Peto MacCallum Ltd.
CONSULTING ENGINEERS

GEOTECHNICAL INVESTIGATION AND LIMITED CHEMICAL TESTING PROGRAM PROPOSED GAS STATION 10819 HIGHWAY 9 CALEDON, ONTARIO

for

2203315 ONTARIO CORPORATION

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PML Ref.: 19BF043, Revised
Report: 1

2203315 Ontario Corporation
c/o Mr. Jay Heming
10819 Highway 9
Caledon, Ontario
L7E 0G5

Dear Mr. Heming

Geotechnical Investigation and
Limited Chemical Testing Program
Proposed Gas Station
10819 Highway 9
Caledon, Ontario

Peto MacCallum Ltd. (PML) is pleased to report the results of the geotechnical investigation and limited chemical testing program recently completed for this project. Authorization to proceed with this assignment was provided by Mr. Jay Heming in an email dated November 1, 2019.

It is understood that the subject development site located at 10819 Highway 9, at the south side of intersection of Highway 9 and Tottenham Road in Caledon, Ontario. The site is approximately 6,400 m^2 (0.64 ha) in size and is currently occupied by a commercial auto repair building fronting Highway 9 and a two-story residential dwelling in the rear portion of the property. The proposed site development plans call for the construction of a retail gas station with a 260 m^2 single storey convenience store and restaurant, three pump islands with an overhead canopy, two underground fuel storage tanks with related distribution piping, asphalt pavements for drive lanes and parking areas, various minor landscape areas and a proposed septic bed area located in the eastern part of the site.

The purpose of the geotechnical investigation was to assess the subsurface soil and ground water conditions at the site and based on the findings, provide geotechnical comments and recommendations for the design and construction of the development.

A limited chemical testing program was included with the geotechnical work to check the geoenvironmental quality of the on-site soil in order to provide comments regarding on-site or off-site re-use and/or off-site disposal options of excess soil.

The subsurface stratigraphy revealed in the boreholes typically comprised surficial pavement structure or topsoil, over fill, underlain by silty sand and/or sand deposits. As of the last recorded water level by PML on January 13, 2020, Borehole/Monitoring Well 1 was dry.

Based on the findings of this investigation, it is considered feasible to construct the buildings and infrastructure using standard construction practices.

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The results of the limited chemical testing program indicate the chemical quality of the tested soil samples met the site condition standards for Table 1 residential/parkland/institutional/ industrial/commercial/community (RPI/ICC) property use. It is understood that environmental site assessments (ESAs) have been completed for this site by others and these ESA reports should be consulted for further information regarding the geoenvironmental condition of the soil and groundwater at the site.

Detailed comments and recommendations concerning the design and construction of the development as well as the results of the limited chemical testing program are provided in the attached report.

We trust the information presented in the attached report will be sufficient for your present purposes. If you have any questions, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

Scott Jeffrey, P.Eng., QP_{ESA}, $LEED_{GA}$
Senior Engineer
Regional Manager, Geotechnical Services

UI/SJ:ui/sj

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1. INTRODUCTION

Peto MacCallum Ltd. (PML) is pleased to report the results of the geotechnical investigation and limited chemical testing program recently completed for this project. Authorization to proceed with this assignment was provided by Mr. Jay Heming in an email dated November 1, 2019.

It is understood that the subject development site located at 10819 Highway 9, at the south side of intersection of Highway 9 and Tottenham Road in Caledon, Ontario. The site is approximately 6,400 m2 (0.64 ha) in size and is currently occupied by a commercial auto repair building fronting Highway 9 and a two-story residential dwelling in the rear portion of the property. The proposed site development plans call for the construction of a retail gas station with a 260 m^2 single storey convenience store and restaurant, three pump islands with an overhead canopy, two underground fuel storage tanks with related distribution piping, asphalt pavements for drive lanes and parking areas, various minor landscape areas and a proposed septic bed area located in the eastern part of the site.

The purpose of the geotechnical investigation was to assess the subsurface soil and ground water conditions at the site and based on the findings, provide geotechnical comments and recommendations for the design and construction of the development.

A limited chemical testing program was included with the geotechnical work to check the geoenvironmental quality of the on-site soil in order to provide comments regarding on-site or off-site re-use and/or off-site disposal options for excess soil which may be generated during the demolition/construction phase of the project. It should be noted that ground water sampling and testing was not part of the Terms of Reference for this assignment and no work was carried out in this regard.

It is understood that environmental site assessments (ESAs) have been completed for this site by others and these ESA reports should be consulted for further information regarding the geoenvironmental condition of the soil and groundwater at the site.

The comments and recommendations provided in this report are based on the site conditions at the time of the investigation and are applicable only to the proposed development as described in the report. Any changes in development, including finished grades and layout will require review by PML to assess the validity of the report and may require modified recommendations, additional investigation and/or analysis.

2. INVESTIGATION PROCEDURES

The field work was carried out on January 13, 2020 and consisted of five boreholes (Boreholes 1 to 5) drilled to termination depth of 5.0 m. The borehole locations are shown on the appended Borehole Location Plan, Drawing 1.

The borehole locations were selected and established in the field by PML. Ground surface elevations (geodetic) and UTM co-ordinates at the borehole locations were determined by PML.

The boreholes were advanced using continuous flight hollow stem augers, powered by a track-mounted drill rig, supplied and operated by a specialist drilling contractor, working under the full-time supervision of a member of PML's engineering staff.

Representative samples of the overburden were recovered at frequent depth intervals using a conventional split-spoon sampler during drilling. Standard penetration tests were conducted simultaneously with the sampling operation to assess the strength characteristics of the substrata.

The ground water conditions at the borehole locations were assessed during drilling by visual examination of the soil, the sampler and the drill rods as the samples were retrieved and when appropriate by measurement of the water level in the open borehole.

A ground water monitoring well was installed in Borehole/Monitoring Well (BH/MW) 1 comprising clean 50 mm diameter screened and solid PVC Schedule 40 pipe. The well was installed to a depth of 4.5 m and screened at the bottom over a length of 1.5 m. The annular space of the borehole around the screen was backfilled with clean filter sand covered by a bentonite seal and well protector set in concrete. The details of the monitoring well construction are shown on the appended Log of Borehole/Monitoring Well sheet. A well record was provided by the licensed well contractor and it will be kept on file for future reference in accordance with O. Reg. 903/90, as amended.

in accordance with O. Reg. 903/90, as amended, the owner of a well is defined as the owner of the land upon which the well is situated and the well owner should immediately decommission the well if it is not being used or maintained for future use as a well. PML would be pleased to assist in this regard.

Water levels were measured in the monitoring well using a Solinst™ ground water level reader. Upon completion of drilling, the remaining boreholes were decommissioned in accordance with O. Reg. 903/90, as amended.

The recovered soil samples were returned to our laboratory for detailed visual examination and classification. Laboratory testing was completed by PML on selected samples to determine index properties and soil classification (moisture content, grain size).

Selected soil samples were submitted to Caduceon Environmental Laboratories (CEL) for laboratory testing to assess the geoenvironmental properties of the soil. Details concerning the geoenvironmental chemical testing program including procedures and results of chemical testing are provided in Section 5.

3. SUMMARIZED SUBSURFACE CONDITIONS

Reference is made to the appended Log of Borehole sheets for details of the subsurface conditions including soil classifications, inferred stratigraphy, standard penetration test N values, ground water observations, details of monitoring well installation, and the results of laboratory grain size analysis and moisture content determinations.

Due to the soil sampling procedures and limited sample size, the depth demarcations on the borehole logs must be viewed as transitional zones between layers and cannot be construed as exact geologic boundaries between layers. PML would be pleased to assist in defining geologic boundaries during construction if required.

The subsurface stratigraphy revealed in the boreholes typically comprised surficial pavement structure or topsoil, over fill, underlain by silty sand and/or sand deposits.

