-02

Nom du projet : Évaluation Environnementale de site (ÉES) Phase II

Numéro de projet : 131-13558-00
Coordonnées géographiques : X = 75.5204743629 °O
Y = 45.4472004843 °N

Site : Site # 38 Orléans

Secteur : 3636-3646, chemin Innes, Orléans (Ontario)

Client : La Coop fédérée

Élévation surface : 92.43 m ()
Élévation margelle :

Entrepreneur forage : Denis Ladouceur Excavation Ltée

Type de foreuse : Rétrocaveuse

Équipement de forage : Manuelle /

Diamètre du forage :

Fluide forage :

Équip. d'échantillonnage : Carottier fendu

ODEUR

F - Faible odeur
M - Odeur moyenne
P - Odeur persistante

VISUEL

D - Produit disséminé
S - Sol saturé de produit

TYPE D'ÉCHANTILLON

CD - Carottier à diamants
CF - Cuillère fendue
PS - Échantillonneur à piston
TC - Tube creux
TM - Tarière manuelle
TR - Truelle
TS - Tube Shelby
TT - Tube transparent

Niveau d'eau

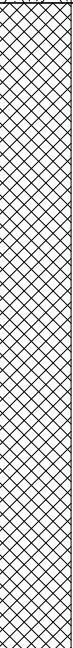
Phase libre

ANALYSES CHIMIQUES

BPC Biphényles polychlorés
BTEX Benzène, toluène, éthylbenzène, xylène
COT Carbone organique total
C. Inorg. Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol. Composés phénoliques
COV Hydrocarbures HAM et HAC
Diox. & Fur. Dioxines et furanes

HAC

HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C₁₀-C₅₀ Hydrocarbures pétroliers C₁₀-C₅₀
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C₁₀-C₅₀)
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc
RMD Lixiviation (mat. dangereuses)

GÉOLOGIE / STRATIGRAPHIE				OBSERVATIONS				ÉCHANTILLONS				PUITS D'OBSERVATION					
PROFONDEUR ÉLÉVATION (m)	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR				VISUEL	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
				F	M	P	D										
		Surface du terrain.															
92.43 0.15 92.28		Terre végétale et un peu de matière résiduelle (20%) (brique).							TR								
0.5		Remblai : Silt sableux graveleux avec trace de matière résiduelle (bois) brun.										TE-05 (0.15-2.30)	HP F1-F4 HAP				0.5
1.0																	1.0
1.5																	1.5
2.0																	2.0
2.30 90.13		Remblai : Silt argileux avec trace de matière organique brun noir.										TE-05 (2.30-3.00)					2.5
3.0																	3.0
3.5												TE-05 (3.00-3.60)					3.5
3.60 88.83		Fin de la tranchée															
4.0																	4.0

BOREHOLE DRILLING RECORD : **BH16-1**

Page 1 of 1

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 1/6/2016
Date (End): 1/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032601 mE
Y = 4593357 mN
Surface Elevation: m ()
Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Line

CHEMICAL ANALYSIS		
PCB	Poly-Chlorinated Biphenyls	MAH Monocyclic Aromatic Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	PAH Polycyclic Aromatic Hydrocarbons
Inorg. C.	Inorganic Compounds	PH $C_{10}-C_{50}$ Petroleum Hydrocarbons $C_{10}-C_{50}$
Phenol. C.	Phenolic Compounds	PH $PH-1-F4$ Petroleum Hydrocarbons $PH-1-F4$ ($C_{10}-C_{50}$)
VOC	Volatil Organic Compounds (MAH & CAH)	Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
Diox. & Fur.	Dioxins & Furans	HWR Leachate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons	

▽ Water Level ▼ Free Phase

[illegible]

BOREHOLE DRILLING RECORD : **BH16-2**

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 1/6/2016
Date (End): 1/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032622 mE
Y = 4593337 mN
Surface Elevation: m ()
Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

CHEMICAL ANALYSIS			
PCB	Poly-Chlorinated Biphenyls	MAH	Monocyclic Aromatic Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	PAH	Polycyclic Aromatic Hydrocarbons
		PH C ₁₂ -C ₃₀	Petroleum Hydrocarbons C ₁₂ -C ₃₀
Inorg. C.	Inorganic Compounds	PH F1-F4	Aromatic Hydrocarbons F1-F4 (C ₁₂ -C ₃₀)
Phenol. C.	Phenolic Compounds	Metals	Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
VOC	Volatile Organic Compounds (MAH & CAH)		Leachate Tests (Haz. Waste Reg.)
Diox. & Fur.	Dioxins & Furans	HWR	
CAH	Chlorinated Aliphatic Hydrocarbons		

▽ Water Level ▼ Free Phase

[illegible]

BOREHOLE DRILLING RECORD : **BH/MW16-3**

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): **1/6/2016**
Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5011286 mE
Y = 472354 mN
Surface Elevation: 87.23 m (*Relative*)
Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	Air
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Line

CHEMICAL ANALYSIS	
PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
CAH	Chlorinated Aliphatic Hydrocarbons

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Reg.)

▽ Water Level ▼ Free Phase

[illegible]

BOREHOLE DRILLING RECORD : **BH16-4**

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 1/6/2016
Date (End): 1/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
 Geographic Coordinates: X = 5032619 mE
 Y = 459397 mN
 Surface Elevation: m ()
 Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

CHEMICAL ANALYSIS			
PCB	Poly-Chlorinated Biphenyls	MAH	Monocyclic Aromatic Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	PAH	Polycyclic Aromatic Hydrocarbons
Inorg. C.	Inorganic Compounds	PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
Phenol. C.	Phenolic Compounds	PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₃₀)
VOC	Volatile Organic Compounds (MAH & CAH)	Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
Diox. & Fur.	Dioxins & Furans	HWR	Leachate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons		

 Water Level  Free Phase

[illegible]



