# GEOTECHNICAL INVESTIGATION AND LIMITED CHEMICAL TESTING PROGRAM BRIDGE 34/B-T9 (BRIDGE STREET) TOWNSHIP OF WILMOT, ONTARIO

**for**

**THE CORPORATION OF TOWNSHIP OF WILMOT**
**c/o K. SMART ASSOCIATES LIMITED**

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Peto MacCallum Ltd.
CONSULTING ENGINEERS

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The Corporation of the Township of Wilmot
c/o Mr. Pedram Yazdan Panah, E.I.T.
K. Smart Associates Limited
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Dear Mr. Panah

**Geotechnical Investigation**
**Bridge 34/B-T9 (Bridge Street)**
**Township of Wilmot, Ontario**

Peto MacCallum Ltd. (PML) is pleased to report the findings of our geotechnical investigation completed for the above noted project. Authorization to proceed with this assignment was provided by Mr. A. Garnham, P.Eng. of K. Smart Associates Limited in a letter dated August 31, 2020.

It is understood that the Township of Wilmot is planning to replace Bridge 34/B-T9 located on Bridge Street (crossing the Nith River), between Puddicombe Road and Tye Road in Township of Wilmot. It is understood that the existing bridge comprises a steel truss structure with a span about 45 m, and accommodates only one traffic lane. Details of the proposed structure have not been provided; however, it is envisaged that the new structure will retain the current span but the deck will be wider to accommodate two traffic lanes.

The purpose of the investigation was to determine the specific subsurface soil and ground water conditions at the site. Based on the findings, we have prepared this engineering report with geotechnical recommendations pertaining to design and construction of the new bridge.

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

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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 described in the report. Any changes in plans, will require review by PML to assess the applicability of the report, and may require modified recommendations, additional analysis and/or investigation.

## Investigation Procedure

The field work for the geotechnical investigation was conducted between September 28 and October 28, 2020. The investigation program comprised the drilling of four boreholes near the existing bridge, at locations shown on the appended Borehole Location Plan, Drawing 1. Two deep boreholes, Boreholes 2 and 3 were located at the existing bridge abutments and were advanced to 19.2 and 21.4 m depth, respectively. Boreholes 1 and 4 were advanced to 6.7 m depth on the bridge approaches.

The borehole locations were determined and established in the field by PML. The borehole locations and geodetic elevations were surveyed with a Sokkia GCX3 Real Time Kinematic receiver connected to the Global Navigation Satellite System.

The boreholes were advanced using continuous flight solid and hollow stem augers, powered by a truck mounted CME-75 drill rig, equipped with automatic hammer, supplied and operated by a specialist drilling contractor. The work was carried out under full-time supervision of a PML engineering staff member who directed the drilling and sampling operations, documented the soil stratigraphy, monitored ground water conditions and processed the recovered samples.

Representative samples of the overburden were secured from the boreholes at regular intervals of depth. Standard penetration tests were carried out in conjunction with the sampling operations using a conventional split spoon sampler.

Ground water observations were carried out in the open boreholes during and after completion of drilling. Upon completion of the drilling, the boreholes were decommissioned in accordance with O.Reg. 903/90, as amended.

All of the recovered samples were returned to PML's laboratory for detailed visual examination, classification and routine moisture content determinations. The laboratory testing also included four particle size distribution analyses carried out on samples of the major soil types encountered.

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

Selected soil samples were submitted to SGS Canada Inc. (SGS) for laboratory chemical 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 the Geoenvironmental Considerations section of this report.

**Summarized Subsurface Conditions**

Reference is made to the appended Log of Borehole sheets for details of the field work including soil descriptions, inferred soil stratigraphy, Standard Penetration Test (SPT) N values, pocket penetrometer shear strengths, ground water observations and laboratory moisture 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.

In general, the subsurface soil stratigraphy encountered comprised surficial road pavement structure, fill, and alluvium, underlain by a deposit of sand and gravel/gravelly sand/sand, which in turn was underlain by silty sand till / sandy silt till / silt till.

Pavement Structure

The surficial pavement structure encountered in Boreholes 1 to 4 was 0.88 to 1.2 m thick. The pavement components under the lanes comprised 60 to 70 mm of asphalt, over 230 to 250 mm of granular base, over 560 to 850 mm of granular subbase. The pavement structure materials were observed to be moist, as confirmed by moisture contents between 3 to 7%

Fill

Fill consisting of clayey silt, sandy silt, and sand and gravel was encountered beneath the pavement structures, and extended to depths of between 3.5 to 4.7 m below existing road grades. The cohesive clayey silt fill was drier than plastic limit (DTPL) to about plastic limit (APL) with moisture content results between 21 to 30%. The cohesionless sand and gravel / sandy silt / silt fill was typically moist to wet with moisture contents between 2 to 24%.

Alluvium

A clayey silt alluvium deposit was encountered below the fill in Boreholes 1 and 2, on the west side of the Nith River, and extended to 5.6 and 5.7 m depths, respectively. The alluvium was very soft to soft with SPT N values between 3 to 8 blows per 0.3 m penetration of the split spoon sampler. The alluvium was APL to wetter than plastic limit (WTPL) with moisture contents between 30 and 51%.

Sand and Gravel / Gravelly Sand / Sand

An extensive native deposit of sand and gravel / gravelly sand / sand was encountered in the boreholes, below the fill and alluvium. The sand and gravel / gravelly sand / sand extended to the 6.7 m termination depths in Boreholes 1 and 4, and to 9.4 and 8.0 m depth in Boreholes 2 and 3, respectively. The cohesionless sand and gravel / gravelly sand / sand deposits were found to be compact to dense based on typical SPT N values ranging from 25 to 40 blows per 0.3 m penetration of the split spoon sampler. The sand and gravel / gravelly sand / sand deposits were observed to be saturated with moisture content test results between 8 and 10 %. Reference is given to the appended Figures 1 and 2 for the results of particle size analyses conducted on samples of the gravelly sand and sand. It is noted that the samples submitted for particle size analysis would not include coarse gravel particles greater than 38 mm due to the limitations of the split spoon sampling equipment.

Silty Sand Till / Sandy Silt Till / Silt Till

Cohesionless silty sand till / sandy silt till / silt till deposits were encountered in Boreholes 3 and 4 below the sand and gravel / gravelly sand / sand and extended to the borehole termination depths of up to 21.4 m. Occasional cobbles and occasional boulders were observed in the till deposits. The cohesionless silty sand till / sandy silt till / silt till was found to have a very dense consistency based on typical measured SPT N values greater than 50 blows per 0.3 m penetration of the split spoon sampler. The till deposits were typically wet with moisture content test results between 8 to 30%. Reference is given to the appended Figures 3 and 4 for the results of particle size analyses conducted on samples of the till deposits. It is noted that the samples submitted for particle size analysis would not include coarse gravel particles greater than 38 mm due to the limitations of the split spoon sampling equipment.

Boreholes 2 and 3 were terminated due to auger refusal on probable boulders within the till, at 19.2 and 21.4 m depths, respectively.

Geological mapping published by the Ontario Ministry of Natural Recourses indicates that bedrock at the bridge site would typically be located at 50 m depth and comprise Limestone or Dolostone of the Salina Formation.

Ground Water Conditions

Ground water observations carried out during the course of the field work are summarized on the appended Log of Borehole sheets. During drilling, wet / saturated conditions were observed in the sand and gravel / gravelly sand / sand between 3.6 to 4.7 m depths (Elevation 309.6 to 310.8). Wet samplers were observed below 4.9 to 6.1 m depth in the boreholes. Upon completion of auguring free water was observed at 5.8 and 4.4 m depth in Boreholes 1 and 4, respectively. The wet / saturated conditions and free water reflect the ground water levels at the site, and the Nith River water level.

The ground water levels at the site are subject to seasonal fluctuations and precipitation patterns. It should be noted that the relatively impermeable nature of the silt till could contribute to the development of perched water conditions following short term seasonal participation events.

## Discussion and Recommendations

It is understood that the Township of Wilmot is planning to replace Bridge 34/B-T9 which crosses the Nith River between Puddicombe Road and Tye Road. Details of the proposed structure, which will replace the existing 45 m span steel truss structure have yet to be established. However, it is envisaged that the new structure will retain the current span but the deck and approach grades will be wider to accommodate two traffic lanes. When final design details are available, the comments and recommendations provided in this report should be reviewed to ensure their applicability.

The general subsurface stratigraphy encountered comprises surficial pavement structure, fill, and alluvium, over compact to dense sand and gravel / gravelly sand / sand, underlain by till deposits

### Pile Foundations

Cognizant of the general size of the proposed structure it is anticipated that an integral abutment foundation system comprised of driven piles could be employed to support the prosed new bridge.

A driven pile system consisting of steel H-piles is considered suitable to support the bridge foundation loads at both abutments. The piles should be driven to refusal in the very dense till deposits, which is anticipated below 16 m depth (below Elevation 299).

For pile driven to refusal in the till, the following factored geotechnical axial resistance at ULS for the following sections of steel piles is considered to be appropriate.

| PILE SECTION | FACTORED GEOTECHNICAL AXIAL RESISTANCE PER PILE AT ULS (kN) | ALLOWABLE GEOTECHNICAL AXIAL RESISTANCE PER PILE AT SLS (kN) |
|---|---|---|
| HP 310 x 110 | 1400 | 900 |
| HP 360 x 152 | 1900 | 1250 |

The geotechnical reaction at SLS allows for 25 mm compression of the founding medium.

The piles should be installed and monitored in accordance with the requirements of OPSS 903. This should involve confirmation of the founding elevation, alignment, plumbness, uniformity of set and quality of splices and should be done on a full-time basis by experienced geotechnical personnel.

The pile capacities should be verified in the field by Pile Driving Analyser (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.

Pile caps should be provided with at least 1.2 m of earth cover or equivalent thermal insulation as protection against frost action. A 25 mm thick layer of polystyrene insulation is thermally equivalent to 600 mm of soil cover.

It is anticipated that the part of the existing road embankment will be excavated during demolition of the existing bridge and that working platforms will be constructed to drive the piles. Any additional fill that may be required at these locations should comprise OPSS Granular A to allow installation of the piles without damage. Alternative granular material such as Granular B Type II could be employed provided the maximum particle size does not exceed 75 mm. The granular material must be placed in 300 mm thick lifts and compacted to at least 95% standard Proctor maximum dry density (SPMDD).

To accommodate movement of the integral abutment system, two concentric CSPs that extend at least 3 m below the bottom of the abutment should be placed around the pile to create an annular space. The inner CSP should be filled with sand meeting the gradation requirements of Granular B Type I. Alternatively, a single CSP or auger hole filled with loose uniform sand meeting the requirements shown below maybe used. The sand must be placed following pile installation.

| SIEVE DESIGNATION | | PERCENTAGE PASSING BY MASS |
|---|---|---|
| 2 mm | #10 | 100 |
| 600 µm | #30 | 80 - 100 |
| 425 µm | #40 | 40 - 80 |
| 250 µm | #60 | 5 - 25 |
| 150 µm | #100 | 0 - 6 |

Resistance to lateral loads may be provided in part by mobilization of passive resistance along the pile below the annular space. The lateral resistances recommended for the two pile sections are:

| | HP 310 x 110 | HP 360 x 152 |
|---|---|---|
| Factored Lateral Resistance at ULS | 100 kN | 130 kN |
| Lateral Resistance at SLS | 30 kN | 40 kN |

If additional lateral resistance is required, batter piles driven to refusal should be employed.