3.1 Surficial Pavement Structure

The surficial pavement structure of 600 mm thickness was encountered at Borehole 2 location. The typical pavement components comprised of 100 mm of asphalt and 500 mm of granular base/subbase.

3.2 Topsoil

Topsoil was encountered in Boreholes 3 to 5 and extended to between 0.15 and 0.3 m depth. The topsoil comprised of silty sand trace organic material. The topsoil was observed to be in moist to very moist conditions.

3.3 Fill

A 0.4 to 0.8 m thick fill layer was encountered below the surficial pavement structure or topsoil in Boreholes 2 to 5. A 1.4 m thick fill layer was encountered at the ground surface in Borehole 1. The fill layer extended to between 0.7 and 1.4 m depth in Boreholes 1 to 5. The composition of fill comprised of sand with some/trace silt material. SPT N values within the fill ranged from 3 to 30 blows per 0.3 m penetration of the split spoon sampler, indicating very loose to compact fill material. The fill was observed to be in moist to wet conditions with moisture contents ranging from 4 to 20%.

3.4 Silty Sand

A 1.4 m thick silty sand layer was encountered below the topsoil and fill at 0.7 m and extended to 2.1 m depth, locally in Borehole 4. SPT N values within the silty sand ranged from 13 to 17 blows per 0.3 m penetration of the split spoon sampler, indicating compact silty sand material. The silty sand was observed to be in very moist conditions with moisture contents ranging from 16 to 18%.

3.5 Sand

Sand was encountered below the surficial pavement structure or topsoil, fill, and silty sand at 0.7 to 2.1 m depth and extended to the termination depths of 5.0 m at all borehole locations. SPT N values within the sand ranged from 3 to 35 blows per 0.3 m penetration of the split spoon sampler, indicating very loose to dense sand material. The sand was observed to be in moist to very moist conditions with moisture contents ranging from 2 to 18%.

The results of one grain size test (Figure A1) indicates that the native sand deposits comprised of 98% sand, and 2% silt and clay.

3.6 Ground Water Conditions

Upon completion of augering, all boreholes were open and dry. As of the last recorded water level by PML on January 13, 2020, Borehole/Monitoring Well 1, installed to 4.5 m, was dry. It should be noted that the observed ground water levels may fluctuate subject to seasonal variations and precipitation patterns.

4. ENGINEERING DISCUSSION AND RECOMMENDATIONS

It is understood that the subject development site located at 10819 Highway 9, at the south side of intersection of Highway 9 and Tottenham Road in Caledon, Ontario. The site is approximately 6,400 m^2 (0.64 ha) in size and is currently occupied by a commercial auto repair building fronting Highway 9 and a two-story residential dwelling in the rear portion of the property. The proposed site development plans call for the construction of a retail gas station with a 260 m^2 single storey convenience store and restaurant, three pump islands with an overhead canopy, two underground fuel storage tanks with related distribution piping, asphalt pavements for drive lanes and parking areas, various minor landscape areas and a proposed septic bed area located in the eastern part of the site.

The subsurface stratigraphy revealed in the boreholes typically comprised topsoil or surficial pavement structure, over fill, underlain by silty sand and/or sand.

4.1 Building Foundations

Details concerning the design founding level and finished floor slab elevation (FFE) were not provided. For the purposes of this report, it is assumed that the FFE will be at or near existing grade (elevation 291.8 to 296.0) and the footings will be founded at a typical depth of 1.5 m below the FFE, near elevation 290.3 to 294.5.

A very loose to compact native silty sand/sand material was encountered at borehole locations and this is not suitable for foundation support; however, some of the fill may be left in place for support of slab-on-grade floors and pavements, subject to adequate preparation. For the purposes of slab-on-grade and/or pavement support, it is recommended to compact the exposed subgrade material prior to excavation for footings, and to subexcavate any revealed soft/very loose areas and replace with suitable approved fill material. The subgrade material should be compacted to at least 98% of standard Proctor maximum dry density (SPMDD) to have stable material.

Conventional shallow spread and strip footings on well compacted native undisturbed silty sand/sand subgrade material are considered suitable provided that the topsoil and fill materials are subexcavated to the founding level depth of 1.5 m.

Strip and spread footings founded on the well compacted native undisturbed silty sand/sand should be proportioned for a factored net bearing resistance at Ultimate Limit State (ULS) of 112 kPa and bearing pressure at Serviceability Limit State (SLS) of 75 kPa.

In general, where founding levels of adjacent footings vary, the founding elevation between footings should be stepped in maximum 600 mm steps at a maximum inclination of 10 horizontal to 7 vertical (10H:7V). If adequate stepping of the footings is not possible due to site or design limitations, the need for underpinning of the foundations should be evaluated.

Prior to placement of structural concrete, all foundation excavations should be examined by geotechnical personnel from PML to verify that the founding stratum is in accordance with the assumptions and recommendations of this report.

All footings subject to frost action should be provided with a minimum of 1.2 m of soil cover or equivalent thermal insulation. A 25 mm thick layer of polystyrene insulation is thermally equivalent to 600 mm of soil cover.

The overburden soil is prone to disturbance by the weather elements and construction traffic. Accordingly, a 50 mm thick skim slab of lean concrete should be provided over the base of the approved subgrade if structural concrete cannot be provided within 24 hours of approval of the foundation base.

The total settlement of foundations designed in accordance with the foregoing recommendations is not expected to exceed 25 mm. Differential settlement is expected to be less than 75% of this value.

All work should be carried out in accordance with the Occupational Health and Safety Act (Ontario Regulation 213/91) and with local regulations.

4.1.1 Earthquake Considerations

Design provisions for earthquake loading should also be applied. Based on the characteristics of the subsoils encountered in the boreholes at this site and based on a review of nearby publicly available deeper borehole information, the subject property may be classified as Site Class D for footings bearing on compacted native soils as per The Ontario Building Code Act, (2012) Section 4.1.8.4. It is recommended that supplemental shear wave velocity testing be conducted to assess the potential for classification of the site as a Site Class C.

4.2 Floor Slab Construction

Construction of the floor slab as a conventional slab-on-grade on compacted native silty sand/sand is considered to be feasible.

Preparation of the floor slab subgrade should include stripping of the topsoil, loose fill, and otherwise deleterious material followed by proofrolling of the exposed subgrade with a heavy roller to ensure uniform adequate support. Excessively loose/soft or compressible materials revealed during the proofrolling operations should be subexcavated and replaced with well compacted approved material.

Fill placed under the floor slab to achieve finished subgrade levels or as foundation excavation backfill should comprise approved inorganic material having a moisture content within 3% of the optimum value, placed in maximum 200 mm thick lifts, and compacted to at least 98% of standard Proctor maximum dry density (SPMDD).

A minimum 150 mm thick layer of well compacted free draining Granular A type material meeting OPSS 1010 specifications should be provided directly beneath the slab-on-grade. A polyethylene vapour barrier should be placed under the slab if a moisture sensitive finish is to be placed on the floor.

Exterior grades should be maintained at least 150 mm below the ground floor level and sloped to promote drainage away from the building. If finished floor levels cannot be maintained at least 150 mm above surrounding grades then perimeter foundation drains are recommended.

4.3 Excavation

Open cut excavations are anticipated to extend through the topsoil, and fill and into the native silty sand/sand. In general, excavations are expected to be relatively straightforward using conventional excavation equipment. The possibility of debris in the fill and/or cobbles and boulders in the native overburden should not be overlooked.

Provided that adequate ground water control is achieved, in situ soils are classified as Type 3 soil according to the Occupational Health and Safety Act (OHSA) criteria. Therefore, trench sidewalls should be cut at an inclination of 1 horizontal to 1 vertical (1H:1V) from the bottom of the excavation, otherwise adequate shoring must be provided in accordance with the current OHSA.

