PATERSON GROUP

Geotechnical Investigation

Proposed Residential Development

The Commons – Phase 4

3604-3646 Innes Road Ottawa, Ontario

Prepared for Glenview Homes (Innes) Ltd.

Report PG4026–3 dated July 8, 2024

Table of Contents

Appendices

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 3604-3646 Innes Road in the City of Ottawa (reference should be made to Figure 1 - Key Plan in Appendix 2 of this report for the general site location).

The objectives of the geotechnical investigation were to:

- Determine the subsoil and groundwater conditions at this site by means of boreholes.
- Provide geotechnical recommendations pertaining to the 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. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

Investigating for the presence or potential presence of contamination on the subject property was not part of the scope of work of the present investigation. Therefore, the present report does not address environmental issues.

2.0 Proposed Development

Based on the available drawings it is understood that the proposed development will consist of low-rise townhouse blocks with 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

Field Program

The field program for the current geotechnical investigation was carried out on May 27, 2024, and consisted of advancing a total of 6 boreholes to a maximum depth of 3.3 m below existing ground surface. A previous investigation was carried out by Paterson in 2018 which included advancing a total of 2 boreholes and 1 test pit to a maximum depth of 6.7 m in proximity to the subject phase.

The borehole locations were distributed in a manner to provide general coverage of the subject site, taking into consideration underground utilities and site features. The approximate borehole locations are shown on Drawing PG4026-4 – Test Hole Location Plan included in Appendix 2.

The boreholes were completed using a using a track-mounted drill rig drill rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer. The testing procedure consisted of auguring and excavating to the required depth at the selected location and sampling the overburden.

Two (2) previous investigations were completed by others in 2013 and 2016 in the vicinity of the subject phase. A total of 25 test holes were completed in proximity to the subject phase and extended to a maximum depth of 4.6 m.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using two different techniques, namely, sampled directly from the auger flights (AU) or collected using a 50 mm diameter split spoon (SS) sampler. All samples were visually inspected and initially classified on site and subsequently placed in sealed plastic bags.

All samples were transported to our laboratory for further examination and classification. The depths at which the auger and split spoon samples were recovered from the boreholes are shown as AU, and SS, 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.

The subsurface conditions observed in the boreholes were recorded in detail in the field. The soil profiles are logged on the Soil Profile and Test Data Sheets in Appendix 1 of this report.

Groundwater

Flexible standpipe piezometers were installed in all boreholes with exception of borehole BH 3-23 to permit monitoring of the groundwater levels subsequent to the completion of the sampling program. The groundwater level readings were obtained after a suitable stabilization period subsequent to the completion of the field investigation.

3.2 Field Survey

The borehole locations, and ground surface elevation at each borehole location, were surveyed by Paterson using a handheld GPS unit and referenced to a geodetic datum. The locations of the boreholes, and the ground surface elevations at each borehole location, are presented on Drawing PG4026-4 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging. Additionally, 2 Atterberg Limits tests and 1 grain size distribution analysis were completed on select soil samples. The results are discussed in Section 4.2 and are provided in Appendix 1 of this report. All samples will be stored in the laboratory for a period of 1 month after issuance of this report. They will then be discarded unless we are directed otherwise.

3.4 Analytical Testing

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

4.0 Observations

4.1 Surface Conditions

The subject site is currently in use as a staging area associated with the earlier phases of the overall development. The majority of the site is gravel surfaced. Stockpiles topsoil and fill material were noted throughout the property. However, based on available aerial photos the northwest portion of the was occupied by two industrial buildings as recently as 2017. Historically, the southern portion of the site was used as a parking lot and storage yard associated with the industrial complex. Reference should be made to the aerial photographs in Figure 2 - Aerial Photograph - 1991, and Figure 4 - Aerial Photograph - 2022 which illustrate the former and present site conditions.

The site is bordered to the north by commercial properties, to the east and west by vacant lands, and to the south by previous phases of the residential development.

4.2 Subsurface Profile

Generally, the subsoil profile encountered at the borehole locations consists of an approximate 0.2 to 1.1 m thickness of fill overlying a clayey silt to silty clay layer and/or glacial till. The fill material was generally noted to consist of brown silty sand with crushed stone and gravel.

A hard to very stiff brown silty clay deposit was encountered below the fill layer in all boreholes completed during the current investigation and was noted to extend to depths ranging from 1.1 to 3.0 m below the existing ground surface. A clayey silt to silty clay layer was also encountered in the test holes completed during the historical investigations and was noted extend to a maximum depth of 4.7 m.

A deposit of glacial till was observed underlying the fill and silty clay at boreholes BH 2-24 and BH 3-24. The glacial till deposit consisted of hard brown silty clay with sand, gravel, cobbles and boulders.

Practical refusal to auguring was encountered in all boreholes completed during the current investigation at depths ranging from 0.9 to 3.3 m below the existing ground surface and was noted to shallow towards the northern end of the site.

Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for the details of the soil profile encountered at each test hole location.

Bedrock

Based on available geological mapping, the bedrock in the area of the subject site consists of Limestone of the Bobcaygeon formation, with an overburden drift thickness ranging between 1 and 3 m depth.

Grain Size Distribution and Hydrometer Testing

One (1) hydrometer test was completed to further classify selected soil samples. The results are summarized in Table 1 below, and are presented in Appendix 1.

Table 1 – Summary of Grain Size Distribution Analysis

Borehole Number	Sample	Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 1-24	SS3	1.5 - 2.1	0.0	8.3	52.1	39.7

Atterberg Limit Tests

A total of 2 silty clay samples were submitted for Atterberg Limits testing. The test results indicate that the silty clay is generally classified as Inorganic silt of High Plasticity (MH). These classifications are in accordance with the Unified Soil Classification System. The results are summarized in Table 2 below.

Table 2 – Summary of Atterberg Limits Results

Borehole Number	Sample	Depth (m)	LL (%)	PL (%)	PI (%)	Classification
BH 3-24	SS4	2.3 - 2.9	73	35	38	MH
BH 4-24	SS3	1.5 – 2.1	75	36	39	MH

Notes: LL: Liquid Limit; PL: Plastic Limit; PI: Plasticity Index; CH: Inorganic Clay of High Plasticity

4.3 Groundwater

Groundwater levels were measured within the installed piezometers on June 04, 2024, and are presented in Table 3 on the following page.

Table 3 – Summary of Groundwater Levels

Borehole Number	Ground Surface Elevation (m)	Measured Groundwater Level		Dated Recorded
		Depth (m)	Elevation (m)	
BH 1-24	89.46	Destroyed	-	June 04, 2024
BH 3-24	89.86	1.26	88.60	
BH 4-24	88.93	0.10	88.83	
BH 5-24	89.68	1.15	88.53	
BH 6-24	89.47	0.73	88.74	
BH 1-18	89.02	1.84	87.18	December 14, 2018
BH 2-18	88.81	1.19	87.62	
BH/MW16-3*	-	2.13	-	July 6, 2016
BH/MW16-5*	-	2.27	-	
BH/MW16-8*	-	1.45	-	
TP 1	-	2.50	-	August 1, 2017

Note: * indicates monitoring wells and groundwater level readings by others. Ground surface elevations at borehole location are referenced to a geodetic datum.

Long-term groundwater levels can also be estimated based on the observed colour and consistency of the recovered soil samples. Based on these observations, the long-term groundwater table can be expected at approximately 2.5 to 3.5 m below ground surface.

However, it should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. It is recommended that the proposed residential buildings be founded on conventional spread footings bearing either on the undisturbed hard to stiff brown silty clay, compact to dense glacial till, and/or clean surface sounded bedrock.

Due to the presence of a silty clay deposit at the site, the proposed development will be subjected to grade raise restrictions. Our permissible grade raise recommendations are discussed in Section 5.3.

Due to relatively shallow bedrock depth across the site, it is anticipated that bedrock removal will be required for building construction and site servicing. All contractors should be prepared for bedrock removal within the subject site.

The above and other considerations are discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Asphalt, 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.

Existing foundation walls and other construction debris should be entirely removed from within the footprints of the proposed buildings. Under paved areas, existing construction remnants such as foundation walls should be excavated to a minimum of 1 m below final grade.

Bedrock Removal

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

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 the proximity of the blasting operations should be carried out 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 or claims related to the blasting operations.

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

Vibration Considerations

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

The following construction equipment could be a source of vibrations: piling rig, hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, whether caused by blasting operations or by construction operations, could be the cause of the source of detrimental vibrations on the nearby buildings and structures. Therefore, it is recommended that all vibrations 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).

It should be noted that these guidelines are for today's construction standards. Considering that these guidelines are above perceptible human level and, in some cases, could be very disturbing to some people, it is recommended that a pre-construction survey be completed to minimize the risks of claims during or following the construction of the proposed buildings.

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. 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 proposed building areas 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 this material is to be used to build up the subgrade level for areas to be paved, it should be compacted in thin lifts to at least 95% of the material's SPMDD.

If excavated rock is to be used as fill, it should be suitably fragmented to produce a well-graded material with a maximum particle size of 300 mm. Where this fill material is open-graded, a woven geotextile may be required to prevent adjacent finer materials from migrating into the voids, with associated loss of ground and settlements. Site-generated blast rock fill should be compacted using a suitably sized smooth drum vibratory roller when considered for placement. This can be assessed at the time of construction.

Under winter conditions, if snow and ice is present within the blast rock fill below future basement slabs, then settlement of the fill should be expected and support of a future basement slab and/or temporary supports for slab pours will be negatively impacted and could undergo settlement during spring and summer time conditions. The geotechnical consultant should complete periodic inspections during fill placement to ensure that snow and ice quantities are minimized.

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, hard to stiff silty clay bearing surface 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 an undisturbed glacial till can be designed using a bearing resistance value SLS of **150 kPa** and a factored bearing resistance value at ULS of **225 kPa**.

A geotechnical resistance factor of 0.5 was applied to the above noted bearing resistance value 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 prior to the placement of concrete for footings.

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

Footings supported directly on clean, surface-sounded bedrock, or on lean concrete trenches which are placed directly over the clean surface-sounded bedrock, can be designed using a factored bearing resistance value at ultimate limit states (ULS) of **1,000 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

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 prior to concrete placement for footings.

Footings supported directly on clean, surface sounded bedrock, designed for the bearing resistance values provided above, will be subject to negligible postconstruction 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 silty clay, glacial till and engineered fill bearing media when a plane extending down and out from the bottom edges of the footing, at a minimum of 1.5H:1V, passes only through in situ soil or engineered fill of the same or higher capacity as that of the bearing medium.

Adequate lateral support is provided to a sound bedrock bearing medium when a plane extending down and out from the bottom edges of the footing, at a minimum of 1H:6V (or shallower), passes only through in situ soil or engineered fill of the same or higher capacity as that of the bedrock, such as concrete.

Soil/Bedrock Transition

Where a building is founded partly on bedrock and partly on soil, it is recommended to decrease the soil bearing resistance value by 25% for the footings placed on soil bearing media to reduce the potential long-term total and differential settlements.

Also, at the soil/bedrock and bedrock/soil transitions, it is recommended that the upper 0.5 m of the bedrock be removed for a minimum length of 2 m (on the bedrock side) and replaced with nominally compacted OPSS Granular A or Granular B Type II material. The width of the sub-excavation should be at least the proposed footing width plus 0.5 m. Steel reinforcement, extending at least 3 m on both sides of the 2 m long transition, should be placed in the top part of the footings and foundation walls.

Permissible Grade Raise Recommendations

Due to the presence of the silty clay deposit at the site, a permissible grade raise restriction of **2.5 m** is recommended for grading at the subject site.