BOREHOLE DRILLING RECORD : BH/MW16-5

Page 1 of 1

Prepared by: Kathryn Maton
Reviewed by: Carolyn Adams

Date (Start): 1/6/2016
Date (End): 2/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032607 mE
Y = 459421 mN
Surface Elevation: 87.47 m (Relative)
Top of PVC Elevation:

Drilling Company: Strata Drilling Group
Drilling Equipment: Geomachine GS100
Drilling Method: Probe rod
Borehole Diameter: 50 mm
Drilling Fluid: Air
Sampling Method:

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

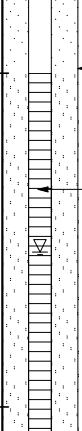
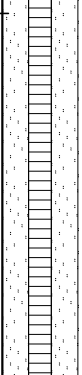
CHEMICAL ANALYSIS
PCB Poly-Chlorinated Biphenyls
BTEX Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C. Inorganic Compounds
Phenol. C. Phenolic Compounds
VOC Volatile Organic Compounds (MAH & CAH)
Diox. & Fur. Dioxins & Furans
CAH Chlorinated Aliphatic Hydrocarbons

MAH Monocyclic Aromatic Hydrocarbons
PAH Polycyclic Aromatic Hydrocarbons
PH C₁₀-C₅₀ Petroleum Hydrocarbons C₁₀-C₅₀
PH F1-F4 Petroleum Hydrocarbons F1-F4 (C₁₀-C₅₀)
Metals Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR Leachate Tests (Haz. Waste Reg.)

Water Level

Free Phase

Project : 161-06382-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY		OBSERVATIONS					SAMPLES				MONITORING WELL		REMARKS			
	LITHOLOGY	DESCRIPTION	VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	ODOUR					SAMPLE TYPE	% RECOVERY	N (Blow/6")	NUMBER	ANALYSIS		DUPLICATE	DIAGRAM	DESCRIPTION
				F	M	P	D	S									
		Ground surface.															
87.47		FILL sand and gravel, brown, dry	H - 0, I - 0						MC	76		BH/MW16-5 1A					
0.23 87.24		CLAYEY SILT brown, moist, stiff	H - 0, I - 0									BH/MW16-5 1B	Metals and Inorganics PHCs F2-F4	BH16-5-101B			
0.5																	0.5
1.0																	1.0
1.5																	1.5
1.52 85.95		SILTY CLAY grey-brown, moist, stiff	H - 0, I - 30						MC	83		BH/MW16-5 2A					
2.0																	2.0
2.5																	2.5
3.0																	3.0
3.05 84.42		← becoming wet and soft	H - 0, I - 35									BH/MW16-5 2B	Metals and Inorganics PH F ₁ -F ₄ BTEX PAH				
		BEDROCK															3.0
3.5																	3.5
4.0																	4.0
4.5																	4.5
4.57 82.90		End of borehole at 4.57 m.															4.5
5.0																	5.0

← Bentonite

← Sand

← Slotted PVC pipe

SCREEN
Diam.: 51 mm
Open.: 0.25 m
Length: 3.05 m

WATER
Depth: 2.27 m
Elev.: m
Date: 6/7/2016

BOREHOLE DRILLING RECORD : **BH16-6**

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 1/6/2016
Date (End): 1/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
 Geographic Coordinates: X = 5032622 mE
 Y = 459430 mN
 Surface Elevation: m ()
 Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

CHEMICAL ANALYSIS			
PCB	Poly-Chlorinated Biphenyls	MAH	Monocyclic Aromatic Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	PAH	Polycyclic Aromatic Hydrocarbons
		PH C ₁₀ -C ₂₀	Petroleum Hydrocarbons C ₁₀ -C ₂₀
Inorg. C.	Inorganic Compounds	PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₂₀)
Phenol. C.	Phenolic Compounds	Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
VOC	Volatile Organic Compounds (MAH & CAH)		Leachate Tests (Haz. Waste Reg.)
Diox. & Fur.	Dioxins & Furans	HWR	
CAH	Chlorinated Aliphatic Hydrocarbons		

 Water Level Free Phase

[illegible]

BOREHOLE DRILLING RECORD : BH16-7

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 1/6/2016
Date (End): 1/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032572 mE
Y = 459424 mN
Surface Elevation: m ()
Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Line

CHEMICAL ANALYSIS	
PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatile Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
CAH	Chlorinated Aliphatic Hydrocarbons

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Reg.)

▽ Water Level ▼ Free Phase

[illegible]

BOREHOLE DRILLING RECORD : **BH/MW16-8**

BOREHOLE DRILLING RECORD : **BH16-9**

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): **2/6/2016**
Date (End): **2/6/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032512 mE
Y = 459382 mN
Surface Elevation: m ()
Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated
S - Saturated

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Line

CHEMICAL ANALYSIS	
PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
CAH	Chlorinated Aliphatic Hydrocarbons

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Reg.)

▽ Water Level ▼ Free Phase

[illegible]

BOREHOLE DRILLING RECORD : BH16-10

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/6/2016
Date (End): 2/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032473 mE
Y = 4594402 mN
Surface Elevation: m ()
Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▽ Water Level ▼ Free Phase

CHEMICAL ANALYSIS	
PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatile Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
CAH	Chlorinated Aliphatic Hydrocarbons

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Req.)

[illegible]

BOREHOLE DRILLING RECORD : BH16-11

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/6/2016
Date (End): 2/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
 Geographic Coordinates: X = 5032342 mE
 Y = 459432 mN
 Surface Elevation: m ()
 Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

▼ Free Phase

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatile Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
CAH	Chlorinated Aliphatic Hydrocarbons

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Req.)

HWF

[illegible]

BOREHOLE DRILLING RECORD : BH16-12

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/6/2016
Date (End): 2/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032334 mE
Y = 459386 mN
Surface Elevation: m ()
Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatile Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
CAH	Chlorinated Aliphatic Hydrocarbons

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Reg.)