It may be necessary to further flatten the excavation sideslopes if excessively loose, soft conditions or concentrated seepage zones are encountered.

Excavation sideslopes should be continuously examined for evidence of instability, particularly following periods of heavy rain, thawing or when the excavation has been left open for extended periods of time. When required, appropriate remedial action must be taken to ensure the continued stability of the excavation slope and the safety of workers in the excavation.

If space is not available for inclined slopes, it will be necessary to use a braced excavation to support the walls of the excavation and maintain the integrity of existing facilities. The magnitude and distribution of the lateral earth pressures acting on a braced excavation wall is dependent upon the support system used, the number of supports, the allowable movements and the construction sequence.

The recommended design earth pressure distributions for singly and multiple braced walls, for the conditions which exist at the site, are presented in Figures 1 and 2, respectively. Recommendations concerning design and construction of the braced excavation support systems are also presented on the Figures.

The ground surface adjacent to a braced excavation is expected to experience some inward movement and vertical settlement. The magnitude of movements adjacent to a braced cut can be limited by proper selection of the lateral earth pressure coefficient provided good quality workmanship and construction practice is employed.

Foundations of heavily loaded/settlement sensitive structures and/or utilities located within close proximity to the excavation may require underpinning to preserve the integrity of these structures. Further comments and general recommendations in this regard are presented in Figure 3.

All work should be carried out in accordance with the current Occupational Health and Safety Act (Ontario Regulation 213/91) and with local regulations.

4.4 Ground Water Control

Upon completion of augering, all boreholes were open and dry. As of the last recorded water level by PML on January 13, 2020, Borehole/Monitoring Well 1 was dry. No major ground water ingress is anticipated; however, ground water levels may fluctuate subject to seasonal variations and precipitation patterns.

It is expected that seepage or surface water that enters the excavations will be adequately handled by conventional sump pumping techniques.

4.5 Re-use of Site Material

It is anticipated that the excavated material will generally consist of topsoil, fill and native silty sand and sand material.

Select portions of the fill, without topsoil inclusions, rootlets, and wood fragments, and native silty sand/sand from above the water table may be suitable for re-use as foundation and underfloor backfill, subject to evaluation at time of construction. Depending on seasonal conditions, some moisture content adjustments to the backfill materials may be required. The on-site soils are frost susceptible and are considered unsuitable for use where free draining backfill is required or at locations where frost related movement would present a concern.

in general, backfill should comprise inorganic, debris free material having a moisture content within 3% of the optimum value. Further, should construction extend into the winter season, particular attention must be given to ensure that frozen material is not used as backfill.

Organic soil, topsoil, deleterious or excessively wet material should not be used as backfill.

In areas that underlie floor slabs (i.e. interior foundation wall backfill), pavements and walkways, the foundation and service trench backfill should be compacted to at least 95% SPMDD. In landscaped areas, where no settlement sensitive structures or landscape features are planned, compaction to at least 90% SPMDD will be adequate.

Full time site observation should be carried out by PML to examine and approve backfill material, to carefully inspect placement operations, and to verify the compaction by in situ density testing using nuclear gauges.

The suitability of re-using the site soil from a geoenvironmental perspective is provided in Section 5 of this report.

4.6 Underground Services

The recommendations made for building excavations, ground water control, and re-use of site material are applicable to underground services.

4.6.1 Bedding Material

It is anticipated the subgrade for underground services will comprise of fill and native silty sand and sand material. The native compact to dense silty sand/sand is considered suitable for conduit support. However, in localized areas, for shallow service trenches, the trench subgrade may be within the very loose to loose material, as observed in the boreholes, and these areas may require subexcavation and compaction prior to the placement of the granular pipe bedding material.

It will be necessary to compact the subgrade in order to provide uniform support prior to placement of the bedding material. Depending on the final design invert elevation, localized subexcavation of excessively loose, soft, organic or wet materials and replacement with granular or non-shrinkable fill may be required.

The normal 150 mm bedding thickness of granular material as per Ontario Provincial Standards (OPS) and/or local municipal requirements should be satisfactory. The bedding and cover material should be placed in 150 mm lifts compacted to a minimum 95% standard Proctor maximum dry density (SPMDD). Compaction should be provided beneath the pipe haunches to provide uniform support. The cover material should be carried up as backfill for at least 300 mm above the pipe obvert.

4.7 Lateral Earth Pressure

The underground storage tanks should be designed to resist the lateral earth pressure and full hydrostatic conditions which may be determined from the following equation:

$$p = K [\gamma (h-dw) + \gamma' dw + q] + \gamma w \, dw$$

where
- P = total lateral pressure at depth h below ground surface (kPa)
- K = lateral earth pressure coefficient
  - = 0.5
- h = depth below grade at which lateral pressure is calculated (m)
- dw = depth below groundwater level at depth, h, below final exterior grade
  - = h, when the water level is at the ground surface (m)
- γ = unit weight of free-draining compacted granular material
  - = 21.0 kN/m^3
- γw = unit weight of water
  - = 9.8 kN/m^3
- γ' = Buoyant unit weight of soil
  - = $\gamma - \gamma w$
- q = surcharge load (kPa), if present

The backfill adjacent to the underground tanks should be carefully compacted to at least 95% of standard Proctor maximum dry density (SPMDD) in areas beneath entranceways and sidewalks and to at least 90% SPMDD beneath landscaped areas. The backfill should be compacted using light equipment to minimize potential damage to the wall.

it is imperative that the excavation is of sufficient width to enable operation of suitable compaction equipment; use of a hoepac is not suitable for this application.

4.8 Underground Storage Tanks

The main concern with installation of the underground storage tanks will be the proximity of the water table to the invert level of the tanks. Providing the excavation for the tanks does not extend below a depth of about 4 m, conventional sump pumping techniques should be adequate to control any minor seepage zones which may be encountered. If excavation to greater depths is necessary, additional groundwater control measures may be required to control the groundwater and prevent subgrade instability. Seasonal fluctuation of the water table can be expected and it is recommended to schedule this work for the summer months if possible.

The proposed tanks will be founded in the native compact to dense silty sand/sand which is considered capable of supporting the tanks. Cut slopes in the silty sand/sand during tank installation should be inclined at 45° from the bottom of excavation.

4.9 Pavement Structure

The anticipated subgrade for pavement construction is anticipated to consist of fill and native silt. Based on typical traffic patterns for parking lots and access roads, the estimated strength and frost susceptibility of the anticipated subgrade and assuming adequate drainage, the following pavement structure is recommended:

Pavement Component	Light Duty Pavement Thickness (mm)	Heavy Duty Pavement Thickness (mm)
Asphalt	90	120
Granular A Base Course	150	150
Granular B Subbase Course	250	300

Light duty pavement is for car parking areas. Heavy duty pavement should be used for access roads and areas where buses, heavy service/emergency vehicles, delivery vehicles, transport trucks and the like will travel.

The pavement granular courses should conform to the OPSS specifications for select granular materials. They should be placed in maximum 200 mm thick lifts and compacted to at least 100% of standard Proctor maximum dry density (SPMDD). The asphalt should be placed and compacted to a minimum of 92% of the material's maximum relative density (MRD). Reference is made to OPSS Specification 310.

Preparation of the subgrade for pavement construction should involve stripping of the topsoil, fill and obvious deleterious materials followed by proofrolling of the subgrade with a heavy roller. Excessively loose, soft, wet or deleterious material revealed by the proofrolling operations should be subexcavated and replaced. It is noted that very loose to loose fill was encountered in the boreholes and the proofrolling operations may be extensive. The subgrade surface should be compacted to at least 95% SPMDD.

The pavement design considers that construction will be carried out during the drier time of the year and that the subgrade is stable, as determined by proofrolling operations. If the subgrade should become excessively wet or rutted during construction activities, additional subbase material may be required. The need for additional subbase is best determined during construction.

