

## **Geotechnical Investigation**

Cell 20, Subcell 1 Clean Harbors Lambton Facility Landfill Corunna, Ontario

Clean Harbors Canada, Inc.





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## 1. Introduction

Clean Harbors Canada, Inc. (Clean Harbors) operates a hazardous waste landfill facility (Facility or Site) in Corunna, Lambton County, Ontario. Hazardous solid waste, select non-hazardous waste, liquid waste, and untreated and pre-treated hazardous waste is accepted at the Facility. The Facility is located on Lots 8 and 9 of Concession 10, in St. Clair Township, Lambton County. The Site has a total property area of 140 hectares (ha). The layout of the existing Facility is shown on Figure 1.

GHD is currently designing a below-grade landfill expansion cell identified as Cell 20-1, at the location shown on Figure 2. The geotechnical division of GHD carried out a geotechnical investigation in the Fall of 2020 to support the design of the cell.

The following report summarizes the results of our geotechnical investigation, associated laboratory testing, subsurface soil and groundwater conditions encountered at the borehole locations. This information was used to carry out slope stability modelling of the proposed Cell 20-1 excavation, and to provide recommendations to aid in the design of the excavation and sides slopes for the new cell.

## 2. Field and Laboratory Work Program

## 2.1 Field Investigation

The scope of work (SOW) for the geotechnical investigation comprised drilling a total of four geotechnical boreholes BH20-1 through BH20-4 (one borehole approximately at each corner of the proposed rectangular shaped Cell). The boreholes were advanced to a depth of 25.0 metres (m) below the existing ground surface (bgs). The boreholes were located in the field by GHD staff with the assistance of Murphy Contracting, Clean Harbor's earthworks contractor present at Site. Murphy Contracting provided the coordinates and ground surface elevations of the staked borehole location. The borehole locations are shown on Figure 2.

A Site-specific Health and Safety Plan (HASP) was developed by GHD for implementation prior to commencement of any field activities and associated investigation program. Prior to commencement of field drilling activities, underground utility locates through Ontario One Call and a private utility locating company were arranged. The boreholes were advanced by Geo-Environmental Drilling Inc., a Ministry of the Environment, Conservation and Parks (MECP) licensed driller between October 5 to 8, 2020, using a rubber-track mounted drill rig equipped with hollow stem augers, and mud-rotary drilling arrangements under the full time supervision of GHD field personnel.

The boreholes were installed using 70 mm inside diameter hollow stem augers up to a depth of 4.5 m bgs, and mud rotary drilling techniques below this depth, by advancing a 100 mm diameter steel casing. Representative samples of the strata penetrated were obtained during drilling at depth intervals of 0.75 m and 1.5 m, as appropriate, utilizing a 50 mm diameter split-barrel sampler, advanced by dropping a 63.5 kg hammer from a height of 760 mm in accordance with the standard penetration test method (ASTM D1586). Undisturbed thin walled tube (Shelby tube) samples in accordance with ASTM D1587 were also collected at select depths for geotechnical lab testing. The



results of the Standard Penetration Tests (SPT) are reported as 'N' values at the corresponding depths on the respective borehole logs presented in Appendix A.

Groundwater observations were made in the boreholes as drilling progressed up to the 4.5 m depth. Groundwater observations in the borehole could not be made below 4.5 m due to the use of mud rotary drilling. Each borehole was dry with no groundwater present to a depth of 4.5 m bgs during drilling as noted on the borehole logs. Following completion of drilling, each borehole was backfilled using the cement-bentonite grout, and hydrated bentonite pellets in accordance with Ontario Regulation 903.

## 2.2 Geotechnical Laboratory Testing

The geotechnical laboratory testing program consisted of moisture content tests on all recovered split spoon samples. Eight Shelby tube samples (two samples from each of the four boreholes at select depths) were also collected for further geotechnical testing as noted below.

- Grainsize distribution analysis (ASTM D6913-17) and Atterberg limits tests (ASTM D4318) on five Shelby tube samples.
- Unconfined compressive strength test (ASTM D2166) on eight Shelby tubes samples.
- Dry density (unit weight) test (ASTM D7263) on all eight Shelby tube samples.
- Consolidated undrained (CU) triaxial compression tests (ASTM D4767) on three Shelby tube samples.

The laboratory test results are discussed in Section 3, and shown at their corresponding depths on the individual borehole logs provided in Appendix A. Detailed laboratory test results are provided in Appendix B.

## 3. Subsurface Conditions

Details of the subsurface conditions encountered at the Site are summarized in the following sections of the report. Detailed borehole stratigraphic logs are provided in Appendix A.

The Facility is located in the low-relief physiographic region of the approximately 5,800 square kilometres (km<sup>2</sup>) St. Clair Clay Plains<sup>1</sup>. The clay till deposits are ablation till deposits left by retreating ice lobes, smoothed over by shallow lacustrine clays deposited by the early Lake Warren. The clay overburden thickness at the Facility consists of 42 to 50 m thick firm to very stiff clayey still deposited over Paleozoic black Shale bedrock of the Kettle Point formation.

The clay till has an over-consolidated crust underlain by lightly over-consolidated clay stratum becoming normally consolidated with depth. Based on the physical characteristics and shear strength parameters, the clay till deposits can be subdivided into four sublayers shown on the computer models.

<sup>1</sup> Chapman L.J., Putnam D.F. (1984): The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2, 270p. accompanied by Map P.2715 (coloured), scale 1:600,0000



## 3.1 Surficial Fill

A thin veneer of surficial fill (surface soils reworked from grading activities) was encountered in the four boreholes. The thickness of the fill was noted to be 0.9 m, 2.2 m, 0.1 m, and 0.1 m in BH1-20, BH2-20, BH3-20 and BH4-20 respectively. The fill deposit in general comprise clayey silt, trace to some sand, trace gravel, and include topsoil roots at the location of BH1-20 and BH3-20.

The natural moisture content of the samples recovered from fill deposits generally ranged from 11 percent to 18 percent indicating a moist condition, except in BH1-20 where 31 percent moisture was noted, which indicates a moist-wet condition.

## 3.2 Clayey Silt Deposits

The surficial clayey fill deposits in all boreholes are further underlain by native clayey soils, which extend to the termination depth of the borehole. The native clayey deposits comprise clayey silt/ clay and silt/ silt and clay, and include a trace or some sand, and trace gravel.

SPT 'N' values recorded in the native clayey soils generally ranged from 5 to 23. The native deposits have a brown crust that is typically stiff to very stiff, and slightly desiccated from natural groundwater table variations. SPT values in the crust material tend to be in the range of 10 to 20. The crust extends to a depth of 3 to 4 m in the boreholes, and transitioned into a firm to stiff grey clayey silt deposit, with SPT values typically less than 12, and decreasing to as low as 3 in BH4-20 at 23 m depth bgs. The natural moisture content of the samples recovered from the native deposits generally ranged from 10 percent to 28 percent, indicating moist to moist-wet conditions.

Undisturbed samples of the clayey silt were collected with eight Shelby tubes for geotechnical laboratory testing, consisting of grain size distribution analyses, Atterberg limits, unconfined compressive strength tests, unit weight, and consolidated undrained (CU) triaxial compression tests. The test results are summarized and presented in the attached Table 3.1.

The laboratory results performed on the Shelby tube samples show that the clayey silt deposit is generally consistent in nature in the boreholes. The grain size analyses show a sand content of typically 6 to 8 percent (with one result of 17 percent), silt content of 42 to 57 percent, and a clay content of 36 to 49 percent. Atterberg limit results for the clayey silt samples show a liquid limit in the range of 30 to 41, and a plasticity index of 15 to 20, indicating low to medium plastic clay. Shear strengths were obtained from unconfined compressive strength testing on the clayey silt samples and range from 26 to 144 kPa. The shear strengths results confirm that the clayey silt deposits are stiff to very stiff to a depth of about 10 to 15 m and become softer below these depths. These shear strength values are generally consistent with the SPT values obtained in the boreholes. The three CU triaxial compressive strength tests were used to determine the effective strength parameters of the deposit, for use in the slope stability modelling.

## 3.3 Groundwater Observations

Groundwater observations were made in the boreholes as they were advanced. Mud rotary drilling techniques were used below a depth of 4.5 m bgs, and groundwater observations could not be obtained due to the presence of the mud slurry in the boreholes. The boreholes were backfilled with cement bentonite upon completion of drilling. These deposits generally do not have significant



groundwater bearing layers, due to the low permeability of the clayey silt materials. However, the stabilized groundwater table can generally be considered at the depth of the transition between the upper brown clay (desiccated crust), and the lower grey clay deposits. Seepage may occur from pockets of sandy soils within these clayey deposits.

## 4. Discussion and Recommendations

The purposes of this geotechnical investigation was to assist with GHD's design of the excavation and side slopes for Cell 20-1. The proposed draft design is shown on Figure 2. The Cell will be excavated to a depth of approximately 20 m below existing grades, and will have a base elevation of 182 m. The excavation side slopes have been preliminarily designed to have an excavation angle of 1 horizontal to 1 vertical (1H:1V), with horizontal benching part way down the slope to provide sufficient slope stability against sidewall collapse. GHD's geotechnical group utilized the subsurface information obtained from the recent geotechnical boreholes to evaluate the stability of the proposed excavation slopes. The following sections of the report describe the analyses and the results of the slope stability modelling, and provides recommendations based on the modelling.

## 4.1 Slope Stability Methodology and Approach

GHD utilized the Geo-Studio 2019 R2 suite of Software developed by Geo-Slope International of Calgary, Alberta for the slope stability modelling. The software comprises three modules-SEEP/W, SLOPE/W and SIGMA/W.

The SLOPE/W module employs mainly limit-equilibrium methods such as Bishop, Janbu, Spencer, or Morgenstern & Price methods. The slope stability analyses for this study were carried out using the Morgenstern & Price Method, which is a general method of slices developed on the basis of limit equilibrium that requires satisfying equilibrium of forces and moments acting on individual blocks. The blocks are created by dividing the soil above the slip surface by dividing planes.

## 4.2 Cross-Sections Analyzed

Four cross-sections were reviewed prior to commencing the slope stability models. The cross-section locations are shown on Figure 2. Section B-B' was selected for the detailed modelling analyses, as the other sections (A-A', C-C', and D-D') were considered to be similar, or more conservative (safer against slope stability issues) than Section B-B'.

## 4.3 Stratigraphy and Material Properties

The properties required for the stability analyses of the slopes are the bulk densities and shear strength parameters of the materials involved. Relevant geotechnical properties comprising bulk density and shear strength of the different subsurface units have been determined from the field investigation, laboratory test results, and GHD's previous experience with the subsurface conditions at this site. The material properties, including bulk density and effective shear strength parameters, assumed in the slope stability analyses are summarized in Table 4.1. The clayey silt units have been divided into geologic subunits based on their geotechnical properties. These are referred to as the St. Joseph Till, and Black Shale Till, based on historical geotechnical reports and geologic



descriptions. Lower bound and upper bound shear strength parameters were used in the model sections based on previous studies at the site, and the laboratory data obtained from the 2020 lab testing.

## 4.4 **Piezometric Conditions**

The stabilized pieziometric (groundwater table) surface in the model was assumed to be at elevation 195 m, or about 5 to 6 m below grade. The excavation for the cell is therefore mainly in the saturated clay deposits. The response of the clay during unloading was modelled using SIGMA/W module using the material model category of 'Effective stress with Porewater Changes'. This material category carried out a fully coupled volumetric consolidation analysis where deformation and porewater pressures are computed simultaneously using the effective stress parameters. The post-excavation phreatic surface is shown on the output computer models. When a saturated clay (clay below the groundwater table) is loaded, at time t=0, all the load goes into the porewater pressure. Conversely, if saturated clay is unloaded due to its low hydraulic conductivity, it cannot release porewater pressure fast enough to maintain equilibrium through release of porewater, and therefore to maintain equilibrium, negative porewater pressure develops, which acts as a pseudo-reinforcement.

## 4.5 Minimum Factors of Safety

The FS in slope stability analysis can be defined as the ratio of the available shear strength to that of the applied stresses along a potential failure plane. An FS of 1 or greater indicates stable conditions and a value of less than 1 represents unstable conditions and failure. Given the variability and uncertainty in the selection of strength parameters for natural soil and waste material, an FS above 1 is usually required to provide confidence in the model results. The Canadian Foundation Engineering Manual provides recommendations for typical accepted FS for various structures, depending on the risks associated with the failure. Generally, for landfills, the accepted FS for excavation side slopes is a minimum of 1.3.

## 4.6 Slope Stability Evaluation Results and Conclusions

The slope stability modelling is based on the following design assumptions for the Cell 20-1 excavation:

- The entire cell will be excavated to a base elevation of 182 m.
- Side slopes will be excavated at a slope of 1H:1V.
- A horizontal intermediate bench, 5 m wide, will be left unexcavated at elevation 192 m to provide side slope stability.
- An optional additional 5 m wide bench may be left at elevation 186 m, if required, to improve the overall slope stability.

The graphical outputs of the slope stability analyses for these conditions are provided on Figures 3 to 6 and are summarized in Table 4.1. The following conclusions can be made from the modelling:



- Based on previous experience at the site and the modelling, excavation side slopes of 1H:1V will be stable, however, horizontal benches are required to improve the side slope stability. With one 5 m wide bench at elevation 192 m, the FS values are 1.27 and 1.31 for the lower bound, and upper bound parameters, respectively. These FS values are considered marginal, especially when it is expected that the cell will remain open (unfilled) for an extended period of time (months).
- 2. The use of an additional horizontal bench at elevation 186 m improves the FS value, to 1.37 and 1.41 for the lower bound and upper bound parameters, respectively. For slopes that are going to be open for an extended period (months), it is recommended that the lower bench is incorporated into the design.

## 5. Limitations of the Report

This report is intended solely for GHD's internal design purposes. This report cannot be used by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the third party's sole risk, without liability to GHD. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All of Which is Respectfully Submitted,

GHD



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## Client CLEAN HARBORS CANADA, INC. LAMBTON COUNTY, ONTARIO

#### 2021 CAPITAL WORKS CELL DESIGN ECA 1065-9VVJSW

| No.                      | Issue  | Drawn           | Approved                | Date                      |
|--------------------------|--|-----------------|-------------------------|---------------------------|
| Draw                     | m K. DHALIWAL  | Designer        |                         |                           |
| Drafti<br>Chec           | <sup>ing</sup> J. YARDLEY  | Design<br>Check | J. YARDL                | EY                        |
| Proje<br>Mana            | ct<br>ager J. YARDLEY  | Date            | -                       |                           |
| This<br>constr<br>constr | document shall not be used for<br>uction unless signed and sealed for<br>uction. | Scale           | 1:750                   |                           |
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roject No. 44985-50

#### 2020 CAPITAL WORKS PHASING PLANS

Sheet No.

## **FIGURE 1**



| °    | 6 12 18 24m                          |
|------|--------------------------------------|
|      | LEGEND:                              |
|      | LIMIT OF WASTE                       |
| _    | CELL BOUNDARIES                      |
|      | CELL 20-1 TOE OF SLOPE (ELEV. 182)   |
|      | EXISTING MAJOR CONTOUR (2m INTERVAL) |
|      | EXISTING MINOR CONTOUR (1m INTERVAL) |
| )    | MAJOR CONTOUR (PROPOSED BASE GRADES) |
| 5    | MINOR CONTOUR (PROPOSED BASE GRADES) |
|      | EXISTING LEACHATE COLLECTION TRENCH  |
|      | EXISTING DRAINAGE DITCH              |
|      | EXISTING ACCESS ROADS                |
|      | LEACHATE COLLECTION TRENCH EXTENSION |
|      | ACCESS ROAD/TIPPING FACE             |
|      | CELL 20-1 BENCH (ELEV, 192)          |
| 2-20 | GEOTECHNICAL BOREHOLE AND GROUND     |
| 50   |                                      |

EXISTING TOPOGRAPHICAL AND SITE FEATURES FROM MAY 22, 2020 GHD SURVEY. EXISTING TOPOGRAPHICAL SURVEY ADJUSTED 0.510m TO MATCH HISTORICAL VERTICAL DATUM.



