Peto MacCallum Ltd.
CONSULTING ENGINEERS

March 5, 2021

PML Ref.: 20BF047
Report: 1

Mr. Matt Brooks, P.Eng
R.J. Burnside & Associates Limited
Georgian Bay Office
3 Ronell Crescent
Collingwood, Ontario
L9Y 4J6

Dear Mr. Brooks

Geotechnical Investigation
Proposed Replacement of Bridges
Patterson Road
Town of Caledon, Ontario

Peto MacCallum Ltd (PML) is pleased to present the results of the geotechnical investigation recently completed at the above noted project site. Authorization for the work was provided by Mr. M. Brooks in the signed Subconsultant agreement dated September 8, 2020.

The Town of Caledon is planning to replace two bridges as follows:

- Patterson Side Road Bridge (B22162016) - Located 100 m west of Duffy's Lane;
- Patterson Side Road Bridge (B22162017) - Located 30 m east of Duffy's Lane.

A geotechnical investigation has been requested to assess the subsurface conditions at the bridge abutments for both bridges, and based on this information, provide geotechnical recommendations for bridge abutment foundations.

A total of four boreholes to 2.1 to 30.2 m depth were advanced for the project (two boreholes for each bridge). Pavement was overlying fill and peat over a major native silt unit.

A limited chemical testing program was carried out to check the geoenvironmental quality of a limited number of soil samples retrieved from the boreholes in order to provide comments regarding on-site re-use and/or off-site disposal/reuse of excess excavated soils.

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

Sincerely

Peto MacCallum Ltd.

Geoffrey R. White, P.Eng.
Director
Manager, Geotechnical Services

DP/GRW:tc

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1. INTRODUCTION

Peto MacCallum Ltd (PML) is pleased to present the results of the geotechnical investigation recently completed at the above noted project site. Authorization for the work was provided by Mr. M. Brooks in the signed Subconsultant agreement dated September 8, 2020.

The Town of Caledon is planning to replace two bridges as follows:

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A geotechnical investigation has been requested to assess the subsurface at the bridge abutments for both bridges, and based on this information, provide geotechnical recommendations for bridge abutment foundations.

A limited chemical testing program was carried out to check the geoenvironmental quality of a limited number of soil samples retrieved from the boreholes in order to provide comments regarding on-site re-use and/or off-site disposal/reuse of excess excavated soils.

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 works as addressed in the report. Any changes in the proposed plans will require review by PML to re-assess the validity of the report, and may require modified recommendations, additional investigation and/or analysis.

This report is subject to the Statement of Limitations that is included in Appendix A and must be read in conjunction with the report.

2. INVESTIGATION PROCEDURES

The geotechnical field work for this project consisted Boreholes 1 and 2 (Bridge – B22162017) both advanced to 15.7 m depth, extended by Dynamic Cone Penetration Tests (DCPT) to 25.0 m and 19.2 m depth, respectively. Boreholes 3 and 4 (Bridge – B22162016) extended to 2.1 and 30.2 m depth. The field work was carried out on October 8, 9, 14, and 15, 2020.

PML laid out the boreholes in the field. The ground surface elevation at the borehole locations was obtained with a Sokkia SHC5000 Global Navigation Satellite System (GNSS). Vertical and horizontal accuracy of this unit are 0.1 and 0.5 m, respectively. All elevations in this report are geodetic and expressed in metres.

Co-ordination for clearances of underground utilities was provided by PML. The boreholes were drilled cognizant of the underground utilities.

Traffic control was provided in accordance with Ontario Traffic Manual, Book 7.

The boreholes were advanced using continuous flight hollow stem augers, powered by truck mounted CME-75 and track mounted D-50 drill rigs, equipped with an automatic hammer, supplied and operated by a specialist drilling contractors, working under the full-time supervision of a member of PML's engineering staff.

The existing pavement component thicknesses were measured and samples of the granular material were collected.

Representative samples of the subgrade were recovered at frequent depth intervals for identification purposes using a conventional 51 mm OD split spoon sampler. The sampler excluded particles larger than 38 mm. Standard penetration tests were carried out simultaneously with the sampling operations to assess the strength characteristics of the subsoil. The ground water conditions in the boreholes were assessed during drilling by visual examination of the soil samples, the sampler, and drill rods as the samples were retrieved, and measurement of the

water level in the open boreholes, if any. Beyond the depth of the boreholes, DCPTs were utilized to assess soil density.

Monitoring wells, comprised of 50 mm diameter pipe, filter sand, bentonite seal, and flush-mounted protection casing, were installed in two boreholes. The details of the monitoring well installation are shown on the applicable Log of Borehole Sheets. It should be noted that the wells become the property of the Owner and will have to be decommissioned by the Owner when no longer required. PML would be pleased to assist, if requested.

All recovered samples were returned to our laboratory for detailed examination and moisture content determinations. Grain size analyses were carried out on four samples of the major soil unit. Atterberg Limits showed the samples to be non-plastic. The laboratory test results are provided on Figure 1-1, appended.

3. SUBSURFACE CONDITIONS

Reference is made to the appended Log of Borehole sheets for details of the subsurface conditions, including pavement component thicknesses, soil classifications and inferred stratigraphy and thicknesses, Standard Penetration N values (N Values – blows per 300 mm of penetration of the split spoon sampler), monitoring well installation details and ground water levels, and the results of laboratory water content determinations.

Due to the soil sampling procedures and the limited size of samples, the depth/elevation demarcations on the borehole logs must be viewed as “transitional” zones, and cannot be construed as exact geologic boundaries between layers. PML should be retained to assist in defining the geological boundaries in the field during construction, if required.

At both bridges, pavement was at the surface of the boreholes, over fill and peat, underlain by a native silt deposit.

3.1 Patterson Side Road Bridge B22162016 (Boreholes 1 and 2)

3.1.1 Soil

The existing pavement component thicknesses encountered in Boreholes 1 and 2 are summarized in the following table:

BOREHOLE	ASPHALT (mm)	GRANULAR BASE (mm)	GRANULAR SUBBASE (mm)	TOTAL THICKNESS (mm)
1	100	150	250	500
2	110	130	250	490

Fill was contacted below the pavement, extending to 2.6 and 3.1 m depth (elevation 262.5 and 263.5). The fill comprised silty sand to sandy silt with trace to some gravel. The N Values in the fill were 2 to 38, indicating a variable compactive effort was applied when the fill was placed. The fill was moist to wet, with moisture contents ranging from 4 to 18%.

An amorphic peat layer was encountered beneath the fill in both boreholes, extending to 3.7 m and 4.4 m depth (elevation 261.2 and 262.4). The unit was wet with moisture contents of 17% to 37%.

A major silt unit was encountered beneath the peat to the 15.7 m depth of exploration in both boreholes. Two samples of the material were submitted for grain size analysis, and the results are presented on Figure 1-1, attached. Atterberg Limits showed the samples to be non-plastic. The unit was loose to compact, with N Values of 8 to 26. The unit was very moist with moisture contents of 14 to 34%.

3.1.2 Dynamic Cone Penetration Test

DCPTs extended the boreholes to 25.0 to 19.7 m depth. In Borehole 1, the DCPT showed compact conditions to 22.0 m depth (about elevation 243.5), being dense between 22.0 m and 23.5 m depth and very dense below 23.5 m depth. In Borehole 2, the DCPT revealed dense to very dense conditions from 15.7 to 19.2 m depth.

3.1.3 Ground Water

The first water strike (ground water first encountered during drilling), the ground water/wet cave levels measured in the boreholes upon completion of augering, and ground water level measured in the well about two weeks after installation are summarized in the table below, on a borehole by borehole basis.