▽ Water Level ▼ Free Phase

[illegible]

BOREHOLE DRILLING RECORD : **BH16-13**

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/6/2016
Date (End): 2/6/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032385 mE
Y = 459515 mN
Surface Elevation: m ()
Top of PVC Elevation:

Drilling Company:	Strata Drilling Group
Drilling Equipment:	Geomachine GS100
Drilling Method:	Probe rod
Borehole Diameter:	50 mm
Drilling Fluid:	None
Sampling Method:	

ODOUR
F - Light
M - Medium
P - Persistent

VISUAL
D - Disseminated Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TU - DT32 Liner
MC - Macro Core Liner

CHEMICAL ANALYSIS	
PCB	Poly-Chlorin
BTEX	Benzene, To Xylene
Inorg. C.	Inorganic Co
Phenol. C.	Phenolic Co
VOC	Volatil Orga & CAH)
Diox. & Fur.	Dioxins & Fu
CAH	Chlorinated

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F1-F4	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Rec.)

▽ Water Level ▼ Free Phase

[illegible]

TEST PIT RECORD : TP16-1

Page 1 of 1

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/11/2016
Date (End): 2/11/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032612 mE
Y = 459421 mN
Surface Elevation: m ()

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F ₁ -F ₄	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Reg.)

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

▽ Water Sepage ▼ Free Phase

[illegible]

TEST PIT RECORD : TP16-2

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/11/2016
Date (End): 2/11/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032619 mE
Y = 459408 mN
Surface Elevation: m ()

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity

MAH
PAH
PH C₁₀⁺
PH F₁-F₁₀
Metals

Monocyclic Aromatic Hydrocarbons
Polycyclic Aromatic Hydrocarbons
Petroleum Hydrocarbons C₁₀-C₅₀
Petroleum Hydrocarbons F1-F4 (C₁₀-C₅₀)
Arsenic, Barium, Cadmium, Chromium, Cobalt,
Copper, Lead, Manganese, Molybdenum,
Nickel, Silver, Tin, Zinc.
Leachate Tests (Haz. Waste Reg.)

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

▽ Water Sepage ▼ Free Phase

[illegible]

TEST PIT RECORD : TP16-3

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): **2/11/2016**
Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032631 mE
Y = 459412 mN
Surface Elevation: m ()

Contractor: **A.Lacroix Equipment Rentals Ltd.**
Equipment: **Excavator**

CHEMICAL ANALYSIS

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

▽ Water Sepage ▼ Free Phase

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F ₁ -F ₄	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Reg.)

[illegible]

TEST PIT RECORD : TP16-4

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/11/2016
Date (End): 2/11/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
 Geographic Coordinates: X = 5032626 mE
 Y = 459424 mN
 Surface Elevation: m ()

Contractor:	A.Lacroix Equipment Rentals Ltd.
Equipment:	Excavator

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity

MAH
PAH
PH C₁₀-C₁₉
PH F₁-F₄
Metals

Monocyclic Aromatic Hydrocarbons
Polycyclic Aromatic Hydrocarbons
Petroleum Hydrocarbons C₁₀-C₅₀
Petroleum Hydrocarbons F1-F4 (C₁₀-C₅₀)
Arsenic, Barium, Cadmium, Chromium, Cobalt,
Copper, Lead, Manganese, Molybdenum,
Nickel, Silver, Tin, Zinc.
Leachate Tests (Haz. Waste Reg.)

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TB - Trowel

▽ Water Sepage ▼ Free Phase

[illegible]

TEST PIT RECORD : **TP16-5**

Page 1 of 1

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/11/2016
Date (End): 2/11/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
 Geographic Coordinates: X = 5032559 mE
 Y = 459440 mN
 Surface Elevation: m ()

Contractor:	A.Lacroix Equipment Rentals Ltd.
Equipment:	Excavator

CHEMICAL ANALYSIS

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TB - Trowel

▽ Water Sepage ▼ Free Phase

PCB	Poly-Chlorinated Biphenyls	MAH	Monocyclic Aromatic Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	PAH	Polycyclic Aromatic Hydrocarbons
Inorg. C.	Inorganic Compounds	PH $C_{10}-C_{50}$	Petroleum Hydrocarbons $C_{10}-C_{50}$
Phenol. C.	Phenolic Compounds	PH F_1-F_4	Petroleum Hydrocarbons F1-F4 ($C_{10}-C_{50}$)
VOC	Volatil Organic Compounds (MAH & CAH)	Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
Diox. & Fur.	Dioxins & Furans		
EC	Electrical Conductivity	HWR	Leachate Tests (Haz. Waste Reg.)

[illegible]

TEST PIT RECORD : **TP16-6**

Page 1 of 1

Prepared by: **Kathryn Maton**
Reviewed by: **Carolyn Adams**

Date (Start): 2/11/2016
Date (End): 2/11/2016

Project Name: **Phase Two Environmental Site Assessment**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Sector:
Client: **The Builders Warehouse Inc.**

Project Number: **161-06382-00**
Geographic Coordinates: X = 5032988 mE
Y = 459317 mN
Surface Elevation: m ()

Contractor:	A.Lacroix Equipment Rentals Ltd.
Equipment:	Excavator

CHEMICAL ANALYSIS

PCB	Poly-Chlorinated Biphenyls
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Inorg. C.	Inorganic Compounds
Phenol. C.	Phenolic Compounds
VOC	Volatil Organic Compounds (MAH & CAH)
Diox. & Fur.	Dioxins & Furans
EC	Electrical Conductivity

MAH	Monocyclic Aromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
PH C ₁₀ -C ₅₀	Petroleum Hydrocarbons C ₁₀ -C ₅₀
PH F ₁ -F ₄	Petroleum Hydrocarbons F1-F4 (C ₁₀ -C ₅₀)
Metals	Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Zinc.
HWR	Leachate Tests (Haz. Waste Reg.)