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#### 2021 CAPITAL WORKS CELL DESIGN

| No.               | lssue  | Drawn           | Approved                | Date                      |
|-------------------|--|-----------------|-------------------------|---------------------------|
| Draw              | m K. DHALIWAL  | Designer        |                         |                           |
| Drafti<br>Chec    | <sup>ing</sup> J. YARDLEY  | Design<br>Check | J. YARDL                | EY                        |
| Proje<br>Mana     | ct<br>ager J. YARDLEY  | Date            | -                       |                           |
| This construction | document shall not be used for<br>uction unless signed and sealed for<br>uction. | Scale           | 1:750                   |                           |
| Origi             | ANSI D   | Bar<br>0        | is 20mm or<br>size draw | n original<br>ing<br>20mm |

Project No. 44985-50

BOREHOLE LOCATION PLAN-CELL 20-1

Sheet No.

Title

## FIGURE 2

Color Name Unit Cohesion' Phi' Weight (kPa) (kN/m³) (°) Bedrock Black Shale Till, Sub-unit 2A 20 26 13 Black Shale Till, Sub-unit 2B 18.2 13 26 St. Joseph Till, Sub-unit 1A 21.5 25 24 St. Joseph Till, Sub-unit 1B 21 15 28



## LOWER BOUND









TABLE 3.1



#### SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS CELL 20-1 GEOTECHNICAL INVESTIGATION CLEAN HARBORS LAMBTON FACILITY, CORUNNA, ON

|               |                 |             |             | ю                                       | le)                                | No.               | Par    | ticle § | Size I | Distribut                | ion (%)              | (%)                               | Atterb            | erg Limi           | ts (%)                | Unconfine<br>d Strength | Bulk Unit<br>Weight  | CU Comp                     | ression Test  |
|---------------|-----------------|-------------|-------------|---|------------------------------------|-------------------|--------|---------|--------|--------------------------|----------------------|-----------------------------------|-------------------|--------------------|-----------------------|-------------------------|----------------------|-----------------------------|---|
| Sample Number | Sample Location | Sample Date | Sample Type | Material Descripti                      | Sample Depth<br>(metres below grac | Laboratory Sample | Gravel | Sand    | Silt   | Passing No. 200<br>Sieve | Clay<br>(< 0.002 mm) | As Received<br>Moisture Content ( | Liquid Limit (LL) | Plastic Limit (PL) | Plasticity Index (PI) | Shear Strength<br>(kPa) | (kN/m <sup>3</sup> ) | Effective Strength<br>(kPa) | Effective Angle of<br>Internal Friction<br>(degree) |
| 1             | BH1-20, ST-1    | 5-Oct-20    | Shelby Tube | Silt and Clay, trace sand, trace gravel | 13.0 m - 13.6 m                    | WLT 453-1         | 1      | 6       | 57     | 93                       | 36                   | 19                                | 32                | 17                 | 15                    | 143.9                   | 20.1                 |                             |   |
| 2             | BH1-20, ST-2    | 5-Oct-20    | Shelby Tube | Clay and Silt, trace sand, trace gravel | 22.9 m - 23.5 m                    | WLT 453-2         | 1      | 7       | 43     | 92                       | 49                   | 24                                | 41                | 21                 | 20                    | 32.6                    | 20.0                 | 22                          | 25  |
| 3             | BH2-20, ST-1    | 8-Oct-20    | Shelby Tube | Silt and Clay, some sand, trace gravel  | 10.7 m - 11.3 m                    | WLT 453-3         | 1      | 17      | 46     | 82                       | 36                   | 19                                | 30                | 15                 | 15                    | 63.5                    | 21.0                 | 27                          | 26  |
| 4             | BH2-20, ST-2    | 8-Oct-20    | Shelby Tube | Clayey Silt                             | 21.3 m - 21.9 m                    | WLT 453-4         |        |         |        |                          |                      |                                   |                   |                    |                       | 64.3                    | 18.1                 |                             |   |
| 5             | BH3-20, ST-1    | 7-Oct-20    | Shelby Tube | Clayey Silt                             | 10.7 m - 11.3 m                    | WLT 453-5         |        |         |        |                          |                      |                                   |                   |                    |                       | 105.0                   | 21.0                 |                             |   |
| 6             | BH3-20, ST-2    | 7-Oct-20    | Shelby Tube | Clay and Silt, trace sand, trace gravel | 21.3 m - 21.9 m                    | WLT 453-6         | 2      | 7       | 42     | 91                       | 49                   | 25                                | 41                | 21                 | 20                    | 42.9                    | 19.9                 |                             |   |
| 7             | BH4-20, ST-1    | 6-Oct-20    | Shelby Tube | Clayey Silt                             | 10.7 m - 11.3 m                    | WLT 453-7         |        |         |        |                          |                      |                                   |                   |                    |                       | 104.6                   | 21.1                 |                             |   |
| 8             | BH4-20, ST-2    | 6-Oct-20    | Shelby Tube | Clay and Silt, trace sand, trace gravel | 21.3 m - 21.9 m                    | WLT 453-8         | 1      | 8       | 44     | 91                       | 47                   | 27                                | 41                | 20                 | 21                    | 26.2                    | 20.0                 | 24                          | 21  |
| Notes:        |                 |             |             |   |                                    |                   |        |         |        |                          |                      |                                   |                   |                    |                       |                         |                      |                             |   |

(1) NP denotes Non Plastic





#### SUMMARY OF PARAMETERS AND SLOPE STABILITY ANALYSES RESULTS CELL 20-1 CLEAN HARBORS LAMBTON FACILITY CORUNNA, ONTARIO

#### Material Properties for Slope Stability Analyses

|  | ι                   | Jnit Weight (kN/m                  | <sup>3</sup> )      |                     | Cohesi                             | on (kPa)                            |                                     | Friction Angle (degrees) |                                    |                                     |                                     |  |  |  |
|--|---------------------|------------------------------------|---------------------|---------------------|------------------------------------|-------------------------------------|-------------------------------------|--------------------------|------------------------------------|-------------------------------------|-------------------------------------|--|--|--|
| Unit   | Previous<br>Studies | 2020<br>Geotechnical<br>Lab Result | 2021 Model<br>Input | Previous<br>Studies | 2020<br>Geotechnical<br>Lab Result | 2021 Model<br>Input- Lower<br>Bound | 2021 Model<br>Input- Upper<br>Bound | Previous<br>Studies      | 2020<br>Geotechnical<br>Lab Result | 2021 Model<br>Input- Lower<br>Bound | 2021 Model<br>Input- Upper<br>Bound |  |  |  |
| St. Joseph Till- Unit 1A- Elevation 201 to 194 m     | 21.5                |                                    | 21.5                | 24                  |                                    | 24                                  | 24                                  | 25                       |                                    | 25                                  | 25                                  |  |  |  |
| St. Joseph Till- Unit 1B- Elevation 194 to 185 m     | 21.0                | 20.8                               | 21.0                | 15                  | 27                                 | 15                                  | 27                                  | 28                       | 26                                 | 28                                  | 26                                  |  |  |  |
| Black Shale Till- Unit 1A- Elevation 185 to 180 m    | 20.5                | 19.5                               | 20.0                | 13                  | 22 to 24                           | 13                                  | 24                                  | 26                       | 21 to 25                           | 26                                  | 21                                  |  |  |  |
| Black Shale Till- Unit 1B- Elevation 180 m and below | 18.2                | 19.5                               | 18.2                | 13                  | 22 to 24                           | 13                                  | 24                                  | 26                       | 21 to 25                           | 26                                  | 21                                  |  |  |  |

#### Slope Stability Analyses Results

| Slope Condition Analyzed  | Slope Stability Factor of<br>Safety (FS) | Reference Figure | Comments          |
|---|--|------------------|-------------------|
| Cross-Section B-B'- Lower Bound Strength Parameters, Bench at 192 m                                   | 1.27                                     | Figure 3         | Marginally Stable |
| Cross-Section B-B'- Upper Bound Strength Parameters, Bench at 192 m                                   | 1.31                                     | Figure 4         | Marginally Stable |
| Cross-Section B-B'- Lower Bound Strength Parameters, Bench at 192 m and Optional Lower Bench at 186 m | 1.37                                     | Figure 5         | Stable            |
| Cross-Section B-B'- Upper Bound Strength Parameters, Bench at 192 m and Optional Lower Bench at 186 m | 1.40                                     | Figure 6         | Stable            |



GHD | Geotechnical Investigation | 044985 (45)

## Appendix A Borehole Logs

| REFEREN           | ICE No.              | :            | 044985-50-04             |                          |                         |                    |               |                     |   |             | ENCLOSURE  | No.: _             |           | <u>A-1</u>       |           | _   |
|-------------------|----------------------|--------------|--------------------------|--------------------------|-------------------------|--------------------|---------------|---------------------|---|-------------|--|--------------------|-----------|------------------|-----------|-----|
|                   | G                    | HD           |                          | BOREHOLE No              | .: .                    |                    | BH1           | -20                 |   | B           | OREHOL   | E R                | <b>EF</b> | <b>'</b> OF      | ۲s        |     |
|                   | 9                    |              |                          | ELEVATION: _             |                         | 201                | . <u>56 r</u> | n                   |   |             | Page: <u>1</u>   | _ of               | 3         | _                |           |     |
| CLIENT:           |                      | Clea         | an Harbors - Lambto      | n Facility               |                         |                    |               |                     |   | LEC         | GEND   |                    |           |                  |           |     |
| PROJECT           | :                    | Geo          | otechnical Investigation | on - Cell 20-1           |                         |                    |               |                     |   | $\boxtimes$ | SS - SPLIT   | SPOC               | )N        |                  |           |     |
| LOCATIO           | N:                   | Clea         | an Harbors Lambton       | Facility, 4090 Telfer Ro | I. C                    | orunna,            | ON            |                     |   | $\boxtimes$ | ST - SHEL  | 3Y TU              | BE        |                  |           |     |
| DESCRIB           | ED BY:               | Ahn          | ned Mneina               | CHECKED BY:              |                         | Abdul I            | lafee         | z Kha               | <u>n</u>                                |             | RC - ROCK  | CORE               | Ξ         |                  |           |     |
| DATE (ST          | ART):                | 5 O          | ctober 2020              | DATE (FINISH)            | : _                     | 5 Octol            | per 20        | )20                 |   | Ţ           | - WATE   | R LEV              | 'EL       |                  |           |     |
|                   |                      |              |                          |                          |                         |                    |               |                     |   |             |  |                    |           |                  |           |     |
| Depth             | Elevation<br>(m) BGS | Stratigraphy | DESCR<br>SOIL ANI        | IPTION OF<br>D BEDROCK   | State                   | Type and<br>Number | Recovery      | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | enetration  | Shear test (Cu)<br>Sensitivity (S)<br>O Water com<br>M <sub>p</sub> W <sub>1</sub> Atterberg I | ent (%)<br>mits (% |           | → Field<br>→ Lab |           |     |
| Feet Metres       | 201.56               |              | GROUN                    | D SURFACE                |                         |                    | %             | %                   |   | N           | 10 20 30   | 40 50              | 60        | 70 8             | 0 90      | )   |
|                   |                      |              | FILL: CLAYEY SIL         | T - brown, trace sand,   | $\mathbb{N}$            | CC 1               | 75            | 24                  | 2222                                    | 6           |  | $\square$          | $\mp$     | $\square$        |           |     |
|                   |                      |              | moist-wet to moist       | ייטיז טי נטףצטוו, וטטנצ, | Δ                       | 33-1               | 10            | 51                  | J-J-J-J                                 | 0           |  | $\ddagger$         | $\pm$     |                  |           |     |
|                   | 200.66               |              | NATIVE: CLAYEY           | SILT - grey/brown        | $\overline{\mathbf{A}}$ | SS-2               | 96            | 17                  | 3-5-7-9                                 | 12          | •0   |                    | <u> </u>  |                  |           | 22  |
| 5 - 1.4           | 200.16               |              |                          |                          |                         |                    |               |                     |   |             |  | +                  | _         |                  |           | _   |
|                   |                      |              | becoming brown           |                          | X                       | SS-3               | 83            | 16                  | 4-6-8-10                                | 14          | •  |                    | -         |                  |           | 19  |
|                   |                      |              |                          |                          |                         |                    |               |                     |   |             |  | ++                 | _         |                  |           | _   |
|                   |                      |              |                          |                          | X                       | SS-4               | 96            | 15                  | 4-7-8-11                                | 15          | •  |                    |           |                  |           | 1   |
|                   | 198.66               |              | becoming greyish         | brown, very stiff        | $\square$               |                    |               |                     |   |             |  | +                  |           |                  |           |     |
|                   |                      |              |                          |                          | X                       | SS-5               | 92            | 15                  | 7-8-12-15                               | 20          |  | +                  | _         |                  | $\square$ | -22 |
|                   | 197.86               |              | becoming stiff           |                          | ॑                       |                    |               |                     |   |             |  | +                  |           |                  |           |     |
| 13 - 4.0<br>14 -  |                      |              |                          |                          | X                       | SS-6               | 100           | 18                  | 3-5-4-9                                 | 9           | • •  | ++                 | —         |                  | $\square$ | -12 |
|                   | 197.06               |              | becoming grey, so        | <br>me sand              |                         |                    |               |                     |   |             |  |                    | _         |                  |           |     |
|                   |                      |              |                          |                          | X                       | SS-7               | 100           | 16                  | 3-4-5-7                                 | 9           | • 0  | ++                 | _         |                  | $\square$ |     |
|                   | 196.36               |              | mud rotary drilling      | with 100 mm diameter     | $\square$               |                    |               |                     |   |             |  | +                  | +         |                  |           |     |
|                   |                      |              | some gravel              |                          | X                       | SS-8               | 33            | 15                  | 3-5-6-6                                 | 11          | •0   |                    |           |                  |           |     |
| 20 - 6.0          | 195.56               |              | becoming grey            |                          | H                       |                    |               |                     |   |             |  |                    |           |                  |           |     |
|                   |                      |              |                          |                          | X                       | SS-9               | 75            | 18                  | 2-4-6-7                                 | 10          | • •  |                    | _         |                  |           |     |
| 22 - 70           |                      |              |                          |                          |                         |                    |               |                     |   |             |  |                    |           |                  |           |     |
| 23 7.0            | 194.26               |              |                          |                          |                         |                    |               |                     |   |             |  | ++                 | —         |                  |           |     |
| 25 -              |                      |              | becoming sandy to        | some sand                |                         |                    |               |                     |   |             |  |                    |           |                  |           |     |
| 26 - 8.0          |                      |              |                          |                          | X                       | SS-10              | 100           | 14                  | 3-4-5-6                                 | 9           | •0   | ++                 | 4         |                  |           |     |
|                   |                      |              |                          |                          |                         |                    |               |                     |   |             |  |                    | _         |                  |           |     |
| 20 - 1 = 29 - 8.8 | 192.76               |              |                          |                          | 4                       |                    |               |                     |   |             |  | $\ddagger$         | +         | $\mp$            | $\square$ |     |
| 30 + 9.0          |                      |              | nace sanu, occasi        | onal gravel, moist-wel   |                         |                    |               |                     |   |             |  | ++                 | +         | +                | $\square$ |     |
| 31 —              |                      |              |                          |                          | X                       | SS-11              | 100           | 19                  | 3-4-6-7                                 | 10          |  |                    | $\pm$     |                  |           |     |
| 32 - 10 0         |                      | 11           |                          |                          |                         |                    |               |                     |   |             |  |                    | $\pm$     |                  |           |     |
| 33 - 10.0         |                      |              |                          |                          |                         |                    |               |                     |   |             |  |                    | _         |                  |           |     |
|                   | 191.06<br>190.86     |              | some gravel              |                          |                         |                    |               |                     |   |             |  | ++                 | _         |                  | $\square$ |     |
|                   |                      | 111          | Attempted Shelby         | tube sampling at 10.7    | $\otimes$               | GS-1               |               | 19                  |   |             |  |                    |           |                  |           | -   |