BOREHOLE	FIRST STRIKE DURING DRILLING DEPTH (m) / ELEVATION	UPON COMPLETION OF AUGERING DEPTH (m) / ELEVATION	WATER LEVEL IN WELL DEPTH (m) / ELEVATION 2020-10-28
1	4.0 / 261.6	3.0 / 262.6	2.7 / 262.9
2	3.0 / 263.1	3.2 / 262.9	--

The creek bed was about 4.2 to 4.9 m below the road surface, and was 0.5 m deep at the time of our investigation.

Ground water levels will fluctuate seasonally, and in response to variations in precipitation.

3.2 Patterson Side Road Bridge B22162017 (Boreholes 3 and 4)

3.2.1 Soil

The existing pavement component thicknesses in Boreholes 3 and 4 encountered are summarized in the following table:

BOREHOLE	ASPHALT (mm)	GRANULAR BASE (mm)	GRANULAR SUBBASE (mm)	TOTAL THICKNESS (mm)
3	100	150	250	500
4	130	130	170	430

Fill was contacted below the pavement, extending to the 2.1 m depth of Borehole 3 and 2.1 m depth (elevation 262.9) in Borehole 4. The fill comprised silty sand/sandy silt with trace gravel and clay varying to sand with some silt and trace gravel. The N Values in the fill were 5 to 23, indicating a variable compactive effort was applied when the fill was placed. The fill was moist, with moisture contents ranging from 5 to 20%.

An amorphic peat unit was encountered beneath the fill in Borehole 4, extending to 2.9 m depth (elevation 262.1). The unit was wet with a moisture content of 30%.

A major silt unit was encountered beneath the peat to the 30.2 m depth of exploration in Borehole 4. Two samples of the material were submitted for grain size analysis, and the results are presented on Figure 1-1, attached. Atterberg Limits showed both samples to be non-plastic. The unit was loose to compact, with N Values of 7 to 28. Moisture contents were 14 to 21% (very moist).

3.2.2 Auger Refusal

Refusal to auger was encountered in Borehole 3 at 2.1 m depth (elevation 262.3). Multiple attempts were made to advance the borehole further without success.

3.2.3 Ground Water

The first water strike (ground water first encountered during drilling), the ground water/wet cave levels measured in the boreholes upon completion of augering, and ground water level measured in the well about two weeks after installation are summarized in the table below, on a borehole by borehole basis.

BOREHOLE	FIRST STRIKE DURING DRILLING DEPTH (m) / ELEVATION	UPON COMPLETION OF AUGERING DEPTH (m) / ELEVATION	WATER LEVEL IN WELL DEPTH (m) / ELEVATION 2020-10-28
3	No Water	No Water	--
4	2.9 / 262.1	4.3 / 260.7	2.2 / 262.8

The creek bed was 4.7 m below the road surface, and was 0.5 m deep at the time of our investigation.

Ground water levels will fluctuate seasonally, and in response to variations in precipitation.

4. GEOTECHNICAL ENGINEERING CONSIDERATIONS

4.1 Foundations

It is understood that a deep foundation comprised of 25 ft. long timer piles is in place for the bridge, 30 m east of Duffy's Lane. Based on the low bearing capacity available at the typical footing level, a deep foundation comprising pipe piles is proposed for both bridges.

If the abutments are to be closer to the creek, it is envisioned that the base of the pile cap would be set at about elevation 259 for Bridge 22162016 and elevation 258 for Bridge 22162017 (minimum 2.0 m below the creek bed to provide scour and frost protection). Where the abutments are further from the creek (longer span bridge), such that scour protection is provided laterally, then the pile caps can be set at a higher elevation assumed 2.0 m below the road grade, allowing a minimum 1.2 m of earth cover for frost protection. The latter has been assumed for pile capacities below.

For Bridge 22162016, the pipe piles should be driven through the fill, upper loose to compact soil layers, to the very dense soil stratum, relying on friction and some end bearing. The following vertical axial resistances are recommended for pipe piles driven a minimum 1 to 2 m into the 50 to 100-blow stratum, approximately 24 m below the existing grade, corresponding to about 22 m below the base of the pile cap (elevation 241).

PILE SECTION	GEOTECHNCIAL RESISTANCE AT SLS (kN)	FACTORED BEARING RESISTANCE AT ULS (kN)
324 mm Diameter Pipe Pile (minimum 9.5 mm wall thickness)	700	875
356 mm Diameter Pipe Pile (minimum 9.5 mm wall thickness)	800	950

For Bridge 22162017, the piles will rely on friction only as no end bearing unit was revealed within the depth of exploration. The vertical axial resistances below are based on a pile driven at least 20 m below the pile cap or deeper.

PILE SECTION	GEOTECHNCIAL RESISTANCE AT SLS (kN)	FACTORED BEARING RESISTANCE AT ULS (kN)
324 mm Diameter Pipe Pile (minimum 9.5 mm wall thickness)	450	550
356 mm Diameter Pipe Pile (minimum 9.5 mm wall thickness)	500	625

Pipe piles should be driven closed ended and filled with 20 MPa concrete.

The required pile set should be established when the pile section is selected, and based on the pile hammer to be used by the piling contractor. For preliminary design and planning purposes only, the piles should be driven with a hammer transferring at least 40 kJ of energy to the pile. The required set will be dictated by the pile section selected, the design capacity /axial resistance as well as the transferred energy and impact force on the piles of the hammer selected to install the piles. The actual set should be reviewed when design details are established and the pile capacities should be verified in the field by Pile Dynamic Analysis (PDA). A geotechnical

resistance factor of 0.5 was utilized for the ULS values, in anticipation that values would be verified via PDA testing.

Prior to driving of piles, a Wave Equation Analysis (WEAP) should be performed by PML in order to confirm that appropriate pile driving equipment has been selected for the project and the pile will not be overstressed during driving. A WEAP analysis estimates the bearing capacities and stresses during driving based on the pile driving equipment, pile and the soil.

To evaluate the point of contraflexure, the coefficient of horizontal subgrade reaction, k_s (MN/m^3) should be computed using the following equation:

Cohesionless Soils –Silt (Terzaghi, 1955)

$k_s = n_h z/b$

Where n_h = coefficient related to soil density, (MN/m^3)
$= 4.4\ MN/m^3$
z = depth, (m)
b = pile width, (m)

Battered piles should be installed to resist lateral loads.

Lateral load testing is recommended to verify the horizontal pile resistance.

The piling installation operations should be reviewed on a full-time basis by qualified geotechnical personnel to check that the required set and capacity are achieved, and to document founding elevation, alignment and plumbness.

4.1.1 Seismic Considerations

Based on the stratigraphic conditions in the boreholes (N Values) and as per the Canadian Highway Bridge Design Code (CHBDC), December 2014, CSA-S6-14, Clause 4.4.3.2 – Table 4.1, Site Class D is applicable for both bridges.

Based on the type and relative density of the soil revealed in the boreholes, there is a moderate potential for liquefaction of the shallow soils to occur (CHBDC Clause 4.6.6).

4.2 Abutment Wall Design

Abutment walls must be designed to resist the unbalanced lateral earth pressure imposed by the backfill adjacent to the abutment. The lateral earth and water pressure, P (kPa), may be computed using the equivalent fluid pressure method presented in Section 6.12 of the CHBDC, or employing the following equation:

$$P = K(\gamma h + q) + C_p$$

Where
- P = total lateral pressure at depth h (m) below ground surface (kPa)
- K = lateral earth pressure coefficient of compacted backfill
- h = depth below grade (m) at which lateral pressure is calculated
- γ = unit weight of compacted sand and gravel backfill
- q = vertical stress at depth h due to surcharge loads (kPa)
- C_p = compaction pressure (refer to clause 6.12.3 of CHBDC)

In addition, there should be allowance for seismic events and appropriate safety factors.