If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class C**. If a higher seismic site class is required (Class A or B) for the proposed residential buildings, and the proposed footings are to be located within 3 m of the bedrock surface, a site-specific shear wave velocity test may be completed to accurately determine the applicable seismic site classification for foundation design of the proposed building, as defined in Table 4.1.8.4.A of the Ontario Building Code (OBC) 2012.

Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest version of the OBC 2012 for a full discussion of the earthquake design requirements.

5.5 Floor Slab Construction

With the removal of all topsoil and deleterious fill from within the footprint of the proposed building, the soil or bedrock medium will be considered acceptable subgrades on which to commence backfilling for floor slab construction.

For structures with slab-on-grade construction, it is recommended that the upper 200 mm of sub-slab fill consist of OPSS Granular A crushed stone. All backfill material within the footprint of the proposed structures should be placed in maximum 300 mm thick loose layers and compacted to a minimum of 98% of the material's SPMDD.

If a basement level is considered for the proposed building, it is recommended that the upper 300 mm of sub-floor fill consists of 19 mm clear crush stone. All backfill material within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose layers and compacted to a minimum of 98% of the material's SPMDD.

Any soft areas in the floor slab subgrade should be removed and backfilled with appropriate backfill material prior to placing fill. OPSS Granular A or Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab. All backfill material within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose layers and compacted to a minimum of 98% of the SPMDD.

5.6 Pavement Design

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 with bus traffic.

Table 4 - Recommended Pavement Structure - Car Only Parking Areas

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 fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil, fill, or bedrock.	

Table 5 - 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 fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil, fill or bedrock.	

Table 6 - 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
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil, fill or bedrock.	

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 II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% 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

Foundation Drainage

Should the proposed buildings include below-grade space, a perimeter foundation drainage system is recommended to be provided for the proposed structures. The system should consist of a 150 mm diameter perforated and corrugated plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, which is placed at the footing level around the exterior perimeter of the structure. The pipe should have 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 drainage geocomposite, such as Delta Drain 6000, connected to the perimeter foundation drainage system. 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 of Footings Against Frost Action

Perimeter foundations of heated structures are required to be insulated against the deleterious effects of frost action. A minimum 1.5 m thick soil cover, or an equivalent thickness of soil cover and foundation insulation, should be provided in this regard.

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

However, foundations which are founded directly on clean, surface-sounded bedrock with no cracks or fissures, and which is approved by Paterson at the time of construction, is not considered frost susceptible and does not require soil cover.

6.3 Excavation Side Slopes

The side slopes of excavations in the overburden and weathered bedrock should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. For the proposed development, it is anticipated that sufficient room will be available for the greater part of the excavations to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes in the overburden soils and weathered bedrock, above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. Excavations below the groundwater level should be cut back at a maximum slope of 1.5H:1V. 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.

Excavation side slopes in sound bedrock can be carried out using almost vertical side walls. A minimum 1 m horizontal ledge should be left between the bottom of the overburden excavation and the top of the bedrock surface to provide an area to allow for potential sloughing or to provide a stable base for the overburden shoring system. Where sufficient space for the horizontal ledge is not available, it is recommended that concrete blocks be used to retain the overburden soils.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent material specifications and standard detail drawings from the department of public works and services, infrastructure services branch of the City of Ottawa.

A minimum of 150 mm of OPSS Granular A should be placed for bedding for sewer or water pipes when placed on a soil or weathered bedrock subgrade. If the bedding is placed on clean, surface sounded bedrock, the thickness of the bedding

should be increased to 300 mm for sewer pipes. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to a minimum of 300 mm above the obvert of the pipe, should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts and compacted to 95% of the SPMDD.

It should generally be possible to re-use the upper portion of the dry to moist (not wet) silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. The wet silty clay should be given a sufficient drying period to decrease its moisture content to an acceptable level to make compaction possible prior to being re-used.

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 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

It is anticipated that groundwater infiltration into the excavations should be low to moderate and controllable using open sumps. 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.

Groundwater Control for Building Construction

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, typically 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.

6.6 Winter Construction

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

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 and 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.

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. 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 (GU – General Use cement) would be appropriate for this site. The chloride content and pH of the sample indicate that they are not a significant factor in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a moderate to aggressive corrosive environment.

6.8 Landscaping Considerations

Tree Planting Restrictions

In accordance with the City of Ottawa Tree Planting in Sensitive Marine Clay Soils (2017 Guidelines), Paterson completed a soils review of the site to determine applicable tree planting setbacks. Atterberg Limits testing was completed for recovered silty clay samples at selected locations throughout the subject site. Grain size distribution and hydrometer testing were also completed on selected soil samples. The above-noted soil samples were recovered from elevations below the anticipated design underside of footing elevation and 3.5 m depth below anticipated finished grade. The results of our testing are presented in Section 4.2 and in Appendix 1.

Based on the Atterberg Limits test results, the plasticity index limit does not exceed 40% across the subject site. In addition, based on the moisture levels and consistency, the silty clay encountered at the subject site is considered low to medium sensitive clay. Therefore, the following tree planting setbacks are recommended for the low to medium sensitivity areas.

Large trees (mature height over 14 m) can be planted within the site 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). A tree planting setback limit of **4.5 m** is applicable for small (mature tree height up to 7.5m) 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 m^3 of available soil volume while a medium tree must be provided with a minimum of 30 m^3 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 surrounding the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), be noted in a drawing as part of the Grading Plan.

The recommended tree planting setbacks should be reviewed by Paterson, once the proposed Grading Plan and Landscape Plan have been prepared.

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 neighboring 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

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- ❑ Review detailed grading plan(s) 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.
- ❑ 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 the completion of a satisfactory inspection program by the geotechnical consultant.

All excess soil must be handled as per ***Ontario Regulation 406/19: On-Site and Excess Soil Management*****.**

8.0 Statement of Limitations

The recommendations provided are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

A soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, Paterson requests 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 or 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 agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

Paterson Group Inc.

Kinobe Ssekadde, B.Eng.

Kevin A. Pickard, P.Eng.

Report Distribution:

- ❑ Glenview Homes (Innes) Ltd. (Email Copy)
- ❑ Paterson Group (1 Copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

SOIL PROFILE AND TEST DATA SHEETS BY OTHERS

GRAIN SIZE DISTURBUTION AND HYDROMETER TESTING RESULTS

ATTERBERG LIMIT TESTING RESULTS

ANALYTICAL TESTING RESULTS

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

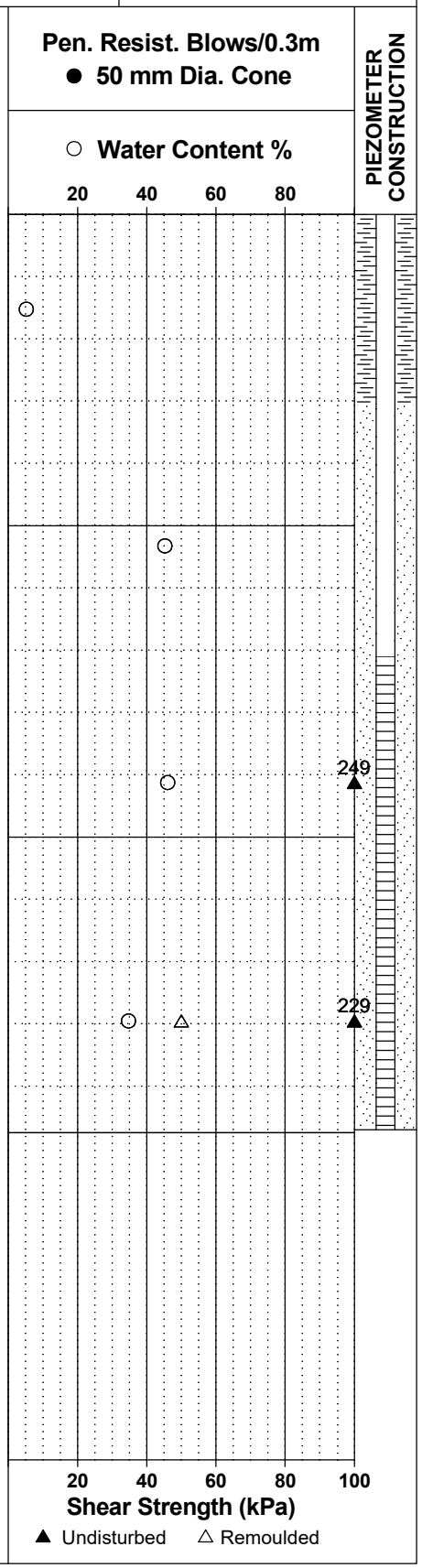
SOIL PROFILE AND TEST DATA

Geotechnical Investigation - Prop. Residential Dev.
The Commons Phase 4 - 3610 Innes Road
Ottawa, Ontario

EASTING: 381487.589 **NORTHING:** 5034488.129 **ELEVATION:** 89.46
DATUM:
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** May 27, 2024

FILE NO. PG4026
HOLE NO. BH 1-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Ground Surface						0	89.46
FILL: Brown silty sand with crushed stone, gravel		AU	1				
		SS	2	63	10	1	88.46
1.07							
Hard brown **SILTY CLAY**		SS	3	100	9	2	87.46
		SS	4	75			
2.95							
End of Borehole							
Practical refusal to augering @ 2.95m depth							
Piezometer damaged, GWL not available							



PIEZOMETER CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

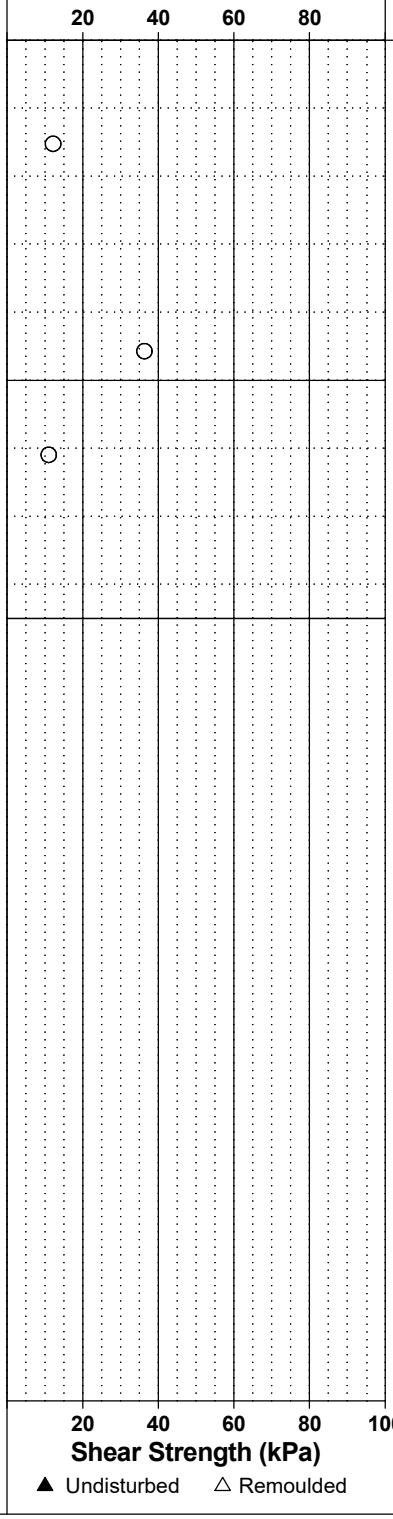
Geotechnical Investigation - Prop. Residential Dev.
The Commons Phase 4 - 3610 Innes Road
Ottawa, Ontario