L LOG WITH GRAPH 044985-50-04 - BOREHOLE LOGS (FINAL).GPJ GHD Geotechnical

| REFERENCE  | No.:                    | 044985-50-04                             |  |           |                    |              |                     |   | ENCLOSURE No.: <u>A-1</u> |                                     |  |   |                           |                     |                    |                       |       |        |
|--|-------------------------|--|--|-----------|--------------------|--------------|---------------------|---|---------------------------|-------------------------------------|--|---|---------------------------|---------------------|--------------------|-----------------------|-------|--------|
|  | CHD                     |  | BOREHOLE No.: BH1-20                           |           |                    |              |                     |   |                           | OR                                  | REH  | OL                                      | E                         | RE                  | PC                 | )R.                   | Т     |        |
|  | GILD                    |  | ELEVATION:                                     |           | 201                | <u>.56 r</u> | n                   |   |                           |                                     | Page:  | _2                                      |                           | of _                | 3                  |                       |       |        |
| CLIENT:  | Clea                    | an Harbors - Lambto                      | n Facility                                     |           |                    |              |                     |   | LEC                       | GEN                                 | D  |   |                           |                     |                    |                       |       |        |
| PROJECT:   | Geo                     | technical Investigation                  | on - Cell 20-1                                 |           |                    |              |                     |   | $\boxtimes$               | SS                                  | SF   | PLIT                                    | SPC                       | DON                 |                    |                       |       |        |
| LOCATION:  | Clea                    | an Harbors Lambton                       | Facility, 4090 Telfer Rd                       | . C       | orunna,            | ON           |                     |   |                           | ST                                  | - SH   |   | BY T                      |                     | -                  |                       |       |        |
| DESCRIBED E  | BY: <u>Ahm</u>          | ned Mneina                               | CHECKED BY:                                    |           | Abdul H            | lafee        | z Kha               | n                                       |                           | RC                                  | - R(   | CK                                      | COI                       | RE                  | -                  |                       |       |        |
| DATE (START  | T): <u>5 Oo</u>         | ctober 2020                              | DATE (FINISH):                                 | _         | 5 Octob            | per 20       | )20                 |   | Ţ                         |                                     | - W.   | ATE                                     | RLE                       | EVEL                | •                  |                       |       |        |
|  |                         |  |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     |                    |                       |       |        |
| Depth<br>Elevation                                     | (m) BGS<br>Stratigraphy | DESCR<br>SOIL ANI                        | IPTION OF<br>D BEDROCK                         | State     | Type and<br>Number | Recovery     | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index      | She<br>Ser<br>○<br>₩ <sub>p</sub> w | ear test<br>nsitivity<br>Water<br>Atterb<br>''<br>"N" Va | (Cu)<br>(S)<br>cont<br>erg li<br>alue ( | ent (9<br>mits (<br>blows | %)<br>(%)<br>s / 12 | △ F<br>□ L<br>in3( | Field<br>.ab<br>0 cm) |       |        |
| Feet Metres 201  | 1.56                    |  |  |           |                    | %            | %                   |   | Ν                         | 1(                                  | 0 20   | 30 4                                    | 40 5                      | 50 60               | J 70               | ) 80                  | 90    |        |
|  |                         | m bgs, with zero re<br>spoon sample at 1 | covery. Grabbed split<br>0.7 m bgs without SPT |           |                    |              |                     |   |                           |                                     |  |   |                           |                     | $\pm$              | $\pm$                 | $\pm$ | _      |
|  |                         | count<br>Attempted Shelby                | tube sampling at 11.4                          |           |                    |              |                     |   |                           |                                     |  |   |                           |                     | $\pm$              | $\pm$                 | $\pm$ |        |
| $\begin{vmatrix} 39 \\ -12.0 \end{vmatrix}$ 189        | 9.66                    | m bgs, with zero re<br>trace gravel      | coveryJ  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     | $\pm$              | $\pm$                 | $\pm$ | _      |
|  |                         | Ū  |  | M         | SS-12              | 100          | 20                  | 3-4-7-8                                 | 11                        |                                     | • • • •  |   |                           |                     |                    | _                     | _     |        |
|  | 2 56                    |  |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     |                    | $\pm$                 | $\pm$ |        |
|  |                         | Shelby tube sampl<br>Grainsize Analysis  | e at 12.96 m bgs<br><u>::</u>                  |           | ST-1               | 100          | 20                  |   |                           |                                     |  | -1                                      |                           |                     | $\rightarrow$      | $\pm$                 | $\pm$ | _      |
|  | 7.96                    | Gr =1%, Sa =6%, 0                        | CI & Si =93%                                   |           |                    |              |                     |   |                           |                                     |  | -                                       |                           |                     | $\neg$             | —                     | —     |        |
| 46 - 14.0  |                         | Second group can                         |  | M         | SS-13              | 100          | 21                  | 5-8-11-15                               | 19                        |                                     | -  |   |                           |                     | —                  | $\mp$                 | +     | 15     |
| 47 -   |                         |  |  | $\square$ |                    |              |                     |   |                           |                                     |  |   |                           |                     | $\dashv$           | $\mp$                 | $\mp$ | _      |
| 48   |                         |  |  |           |                    |              |                     |   |                           |                                     |  | -                                       |                           |                     | =                  |                       | $\mp$ |        |
| <sup>49</sup> – 15.0                                   |                         |  |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     | =                  | _                     | $\pm$ | _      |
| 51 -   |                         |  |  | M         | SS-14              | 100          | 23                  | 5-8-12-15                               | 20                        |                                     | •0   |   |                           |                     | $\Rightarrow$      | +                     | $\pm$ | -12    |
| 52   |                         |  |  | $\square$ |                    |              |                     |   |                           |                                     |  |   |                           |                     | _                  | _                     | $\pm$ | _      |
|  |                         |  |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     |                    | _                     | $\pm$ |        |
| <sup>54</sup> <sup></sup> 16.5 185<br>  55 <sup></sup> | 5.06                    | occasional gravel                        |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     |                    | _                     | $\pm$ |        |
| <sub>56</sub> 17.0                                     |                         |  |  | M         | SS-15              | 58           | 23                  | 4-8-10-14                               | 18                        |                                     | •0   |   |                           |                     | _                  |                       | _     | _13    |
| 57   |                         |  |  | $\square$ |                    |              |                     |   |                           |                                     |  | +                                       | -                         |                     | +                  | +                     | +     | _      |
| 58 - 17.8  | 3.76                    | becomina stiff                           |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     | _                  |                       | —     | _      |
|  |                         | 0  |  |           |                    |              |                     |   |                           |                                     | +  | -                                       |                           |                     | $\neg$             | _                     | 7     | _      |
| 61   |                         |  |  | X         | SS-16              | 100          | 25                  | 3-7-8-10                                | 15                        |                                     | • •  | -                                       |                           | - 4                 | <u> </u>           |                       | +     | _      |
| 62   |                         |  |  |           |                    |              |                     |   |                           |                                     |  | -                                       |                           |                     | _                  | _                     | $\mp$ |        |
|  |                         |  |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     | $ \rightarrow$     | +                     | +     |        |
| 65   | 2.00                    | becoming firm                            |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     | $\pm$              | _                     | $\pm$ |        |
| 66 - 20.0  |                         |  |  | M         | SS-17              | 100          | 26                  | 1-2-4-5                                 | 6                         |                                     | A  |   |                           |                     | $\pm$              | $\pm$                 | $\pm$ |        |
| 67   |                         |  |  | $\square$ |                    |              |                     |   |                           |                                     |  |   |                           |                     | $\pm$              | $\pm$                 | $\pm$ | _      |
| 68 - 210   |                         |  |  |           |                    |              |                     |   |                           |                                     |  |   |                           |                     | $\pm$              | $\pm$                 | $\pm$ |        |
|  |                         |  |  |           |                    |              |                     |   |                           |                                     |  | -                                       |                           |                     | $\neg$             | $\mp$                 | $\mp$ | $\neg$ |
| 71 -   |                         |  |  |           |                    |              |                     |   |                           | $\square$                           |  | -                                       | -                         |                     | 7                  | $\mp$                 | +     | $\neg$ |
|  |                         |  |  |           |                    |              |                     |   | 1                         |                                     |  |   |                           |                     |                    |                       |       | _      |

| REFERENCE No.:044985-50-   | 04                                     |      |               |              |                 |           |                 | ENCL             | OSU                     | RE N         | <u>o.:</u>        |           | <u>A-1</u>     |          |        |
|--|--|------|---------------|--------------|-----------------|-----------|-----------------|------------------|-------------------------|--------------|-------------------|-----------|----------------|----------|--------|
| CUD  | BOREHOLE No                            | .: . |               | BH1          | -20             |           | BOREHOLE REPORT |                  |                         |              |                   |           |                |          |        |
| GHD  | ELEVATION:                             |      | 201           | <u>.56 r</u> | n               |           | _               | F                | age:                    | 3            | of                | 3         | -              |          |        |
| CLIENT: Clean Harbors - La   | nbton Facility                         |      |               |              |                 |           | LEC             | GEND             | <u>)</u>                |              |                   |           |                |          |        |
| PROJECT: Geotechnical Inves  | igation - Cell 20-1                    |      |               |              |                 |           | $\boxtimes$     | SS               | - SP                    | LIT §        | SPOC              | N         |                |          |        |
| LOCATION: Clean Harbors Lam  | bton Facility, 4090 Telfer Ro          | I. C | orunna,       | ON           |                 |           |                 | ST<br>GS         | - SH<br>- GF            | ELB`<br>AB { | y tu<br>Samf      | BE<br>ขF  |                |          |        |
| DESCRIBED BY: Ahmed Mneina   | CHECKED BY:                            |      | Abdul H       | lafee        | z Kha           | <u>n</u>  | Ĩ               | RC               | - RC                    | CK           | CORE              | =         |                |          |        |
| DATE (START): 5 October 2020   | DATE (FINISH)                          | :    | 5 Octob       | per 20       | )20             |           | Ţ               |                  | - VV <i>A</i>           | 11EF         | (LEV              | ΈL        |                |          |        |
|  |  |      |               |              |                 | I         |                 |                  |                         |              |                   |           |                |          |        |
| 4 line 20 line   |  | υ    | and           | ery          | art e           | Blows per | ation ×         | Shea<br>Sena     | ar test (<br>sitivity ( | Cu)<br>S)    |                   | $\square$ | Field<br>Lab   | 1        |        |
| TIOS atigna Dept   | AND BEDROCK                            | Stat | ype a<br>Jumk | ecov         | Aoisti<br>Conte | 15 cm     | Inde            |                  | vvater<br>Atterbe       | rg lim       | nt (%)<br>1its (% | )         |                |          |        |
| Stt ~ H  |  |      | μz            | Ŕ            | 20              | or RQD    | Ре              | ė                | "N" Va                  | lue (b       | lows /            | 12 in     | 30 cm          | n)       |        |
| Feet Metres 201.56   |  | -    |               | %            | %               |           | N               | 10               | 20 3                    | 30 40        | 0 50              | 60        | 70 8           | .0 9     | ,0<br> |
|  |  |      |               |              |                 |           |                 |                  |                         | $\square$    | _                 |           | $\blacksquare$ | _        |        |
| 74   |  |      |               |              |                 |           |                 |                  |                         | $\square$    |                   |           |                |          |        |
| 76 – 23.0  | ample at 22.87 m bgs<br><b>Ilysis:</b> |      | ST-2          | 96           | 24              |           |                 |                  | Þ                       | H            | -                 |           |                |          | _      |
| 77 – Gr = 1%, Sa =   | 7%, CI & SI =92%                       |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| 78 – 23.8 177.76 becoming mo   | st-wet                                 | 1    |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| 80 -   |  |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| 81 -   |  | X    | SS-18         | 100          | 27              | 3-3-4-6   | 7               |                  | 0                       |              |                   |           |                |          |        |
| 82 - <b>25.0</b> 176.56 END OF BOF   | EHOLE AT 25.0 m bgs                    |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| Borehole drill   | ed using 70 mm inside                  |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| 85 – 26.0  | ry drilling using 100 mm               |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| 86 - Borehole dry  | to 4.5 m bgs prior to                  |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
|  | dilled with                            |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| 89 - 27.0  | nite grout to drilled depth,           |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| 90 – hydrated beni   | onite pellets.                         |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| m bgs - refers   | to meters below ground                 |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| Gr =gravel; S  | a =sand; CI & Si =clay & silt          |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| <sup>₹</sup> 94 – <u></u>  |  |      |               |              |                 |           |                 |                  |                         |              |                   |           |                |          |        |
| 95   |  |      |               |              |                 |           |                 |                  |                         | $\square$    |                   |           | +              | -        |        |
|  |  |      |               |              |                 |           |                 |                  |                         | $\square$    |                   |           | $\square$      |          |        |
|  |  |      |               |              |                 |           |                 |                  |                         | $\square$    |                   |           | $\square$      | <u> </u> | _      |
| j<br>99 – 10.0<br>1 99 – 10.0  |  |      |               |              |                 |           |                 |                  | +                       | $\square$    | $\mp$             | -         |                | <u> </u> |        |
|  |  |      |               |              |                 |           |                 | $\left  \right $ | _                       | $\square$    | <u> </u>          |           |                |          |        |
| $\frac{101}{2}$ $\frac{1}{2}$ $$ |  |      |               |              |                 |           |                 | $\models$        | +                       | $\square$    | +                 | -         |                | <u> </u> |        |
|  |  |      |               |              |                 |           |                 |                  | 1                       |              | <u> </u>          |           |                | <u> </u> |        |
|  |  |      |               |              |                 |           |                 |                  | _                       |              |                   |           |                |          |        |
|  |  |      |               |              |                 |           |                 |                  | +                       |              | $\rightarrow$     |           |                |          |        |
|  |  |      |               |              |                 |           |                 |                  |                         |              | =                 |           |                |          |        |
|  |  |      |               |              |                 |           |                 |                  |                         | $\vdash$     |                   |           | +              |          |        |