Free draining granular material should be used as backfill behind the abutments comprising OPSS Granular A or Granular B, placed in thin lifts compacted to a minimum 95% Standard Proctor maximum dry density (SPmdd). Site soils are not suitable for use as free draining backfill. Over compaction close to the abutment wall should be avoided as this could generate excessive pressure on the abutment wall. The following parameters are recommended for design:

	Granular 'A'	Granular 'B'
Angle of Internal Friction (degrees)	35	32
Unit Weight (kN/m^3)	22.8	21.2
Rankin Active Earth Pressure Coefficient (K_a)	0.27	0.31
At Rest Earth Pressure Coefficient (K_o)	0.43	0.47
Rankin Passive Earth Pressure Coefficient (K_p)	3.70	3.23

A weeping tile system and/or weeping holes should be installed to minimize the build-up of hydrostatic pressure behind the abutments. The weeping tiles should be surrounded by a properly designed granular filter or geotextile to prevent migration of fines into the system. The drainage pipe should be placed on a positive grade and lead to a frost-free outlet.

4.3 Approach Fill

In general, approach fill embankments should be constructed in accordance with OPSS 206 and OPSD 200.01. The side slopes of the approach embankments should be inclined no steeper than three horizontal to one vertical (3H:1V) for earth fill. Backfill adjacent to the structure should be carried out in conformance with OPSS for granular backfill.

Excavated inorganic site soil is generally considered to be acceptable for reuse in constructing bridge approaches, subject to moisture content control and geotechnical field review and approval.

Side slopes should be protected from surface erosion by sodding or by seed and mulch as soon as possible following construction.

4.4 Excavation and Ground Water Control

Excavation for pile caps for the bridge abutments is expected to extend to about 2.0 m depth at both locations (based on discussion earlier, regarding pile caps set laterally away from the creek) and will encounter the pavement and fill.

Subject to ground water control as discussed below, site soils are considered as Type 3 Soil requiring excavation sidewalls to be constructed at no steeper than 1H:1V from the base of the excavation in accordance with the Occupational Health and Safety Act. Peat is considered Type 4 Soil and where encountered excavation side slopes shall be constructed no steeper than 3H:1V from the base of the excavation. Flatter side slopes may be required.

Excavation side slopes should be continuously examined and reviewed for evidence of instability, particularly following periods of heavy rain or thawing. When required, remediation action must be taken to ensure the continued stability of the excavation slope and the safety of the workers.

For shallow excavation to 2.0 m depth, sump pumping should suffice to control seepage and surface water runoff.

It envisioned that sheet piling will be employed to support the excavations where space does not permit open cut or deeper excavation is required. Sheet piling will aid with ground water control. For design of temporary sheet piling for excavations, in addition to hydrostatic pressure, the following parameters may be assumed (wall friction ignored):

PARAMETER	FILL	SILT
Angle of Internal Friction, ϕ, (degrees)	28	29
Shear Strength, c, (kPa)	--	--
Bulk Unit Weight (kN/m^3)	19	19

Sheet piling should penetrate sufficiently below the lowest level of excavation to maintain basal stability. Sheet piling should be designed and installed by specialist in this field. Sump pumping from within the sheeted excavation is still anticipated.

Depending on the construction staging coffer dams and creek diversion will likely be required.

It is recommended the work be scheduled following periods of prolonged dry weather, and when the ground water table and creek flow are usually at their lowest, in order to minimize the quantity of water to be handled.

Water taking in Ontario is governed by the Ontario Water Resources Act (OWRA) and the Water Taking and Transfer Regulation O.Reg. 387/040, Section 34 of the OWRA requires any one taking more than 50,000 L/d to notify the Ministry of Environment, Conservation and Parks (MECP). This requirement applies to all withdrawals, whether for consumption, temporary construction dewatering or permanent drainage improvements. Projects assessed to be taking more than 50,000 L/d but less than 400,000 L/d of ground water can obtain a permit/permission online via the Environmental Activity and Sector Registry (EASR) system. If it is assessed that more than 400,000 L/d is required, then a Category 3 Permit-to-Take-Water (PTTW) will be required.

Once design details, including creek diversion and excavation plans, are finalized, the project should be reviewed to confirm the MECP requirements. As minimum, registering on the EASR system may be required.

It is recommended that a test dig be undertaken to allow prospective contractors an opportunity to observe and evaluate the conditions likely to be encountered and assess preferred means of excavation and ground water control measures based on their own experience.

4.5 Pavement Design and Construction

Once the bridges are replaced, the pavement is to be restored. Based on the boreholes, it is anticipated that the pavement subgrade will comprise moderately to highly frost susceptible silty sand to sandy silt fill. Traffic volumes of approximately 1000 AADT with 1% commercial vehicles were provided at the time of this report by the Client. Considering the existing pavement appears to be performing adequately, the following pavement structure thicknesses are recommended:

MATERIAL	THICKNESS (mm)
Asphalt (two lifts)	110
Granular A Base Course	150
Granular B Subbase Course	350
Total Thickness	610

Rough grading will involve stripping of the asphalt and the existing granulars and cutting down to the design subgrade level. It is not intended to remove all of the existing fill from under the road structure. However, in order to minimize potential settlement issues, it is recommended that following rough grading to the proposed subgrade level, the exposed subgrade soil should be compacted to minimum 95% SPmdd, under geotechnical review by PML. Any unstable zones identified during this process should be sub-excavated and replaced with select site material placed in 200 mm thick lifts and compacted to a minimum 95 % SPmdd.

The pavement design considering that construction will be carried out during the dry time of the year and that the subgrade is relatively dry and is stable, as determined by proofrolling operations described above. If the pavement subgrade is wet, remediation may include increasing the thickness/depth of the subbase, the use of Granular B Type II and/or the use of geogrid reinforcement, subject to geotechnical review during construction.

Imported material for the granular base and subbase should conform to OPSS gradation specifications for Granular A and Granular B, and should be compacted to 100% SPmdd. Asphalt should be compacted in accordance with OPSS 310.

The new pavement structure thickness should be tapered 10H:1V to match the existing pavement structure thickness at tie-in locations. For transverse joints at the tie-in locations, key each lift of asphalt into the existing pavement (where existing asphalt thicknesses allow) to provide a 5 m overlap into the existing asphalt, in accordance with OPSS.PROV313 (item 313.07.07.03.03).

For the pavement to function properly, it is essential that provisions be made for water to drain out of and not collect in the base material. The granular material should daylight at the ditches with the ditches constructed as per OPSD 200.010.

4.6 Geotechnical Review and Construction Inspection and Testing

It is recommended that the final design drawings be submitted to PML for geotechnical review for compatibility with site conditions and recommendations of this report.

Earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures and check the specified degree of compaction is achieved throughout.

The piling installation operations should be reviewed on a full-time basis by qualified geotechnical personnel to check that the required set and capacity are achieved, and to document founding elevation, alignment and plumbness.

The comments and recommendations provided in the report are based on information revealed in the boreholes. Conditions away from and between boreholes may vary. Geotechnical review during construction should be ongoing to confirm the subsurface conditions are substantially similar to those encountered in the boreholes, which may otherwise require modification to the original recommendations.

5. GEOENVIRONMENTAL CONSIDERATIONS

5.1 General

A limited chemical testing program was carried out to check the geoenvironmental quality of the soil at selected sampling locations in order to provide comments regarding on site reuse or off-site disposal options for excess excavated soil.

A Phase One Environmental Site Assessment (ESA) was not within the scope of work for this assignment. Accordingly, soil impairment that has not been identified by the limited chemical testing program may exist 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.