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TB - Trowel

▽ Water Sepage ▼ Free Phase

[illegible]

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
Cu	-	Uniformity coefficient = D_{60} / D_{10}

Cc and Cu are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$

Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

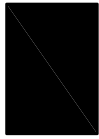
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.
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SYMBOLS AND TERMS (continued)

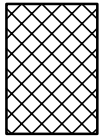
STRATA PLOT



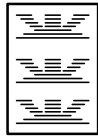
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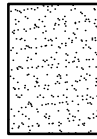
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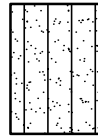
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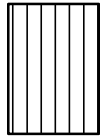
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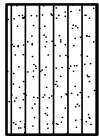
Sand



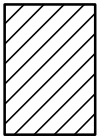
Silty Sand



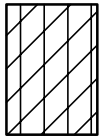
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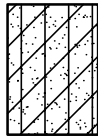
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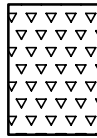
Clay



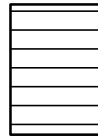
Silty Clay



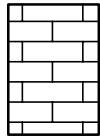
Clayey Silty Sand



Glacial Till



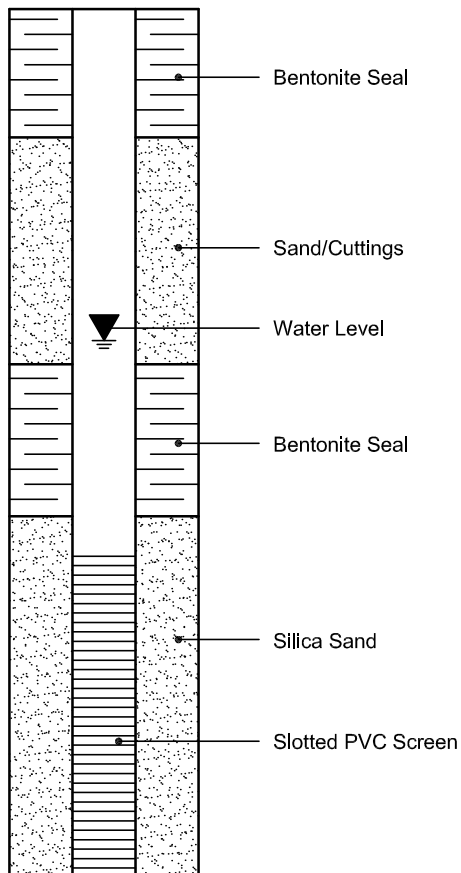
Shale



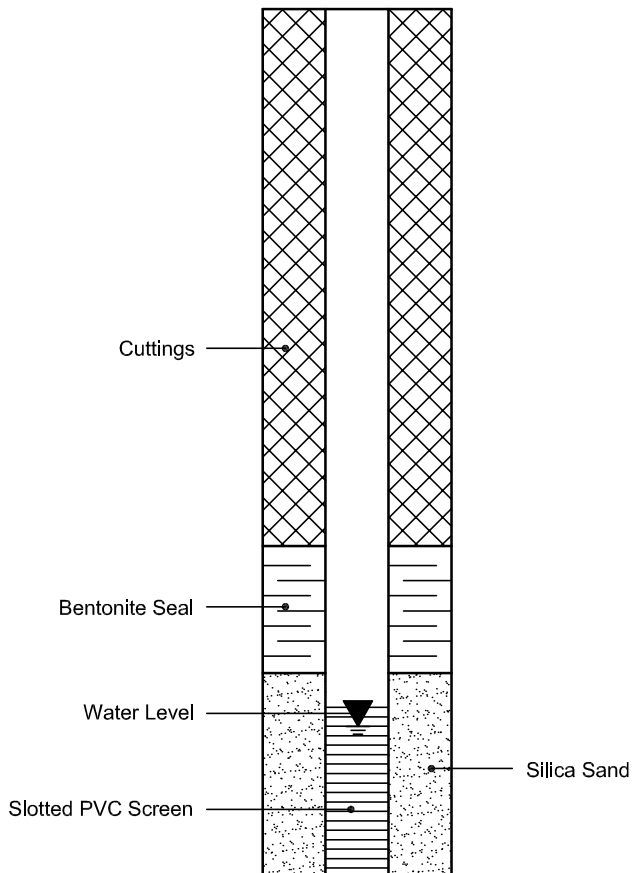
Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

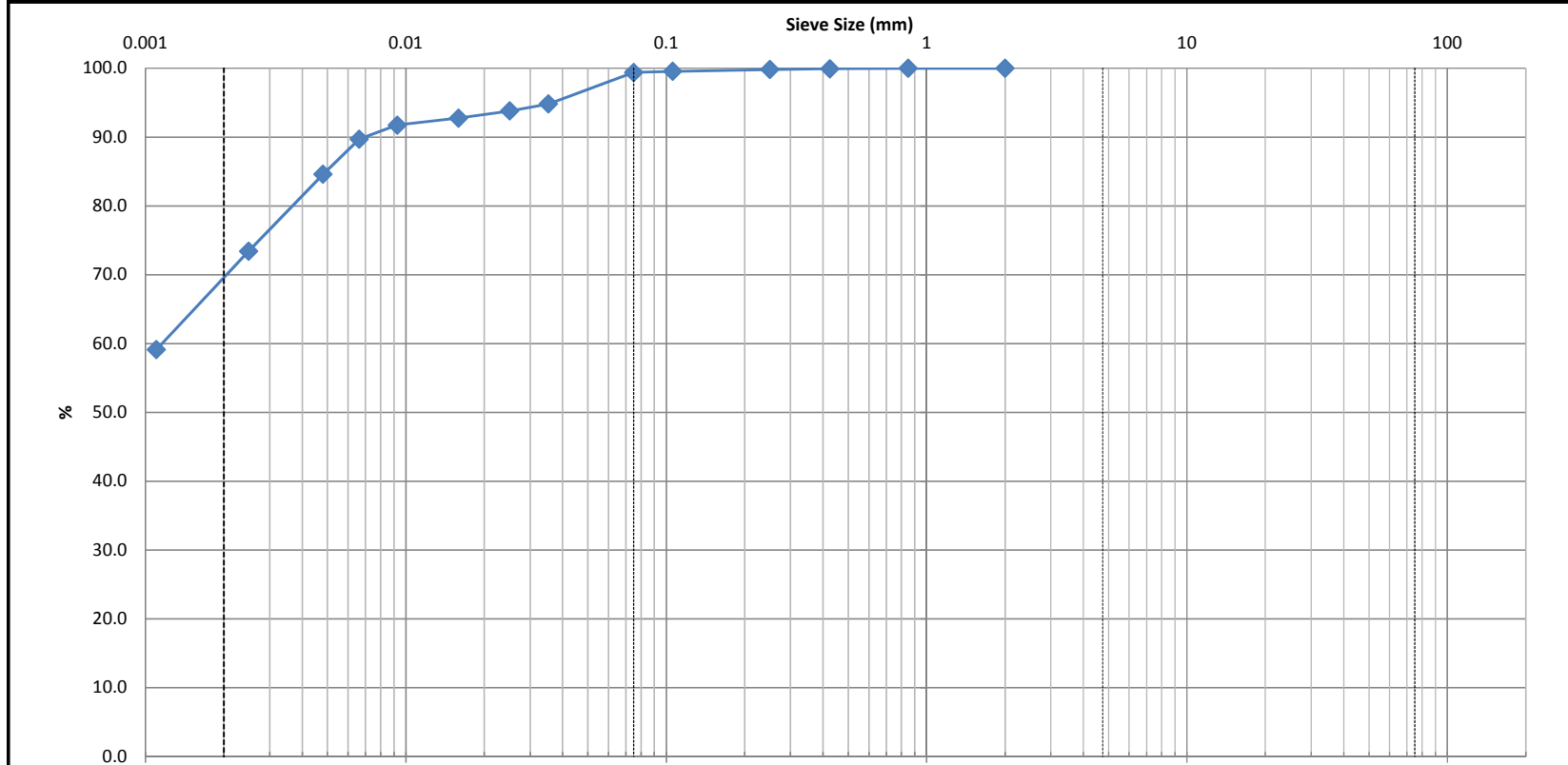
MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION

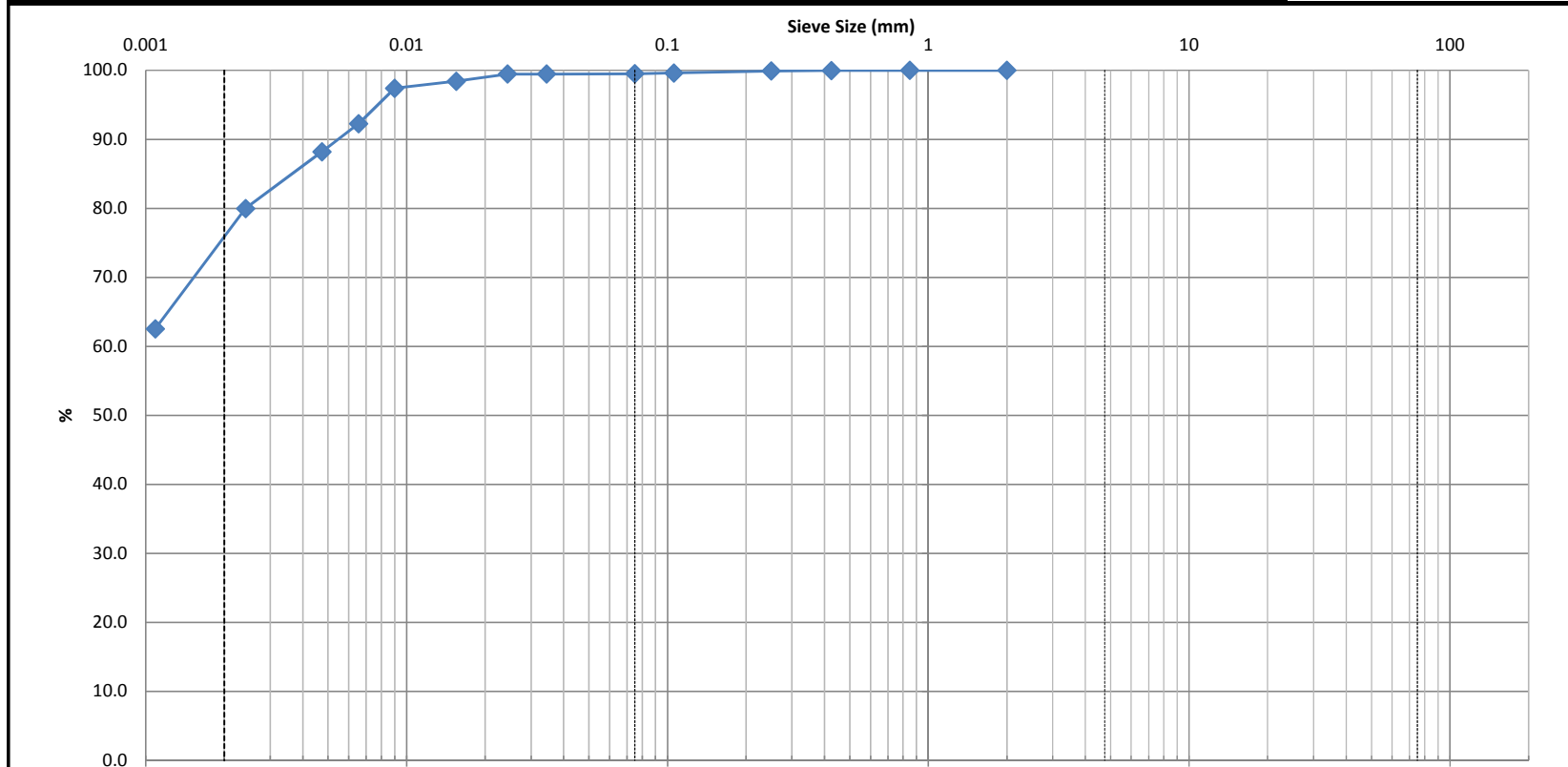


CLIENT:	Glenview Homes	DEPTH:	1.5 - 2.1 m	FILE NO:	PG4026
CONTRACT NO.:		BH OR TP No.:	BH4-18 - SS3	LAB NO:	06542
PROJECT:	3604-3636 Innes Road			DATE RECEIVED:	7-Dec-18
DATE SAMPLED:	5-Dec-18			DATE TESTED:	12-Dec-18
SAMPLED BY:	N. Giamberardino			DATE REPORTED:	17-Dec-18
				TESTED BY:	D. Bertrand