|  | CE NO.:              | 044985-50-04                                   |   |                         |                    |               |                     | i                                       |                      | ENCLOS  | UREI   | NO.:                         |                              | A-2                       |              | =  |
|--|----------------------|--|---|-------------------------|--------------------|---------------|---------------------|---|----------------------|---|--|------------------------------|------------------------------|---------------------------|--------------|----|
|  | C                    | HD   | BOREHOLE No                                 | .: .                    |                    | BH2           | -20                 |   | B                    | ORE   | IOL  | EF                           | REF                          | <b>'OR</b>                | ۲            |    |
|  | G                    |  | ELEVATION: _                                |                         | 201                | . <u>59 r</u> | n                   |   | _                    | Page  | e: <u>1</u>  | 0                            | f _3                         | _                         | ·            |    |
| CLIENT:  |                      | Clean Harbors - Lambto                         | on Facility                                 |                         |                    |               |                     | I                                       | LEC                  | GEND  |  |                              |                              |                           |              |    |
| PROJECT  | :                    | Geotechnical Investigat                        | ion - Cell 20-1                             |                         |                    |               |                     |   | $\boxtimes$          | ss -s   | SPLIT  | SPO                          | NC                           |                           |              |    |
| LOCATION   | ۱:                   | Clean Harbors Lambton                          | i Facility, 4090 Telfer Rd                  | . Co                    | orunna,            | ON            |                     |   |                      | ST - S  | SHELE  |                              | IBE                          |                           |              |    |
| DESCRIBE   | ED BY:               | Ahmed Mneina                                   | CHECKED BY:                                 |                         | Abdul I            | lafee         | z Kha               | <u>n</u>                                |                      | RC - F  | ROCK   | COR                          | E                            |                           |              |    |
| DATE (ST   | ART):                | 8 October 2020                                 | DATE (FINISH)                               | :                       | 8 Octol            | per 20        | )20                 |   | Ţ                    | - \   | NATE   | R LE\                        | /EL                          |                           |              |    |
|  |                      |  |   |                         |                    |               |                     |   |                      |   |  |                              |                              |                           |              |    |
| Depth  | Elevation<br>(m) BGS | Stratigraphy<br>DESCL<br>SOIT AN               | RIPTION OF<br>D BEDROCK                     | State                   | Type and<br>Number | Recovery      | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index | Shear te<br>Sensitivit<br>O Wat<br>W <sub>p</sub> W <sub>1</sub> Atte | st (Cu)<br>ty (S)<br>er conte<br>rberg lii<br>Value (l | ent (%<br>mits (%<br>blows / | 2<br>[<br>)<br>6)<br>/ 12 in | ⊥ Field<br>] Lab<br>30 cm | n)           |    |
| Feet Metres  | 201.59               | GROUN  | ID SURFACE                                  |                         |                    | %             | %                   |   | Ν                    | 10 20   | 30 4   | 40 50                        | 60                           | 70 80                     | 0 90         |    |
|  |                      | FILL: CLAYEY SIL trace gravel, mois            | _T - brown, some sand,<br>t                 | $\mathbb{X}$            | SS-1               | 12            | 11                  | 3-6-6-5                                 | 12                   | -   |  |                              |                              |                           |              |    |
| 3 <u>-</u> 1.0<br>4 <u>-</u>   |                      |  |   |                         | SS-2               | 63            | 15                  | 3-3-4-5                                 | 7                    | • •   |  |                              |                              |                           |              | 1: |
| $5 - \frac{1}{2}$<br>$6 - \frac{1}{2}$<br>$7 - \frac{1}{2} 2.0$  |                      |  |   |                         | SS-3               | 54            | 18                  | 4-4-6-11                                | 10                   | • •   |  |                              |                              |                           |              | 1  |
| 2.2<br>8 – 2.2<br>9 – 1  | 199.39               | NATIVE: CLAYEY<br>mottled, stiff, som<br>moist | ´SILT - grey/brown<br>e sand, trace gravel, |                         | SS-4               | 79            | 17                  | 3-4-7-11                                | 11                   |   |  |                              |                              |                           |              | 14 |
| 10 <u>-</u> 3:0<br>11 <u>-</u>   | 198.69               | becoming rust-sta                              | ined, to greyish brown,                     | X                       | SS-5               | 100           | 16                  | 6-10-12-12                              | 22                   |   |  |                              |                              |                           |              | 2  |
| 12 - 3.7<br>13 - 4.0<br>14 - 4.0   | 197.89               | becoming stiff                                 |   | $\overline{\mathbb{X}}$ | SS-6               | 100           | 15                  | 4-6-8-12                                | 14                   |   |  |                              |                              |                           |              |    |
| 15 - 4.5<br>16 - 50  | 197.09               | trace sand                                     |   | $\mathbb{X}$            | SS-7               | 95            | 16                  | 3-5-7-7                                 | 12                   | •0  |  |                              |                              |                           |              |    |
| 17 <u>-</u> 5.0<br>17 <u>-</u> 5.2<br>18 <u>-</u>  | 196.39               | mud rotary drilling casing                     | with 100 mm diameter                        | $\langle \rangle$       | SS-8               | 100           | 16                  | 3-4-5-7                                 | 9                    | • 0   |  |                              |                              |                           |              |    |
| $ \begin{array}{c} 19 \\ -20 \\ -21 \\$ | 195.49               | becoming firm                                  |   | $\mathbb{N}$            | SS-9               | 100           | 19                  | 2-3-5-5                                 | 8                    |   |  |                              |                              |                           |              |    |
| 22 <u>-</u><br>23 <u>-</u> 7.0   |                      |  |   | Δ                       |                    |               |                     |   |                      |   |  |                              |                              |                           |              |    |
| 24 – 1<br>25 – 1<br>1  |                      |  |   | $\nabla$                |                    |               |                     |   |                      |   |  |                              |                              |                           |              | _  |
| 26 + 8.0<br>27 - 8.0   |                      |  |   | Å                       | SS-10              | 75            | 20                  | 3-3-4-5                                 | 7                    |   |  |                              |                              |                           | $\downarrow$ |    |
| $ \begin{array}{c} 20 \\ 29 \\ -29 \\ -29 \\ -29 \\ -29 \\ -29 \\ -9.0 \\ -29 \\$ | 192.79               | becoming grey                                  |   |                         |                    |               |                     |   |                      |   |  |                              |                              |                           |              |    |
| 31 —<br>32 —   |                      |  |   | X                       | SS-11              | 83            | 19                  | W-3-3-4                                 | 6                    | • 0   | Δ  |                              |                              |                           |              |    |
| 33 <u>-</u> 10.0<br>34 <u>-</u>  |                      |  |   |                         |                    |               |                     |   |                      |   |  |                              |                              |                           | $\downarrow$ |    |
| 35 - 10.7  | 190.92               | Shelby tube samp                               | le at 10.67 m bgs                           |                         |                    |               |                     |   |                      |   |  |                              |                              |                           |              |    |

| REFERENCE NO.: 044985-50-04                          |                               |           |                    |             |                     |   |                      | ENC  | LOSU                                   | JRE N   | 10.:                          |                             | <u>A-2</u>   |    |          |
|--|-------------------------------|-----------|--------------------|-------------|---------------------|---|----------------------|--|--|---|-------------------------------|-----------------------------|--------------|----|----------|
| CHID   | BOREHOLE No                   | .: _      |                    | BH2         | -20                 |   | B                    | OR   | EH                                     | OL  | EF                            | REP                         | OF           | ۲۶ |          |
| GHD  | ELEVATION: _                  |           | 201                | <u>59 n</u> | n                   |   |                      | F  | Page:                                  | _2  | 0                             | f <u>3</u>                  | -            |    |          |
| CLIENT: Clean Harbors - Lambt                        | on Facility                   |           |                    |             |                     |   | LEC                  | GENI   | D                                      |   |                               |                             |              |    |          |
| PROJECT: <u>Geotechnical Investiga</u>               | tion - Cell 20-1              |           |                    |             |                     |   | $\boxtimes$          | SS   | - S                                    | PLIT  | SPO                           | ON                          |              |    |          |
| LOCATION: Clean Harbors Lambton                      | n Facility, 4090 Telfer Ro    | d. Co     | orunna,            | ON          |                     |   | $\boxtimes$          | ST   | - S                                    |   |                               | BE                          |              |    |          |
| DESCRIBED BY: <u>Ahmed Mneina</u>                    | CHECKED BY:                   |           | Abdul H            | lafee       | z Kha               | n                                       |                      | RC   | - G<br>- R                             | OCK   | COR                           | E                           |              |    |          |
| DATE (START): <u>8 October 2020</u>                  | _ DATE (FINISH)               | :         | 8 Octol            | ber 20      | 020                 |   | Ţ                    |  | - V                                    | /ATEI   | R LE\                         | /EL                         |              |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
| Depth<br>Elevation<br>BGS<br>My TIOS<br>Stratigraphy | RIPTION OF<br>ND BEDROCK      | State     | Type and<br>Number | Recovery    | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index | She<br>Sen<br>O<br>W <sub>p</sub> W <sub>1</sub> | ear test<br>sitivity<br>Wate<br>Attert | t (Cu)<br>r (S)<br>r conte<br>perg lir<br>alue (t | ent (%)<br>nits (%<br>plows / | △<br>□<br>)<br>)<br>' 12 in | Field<br>Lab | n) |          |
| Feet Metres 201.59                                   |                               |           | <u>ет 1</u>        | %           | %                   |   | N                    | 10   | ) 20                                   | 30 4  | 0 50                          | 60                          | 70 8         | 09 | 0        |
| 37 - Grainsize Analys<br>Gr =1%, Sa =179             | <u>is:</u><br>6, Cl & Si =82% | A         | 51-1               | ΞZ          | 13                  |   |                      |  |  |   |                               |                             |              |    |          |
| 38 -   |                               |           |                    |             |                     |   |                      |  |  |   |                               | _                           | +            |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    | _        |
|  |                               | Μ         | 55-12              | 96          | 23                  | 1355                                    | 8                    |  |  |   |                               |                             |              |    |          |
|  |                               | Д         | 00-12              | 30          | 25                  | 1-5-5-5                                 | 0                    |  |  |   |                               |                             |              |    |          |
| 43 - 13.0  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               | $\square$ |                    |             |                     |   |                      |  |  |   |                               | _                           | +            |    |          |
|  |                               | Å         | SS-13              | 100         | 21                  | 3-3-4-6                                 | 7                    |  |  |   | 3                             |                             |              |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
| 49 - 14.9 186.69 1 becoming stiff. oc                | casional gravel               | -         |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
| 50   | 5                             |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
| 51   |                               | М         | SS-14              | 100         | 22                  | 4-5-8-10                                | 13                   |  | þþ                                     |   |                               |                             | +            |    |          |
| 52 - 16.0  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
| 55   |                               | $\square$ |                    |             |                     |   |                      |  |  |   |                               | _                           |              |    |          |
| 56 - 17.0  |                               | X         | SS-15              | 83          | 25                  | 4-4-5-6                                 | 9                    | •  | C                                      | >   |                               |                             |              |    |          |
|  |                               | Н         |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               | X         | SS-16              | 100         | 24                  | 3-4-6-7                                 | 10                   | -  | 0                                      |   | 4                             |                             |              |    |          |
|  |                               | Н         |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               | $\square$ | SS-17              |             | 26                  | 3-4-5-6                                 | 9                    |  |  |   | +                             |                             | +            |    | <u> </u> |
|  |                               | Д         |                    |             |                     |   |                      |  |  |   |                               |                             | $\square$    |    | —        |
| 68   |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             |              |    | <u> </u> |
|  |                               |           |                    |             |                     |   |                      |  |  |   |                               |                             | $\square$    |    |          |
| 70 - 21.3 180.25 Shelby tube sam                     | ole at 21.34 m bgs            |           | <u>ст о</u>        | 100         |                     |   |                      |  |  |   |                               |                             |              |    |          |
|  |                               |           | J1-2               | 100         |                     |   |                      |  |  |   |                               |                             |              |    |          |

LOG WITH GRAPH 044985-50-04 - BOREHOLE LOGS (FINAL).GPJ GHD Geotechnica

| REFEREN                             | NCE No.                    | :            | 044985-50-04  |  |       |                    |             |                     |   |                      | ENC  | LOSL   | IRE N   | lo.:                       |                    | <u> </u>                  |         |    |
|-------------------------------------|----------------------------|--------------|---|--|-------|--------------------|-------------|---------------------|---|----------------------|--|--|---|----------------------------|--------------------|---------------------------|---------|----|
|                                     |                            |              |   | <b>BOREHOLE No</b>   | .: .  |                    | BH2         | -20                 |   | B                    | OR   | EH   | OL  | ΕF                         | REF                | POF                       | ٦٢      |    |
|                                     | G                          | HD           |   | ELEVATION:   |       | 201.               | <u>59 r</u> | n                   |   | -                    | F  | Page:  | 3   | c                          | of <u>3</u>        |                           | •••     |    |
| CLIENT:                             |                            | Clea         | n Harbors - Lambto  | n Facility   |       |                    |             |                     |   | LEC                  | GENI   | <u>.</u>                                       |   |                            |                    |                           |         |    |
| PROJECT                             | Г:                         | Geo          | technical Investigati   | on - Cell 20-1   |       |                    |             |                     |   | $\boxtimes$          | SS   | - S  | PLIT  | SPO                        | ON                 |                           |         |    |
| LOCATIO                             | N:                         | Clea         | n Harbors Lambton   | Facility, 4090 Telfer Rd   | I. C  | orunna,            | ON          |                     |   |                      | ST   | - S  | HELB  | ΥΤ                         | JBE                |                           |         |    |
| DESCRIB                             | ED BY:                     | Ahm          | ned Mneina  | CHECKED BY:  |       | Abdul H            | lafee       | z Kha               | n                                       |                      | GS<br>RC   | - G<br>- R                                     | OCK   | COR                        | E                  |                           |         |    |
| DATE (ST                            | ART):                      | 8 Oo         | ctober 2020   | DATE (FINISH)  | :     | 8 Octob            | ber 20      | )20                 |   | Ţ                    |  | - W  | ATE   | R LE                       | VEL                |                           |         |    |
|                                     |                            |              |   |  |       |                    |             |                     |   |                      |  |  |   |                            |                    |                           |         |    |
| Depth                               | Elevation<br>(m) BGS       | Stratigraphy | DESCR<br>SOIL AN  | IPTION OF<br>D BEDROCK   | State | Type and<br>Number | Recovery    | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index | She<br>Sen<br>O<br>W <sub>p</sub> W <sub>1</sub> | ar test<br>sitivity<br>Wate<br>Attert<br>"N" V | (Cu)<br>(S)<br>r conte<br>perg lir<br>alue (t | ent (%<br>nits (%<br>plows | )<br>%)<br>/ 12 in | ∆ Fielo<br>∃ Lab<br>30 cr | d<br>m) |    |
| Feet Metres                         | 201.59                     | r I/I        |   |  |       |                    | %           | %                   |   | N                    | 10   | 20   | 30 4  | 0 50                       | ) 60               | 70 8                      | 30 9    | 90 |
| 73                                  | )<br>177.39<br>)<br>176.59 |              | END OF BOREHC<br>Borehole drilled us<br>diameter hollow st<br>bgs. Mud rotary dr<br>diameter casing be<br>Borehole dry to 4.5<br>switching to mud r<br>Borehole backfillee<br>cement-bentonite<br>using tremie pipe.<br>hydrated bentonite<br>W - refers to samp<br>self weight<br>m bgs - refers to r<br>surface<br>Gr = gravel: Sa = sc | DLE AT 25.0 m bgs<br>sing 70 mm inside<br>em augers up to 4.5 m<br>illing using 100 mm<br>elow 4.5 m bgs.<br>5 m bgs prior to<br>otary drilling.<br>d with<br>grout to drilled depth,<br>Surface sealed with<br>e pellets.<br>eler penetration under<br>neters below ground<br>and: CL& Si =clay & sit |       | SS-18<br>SS-19     |             | 27                  | 2-4-6-8<br>4-3-5-6                      | 8                    |  |  |   |                            |                    |                           |         |    |
| 95 29.0<br>95 29.0<br>96 29.0<br>97 |                            |              |   |  |       |                    |             |                     |   |                      |  |  |   |                            |                    |                           |         |    |