EASTING: 381541.42 **NORTHING:** 5034525.086 **ELEVATION:** 89.7
DATUM:
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** May 27, 2024

FILE NO. PG4026
HOLE NO. BH 2-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	PIEZOMETER CONSTRUCTION
Ground Surface						0	89.70	
FILL: Brown silty sand with crushed stone and gravel		AU	1					
0.84								
Hard brown **SILTY CLAY**						1	88.70	
1.07		SS	2	83	11			
GLACIAL TILL: Hard brown silty clay with sand, gravel, cobbles and boulders								
		SS	3	17	+50			
1.70								
End of Borehole Practical refusal to augering @ 1.70m depth								

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %



patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

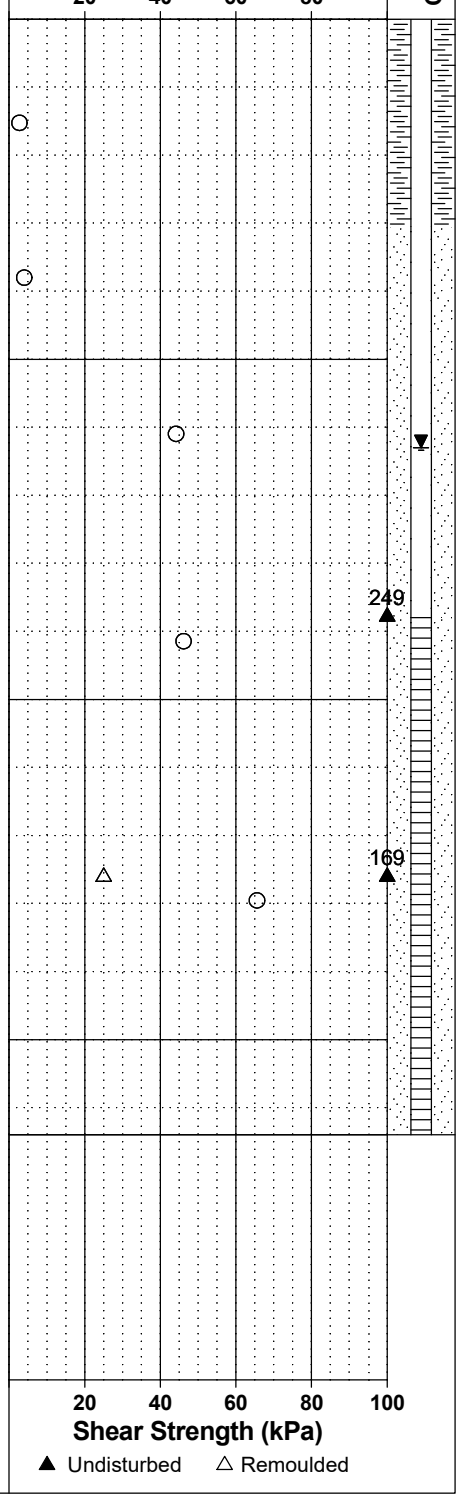
SOIL PROFILE AND TEST DATA

Geotechnical Investigation - Prop. Residential Dev.
The Commons Phase 4 - 3610 Innes Road
Ottawa, Ontario

EASTING: 381494.241 **NORTHING:** 5034540.755 **ELEVATION:** 89.86
DATUM:
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** May 27, 2024

FILE NO. PG4026
HOLE NO. BH 3-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Ground Surface						0	89.86
FILL: Brown silty sand with crushed stone, gravel		AU	1				
0.99						1	88.86
Hard to very stiff brown **SILTY CLAY**		SS	2	75	10		
		SS	3	75	12	2	87.86
		SS	4	100	3		
2.97						3	86.86
GLACIAL TILL: Hard brown silty clay with sand, gravel, cobbles and boulders		SS	5	13	+50		
3.28							
End of Borehole Practical refusal to augering @ 3.28m depth (GWL @ 1.26m - June 4, 2024)							



PIEZOMETER CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

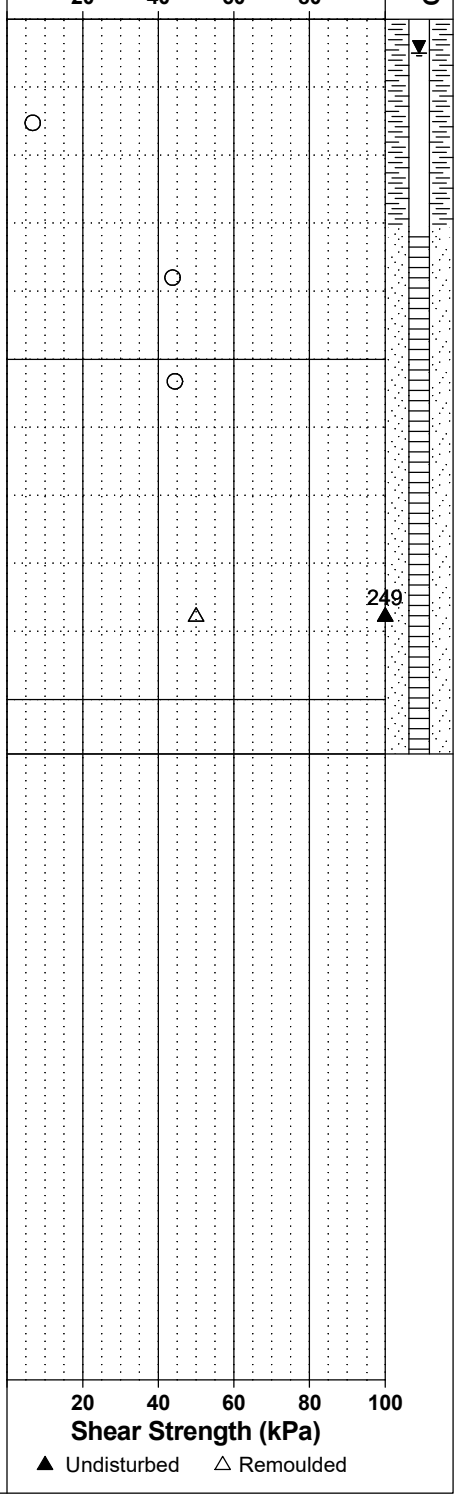
Geotechnical Investigation - Prop. Residential Dev.
The Commons Phase 4 - 3610 Innes Road
Ottawa, Ontario

EASTING: 381378.508 **NORTHING:** 5034532.547 **ELEVATION:** 88.93
DATUM:
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** May 27, 2024

FILE NO. PG4026
HOLE NO. BH 4-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Ground Surface						0	88.93
FILL: Brown silty sand with crushed stone, gravel		AU	1				
0.69							
Hard brown **SILTY CLAY**		SS	2	100	7	1	87.93
		SS	3	71			
2.16						2	86.93
End of Borehole Practical refusal to augering @ 2.16m depth (GWL @ 0.10m - June 4, 2024)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %



PIEZOMETER CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

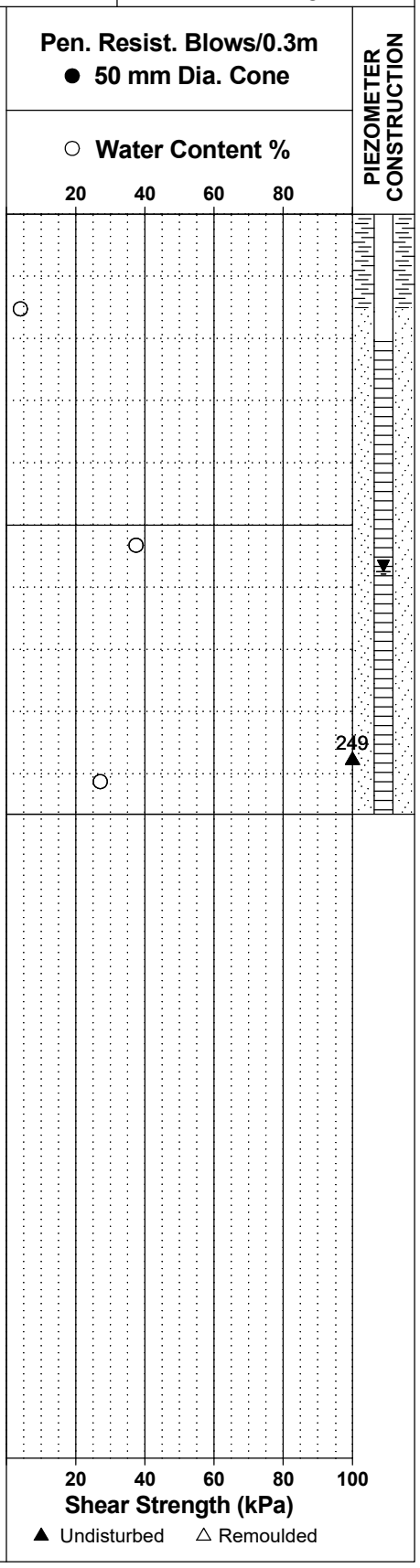
SOIL PROFILE AND TEST DATA

Geotechnical Investigation - Prop. Residential Dev.
The Commons Phase 4 - 3610 Innes Road
Ottawa, Ontario

EASTING: 381351.585 **NORTHING:** 5034583.402 **ELEVATION:** 89.68
DATUM:
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** May 27, 2024

FILE NO. PG4026
HOLE NO. BH 5-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Ground Surface						0	89.68
FILL: Brown silty sand with crushed stone, gravel		AU	1				
0.84						1	88.68
Hard brown **SILTY CLAY**		SS	2	75	14		
		SS	3	42			
- Sand seam @ 1.83m							
1.93							
End of Borehole							
Practical refusal to augering @ 1.93m depth							
(GWL @ 1.15m - June 4, 2024)							



patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

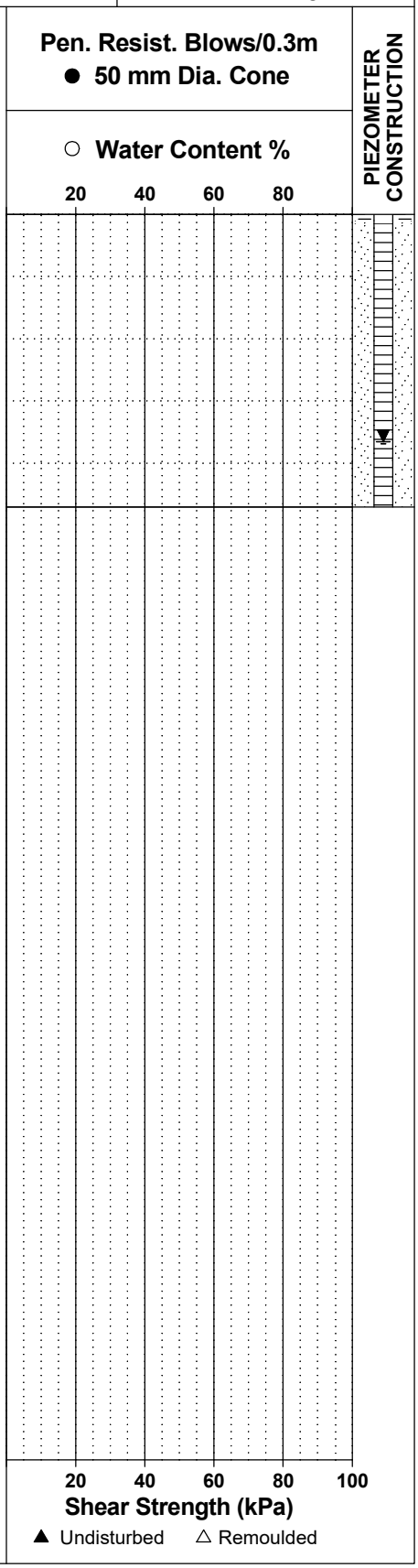
SOIL PROFILE AND TEST DATA

Geotechnical Investigation - Prop. Residential Dev.
The Commons Phase 4 - 3610 Innes Road
Ottawa, Ontario