The coefficient of horizontal subgrade reaction, $k_s$ (MN/m$^3$), for Granular A or B backfill and native sand and gravel / gravelly sand / sand may be computed using the following equation to evaluate the point of counter flexure:

$$k_s = n_h z/b$$

where $k_s$ = coefficient of horizontal subgrade reaction

$n_h$ = coefficient related to soil density

= 10 MN/m$^3$ for Granular A and B backfill

= 4 MN/m$^3$ for native sand and gravel / clayey silt / silty sand / silt / sandy gravel

$z$ = depth, (m)

$b$ = pile width, (m)

Group action for lateral loading should be considered, as the lateral capacity of a pile group may be less than the sum of the lateral capacities of individual piles. For design a reduction of the coefficient of subgrade reaction may be required when the spacing between piles in the direction of loading is less than eight pile diameters. Group action can be evaluated by reducing the coefficient of horizontal subgrade reaction by a reduction factor, R, as follows:

| PILE SPACING<br>d = PILE DIAMATER OR WIDTH | HORIZONTAL SUBGRADE<br>REACTION REDUCTION FACTOR, R |
|---|---|
| 8d | 1.00 |
| 6d | 0.70 |
| 4d | 0.40 |
| 3d | 0.25 |

Pile spacing normal to the direction of loading has no influence provided it is greater than 2.5 times the pile diameter.

Shallow Foundations

In general, shallow foundations may be used to support retaining walls, wing walls and headwalls at the abutments. Based on the results of the investigation, these structures may be supported on conventional shallow foundations. Foundations should extend a minimum of 0.2 m into the competent native sand and gravel / gravelly sand / sand deposits as shown in the following table.

**FOOTING FOUNDING DEPTHS**

| BOREHOLE | For 200 kPa at SLS and 300 kPa at ULS | |
|---|---|---|
| | MINIMUM DEPTH (m) | CORRESPONDING ELEVATION |
| 1 | 5.8 | 310.6 |
| 2 | 5.9 | 309.4 |
| 3 | 4.9 | 310.3 |
| 4 | 4.7 | 309.8 |

Alternatively, footings may be placed at higher elevations and supported on engineered structural fill, placed in accordance with the recommendations provided below. Footings founded on approved structural fill may be designed for 150 kPa at the SLS and 225 kPa at the ULS. Prior to placement of engineered fill, all existing deleterious soils must be removed and the soils should be subexcavated to the level of competent native soils, as noted in the table above. For engineered fill supporting footing loads, the fill should comprise approved granular material compacted to a minimum 98% SPMDD.

It is recommended that the footings be constructed at least 1.2 m below the river bottom as all footings subject to frost action should be provided with the normal 1.2 m of earth cover. The depth of potential scour should also be considered.

It is essential that all foundation excavations be inspected by geotechnical personnel from PML to check the competency of the founding surfaces and ensure that the geotechnical requirements presented in this report are properly implemented. All backfill, frost protection and cover for concrete abutments should be placed in accordance with Ontario Provincial Standard Drawing (OPSD) 3101.150.

The saturated native sand and gravel / gravelly sand / sand soils at this site are prone to disturbance by the weather elements and construction traffic. Accordingly, a 50 mm skim slab of lean concrete should be provided over the base of the approved founding subgrade, prior to erection of formwork or placement of reinforcing steel.

Provided the footings are designed and constructed for the SLS resistance outlined above, total settlements should not exceed 25 mm with differential settlements of 75% of this value.

Design provisions for earthquake loading should also be applied. For the soil conditions at the site, a Class C site category may be assumed, in accordance with the 2012 Ontario Building Code.

Excavation and Groundwater Control

It is anticipated that excavations for the proposed bridge will extend approximately 6 m below the existing road grades. The excavations will be advanced through the existing pavement structure, fill, alluvium the underlying wet to saturated native sand and gravel / gravelly sand / sand subgrade. Provided adequate ground water control has been achieved, the excavation side slopes may be assumed to be within a Type 3 soil, for which side slopes can be no steeper than one horizontal to one vertical (1H:1V). It may be necessary to flatten the side slopes to 3H:1V if excessively loose/soft conditions or concentrated seepage zones are encountered. Workers should not enter an unprotected excavation if there is evidence of ongoing ground water seepage in the banks. All construction work should be carried out in accordance with the Occupational Health and Safety Act (OHSA).

Excavations for the foundations are anticipated to extend below the ground water level into wet to saturated sand and gravel / gravelly sand / sand deposits. Rigorous dewatering will be required to maintain a safe and sufficiently dry excavation and the use of keg wells or well point dewatering is envisaged, in conjunction with River diversion an/or cut offs. Regardless of the dewatering method chosen, the hydraulic head and ground water inflow must be properly controlled to ensure stable and safe excavation and to facilitate construction. The design of the dewatering system should be left to the contractor's discretion, and the system should meet a performance specification to maintain and control ground water at least 0.3 m below the excavation base level, in order to provide a stable excavation base throughout construction.

It is recommended that test pits be carried out during the tendering stage of the project in order that prospective contractors may familiarize themselves with soil and ground water conditions. Also, the dewatering requirements should also be established by the contractor in the context of a performance specification.

It should be noted that, under the Ontario Water Resources Act, the Water Taking and Transfer Regulation 387/04, a Permit to Take Water (PTTW) from the Ministry of Environment Conservation and Parks (MECP) is required if the dewatering discharge is greater than 50,000 L/day. In accordance with the above noted regulatory requirements and in compliance with the MECP's PTTW Manual (April 2005), and application should be filed to the MECP for the subject property construction dewatering PTTW, if the dewatering discharge is greater than 400,000 L/day, or about 4.6 L/S. If the dewatering discharge is between 50,000 L/day (or about 0.6 L/S) and 400,000 L/day (or about 4.6 L/S) dewatering activities need to be registered on the Environmental Activity and Sector Registry (EASR). Dewatering volumes are expected to exceed 50,000 L/day and may possibly exceed 400,000 L/day cognizant of the ground water conditions observed. Therefore, an EASR or PTTW and supporting hydrogeological assessment will likely be required. A detailed review of the final foundation levels will be required to determine the extent of the dewatering and the requirements for a hydrogeological investigation.

Backfilling

Backfill adjacent to the bridge should be placed in accordance with the Ontario Provincial Standard Specifications (OPSS) 401, and 501, and OPSD 3101.150. The backfill should be placed in 300 mm maximum lifts and compacted to at least 95% SPMDD, as verified by insitu density testing.

The backfill should comprise free draining granular material such as OPS Granular B Type I. The near surface fill soils found below the pavement in the boreholes are not suitable for reuse as backfill, and imported granular fill will be required. Materials containing peat and / or organic matter should not be used as backfill.

Backfill should be brought up simultaneously on each side of the structure and operation of heavy equipment within 0.5 times the height of the structure (each side) restricted to minimize the potential for movement and/or damage of the structure due to the lateral earth pressure induced by compaction.

The structure must be designed to support the stress imposed by roadway traffic and the overlying fill as well as to resist the unbalanced lateral earth pressure and compaction pressure imposed by the backfill adjacent to the walls.

The lateral earth and water pressure, P (kPa), may be computed using the equivalent fluid pressure method presented in Section 6.12 of the Canadian Highway Bridge Design Code (CHBDC), CAN/CSA-S6-14, December 2014, 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 (0.5)
- $h$ = depth below grade (m) at which lateral pressure is calculated
- $\gamma$ = 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)

For walls restrained at the top, the total lateral compaction pressure may be computed as 12 kPa added at the backfill surface, reducing linearly to 0 kPa at a depth of 1.7 m, plus a further lateral surcharge of 0.15 times the at-rest lateral pressure added over the full backfilled height of the wall. It should be understood that the above equation assumes that the backfill will be free draining, and hydrostatic pressures cannot develop.

The loading induced by seismic events should also be considered in design, and reference is made to clause 4.6.4 of CHDBC.

Appropriate factors of safety must be used in design.

The following design parameters may be assumed for granular backfill materials compacted to 95% SPMDD:

| PARAMETER | OPS GRANULAR A | OPS GRANULAR B TYPE I |
|---|---|---|
| Angle of Internal Friction, Ø (degrees) | 35 | 32 |
| Unit Weight, γ (kN/m3) | 23 | 21 |
| Coefficient of Active Earth Pressure ($K_a$) | 0.27 | 0.31 |
| Coefficient of Earth Pressure At Rest ($K_o$) | 0.43 | 0.47 |
| Coefficient of Passive Earth Pressure ($K_p$) | 3.70 | 3.23 |
| Angle of friction between soil and wall, d (degrees) | 23.5 | 21.5 |

Upon completion of backfilling, the embankment slope should be graded and dressed with an appropriate cover to prevent erosion. Minimal erosion is anticipated in earth slopes that are properly constructed at 2H:1V or flatter. Effort should be made to use 3H:1V earth slopes where possible. As a minimum, the new slopes should be seeded and mulched (as per OPSS 804) as soon after grading as possible to prevent erosion.

Pavement Reinstatement

Based on the proposed pavement usage, frost susceptibility, and strength of the expected subgrade soils, the following pavement component thicknesses are considered suitable for roadway reinstatement.

| PAVEMENT COMPONENT | THICKNESS |
|---|---|
| Asphalt | 100 mm |
| Granular A Base | 150 mm |
| Granular B Subbase | 400 mm |

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 and inspection by PML personnel. If the subgrade is wet and unstable, subexcavation and placement of additional granular subbase material will be required.

The pavement materials should conform to current OPS and municipal specifications. The Granular A base and Granular B subbase courses should be placed in thin lifts and compacted to a minimum of 100% SPMDD, and asphalt should be placed to a minimum of 92% of the material's maximum relative density (MRD) and reference is made to OPS Specification 310.

It should be noted that the subgrade will lose its strength if allowed to become wet due to surface water or during freezing and thawing periods. Therefore, drainage of the granular courses and subgrade becomes very essential. Drainage should be provided by extending the granular courses out to the face of the embankment slopes.

It is recommended that at the transition zones, the subgrade level of the new pavement sections and existing pavement section should match, if possible, to avoid any problems associated with differential frost heaving of the subgrade. Alternatively, frost tapering of the subgrade at 10 horizontal to 1 vertical would be recommended.

During construction, testing should be conducted to confirm the gradation and compatibility characteristics of the granular base and subbase materials.

Proofrolling procedures and the placement and compaction of all the fill and granular materials for the pavement construction and backfilling at the site should be inspected on a continuous basis by PML technicians.

## 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 comments regarding on-site or off-site re-use and/or disposal options of excess soil.