				HYDROMETER LS-702 ASTM-422			
CLIENT: Glenview Homes		DEPTH: 1.5 - 2.1 m		FILE NO.: PG4026			
PROJECT: 3604-3636 Innes Road		BH OR TP No.: BH4-18 - SS3		DATE SAMPLED: 05-Dec-18			
LAB No.: 06542		TESTED BY: D. Bertrand		DATE RECEIVED: 07-Dec-18			
SAMPLED BY: N. Giamberardino		DATE REPT'D: 17-Dec-18		DATE TESTED: 12-Dec-18			
SAMPLE INFORMATION							
SAMPLE MASS	102.5	50.00					
SPECIFIC GRAVITY (Gs)	2.700	REMARKS					
HYGROSCOPIC MOISTURE	Tare No.						
TARE Wt.	50.00					ACTUAL Wt.	
AIR DRY (Wa)	150.00					100.00	
OVEN DRY (Wo)	147.00					97.00	
F=(Wo/Wa)	0.970						
INITIAL Wt. (Ma)	50.00						
Wt. CORRECTED	48.50						
Wt. AFTER WASH BACK SIEVE	0.3						
SOLUTION CONCENTRATION	40 g / L						
GRAIN SIZE ANALYSIS							
SIEVE DIAMETER (mm)		WEIGHT RETAINED (g)		PERCENT RETAINED		PERCENT PASSING	
63.0							
53.0							
37.5							
26.5							
19.0							
16.0							
13.2							
9.5							
4.75							
2.0		0.0		0.0		100.0	
Pan		102.5					
0.850		0.00		0.0		100.0	
0.425		0.04		0.1		99.9	
0.250		0.10		0.2		99.8	
0.106		0.23		0.5		99.5	
0.075		0.30		0.6		99.4	
Pan		0.30					
SIEVE CHECK		0.0		MAX = 0.3%			
HYDROMETER DATA							
ELAPSED	TIME (24 hours)	Hs	Hc	Temp. (°C)	DIAMETER	(P)	TOTAL PERCENT PASSING
1	8:38	52.5	6.0	23.0	0.0353	94.8	94.8
2	8:39	52.0	6.0	23.0	0.0251	93.8	93.8
5	8:42	51.5	6.0	23.0	0.0160	92.8	92.8
15	8:52	51.0	6.0	23.0	0.0093	91.7	91.7
30	9:07	50.0	6.0	23.0	0.0066	89.7	89.7
60	9:37	47.5	6.0	23.0	0.0048	84.6	84.6
250	12:47	42.0	6.0	23.0	0.0025	73.4	73.4
1440	8:37	35.0	6.0	23.0	0.0011	59.1	59.1
COMMENTS							
Moisture Content = 32.5%							
REVIEWED BY:	Curtis Beadow			APPROVED BY:	Joe Forsyth, P. Eng.		
							

CLIENT:	Glenview Homes	DEPTH:	1.5 - 2.1 m	FILE NO:	PG4026
CONTRACT NO.:		BH OR TP No.:	BH6-18 - SS3	LAB NO:	06543
PROJECT:	3604-3636 Innes Road			DATE RECEIVED:	7-Dec-18
DATE SAMPLED:	5-Dec-18			DATE TESTED:	12-Dec-18
SAMPLED BY:	N. Giamberardino			DATE REPORTED:	17-Dec-18
				TESTED BY:	D. Bertrand



Identification	Soil Classification				MC(%)	LL	PL	PI	Cc	Cu
	D100	D60	D30	D10	Gravel (%)	Sand (%)	Silt (%)	Clay (%)		
					0.0	0.5	23.0	76.5		
Comments										

Low Risk

jeff

CLIENT:	Glenview Homes	DEPTH:	1.5 - 2.1 m	FILE NO.:	PG4026
PROJECT:	3604-3636 Innes Road	BH OR TP No.:	BH6-18 - SS3	DATE SAMPLED:	05-Dec-18
LAB No. :	06543	TESTED BY:	D. Bertrand	DATE RECEIVED:	07-Dec-18
SAMPLED BY:	N. Giamberardino	DATE REPT'D:	17-Dec-18	DATE TESTED:	12-Dec-18

SAMPLE INFORMATION

SAMPLE MASS	109.3	50.10	REMARKS
SPECIFIC GRAVITY (Gs)	2.700		
HYGROSCOPIC MOISTURE	Tare No.		
TARE Wt.	50.00	ACTUAL Wt.	
AIR DRY (Wa)	150.00	100.00	
OVEN DRY (Wo)	146.25	96.25	
F=(Wo/Wa)	0.963		
INITIAL Wt. (Ma)	50.10		
Wt. CORRECTED	48.22		
Wt. AFTER WASH BACK SIEVE	0.26		
SOLUTION CONCENTRATION	40 g / L		

GRAIN SIZE ANALYSIS

SIEVE DIAMETER (mm)	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
63.0			
53.0			
37.5			
26.5			
19.0			
16.0			
13.2			
9.5			
4.75			
2.0	0.0	0.0	100.0
Pan	109.3		
0.850	0.00	0.0	100.0
0.425	0.02	0.0	100.0
0.250	0.05	0.1	99.9
0.106	0.19	0.4	99.6
0.075	0.25	0.5	99.5
Pan	0.26		
SIEVE CHECK	0.0	MAX = 0.3%	

HYDROMETER DATA

ELAPSED	TIME (24 hours)	Hs	Hc	Temp. (°C)	DIAMETER	(P)	TOTAL PERCENT PASSING
1	8:51	54.5	6.0	23.0	0.0344	99.5	99.5
2	8:52	54.5	6.0	23.0	0.0244	99.5	99.5
5	8:55	54.0	6.0	23.0	0.0155	98.4	98.4
15	9:05	53.5	6.0	23.0	0.0090	97.4	97.4
30	9:20	51.0	6.0	23.0	0.0065	92.3	92.3
60	9:50	49.0	6.0	23.0	0.0047	88.2	88.2
250	13:00	45.0	6.0	23.0	0.0024	80.0	80.0
1440	8:50	36.5	6.0	23.0	0.0011	62.5	62.5

COMMENTS

Moisture Content = 30.1%

REVIEWED BY:	Curtis Beadow	APPROVED BY:	Joe Forsyth, P. Eng.
			