EASTING: 381350.724 **NORTHING:** 5034626.189 **ELEVATION:** 89.47
DATUM:
REMARKS:
BORINGS BY: CME-55 Low Clearance Drill **DATE:** May 27, 2024

FILE NO. PG4026
HOLE NO. BH 6-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	PIEZOMETER CONSTRUCTION
Ground Surface						0	89.47	
FILL: Brown silty sand with crushed stone, gravel		AU	1					
0.84								
Hard brown **SILTY CLAY**								
0.94								
End of Borehole								
Practical refusal to augering @ 0.94m depth								
(GWL @ 0.73m - June 4, 2024)								



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

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

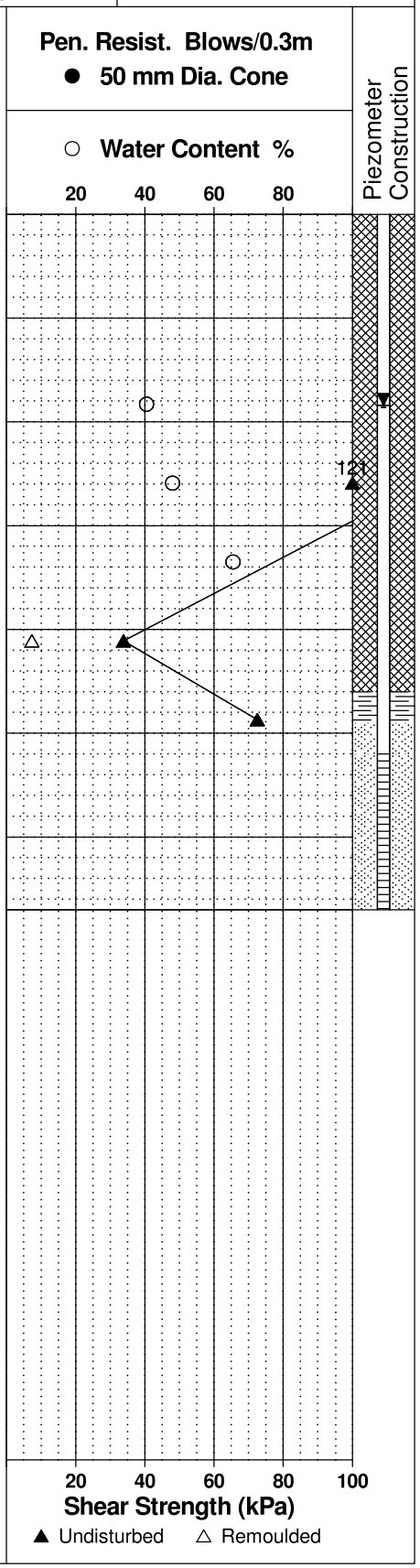
FILE NO. PG4026

REMARKS

HOLE NO. BH 1-18

BORINGS BY CME 55 Power Auger **DATE** December 5, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	89.02
FILL: Brown silty clay with sand and gravel, trace crushed stone		AU	1				
0.30							
		SS	2	50	8	1	88.02
		SS	3	92	10	2	87.02
Very stiff to stiff, brown **SILTY CLAY**		SS	4	92	P		
		SS	5	92	2	3	86.02
- firm to stiff and grey by 3.4m depth						4	85.02
4.72							
		SS	6	67	P	5	84.02
GLACIAL TILL: Grey silty clay with sand and gravel, occasional cobbles and boulders		SS	7	33	20	6	83.02
		SS	8	46	8		
6.70							
End of Borehole							
(GWL @ 1.84m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

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

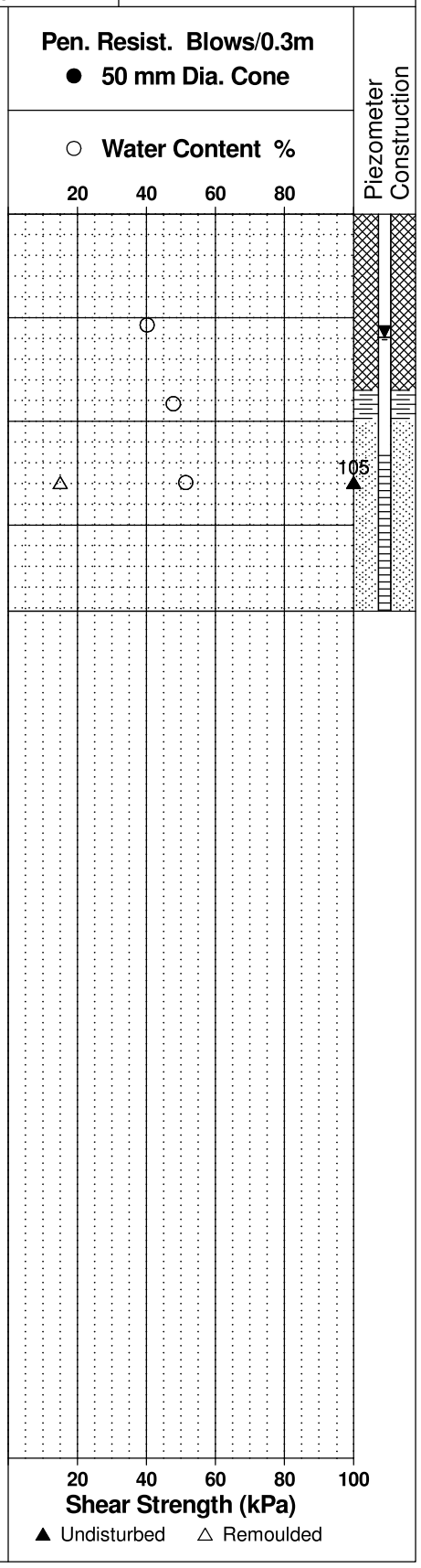
FILE NO. PG4026

REMARKS

HOLE NO. BH 2-18

BORINGS BY CME 55 Power Auger **DATE** December 5, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.81
TOPSOIL 0.20		AU	1				
		SS	3	92	7	1	87.81
Very stiff, brown **SILTY CLAY**		SS	2	75	9		
						2	86.81
- grey by 2.7m depth		SS	4	100	P		
2.92						3	85.81
GLACIAL TILL: Grey silty clay with sand and gravel, occasional cobbles and boulders		SS	5	50	10		
3.83		SS	6	27	50+		
End of Borehole							
Practical refusal to augering at 3.83m depth							
(GWL @ 1.19m - Dec. 14, 2018)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
3604-3646 Innes Road
Ottawa, Ontario

DATUM

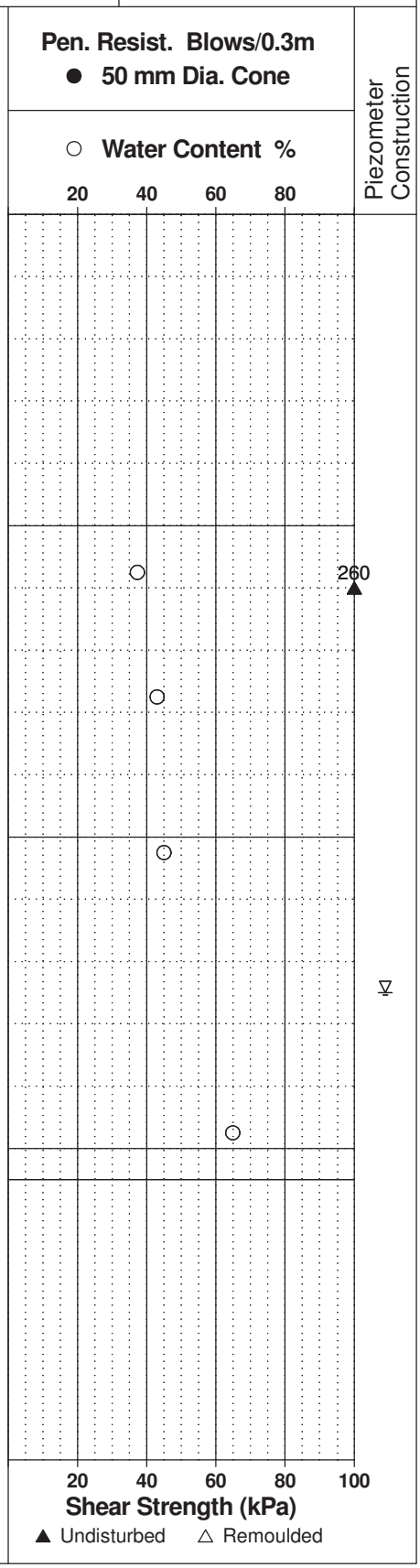
REMARKS

BORINGS BY Backhoe **DATE** August 1, 2017

FILE NO. PG4026

HOLE NO. TP 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	
TOPSOIL 0.10							
Hard to stiff, brown **SILTY CLAY**		G	1			1	
		G	2				
		G	3			2	
2.50							
Stiff to firm, grey-brown **SILTY CLAY**		G	4			3	
3.10							
End of Test Pit							
(GWL @ 2.5m depth based on field observations)							



Piezometer Construction

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 = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

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

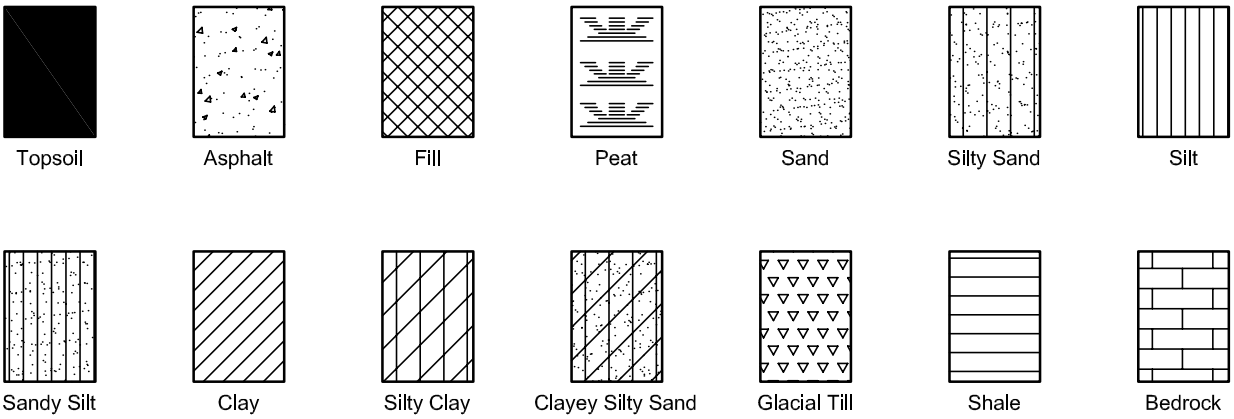
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void 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.