5.2 Chemical Testing Protocols

As part of the geoenvironmental procedural protocol, all recovered soil samples were examined for visual and olfactory evidence of potential contamination. It is noted that none of the samples displayed visual or olfactory evidence of contamination.

After field examination, selected geoenvironmental soil samples were placed in laboratory air tight glass containers and stored in an insulated cooler for transportation to our laboratory for detailed visual examination.

Soil samples were submitted for chemical analysis to a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory. The chemical analyses conducted 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.

For general environmental quality characterization, soil samples were tested for the following analyte groups:

- Metals and Inorganics;
- Petroleum Hydrocarbons (F1 to F4 fractions).

The following soil samples were submitted for testing:

Borehole 1 SS2 (fill – 0.8 to 1.4 m)
Borehole 2 SS3 (fill – 1.5 to 2.1 m)
Borehole 3 SS2 (fill – 0.8 to 1.4 m)
Borehole 4 SS3 (fill – 1.5 to 2.1 m)

5.3 Site Condition Standards

The Ontario 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, SCSs depend on the site location, land use, soil texture, bedrock depth 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 shown in the following table:

CRITERIA	RESULT
Current Property Use	Roadway
Potable vs. Non-Potable Ground Water	Potable [i]
Proximity of Areas of Natural Significance	> 30 m
Proximity to a Water Body	< 30 m[ii]
Shallow Soil Condition	No
Land Use	Industrial / Commercial / Community (ICC)
Applicable Site Condition Standard	Table 8: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition (Table 8 ICC)

Notes: i) MECP interactive Water Well Record (WWR) mapping indicates water supply wells within 100 m of the site.
ii) Creeks run through the site(s).

5.4 Analytical Findings and Conclusions

The Certificates of Analyses for Chemical Testing are included in Appendix B.

5.4.1 On-Site Reuse

In summary, the concentration of the tested parameters in the submitted soil samples from the boreholes were either not detected (below the method detection limit) or were within the Table 8 ICC SCSs except as follows:

- Electrical Conductivity (EC) of 3.08 mS/cm in Borehole 2 and 0.997 mS/cm in Borehole 3 (Guideline Value is 0.7 mS/cm);
- Sodium Adsorption Ratio (SAR) of 46 in Borehole 2, 8.24 in Borehole 3 and 5.26 in Borehole 4 (Guideline Value is 5).

The results show that the soil associated with Borehole 1 can remain on site, subject to geotechnical requirements. The results indicate that the soils associated with Boreholes 2, 3 and 4 can remain on site, subject to the discussion below and geotechnical requirements.

Non-conforming levels of EC and/or SAR were indicated in the samples. The elevated levels of EC/SAR in the samples are considered associated with winter de-icing operations. It is noted that EC and SAR are physical, non-health related parameters typically affecting vegetation and elevated levels of this parameters is relevant to soils that must support plant growth.

Under O. Reg. 153/04, as amended, where a site condition standard is exceeded solely because a substance has been used on a surface for purposes of keeping traffic safe under conditions of snow and ice, the applicable site condition standard is deemed not to be exceeded. In this regard, the tested soil samples exhibiting EC/SAR exceedances only can be reused on- or off-site at a road site where paved surfaces are to be constructed and continued de-icing salt application can be expected to occur for traffic safety. Reference is made to O. Reg. 153/04 (as amended), s. 48 (3) and O. Reg. 339 s. 2 for a full outline of the regulations regarding soils impacted by de-icing salt.

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.

This assessment is subject to the Statement of Limitations that is included with this report (Appendix A) which must be read in conjunction with the report.

5.4.2 Off-Site Reuse/Disposal

As of January 1, 2021, excess excavated soil at a site that is to be transported off site is governed by O.Reg. 406/19. Within the new regulation, for excess soil volumes leaving the site of less than 350 m^3 the existing O.Reg. 153/04 tables apply (Tables 1, 2, 3, 4, 5, 6, 7, 8 and 9) and for volumes in excess of 350 m^3 the recent O.Reg. 406/19 tables apply (Tables 1, 2.1, 3.1, 4.1, 5.1, 6.1, 7.1, 8,1 and 9,1), for evaluating Environmental Soil Characteristics. Tables from both regulations are further divided based on land use. The chemical testing results from this project were compared to the various SCSs to evaluate where the excess soil can be transported. Our assessment was limited to Tables 1, 2 and 3 (O.Reg. 153/04) and Tables 1, 2.1 and 3.1

(O.Reg. 406/19), the most common SCSs. If a potential receiving site has SCSs other than the above noted tables, then PML should be consulted to ensure that the results meet the applicable SCSs of the proposed receiving site.

Based on the limited chemical testing results the on-site soil associated with Boreholes 1, 3 and 4, is in compliance with the following O. Reg. 153/04, as amended, and O.Reg. 406/19 SCS's;

- Table 2 RPI/ICC;
- Table 3 RPI/ICC;
- Table 2.1 RPI/ICC;
- Table 3.1 RPI/ICC.

The soil associated with Borehole 2 does not meet any SCS's used in this assessment. Due the road salt exemption noted earlier in the report, it is recommended that the soil associated with Borehole 2 stay on site, or alternatively be taken to a landfill. Excess excavated soil can be transported to a landfill site, however, additional testing for Toxicity Characteristic Leaching Procedure (TCLP) will be required, in accordance with Ontario Regulation 347, Schedule 4, as amended to Ontario Regulation 558/00, dated March 2001.

In accordance with O.Reg. 406/19, the following requirements must also be completed by a QP prior to movement of soil:

- Preparation of an assessment of past land uses for the source site;
- Preparation and implementation of a soil sampling and chemical testing plan;
- Preparation of a soil characterization report (chemical testing results);
- Preparation of an excess soil destination assessment report.

Since there are exceedances of salt related contaminants, the reuse and placement of soil from the site must also meet the following guidelines from O.Reg. 406:

1. Excess soil quality standards for chemicals (e.g., SAR and EC) in soil resulting solely from the use of a substance for the safety of vehicular or pedestrian traffic applied under conditions of snow or ice or both, are deemed to be met if the following criteria are met:

    a) The excess soil is final placed:

        i) Where it is reasonable to expect that the soil will be affected by the same chemicals as a result of continued application of a substance for the safety of vehicular or pedestrian traffic under conditions of snow or ice; or

        ii) With an industrial or commercial property use and to which non-potable standards would be applicable; or

        iii) That is at least 1.5 m below the surface of the soil.

    b) Further, the excess soil is not to be finally placed:

        i) Within 30 m of a waterbody;

        ii) Within 100 m of a potable water well or area with an intended property use that may require a potable water well;

        iii) That will be used for growing crops or pasturing livestock unless the excess soil is placed 1.5 m or greater below the soil surface.

In general, when transporting excavated site soil to another site, O.Reg. 406/19 should be followed along with any local bylaws, with the following highlighted below:

- The soil characterization and excess soil destination assessment reports, including all applicable chemical testing results, should be provided to the receiving site authority for approval;
- A tracking system must be implemented by the source site QP such that transportation and placement of the surplus soil is monitored to check the material is appropriately placed at the pre-approved site;
- The receiving site(s) must be arranged and/or approved in advance of excavation such that a site-specific excess soil destination report assessment report is completed for each site prior to fill movement;
- Additional sampling and chemical testing shall be carried out during construction to verify the chemical quality of the excess soil to assess the appropriate management/disposal options for the actual soil to leave the site. The frequency of additional testing depends on the volume of soil to be transported and it is noted that additional leachate testing will be required to meet O.Reg. 406/19 requirements, where the volume of soil is to be transferred off site is greater than 350 m^3.

This assessment is subject to the Statement of Limitations that is included with this report (Appendix A) which must be read in conjunction with the report.