The geoenvironmental sampling and testing was conducted as a limited chemical testing program. 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.

### 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 SGS, a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory in Lakefield, Ontario. The chemical analyses conducted by SGS 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.

The rational for sample selection was based on materials exhibiting visual or olfactory evidence of contamination, SVC screening, site coverage, and materials most likely to be excavated during construction.

Four samples were submitted for analysis for metals and inorganics (M&I), petroleum hydrocarbon (PHC) fractions F1 to F4 and volatile organic compounds (VOCs) in. The M&I analyses includes testing for electrical conductivity (EC) and sodium adsorption ratio (SAR). A list of all samples submitted for analysis is presented in the table below.

**SAMPLES SUBMITTED FOR CHEMICAL TESTING**

| LOCATION | SAMPLE ID | APPROXIMATE DEPTH (m) | DESCRIPTION | CHEMICAL ANALYSIS |
|---|---|---|---|---|
| Borehole 1 | BH1 SS2 | 0.8 to1.4 | Fill | PHC, VOC and M&I |
| Borehole 3 | BH3 SS6 | 4.7 to 5.2 | Sand and Gravel | PHC, VOC and M&I |
| Borehole 4 | BH4 SS4 | 2.3 to 2.9 | Fill | PHC, VOC and M&I |
| Borehole 4 | BH4 SS6 | 4.6 to 5.2 | Sand and Gravel | PHC, VOC and M&I |

Site Condition Standards

The 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 Table and corresponding Site Condition Standards (SCSs) depend on the site location, land use, soil texture, bedrock depth, soil pH and potable or non-potable ground water setting at the site.

As a transportation corridor, a community property use designation applies to the site (Bridge Street) under O.Reg. 153/04, as amended. Based on review of the above factors, PML selected the Generic Criteria of the O.Reg. 153/04, Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act dated April 15, 2011. In particular, the Table 8 (T8) Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Residential / Parkland / Institutional / Industrial / Commercial / Community (RPI/ICC) Property Use within 30 m of a Water Body in a Potable Ground Water Condition would likely apply to the site; however, a full evaluation of applicable SCSs in accordance with Sections 41 and 43.1 of O.Reg. 153/04, as amended, was not within the scope of this assignment and further environmental work would be required to confirm this.

For off-site re-use of soil with minimal environmental restrictions, the O.Reg. 153/04, as amended, Full Depth Background Table 1 (T1) SCSs for RPI/ICC property uses were utilized, which is the most stringent Standard listed under the Regulation apart from agricultural use.

For the option of reusing the excess soil at a property with a potable or non potable ground water condition, the O.Reg. 153/04, as amended, Full Depth Generic Table 2 and Table 3 SCSs were utilized for RPI/ICC land use.

It is noted that a comparison to the O.Reg. 153/04, as amended, Tables 4 and 5 SCSs for stratified site conditions and Tables 6 and 7 SCSs for shallow bedrock conditions were 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.

Analytical Findings and Conclusions

Laboratory Certificates of Analysis compared to the Table 1 RPI/ICC SCSs are included in Appendix A. The results of the analyses were also compared to Table 2 ICC and Table 8 RPI/ICC SCSs in the following paragraphs. The measured values and corresponding Standards (labelled as G/S for Guideline/Standard) are shown on the certificates of analysis. In the event of an exceedance of the SCSs, the level is shown as **highlighted**, if applicable.

On-Site Re-use

The measured concentrations of the tested parameters complied with T8 RPI/ICC SCSs with the following exceptions:

| LOCATION | SAMPLE | PARAMETERS |
|---|---|---|
| Borehole 1 | BH1 SS2 | EC |
| Borehole 4 | BH4 SS4 | EC & SAR |
| Borehole 4 | BH4 SS6 | EC |

Under O.Reg. 153/04, as amended, where a SCS is exceeded solely because a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both, the applicable site condition standard is deemed not to be exceeded. In this regard, soil exhibiting EC and SAR exceedances, only, would not be considered "contaminated" if re-used on site as part of the road reconstruction or off-site at another 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. 49.1 and O.Reg. 339 s. 2 for a full outline of the regulations regarding soils impacted by de-icing salt.

Off Site Re-use

A comparison of the results was carried out against the Table 1 RPI/ICC, Table 8 RPI/ICC and Table 2 and 3 ICC SCSs. The following table outlines a summary of the suitability for re-use of excess soil material based on the limited chemical testing.

| SAMPLE ID | TABLE 1 RPI/ICC | TABLE 8 RPI/ICC | TABLE 2 ICC & TABLE 3 ICC | LICENSED LANDFILL |
|---|---|---|---|---|
| BH1 SS2 | No[1] | No[1] | Yes | TCLP testing required |
| BH3 SS6 | Yes | Yes | Yes | |
| BH4 SS4 | No[1] | No[1] | Yes | |
| BH4 SS6 | No[1] | No[1] | Yes | |

**Notes:**
1. Due to elevated metals and inorganics parameters, specifically EC and SAR

Cognizant of the elevated levels of EC and SAR parameters in the tested samples, off-site re-use and/or disposal will be subject to restrictions. In general, excess soil would not be considered suitable for off-site re-use as Table 1 RPI/ICC soil due to the above noted exceedances; however, samples with EC exceedances only (BH2 SS4 and BH2 SS5) may be considered suitable for reuse at Table 2 ICC and Table 3 ICC sites subject to the following conditions.

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

- The extent of the contaminated soil identified above is delineated;
- 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;
- The excess soil cannot be taken to a property for which a Record of Site Condition (RSC) is being filed as outlined in O.Reg. 153/04, as amended, unless the chemical testing program is completed in accordance with the regulation;
- Transportation and placement of the surplus 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 limited sampling and testing report.
- The excavation work should be conducted in accordance with a written Soil Management Plan prepared by a qualified professional to ensure that all surplus 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.

Additional sampling and chemical testing should be carried out 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 MECP has introduced new On-Site and Excess Soil Management Regulations (O.Reg. 406/19) which include certain exemptions for projects which are underway prior to January 1, 2022. Compliance with the regulations will require additional environmental review and management of excess soils, including additional soil sampling and analytical testing requirements.

It should be noted there is no legal imperative to remove or treat the soil that exceeds the applicable Site Condition Standard, provided it is demonstrated that there is no off-site impact or adverse effect. However, if contaminated soil is left on site, the landowner assumes liability associated with the contamination. The liability concerns could include potential scrutiny from the MECP, neighbouring property owners and the public; potential for decreased value of the land and issues during potential divesting of the property due to environmental liability concerns on the part of future owners or their financiers / insurers.

**Geotechnical Review and Construction Inspection and Testing**

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

Foundation construction and earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures, and verify the specified degree of compaction is achieved uniformly throughout fill materials.

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

This report is subject to the Statement of Limitations that is included in Appendix B, which must be read in conjunction with the report.

## Closure

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.


William Loghrin, P.Eng.
Project Engineer, Geotechnical Services


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

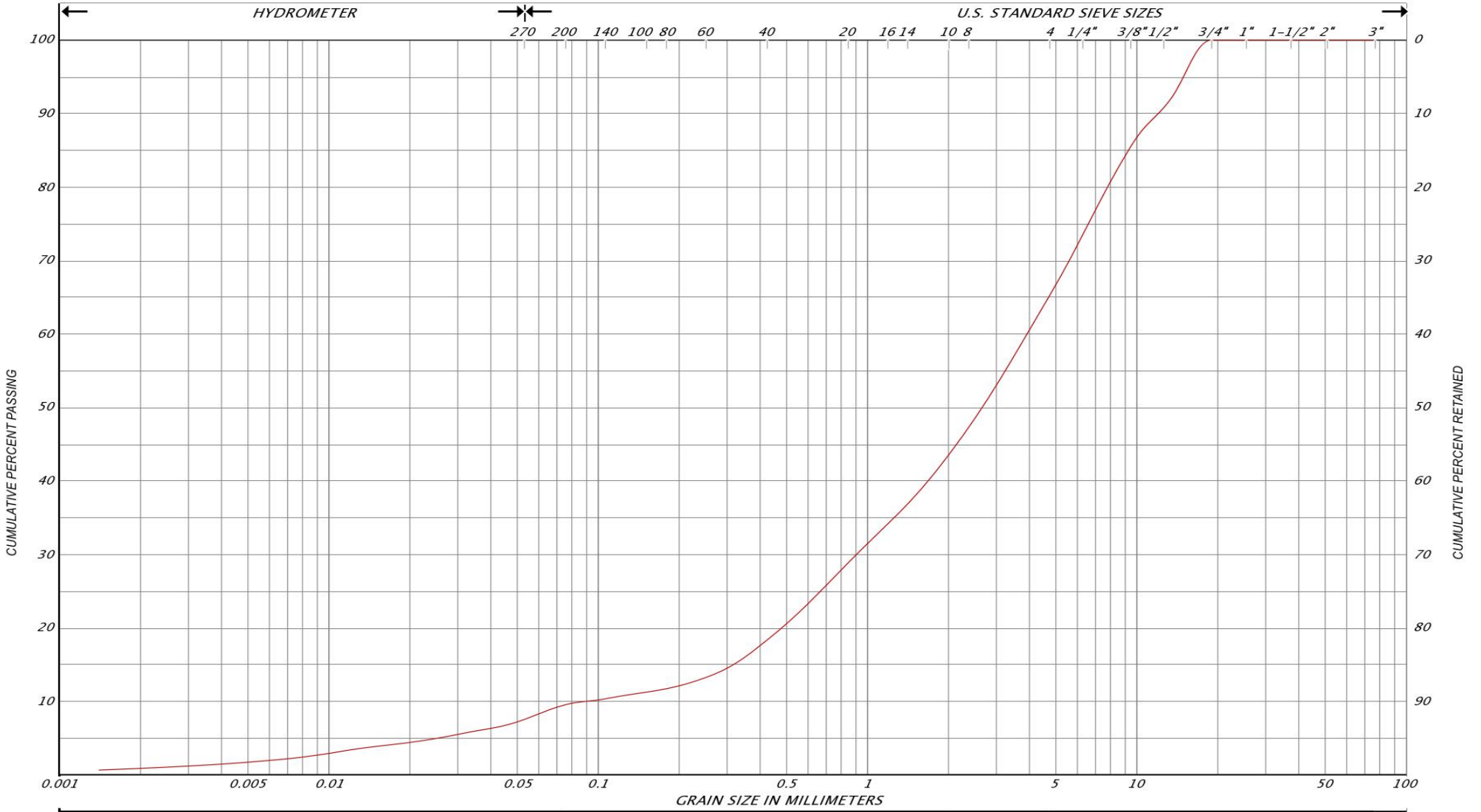
RB/WL/SJ:cs

Enclosure(s):
Figures 1 to 4 - Particle Size Distribution Charts
List of Abbreviations
Log of Boreholes 1 to 4
Drawing 1 – Borehole Location Plan
Appendix A – SGS – Certificate of Analysis
Appendix B – Statement of Limitations