For the pavement to function properly, provision must be made for water to drain out of, and not collect in, the granular courses. The pavement subgrade should be sloped to promote drainage towards catch basins and manholes. The excavation around catch basins and manholes should be backfilled with free-draining granular material to minimize differential movements between the pavement and structures due to frost action. The manholes/catch basins should be provided with perforated stub drains to permit drainage of the backfill.

Site review should be carried out by PML personnel to examine and approve subgrade, backfill/granular materials, to observe placement operations and verify the compaction (granular and asphalt) by in situ testing using nuclear gauges.

4.10 Storm Water Infiltration

It is assumed that a storm water management infiltration system may be considered for the Site. At the time of this report, the proposed depth of the infiltration system and location were not known. Based on the results of this investigation, it is anticipated that the soil will consist of native silty sand/sand material.

Based on the subsurface soil and ground water conditions encountered at the site, stormwater recharge into the native sand materials found at the site is considered feasible, assuming that the depth of the infiltration system will be located within the sand deposits. Based on the results of the particle size distribution test, the hydraulic conductivity (K) was estimated using Hazen's approximation and the following values for the native sand deposits should be used for design of infiltration systems.

SOIL TYPE	HYDRAULIC CONDUCTIVITY (k) (cm/sec)	INFILTRATION RATE (mm/hr)
Sand	3×10^{-2}	50 to 100

5. GEOENVIRONMENTAL CONSIDERATIONS

PML understands that excess soil may be generated during construction; the volume of which is unknown at this time. A limited chemical testing program was carried out to check the geoenvironmental quality of the soil at selected sampling locations in order to provide preliminary comments regarding the likely on-site or off-site re-use and/or off-site disposal options of excess soil.

A Phase One Environmental Site Assessment (ESA) was not within the scope of work for this assignment. Accordingly, soil and ground water impairment that has not been identified by the limited chemical testing program may exist elsewhere at the site. The limited chemical testing program does not constitute an Environmental Site Assessment as defined under the Environmental Protection Act and O. Reg. 153/04, as amended. As such, it is important to note that not all possible contaminants of concern have been analysed. Additional sampling and testing may be required for final excess fill management purposes.

it is understood that environmental site assessments (ESAs) have been completed for this site by others and these ESA reports should be consulted for further information regarding the geoenvironmental condition of the soil and groundwater at the site.

5.1 Chemical Testing Protocol

Representative samples collected during the geotechnical investigation were returned to our laboratory for detailed visual examination. Soil samples were submitted for chemical analysis to Caduceon Environmental Laboratories (CEL), a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory in Lakefield, Ontario. The chemical analyses conducted by CEL were in accordance with the O. Reg. 153/04, as amended Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act dated March 9, 2004, amended as of July 1, 2011.

As part of the geoenvironmental procedural protocol, all recovered soil samples were examined for visual and olfactory evidence of potential contamination.

Samples were reviewed and selected for chemical testing in accordance with the proposal whereby two soil samples were selected and analyzed for general testing for metals and inorganic parameters.

The rationale for sample selection was based on materials exhibiting visual and/or olfactory evidence of contamination, material most likely to be contaminated (i.e. fill materials), site coverage and materials most likely to be excavated during construction. A list of all samples submitted for analysis is included as Table B1, appended.

5.2 Site Condition Standards

The Ontario Ministry of the Environment, Conservation and Parks (MECP) has developed a set of Soil, Ground water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 15, 2011) and O. Reg. 153/04, as amended. The standards consist of nine tables (Table 1 through Table 9) that provide criteria for maximum concentrations of various contaminants. In general, the applicable O. Reg. 153/04, as amended Site Condition Standards (SCSs) depend on the site location, land use, soil texture, bedrock depth, soil pH and the applicable potable or non-potable ground water condition at the investigation site.

in order to determine the Site Sensitivity, Sections 41 and 43.1 of O. Reg. 153/04, as amended were evaluated by PML as per the following table:

Site Condition Standard and Site Sensitivity Analysis

Criteria	Result
Current Property Use O. Reg. 153/04, as amended Part I Section 1	Commercial
Potable vs. Non-Potable Ground Water O. Reg. 153/04, as amended Part IX Section 35	Potable
Proximity to Areas of Natural Significance O. Reg. 153/04, as amended Part IX Section 41 (1) (a)	> 30 m
Soil pH O. Reg. 153/04, as amended Section 41 (1) b	Surface Soil: 5 to 9 Subsurface Soil: 5 to 11
Soil Texture O. Reg. 153/04, as amended Part IX Section 42	Coarse
Proximity to a Water Body O. Reg. 153/04, as amended Part IX Section 43.1	>30 m
Shallow Soil O. Reg. 153/04, as amended Part IX Section 43.1	No
Site Condition Standards	Table 2 (T2) Site Condition Standards (SCSs) for industrial/commercial/community (ICC)

For the option of re-using the excess soils with minimal environmental restrictions, the O. Reg. 153/04, as amended, Full Depth Background T1 SCSs for residential/parkland/ institutional/industrial/commercial/community (RPI/ICC) property uses were utilized.

For the option of re-using the excess soils at a property (or properties) with a potable ground water condition, the O. Reg. 153/04, as amended, Full Depth Generic Table 2 (T2) SCSs were utilized for both RPI and ICC land uses.

For the option of re-using the excess soils at a property (or properties) with a non-potable ground water condition, the O. Reg. 153/04, as amended, Full Depth Generic Table 3 (T3) SCSs were utilized for both RPI and ICC land uses.

It is noted that a comparison to the Tables 4 and 5 SCSs for stratified site condition, Tables 6 and 7 SCSs for shallow bedrock condition and Table 9 for use within 30 m of a water body (non-potable ground water condition) was not conducted as part of this assignment. If the potential receiving site for excess soil falls within one of these categories, additional evaluation by PML will be required to confirm conformance.

5.3 Analytical Findings

Laboratory Certificates of Analysis compared to T1 RPI/ICC are included in Appendix B. The measured values and corresponding SCSs are shown on the certificates of analysis. In the event of an exceedance of the SCSs, the level is shown highlighted, where applicable.

5.3.1 On-Site Re-Use

Based on the results of chemical testing, the measured concentration of the tested parameters complied with the applicable T1 RPI/ICC SCSs.

5.3.2 Off-Site Re-Use

A comparison of the results was carried out against the SCSs of T1. The following table outlines a summary of the suitability for re-use of excess soil material based on the limited chemical testing.

Table 1 (RPI/ICC)	Table 2 (RPI or ICC)	Table 3 (RPI or ICC)	Licensed Landfill
Yes	Yes	Yes	TCLP (1) Required

(1) **Notes:** Toxicity Characteristic Leaching Procedure

5.4 Discussion and Recommendations

If the excess soil is to be removed from the site for off-site re-use, the following conditions must be met:

- The work must be completed in accordance with local by-laws governing soil movement and/or placement at other sites;
- All analytical results and environmental assessment reports must be fully disclosed to the receiving site owners/authorities and they have agreed to receive the material;
- The applicable SCSs for the receiving site have been determined, as confirmed by the environmental consultant and the SCSs are consistent with the chemical quality of the soil originating at the source site;
- Transportation and placement of the excess soil is monitored by the environmental consultant to check the material is appropriately placed at the pre-approved site;
- The receiving site must be arranged and/or approved well in advance of excavation in order to avoid delays during construction. As well, it is noted the chemical testing requirements for various receiving sites is site-specific and additional testing may be required, beyond that provided in this report.
- The excavation work should be conducted in accordance with a written Soil Management Plan prepared by a qualified professional to ensure that all excess excavated material is tested and managed appropriately, and that imported fill material is of suitable quality and meets the SCSs applicable to the site. Re-use of excess excavated soil on site is also subject to acceptance for re-use by the geotechnical consultant at the time of construction based on geotechnical considerations.