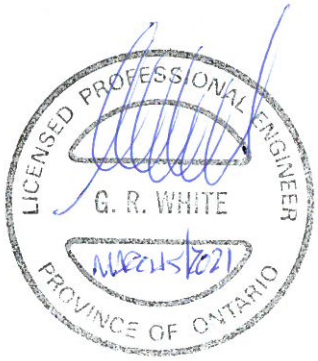
6. CLOSURE

We trust this report is complete within our terms of reference, and the information presented is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to call our office.

Sincerely

Peto MacCallum Ltd.

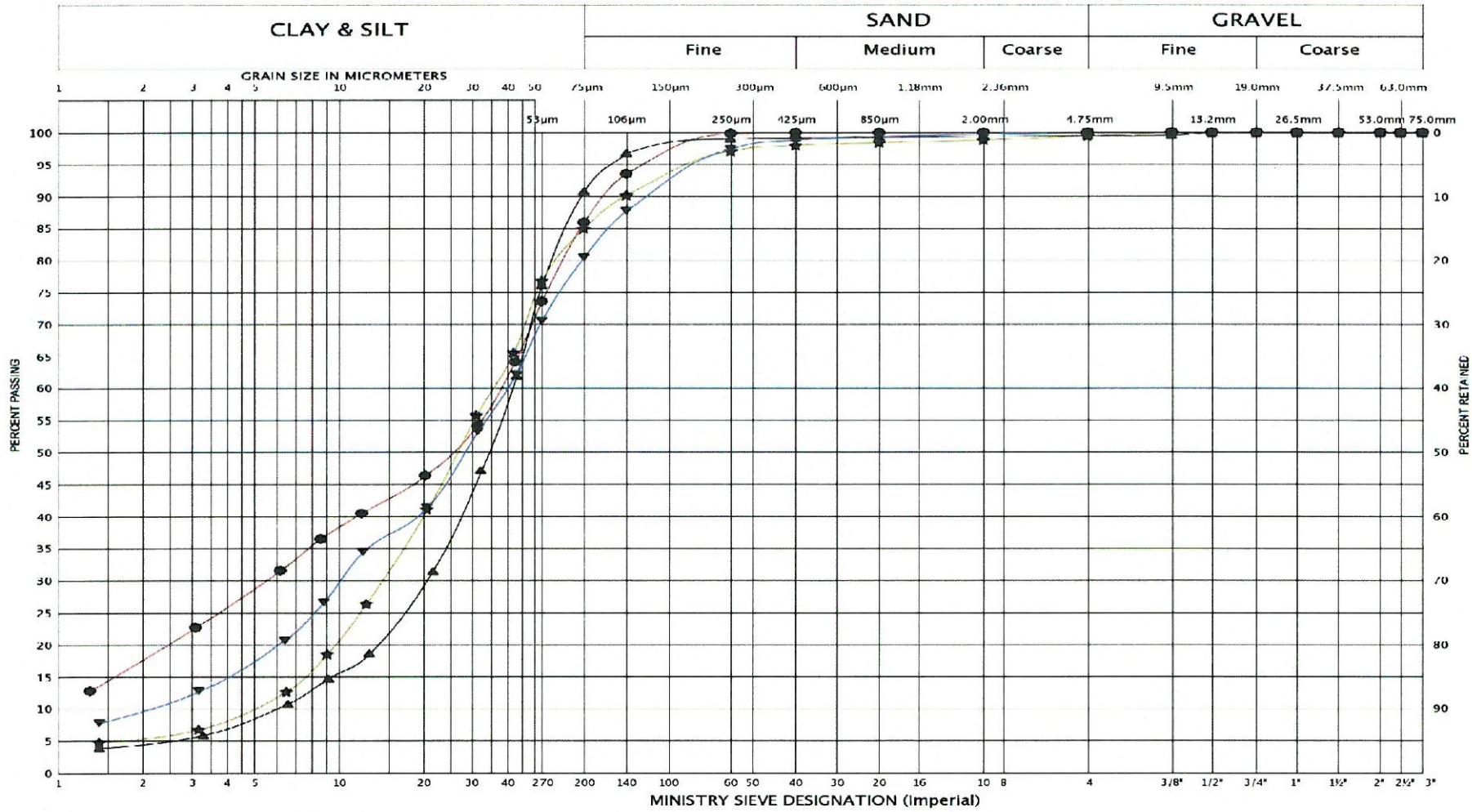
Davin Power, E.I.T.
Project Supervisor, Geotechnical Services



Geoffrey R. White, P.Eng.
Director
Manager, Geotechnical Services

DP/GRW:tc

UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND	BH	1	1	4	4B
	SAMPLE	8	11	15	22
	SYMBOL	★	▼	●	▲

PML Peto MacCallum Ltd. CONSULTING ENGINEERS

GRAIN SIZE DISTRIBUTION

SILT, Trace to Some Sand, Trace to Some Clay

FIG No.: 1-1

Project No.: 20BF041

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		

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

TYPE OF SAMPLE

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

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

592948E 4865415N

PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 8/15, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 265.60				
0.0	265.60	PAVEMENT: 100 mm asphalt, over 150 mm granular base, over 250 mm granular subbase, moist		1A 1B	GS	-
0.50	265.10	FILL: Brown, silty sand, trace to some gravel, moist to wet		2[1]	SS	12
1.0				3	SS	38
2.0				4	SS	3
3.0	262.5	PEAT: Black, peat, amorphic, wood pieces, wet		5	SS	5
3.1				6	SS	2
4.0	261.2	SILT: Loose to compact, grey, silt, trace to some sand and clay, very moist		7	SS	21
4.4				8	SS	14
5.0				9	SS	8
6.0				10	SS	20
7.0				11	SS	13
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0		CONTINUED				

ELEVATION SCALE: 265, 264, 263, 262, 261, 260, 259, 258, 257, 256, 255, 254, 253, 252, 251

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

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 1

592948E 4865415N

PROJECT Proposed Replacement of Bridges
PML REF. 20BF041
LOCATION Patterson Sideroad, Town of Caledon
BORING DATE October 8/15, 2020
ENGINEER GW
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN NG

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
15.0	CONTINUED FROM PREVIOUS PAGE				
250.6	SILT(Continued): Loose to compact, grey, silt, trace to some sand and clay, very moist		12	SS	14
15.7					
249.9	BOREHOLE TERMINATED AT 15.7 m BEGIN DYNAMIC CONE PENETRATION TEST				
25.0					
240.6	DYNAMIC CONE TEST TERMINATED AT 25.0 m				

ELEVATION SCALE: 250, 249, 248, 247, 246, 245, 244, 243, 242, 241

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200

DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

109×
135×

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
Water at 3.0 m
No cave
Water Level Readings:

Date	Depth	Elev.
2020-10-28	2.7	262.9

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

592937E 4865397N

PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 8/15, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG/DP

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 266.10				
0.0	266.10	PAVEMENT: 110 mm asphalt, over 130 mm granular base, over 250 mm granular subbase, moist		1A 1B	GS	-
0.49	265.61	FILL: Brown, sandy silt, trace gravel, moist to wet		2	SS	16
1.0				3[1]	SS	6
2.0				4	SS	2
2.6	263.5	PEAT: Black, peat, amorphic, wood pieces, wet		5	SS	2
3.0				6	SS	8
3.7	262.4	SILT: Loose to compact, grey, silt, trace to some sand and clay, very moist		7	SS	8
4.0				8	SS	21
5.0				9	SS	12
6.0				10	SS	26
7.0				11	SS	26
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0		CONTINUED				