| REFERENCE No.: 044985-50-04  |   |                    |          |                     |   |                      | ENCLOSURE NO   | .:                                     | A-3                        |          |
|--|---|--------------------|----------|---------------------|---|----------------------|--|--|----------------------------|----------|
| GHD  | BOREHOLE No.:                                 |                    | BH3      | -20                 |   | В                    | OREHOLE  | REF                                    | <b>ORT</b>                 | I        |
| dinb   | ELEVATION:                                    | 201                | .02 r    | n                   |   |                      | Page: <u>1</u>   | of <u>3</u>                            | _                          |          |
| CLIENT: Clean Harbors - Lambto   | on Facility                                   |                    |          |                     |   | LE                   | GEND   |  |                            |          |
| PROJECT: Geotechnical Investigat   | ion - Cell 20-1                               |                    |          |                     |   | $\boxtimes$          | SS - SPLIT SI  | POON                                   |                            |          |
| LOCATION: Clean Harbors Lambtor  | Facility, 4090 Telfer Rd. C                   | Corunna,           | ON       |                     |   |                      | ST - SHELBY  |  |                            |          |
| DESCRIBED BY: <u>Ahmed Mneina</u>  | CHECKED BY:                                   | Abdul H            | lafee    | z Kha               | <u>n</u>                                |                      | RC - ROCK C  | ORE                                    |                            |          |
| DATE (START): 7 October 2020   | DATE (FINISH):                                | 7 Octob            | per 20   | )20                 |   | Ţ                    | - WATER  | LEVEL                                  |                            |          |
|  |   |                    |          |                     |   |                      |  |  |                            |          |
| Depth<br>(m) BGS<br>Stratigraphy<br>VA TIOS  | RIPTION OF TRANSPORT                          | Type and<br>Number | Recovery | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index | Shear test (Cu)<br>Sensitivity (S)<br>O Water content<br>W <sub>p</sub> W <sub>i</sub> Atterberg limit<br>• "N" Value (blc | ∠<br>⊑<br>∑(%)<br>s (%)<br>ws / 12 in. | ⊥ Field<br>] Lab<br>30 cm) |          |
| Feet Metres 201.02 GROUN   | D SURFACE                                     |                    | %        | %                   |   | Ν                    | 10 20 30 40  | 50 60                                  | 70 80 9                    | 90       |
| 1 0.1 200.92 FILL: CLAYEY SIL  | T - dark brown, trace , inclusion of topsoil, | SS-1               | 33       | 16                  | 2-1-2-7                                 | 3                    |  |  | +                          | <b>1</b> |
| 2 - 0.7<br>3 - 1.0<br>200.32<br>MATIVE: CLAYEY<br>moist<br>NATIVE: CLAYEY<br>moist | SILT - grey/brown                             | SS-2               | 79       | 16                  | 6-8-9-12                                | 17                   |  |  |                            | <u>2</u> |
| 4 becoming very still  | / [<br>f/                                     |                    |          |                     |   |                      |  |  | +                          | -        |
| 6 - 20 becoming brown,   | rust-stained                                  | SS-3               | 88       | 15                  | 5-7-10-14                               | 17                   | •  |  |                            | 2        |
|  |   |                    |          |                     |   |                      |  |  |                            |          |
| 9  | X   | SS-4               |          | 16                  | 5-8-12-12                               | 20                   |  |  |                            |          |
|  |   |                    |          |                     |   |                      |  |  |                            |          |
|  |   | SS-5               | 100      | 15                  | 3-5-6-8                                 | 11                   |  |  |                            |          |
|  |   |                    |          |                     |   |                      |  |  |                            |          |
|  | X   | SS-6               | 100      | 17                  | 3-4-6-9                                 | 10                   | • •  |  |                            |          |
| 15   |   | 7                  |          |                     |   |                      |  |  |                            |          |
|  | X   | SS-7               | 100      | 14                  | 3-4-6-8                                 | 10                   |  |  |                            |          |
| 17 5.2 195.82 mud rotary drilling  | with 100 mm diameter                          | 7                  |          |                     |   |                      |  |  |                            |          |
| 19 becoming very still   | f   | SS-8               | 100      | 17                  | 6-9-9-11                                | 18                   |  |  |                            | -        |
| 20 <b>6.0</b> 195.02 becoming stiff  | <br>\/  | 7                  |          |                     |   |                      |  |  | +                          | <u> </u> |
| $\begin{vmatrix} 21 \\ 22 \\ \pm \end{vmatrix}$                                    | X   | SS-9               | 100      | 18                  | 3-4-7-8                                 | 11                   |  |  |                            | +        |
| 23 - 7.0   |   |                    |          |                     |   |                      |  |  | ++                         | <u> </u> |
| 24 7.3 193.72 reddish brown mo   |   |                    |          |                     |   |                      |  |  |                            |          |
| 25   | Ν.  | 7                  |          |                     |   |                      |  |  |                            |          |
|  | X   | SS-10              | 100      | 10                  | 2-4-6-8                                 | 10                   |  |  |                            |          |
|  |   |                    |          |                     |   |                      |  |  |                            |          |
| 29 – 8.8 192.22 becoming firm of   | casional gravel                               |                    |          |                     |   |                      |  | $\mp$                                  | +                          |          |
|  |   | 7                  |          |                     |   |                      |  |  | ++                         | +        |
| 31   | X   | SS-11              | 100      | 20                  | 3-3-5-8                                 | 8                    | • •  |  |                            |          |
| $\begin{vmatrix} 32 \\ 22 \end{vmatrix} = 10 0$                                    | /   |                    |          |                     |   |                      |  |  |                            | +        |
|  |   |                    |          |                     |   |                      |  | ++                                     | + $+$ $-$                  | +        |
| 35 - 10.7 190.35   | lo at 10.67 m bas                             | 2                  |          |                     |   |                      |  |  | +                          | —        |
| Shelby tube samp   | ie at 10.67 m bgs                             |                    |          |                     |   | [                    |  |  |                            |          |

OG WITH GRAPH 044985-50-04 - BOREHOLE LOGS (FINAL).GPJ GHD Geotechnic

| REFERENCE No.: 044985-50-04                                     |                            |              |                    |              |                     |   |                      | ENC  | LOS                            | SUR   |  | D.:                          |                 | A-3                    |           | _         |
|---|----------------------------|--------------|--------------------|--------------|---------------------|---|----------------------|--|--------------------------------|---|--|------------------------------|-----------------|------------------------|-----------|-----------|
| CHID  | BOREHOLE No                | .: .         |                    | BH3          | -20                 |   | B                    | OR   | E                              | HC  | )LE                                      | ER                           | EP              | OF                     | ۲         |           |
| GHD   | ELEVATION: _               |              | 201                | <u>.02 r</u> | n                   |   |                      | I  | Pag                            | e: _  | 2  | of                           | _3              |                        |           |           |
| CLIENT: Clean Harbors - Lambte                                  | on Facility                |              |                    |              |                     |   | LEC                  | GEN  | D                              |   |  |                              |                 |                        |           |           |
| PROJECT: Geotechnical Investigat                                | ion - Cell 20-1            |              |                    |              |                     |   | $\boxtimes$          | SS   | -                              | SPL   | _IT S                                    | POOI                         | N               |                        |           |           |
| LOCATION: Clean Harbors Lambtor                                 | n Facility, 4090 Telfer Rd | I. C         | orunna,            | ON           |                     |   |                      | ST   | -                              | SHE   | ELB                                      | ′ TUB                        | E               |                        |           |           |
| DESCRIBED BY: Ahmed Mneina                                      | CHECKED BY:                |              | Abdul I            | lafee        | z Kha               | n                                       |                      | GS<br>RC   | -                              | GR/<br>RO                                   | AB S<br>CK C                             | AMPI                         | -E              |                        |           |           |
| DATE (START): 7 October 2020                                    | DATE (FINISH)              | :            | 7 Octol            | ber 20       | )20                 |   | Ţ                    |  | -                              | WA  | TER                                      | LEVE                         | EL              |                        |           |           |
|   | ,                          |              |                    |              |                     |   |                      |  |                                |   |  |                              |                 |                        |           |           |
| Depth<br>Elevation<br>WA TIOS<br>Stratigraphy<br>BGS<br>MA TIOS | RIPTION OF<br>ID BEDROCK   | State        | Type and<br>Number | Recovery     | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index | She<br>Sen<br>O<br>W <sub>p</sub> W <sub>l</sub> | ear te<br>nsitiv<br>Wa<br>Atte | est (C<br>ity (S<br>iter c<br>erber<br>Valu | Cu)<br>S)<br>conter<br>rg limi<br>ue (bl | nt (%)<br>its (%)<br>ows / 1 | <br>□<br> 2 in: | Field<br>Lab<br>30 crr | <br>ו)    |           |
| Feet Metres 201.02  |                            |              |                    | %            | %                   |   | N                    | 10   | ) 20                           | ) 30  | 0 40                                     | 50                           | 60 7            | '0 8(                  | 0 90      | D         |
| 37 -  |                            |              | ST-1               | 100          |                     |   |                      |  |                                |   |  |                              | +               | $\square$              | $\square$ | $\square$ |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | +               | $\square$              |           |           |
| 39 - 12.0 becoming stiff  |                            |              |                    |              |                     |   |                      |  |                                |   | _  |                              | +               | $\left  - \right $     |           |           |
|   |                            | $\mathbb{N}$ | SS-12              | 75           | 21                  | 3-5-8-12                                | 13                   |  |                                | )   |  |                              | —               |                        |           |           |
|   |                            | Δ            |                    |              |                     |   |                      |  |                                |   |  |                              | +               | $\square$              | =         |           |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | +               |                        |           |           |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | <u> </u>        |                        |           |           |
| 45 - 140  |                            | $\nabla$     | SS 12              |              | 21                  | 2 5 9 11                                | 12                   |  |                                |   |  |                              |                 |                        |           |           |
|   |                            | Δ            | 55-13              |              | 21                  | 3-5-6-11                                | 13                   |  |                                |   |  |                              | +               | $\left  - \right $     |           |           |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | —               | $\square$              | _         |           |
| 49 - 15.0   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | +               |                        |           |           |
| 50 -  |                            | $\nabla$     |                    |              |                     |   |                      |  |                                |   |  |                              | +               |                        |           |           |
|   |                            | Ň            | SS-14              | 88           | 22                  | 3-5-8-11                                | 13                   |  |                                | о<br>                                       |  |                              | +               |                        |           |           |
| 52 - 16.0   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              |                 |                        |           |           |
| 54  |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              |                 | $\square$              | _         |           |
| 55  |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | —               | $\square$              |           |           |
| 56  |                            | X            | SS-15              | 75           | 26                  | 3-5-8-9                                 | 13                   |  | •                              | 0   |  |                              | <u>+</u>        |                        |           |           |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | +               |                        |           |           |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | <u> </u>        |                        |           |           |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | +               | $\vdash$               |           |           |
|   |                            | X            | SS-16              | 58           | 26                  | 3-4-6-6                                 | 10                   | -+   | -                              | 0   |  |                              |                 | $\square$              | _         |           |
|   |                            | $\square$    |                    |              |                     |   |                      |  |                                |   |  |                              | +               | $\square$              | =         |           |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | <u>+</u>        |                        |           |           |
| 64 - 19.5 181.52 becoming firm, tra                             | ace sand, trace gravel     |              |                    |              |                     |   |                      |  |                                |   |  |                              | <u> </u>        |                        |           |           |
|   |                            | M            | SS-17              | 100          | 27                  | W-2-3-4                                 | 5                    |  | 2                              | 0   |  |                              |                 |                        |           |           |
| 67 —  |                            | μ            |                    |              |                     |   |                      |  |                                |   |  |                              | —               | $\square$              |           |           |
| 68 -  |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | +               | $\square$              | $\exists$ |           |
|   |                            |              |                    |              |                     |   |                      |  |                                |   |  |                              | +               | Ħ                      | =         |           |
| 71 - 21.3 179.68 Shelby tube same                               | e at 21.34 m bgs           |              | ST 2               | 100          | 21                  |   |                      |  |                                | ,   |  |                              | $\pm$           | ╞                      | =         |           |
| Gr = 2%, Sa = 7%,   | Cl & Si =91%               |              | 51-2               | 100          |                     |   |                      |  |                                |   |  |                              | $\pm$           |                        |           |           |

WITH GRAPH 044985-50-04 - BOREHOLE LOGS (FINAL).GPJ GHD Geoter

| REFEREN   | CE No.:              |              | 044985-50-04                               |   |            |                    |          |                     |   |                      | ENC                                 | LOSU                                   |   | 10.:                       |                  |                    | 1-3             |                |   |
|---|----------------------|--------------|--|---|------------|--------------------|----------|---------------------|---|----------------------|-------------------------------------|--|---|----------------------------|------------------|--------------------|-----------------|----------------|---|
|   | G                    | HD           |  | BOREHOLE No                                 | .:         |                    | BH3      | -20                 |   | B                    | OR                                  | EH                                     | OL  | ΕF                         | RE               | PC                 | )R              | T              |   |
|   |                      |              |  | ELEVATION:                                  |            | 201                | .02 r    | n                   |   |                      |                                     | Page:                                  | 3   | _ 0                        | of _             | 3                  |                 |                |   |
| CLIENT:   |                      | Clea         | n Harbors - Lambtor                        | n Facility                                  |            |                    |          |                     |   | LEC                  | GEN                                 | D                                      |   |                            |                  |                    |                 |                |   |
| PROJECT   | :                    | Geo          | technical Investigation                    | on - Cell 20-1                              |            |                    |          |                     |   | $\boxtimes$          | SS                                  | - S                                    | PLIT  | SPO                        | ON               |                    |                 |                |   |
| LOCATION  | N:                   | Clea         | n Harbors Lambton                          | Facility, 4090 Telfer Ro                    | l. C       | orunna,            | ON       |                     |   |                      | ST<br>GS                            | - S<br>- G                             | HELB<br>RAB                                     | SAM                        | JBE<br>PLE       | -                  |                 |                |   |
| DESCRIBE  | ED BY:               | Ahm          | ned Mneina                                 | CHECKED BY:                                 |            | Abdul H            | lafee    | z Kha               | <u>n</u>                                | Ĩ                    | RC                                  | - R                                    | оск   | COF                        | ε                |                    |                 |                |   |
| DATE (ST  | ART):                | 7 Oc         | tober 2020                                 | DATE (FINISH)                               | : _        | 7 Octol            | per 20   | )20                 |   | Ţ                    |                                     | - W                                    | ATE   | R LE                       | VEL              | •                  |                 |                |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  |                    |                 |                |   |
| Depth   | Elevation<br>(m) BGS | Stratigraphy | DESCR<br>SOIL ANI                          | IPTION OF<br>D BEDROCK                      | State      | Type and<br>Number | Recovery | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index | She<br>Ser<br>○<br>₩ <sub>p</sub> w | ear test<br>sitivity<br>Wate<br>Attert | : (Cu)<br>(S)<br>r conte<br>perg lir<br>alue (t | ent (%<br>nits (%<br>plows | 5)<br>%)<br>/ 12 | △ F<br>□ L<br>in3( | ield<br>.ab     | )              |   |
| Feet Metres   | 201.02               |              |  |   |            |                    | %        | %                   |   | N                    | 10                                  | ) 20                                   | 30 4  | 0 50                       | 0 60             | J 70               | ) 80            | ) 90           | C |
| 73 -  |                      |              |  |   |            |                    |          |                     |   |                      | $  -   \bar{ }$                     |  | +   |                            | $\neg$           | $\overline{+}$     | -               | $\overline{+}$ |   |
| 74 22.5   | 178.52               |              | becoming moist-we                          |   | -          |                    |          |                     |   |                      |                                     |  |   |                            |                  | $\square$          |                 | $\neg$         |   |
| 75  |                      |              |  |   | $\nabla$   |                    |          |                     |   |                      |                                     |  | _   |                            |                  | 4                  | $\square$       | 4              |   |
| 76  |                      |              |  |   | Ň          | SS-18              | 46       | 28                  | 1-3-5-7                                 | 8                    |                                     |  |   |                            |                  | _                  |                 | $\exists$      |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  |                    | $\pm$           |                |   |
| 7924.0  |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            | _                | +                  | +               | +              |   |
| 80 –  |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | _                  |                 | $\neg$         |   |
| 81  |                      |              |  |   | X          | SS-19              | 100      | 28                  | 1-3-5-6                                 | 8                    | •                                   | 2                                      | 0   |                            |                  | =                  | $\square$       | $\dashv$       |   |
| 82 <b>— 25.0</b>  | 176.02               |              | END OF BOREHO                              | LE AT 25.0 m bgs                            | $\uparrow$ |                    |          |                     |   |                      |                                     |  |   |                            |                  | _                  | _               | _              |   |
| 83 —  |                      |              | Borehole drilled us                        | ing 70 mm inside                            |            |                    |          |                     |   |                      |                                     |  |   |                            |                  |                    |                 |                |   |
|   |                      |              | diameter hollow ste<br>bgs. Mud rotary dri | em augers up to 4.5 m<br>lling using 100 mm |            |                    |          |                     |   |                      |                                     |  | -   |                            |                  | +                  | +               | +              |   |
| 86  |                      |              | diameter casing be<br>Borehole dry to 4.5  | low 4.5 m bgs.<br>m bgs prior to            |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | $\neg$             |                 | $\neg$         |   |
| 87  |                      |              | switching to mud ro                        | otary drilling.                             |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | _                  | $\square$       | $\exists$      |   |
| 88  |                      |              | Borehole backfilled                        | with  |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | $ \rightarrow $    |                 | =              |   |
|   |                      |              | using tremie pipe.                         | Surface sealed with                         |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | _                  |                 |                |   |
|   |                      |              |  | penets.                                     |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | -                  | _               | -              |   |
| 92 <u>-</u> 28.0  |                      |              | self weight                                |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | $\square$          |                 | $\neg$         |   |
| <sup>9</sup> 93 –   |                      |              | m bgs - refers to m<br>surface             | eters below ground                          |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | _                  | _               | $\dashv$       |   |
|   |                      |              | Gr =gravel; Sa =sa                         | nd; Cl & Si =clay & silt                    |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | =                  |                 |                |   |
| 95  |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | $\pm$              |                 | _              |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  | -   |                            |                  | +                  | _               | +              |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  | -   |                            |                  | $\neg$             |                 | $\neg$         |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | _                  | $ \rightarrow$  | $\exists$      |   |
| mm 100 – 10 |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | $ \rightarrow $    | $\pm$           | $\pm$          |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  |                    |                 | -              |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | $\neg$             | $\neg$          | $\neg$         |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  | -   |                            |                  | $\downarrow$       | $\downarrow$    | #              |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | $\pm$              | $\pm$           | $\pm$          |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  | $ \rightarrow $    | $ \rightarrow $ | $\pm$          |   |
|   |                      |              |  |   |            |                    |          |                     |   |                      | $\vdash$                            |  | +   |                            | $\neg$           | $\overline{+}$     | -               | $\overline{+}$ |   |
| <u>, 108 – </u>   |                      |              |  |   |            |                    |          |                     |   |                      |                                     |  |   |                            |                  |                    |                 | $\pm$          |   |