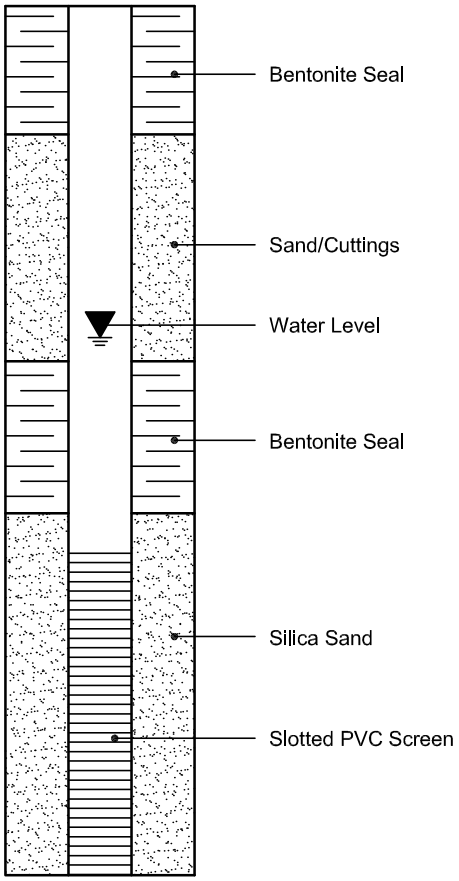
SYMBOLS AND TERMS (continued)

STRATA PLOT

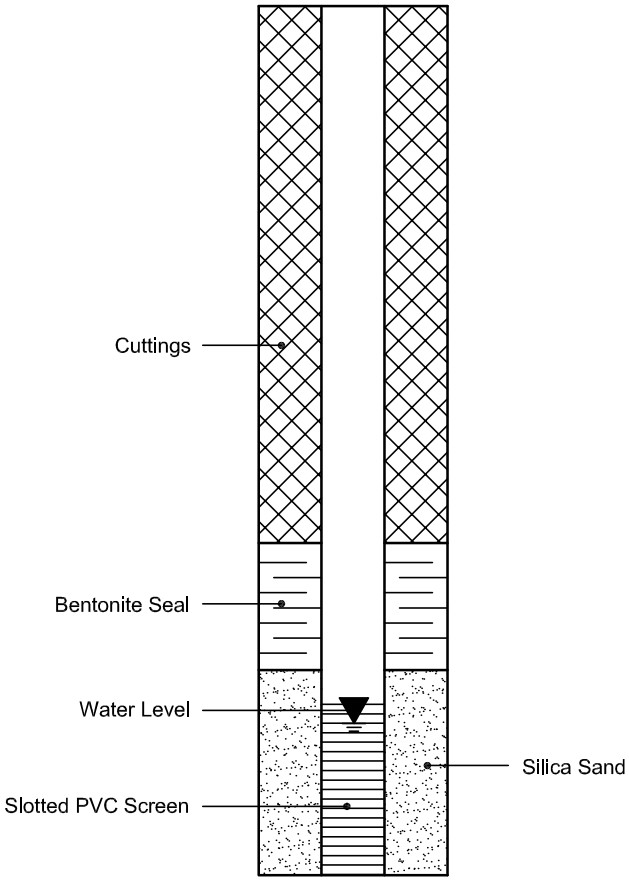


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



BOREHOLE DRILLING RECORD : **BH16-1**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** 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 = 459357 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 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 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 Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	LITHOLOGY	DESCRIPTION	VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	ODOUR F	ODOUR M	ODOUR P	VISUAL D	VISUAL S	SAMPLE TYPE	% RECOVERY	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	DIAGRAM	DESCRIPTION	REMARKS
		Ground surface.															
0.30		**FILL** sand and gravel, brown, dry	H - 0, I - 0						MC	66		BH16-1 1A					
1.52		**CLAYEY SILT** brown, moist, stiff	H - 0, I - 0									BH16-1 1B	Metals and Inorganics				
2.53		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 0						MC	100		BH16-1 2A	Metals and Inorganics				
2.89		**GRAVEL** with sand and some silty clay, grey-brown, wet, soft	H - 0, I - 0									BH16-1 2B	Metals and Inorganics				
		Refusal at 2.89 m below ground surface on assumed bedrock															
		End of borehole at 2.89 m.															

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

BOREHOLE DRILLING RECORD : **BH16-2**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** 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 = 459337 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 Liner

▽ Water Level ▼ Free Phase

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_{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	Leacheate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons		

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
0.30		**FILL** sand and gravel, brown, dry	H - 0, I - 0			MC	50		BH16-2 1A					
		CLAYEY SILT brown, moist, stiff	H - 20, I - 0						BH16-2 1B	Metals and Inorganics				
2.44		*with some sand*	H - 0, I - 0			MC	83		BH16-2 2A	Metals and Inorganics				
		Refusal at 2.44 m below ground surface on assumed bedrock	H - 0, I - 0						BH16-2 2B	Metals and Inorganics				
		End of borehole at 2.44 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

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

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** 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 Liner

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 Leacheate Tests (Haz. Waste Reg.)

Water Level ▽ Free Phase ▼

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
87.23		**FILL** sand and gravel, brown, dry	H - 0, I - 0			MC	73		BH/MW16-3 1A					
0.43														
86.80		**CLAYEY SILT** brown, moist, stiff	H - 0, I - 0						BH/MW16-3 1B	Metals and Inorganics			Bentonite	
1.52														
85.71		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 0			MC	100		BH/MW16-3 2A	Metals and Inorganics			Slotted PVC pipe	
			H - 0, I - 0						BH/MW16-3 2B				Sand	
3.05														
3.12													SCREEN	
84.11		**GRAVEL** with sand , brown, wet	H - 0, I - 0			MC	5		BH/MW16-3 3	Metals and Inorganics			Diam.: 51 mm Open.: 0.25 mm Length: 3.05 m	
		BEDROCK											WATER Depth: 2.13 m Elev.: m Date: 6/7/2016	
4.57														
82.66		End of borehole at 4.57 m.												

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-4**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** 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 Corer
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	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_{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	Leacheate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons		

DEPTH ELEVATION (m)	LITHOLOGY	DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	ODOUR F M P	VISUAL D S	SAMPLES: SAMPLE TYPE	% RECOVERY	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	MONITORING WELL: DIAGRAM	DESCRIPTION	REMARKS
		Ground surface.												
		FILL sand and gravel, brown, dry	H - 0, I - 0			MC	71		BH16-4 1A					
0.43														
0.5		**CLAYEY SILT** brown, moist, stiff	H - 0, I - 0						BH16-4 1B	Metals and Inorganics PHCs F2-F4				
1.0														
1.5			H - 0, I - 0			MC	86		BH16-4 2A					
2.0														
2.28														
2.5		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 0						BH16-4 2B	Metals and Inorganics	BH16-4-102B			
		becoming wet and soft												
3.0														
3.05		*Refusal at 3.05 m below ground surface on assumed bedrock*												
3.5		End of borehole at 3.05 m.												
4.0														
4.5														
5.0														

BOREHOLE DRILLING RECORD : **BH/MW16-5**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** 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 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 Leacheate Tests (Haz. Waste Reg.)

▽ Water Level ▼ Free Phase

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		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		Bentonite	
1.52														
85.95		**SILTY CLAY** grey-brown, moist, stiff	H - 0, I - 30			MC	83		BH/MW16-5 2A				Sand	
		becoming wet and soft											Slotted PVC pipe	
3.05			H - 0, I - 35						BH/MW16-5 2B	Metals and Inorganics PH F_1-F_4 BTEX PAH			SCREEN Diam.: 51 mm Open.: 0.25 mm Length: 3.05 m WATER Depth: 2.27 m Elev.: m Date: 6/7/2016	
84.42		**BEDROCK**												
4.57														
82.90		End of borehole at 4.57 m.												

BOREHOLE DRILLING RECORD : **BH16-6**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** 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 Corer
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	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_{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	Leacheate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons		

DEPTH ELEVATION (m)	LITHOLOGY	DESCRIPTION	VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	ODOUR F M P	VISUAL D S	SAMPLE TYPE	% RECOVERY	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	DIAGRAM	DESCRIPTION	REMARKS
		Ground surface.												
0.23		**FILL** Sand and gravel, brown, dry	H - 15, I - 2			MC	46		BH16-6 1A					
		CLAYEY SILT brown, moist, stiff	H - 0, I - 0						BH16-6 1B	Metals and Inorganics PH F_1-F_4 BTEX				
2.90			H - 0, I - 0			MC	100		BH16-6 2A					
3.05		**SILTY CLAY** grey-brown, moist, stiff *Refusal at 3.05 m below ground surface on assumed bedrock*	H - 0, I - 0						BH16-6 2B	Metals and Inorganics				
		End of borehole at 3.05 m.												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_WELL-ENVIRONMENTAL Data Template : WSP_TEMPLATE_GEOTECH.GDT 6/10/2016

BOREHOLE DRILLING RECORD : **BH16-7**

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** 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 Liner

▽ Water Level ▼ Free Phase

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_{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	Leacheate Tests (Haz. Waste Reg.)
CAH	Chlorinated Aliphatic Hydrocarbons		

DEPTH ELEVATION (m)	LITHOLOGY	DESCRIPTION	VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	ODOUR F M P	VISUAL D S	SAMPLE TYPE	% RECOVERY	N (Blow/6")	NUMBER	ANALYSIS	DUPLICATE	MONITORING WELL DIAGRAM	MONITORING WELL DESCRIPTION	REMARKS
		Ground surface.												
0.20		**TOP SOIL**				MC	85							
		CLAYEY SILT brown or grey-brown, moist, stiff	H - 10, I - 0						BH16-7 1	Metals and Inorganics PAH PH F_1-F_4 BTEX				
			H - 0, I - 0			MC	100		BH16-7 2A					
2.44														
		SILTY CLAY with some sand, grey-brown, moist, stiff *becoming wet and soft*	H - 0, I - 0						BH16-7 2B	Metals and Inorganics				
3.05														
		SANDY GRAVEL with some silty clay grey-brown, wet, soft	H - 0, I - 0			MC	26		BH16-7 3					
4.11		*Refusal at 4.11 m below ground surface on assumed bedrock*												
		End of borehole at 4.11 m.												

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

Prepared by: **Kathryn Maton** Date (Start): **1/6/2016**
Reviewed by: **Carolyn Adams** 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 = 5032569 mE, Y = 459449 mN
Surface Elevation: 86.84 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 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 Leacheate Tests (Haz. Waste Reg.)

Water Level ▽ Free Phase ▼

DEPTH ELEVATION (m)	GEOLOGY / LITHOLOGY: LITHOLOGY	GEOLOGY / LITHOLOGY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. I - Isobutylene (ppm) H - Hexane (ppm)	OBSERVATIONS: ODOUR F M P	OBSERVATIONS: VISUAL D S	SAMPLES: SAMPLE TYPE	SAMPLES: % RECOVERY	SAMPLES: N (Blow/6")	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
		Ground surface.												
86.84														
0.20		**TOPSOIL**				MC	100							
86.64		**CLAYEY SILT** brown or grey-brown, moist, stiff	H - 10, I - 0						BH/MW16-8 1	Metals and Inorganics PAH PH F_1-F_4 BTEX			Bentonite	
0.5														0.5
1.0														1.0
1.5			H - 10, I - 0			MC	100		BH/MW16-8 2A				Sand	1.5
2.0													Slotted PVC pipe	2.0
2.44														
84.40		**SILTY CLAY** grey-brown, moist, stiff	H - 5, I - 0						BH/MW16-8 2B	Metals and Inorganics			SCREEN Diam.: 51 mm Open.: 0.25 mm Length: 3.05 m WATER Depth: 1.45 m Elev.: m Date: 6/7/2016	2.5
3.0														3.0
3.05														
83.79		**SANDY GRAVEL** with trace to some silty clay grey-brown, wet, soft	H - 0, I - 0			MC	100		BH/MW16-8 3A					
3.5														3.5
			H - 15, I - 0						BH/MW16-8 3B					
4.0														4.0
4.11														
82.73		End of borehole at 4.11 m.												
4.5														4.5
5.0														5.0

RAPPORT DE FORAGE : **F-01**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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 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
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	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR F	ODEUR M	ODEUR P	VISUEL D	VISUEL S	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.															
0.10 *90.59*		Asphalte.															
		Remblai : Gravier sableux sec.							CF	82	11 6 6 11	F-01 (0.30-0.40) F-01 (0.40-0.50) F-01 (0.50-0.91)	HP F1-F4 HAP BTEX Métaux (R153)				
0.50 *90.19*		Sol naturel : Gravier sableux.															
1.06 *89.63*		Fin du forage à 1.06 m de profondeur.							CF	33	15 R/1.06						Refus à 1.06 m sur bloc ou roc.