APPENDIX 2

FIGURE 1 - KEY PLAN

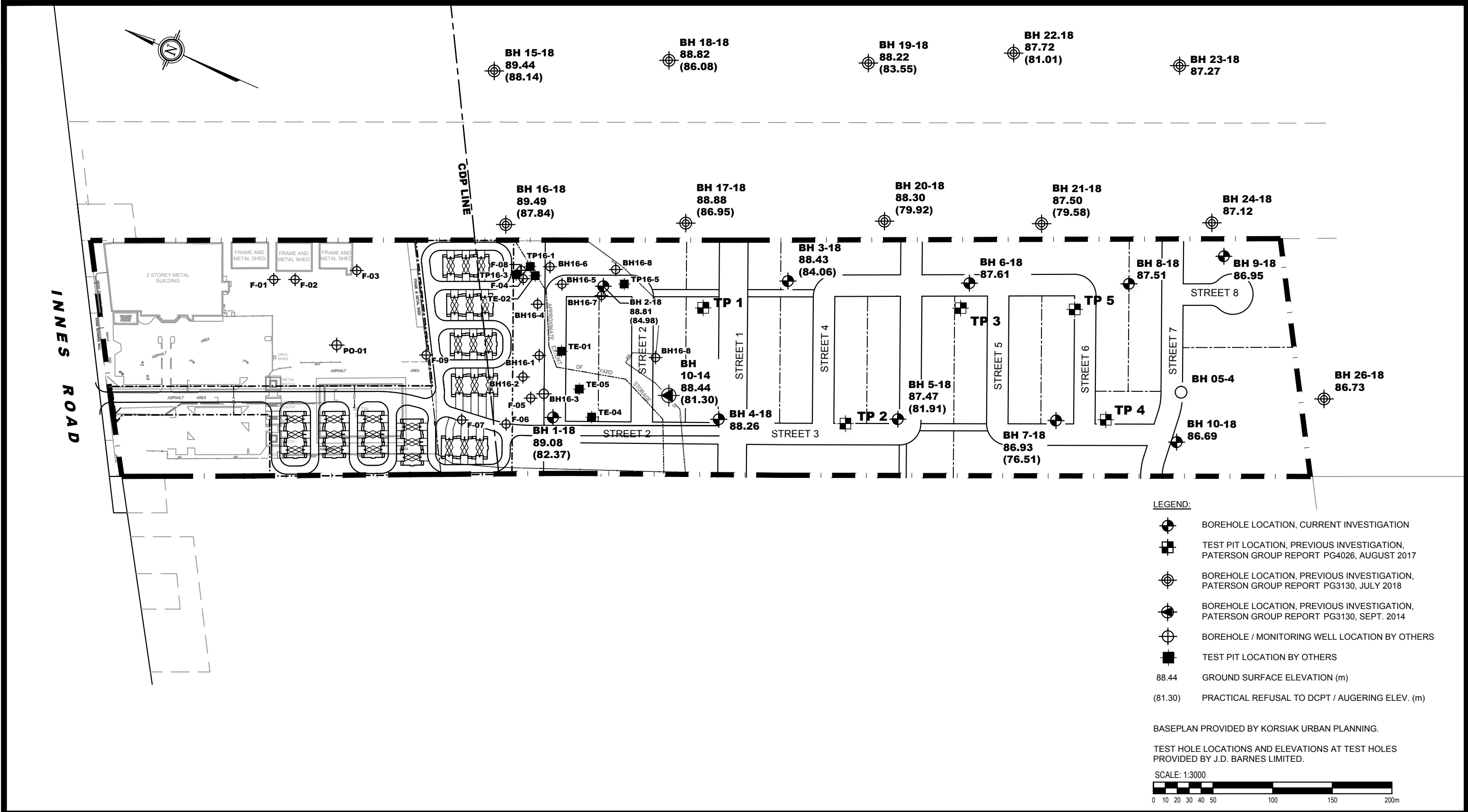
DRAWING PG4026-1 - TEST HOLE LOCATION PLAN

DRAWING PG4026-2 - PERMISSIBLE GRADE RAISE PLAN



FIGURE 1

KEY PLAN



- LEGEND:**
- BOREHOLE LOCATION, CURRENT INVESTIGATION
 - TEST PIT LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG4026, AUGUST 2017
 - BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, JULY 2018
 - BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, SEPT. 2014
 - BOREHOLE / MONITORING WELL LOCATION BY OTHERS
 - TEST PIT LOCATION BY OTHERS
 - 88.44 GROUND SURFACE ELEVATION (m)
 - (81.30) PRACTICAL REFUSAL TO DCPT / AUGERING ELEV. (m)

BASEPLAN PROVIDED BY KORSIK URBAN PLANNING.

TEST HOLE LOCATIONS AND ELEVATIONS AT TEST HOLES PROVIDED BY J.D. BARNES LIMITED.