PML Peto MacCallum Ltd.
CONSULTING ENGINEERS

PROJECT NO. 20LF007
FIGURE NO. 1

# PARTICLE SIZE DISTRIBUTION CHART




| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SILT & CLAY | | | FINE | MEDIUM | COARSE | GRAVEL | | COBBLES | UNIFIED |
| | | | SAND | | | | | | |
| CLAY | FINE | MEDIUM | COARSE | FINE | MEDIUM | COARSE | GRAVEL | | COBBLES | M.I.T |
| | SILT | | | SAND | | | | | | |
| CLAY | SILT | | V.FINE | FINE | MED. | COARSE | GRAVEL | | | US BUREAU |
| | | | SAND | | | | | | | |

REMARKS: Borehole 3, Sample SS7, Depth 6.1 to 6.7 m

SAND AND GRAVEL

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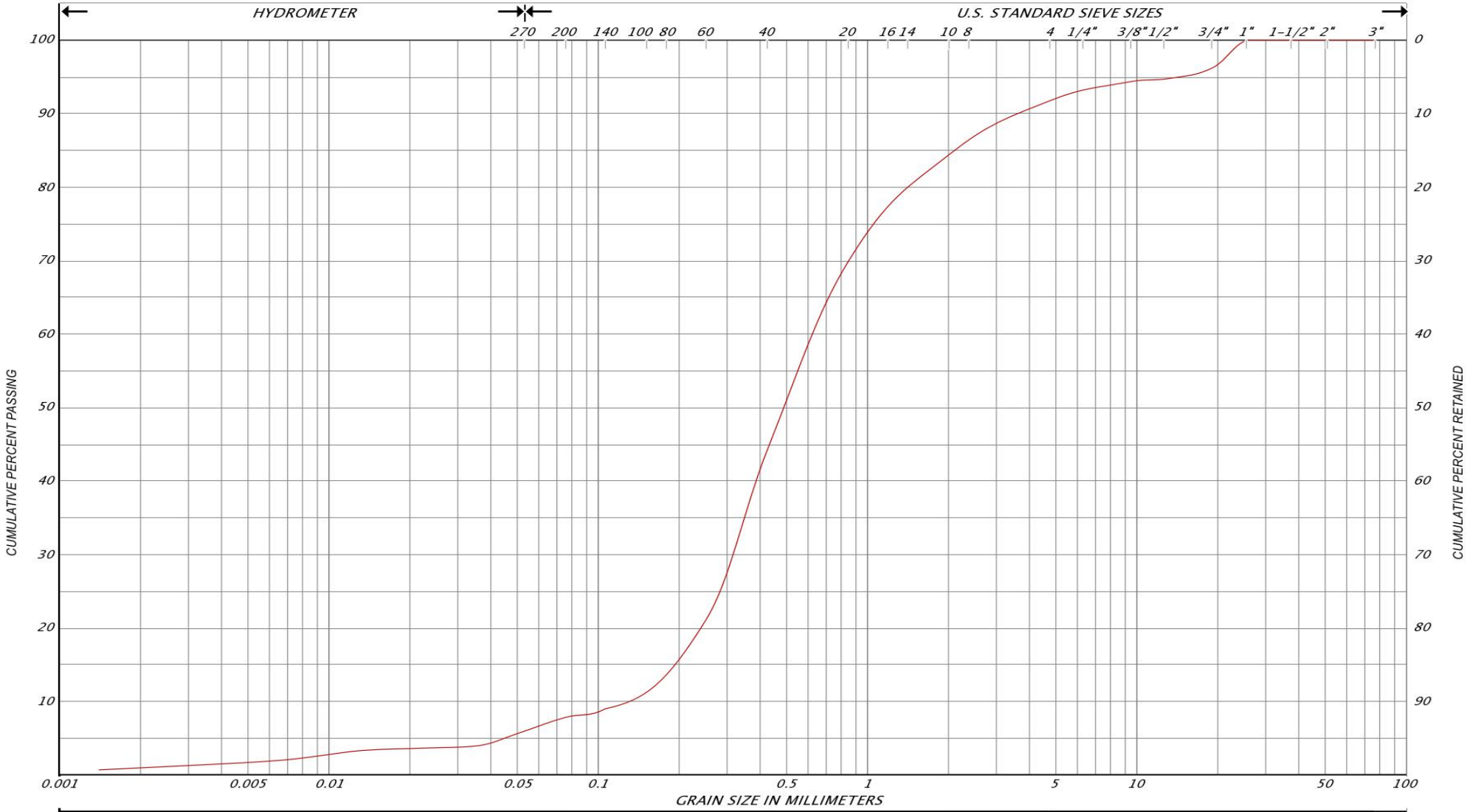
PROJECT NO. 20LF007
FIGURE NO. 2

# PARTICLE SIZE DISTRIBUTION CHART




| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SILT & CLAY | | | | FINE | MEDIUM | COARSE | GRAVEL | | | COB BLES | UNIFIED |
| | | | | SAND | | | | | | | |
| CLAY | FINE | MEDIUM | COARSE | FINE | MEDIUM | COARSE | GRAVEL | | | COBBLES | M.I.T |
| | SILT | | | SAND | | | | | | | |
| CLAY | SILT | | | V.FINE | FINE | MED. | COARSE | GRAVEL | | | US BUREAU |
| | | | | SAND | | | | | | | |

REMARKS: Borehole 2, Sample SS8, Depth 7.6 to 8.1 m

GRAVELLY SAND

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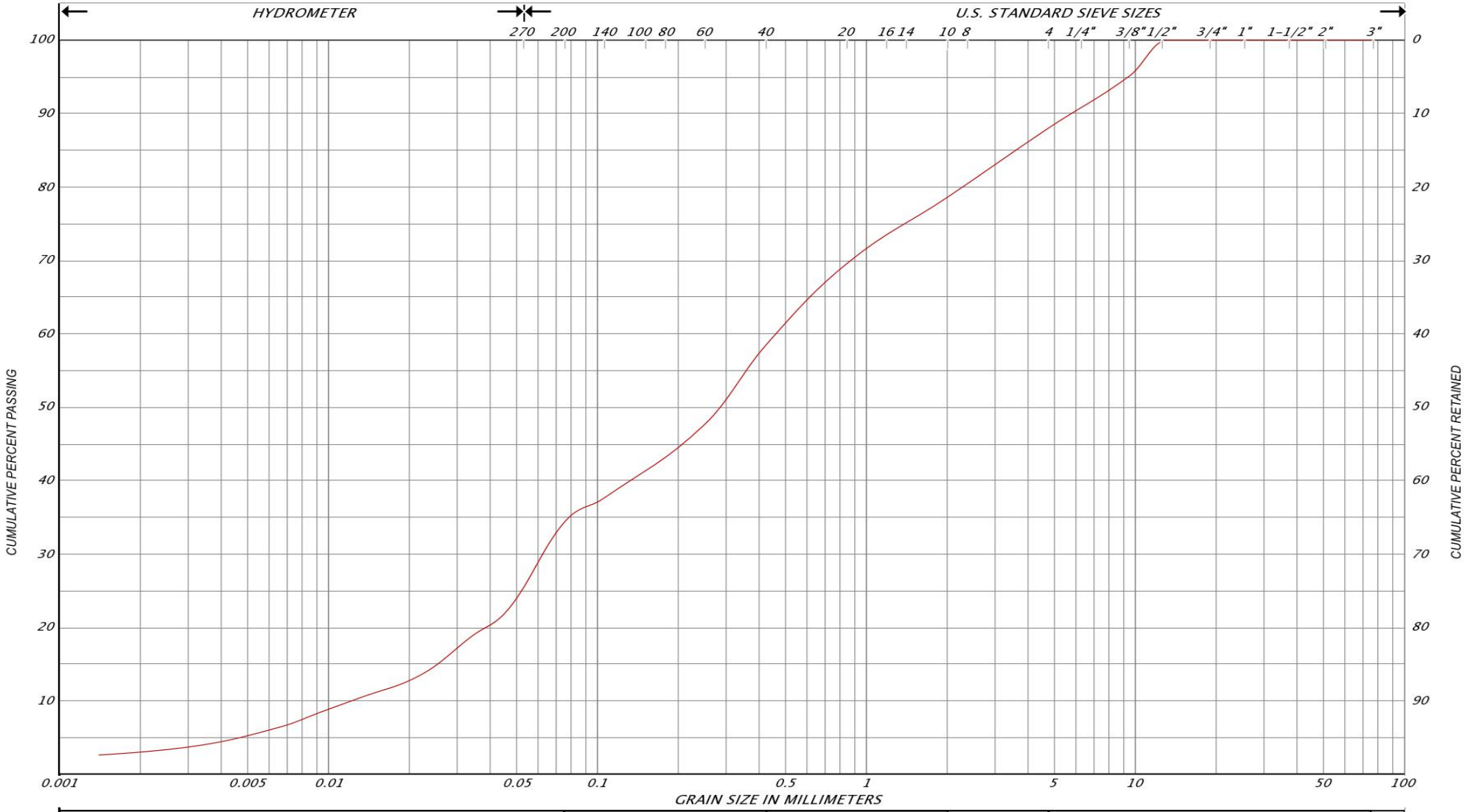
CONSULTING ENGINEERS

PROJECT NO. 20LF007
FIGURE NO. 3

# PARTICLE SIZE DISTRIBUTION CHART




| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SILT & CLAY | | | FINE | MEDIUM | COARSE | GRAVEL | | COB BLES | UNIFIED | | |
| | | | SAND | | | | | | | | |
| CLAY | FINE | MEDIUM | COARSE | FINE | MEDIUM | COARSE | GRAVEL | | COBBLES | M.I.T | |
| | SILT | | | SAND | | | | | | | |
| CLAY | SILT | | V.FINE | FINE | MED. | COARSE | GRAVEL | | | US BUREAU | |
| | | | SAND | | | | | | | | |