RAPPORT DE FORAGE : **F-02**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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

▽ 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 Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
0.10 / *90.54*		Asphalte.												
		Remblai : Gravier sableux brun gris sec.												
0.45						CF	41	3 11 9 6	F-02 (0.30-0.45)					
0.5 — 0.55 / *90.09*		Sol naturel : Sable silteux noir.							F-02 (0.45-0.55)	HP F1-F4 HAP Métaux (R153)				0.5
		Sol naturel : Sable silteux brun sec.							F-02 (0.55-0.75)	HP F1-F4 HAP BTEX				
0.75 / *89.89*		Sol naturel : Sable graveleux.							F-02 (0.75-0.91)					
1.0						CF	66	3 6 R/1.21	F-02 (0.91-1.02)					1.0
1.21 / *89.43*		Fin du forage à 1.21 m de profondeur.							F-02 (1.02-1.12)					Refus à 1.21 m sur bloc ou roc.
1.5														1.5
2.0														2.0
2.5														2.5
3.0														3.0
3.5														3.5
4.0														4.0

RAPPORT DE FORAGE : **F-03**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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

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 Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
0.10 / 90.29		Asphalte.												
		Remblai : Gravier sableux sec.												
0.30 / 90.09		Sol naturel : Sable graveleux gris.				CF	49	12 5 5 3	F-03 (0.30-0.50)	HP F1-F4 HAP BTEX Métaux (R153)				
0.50 / 89.89		Sol naturel : Sable silteux avec trace de gravier.							F-03 (0.50-0.91)	HP F1-F4 HAP BTEX Métaux (R153)				
0.91 / 89.48		Sol naturel : Sable silteux.				CF	33		F-03 (0.91-1.01)	HP F1-F4 HAP BTEX Métaux (R153)				
									F-03 (1.01-1.11)					
1.52 / 88.87		Fin du forage à 1.52 m de profondeur.												

RAPPORT DE FORAGE : **F-04**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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 = 75.5201167458 °O
Y = 45.4451939281 °N
Élévation surface : 89.29 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
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 Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
89.29														
0.20		Remblai : Sable graveleux gris et blanc.				CF	74	85 55 30 18	F-04 (0.00-0.20)					
89.09														
		Remblai : Gravier sableux saturé							F-04 (0.20-0.61)					
0.61														
88.68														
		Sol naturel : Argile silteuse brune grise.				CF	90	1 1 2 6	F-04 (0.61-1.22)	HP F1-F4 HAP BTEX				
1.22														
88.07														
		Fin du forage à 1.22 m de profondeur.												Refus à 1.22 m sur bloc ou roc.

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE FORAGE : **F-05**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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
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	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
89.21 / 0.20		Remblai : Sable et gravier sec				CF	66	58 69 21 18	F-05 (0.00-0.20)					
89.01 / 0.61		Sol naturel : Gravier noir et saturé avec un peu de sable.							F-05 (0.20-0.61)					
88.60 / 1.83		Sol naturel : Argile silteuse brune-beige et humide.				CF	100	1 1 5 6	F-05 (0.61-1.22)					
						CF	100		F-05 (1.22-1.32)	HP F1-F4 HAP BTEX Métaux (R153)				
									F-05 (1.32-1.83)					
87.38 / 2.10		Sol naturel : Argile silteuse grise humide.				CF	82	3 3 22 8	F-05 (1.83-2.10)					
87.11 / 2.34		Sol naturel : Gravier sableux gris.							F-05 (2.10-2.34)					
86.87	Roc atteint	Fin du forage à 2.34 m de profondeur.												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE FORAGE : **F-06**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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

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	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE		OBSERVATIONS				ÉCHANTILLONS						PUITS D'OBSERVATION		
	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR F	ODEUR M	ODEUR P	VISUEL D	VISUEL S	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
		Surface du terrain.															
89.22		Remblai : Sable graveleux gris-brun et sec.							CF	100	1 3 4 7	F-06 (0.00-0.61)	HP F1-F4 HAP BTEX				
0.61																	
88.61		Sol naturel : Argile silteuse grise.							CF	100	1 4 4 6	F-06 (0.61-1.22)					
									CF	49	56 36 19 10	F-06 (1.22-1.83)					
87.70																	
1.83		Fin du forage à 1.52 m de profondeur.															

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

RAPPORT DE FORAGE : **F-07**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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 = 75.5199577902 °O
Y = 45.4476971365 °N
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
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 Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
89.47		Remblai : Sable graveleux gris-blanc et sec.				CF	57	110 54 13 11	F-07 (0.00-0.50)					
0.50														
0.60		Remblai : Sable graveleux gris-blanc et humide.							F-07 (0.50-0.61)					
88.87		Sol naturel : Argile silteuse.				CF	90	1 3 4 6	F-07 (0.61-1.22)	HP F1-F4 HAP BTEX				
						CF			F-07 (1.22-1.83)					
87.95														
1.83		Fin du forage à 1.52 m de profondeur.												

RAPPORT DE FORAGE : **F-08**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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 = 75.5196453839 °O
Y = 45.4472729549 °N
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
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 Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

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

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

Projet : 131-13558-00_TE_01.GPJ Type rapport : GENIVAR-PUITS-FR Data Template : GENIVAR_TEMPLATE_GEOTECH.GDT 2013-8-16

RAPPORT DE FORAGE : **F-09**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-06-27**
Vérifié par : **Annie Gauthier** 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 Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: DESCRIPTION	REMARQUES
		Surface du terrain.												
89.71		Remblai : Sable et gravier. Gris blanc sec devenant humide.				CF	74	64 66 24 16		HP F1-F4 HAP BTEX	DUP7			
0.61														
89.10		Sol naturel : Argile silteuse avec un peu de sable humide.				CF	25	1 2 3 4						
						CF	100	2 3 3 5						
88.19														
1.83		Fin du forage à 1.52 m de profondeur.												

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

TEST PIT RECORD : **TP16-1**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment**
Project Number: **161-06382-00**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario**
Geographic Coordinates: X = 5032612 mE, Y = 459421 mN
Sector:
Client: **The Builders Warehouse Inc.**
Surface Elevation: m ()

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

VAPOUR READINGS
I - Isobutylene
H - Hexane

SAMPLE TYPE
TM - Manual Auger
TR - Trowel
Water Sepage Free Phase

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 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	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY	DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	ODOUR (F M P)	VISUAL (D S)	SAMPLES: SAMPLE TYPE	NUMBER	ANALYSIS	DUPLICATE	WATER ARRIVAL	REMARKS
0.0		**FILL** Sand and gravel with some bricks, wood, metal and organic material, brown, dry	H - 0, I - 0			TR	TP16-1 SA1				
1.01		**CLAYEY SILT** brown, moist	H - 0, I - 0			TR	TP16-1 SA2				
1.34		End of test pit at 1.34 m.									

0.5 1.0 1.5 2.0

TEST PIT RECORD : **TP16-3**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** 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**

VAPOUR READINGS
I - Isobutylene
H - Hexane

SAMPLE TYPE
TM - Manual Auger
TR - Trowel
Water Sepage Free Phase

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 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	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY: LITHOGRAPHY	GEOLOGY / LITHOGRAPHY: DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	OBSERVATIONS: ODOUR (F M P D S)	OBSERVATIONS: VISUAL (F M P D S)	SAMPLES: SAMPLE TYPE	SAMPLES: NUMBER	SAMPLES: ANALYSIS	SAMPLES: DUPLICATE	WATER ARRIVAL	REMARKS
0.5		**FILL** Sand and gravel with some bricks, wood, metal and organic material, brown, moist to wet	H - 0, I - 0			TR	TP16-3 SA1				
0.91											
1.0		**CLAYEY SILT** brown, wet	H - 0, I - 0			TR	TP16-3 SA2				
1.52		End of test pit at 1.52 m.									
1.5											
2.0											

TEST PIT RECORD : **TP16-5**

Prepared by: **Kathryn Maton** Date (Start): **2/11/2016**
Reviewed by: **Carolyn Adams** Date (End): **2/11/2016**

Project Name: **Phase Two Environmental Site Assessment** Project Number: **161-06382-00**
Site: **Part of Lot 4, Concession 3, Parts 1-5, Gloucester, Ontario** Geographic Coordinates: X = 5032559 mE
Sector: Y = 459440 mN
Client: **The Builders Warehouse Inc.** Surface Elevation: m *()*

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

VAPOUR READINGS

I - Isobutylene
H - Hexane

SAMPLE TYPE

TM - Manual Auger
TR - Trowel

Water Sepage Free Phase

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	Leacheate Tests (Haz. Waste Reg.)

DEPTH ELEVATION (m)	GEOLOGY / LITHOGRAPHY	DESCRIPTION	OBSERVATIONS: VAPOR CONC. (ppm)	ODOUR (F M P)	VISUAL (D S)	SAMPLES: SAMPLE TYPE	NUMBER	ANALYSIS	DUPLICATE	WATER ARRIVAL	REMARKS
0.20		**TOP SOIL**									
		CLAYEY SILT brown or grey-brown, moist									
			H - 0, I - 0			TR	TP16-5 SA1	EC			
1.14		End of test pit at 1.14 m.									