SCALE: 1:3000

0 10 20 30 40 50 100 150 200m

patersongroup
consulting engineers

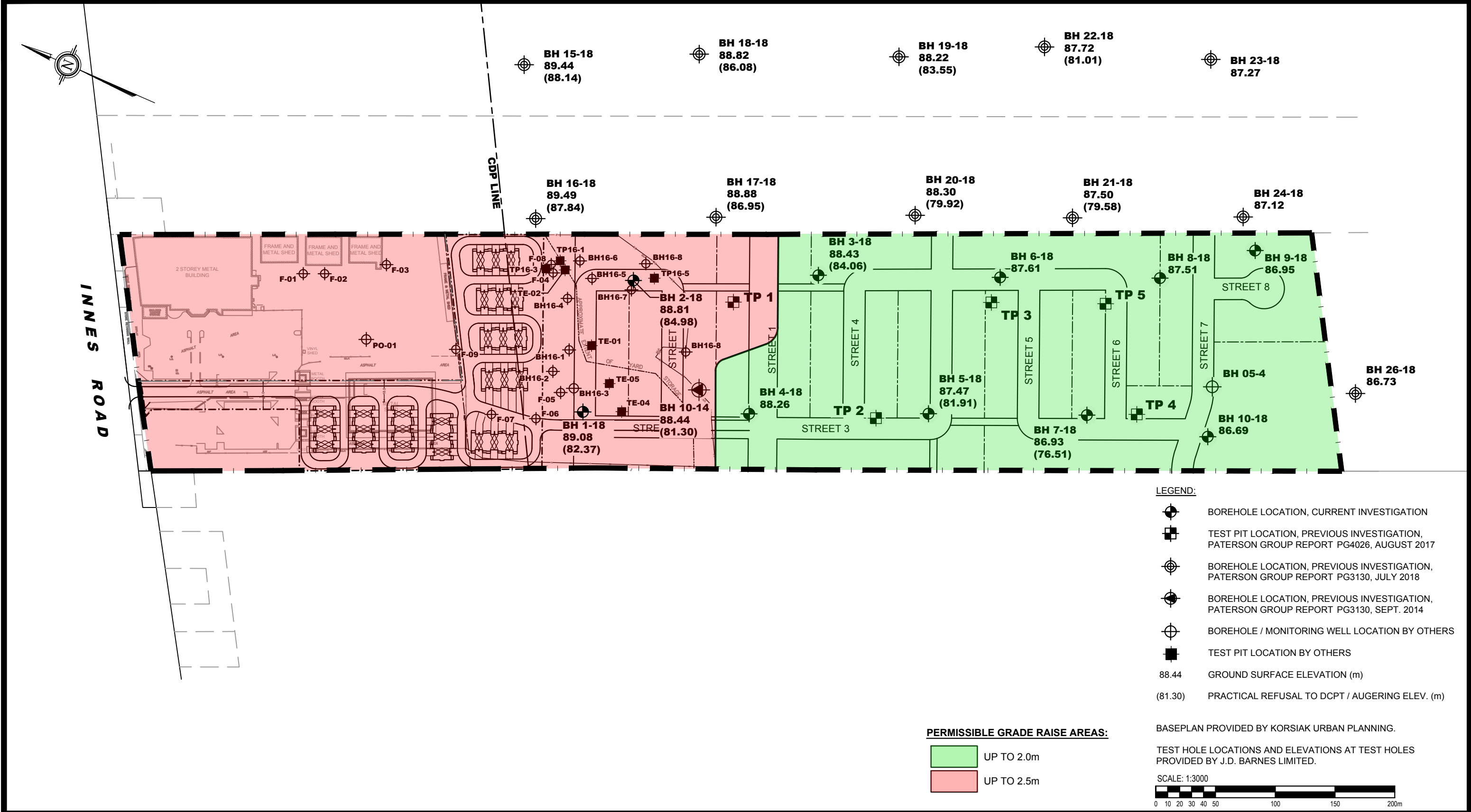
154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
3	UPDATED CONCEPTUAL PLAN	09/08/2019	RG
2	EXISTING BOREHOLES BY OTHERS ADDED	01/2019	RG
1	NEW BOREHOLES ADDED	11/2018	RG

GLENVIEW HOMES (INNES) LTD.	
SUPPLEMENTAL GEOTECHNICAL INVESTIGATION	
3604-3646 INNES ROAD	
OTTAWA,	ONTARIO
Title: TEST HOLE LOCATION PLAN	

Scale:	1:3000	Date:	08/2017
Drawn by:	RCG	Report No.:	PG4026-1
Checked by:	NZ	Dwg. No.:	PG4026-1
Approved by:	DJG	Revision No.:	3

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- LEGEND:**
- BOREHOLE LOCATION, CURRENT INVESTIGATION
 - TEST PIT LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG4026, AUGUST 2017
 - BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, JULY 2018
 - BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3130, SEPT. 2014
 - BOREHOLE / MONITORING WELL LOCATION BY OTHERS
 - TEST PIT LOCATION BY OTHERS
 - 88.44 GROUND SURFACE ELEVATION (m)
 - (81.30) PRACTICAL REFUSAL TO DCPT / AUGERING ELEV. (m)

PERMISSIBLE GRADE RAISE AREAS:

- UP TO 2.0m
- UP TO 2.5m

BASEPLAN PROVIDED BY KORSIK URBAN PLANNING.
TEST HOLE LOCATIONS AND ELEVATIONS AT TEST HOLES PROVIDED BY J.D. BARNES LIMITED.
SCALE: 1:3000
0 10 20 30 40 50 100 150 200m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

3	UPDATED CONCEPTUAL PLAN	08/2019	RG
2	EXISTING BOREHOLES BY OTHERS ADDED	01/2019	RG
1	NEW BOREHOLES ADDED	11/2018	RG
NO.	REVISIONS	DATE	INITIAL

GLENVIEW HOMES (INNES) LTD.	
SUPPLEMENTAL GEOTECHNICAL INVESTIGATION	
3604-3646 INNES ROAD	
OTTAWA,	ONTARIO
Title: PERMISSIBLE GRADE RAISE PLAN	

Scale:	1:3000	Date:	02/2019
Drawn by:	RCG	Report No.:	PG4026-1
Checked by:	NC	Dwg. No.:	PG4026-2
Approved by:	DJG	Revision No.:	3

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