| BORCHOLE No:         BH4-20<br>LEVATON         BORCHOLE Response           CUENT:         Clean Harbors - Lambon Facility         200.61 m         Page 1 of 3.           CUENT:         Clean Harbors - Lambon Facility         Monore Call 201         Image: Second S  | REFERENCE No.:                                 | 044985-50-04                              |  |                         |                    |          |                     |   |                      | ENCL   | OSURE  | = No.:                                     |                        | A            | .4              |           |
|---|--|---|--|-------------------------|--------------------|----------|---------------------|---|----------------------|--|--|--|------------------------|--------------|-----------------|-----------|
| ELEVATION:         200.61 m         Page:         1         of         3           CUENT:         Clean Hathers - Lambton Faelly         ECCMION:         S8         - SPLIT SPOON           DCATION:         Clean Hathers - Cell 20-1         S8         - SPLIT SPOON           DESCRIBED BY:         Ahmed Mineira         CHECKED BY:         Abdul Haters Khan           DATE (START)         6 October 2020         DATE (FINSH)         - GOCKBORD 00F         B         B         B         B         B         B         B         B         B         CHECKED 100 OF         B         B         B         B         B         B         B         B         B         B         B         B         B         B         B         CHECKED 100 OF         B  | 01   |   | <b>BOREHOLE No</b>                       | .: .                    |                    | BH4      | -20                 |   | B                    | OR   | EHO  | LE   | RE                     | PO           | RT              | •         |
| CLENT:         Clean Harbors - Lambon Facility         LECEND           PROJECT:         Gestechnical Investigation - Cell 20-1         S S - SPUT SPOON           LOCATION:         Chen Huttors Lambon Facility, 400 Telfer Rd Coruma, ON         S S - SPUT SPOON           DESCRIBED DY:         Almad Minena         CHECKED BY:         Abdul Haleack Khan           DATE (START):         0 October 2020         DATE (FINISH):         6 October 2020         Water Intelloy           S         S S         S S S - SPUT SPOON         Water Intelloy         Water Intelloy         S S - SPUT SPOON           S         S S S - SPUT SPOON         Water Intelloy         S S - SPUT SPOON         Water Intelloy         N N N N N N N N N N N N N N N N N N N  | Gh   |   | ELEVATION:                               |                         | 200                | .61 n    | n                   |   | _                    | F  | Page: _  | 1  | of _                   | <u>3</u>     |                 |           |
| PROJECT:  | CLIENT: 0                                      | Clean Harbors - Lambto                    | n Facility                               |                         |                    |          |                     |   | LEG                  | GENE   | <b>)</b>   |  |                        |              |                 |           |
| LOCATION:         Clean Harbors Lambton Facility. 4090 Telfer Rd. Corunta. ON         Corunta. ON         State   | PROJECT: 0                                     | Geotechnical Investigat                   | on - Cell 20-1                           |                         |                    |          |                     |   |                      | SS   | - SPU  | IT SP                                      |                        |              |                 |           |
| DESCRIBED BY:       Ahmed Mneina       CHECKED BY:       Abdul Hifeer Khan       CHECKED BY:       Abdul Hifeer Khan       CROCK ORE         DATE (START):       6 October 2020       DATE (FINISH):       6 October 2020       CHECKED BY:       Abdul Hifeer Khan       WATER LEVEL         E       E       E       October 2020       DATE (FINISH):       6 October 2020       CHECKED BY:       Abdul Hifeer Khan       WATER LEVEL         E       E       E       October 2020       DATE (FINISH):       6 October 2020       CHECKED BY:       Abdul Hifeer Khan       WATER LEVEL         E       E       E       E       E       E       E       E       Share Twitt(Ch)       Checker       Checker         0       0       SOLLAND BEDROCK       E       E       Share Twitt(Ch)       Checker       Chec  | LOCATION: 0                                    | Clean Harbors Lambton                     | Facility, 4090 Telfer Rd                 | . C                     | orunna.            | ON       |                     |   |                      | ST   | - SHE  | LBY T                                      | UBE                    |              |                 |           |
| DATE (START):         6 October 2020         DATE (FINISH):         6 October 2020         •WATER LEVEL   | DESCRIBED BY: A                                | Ahmed Mneina                              | CHECKED BY:                              |                         | Abdul I            | lafee    | z Kha               | <br>n                                   |                      | GS<br>RC   | - GRA<br>- ROC   | B SAI                                      | MPLE<br>RF             |              |                 |           |
| g           | DATE (START): 6                                | October 2020                              | DATE (FINISH)                            |                         | 6 Octo             | per 20   | )20                 |   | Ţ                    |  | - WAT  | ER LI                                      | EVEL                   |              |                 |           |
| Each         Each <th< td=""><td></td><td></td><td>· · · · · ·</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>  |  |   | · · · · · ·                              |                         |                    |          |                     |   |                      |  |  |  |                        |              |                 |           |
| Feet Metrics 200.61         GROUND SURFACE         %         %         N         10.203.040 90 60 70 80 90           1         0.1         200.51         1         10   | Depth<br>Elevation<br>(m) BGS                  | DESCF<br>DESCF<br>SOIL AN                 | RIPTION OF<br>D BEDROCK                  | State                   | Type and<br>Number | Recovery | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index | Shea<br>Sens<br>○<br>₩ <sub>p</sub> ₩ <sub>l</sub> | ar test (C<br>sitivity (S)<br>Water co<br>Atterberg<br>"N" Value | u)<br>)<br>ontent (<br>g limits<br>e (blow | %)<br>(%)<br>rs / 12 i | △ Fi<br>□ La | ∍ld<br>b<br>cm) |           |
| 1       0.1       200.51       FIL: CLAYEY SILT - dark brown, some MAR A some gravel, and some gravel, trace topol, moltal       SS-1       63       13       5-5-7-9       12  | Feet Metres 200.61                             | GROUN                                     | D SURFACE                                |                         |                    | %        | %                   |   | Ν                    | 10   | 20 30  | 40   | 50 60                  | ) 70         | 80              | 90        |
| 2       0.7       199.91       NATWE: CLAYEY SLT - graybrown         3       1.0       10       199.91       NATWE: CLAYEY SLT - graybrown         4       1.0       199.21       Decoming brown, very stiff       SS-2       67       15       11-11-12-12       23         6       2.0       198.41       Decoming brown, very stiff       SS-3       100       16       57-11-13       18         7       2.2       198.41       Decoming strown, very stiff       SS-4       100       16       58-10.14       18         9       3.0       197.61       Decoming strff, embedded brown moist       SS-5       100       16       4-67-11       13         11       4.0       Decoming grey       SS-6       100       16       4-67-11       13         13       4.0       Decoming grey       SS-6       100       16       4-56-7       11         14       4.5       196.61       Decoming grey       SS-6       100       12       3-4-6-8       10         16       5.0       196.41       Decoming grey.some sand       SS-7       100       12       3-4-6-8       10         17       5.2       196.41       Decoming grey.some sand<  |  | FILL: CLAYEY SIL                          | I - dark brown, some                     | 1                       | SS-1               | 63       | 13                  | 5-5-7-9                                 | 12                   |  |  |  |                        |              | $\pm$           | <b>2</b>  |
| 3       1.0       100 coning brown, very stiff       SS-2       67       15       11-11-12-12       23         6       2.0       198.41       becoming brown       SS-3       100       16       57-11-13       18         7       2.2       198.41       rust-stained, some sand       SS-4       100       16       57-11-13       18         9       3.0       197.61       becoming strif, embedded brown moist sand seams       SS-4       100       16       58-10-14       18         11       becoming grey       SS-6       100       16       4-6-7-11       13       4 <td>2 0.7 199.91</td> <td>NATIVE: CLAYEY<br/>⊓ mottled, stiff, trace</td> <td>SILT - grey/brown<br/>sand, trace gravel,</td> <td>H</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td><math>\downarrow \downarrow</math></td> <td></td> <td></td> <td></td> <td><math>\pm</math></td> <td>+</td>  | 2 0.7 199.91                                   | NATIVE: CLAYEY<br>⊓ mottled, stiff, trace | SILT - grey/brown<br>sand, trace gravel, | H                       |                    |          |                     |   |                      |  | $\downarrow \downarrow$  |  |                        |              | $\pm$           | +         |
| 4       14       199.21       10       199.21       10       10       16       5-7-11-13       18         7       2.2       198.41       197.61       10       16       4-6-7-11       13       10       10       14       4.0       10       14       4.0       10       14       10       10       12       3-4-4-5       8       10       10       12       3-4-4-5       8       10       10       5-6-7-8       13       13       10       10       5-6-7-8       13       10       10       5-6-7-8       13       10       10       5-6-7-8       13       <   |  | hmoist                                    |  | $\mathbb{N}$            | SS-2               | 67       | 15                  | 11-11-12-12                             | 23                   |  | • • +  |  |                        |              | $\pm$           | 2         |
| 6       -       2.0       198.41       -       rust-stained, some sand       SS-3       100       16       5-7.11.13       18       -       -       2         9       -       3.0       197.61       -       -       -       SS-4       100       16       5-8-10.14       18       -       -       -       2         11       -       -       -       SS-4       100       16       5-8-10.14       18       -       -       -       2         11       -       -       -       -       SS-6       100       16       4-6-7-11       13       -  |  | becoming brown,                           |  | Д                       |                    |          |                     |   |                      |  |  |  | $\square$              | _            | -               |           |
| 7       2.0       198.41       rust-stained, some sand       SS-4       100       16       5-8-10-14       18         9   |  |   |  | M                       | SS-3               | 100      | 16                  | 5-7-11-13                               | 18                   |  |  |  |                        |              | —               | 22        |
| 8       -       10       10       16       5.8-10-14       18       -       -       2         10       -       3.0       197.61       1       16       5.8-10-14       18       -       -       2         11       -       -       -       -       -       -       -       -       -       2         12       3.7       196.91       -       <  | 7 - 2.0 198.41                                 |   |  | $\square$               |                    |          |                     |   |                      |  |  |  |                        |              | +               |           |
| 9       3.0       197.61       197.61       197.61       197.61       197.61       197.61       197.61       10       16       4.6-7-11       13       13       13       4.0       13       4.0       14       13       4.0       15       196.11       10       16       4.6-7-11       13       10       16       4.6-7-11       13       10       16       4.6-7-11       13       10       16       4.6-7-11       13       10 <td>8 –</td> <td>rust-stained, some</td> <td>sand</td> <td>M</td> <td>SS-4</td> <td>100</td> <td>16</td> <td>5-8-10-14</td> <td>18</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>+</td> <td>20</td>  | 8 –  | rust-stained, some                        | sand                                     | M                       | SS-4               | 100      | 16                  | 5-8-10-14                               | 18                   |  |  |  |                        |              | +               | 20        |
| 10       −       0.0       10.0       <  | 9  |   |  | Δ                       |                    |          |                     |   |                      |  |  |  |                        |              |                 |           |
| 11       3.7       196.91       10       100  |  | becoming stiff, em                        | bedded brown moist                       | $\square$               | SS-5               | 100      | 16                  | 4-6-7-11                                | 13                   |  |  |  |                        |              | +               | -14       |
| 13       4.0       14       4.0       16       4.5       16       16       4.5-6-7       11       0       Δ       1         15       4.5       196.11       becoming firm       SS-7       100       12       3.4-4-5       8       0       Δ       1         16       5.0       195.41       mud rotary drilling with 100 mm diameter casing       SS-7       100       12       3.4-4-5       8       0       Δ       1       1       0       Δ       1       1       0       Δ       1       1       1       0       Δ       1   |  | []  |  | Δ                       | 00-0               | 100      |                     | 40711                                   |                      |  |  |  |                        |              | —               |           |
| 14       4.5       196.11       becoming firm       SS-8       100       16       4-3-6-7       11       0       4         16       5.0       195.41       mud rotary drilling with 100 mm diameter casing becoming grey-brown, stiff       SS-8       100       10       5-6-7-8       13         19       6.0       194.61       becoming grey, some sand       SS-9       100       12       3-4-6-8       10         21       -       -       -       -       -       -       -       -         22       -       <  |  | becoming grey                             |  | $\square$               | <u> </u>           | 100      | 10                  | 4507                                    | 1.1                  |  |  |  |                        |              | +               |           |
| 15       4.5       196.11       becoming firm         16       5.0       195.41       mud rotary drilling with 100 mm diameter casing becoming grey-brown, stiff       SS-7       100       12       3.4.4.5       8         19       6.0       194.61       becoming grey, some sand       SS-8       100       10       5-6.7.8       13         21       -       -       -       -       -       -       -         23       7.0       193.31       -       -       -       -       -         24       7.3       193.31       -       -       -       -       -       -         26       8.0       -  |  |   |  | $\square$               | 55-6               | 100      | 16                  | 4-5-6-7                                 | 11                   | Ţ  |  |  |                        |              | <u> </u>        |           |
| 16       5.0       195.41       mud rotary drilling with 100 mm diameter casing becoming grey. some sand       SS-7       100       12       3.4.4.5       8       ΦO       Δ       Δ         19       52       195.41       mud rotary drilling with 100 mm diameter casing becoming grey. some sand       SS-8       100       10       5-67-8       13       Φ       Δ   |  | becoming firm                             |  | $\overline{\mathbb{N}}$ |                    |          |                     |   |                      |  |  |  |                        |              | _               |           |
| 17       5.2       195.41       mud rotary drilling with 100 mm diameter casing becoming grey-brown, stiff         19       6.0       194.61       becoming grey-brown, stiff       SS-8       100       10       5-6-7-8       13         21       5       6.0       194.61       becoming grey. some sand       SS-9       100       12       3-4-6-8       10         23       7.0       7.0       193.31       trace sand       SS-9       100       12       3-4-6-8       10         24       7.3       193.31       trace sand       SS-10       100       13       3-5-7-9       12       4       4       4         26       8.0       SS-10       100       13       3-5-7-9       12       4<   |  |   |  | Ň                       | SS-7               | 100      | 12                  | 3-4-4-5                                 | 8                    |  | )  |  |                        |              | +               |           |
| 19       -  |  | mud rotary drilling                       | with 100 mm diameter                     |                         |                    |          |                     |   |                      |  |  |  |                        |              | _               |           |
| 20       6.0       194.61       <  |  | becoming grey-bro                         | own, stiff                               | X                       | SS-8               | 100      | 10                  | 5-6-7-8                                 | 13                   |  |  |  |                        |              | +               |           |
| 21  | 20 - 6.0 194.61                                | becoming grey, so                         |  | Ħ                       |                    |          |                     |   |                      |  |  |  |                        |              | +               |           |
| 22       -       7.0       193.31       -   |  |   |  | X                       | SS-9               | 100      | 12                  | 3-4-6-8                                 | 10                   | -  |  | -  |                        |              | $\pm$           |           |
| 23       7.0         24       7.3         193.31       trace sand         25  |  |   |  |                         |                    |          |                     |   |                      |  |  |  |                        |              | —               |           |
| 25       -  | 23 - 7.0<br>24 - 7.3 193.31                    |   |  |                         |                    |          |                     |   |                      |  |  |  |                        |              | —               |           |
| $ \begin{array}{c} 26 \\ -8.0 \\ 27 \\ -8.0 \\ 28 \\ -9.0 \\ 30 \\ -9.0 \\ 30 \\ -9.0 \\ 31 \\ -32 \\ -33 \\ -10.0 \\ 34 \\ -35 \\ -10.7 \\ 189.94 \\ \end{array} $ Shelby tube sample at 10.67 m bgs $ \begin{array}{c} 35 \\ -10.67 \\ -10$ | 25 -   | trace sand                                |  |                         |                    |          |                     |   |                      |  |  |  |                        |              | —               |           |
| $ \begin{array}{c} 27 \\ 28 \\ -29 \\ -9.0 \\ 30 \\ -9.0 \\ 31 \\ -32 \\ -33 \\ -10.0 \\ 34 \\ -35 \\ -10.7 \\ 189.94 \end{array} $ Shelby tube sample at 10.67 m bgs   | 26 - 8.0                                       |   |  | X                       | SS-10              | 100      | 13                  | 3-5-7-9                                 | 12                   |  |  |  |                        |              | 4               |           |
| $ \begin{array}{c} 28 \\ 29 \\ 30 \\ 31 \\ 32 \\ 33 \\ 33 \\ 10.0 \\ 34 \\ 35 \\ 10.7 \\ 189.94 \end{array} $ Shelby tube sample at 10.67 m bgs   | 27   |   |  | $\square$               |                    |          |                     |   |                      |  |  |  |                        |              | <u> </u>        |           |
| 29       -9.0         30       -9.0         31       -         32       -         33       -10.0         34       -         35       -10.7         189.94       Shelby tube sample at 10.67 m bgs   |  |   |  |                         |                    |          |                     |   |                      |  |  |  |                        |              | <u> </u>        |           |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | $\begin{vmatrix} 29 \\ 30 \end{vmatrix} = 9.0$ |   |  |                         |                    |          |                     |   |                      | -  | +  |  | $+ \overline{+}$       | _            | +               | +         |
| 32       33       10.0         33       10.0         34       35       10.7         189.94       189.94   | 31 -   |   |  | M                       | SS-11              | 100      | 19                  | 3-5-8-10                                | 13                   |  |  |  | $\square$              |              | —               | $\square$ |
| 33     -10.0       34   |  |   |  | Д                       |                    |          |                     |   |                      |  |  |  |                        |              | +               | +         |
| 34  | 3310.0   |   |  |                         |                    |          |                     |   |                      |  |  |  |                        |              | $\pm$           |           |
| 35         10.7         189.94         Shelby tube sample at 10.67 m bgs  |  |   |  |                         |                    |          |                     |   |                      |  |  |  |                        |              | $\pm$           | +         |
|   |  | Shelby tube samp                          | le at 10.67 m bgs                        |                         |                    |          |                     |   |                      |  |  |  |                        |              |                 |           |