REMARKS: Borehole 2, Sample SS10, Depth 10.7 to 10.8 m

SILTY SAND TILL

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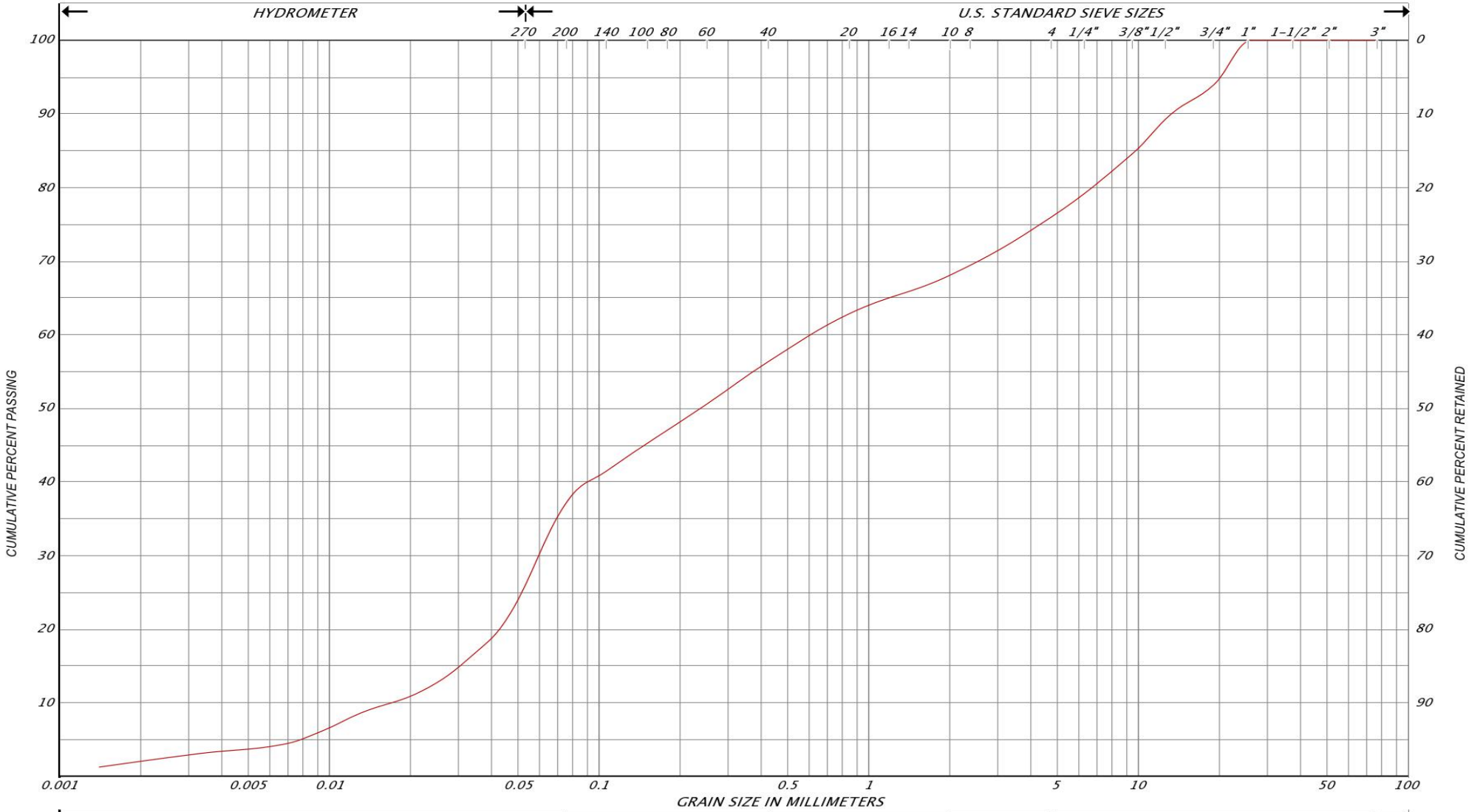
PROJECT NO. 20LF007
FIGURE NO. 4

# PARTICLE SIZE DISTRIBUTION CHART




| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SILT & CLAY | | | FINE | MEDIUM | COARSE | GRAVEL | | COBBLES | UNIFIED |
| | | | SAND | | | | | | |
| CLAY | FINE | MEDIUM | COARSE | FINE | MEDIUM | COARSE | GRAVEL | | COBBLES | M.I.T |
| | SILT | | | SAND | | | | | | |
| CLAY | SILT | | V.FINE | FINE | MED. | COARSE | GRAVEL | | | US BUREAU |
| | | | SAND | | | | | | | |

REMARKS: Borehole 3, Sample SS9, Depth 9.1 to 9.4 m,

SILT TILL

# *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 | USS | Undisturbed Shear Strength |
| PH | Sample Advanced Hydraulically | RSS | Remoulded Shear Strength |
| 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 NO. 1

***PROJECT*** Geotechnical Invesrigation - Bridge 34/B-T9 (Bridge Street Bridge) ***PML REF.***

***LOCATION*** Wilmot, Ontario ***BORING DATE*** October 26, 2020 ***ENGINEER*** W. Loghrin

***BORING METHOD*** Continuous Flight Solid Stem Augers ***TECHNICIAN*** R. Bhavsar

| DEPTH (metres) | ELEV | DESCRIPTION | STRAT PLOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES "N" VALUES | ELEVATION SCALE |
|---|---|---|---|---|---|---|---|
| | 316.43 | SURFACE ELEVATION 316.43 | | | | | |
| 0.0 | 316.43 | PAVEMENT STRUCTURE: 70 mm asphalt, over 250 mm granular base, moist, over 560 mm granular subbase, moist | | 1 | SS | 34 | 316 |
| 0.88 | 315.55 | FILL: Dark brown clayey silt, some gravel, trace sand, DTPL to APL | | 2 | SS | 13 | |
| 1.0 | | | | | | | 315 |
| 2.0 | | | | 3 | SS | 11 | |
| | | | | 4 | SS | 9 | 314 |
| 3.0 | | | | 5 | SS | 18 | 313 |
| 4.1 | 312.3 | occasional rootlets | | | | | |
| 4.0 | | | | 6 | SS | 8 | 312 |
| 5.0 | | | | | | | 311 |
| 5.6 | 310.8 | SAND AND GRAVEL: Compact brown sand and gravel, some silt, trace clay, saturated | | 7 | SS | 25 | |
| 6.0 | | | | | | | 310 |
| 6.7 | 309.7 | BOREHOLE TERMINATED AT 6.7 m | | | | | |
| 7.0 | | | | | | | |
| 8.0 | | | | | | | |
| 9.0 | | | | | | | |
| 10.0 | | | | | | | |
| 11.0 | | | | | | | |
| 12.0 | | | | | | | |
| 13.0 | | | | | | | |
| 14.0 | | | | | | | |

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

Sampler wet from 6.1 m to completion

Upon completion of auguring
Cave at 5.9 m
Free water at 5.8 m

***NOTES***

Peto MacCallum Ltd.
CONSULTING ENGINEERS

# LOG OF BOREHOLE NO. 2



***PROJECT*** Geotechnical Invesrigation - Bridge 34/B-T9 (Bridge Street Bridge) ***PML REF.***

***LOCATION*** Wilmot, Ontario ***BORING DATE*** September 28, 2020 ***ENGINEER*** W. Loghrin

***BORING METHOD*** Continuous Flight Hollow Stem Augers ***TECHNICIAN*** D. Patterson

| DEPTH (metres) | ELEV | DESCRIPTION | STRAT PLOT | SAMPLES NUMBER | TYPE | "N" VALUES |
|---|---|---|---|---|---|---|
| 0.0 | | SURFACE ELEVATION 315.32 | | | | |
| | | PAVEMENT STRUCTURE: 70 mm asphalt, over 1020 mm granular | | 1 | GS | 20 |
| 1.1 | 314.2 | FILL: Brown sandy silt, some gravel, occasional cobbles, moist | | 2 | SS | 3 |
| | | | | 3 | SS | 4 |
| 2.2 | 313.1 | becoming brown silt, trace to some sand, trace to some gravel, occasional cobbles, moist | | 4 | SS | 2 |
| 3.5 | | | | 5 | SS | 4 |
| | 311.8 | CLAYEY SILT: Soft dark brown clayey silt, trace sand, occasional cobbles, trace organics, APL to WTPL | | | | |
| | | | | 6 | SS | 3 |
| 5.7 | 309.6 | SAND: Compact brown sand, some gravel, occasional cobbles, saturated | | | | |
| | | | | 7 | SS | 22 |
| | | | | 8 | SS | 26 |
| 9.4 | 305.9 | SILTY SAND: Very dense grey silty sand, trace gravel, occasional cobbles, wet to saturated | | 9 | SS | 58 |
| | | | | 10 | SS | 50/100mm |
| | | | | 11 | SS | 85/280mm |
| 14.0 | | 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: 315, 314, 313, 312, 311, 310, 309, 308, 307, 306, 305, 304, 303, 302

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

UNIT WEIGHT kN/m³
51

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

Sampler wet from 6.1 m to completion

***NOTES***

Peto MacCallum Ltd.
CONSULTING ENGINEERS

# LOG OF BOREHOLE NO. 2



***PROJECT*** Geotechnical Invesrigation - Bridge 34/B-T9 (Bridge Street Bridge) ***PML REF.***

***LOCATION*** Wilmot, Ontario ***BORING DATE*** September 28, 2020 ***ENGINEER*** W. Loghrin

***BORING METHOD*** Continuous Flight Hollow Stem Augers ***TECHNICIAN*** D. Patterson

| DEPTH (metres) / ELEV | DESCRIPTION | STRAT PLOT | SAMPLES: NUMBER | TYPE | "N" VALUES | ELEVATION SCALE |
|---|---|---|---|---|---|---|
| 14.0 | CONTINUED FROM PREVIOUS PAGE | | 12 | SS | 87/280mm | 301 |
| | | | | | | |
| | | | 13 | SS | 50/130mm | 300 |
| | | | | | | 299 |
| | | | 14 | SS | 50/80mm | 298 |
| | | | | | | |
| | | | 15 | SS | 50/100mm | 297 |
| 19.2 / 296.1 | BOREHOLE TERMINATED AT 19.2 m DUE TO AUGUR REFUSAL | | | | | |

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***

Peto MacCallum Ltd.
CONSULTING ENGINEERS

# LOG OF BOREHOLE NO. 3



***PROJECT*** Geotechnical Invesrigation - Bridge 34/B-T9 (Bridge Street Bridge) ***PML REF.***

***LOCATION*** Wilmot, Ontario ***BORING DATE*** October 28, 2020 ***ENGINEER*** W. Loghrin

***BORING METHOD*** Continuous Flight Hollow Stem Augers ***TECHNICIAN*** R. Bhavsar

| DEPTH (metres) | ELEV | DESCRIPTION | STRAT PLOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES "N" VALUES | ELEVATION SCALE |
|---|---|---|---|---|---|---|---|
| | | SURFACE ELEVATION 315.23 | | | | | |
| 0.0 | | PAVEMENT STRUCTURE: 70 mm asphalt, over 230 mm granular base, moist, over 620 mm granular subbase, moist | | 1 | GS | 59 | 315 |
| 0.88 | | | | | | | |
| 1.0 | | FILL: Dark brown sandy silt, some gravel, trace clay, moist | | 2 | SS | 11 | 314 |
| 2.0 | | | | 3 | SS | 8 | 313 |
| 3.0 | | | | 4 | SS | 6 | 312 |
| 4.0 | | | | 5 | SS | 7 | 311 |
| 4.7 | 310.5 | SAND AND GRAVEL: Dense brown sand and gravel, some silt, trace clay, saturated | | 6 | SS | 37 | 310 |
| 5.0 | | | | | | | |
| 6.0 | | | | 7 | SS | 40 | 309 |
| 7.0 | | | | | | | |
| 8.0 | 307.2 | SILTY SAND: Very dense grey silty sand till, some gravel, trace clay, moist to wet | | 8 | SS | 86/280mm | 308 |
| 9.0 | | | | 9 | SS | 81/280mm | 307 |
| 10.0 | | | | | | | 306 |
| 11.0 | | | | 10 | SS | 55 | 305 |
| 11.7 | 303.5 | SAND AND GRAVEL: Very dense grey sand and gravel, trace silt, saturated | | | | | 304 |
| 12.0 | | | | 11 | SS | 50/150mm | 303 |
| 13.0 | | | | | | | 302 |
| 14.0 | | 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