It is recommended that transportation of fill material from the Source Site(s) to the Receiving Site(s) be carried out in accordance with the MECP document Management of Excess Soil – A Guide for Best Management Practices dated January 2014.

It is recommended that additional sampling and chemical testing be conducted during construction to verify the chemical quality of the excess soil to assess the appropriate management/disposal options for the soil leaving the site.

It should be noted that the soil conditions between and beyond the sampled locations may differ from those encountered during this assignment. PML should be contacted if impacted soil conditions become apparent during future development to further assess and appropriately handle the materials, if any, and evaluate whether modifications to the conclusions documented in this report are necessary.

It is understood that environmental site assessments (ESAs) have been completed for this site by others and these ESA reports should be consulted for further information regarding the geoenvironmental condition of the soil and groundwater at the site.

We trust the information presented in this report is sufficient for your present purposes. If you have any questions, please do not hesitate to contact our office.

Sincerely
Peto MacCallum Ltd.

Umbreen Imran, M.Sc., P.Eng.
Pavement Engineer

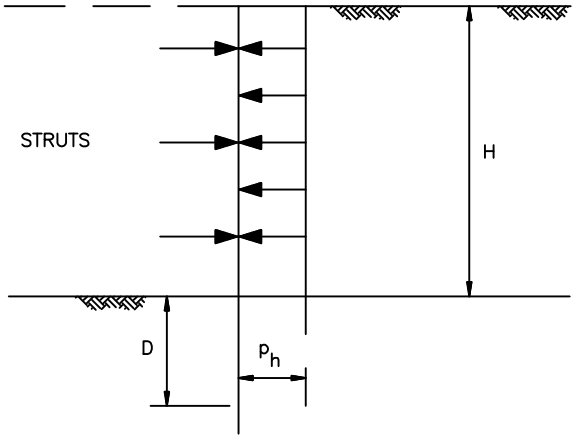
Scott Jeffrey, P.Eng., QP_{ESA}, $LEED_{GA}$
Associate
Regional Manager, Geotechnical Services

UI/SJ:ui/sj

NOTES

1. The actual magnitude and distribution of the horizontal earth pressures which will act on the bracing system are dependent upon the permissible lateral/vertical movements adjacent to the excavation, the soil type, groundwater conditions, drainage provisions, temporary/permanent surcharge loads, the type of bracing system adopted, weather conditions, quality of workmanship and length of time the excavation will be supported. Hence, the recommended pressure diagram and design parameters should be reviewed when construction details, schedule and type of support system are established.
2. Stability of base of excavation must be confirmed when bracing system design, excavation geometry and surcharge loads are established. If groundwater table is well above base of excavation and/or artesian conditions exist, local lowering of the groundwater level will be necessary to prevent bottom heave/piping of the base of the excavation.
3. Earth pressure diagram is applicable to maximum depth of cut of 12m (40 ft.).
4. Structural components of bracing system should be confirmed adequate for each level of excavation.
5. If sheeting will not permit drainage, bracing system must be designed to resist water pressure.
6. Surcharge loads such as street/construction traffic, supported utilities, adjacent foundations, temporary stockpiles and other loads carried by bracing system are not included in earth pressure diagram.
7. Temporary surcharge loading should not be closer to the face of the excavation than half the depth of excavation unless accounted for in bracing design.
8. If settlement sensitive structures are located near the excavation, special measures should be undertaken to control settlements. A condition survey should be conducted prior to construction and apppropriate monitoring (surface and insitu) carried out during construction.
9. Earth pressure diagram is applicable for relatively short construction periods. If excavation is to be open for long periods, monitoring of deformation is essential, earth pressure diagram must be reviewed, and remedial works may be required.
10. Earth pressure diagram does not account for extended periods of exposure of the excavation to freezing temperatures.
11. Bracing system should be regularly examined for signs of distress.
12. All work should be carried out in accordance with the Occupational Health and Safety Act and local regulations. Good quality workmanship and construction practices are to be employed.
13. This sheet should be read in conjunction with text of report for this project. Additional comments and recommendations concerning these general guidelines will be provided if required.

EARTH PRESSURE DIAGRAM



p_h = design lateral earth pressure
= $0.65K\gamma H$

K = lateral earth pressure coefficient

γ = unit weight of soil

H = depth of excavation

D = depth of embedment of soldier piles (if used).

RECOMMENDED DESIGN PARAMETERS

γ = 18.0 kN/m^3

K = 0.30 (movement of retained soil acceptable)
0.50 (movement of adjacent structures/facilities unacceptable)

LATERAL EARTH PRESSURE DISTRIBUTION

MULTI-BRACED CUTS IN COHESIONLESS SOILS

PML Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	T.C.	DATE	SCALE	PML REF.	FIG. NO.
CHECKED	U.I.	March 2020	N.T.S.	19BF043	1
APPROVED	S.J.				

NOTES

1. The actual magnitude and distribution of the horizontal earth pressures which will act on the bracing system are dependent upon the permissible lateral/vertical movements adjacent to the excavation, the soil type, groundwater conditions, drainage provisions, temporary/permanent surcharge loads, the type of bracing system adopted, weather conditions, quality of workmanship and length of time the excavation will be supported. Hence, the recommended pressure diagram and design parameters should be reviewed when construction details, schedule and type of support system are established.

2. Stability of base of excavation must be confirmed when bracing system design, excavation geometry and surcharge loads are established. If groundwater table is well above base of excavation and/or artesian conditions exist, local lowering of the groundwater level will be necessary to prevent bottom heave/piping of the base of the excavation.

3. Earth pressure diagram is applicable to maximum depth of cut of 12m (40 ft.).

4. Structural components of bracing system should be confirmed adequate for each level of excavation.

5. If sheeting will not permit drainage, bracing system must be designed to resist water pressure.

6. Surcharge loads such as street/construction traffic, supported utilities, adjacent foundations, temporary stockpiles and other loads carried by bracing system are not included in earth pressure diagram.

7. Temporary surcharge loading should not be closer to the face of the excavation than half the depth of excavation unless accounted for in bracing design.

8. If settlement sensitive structures are located near the excavation, special measures should be undertaken to control settlements. A condition survey should be conducted prior to construction and apppropriate monitoring (surface and insitu) carried out during construction.

9. Earth pressure diagram is applicable for relatively short construction periods. If excavation is to be open for long periods, monitoring of deformation is essential, the earth pressure diagram must be reviewed, and remedial works may be required.

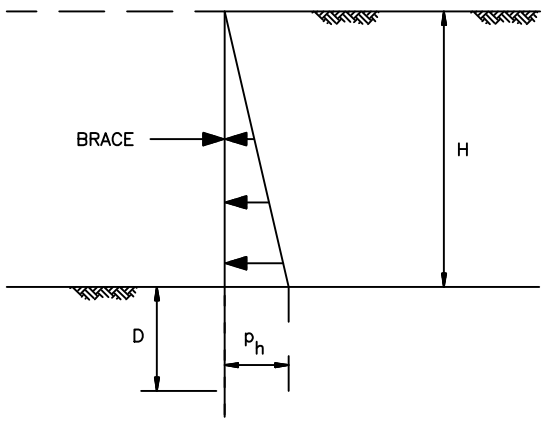
10. Earth pressure diagram does not account for extended periods of exposure of the excavation to freezing temperatures.

11. Bracing system should be regularly examined for signs of distress.

12. All work should be carried out in accordance with the Occupational Health and Safety Act and local regulations. Good quality workmanship and construction practices are to be employed.

13. This sheet should be read in conjunction with text of report for this project. Additional comments and recommendations concerning these general guidelines will be provided if required.