| REFEREN   | ICE No.      | :       | 044985-50-04                            |                           |             |              |        |            |                    |               | ENCLO         | JSUR                    | E No              | ).: _          |              | A-4          |         |
|---|--------------|---------|---|---------------------------|-------------|--------------|--------|------------|--------------------|---------------|---------------|-------------------------|-------------------|----------------|--------------|--------------|---------|
|   | 6            |         |   | BOREHOLE No               | <b>.:</b> . |              | BH4    | -20        |                    | B             | ORE           | EHC                     | )LE               | ER             | EP           | OR           | т       |
|   |              |         |   | ELEVATION: _              |             | 200          | .61 r  | n          |                    | _             | Pa            | nge:                    | 2                 | of             | 3            | _            | -       |
| CLIENT:   |              | Clea    | an Harbors - Lambto                     | n Facility                |             |              |        |            |                    | LEC           | GEND          |                         |                   |                |              |              |         |
| PROJECT   | :            | Geo     | otechnical Investigatio                 | on - Cell 20-1            |             |              |        |            |                    | $\boxtimes$   | SS            | - SPL                   | IT S              | POC            | N            |              |         |
| LOCATION  | N:           | Clea    | an Harbors Lambton                      | Facility, 4090 Telfer Ro  | d. Co       | orunna,      | ON     |            |                    |               | ST            | - SHE                   | ELBY              | ' TUI          | BE           |              |         |
| DESCRIB   | ED BY:       | Ahn     | ned Mneina                              | CHECKED BY:               |             | Abdul I      | lafee  | z Kha      | n                  |               | GS<br>RC      | - GR/<br>- RO(          | AB S<br>CK C      | amf<br>Ore     | PLE          |              |         |
| DATE (ST  | ART):        | 6 0     | ctober 2020                             | DATE (FINISH)             | ):          | 6 Octol      | ber 20 | 20         |                    | Ţ             |               | - WA                    | TER               | LEV            | ΈL           |              |         |
|   |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              |              |         |
|   | -            | ح       |   |                           |             | σ.           | ۲      | 0          | Plays no           | u             | Shear         | test (C                 | Cu)               |                |              | Field        |         |
| pth   | atior<br>BGS | grapł   | DESCR                                   | IPTION OF                 | ate         | e an<br>nber | over   | sture      | ыоws ре<br>6 in. / | tratio<br>dex | Sensit<br>O W | tivity (S<br>Vater co   | 5)<br>onten       | t (%)          |              | Lab          |         |
| ă   | (m)          | Strati  | SOIL ANI                                | DBEDROCK                  | St          | Type<br>Nur  | Rec    | Moi<br>Cor | 15 cm<br>or RQD    | ene           |               | tterber                 | g limi<br>19 (bla | ts (%          | )<br>12 in . | -30 cm)      |         |
| Feet Metres   | 200 61       | 0,      |   |                           |             |              | %      | %          |                    | ц.<br>N       | 10            | 20 30                   | ) 40              | 50             | 60           | 70 80        | 90      |
|   |              |         |   |                           |             | ST-1         | 100    |            |                    |               |               |                         |                   |                |              | $\square$    |         |
|   |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              |              | _       |
| 39 - 120  |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              |              |         |
| 40 - 12.0   |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              | +            |         |
| 41 —  |              |         |   |                           | X           | SS-12        | 100    | 21         | 3-4-7-10           | 11            | •             | 0                       |                   |                |              | ++           |         |
| 42 + 13.0   |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              | $\downarrow$ | +       |
|   |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              | $\pm$        | _       |
| 45 —  |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              |              | +       |
| 4614.0  |              |         |   |                           | X           | SS-13        | 100    | 23         | 4-6-10-12          | 16            |               |                         |                   |                |              |              |         |
| 47 —  |              |         |   |                           |             |              |        |            |                    |               |               | +                       | -                 | _              |              | ++           | +       |
|   |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   | _              |              | ++           | _       |
| <sup>49</sup> <u>–</u> 15.0<br>50 –                                   |              |         |   |                           |             |              |        |            |                    |               |               |                         | _                 |                |              | $\mp$        | +       |
| 51 —  |              |         |   |                           | X           | SS-14        | 75     | 18         | 4-5-8-10           | 13            | •             | 2                       |                   |                |              | $\pm$        | <b></b> |
| 52 - 16 0   |              |         |   |                           | $\square$   |              |        |            |                    |               |               |                         |                   |                |              |              | _       |
|   |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              |              |         |
|   |              |         |   |                           |             |              |        |            |                    |               |               |                         | -                 |                |              | ++           | +       |
| 5617.0  |              |         |   |                           | Μ           | SS-15        | 88     | 26         | 3-4-7-10           | 11            | •             | 0                       | -                 |                |              | $\square$    |         |
| 57 —  |              |         |   |                           | μ           |              |        |            |                    |               |               |                         |                   |                |              | ++           | +       |
| 58  | 182.81       |         |   |                           | _           |              |        |            |                    |               |               |                         |                   |                |              | ++           | +       |
| 59  |              |         | becoming intri, mo                      | St-wet                    |             |              |        |            |                    |               |               |                         |                   |                |              |              | +       |
|   |              |         |   |                           | $\square$   | SS-16        | 100    | 22         | 2-3-4-5            | 7             |               |                         |                   |                |              |              |         |
| 62 + 100  |              |         |   |                           | Δ           | 00 10        | 100    | ~~~        | 2010               |               |               |                         | -                 | $\overline{+}$ |              | ++           | _       |
| 63 - 19.0   |              |         |   |                           |             |              |        |            |                    |               |               |                         | -                 |                |              | $\square$    | _       |
|   |              |         |   |                           |             |              |        |            |                    |               |               | $\downarrow \downarrow$ |                   |                |              | $\ddagger$   | +       |
| $\begin{bmatrix} 65 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $ |              |         |   |                           | $\square$   | 00 1-        |        | <u> </u>   | 401-               |               |               |                         |                   |                |              | $\ddagger$   | $\mp$   |
|   |              |         |   |                           | Ň           | 55-17        |        | 25         | 1-2-4-5            | 6             |               |                         |                   |                |              |              | $\pm$   |
|   |              |         |   |                           |             |              |        |            |                    |               |               |                         |                   |                |              |              |         |
| 6921.0  |              |         |   |                           |             |              |        |            |                    |               |               | +                       | -                 |                |              | +            | +       |
| 70 - 21.3   | 179.27       |         | Shelby tube sampl                       | e at 21.34 m bgs          |             |              |        |            |                    |               |               | +                       | _                 | _              |              | ++           | +       |
| 71  |              |         | Grainsize Analysis<br>Gr =1%, Sa =8%, 0 | <u>::</u><br>CI & Si =91% |             | ST-2         | 100    | 27         |                    |               |               |                         | -                 |                |              | $\ddagger$   | +       |
|   |              | A     V | · · · · · · · · · · · · · · · · · · ·   |                           |             |              |        |            |                    |               |               |                         |                   |                |              |              |         |

DG WITH GRAPH 044985-50-04 - BOREHOLE LOGS (FINAL).GPJ GHD Geotech

| REFERENCE No.:044   | 1985-50-04                                   |           |                    |          |                     |   |                      | ENCL   | JSU   | KE N                                      | o.:                          |                     | <u>A-4</u>            |          |
|---|--|-----------|--------------------|----------|---------------------|---|----------------------|--|---|---|------------------------------|---------------------|-----------------------|----------|
| GHD   | BOREHOLE No.                                 | : _       |                    | BH4      | -20                 |   | B                    | ORE  | EHO   | DLI                                       | ER                           | EP                  | OR                    | <b>T</b> |
|   | ELEVATION:                                   |           | 200.               | 61 n     | n                   |   |                      | Pa   | age:  | 3   | of                           | 3                   |                       |          |
| CLIENT: Clean Harb  | ors - Lambton Facility                       |           |                    |          |                     |   | LEC                  | GEND   |   |   |                              |                     |                       |          |
| PROJECT: Geotechnic   | al Investigation - Cell 20-1                 |           |                    |          |                     |   | $\boxtimes$          | SS   | - SP  | LIT S                                     | POO                          | N                   |                       |          |
| LOCATION: Clean Harb  | ors Lambton Facility, 4090 Telfer Rd         | . Co      | orunna,            | ON       |                     |   |                      | ST<br>GS   | - SH  |   | Y TUB<br>Sampi               | E                   |                       |          |
| DESCRIBED BY: Ahmed Mne   | eina CHECKED BY:                             |           | Abdul H            | lafee    | z Khai              | <u>n</u>                                |                      | RC   | - RC  | CK C                                      | ORE                          |                     |                       |          |
| DATE (START): 6 October 2   | 2020 DATE (FINISH):                          |           | 6 Octob            | er 20    | )20                 |   | Ţ                    |  | - WA  | ATER                                      | LEVE                         | EL                  |                       |          |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
| Depth<br>Elevation<br>(m) BGS<br>Stratigraphy                         | DESCRIPTION OF<br>SOIL AND BEDROCK           | State     | Type and<br>Number | Recovery | Moisture<br>Content | Blows per<br>6 in. /<br>15 cm<br>or RQD | Penetration<br>Index | Shear<br>Sensi<br>○ V<br>₩ <sub>wp</sub> W <sub>I</sub> A<br>• " | r test (<br>tivity (<br>Vater<br>Atterbe<br>N" Va | Cu)<br>S)<br>contei<br>erg lim<br>lue (bl | nt (%)<br>its (%)<br>ows / 1 | △  <br>□  <br>2 in3 | Field<br>Lab<br>30 cm | )        |
| Feet Metres 200.61  |  |           |                    | %        | %                   |   | Ν                    | 10   | 20 3  | 30 40                                     | ) 50                         | 60 7                | 0 80                  | ) 90     |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
| 74 22.5 178.11 becom  |  |           |                    |          |                     |   |                      |  |   |   |                              | +                   | $\vdash$              |          |
| 75 - 23.0   |  | $\square$ | 00.40              |          | 20                  | 4.0.4.144                               |                      |  |   |   |                              |                     | $\square$             |          |
|   |  | Д         | 55-18              |          | 30                  | 1-2-1-00                                | 3 2                  |  |   |   |                              |                     | $\square$             |          |
|   | ming firm maint wat                          |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             | _        |
| 79 - 24.0   | ming mm, moist-wet                           |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
| 80 -  |  | $\square$ |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
|   |  | Ŵ         | SS-19              |          | 26                  | 1-2-3-5                                 | 5                    |  | 0   |   |                              |                     |                       |          |
| 82 - 23.0 175.01 END  | OF BOREHOLE AT 25.0 m bgs                    |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             |          |
| 84 - Boreh  | nole drilled using 70 mm inside              |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             |          |
| 85 – 26.0 bgs. I  | Mud rotary drilling using 100 mm             |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             | _        |
| 86 – Boreh  | hole dry to 4.5 m bgs prior to               |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
| 87 — Switch   | nole backfilled with                         |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
| 5 89 - 27.0 ceme  | ent-bentonite grout to drilled depth,        |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
|   | ated bentonite pellets.                      |           |                    |          |                     |   |                      |  |   |   | _                            | +                   | $\vdash$              | _        |
|   | efers to sampler penetration under           |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             |          |
| $\begin{bmatrix} 92 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $ | s - refers to meters below ground            |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             |          |
| GH 93   | ce<br>gravel; Sa =sand; Cl & Si =clay & silt |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             | _        |
| Period 95   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
|   |  |           |                    |          |                     |   |                      |  |   | F   |                              | $\square$           | $\square$             | _        |
|   |  |           |                    |          |                     |   |                      |  | _   | H   |                              | $\mp$               | $\square$             | —        |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              | $\mp$               |                       | _        |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             | <u> </u> |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     | $\square$             |          |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |
|   |  |           |                    |          |                     |   |                      |  | -   | $\square$                                 |                              | $\square$           |                       |          |
|   |  |           |                    |          |                     |   |                      |  |   |   |                              |                     |                       |          |



## **Notes on Borehole and Test Pit Reports**

#### Soil description :

Each subsurface stratum is described using the following terminology. The relative density of granular soils is determined by the Standard Penetration Index ("N" value), while the consistency of clayey sols is measured by the value of undrained shear strength (Cu).