Sampler wet from 4.8 m to completion

***NOTES***

Peto MacCallum Ltd.
CONSULTING ENGINEERS

# LOG OF BOREHOLE NO. 3



***PROJECT*** Geotechnical Invesrigation - Bridge 34/B-T9 (Bridge Street Bridge) ***PML REF.***

***LOCATION*** Wilmot, Ontario ***BORING DATE*** October 28, 2020 ***ENGINEER*** W. Loghrin

***BORING METHOD*** Continuous Flight Hollow Stem Augers ***TECHNICIAN*** R. Bhavsar

| DEPTH (metres) | ELEV | DESCRIPTION | STRAT PLOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES "N" VALUES | ELEVATION SCALE |
|---|---|---|---|---|---|---|---|
| 14.0 | | CONTINUED FROM PREVIOUS PAGE | | 12 | SS | 88 | 301 |
| 14.8 | 300.4 | SILT TILL: Very dense grey silt till, some gravel, some sand, trace clay, wet | | 13 | SS | 50/100mm | 300 |
| | | | | 14 | SS | 50/80mm | 297 |
| | | | | 15 | SS | 50/50mm | 295 |
| 21.4 | 293.8 | BOREHOLE TERMINATED AT 21.4 m | | 16 | SS | 50/80mm | 294 |

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***

Peto MacCallum Ltd.
CONSULTING ENGINEERS

# LOG OF BOREHOLE NO. 4

***PROJECT*** Geotechnical Invesrigation - Bridge 34/B-T9 (Bridge Street Bridge) ***PML REF.***

***LOCATION*** Wilmot, Ontario ***BORING DATE*** October 26, 2020 ***ENGINEER*** W. Loghrin

***BORING METHOD*** Continuous Flight Solid Stem Augers ***TECHNICIAN*** R. Bhavsar

| DEPTH (metres) | ELEV | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES |
|---|---|---|---|---|---|---|
| | | SURFACE ELEVATION 314.53 | | | | |
| 0.0 | | PAVEMENT STRUCTURE: 60 mm asphalt, over 250 mm granular base, moist, over 850 mm granular subbase, moist | | 1 | SS | 63 |
| 1.2 | 313.3 | FILL: Brown sand and gravel fill, trace silt, moist | | 2 | SS | 47 |
| | | | | 3 | SS | 68 |
| 2.2 | 312.3 | becoming dark brown clayey silt, some gravel, trace sand, DTPL to APL | | 4 | SS | 8 |
| | | | | 5 | SS | 3 |
| 4.1 | 310.4 | SAND AND GRAVEL: Compact to dense brown sand and gravel, some silt, trace clay, saturated | | 6 | SS | 36 |
| | | | | 7 | SS | 21 |
| 6.7 | 307.8 | BOREHOLE TERMINATED AT 6.7 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

UNIT WEIGHT kN/m³

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

Sampler wet from 4.9 m to completion

Upon completion of auguring
Cave at 4.6 m
Free water at 4.4 m

***NOTES***



KEY PLAN

**LEGEND:**

APPROXIMATE BOREHOLE LOCATION

**REFERENCE:**

BOREHOLE LOCATION PLAN REPRODUCED FROM AN AERIAL PHOTO.

**NOTES:**

THE INFERRED STRATIGRAPHY REFERRED TO IN THE REPORT IS BASED ON THE DATA FROM THESE BOREHOLES SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY BETWEEN THE BOREHOLES MAY VARY.

THE BOREHOLE LOCATIONS AND GEODETIC ELEVATIONS WERE SURVEYED WITH A SOKKIA GCX3 REAL TIME KINEMATIC RECEIVER CONNECTED TO THE GLOBAL NAVIGATION SATELLITE SYSTEM.

## TOWNSHIP OF WILMOT

## GEOTECHNICAL INVESTIGATION BRIDGE 34/B-T9

BRIDGE STREET

NEW HAMBURG, ONTARIO

## BOREHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS

| | | | | | |
|---|---|---|---|---|---|
| DRAWN | R. BHAVSAR | DATE | SCALE | PML REF. | DWG. NO. |
| CHECKED | W. LOGHRIN | JUNE 2021 | AS SHOWN | 20LF007 | 1 |
| APPROVED | S. JEFFREY | | | | |

# APPENDIX A

SGS, Certificates of Analysis

# O.Reg. 153/04, As Amended, Table 1, Table 2, Table 3 and Table 8 Standards (Soil)

(Residential / Parkland / Institutional / Industrial / Commercial / Community Property Use)

# FINAL REPORT

## CA14936-OCT20 R

**20LF007, Bridge St, New Hamburg**

Prepared for

Peto MacCallum Ltd

# FINAL REPORT

CA14936-OCT20 R

## First Page

| CLIENT DETAILS | | LABORATORY DETAILS | |
|---|---|---|---|
| Client | Peto MacCallum Ltd | Project Specialist | Brad Moore Hon. B.Sc |
| | | Laboratory | SGS Canada Inc. |
| Address | 16 Franklin St S<br>Kitchener, ON<br>N2C 1R4. Canada | Address | 185 Concession St., Lakefield ON, K0L 2H0 |
| Contact | Rahil Bhavsar | Telephone | 705-652-2143 |
| Telephone | 519-893-7500 | Facsimile | 705-652-6365 |
| Facsimile | 519-893-0654 | Email | brad.moore@sgs.com |
| Email | rbhavsar@petomaccallum.com;sjeffrey@petomaccallum.com | SGS Reference | CA14936-OCT20 |
| Project | 20LF007, Bridge St, New Hamburg | Received | 10/30/2020 |
| Order Number | | Approved | 11/05/2020 |
| Samples | soil (4) | Report Number | CA14936-OCT20 R |
| | | Date Reported | 11/05/2020 |

### COMMENTS

CCME Method Compliance: Analyses were conducted using analytical procedures that comply with the Reference Method for the CWS for Petroleum Hydrocarbons in Soil and have been validated for use at the SGS laboratory, Lakefield, ON site.

Quality Compliance: Instrument performance / calibration quality criteria were met and extraction and analysis limits for holding times were met.

nC6 and nC10 response factors within 30% of response factor for toluene: YES

nC10, nC16 and nC34 response factors within 10% of the average response for the three compounds: YES

C50 response factors within 70% of nC10 + nC16 + nC34 average: YES

Linearity is within 15%: YES

F4G - gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
The results for F4 and F4G are both reported and the greater of the two values is to be used in application to the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

Temperature of Sample upon Receipt: 4 degrees C
Cooling Agent Present:Yes
Custody Seal Present:Yes

Chain of Custody Number:012784

F4 (C34-C50) Duplicate: RPD for this parameter is outside control limits. The average of the two duplicates is less than five times the RL, therefore a greater uncertainty is expected.

### SIGNATORIES

Brad Moore Hon. B.Sc

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**Client:** Peto MacCallum Ltd
**Project:** 20LF007, Bridge St, New Hamburg
**Project Manager:** Rahil Bhavsar
**Samplers:** Rahil Bhavsar

PACKAGE: **REG153 - BTEX** (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **Sample Number** | 8 | 9 | 10 | 11 |
| | | | **Sample Name** | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| | | | **Sample Matrix** | soil | soil | soil | soil |
| | | | **Sample Date** | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **BTEX** | | | | | | | |
| Benzene | µg/g | 0.02 | 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Ethylbenzene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Toluene | µg/g | 0.05 | 0.2 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Xylene (total) | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| m/p-xylene | µg/g | 0.05 | | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| o-xylene | µg/g | 0.05 | | < 0.05 | < 0.05 | < 0.05 | < 0.05 |

PACKAGE: **REG153 - Hydrides** (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **Sample Number** | 8 | 9 | 10 | 11 |
| | | | **Sample Name** | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| | | | **Sample Matrix** | soil | soil | soil | soil |
| | | | **Sample Date** | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **Hydrides** | | | | | | | |
| Antimony | µg/g | 0.8 | 1.3 | < 0.8 | < 0.8 | < 0.8 | < 0.8 |
| Arsenic | µg/g | 0.5 | 18 | 2.9 | 2.6 | 2.3 | 3.1 |
| Selenium | µg/g | 0.7 | 1.5 | < 0.7 | < 0.7 | < 0.7 | < 0.7 |

**Client:** Peto MacCallum Ltd
**Project:** 20LF007, Bridge St, New Hamburg
**Project Manager:** Rahil Bhavsar
**Samplers:** Rahil Bhavsar

PACKAGE: **REG153 - Metals and Inorganics**
(SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **Sample Number** | 8 | 9 | 10 | 11 |
| | | | **Sample Name** | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| | | | **Sample Matrix** | soil | soil | soil | soil |
| | | | **Sample Date** | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **Metals and Inorganics** | | | | | | | |
| Moisture Content | % | - | | 17.4 | 9.8 | 14.2 | 14.6 |
| Barium | µg/g | 0.1 | 220 | 71 | 20 | 53 | 36 |
| Beryllium | µg/g | 0.02 | 2.5 | 0.51 | 0.15 | 0.36 | 0.25 |
| Boron | µg/g | 1 | 36 | 5 | 5 | 5 | 5 |
| Cadmium | µg/g | 0.02 | 1.2 | 0.11 | 0.05 | 0.17 | 0.12 |
| Chromium | µg/g | 0.5 | 70 | 18 | 11 | 14 | 12 |
| Cobalt | µg/g | 0.01 | 21 | 7.8 | 2.5 | 5.9 | 4.3 |
| Copper | µg/g | 0.1 | 92 | 17 | 6.2 | 12 | 12 |
| Lead | µg/g | 0.1 | 120 | 10 | 4.1 | 7.9 | 7.2 |
| Molybdenum | µg/g | 0.1 | 2 | 0.3 | 1.0 | 0.3 | 0.6 |
| Nickel | µg/g | 0.5 | 82 | 17 | 5.4 | 12 | 8.8 |
| Silver | µg/g | 0.05 | 0.5 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Thallium | µg/g | 0.02 | 1 | 0.13 | 0.03 | 0.08 | 0.06 |
| Uranium | µg/g | 0.002 | 2.5 | 0.53 | 0.64 | 0.48 | 0.49 |
| Vanadium | µg/g | 3 | 86 | 25 | 13 | 19 | 15 |
| Zinc | µg/g | 0.7 | 290 | 50 | 20 | 45 | 40 |
| Water Soluble Boron | µg/g | 0.5 | | < 0.5 | < 0.5 | < 0.5 | < 0.5 |

**Client:** Peto MacCallum Ltd
**Project:** 20LF007, Bridge St, New Hamburg
**Project Manager:** Rahil Bhavsar
**Samplers:** Rahil Bhavsar