EARTH PRESSURE DIAGRAM



p_h = design lateral earth pressure
= $K\gamma H$

K = lateral earth pressure coefficient

γ = unit weight of soil

H = depth of excavation

D = depth of embedment of soldier piles (if used).

RECOMMENDED DESIGN PARAMETERS

γ = 18.0 kN/m^3

K = 0.30 (movement of retained soil acceptable)
0.50 (movement of adjacent structures/facilities unacceptable)

LATERAL EARTH PRESSURE DISTRIBUTION

SINGLY- BRACED CUTS IN COHESIONLESS SOILS

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	T.C.	DATE	SCALE	PML REF.	FIG. NO.
CHECKED	U.I.	March 2020	N.T.S.	19BF043	2
APPROVED	S.J.				

NOTES

1. The need to underpin existing footings/utilities is dependent upon soil type, proximity of the existing facility to the face of the excavation, loads imposed on the foundation and permissible movements.

   ZONE A:
   Foundations of relatively heavy and/or settlement sensitive structures/ utilities located in Zone A generally require underpinning.

   ZONE B:
   Foundations of structures located within Zone B generally do not require underpinning. Consideration should be given to underpinning of settlement sensitive utilities or heavy foundation units located in this zone.

   ZONE C:

   Utilities and foundations located within Zone C do not normally require underpinning.

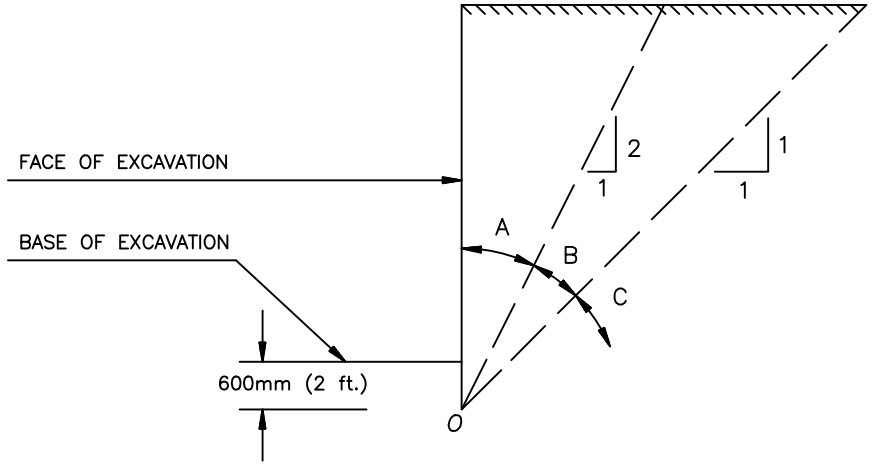
   Underpinning of foundations located in Zones A and B should extend at least into Zone C.

2. As an alternative to underpinning, it may be possible to control movement of existing utilities and foundations by supporting the face of the excavation with bracing/tiebacks or a rigid (caisson) wall. Horizontal and vertical earth pressures imposed on the excavation wall by non–underpinned foundations must be considered in the design of the support system.

3. A condition survey should be conducted prior to construction and appropriate monitoring (surface and insitu) carried out during construction to monitor any movement which may occur.

4. All work should be carried out in accordance with the Occupational Health and Safety Act and local regulations. Good quality workmanship and construction practices are to be employed.

5. This sheet is to be read in conjunction with text of report for this project. Additional comments and recommendations concerning these general guidelines will be provided if required.



– *If the base of excavation is in bedrock, point "O" is drawn through the intersection point of the wall and the surface of sound bedrock.*

GENERAL GUIDELINES REGARDING UNDERPINNING OF FOUNDATIONS / UTILITIES LOCATED CLOSE TO EXCAVATION

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	T.C.	DATE	SCALE	PML REF.	FIG. NO.
CHECKED	U.I.	March 2020	N.T.S.	19BF043	3
APPROVED	S.J.				

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	TW	Thinwall Open
WS	Washed Sample	TP	Thinwall Piston
SB	Scraper Bucket Sample	OS	Oesterberg Sample
AS	Auger Sample	FS	Foil Sample
CS	Chunk Sample	RC	Rock Core
ST	Slotted Tube Sample		

PH	Sample Advanced Hydraulically
PM	Sample Advanced Manually

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 1

17T 596496E 4870886N

PROJECT Proposed Gas Bar and Convenience Store
LOCATION 10819 Highway 9, Caledon, ON
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE January 13, 2020
PML REF. 19BF043
ENGINEER GW
TECHNICIAN JR

SOIL PROFILE

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
	SURFACE ELEVATION 292.85				
0.0	FILL: Brown, sand, trace silt, trace gravel, moist to very moist		1	SS	12
1.0			2[1]	SS	3
1.4 291.5	SAND: Loose to compact, brown, sand, trace silt, moist		3	SS	6
2.0			4	SS	12
3.0			5	SS	16
4.0					
5.0 287.9	BOREHOLE TERMINATED AT 5.0 m		6	SS	21

ELEVATION SCALE: 292, 291, 290, 289, 288

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Flushmount Casing
Concrete
Bentonite seal
50 mm slotted pipe
Filter sand

Upon completion of augering
No water
No cave

NOTES 1 - Soil sample submitted for chemical testing.

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

17T 596512E 4870904N

PROJECT Proposed Gas Bar and Convenience Store
LOCATION 10819 Highway 9, Caledon, ON
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE January 13, 2020
PML REF. 19BF043
ENGINEER GW
TECHNICIAN JR

SOIL PROFILE

DEPTH (metres)	ELEV	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
		SURFACE ELEVATION 291.75				
0.0		PAVEMENT: 100 mm asphalt, over 500 mm granular base, moist		1A	GS	-
0.60	291.15	FILL: Brown, sand, trace to some silt, trace gravel, moist		1B		
1.0				2	SS	30
1.4	290.4	SAND: Very loose to compact, brown, sand, trace silt, moist		3	SS	10
2.0				4	SS	3
3.0				5	SS	4
4.0				6	SS	9
5.0				7	SS	16
5.0	286.8	BOREHOLE TERMINATED AT 5.0 m				

ELEVATION SCALE: 291, 290, 289, 288, 287

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
No water
No cave

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

17T 596550E 4870908N

PROJECT Proposed Gas Bar and Convenience Store
LOCATION 10819 Highway 9, Caledon, ON
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE January 13, 2020
PML REF. 19BF043
ENGINEER GW
TECHNICIAN JR

SOIL PROFILE

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
		SURFACE ELEVATION 292.55				
0.15	292.40	TOPSOIL: Dark brown, silty sand, trace organics, very moist		1	SS	5
0.70	291.85	FILL: Dark brown, sand, some silt, moist				
		SAND: Very loose to compact, brown to grey, sand, trace silt, moist		2[1]	SS	5
				3	SS	3
				4	SS	10
				5	SS	24
				6	SS	22
5.0	287.6	BOREHOLE TERMINATED AT 5.0 m				

ELEVATION SCALE: 292, 291, 290, 289, 288

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
No water
No cave

NOTES 1 - Soil sample submitted for chemical testing.