0.5 1.0 1.5 2.0

Projet : 161-08368-00 PHASE TWO ESA - 3636 INNES ROAD.GPJ Type rapport : WSP_EN_TEST PIT Data Template : WSP_TEMPLATE_GEOTECH.GDT 11/14/2016

RAPPORT DE TRANCHÉE : **TE-01**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** 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
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	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	STRATIGRAPHIE	DESCRIPTION	CONC. VAPEUR (ppm OU % LIE)	ODEUR (F M P)	VISUEL (D S)	TYPE ÉCHANTILLON	% RÉCUPÉRATION	N (Coups/6")	NUMÉRO	ANALYSES	DUPLICATA	DIAGRAMME	DESCRIPTION	REMARQUES
		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)				
0.60		*Infiltration d'eau à 0.6 m.*												
88.97		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)					
3.50		*Infiltration d'eau.*												
86.07		Fin de la tranchée												
	Roc atteint													

Projet : 131-13558-00_TE_01.GPJ Type rapport : GENIVAR-PUITS-FR Data Template : GENIVAR_TEMPLATE_GEOTECH.GDT 2013-8-16

RAPPORT DE TRANCHÉE : **TE-02**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** 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 Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

PROFONDEUR / ÉLÉVATION (m)	GÉOLOGIE / STRATIGRAPHIE: STRATIGRAPHIE	GÉOLOGIE / STRATIGRAPHIE: DESCRIPTION	OBSERVATIONS: CONC. VAPEUR (ppm OU % LIE)	OBSERVATIONS: ODEUR (F M P)	OBSERVATIONS: VISUEL (D S)	ÉCHANTILLONS: TYPE ÉCHANTILLON	ÉCHANTILLONS: % RÉCUPÉRATION	ÉCHANTILLONS: N (Coups/6")	ÉCHANTILLONS: NUMÉRO	ÉCHANTILLONS: ANALYSES	ÉCHANTILLONS: DUPLICATA	PUITS D'OBSERVATION: DIAGRAMME	PUITS D'OBSERVATION: 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)				
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)				
1.45 / 88.14		Sol naturel : Silt argileux gris avec traces de gravier.							TE-02 (1.45-3.30)					
3.30 / 86.29	Roc atteint	*Infiltration d'eau.* Fin de la tranchée												

RAPPORT DE TRANCHÉE : **TE-04**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** 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 Hydrocarb. aliphatiques chlorés
HAM Hydrocarbures aromatiques monocycliques
HAP Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50} Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4 Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure Mercure
Métaux Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD Lixiviation (mat. dangereuses)

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

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

Projet : 131-13558-00_TE_01.GPJ Type rapport : GENIVAR-PUITS-FR Data Template : GENIVAR_TEMPLATE_GEOTECH.GDT 2013-8-16

RAPPORT DE TRANCHÉE : **TE-05**

GENIVAR

Préparé par : **Catherine Tardy Laporte** Date début : **2013-07-02**
Vérifié par : **Annie Gauthier** 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 = 75.5204743629 °O
Y = 45.4472004843 °N
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

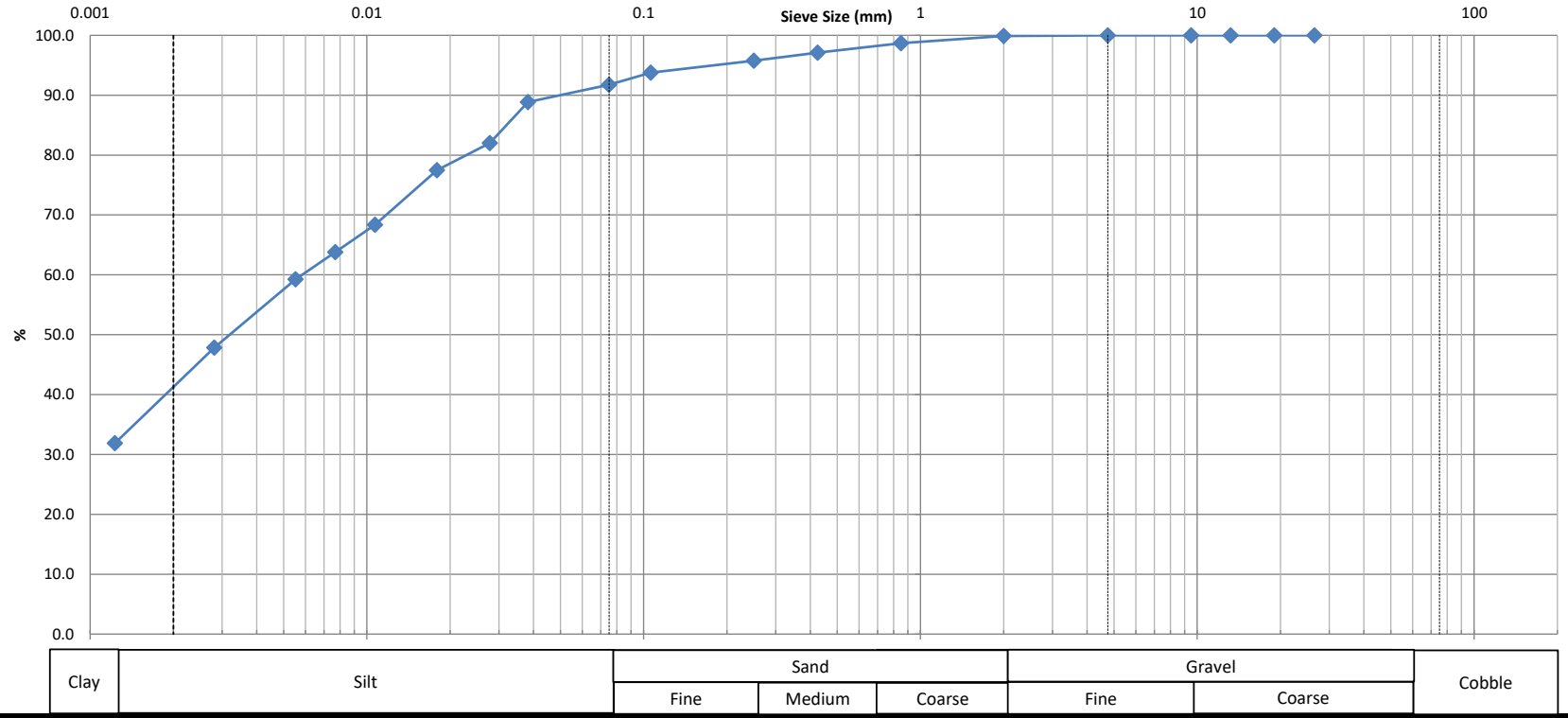
BPC	Biphényles polychlorés
BTEX	Benzène, toluène, éthylbenzène, xylène
COT	Carbone organique total
C. Inorg.	Autres composés inorganiques (cyanure, fluorure, bromure, soufre total)
C. Phénol.	Composés phénoliques
COV	Hydrocarbures HAM et HAC
Diox. & Fur.	Dioxines et furanes
HAC	Hydrocarb. aliphatiques chlorés
HAM	Hydrocarbures aromatiques monocycliques
HAP	Hydrocarbures aromatiques polycycliques
HP C_{10}-C_{50}	Hydrocarbures pétroliers C_{10}-C_{50}
HP F1-F4	Hydrocarb. pétrol. F1-F4 (C_{10}-C_{50})
Mercure	Mercure
Métaux	Argent, arsenic, baryum, cadmium, cobalt, chrome, cuivre, étain, manganèse, molybdène, nickel, plomb, sélénium, zinc.
RMD	Lixiviation (mat. dangereuses)

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

PATERSON GROUP

SIEVE ANALYSIS
ASTM C136

CLIENT:	Glenview Properties	DEPTH:	5' - 7'	FILE NO:	PG4026
CONTRACT NO.:		BH OR TP No.:	BH1-24 SS3	LAB NO:	52430
PROJECT:	3604-3646 Innes Road			DATE RECEIVED:	28-May-24
				DATE TESTED:	29-May-24
DATE SAMPLED:	27-May-24			DATE REPORTED:	13-Jun-24
SAMPLED BY:	K.S.			TESTED BY:	D.K



Identification	Soil Classification					MC(%)	LL	PL	PI	Cc	Cu
						45.5%					
	D100	D60	D30	D10	Gravel (%)	Sand (%)		Silt (%)		Clay (%)	
					0.0	8.3		52.1		39.7	

Comments:

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

PATERSON GROUP

HYDROMETER
LS-702 ASTM-422

CLIENT:	Glenview Properties	DEPTH:	5' - 7'	FILE NO.:	PG4026
PROJECT:	3604-3646 Innes Road	BH OR TP No.:	BH1-24 SS3	DATE SAMPLED:	27-May-24
LAB No. :	52430	TESTED BY:	D.K	DATE RECEIVED:	28-May-24
SAMPLED BY:	K.S.	DATE REPT'D:	13-Jun-24	DATE TESTED:	29-May-24

SAMPLE INFORMATION

SAMPLE MASS	SPECIFIC GRAVITY
103.7	2.700

INITIAL WEIGHT	50.00	**HYGROSCOPIC MOISTURE**		
WEIGHT CORRECTED	43.35	TARE WEIGHT	0.00	ACTUAL WEIGHT
WT. AFTER WASH BACK SIEVE	4.16	AIR DRY	119.60	119.60
SOLUTION CONCENTRATION	40 g/L	OVEN DRY	103.70	103.70
		CORRECTED	0.867	

GRAIN SIZE ANALYSIS

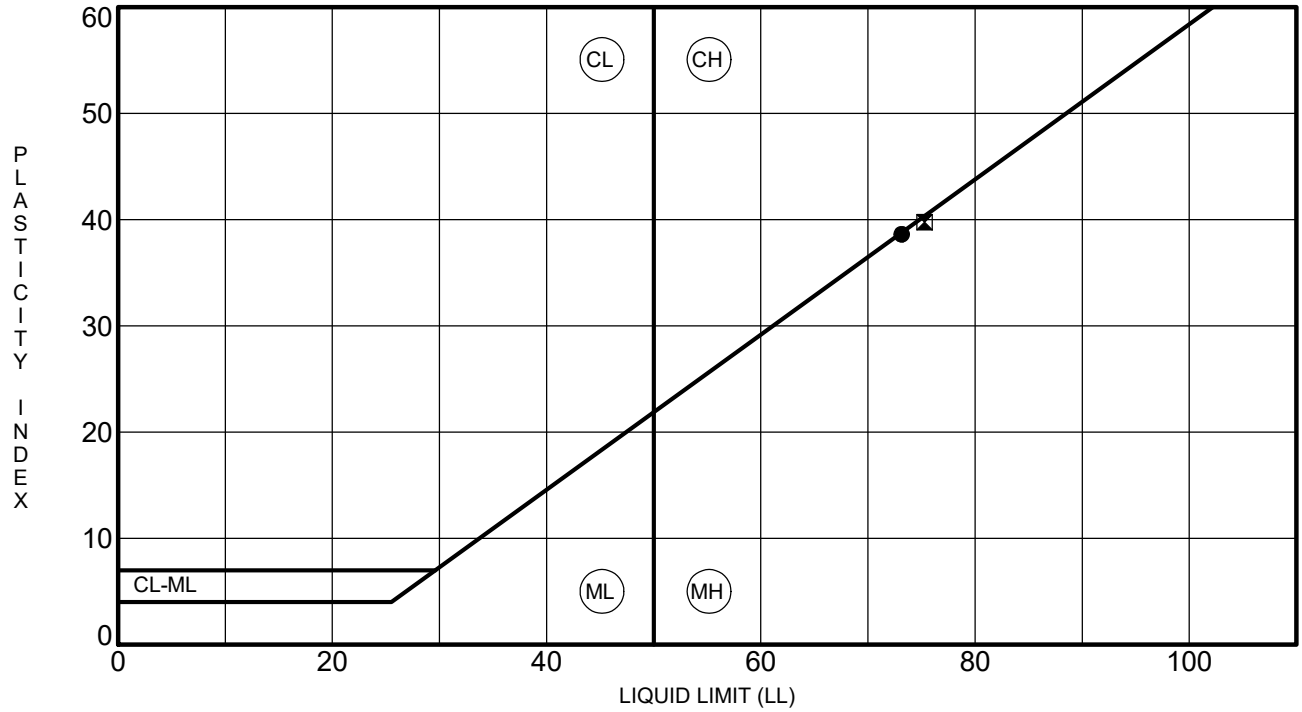
SIEVE DIAMETER (mm)	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
26.5	**0.0**	0.0	**100.0**
19	**0.0**	0.0	**100.0**
13.2	**0.0**	0.0	**100.0**
9.5	**0.0**	0.0	**100.0**
4.75	**0.0**	0.0	**100.0**
2.0	**0.1**	0.1	**99.9**
Pan	**103.6**		
0.850	**0.60**	1.3	**98.7**
0.425	**1.39**	2.9	**97.1**
0.250	**2.06**	4.2	**95.8**
0.106	**3.06**	6.2	**93.8**
0.075	**4.08**	8.3	**91.7**
Pan	**4.16**		
SIEVE CHECK 0.0	MAX = 0.3%		

HYDROMETER DATA

ELAPSED	TIME (24 hours)	Hs	Hc	Temp. (°C)	DIAMETER	(P)	TOTAL PERCENT PASSING
1	7:41	45.0	6.0	23.0	0.0382	89.0	**88.9**
2	7:42	42.0	6.0	23.0	0.0278	82.1	**82.0**
5	7:45	40.0	6.0	23.0	0.0179	77.5	**77.5**
15	7:55	36.0	6.0	23.0	0.0107	68.4	**68.4**
30	8:10	34.0	6.0	23.0	0.0077	63.9	**63.8**
60	8:40	32.0	6.0	23.0	0.0055	59.3	**59.2**
250	11:50	27.0	6.0	23.0	0.0028	47.9	**47.8**
1440	7:40	20.0	6.0	23.0	0.0012	31.9	**31.9**

Moisture = 45.5%

REVIEWED BY:	C. Beadow	Joe Forsyth, P. Eng.