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

ELEVATION SCALE: 266, 265, 264, 263, 262, 261, 260, 259, 258, 257, 256, 255, 254, 253, 252

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

First water strike at 3.0 m

Approximate Creek Bed EL. 261.2

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

592937E 4865397N

PROJECT Proposed Replacement of Bridges
PML REF. 20BF041
LOCATION Patterson Sideroad, Town of Caledon
BORING DATE October 8/15, 2020
ENGINEER GW
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN NG/DP

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
15.0	CONTINUED FROM PREVIOUS PAGE					
251.1	SILT(Continued): Loose to compact, grey, silt, trace to some sand and clay, very moist		12	SS	23	
15.7						
250.4	BOREHOLE TERMINATED AT 15.7 m BEGIN DYNAMIC CONE PENETRATION TEST					
19.2						
246.9	DYNAMIC CONE PENETRATION TEST TERMINATED AT 19.2 m					Upon completion of augering Water at 3.2 m Cave at 8.5 m

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

ELEVATION SCALE: 251, 250, 249, 248, 247

UNIT WEIGHT kN/m³

134

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

593044E 4965534N

PROJECT Proposed Replacement of Bridges
PML REF. 20BF041
LOCATION Patterson Sideroad, Town of Caledon
BORING DATE October 14, 2020
ENGINEER GW
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN NG

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L; WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	SURFACE ELEVATION 264.35						50 100 150 200 / 20 40 60 80	10 20 30 40		
0.50 263.85	PAVEMENT: 100 mm asphalt, over 150 mm granular base, over 250 mm granular subbase, moist		1A 1B	GS	-	264				
	FILL: Brown to grey, sand, some silt, trace gravel, moist		2[1]	SS	23	263		○		
2.1			3	SS	5			○		
262.3	BOREHOLE TERMINATED AT 2.1 m UPON REFUSAL TO AUGER									Upon completion of augering No water No cave Multiple attempts to advance past 2.1 m depth encountering refusal at same depth

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 4

593075E 4865563N

PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 9/14, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG/DP

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 265.00				
0.0		PAVEMENT: 130 mm asphalt, over 130 mm granular base, over 170 mm granular subbase, moist		1A 1B	GS	-
0.43	264.57	FILL: Brown, sandy silt/sandy silt, trace gravel, trace clay, moist		2	SS	11
1.0				3[1]	SS	13
2.0	2.1					
	262.9	PEAT: Black, peat, amorphic, wood pieces, wet		4	SS	3
	2.9					
3.0	262.1	SILT: Loose to compact, grey, silt, trace to some sand and clay, very moist		5	SS	10
4.0				6	SS	17
5.0				7	SS	21
6.0				8	SS	20
7.0						
8.0				9	SS	16
9.0						
10.0				10	SS	21
11.0				11	SS	18
12.0						
13.0				12	SS	27
14.0						
				13	SS	25
15.0		CONTINUED				

ELEVATION SCALE: 264, 263, 262, 261, 260, 259, 258, 257, 256, 255, 254, 253, 252, 251

SHEAR STRENGTH (kPa)
+FIELD VANE ΔTORVANE O Qu
▲POCKET PENETROMETER O 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
First water strike at 2.9 m
Approximate Creek Bed EL. 260.3
50 mm slotted pipe
Filter sand

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 4

593075E 4865563N

PROJECT Proposed Replacement of Bridges
LOCATION Patterson Sideroad, Town of Caledon
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE October 9/14, 2020
PML REF. 20BF041
ENGINEER GW
TECHNICIAN NG/DP

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE
15.0	CONTINUED FROM PREVIOUS PAGE					
	SILT (Continued): Loose to compact, grey, silt, trace to some sand and clay, very moist		14	SS	28	
			15	SS	28	
			16	SS	13	
			17	SS	9	
			18	SS	27	
			19	SS	7	
30.0	CONTINUED					

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

NOTES 1. Sample submitted for chemical testing

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 4

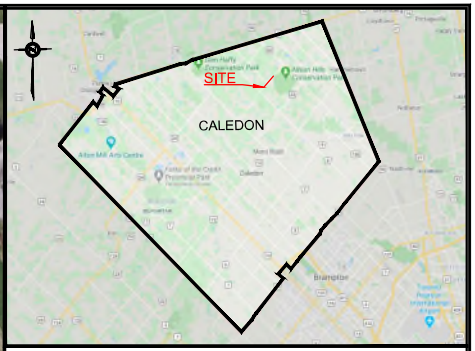
593075E 4865563N

PROJECT Proposed Replacement of Bridges
PML REF. 20BF041
LOCATION Patterson Sideroad, Town of Caledon
BORING DATE October 9/14, 2020
ENGINEER GW
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN NG/DP

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	ELEVATION SCALE	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
30.0	CONTINUED FROM PREVIOUS PAGE									
30.2 234.8	SILT (Continued): Loose to compact, grey, silt, trace to some sand and clay, very moist BOREHOLE TERMINATED AT 30.2 m									Upon completion of augering Water at 4.3 m Cave at 5.5 m Water Level Readings: Date Depth Elev. 2020-10-28 2.2 262.8

30.0 31.0 32.0 33.0 34.0 35.0 36.0 37.0 38.0 39.0 40.0 41.0 42.0 43.0 44.0 45.0

NOTES 1. Sample submitted for chemical testing



KEY PLAN
CALEDON, ONTARIO

LEGEND:

BH 1
EL. 265.60
▼ 262.90
BOREHOLE/MONITORING WELL 1
SURFACE ELEVATION
WATER ELEVATION

BH 2
EL. 266.10
BOREHOLE 2
SURFACE ELEVATION

APPROXIMATE BRIDGE LIMITS

REFERENCE:

BASE PLAN PRODUCED USING THE TOWN OF CALEDON MAPPING SERVICE, 2018

0m 20 40 60 80 100
SCALE

BOREHOLE LOCATION PLAN

PROPOSED BRIDGE AND CULVERT REPLACEMENT
PATTERSON SIDEROAD
CALEDON, ONTARIO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

		DATE	SCALE	PML REF.	DRAWING NO.
DRAWN	NG	JAN 2021	AS SHOWN	20BF041	1-1
CHECKED	GW				
APPROVED	GW				

APPENDIX A

Statement of Limitations

STATEMENT OF LIMITATIONS

This report is prepared for and made available for the sole use of the client named. Peto MacCallum Ltd. (PML) hereby disclaims any liability or responsibility to any person or entity, other than those for whom this report is specifically issued, for any loss, damage, expenses, or penalties that may arise or result from the use of any information or recommendations contained in this report. The contents of this report may not be used or relied upon by any other person without the express written consent and authorization of PML.

This report shall not be relied upon for any purpose other than as agreed with the client named without the written consent of PML. It shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. A portion of this report may not be used as a separate entity: that is to say the report is to be read in its entirety at all times.

The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

The scope of services carried out by PML is based on details of the proposed development and land use to address certain issues, purposes and objectives with respect to the specific site as identified by the client. Services not expressly set forth in writing are expressly excluded from the services provided by PML. In other words, PML has not performed any observations, investigations, study analysis, engineering evaluation or testing that is not specifically listed in the scope of services in this report. PML assumes no responsibility or duty to the client for any such services and shall not be liable for failing to discover any condition, whose discovery would require the performance of services not specifically referred to in this report.

STATEMENT OF LIMITATIONS
(continued)

The findings and comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may affect the validity of the findings and recommendations given in this report.

The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the site is free from any contaminants from past or current land use activities or that the conditions in all areas of the site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

The Client expressly waives its right to withhold PML's fees, either in whole or in part, or to make any claim or commence an action or bring any other proceedings, whether in contract, tort, or otherwise against PML in anyway connected with advice or information given by PML relating to the cost estimate or Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate.