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 4

17T 596521E 4870873N

PROJECT Proposed Gas Bar and Convenience Store
LOCATION 10819 Highway 9, Caledon, ON
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE January 13, 2020
PML REF. 19BF043
ENGINEER GW
TECHNICIAN JR

SOIL PROFILE

DEPTH ELEV (metres)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
	SURFACE ELEVATION 295.70				
0.30 / 295.40	TOPSOIL: Dark brown, silty sand, trace organics, moist		1	SS	4
0.70 / 295.00	FILL: Brown, sand, trace silt, moist				
	SILTY SAND: Compact, grey, silty sand, very moist		2	SS	13
			3	SS	17
2.1 / 293.6	SAND: Compact, grey, sand, trace silt, moist		4	SS	22
			5	SS	25
			6	SS	29
5.0 / 290.7	BOREHOLE TERMINATED AT 5.0 m				

ELEVATION SCALE: 295, 294, 293, 292, 291

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering
No water
No cave

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

17T 596553E 4870882N

PROJECT Proposed Gas Bar and Convenience Store
LOCATION 10819 Highway 9, Caledon, ON
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE January 13, 2020
PML REF. 19BF043
ENGINEER GW
TECHNICIAN JR

SOIL PROFILE

DEPTH ELEV (metres)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
	SURFACE ELEVATION 295.95				
0.22 / 295.73	TOPSOIL: Dark brown, silty sand, trace organics, moist		1	SS	4
0.70 / 295.25	FILL: Brown, sand, trace silt, very moist to wet				
	SAND: Very loose to dense, brown to grey, sand, trace to some silt, moist to very moist		2	SS	3
			3	SS	8
			4	SS	17
			5	SS	25
			6	SS	35
5.0 / 291.0	BOREHOLE TERMINATED AT 5.0 m				

ELEVATION SCALE: 295, 294, 293, 292, 291

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
No water
No cave

NOTES

PROJECT NORTH

THE KING'S HIGHWAY No. 9
(Road Allowance Between The Townships of Albion and Tecumseth)
P.I.N. 14340 - 0133

TOTTENHAM ROAD

HIGHWAY 9

EXISTING SIGNALIZED INTERSECTION

PROPOSED FULL MOVES ENTRANCE DRIVEWAY

BH 1
EL. 292.85

BH 2
EL. 291.75

BH 3
EL. 292.55

BH 4
EL. 295.70

BH 5
EL. 295.95

14m MTO SETBACK

PYLON SIGN

SIDEWALK

TYPE 'A'

CANOPY

U/G GAS TANKS

DELIVERY SPACE

EARTHBIN WASTE ENCLOSURES

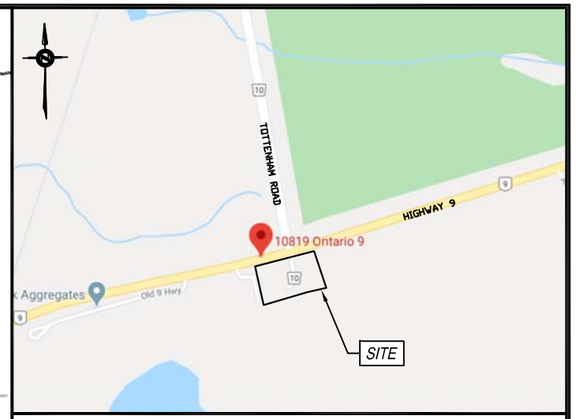
SEPTIC BED AREA

EXISTING A2 ZONE

EXISTING EPA ZONE

APPROXIMATE 10m DRIP LINE SETBACK

APPROX. DRIP LINE BUFFER AREA



KEY PLAN
CALEDON, ONTARIO

LEGEND:

BH 1 EL. 292.85 — BOREHOLE 1 (WITH MONITORING WELL) SURFACE ELEVATION

BH 2 EL. 291.75 — BOREHOLE 2 SURFACE ELEVATION

REFERENCE:
BASE PLAN PROVIDED BY CLIENT.

0m 5 10 15 20 25
SCALE

BOREHOLE LOCATION PLAN

PROPOSED GAS BAR AND CONVENIENCE STORE
10819 HIGHWAY 9, CALEDON, ONTARIO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

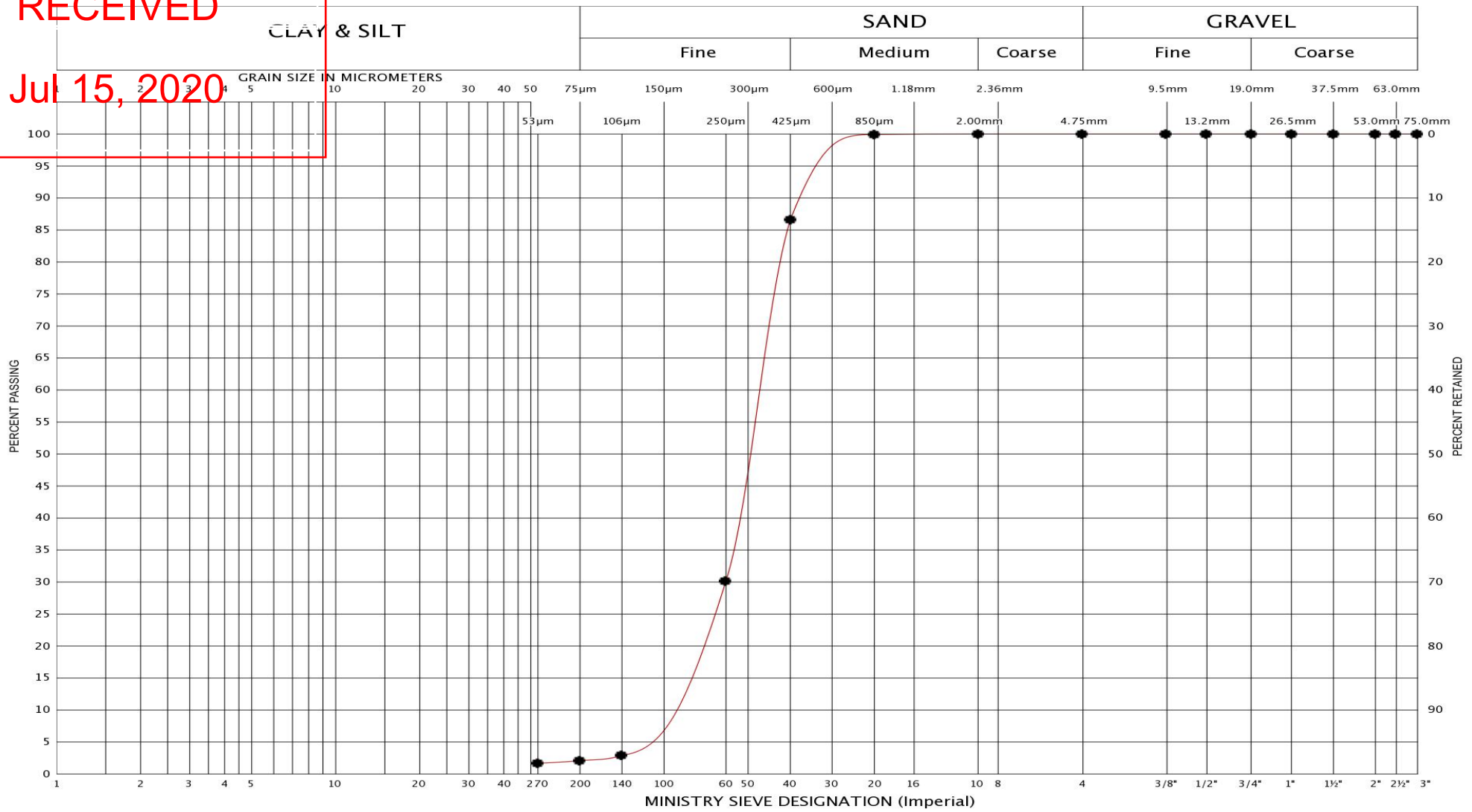
DRAWN	AT	DATE	SCALE	PML REF.	DRAWING NO.
CHECKED	GW	MAR. 2020	AS SHOWN	19BF043	1
APPROVED	GW				

APPENDIX A

Results of Laboratory Testing

Figure A1 – Grain Size Analysis

UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND		
	BH	1
	SAMPLE	4
	SYMBOL	●

Peto MacCallum Ltd.
CONSULTING ENGINEERS

GRAIN SIZE DISTRIBUTION

SAND, Trace Silt

FIG No.: A1

Project No.: 19BF043

APPENDIX B

Limited Chemical Testing Program

Table B1 – Soil Samples Submitted for Geoenvironmental Chemical Testing

Caduceon Environmental Laboratories, Certificates of Analysis

TABLE B1

Summary of Samples Submitted for Geoenvironmental Chemical Testing

Location	Sample ID	Approx. Depth (m)	Description
Borehole/Monitoring Well 1	BH/MW1 SS2	0.8 – 1.4	Fill
Borehole 3	BH3 SS2	0.8 – 1.4	Native Sand

Note: All samples submitted for O. Reg. 153/04, as amended metals and inorganics package chemical testing.