Specimen Identification		LL	PL	PI	Fines	Classification
●	**BH 3-24 SS4**	**73**	**35**	**38**		**MH - Inorganics silts of high plasticity**
⧓	**BH 4-24 SS3**	**75**	**36**	**39**		**MH - Inorganics silts of high plasticity**

CLIENT	**Glenview Homes**	FILE NO.	**PG4026**
PROJECT	**Geotechnical Investigation - Prop. Residential Dev. - The Commons Phase 4 - 3610 Innes Road**	DATE	**27 May 24**

patersongroup Consulting Engineers
9 Auriga Drive, Ottawa, Ontario K2E 7T9

ATTERBERG LIMITS' RESULTS

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 25690

Report Date: 13-Dec-2018

Order Date: 7-Dec-2018

Project Description: PG4026

	Client ID:	BH5 SS2	-	-	-
	Sample Date:	12/06/2018 12:00	-	-	-
	Sample ID:	1849625-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	75.2	-	-	-
General Inorganics					
pH	0.05 pH Units	7.77	-	-	-
Resistivity	0.10 Ohm.m	33.4	-	-	-
Anions					
Chloride	5 ug/g dry	57	-	-	-
Sulphate	5 ug/g dry	116	-	-	-

APPENDIX 2

FIGURE 1 - KEY PLAN

FIGURE 2 - AERIAL PHOTOGRAPH - 1999

FIGURE 2 - AERIAL PHOTOGRAPH - 2022

DRAWING PG4026-4 - TEST HOLE LOCATION PLAN

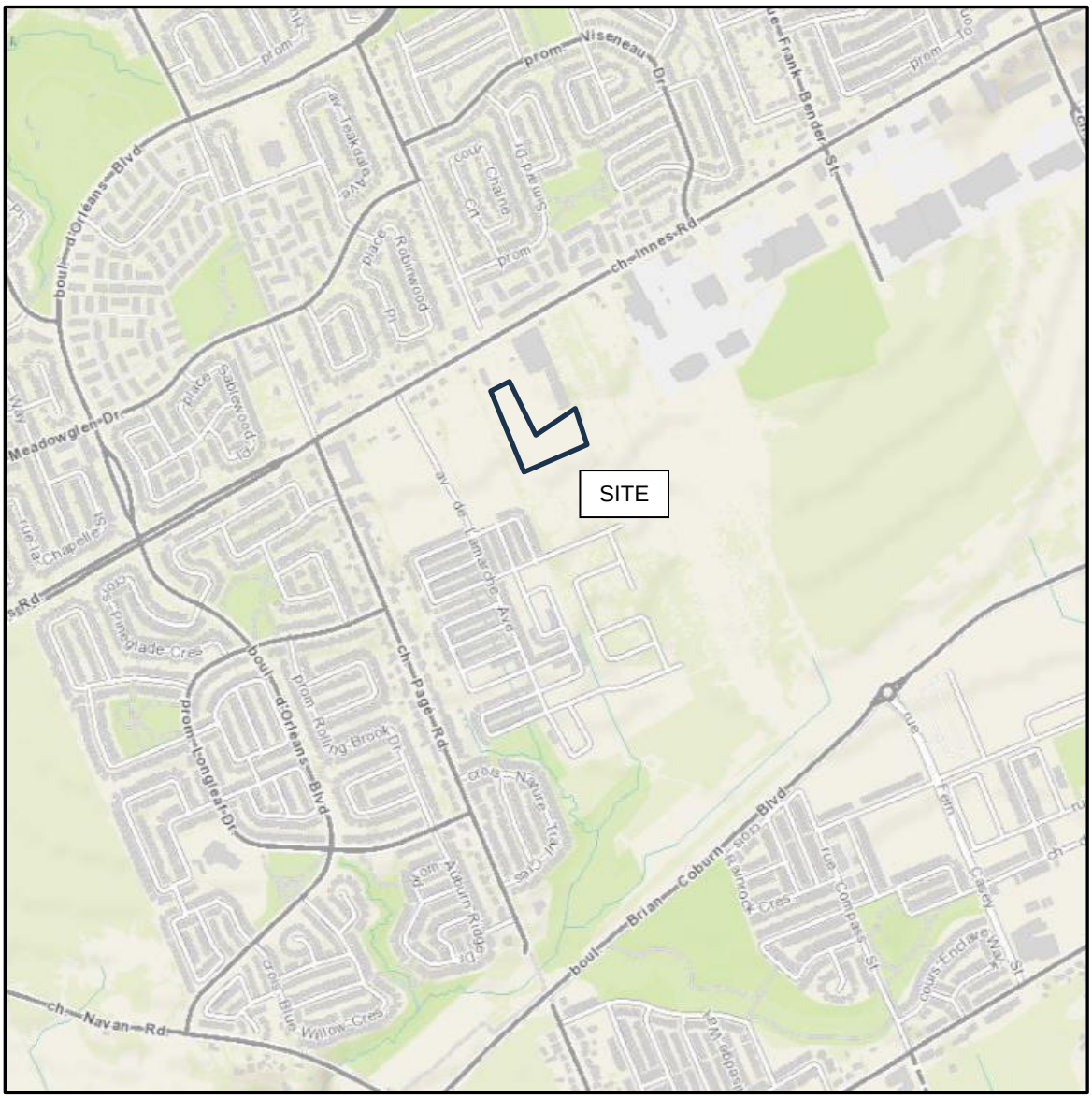


FIGURE 1

KEY PLAN

PATERSON GROUP

FIGURE 2

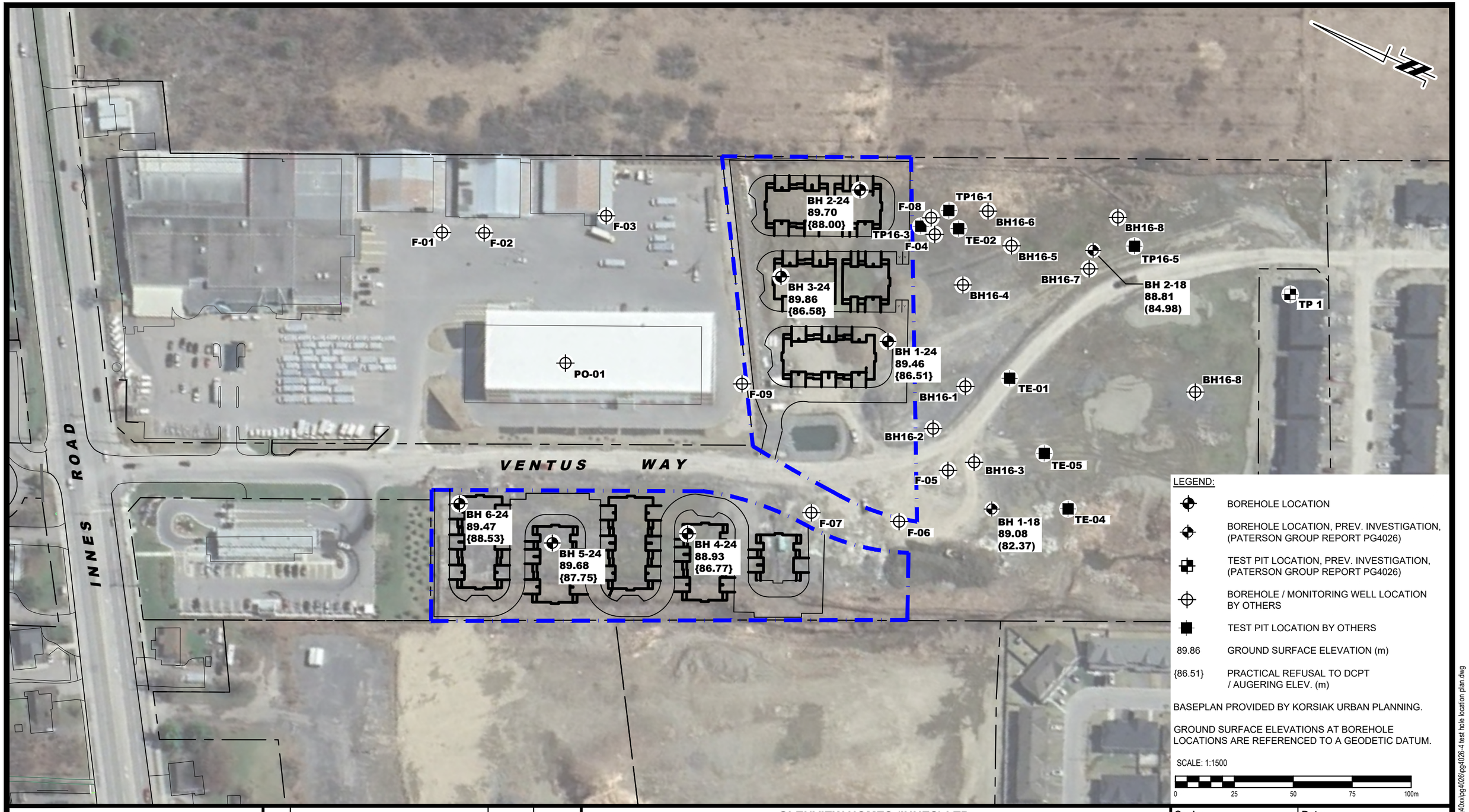
Aerial Photograph – 1999

PATERSON GROUP

FIGURE 3

Aerial Photograph – 2022

PATERSON GROUP



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE LOCATION, PREV. INVESTIGATION, (PATERSON GROUP REPORT PG4026)
- TEST PIT LOCATION, PREV. INVESTIGATION, (PATERSON GROUP REPORT PG4026)
- BOREHOLE / MONITORING WELL LOCATION BY OTHERS
- TEST PIT LOCATION BY OTHERS
- 89.86 GROUND SURFACE ELEVATION (m)
- {86.51} PRACTICAL REFUSAL TO DCPT / AUGERING ELEV. (m)

BASEPLAN PROVIDED BY KORSIAK URBAN PLANNING.

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:1500

0 25 50 75 100m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

GLENVIEW HOMES (INNES) LTD.

GEOTECHNICAL INVESTIGATION

PROPOSED RESIDENTIAL DEVELOPMENT - THE COMMONS PHASE 4

3604-3646 INNES ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1500	Date: 05/2024
Drawn by: GK	Report No.: PG4026-3
Checked by: KS	Dwg. No.: PG4026-4
Approved by: KP	Revision No.:

11x17

p:\autocad drawings\geotechnical\pg40xx\pg4026\pg4026-4 test hole location plan.dwg