APPENDIX B

Certificates of Analysis of Chemical Testing

CADUCEON™
ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G0319 **REPORT No. B20-32199 (i)**

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: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:

P.O. NUMBER: 20BF041
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
Cyanide	12	Kingston	US	20-Oct-20	A-CN s K	in house
Conductivity	12	Holly Lane	ROD	21-Oct-20	A-COND-01 (o)	SM 2510B
pH	12	Richmond Hill	HAZ	19-Oct-20	A-pH-02 (rh)	MOEE3530
Chromium (VI)	12	Holly Lane	LMG	19-Oct-20	D-CRVI-02 (o)	EPA7196A
Mercury	12	Holly Lane	PBK	21-Oct-20	D-HG-01 (o)	EPA 7471A
Sodium Adsorption Ratio	12	Holly Lane	TPR	20-Oct-20	D-ICP-01 SAR (o)	SM 3120
Metals - ICP-OES	12	Holly Lane	TPR	20-Oct-20	D-ICP-02 (o)	EPA 6010
Metals - ICP-MS	12	Holly Lane	TPR	20-Oct-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

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G0319 **REPORT No. B20-32199 (i)**

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: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D.		BH1-SS2	BH2-SS3	BH4-SS3	BH5-SS2	O. Reg. 153	
	Sample I.D.		B20-32199-1	B20-32199-2	B20-32199-3	B20-32199-4	Tbl. 1 - All	
	Date Collected		08-Oct-20	08-Oct-20	09-Oct-20	08-Oct-20		
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		8.25	8.23	7.97	8.22		
Conductivity @25°C	mS/cm	0.001	**0.63**	**3.08**	0.514	**0.823**	0.57	
Cyanide (Free)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.051	
Sodium Adsorption Ratio	units		**3.36**	**46.0**	**5.26**	**9.40**	2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5	2.6	2.2	1.3	1.3	18	
Barium	µg/g	1	37	28	20	13	220	
Beryllium	µg/g	0.2	0.2	0.2	< 0.2	< 0.2	2.5	
Boron	µg/g	0.5	4.5	3.6	1.3	1.7	36	
Cadmium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1	10	10	9	7	70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1	5	5	3	3	21	
Copper	µg/g	1	22	11	6	6	92	
Lead	µg/g	5	11	< 5	< 5	< 5	120	
Mercury	µg/g	0.005	0.008	0.008	0.012	< 0.005	0.27	
Molybdenum	µg/g	1	< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1	9	8	4	4	82	
Selenium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	
Silver	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1	0.5	0.4	0.3	0.3	2.5	
Vanadium	µg/g	1	17	18	21	23	86	
Zinc	µg/g	3	27	21	13	13	290	

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

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DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D.		BH5-SS3	BH6 SS 2	BH6 SS 3	BH7 SS 2	O. Reg. 153	
	Sample I.D.		B20-32199-5	B20-32199-6	B20-32199-7	B20-32199-8	Tbl. 1 - All	
	Date Collected		08-Oct-20	06-Oct-20	06-Oct-20	06-Oct-20		
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		8.10	7.96	7.37	7.89		
Conductivity @25°C	mS/cm	0.001	**0.993**	0.359	0.404	0.404	0.57	
Cyanide (Free)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.051	
Sodium Adsorption Ratio	units		**9.62**	0.409	0.417	1.19	2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5	1.8	2.8	2.9	2.3	18	
Barium	µg/g	1	33	48	62	32	220	
Beryllium	µg/g	0.2	0.2	0.2	0.3	0.2	2.5	
Boron	µg/g	0.5	2.5	4.3	3.6	2.8	36	
Cadmium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1	10	11	11	10	70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1	5	5	5	5	21	
Copper	µg/g	1	11	27	21	13	92	
Lead	µg/g	5	7	9	11	6	120	
Mercury	µg/g	0.005	0.009	0.018	0.038	0.012	0.27	
Molybdenum	µg/g	1	< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1	7	9	8	7	82	
Selenium	µg/g	0.5	< 0.5	< 0.5	0.5	< 0.5	1.5	
Silver	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1	0.4	0.5	0.6	0.5	2.5	
Vanadium	µg/g	1	22	17	16	21	86	
Zinc	µg/g	3	22	70	62	24	290	

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

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Lab Manager

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DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

	Client I.D.		BH7 SS 3	BH8 SS 2	BH 8 SS 3	BH 3 SS 2	O. Reg. 153	
	Sample I.D.		B20-32199-9	B20-32199-10	B20-32199-11	B20-32199-12	Tbl. 1 - All	
	Date Collected		06-Oct-20	07-Oct-20	07-Oct-20	14-Oct-20		
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		7.84	7.80	7.88	8.19		
Conductivity @25°C	mS/cm	0.001	0.383	**1.04**	**0.848**	**0.997**	0.57	
Cyanide (Free)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.051	
Sodium Adsorption Ratio	units		1.82	**7.69**	**3.90**	**8.24**	2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5	3.2	5.8	6.3	1.8	18	
Barium	µg/g	1	38	105	106	28	220	
Beryllium	µg/g	0.2	0.3	0.8	0.8	< 0.2	2.5	
Boron	µg/g	0.5	4.2	16.9	18.6	3.5	36	
Cadmium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1	14	27	25	10	70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1	5	15	15	4	21	
Copper	µg/g	1	13	12	11	13	92	
Lead	µg/g	5	11	8	9	8	120	
Mercury	µg/g	0.005	0.023	< 0.005	< 0.005	0.009	0.27	
Molybdenum	µg/g	1	< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1	9	34	32	6	82	
Selenium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	
Silver	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1	0.4	0.6	0.6	0.4	2.5	
Vanadium	µg/g	1	23	29	29	18	86	
Zinc	µg/g	3	38	65	62	20	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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DATE RECEIVED: 15-Oct-20
DATE REPORTED: 21-Oct-20
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

Summary of Exceedances

Table 1 - Res/Park/Institutional/Indus/Com/Commun		
BH1-SS2	Found Value	Limit
Sodium Adsorption Ratio (units)	3.36	2.4
Conductivity @25°C (mS/cm)	0.63	0.57
BH2-SS3	Found Value	Limit
Sodium Adsorption Ratio (units)	46.0	2.4
Conductivity @25°C (mS/cm)	3.08	0.57
BH4-SS3	Found Value	Limit
Sodium Adsorption Ratio (units)	5.26	2.4
BH5-SS2	Found Value	Limit
Sodium Adsorption Ratio (units)	9.40	2.4
Conductivity @25°C (mS/cm)	0.823	0.57
BH5-SS3	Found Value	Limit
Sodium Adsorption Ratio (units)	9.62	2.4
Conductivity @25°C (mS/cm)	0.993	0.57
BH8 SS 2	Found Value	Limit
Sodium Adsorption Ratio (units)	7.69	2.4
Conductivity @25°C (mS/cm)	1.04	0.57
BH 8 SS 3	Found Value	Limit

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

Christine Burke
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JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

Table 1 - Res/Park/Institutional/Indus/Com/Commun		
BH 8 SS 3	Found Value	Limit
Sodium Adsorption Ratio (units)	3.90	2.4
Conductivity @25°C (mS/cm)	0.848	0.57
BH 3 SS 2	Found Value	Limit
Sodium Adsorption Ratio (units)	8.24	2.4
Conductivity @25°C (mS/cm)	0.997	0.57

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

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Final Report

C.O.C.: G0319 **REPORT No. B20-32199 (ii)**

Report To:

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
% Moisture	12	Richmond Hill	FAL	19-Oct-20	A-% moisture RH	
PHC(F2-F4)	12	Kingston	KPR	20-Oct-20	C-PHC-S-001 (k)	CWS Tier 1
PHC(F2-F4)	5	Kingston	NSC	21-Oct-20	C-PHC-S-001 (k)	CWS Tier 1
PHC(F1)	12	Richmond Hill	FAL	16-Oct-20	C-VPHS-01 (rh)	CWS Tier 1

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

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	Client I.D.		BH1-SS2	BH2-SS3	BH4-SS3	BH5-SS2	O. Reg. 153	
	Sample I.D.		B20-32199-1	B20-32199-2	B20-32199-3	B20-32199-4	Tbl. 1 - All	
	Date Collected		08-Oct-20	08-Oct-20	09-Oct-20	08-Oct-20		
Parameter	**Units**	**R.L.**						
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	6	< 5	< 5	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	46	24	27	< 10	240	
PHC F4 (>C34-C50)	µg/g	10	< 10	27 [1]	< 10	< 10	120	
PHC F4 (Gravimetric)	µg/g	50		160 [2]			120	
% moisture	%		14.9	12.5	9.6	4.4		

1. F4 Gravimetric analysis required as chromats did not return to baseline.
2. Sample silica cleaned

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

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JOB/PROJECT NO.:
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WATERWORKS NO.