CADUCEON™ ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G0146 **REPORT No. B20-01350**

Report To:

Peto MacCallum Ltd
19 Churchill Drive,
Barrie ON L4N 8Z5
Attention: Alicia Kimberley

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 14-Jan-20
DATE REPORTED: 20-Jan-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:

P.O. NUMBER: 19BF043
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
Cyanide	2	Kingston	KD	17-Jan-20	A-CN s K	in house
Conductivity	2	Holly Lane	ROD	20-Jan-20	A-COND-01 (o)	SM 2510B
pH	2	Holly Lane	ROD	20-Jan-20	A-PH-01 (o)	SM 4500H
Chromium (VI)	2	Holly Lane	LMG	16-Jan-20	D-CRVI-02 (o)	EPA7196A
Mercury	2	Holly Lane	PBK	20-Jan-20	D-HG-01 (o)	EPA 7471A
Sodium Adsorption Ratio	2	Holly Lane	AHM	17-Jan-20	D-ICP-01 SAR (o)	SM 3120
Metals - ICP-OES	2	Holly Lane	AHM	20-Jan-20	D-ICP-02 (o)	EPA 6010
Metals - ICP-MS	2	Holly Lane	TPR	20-Jan-20	D-ICPMS-01 (o)	EPA 6020

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON™ ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G0146

REPORT No. B20-01350

Report To:

Peto MacCallum Ltd
19 Churchill Drive,
Barrie ON L4N 8Z5
Attention: Alicia Kimberley

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 14-Jan-20
DATE REPORTED: 20-Jan-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 19BF043
WATERWORKS NO.

	Client I.D.		BH1 SS2	BH3 SS2			O. Reg. 153	
	Sample I.D.		B20-01350-1	B20-01350-2			Tbl. 1 - All	
	Date Collected		13-Jan-20	13-Jan-20				
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		8.39	8.44				
Conductivity @25°C	mS/cm	0.001	0.087	0.1			0.57	
Cyanide (Free)	µg/g	0.05	< 0.05	< 0.05			0.051	
Sodium Adsorption Ratio	units		0.29	0.55			2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5			1.3	
Arsenic	µg/g	0.5	1.2	1.4			18	
Barium	µg/g	1	11	21			220	
Beryllium	µg/g	0.2	< 0.2	0.2			2.5	
Boron	µg/g	0.5	2.1	1.5			36	
Cadmium	µg/g	0.5	< 0.5	< 0.5			1.2	
Chromium	µg/g	1	10	9			70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2			0.66	
Cobalt	µg/g	1	4	4			21	
Copper	µg/g	1	5	5			92	
Lead	µg/g	5	5	< 5			120	
Mercury	µg/g	0.005	0.012	0.017			0.27	
Molybdenum	µg/g	1	< 1	< 1			2	
Nickel	µg/g	1	6	7			82	
Selenium	µg/g	0.5	< 0.5	< 0.5			1.5	
Silver	µg/g	0.2	< 0.2	< 0.2			0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1			1	
Uranium	µg/g	0.1	0.4	0.4			2.5	
Vanadium	µg/g	1	23	21			86	
Zinc	µg/g	3	18	17			290	

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun

Christine Burke
Lab Manager

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G0146 **REPORT No. B20-01350**

Report To:

Peto MacCallum Ltd
19 Churchill Drive,
Barrie ON L4N 8Z5
Attention: Alicia Kimberley

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 14-Jan-20
DATE REPORTED: 20-Jan-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 19BF043
WATERWORKS NO.

Summary of Exceedances

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun

R.L. = Reporting Limit
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Christine Burke
Lab Manager

CARO ANALYTICAL LABORATORIES
Committed. Quality assured.

TESTING REQUIREMENTS

- [x] O.Reg 153 — Table 1 — [ ] Medium/Fine [ ] Coarse
- [ ] RPI [ ] ICC — [ ] Agricultural (O.Reg 153)
- [ ] Yes [ ] No — Record of Site Condition (O.Reg 153)
- [ ] Provincial Water Quality Objectives
- [ ] Sewer Use By-Law: _____
- [ ] MISA Guidelines
- [ ] O.Reg 558 Leachate Analysis
- Disposal Site: _____
- [ ] Landfill Monitoring
- [ ] Other: _____

REPORT NUMBER (Lab Use): B20-01350

Are any samples to be submitted intended for Human Consumption under any Drinking Water Regulations? [ ] Yes [x] No (If yes, submit all Drinking Water Samples on a Drinking Water Chain of Custody)

Indicate Laboratory Samples are submitted to: [ ] Kingston [ ] Ottawa [ ] Richmond Hill [ ] Windsor [x] Barrie [ ] London

Organization: Peto MacCallum Ltd.	**Address and Invoicing Address (if different)**
Contact: A. Kimberley	19 Churchuill Drive, Barrie, ON L4N8Z5, barrie@petomaccallum.com
Tel: 705-734-3900	
Fax: 705-734-9911	**Quote No.:** / **Project Name:** 19BF043
Email: akimberley@petomaccallum.com	**P.O. No.:** / **Additional Info:** jrobinson@petomaccallum.com

ANALYSES REQUESTED (Print Test in Boxes)

Metals and Inorganics | Suspected Highly Contaminated

TURNAROUND SERVICE REQUESTED (see back page)

- [ ] Platinum — 200% Surcharge
- [ ] Gold — 100% Surcharge
- [ ] Silver — 50% Surcharge
- [ ] Bronze — 25% Surcharge
- [x] Standard — 5-7 days
- [ ] Specific Date: _____

* Sample Matrix Legend: WW=Waste Water, SW=Surface Water, GW=Groundwater, LS=Liquid Sludge, SS=Solid Sludge, S=Soil, Sed=Sediment, PC=Paint Chips, F=Filter, Oil = Oil

Lab No:	Sample Identification	S.P.L.	Sample Matrix *	Date Collected (yy-mm-dd)	Time Collected	Indicate Test For Each Sample By Using A Check Mark In The Box Provided	✓	Field pH	Field Temp.	# Bottles Sample	Field Filtered(Y/N)
	BH1 SS2		Soil	2020-01-13		X				1	
	BH3 SS2		Soil	2020-01-13		X				1	
	pee cup → K										
	jar → O.										

SAMPLE SUBMISSION INFORMATION

	Sampled by:	Submitted by:
Print:	J. Robinson	J. Robinson
Sign:		
	2020-01-13	2020-01-13
	Date (yy-mm-dd)/Time:	Date (yy-mm-dd)/Time:

SHIPPING INFORMATION

- [ ] Client's Courier
- [ ] Caduceon's Courier
- [x] Drop Off
- [ ] Caduceon (Pick-up)

Invoice [ ]

# of Pieces: 1

REPORTING / INVOICING

- [ ] Report by Fax
- [x] Report by Email
- [x] Invoice by Email
- [ ] Invoice by Mail

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)

Received By (print): STE.I Signature: S.O

Date Received (yy-mm-dd): 20/01/14 Time Received: 16:05

Laboratory Prepared Bottles: [ ] Yes [ ] No

Sample Temperature °C: 8.8

Labeled by: ES

Comments:

Page 1 of 1

G 0146