PACKAGE: **REG153 - Other (ORP)** (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Number** | | | | 8 | 9 | 10 | 11 |
| **Sample Name** | | | | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| **Sample Matrix** | | | | soil | soil | soil | soil |
| **Sample Date** | | | | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **Other (ORP)** | | | | | | | |
| Mercury | ug/g | 0.05 | 0.27 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Sodium Adsorption Ratio | No unit | 0.2 | 2.4 | 3.6 | 0.4 | 5.8 | 3.1 |
| SAR Calcium | mg/L | 0.09 | | 49.6 | 130 | 48.3 | 50.3 |
| SAR Magnesium | mg/L | 0.02 | | 6.4 | 38.6 | 9.5 | 10.0 |
| SAR Sodium | mg/L | 0.15 | | 97.6 | 21.8 | 168 | 88.5 |
| Conductivity | mS/cm | 0.002 | 0.57 | 0.81 | 0.34 | 1.1 | 0.75 |
| pH | pH Units | 0.05 | | 7.71 | 8.02 | 7.93 | 7.89 |
| Chromium VI | µg/g | 0.2 | 0.66 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Free Cyanide | µg/g | 0.05 | 0.051 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |

**Client:** Peto MacCallum Ltd
**Project:** 20LF007, Bridge St, New Hamburg
**Project Manager:** Rahil Bhavsar
**Samplers:** Rahil Bhavsar

PACKAGE: **REG153 - PHCs** (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | **Sample Number** | 8 | 9 | 10 | 11 |
| | | | | **Sample Name** | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| | | | | **Sample Matrix** | soil | soil | soil | soil |
| | | | | **Sample Date** | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **PHCs** | | | | | | | |
| F1 (C6-C10) | µg/g | 10 | 25 | < 10 | < 10 | < 10 | < 10 |
| F1-BTEX (C6-C10) | µg/g | 10 | | < 10 | < 10 | < 10 | < 10 |
| F2 (C10-C16) | µg/g | 10 | 10 | < 10 | < 10 | < 10 | < 10 |
| F3 (C16-C34) | µg/g | 50 | 240 | < 50 | < 50 | < 50 | < 50 |
| F4 (C34-C50) | µg/g | 50 | 120 | < 50 | < 50 | < 50 | < 50 |
| Chromatogram returned to baseline at nC50 | Yes / No | - | | YES | YES | YES | YES |

PACKAGE: **REG153 - THMs (VOC)** (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | **Sample Number** | 8 | 9 | 10 | 11 |
| | | | | **Sample Name** | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| | | | | **Sample Matrix** | soil | soil | soil | soil |
| | | | | **Sample Date** | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **THMs (VOC)** | | | | | | | |
| Bromodichloromethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Bromoform | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Dibromochloromethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |

**Client:** Peto MacCallum Ltd
**Project:** 20LF007, Bridge St, New Hamburg
**Project Manager:** Rahil Bhavsar
**Samplers:** Rahil Bhavsar

PACKAGE: **REG153 - VOC Surrogates** (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Number** | | | | 8 | 9 | 10 | 11 |
| **Sample Name** | | | | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| **Sample Matrix** | | | | soil | soil | soil | soil |
| **Sample Date** | | | | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **VOC Surrogates** | | | | | | | |
| Surr 1,2-Dichloroethane-d4 | Surr Rec % | - | | 101 | 99 | 101 | 101 |
| Surr 4-Bromofluorobenzene | Surr Rec % | - | | 89 | 96 | 89 | 88 |
| Surr 2-Bromo-1-Chloropropane | Surr Rec % | - | | 96 | 94 | 96 | 95 |

PACKAGE: **REG153 - VOCs** (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Number** | | | | 8 | 9 | 10 | 11 |
| **Sample Name** | | | | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| **Sample Matrix** | | | | soil | soil | soil | soil |
| **Sample Date** | | | | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **VOCs** | | | | | | | |
| Acetone | µg/g | 0.5 | 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromomethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Carbon tetrachloride | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Chlorobenzene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Chloroform | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,2-Dichlorobenzene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,3-Dichlorobenzene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,4-Dichlorobenzene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Dichlorodifluoromethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,1-Dichloroethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,2-Dichloroethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,1-Dichloroethylene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| trans-1,2-Dichloroethylene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |

**Client:** Peto MacCallum Ltd
**Project:** 20LF007, Bridge St, New Hamburg
**Project Manager:** Rahil Bhavsar
**Samplers:** Rahil Bhavsar

PACKAGE: **REG153 - VOCs** (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Number** | | | | 8 | 9 | 10 | 11 |
| **Sample Name** | | | | BH1 SS2 | BH3 SS6 | BH4 SS4 | BH4 SS6 |
| **Sample Matrix** | | | | soil | soil | soil | soil |
| **Sample Date** | | | | 26/10/2020 | 27/10/2020 | 26/10/2020 | 26/10/2020 |
| **Parameter** | **Units** | **RL** | **L1** | **Result** | **Result** | **Result** | **Result** |
| **VOCs (continued)** | | | | | | | |
| cis-1,2-Dichloroethylene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,2-Dichloropropane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| cis-1,3-dichloropropene | µg/g | 0.03 | | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| trans-1,3-dichloropropene | µg/g | 0.03 | | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| 1,3-dichloropropene (total) | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Ethylenedibromide | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| n-Hexane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Methyl ethyl ketone | µg/g | 0.5 | 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Methyl isobutyl ketone | µg/g | 0.5 | 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Methyl-t-butyl Ether | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Methylene Chloride | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Styrene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Tetrachloroethylene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,1,1,2-Tetrachloroethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,1,2,2-Tetrachloroethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,1,1-Trichloroethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 1,1,2-Trichloroethane | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Trichloroethylene | µg/g | 0.05 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Trichlorofluoromethane | µg/g | 0.05 | 0.25 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Vinyl Chloride | µg/g | 0.02 | 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |

## EXCEEDANCE SUMMARY

| Parameter | Method | Units | Result | REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED L1 |
|---|---|---|---|---|
| **BH1 SS2** | | | | |
| Conductivity | EPA 6010/SM 2510 | mS/cm | 0.81 | 0.57 |
| Sodium Adsorption Ratio | MOE 4696e01/EPA 6010 | No unit | 3.6 | 2.4 |
| **BH4 SS4** | | | | |
| Conductivity | EPA 6010/SM 2510 | mS/cm | 1.1 | 0.57 |
| Sodium Adsorption Ratio | MOE 4696e01/EPA 6010 | No unit | 5.8 | 2.4 |
| **BH4 SS6** | | | | |
| Conductivity | EPA 6010/SM 2510 | mS/cm | 0.75 | 0.57 |
| Sodium Adsorption Ratio | MOE 4696e01/EPA 6010 | No unit | 3.1 | 2.4 |

## QC SUMMARY

### Conductivity

Method: EPA 6010/SM 2510 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| Conductivity | EWL0060-NOV20 | mS/cm | 0.002 | <0.002 | 3 | 10 | 100 | 90 | 110 | NA | | |

### Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-IENVISFA-LAK-AN-005

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| Free Cyanide | SKA5004-NOV20 | µg/g | 0.05 | <0.05 | ND | 20 | 99 | 80 | 120 | 83 | 75 | 125 |

### Hexavalent Chromium by SFA

Method: EPA218.6/EPA3060A | Internal ref.: ME-CA-IENVISKA-LAK-AN-012

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| Chromium VI | SKA5001-NOV20 | ug/g | 0.2 | <0.2 | ND | 20 | 93 | 80 | 120 | 92 | 75 | 125 |

## QC SUMMARY

### Mercury by CVAAS

Method: EPA 7471A/EPA 245 | Internal ref.: ME-CA-IENVISPE-LAK-AN-004

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| Mercury | EMS0010-NOV20 | ug/g | 0.05 | <0.05 | ND | 20 | 104 | 80 | 120 | 89 | 70 | 130 |

### Metals in aqueous samples - ICP-OES

Method: MOE 4696e01/EPA 6010 | Internal ref.: ME-CA-IENVISPE-LAK-AN-003

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| SAR Calcium | ESG0012-NOV20 | mg/L | 0.09 | <0.09 | 7 | 20 | 92 | 80 | 120 | 101 | 70 | 130 |
| SAR Magnesium | ESG0012-NOV20 | mg/L | 0.02 | <0.02 | 19 | 20 | 94 | 80 | 120 | 102 | 70 | 130 |
| SAR Sodium | ESG0012-NOV20 | mg/L | 0.15 | <0.15 | 4 | 20 | 93 | 80 | 120 | 98 | 70 | 130 |

## QC SUMMARY

### Metals in Soil - Aqua-regia/ICP-MS

Method: EPA 3050/EPA 200.8 | Internal ref.: ME-CA-[ENVISPE-LAK-AN-005

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| Silver | EMS0010-NOV20 | ug/g | 0.05 | <0.05 | ND | 20 | 106 | 70 | 130 | 91 | 70 | 130 |
| Arsenic | EMS0010-NOV20 | µg/g | 0.5 | <0.5 | 0 | 20 | 102 | 70 | 130 | 98 | 70 | 130 |
| Barium | EMS0010-NOV20 | ug/g | 0.1 | <0.1 | 1 | 20 | 106 | 70 | 130 | 91 | 70 | 130 |
| Beryllium | EMS0010-NOV20 | µg/g | 0.02 | <0.02 | 2 | 20 | 102 | 70 | 130 | 107 | 70 | 130 |
| Boron | EMS0010-NOV20 | µg/g | 1 | <1 | 3 | 20 | 99 | 70 | 130 | 100 | 70 | 130 |
| Cadmium | EMS0010-NOV20 | µg/g | 0.02 | <0.02 | 6 | 20 | 101 | 70 | 130 | 92 | 70 | 130 |
| Cobalt | EMS0010-NOV20 | µg/g | 0.01 | <0.01 | 1 | 20 | 104 | 70 | 130 | 100 | 70 | 130 |
| Chromium | EMS0010-NOV20 | µg/g | 0.5 | <0.5 | 2 | 20 | 108 | 70 | 130 | 104 | 70 | 130 |
| Copper | EMS0010-NOV20 | µg/g | 0.1 | <0.1 | 3 | 20 | 106 | 70 | 130 | 95 | 70 | 130 |
| Molybdenum | EMS0010-NOV20 | µg/g | 0.1 | <0.1 | 7 | 20 | 95 | 70 | 130 | 93 | 70 | 130 |
| Nickel | EMS0010-NOV20 | ug/g | 0.5 | <0.5 | 1 | 20 | 102 | 70 | 130 | 97 | 70 | 130 |
| Lead | EMS0010-NOV20 | µg/g | 0.1 | <0.1 | 3 | 20 | 108 | 70 | 130 | 96 | 70 | 130 |
| Antimony | EMS0010-NOV20 | µg/g | 0.8 | <0.8 | ND | 20 | 93 | 70 | 130 | 92 | 70 | 130 |
| Selenium | EMS0010-NOV20 | µg/g | 0.7 | <0.7 | ND | 20 | 101 | 70 | 130 | 94 | 70 | 130 |
| Thallium | EMS0010-NOV20 | µg/g | 0.02 | <0.02 | 8 | 20 | 108 | 70 | 130 | 101 | 70 | 130 |
| Uranium | EMS0010-NOV20 | µg/g | 0.002 | <0.002 | 4 | 20 | 100 | 70 | 130 | 102 | 70 | 130 |
| Vanadium | EMS0010-NOV20 | µg/g | 3 | <3 | 2 | 20 | 105 | 70 | 130 | 99 | 70 | 130 |
| Zinc | EMS0010-NOV20 | µg/g | 0.7 | <0.7 | 1 | 20 | 106 | 70 | 130 | 93 | 70 | 130 |