	Client I.D.		BH5-SS3	BH6 SS 2	BH6 SS 3	BH7 SS 2	O. Reg. 153	
	Sample I.D.		B20-32199-5	B20-32199-6	B20-32199-7	B20-32199-8	Tbl. 1 - All	
	Date Collected		08-Oct-20	06-Oct-20	06-Oct-20	06-Oct-20		
Parameter	**Units**	**R.L.**						
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5	< 6	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	< 10	176	16	58	240	
PHC F4 (>C34-C50)	µg/g	10	< 10	389 [1]	< 10	92 [1]	120	
PHC F4 (Gravimetric)	µg/g	50		380 [2]		330 [2]	120	
% moisture	%		8.2	11.1	28.1	7.4		

1. F4 Gravimetric analysis required as chromats did not return to baseline.
2. Sample silica cleaned

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

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	Client I.D.		BH7 SS 3	BH8 SS 2	BH 8 SS 3	BH 3 SS 2	O. Reg. 153	
	Sample I.D.		B20-32199-9	B20-32199-10	B20-32199-11	B20-32199-12	Tbl. 1 - All	
	Date Collected		06-Oct-20	07-Oct-20	07-Oct-20	14-Oct-20		
Parameter	**Units**	**R.L.**						
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5	< 5	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	22	< 10	< 10	23	240	
PHC F4 (>C34-C50)	µg/g	10	26 [1]	< 10	< 10	38 [1]	120	
PHC F4 (Gravimetric)	µg/g	50	190 [2]			200 [2]	120	
% moisture	%		9.6	8.8	14.7	4.9		

1. F4 Gravimetric analysis required as chromats did not return to baseline.
2. Sample silica cleaned

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

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JOB/PROJECT NO.:
P.O. NUMBER: 20BF041
WATERWORKS NO.

Summary of Exceedances

Table 1 - Res/Park/Institutional/Indus/Com/Commun

BH2-SS3	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	160	120
BH6 SS 2	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	380	120
PHC F4 (>C34-C50) (µg/g)	389	120
BH7 SS 2	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	330	120
BH7 SS 3	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	190	120
BH 3 SS 2	Found Value	Limit
PHC F4 (Gravimetric) (µg/g)	200	120

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.

TESTING REQUIREMENTS

X O.Reg 153 Table _1_ Medium/Fine Coarse MISA Guidelines
RPI ICC Agricultural (O.Reg 153) O.Reg 558 Leachate Analysis
Yes No Record of Site Condition (O.Reg 153) Disposal Site: _____
Provincial Water Quality Objectives Landfill Monitoring
Sewer Use By-Law: _____ Other: _____

REPORT NUMBER (Lab Use)

B20-32199

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): 19 Churchill Drive, Barrie, ON L4N8Z5, barrie@petomaccallum.com
Contact: A. Kimberley	
Tel: 705-734-3900	
Fax: 705-734-9911	Quote No.: / Project Name: 20BF041
Email: akimberley@petomaccallum.c	P.O. No.: / Additional Info: sberg@petomaccallum.com

ANALYSES REQUESTED (Print Test in Boxes)

Metals and Inorganics; PHCs (F1 to F4 Fractions); 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)
1	BH1-SS2		S	2020-10-08		X X				4	
2	BH2-SS3		S	2020-10-08		X X				4	
3	BH4-SS3		S	2020-10-09		X X				4	
4	BH5-SS2		S	2020-10-08		X X				4	
5	BH5-SS3		S	2020-10-08		X X				4	
6	BH6 SS 2		S	2020-10-06		X X				4	
7	BH6 SS 3		S	2020-10-06		X X				4	
8	BH7 SS 2		S	2020-10-06		X X				4	
9	BH7 SS 3		S	2020-10-06		X X				4	
10	BH8 SS 2		S	2020-10-07		X X				4	

SAMPLE SUBMISSION INFORMATION

	Sampled by:	Submitted by:
Print:	Niklas Gardlund	N. G
Sign:	N Gardlund	N Gardlund
	2020-10-07	2020-10-14
	Date (yy-mm-dd)/Time:	Date (yy-mm-dd)/Time:

SHIPPING INFORMATION

Client's Courier
Caduceon's Courier
Drop Off X
Caduceon (Pick-up)
Invoice
# of Pieces

REPORTING / INVOICING

Report by Fax
Report by Email X
Invoice by Email X
Invoice by Mail

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)

Received By (print): Steel Signature:
Date Received (yy-mm-dd): 20/10/15 Time Received: 16:40
Laboratory Prepared Bottles: Yes No
Sample Temperature °C: 13.5 Labeled by: SC

Comments:

jar → O jar → K Receip + vials → PH.

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White: Lab Copy / Yellow: Invoicing Copy / Pink: Client Copy

CofC, May 2019, Revision No: 22

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

TESTING REQUIREMENTS

X O.Reg 153 Table _1_ Medium/Fine Coarse MISA Guidelines
RPI ICC Agricultural (O.Reg 153) O.Reg 558 Leachate Analysis
Yes No Record of Site Condition (O.Reg 153) Disposal Site: _____
Provincial Water Quality Objectives Landfill Monitoring
Sewer Use By-Law: _____ Other: _____

REPORT NUMBER (Lab Use)

B20-32199

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: 20BF041
Email: akimberley@petomaccallum.c	P.O. No.: / Additional Info:

ANALYSES REQUESTED (Print Test in Boxes)

Metals and Inorganics | PHCs (F1 to F4 Fractions) | 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)
			S	2020-10-07		X X				4	
11	BH 8 SS 3		S	2020-10-14		X X				4	
12	BH 3 SS 2										

SAMPLE SUBMISSION INFORMATION

	Sampled by:	Submitted by:
Print:	N. Gardlund	N. Gardlund
Sign:	N Gardlund	N Gardlund
	2020-10-07	2020-10-14
	Date (yy-mm-dd)/Time:	Date (yy-mm-dd)/Time:

SHIPPING INFORMATION

Client's Courier
Caduceon's Courier
Drop Off X
Caduceon (Pick-up)

Invoice
# of Pieces

REPORTING / INVOICING

Report by Fax
Report by Email X
Invoice by Email X
Invoice by Mail

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)

Received By (print): Steve Signature: SRD
Date Received (yy-mm-dd): 20/10/15 Time Received: 16:40
Laboratory Prepared Bottles: (Yes) No
Sample Temperature °C: 13.5 Labeled by: SF

Comments:

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CofC, May 2019, Revision No: 22

White: Lab Copy / Yellow: Invoicing Copy / Pink: Client Copy