## QC SUMMARY

### Petroleum Hydrocarbons (F1)

Method: CCME Tier 1 I Internal ref.: ME-CA-[ENVIGC-LAK-AN-010

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| F1 (C6-C10) | GCM0012-NOV20 | µg/g | 10 | <10 | ND | 30 | 102 | 80 | 120 | 106 | 60 | 140 |

### Petroleum Hydrocarbons (F2-F4)

Method: CCME Tier 1 I Internal ref.: ME-CA-[ENVIGC-LAK-AN-010

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| F2 (C10-C16) | GCM0015-NOV20 | µg/g | 10 | <10 | ND | 30 | 114 | 80 | 120 | 118 | 60 | 140 |
| F3 (C16-C34) | GCM0015-NOV20 | µg/g | 50 | <50 | ND | 30 | 114 | 80 | 120 | 118 | 60 | 140 |
| F4 (C34-C50) | GCM0015-NOV20 | µg/g | 50 | <50 | 51 | 30 | 114 | 80 | 120 | 118 | 60 | 140 |

## QC SUMMARY

### pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-001

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| pH | ARD0011-NOV20 | pH Units | 0.05 | | 0 | 20 | 100 | 80 | 120 | | | |

## QC SUMMARY

### Volatile Organics

Method: EPA 5035A/5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| 1,1,1,2-Tetrachloroethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 100 | 50 | 140 |
| 1,1,1-Trichloroethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 98 | 50 | 140 |
| 1,1,2,2-Tetrachloroethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 94 | 60 | 130 | 86 | 50 | 140 |
| 1,1,2-Trichloroethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 100 | 50 | 140 |
| 1,1-Dichloroethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 100 | 50 | 140 |
| 1,1-Dichloroethylene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 91 | 60 | 130 | 103 | 50 | 140 |
| 1,2-Dichlorobenzene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 100 | 50 | 140 |
| 1,2-Dichloroethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 99 | 50 | 140 |
| 1,2-Dichloropropane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 98 | 50 | 140 |
| 1,3-Dichlorobenzene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 99 | 50 | 140 |
| 1,4-Dichlorobenzene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 99 | 50 | 140 |
| Acetone | GCM0011-NOV20 | µg/g | 0.5 | < 0.5 | ND | 50 | 75 | 50 | 140 | 92 | 50 | 140 |
| Benzene | GCM0011-NOV20 | µg/g | 0.02 | < 0.02 | ND | 50 | 95 | 60 | 130 | 100 | 50 | 140 |
| Bromodichloromethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 98 | 50 | 140 |
| Bromoform | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 94 | 60 | 130 | 99 | 50 | 140 |
| Bromomethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 89 | 50 | 140 | 67 | 50 | 140 |
| Carbon tetrachloride | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 98 | 50 | 140 |
| Chlorobenzene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 98 | 50 | 140 |
| Chloroform | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 98 | 50 | 140 |
| cis-1,2-Dichloroethylene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 97 | 50 | 140 |

## QC SUMMARY

### Volatile Organics (continued)

Method: EPA 5035A/5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| cis-1,3-dichloropropene | GCM0011-NOV20 | µg/g | 0.03 | < 0.03 | ND | 50 | 95 | 60 | 130 | 87 | 50 | 140 |
| Dibromochloromethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 94 | 60 | 130 | 97 | 50 | 140 |
| Dichlorodifluoromethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | 1 | 50 | 87 | 50 | 140 | 75 | 50 | 140 |
| Ethylbenzene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 97 | 60 | 130 | 100 | 50 | 140 |
| Ethylenedibromide | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 99 | 50 | 140 |
| n-Hexane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 108 | 60 | 130 | 77 | 50 | 140 |
| m/p-xylene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 97 | 60 | 130 | 99 | 50 | 140 |
| Methyl ethyl ketone | GCM0011-NOV20 | µg/g | 0.5 | < 0.5 | ND | 50 | 88 | 50 | 140 | 96 | 50 | 140 |
| Methyl isobutyl ketone | GCM0011-NOV20 | µg/g | 0.5 | < 0.5 | ND | 50 | 92 | 50 | 140 | 102 | 50 | 140 |
| Methyl-t-butyl Ether | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 94 | 60 | 130 | 102 | 50 | 140 |
| Methylene Chloride | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 94 | 60 | 130 | 102 | 50 | 140 |
| o-xylene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 98 | 60 | 130 | 102 | 50 | 140 |
| Styrene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 97 | 60 | 130 | 100 | 50 | 140 |
| Tetrachloroethylene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 94 | 50 | 140 |
| Toluene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 96 | 60 | 130 | 98 | 50 | 140 |
| trans-1,2-Dichloroethylene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 95 | 60 | 130 | 101 | 50 | 140 |
| trans-1,3-dichloropropene | GCM0011-NOV20 | µg/g | 0.03 | < 0.03 | ND | 50 | 98 | 60 | 130 | 90 | 50 | 140 |
| Trichloroethylene | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 94 | 60 | 130 | 107 | 50 | 140 |
| Trichlorofluoromethane | GCM0011-NOV20 | µg/g | 0.05 | < 0.05 | ND | 50 | 104 | 50 | 140 | 98 | 50 | 140 |
| Vinyl Chloride | GCM0011-NOV20 | µg/g | 0.02 | < 0.02 | ND | 50 | 90 | 50 | 140 | 89 | 50 | 140 |

## QC SUMMARY

### Water Soluble Boron

Method: O.Reg. 15 3/04 | Internal ref.: ME-CA-[ENV] SPE-LAK-AN-003

| Parameter | QC batch Reference | Units | RL | Method Blank | Duplicate | | LCS/Spike Blank | | | Matrix Spike / Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RPD | AC (%) | Spike Recovery (%) | Recovery Limits (%) | | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | | | Low | High | | Low | High |
| Water Soluble Boron | ESG0003-NOV20 | µg/g | 0.5 | <0.5 | ND | 20 | 94 | 80 | 120 | 98 | 70 | 130 |

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

**Multielement Scan Qualifier**: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

**Duplicate Qualifier**: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

**Matrix Spike Qualifier**: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

## LEGEND

### FOOTNOTES

| | |
|---|---|
| **NSS** | Insufficient sample for analysis. |
| **RL** | Reporting Limit. |
| ↑ | Reporting limit raised. |
| ↓ | Reporting limit lowered. |
| **NA** | The sample was not analysed for this analyte |
| **ND** | Non Detect |

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.



-- End of Analytical Report --

# Request for Laboratory Services and CHAIN OF CUSTODY

SGS Environment, Health & Safety - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 012784 Page ____ of ____

**Laboratory Information Section - Lab use only**

Received By: Majeed Almandalawi
Received By (signature): Majeed Almandalawi
Received Date: 10/30/2020 (mm/dd/yy)
Received Time: 14:00 (hr : min)
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: Icepack
Temperature Upon Receipt (°C): 3°C, 4°C, 4°C
LAB LIMS #: GA14936-OCT20

## REPORT INFORMATION

Company: Peto Macallum LTD
Contact: Rahil Bhavsar
Address: 16 Franklin St S
Kitchener, ON, N2G 1R4
Phone: 905-719-0102
Fax:
Email: rbhavsar@petomacallum.com

## INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email:

Quotation #:
P.O. #:
Project #: 20LF007
Site Location/ID: Bridge St, New Hamburg

## TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)
TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day
**RUSH TAT (Additional Charges May Apply):** ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days
**PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION**

Specify Due Date:

**NOTE:** DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

## REGULATIONS

**Regulation 153/04:** ☑ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ____ ☐ Res/Park ☐ Ind/Com ☐ Agri/Other Soil Texture: ☐ Coarse ☐ Medium ☐ Fine

**Other Regulations:** ☐ Reg 347/558 (3 Day min TAT) ☐ PWQO ☐ MMER ☐ CCME ☐ Other: ☐ MISA

**Sewer By-Law:** ☐ Sanitary ☐ Storm Municipality:

**RECORD OF SITE CONDITION (RSC)** ☐ YES ☐ NO

## ANALYSIS REQUESTED

| | SAMPLE IDENTIFICATION | DATE SAMPLED | TIME SAMPLED | # OF BOTTLES | MATRIX |
|---|---|---|---|---|---|
| 1 | BH 1 SS2 | Oct 26 | 12:30 | 4 | S |
| 2 | BH 3 SS6 | Oct 27 | 2:15 | 4 | S |
| 3 | BH 4 SS 4 | Oct 26 | 2:30 | 4 | S |
| 4 | BH 4 SS 6 | Oct 26 | 2:50 | 4 | S |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |

| | Field Filtered (Y/N) | M & I: Metals & Inorganics (incl CrVI, CN, Hg pH,(B(HWS),EC,SAR–soil) (Cl, Na–water) | M & I: Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI | M & I: ICP Metals only (Sb,As,Ba,Be,B,Cd,Cr,Co,Cu,Pb,Mo,Ni, Se,Ag,Tl,U,V,Zn | SVOC: PAHs only | SVOC: SVOCs (all incl PAHs, ABNs, CPs | PCB: PCBs Total ☐ Aroclor ☐ | PHC: F1-F4 + BTEX | PHC: F1-F4 only (no BTEX | VOC: VOCs (all incl BTEX | VOC: BTEX only | Pest: Pesticides (Organochlorine or specify other | Other (please specify) | Other | Other | Other | Other | Other: Sewer Use: (Specify pkg:) | Other: Water Characterization Pkg (General ☐ Extended ☐) | TCLP (Specify TCLP tests ☐M&I ☐VOC ☐PCB ☐B(a)P ☐ABN ☐Ignit.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | ✓ | | | | | | ✓ | ✓ | ✓ | | | | | | | | | | |
| 2 | | ✓ | | | | | | ✓ | ✓ | ✓ | | | | | | | | | | |
| 3 | | ✓ | | | | | | ✓ | ✓ | ✓ | | | | | | | | | | |
| 4 | | ✓ | | | | | | ✓ | ✓ | ✓ | | | | | | | | | | |

**COMMENTS:**

Observations/Comments/Special Instructions

**Sampled By (NAME):** Rahil Bhavsar **Signature:** Rm Bhavsar Date: 10/29/20 (mm/dd/yy)
**Relinquished by (NAME):** Rahil Bhavsar **Signature:** Rm Bhavsar Date: 10/29/20 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.2
Date of Issue: 09 Sept, 2019

# APPENDIX B

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.

The findings an 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 effect the validity of the findings and recommendations given in this report.

# *STATEMENT OF LIMITATIONS*

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 any 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.