|  | Classification   | (Unified sys    | stem)  |   |  | Terminolo                                  | ду  |                        |
|--|--|-----------------|--|---|--|--|---|------------------------|
| Clay   | < 0.002 mm   |                 |  |   |  |  |   |                        |
| Silt   | 0.002 to 0.075 mm  |                 |  |   |  |  | 4.400/  |                        |
| Sand   | 0.075 to 1.75 mm   | fine            | 0.075 to 0.425 mm                            |   | "trac<br>"sor                          | ce"<br>ne"                                 | 1-10%<br>10-20%                                     |                        |
| Sanu   | 0.075 10 4.75 1111   | medium          | 0.075 to $0.425$ mm                          |   | adie                                   | ne<br>octive (silty, sandy)                | 20-35%  |                        |
|  |  | coarse          | 2.0 to 4.75 mm                               |   | auje<br>"and                           | vive (sity, salidy)                        | 20-33 %   |                        |
| Gravel   | 4.75 to 75 mm  | fine            | 4.75 to 19 mm                                |   | and                                    | 4  | 00-00 %   |                        |
| Cobbles<br>Boulders  | 75 to 300 mm<br>>300 mm  | coarse          | 19 to 75 mm                                  |   |  |  |   |                        |
| Douldoio   |  |                 |  |   |  |  |   |                        |
| Relati<br>gra  | ve density of<br>nular soils   | Standa<br>inde  | ard penetration<br>ex "N" value              |   | Consi<br>cohes                         | stency of<br>sive soils                    | Undraine<br>strengt                                 | d shear<br>h (Cu)      |
|  |  | (BLO)           | NS/ft – 300 mm)                              |   |  |  | (P.S.F)   | (kPa)                  |
|  |  |                 |  |   | Ve                                     | ry soft                                    | <250  | <12                    |
| V  | ery loose  |                 | 0-4  |   | :                                      | Soft                                       | 250-500   | 12-25                  |
|  | Loose  |                 | 4-10   |   | F                                      | Firm                                       | 500-1000  | 25-50                  |
| 0  | Compact  |                 | 10-30  |   | :                                      | Stiff                                      | 1000-2000   | 50-100                 |
|  | Dense  |                 | 30-50  |   | Ve                                     | ry stiff                                   | 2000-4000   | 100-200                |
| Ve   | ery dense  |                 | >50  |   | ŀ                                      | Hard                                       | >4000   | >200                   |
|  | Rock quality   | docianatio      | n  | -<br>-  |  | STRATICRADHI                               |   |                        |
| "ROI   | (%) Value  | uesignatio      | Quality                                      |   |  | STRATIONALI                                |   |                        |
| RGL  | 27 (70) Value  | ,               | Vorupoor                                     |   |  | 00   | •<br>Ċ  |                        |
|  | ~25<br>25 50   |                 | Poor   |   |  |  | ••  |                        |
|  | 20-30<br>50 75   |                 | Four   |   | Sand                                   | Gravel C                                   | obbles& boulders                                    | Bedrock                |
|  | J0-7J  |                 | Cood   |   |  |  |   |                        |
|  | >90  |                 | Excellent                                    |   |  |  |   |                        |
|  |  |                 |  |   | Silt                                   | Clay                                       | Organic soil  | Fill                   |
| Samples:<br>Type and Numl<br>The type of sam<br>SS: Split spoon<br>SSE, GSE, AGE | <b>ber</b><br>Iple recovered is shown o<br>E: Environmental sampling | n the log by t  | the abbreviation listed he<br>ST: S<br>PS: F | ereafter. The num<br>Shelby tube<br>Piston sample (Os | nbering of samples is<br>terberg)      | sequential for each t<br>AG:<br>RC:<br>GS: | ype of sample.<br>Auger<br>Rock core<br>Grab sample |                        |
| <b>Recovery</b><br>The recovery, sl  | hown as a percentage, is   | the ratio of le | ength of the sample obta                     | ined to the distan                                    | ce the sampler was d                   | riven/pushed into the                      | soil  |                        |
| RQD  |  |                 |  |   |  |  |   |                        |
| The "Rock Qual the run.  | ity Designation" or "RQD"  | value, expre    | essed as percentage, is t                    | the ratio of the tot                                  | al length of all core fra              | agments of 4 inches                        | (10 cm) or more to th                               | e total length of      |
| IN-SITU TEST   | rs:  |                 |  |   |  |  |   |                        |
| N: Standard per  | netration index  |                 |  | N₀: Dynamic   | cone penetration inc                   | lex  | k: Permeab  | ility                  |
| R: Refusal to pe   | enetration   |                 |  | Cu: Undr<br>Pr:                                       | ained shear strength<br>Pressure meter |  | ABS: Absorption (P                                  | acker test)            |
| LABORATOR  | RY TESTS:  |                 |  |   |  |  |   | 0.1/1. 0               |
| l <sub>n</sub> : Plasticity inde   | ex   | H· Hv           | drometer analysis                            | A: Atterber   | a limits                               | C: Consolidation                           | ı   | o.v.: Organic<br>vapor |
| W <sub>I</sub> : Liquid limit  |  | GSA:            | Grain size analysis                          | w: Water c  | ontent                                 | CS: Swedish fal                            | l cone  |                        |
| Wp: Plastic limit  |  |                 |  | γ: Unit wei   | ght                                    | CHEM: Chemica                              | al analysis   |                        |

GHD PS-020.01 - Notes on Borehole and Test Pit Reports - Rev.0 - 07/01/2015

## Appendix B Geotechnical Laboratory Test Results



| Client  | :            | Clean Harbors - Lambto                            | on Facility  |                              | Lab No.:               | WLT 453-  | 1           |        |  |  |  |  |  |  |
|---|--------------|---|--|------------------------------|------------------------|-----------|-------------|--------|--|--|--|--|--|--|
| Proje   | ct, Site:    | Geotechnical Investigat<br>Clean Harbors, 4090 Te | ion - Cell 20-1<br>elfar Road, Co  | l<br>orunna, ON              | Project No.:           | 044985-50 | )-04        |        |  |  |  |  |  |  |
| Во  | prehole No.: | BH1   | -20  |                              | Sample No.:            | ST-1      |             |        |  |  |  |  |  |  |
| De  | epth:        | 42.5 ft 44.5 ft. (                                | 13.0 m - 13.6 n  | n)                           | Enclosure:             | -         |             |        |  |  |  |  |  |  |
|   |              |   |  |                              |                        |           |             |        |  |  |  |  |  |  |
| 100   |              |   |  |                              |                        |           |             | 0      |  |  |  |  |  |  |
| 100   |              |   |  |                              |                        |           |             |        |  |  |  |  |  |  |
| 90  |              |   |  |                              |                        |           |             | 10     |  |  |  |  |  |  |
| 80  | )            |   |  |                              |                        |           |             | 20     |  |  |  |  |  |  |
| 7(  |              |   |  |                              |                        |           |             | 30     |  |  |  |  |  |  |
| 6   |              |   |  |                              |                        |           |             | ad 100 |  |  |  |  |  |  |
| Passin 90                                     |              |   |  |                              |                        |           |             | Retain |  |  |  |  |  |  |
| ercent<br>50                                  | ) <u> </u>   |   |  |                              |                        |           |             | 50 bit |  |  |  |  |  |  |
| <u>م</u> ــــــــــــــــــــــــــــــــــــ |              |   |  |                              |                        |           |             |        |  |  |  |  |  |  |
|   |              |   |  |                              |                        |           |             |        |  |  |  |  |  |  |
| 30  |              |   |  |                              |                        |           |             | 70     |  |  |  |  |  |  |
| 20  |              |   |  |                              |                        |           |             | 80     |  |  |  |  |  |  |
| 1(  | ,            |   |  |                              |                        |           |             | 90     |  |  |  |  |  |  |
|   |              |   |  |                              |                        |           |             |        |  |  |  |  |  |  |
| (   | 0.001        | 0.01  | 0.1<br>Diame   | eter (mm)                    |                        | 10        |             | 100    |  |  |  |  |  |  |
|   |              | Clay & Silt                                       |  | Sand                         |                        | Gravel    |             |        |  |  |  |  |  |  |
|   |              | Partic  | Fine<br>cle-Size Limits  | e Mediu<br>as per USCS (ASTN | ım Coarse<br>1 D-2487) | Fine      | Coarse      |        |  |  |  |  |  |  |
|   |              |   |  |                              |                        |           |             |        |  |  |  |  |  |  |
|   |              | Soil Description                                  |  | Gravel (%)                   | Sand (%)               | Clay      | & Silt (%)  |        |  |  |  |  |  |  |
|   | Si           | It and Clay, trace sand, trace g                  | gravel   | 1                            | 6                      |           | 93          |        |  |  |  |  |  |  |
|   |              | Clay-size particles (<0.002 n                     | nm):   |                              |                        | 3         | 86 %        |        |  |  |  |  |  |  |
| Rema  | rks:         |   |  |                              |                        |           |             |        |  |  |  |  |  |  |
|   |              |   |  |                              |                        |           |             |        |  |  |  |  |  |  |
| Perfo   | rmed by:     | Melanie Mito                                      | hell / Matt Flo  | od                           | Date:                  | Novem     | per 3, 2020 |        |  |  |  |  |  |  |
| Verifie                                       | ed by:       | Abdul Hafeez Khan, P.                             | Melanie Mitchell / Matt FloodDate:November 3, 2020Abdul Hafeez Khan, P.Eng.; Laboratory ManagerDate:November 4, 2020 |                              |                        |           |             |        |  |  |  |  |  |  |



| Clie   | nt:    |          | Cle       | ean                           | Harbo           | ors - La           | amb           | ton I          | Faci           | lity              |              |       |            |            | Lab No.:            |      | V        | NLT 4 | 53-2  |        |     |     | _              |
|--------|--------|----------|-----------|-------------------------------|-----------------|--------------------|---------------|----------------|----------------|-------------------|--------------|-------|------------|------------|---------------------|------|----------|-------|-------|--------|-----|-----|----------------|
| Proj   | ect, S | Site:    | Ge<br>Cle | eoteo<br>ean l                | chnica<br>Harbo | al Inve<br>ors, 40 | stiga<br>90 T | ation<br>Telfa | n - C<br>ar Ro | ell 20-<br>bad, C | -1<br>Sorunr | na, C | DN         |            | _Project N          | lo.: |          | )4498 | 5-50- | 04     |     |     | _              |
|        | Boreh  | ole No.: |           |                               |                 |                    | B⊦            | 11-20          | C              |                   |              |       |            |            | Sample N            | o.:  | 5        | ST-2  |       |        |     |     | _              |
|        | Depth  | :        |           |                               | 75.0            | ft 77              | 7.0 ft.       | (22.           | .9 m           | - 23.5            | m)           |       |            |            | Enclosure           | :    |          |       |       |        |     |     | _              |
|        |        |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     |                |
|        |        |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       | _      |     | _   |                |
|        |        |          |           |                               |                 |                    |               |                |                |                   |              | -     |            | •          |                     |      |          |       |       |        |     |     | )              |
|        | 90 -   |          |           |                               | سو ا            |                    |               | T              | •              |                   |              |       |            |            |                     |      |          |       |       |        |     |     | 10             |
|        | 80 -   |          |           |                               | $\mathbb{K}$    | _                  |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | 20             |
|        | 70     |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | 30             |
| 6      | 10     |          | 1         |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | pe             |
| Passin | 60 —   |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | Retain 01      |
| ercent | 50 -   |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | ercent         |
| ₽.     | 40     |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | <b>م</b><br>50 |
|        |        |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     |                |
|        | 30 —   |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | 70             |
|        | 20 —   |          |           |                               |                 |                    |               |                |                |                   |              | _     |            |            |                     |      |          |       |       |        |     |     | 30             |
|        | 10 —   |          |           |                               |                 | _                  |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | 90             |
|        |        |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     |                |
|        | 0.001  | 1        |           | (                             | 0.01            |                    |               |                | 0.             | .1<br>Diar        | neter (n     | nm)   |            | 1          | <b>I</b>            |      | 1        | 10    |       |        |     | 100 | 100            |
|        |        |          |           |                               | 0.014           |                    |               |                |                |                   |              | 5     | Sand       |            |                     |      |          | Gr    | avel  |        |     | ]   |                |
|        | -      |          |           |                               | s Siit          |                    | Part          | ticle-         | Size           | Fir<br>Limits     | ne<br>as pe  | r USO | M<br>CS (A | edi<br>STI | um Coa<br>M D-2487) | arse | Fir      | ne    | (     | Coars  | e   | -   |                |
|        |        |          |           |                               |                 |                    |               |                |                |                   | 1            |       |            |            | 1                   |      | <u> </u> |       |       |        |     |     | 7              |
|        |        |          |           | Soi                           | l Desc          | riptio             | n             |                |                |                   | G            | irave | el (%)     | )          | Sand                | (%)  |          | С     | lay & | Silt ( | (%) |     |                |
|        |        | Cla      | ay and    | Silt,                         | trace           | sand, 1            | trace         | gra∖           | vel            |                   |              | 1     |            |            | 7                   |      |          |       | 9     | 2      |     |     |                |
|        |        |          | Clay-     | y-size particles (<0.002 mm): |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       | 49    | %      |     |     |                |
| Rem    | arks   | :        |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | _              |
|        |        |          |           |                               |                 |                    |               |                |                |                   |              |       |            |            |                     |      |          |       |       |        |     |     | -              |
| Perf   | orme   | ed by:   |           |                               | Ν               | lelani             | e Mit         | tche           | II / N         | /latt Fl          | ood          |       |            |            | Date                | ):   |          | Nov   | embe  | er 3,  | 202 | 0   | _              |
| Veri   | fied b | oy:      | Al        | bdul                          | Hafe            | ez Kh              | an, F         | P.En           | ng.; l         | _abora            | atory I      | Man   | ager       |            | Date                | ):   |          | Nov   | embe  | er 4,  | 202 | 0   | -              |



| Client:       |            | Clean Harbors - Lambton                                 | Facility                     |                            | Lab No.:               | WLT 453-3 | 3           |         |
|---------------|------------|---|------------------------------|----------------------------|------------------------|-----------|-------------|---------|
| Projec        | t, Site:   | Geotechnical Investigatior<br>Clean Harbors, 4090 Telfa | n - Cell 20-1<br>ar Road, Co | 1<br>prunna, ON            | _Project No.:          | 044985-50 | -04         |         |
| Boi           | ehole No.: | BH2-2   | 0                            |                            | Sample No.:            | ST-1      |             |         |
| De            | oth:       | 35.0 ft 37.0 ft. (10                                    | ).7 m - 11.3 r               | m)                         | Enclosure:             | -         |             |         |
|               |            |   |                              |                            |                        |           |             |         |
| 100           |            |   |                              |                            |                        |           | · · • • • • | ·       |
| 90            |            |   |                              |                            |                        |           |             | 10      |
|               |            |   |                              |                            |                        |           |             |         |
| 80            |            |   |                              |                            |                        |           |             | 20      |
| 70            |            |   |                              |                            |                        |           |             | 30      |
| <b>88 ing</b> |            |   |                              |                            |                        |           |             | 40 tai  |
| sent Pa       |            |   |                              |                            |                        |           |             | Sent Re |
| Pero          |            |   |                              |                            |                        |           |             | Lerc 00 |
| 40            |            |   |                              |                            |                        |           |             | 60      |
| 30            |            |   |                              |                            |                        |           |             | 70      |
| 20            |            |   |                              |                            |                        |           |             | 80      |
| 10            |            |   |                              |                            |                        |           |             |         |
| 10            |            |   |                              |                            |                        |           |             | 90      |
| 0<br>0        | .001       | 0.01  | 0.1<br>Diam                  | eter (mm)                  |                        | 10        |             | 100 100 |
|               |            | Clav & Silt   |                              | Sand                       |                        | Gravel    |             |         |
|               |            | Particle  | Fine<br>Size Limits          | e Medi<br>as per USCS (AST | um Coarse<br>M D-2487) | Fine      | Coarse      |         |
|               |            | Soil Description  |                              | Gravel (%)                 | Sand (%)               | Clay 8    | silt (%)    |         |
|               | Sil        | t and Clay, some sand, trace gra                        | ivel                         | 1                          | 17                     |           | 82          |         |
|               |            | Clay-size particles (<0.002 mm                          | ו):                          |                            |                        | 30        | 6 %         |         |
| Remar         | ks:        |   |                              |                            |                        |           |             |         |
| Perfor        | ned bv:    | Melanie Mitche  | ell / Matt Flo               | ood                        | Date:                  | Novemb    | er 3. 2020  |         |
| Verifie       | d by:      | Abdul Hafeez Khan, P.Er                                 | ng.; Labora                  | tory Manager               | Date:                  | Novemb    | er 4, 2020  |         |



| Client   | ::           | Clean Harbors - Lambton F                               | Facility                  |                              | Lab No.:            | WLT 453-6   |           |              |
|----------|--------------|---|---------------------------|------------------------------|---------------------|-------------|-----------|--------------|
| Proje    | ct, Site:    | Geotechnical Investigation<br>Clean Harbors, 4090 Telfa | - Cell 20-1<br>r Road, Co | orunna, ON                   | Project No.:        | 044985-50-0 | )4        | _            |
| B        | orehole No.: | BH3-20  | )                         |                              | Sample No.:         | ST-2        |           |              |
| D        | epth:        | 70.0 ft 72.0 ft. (21.                                   | 3 m - 21.9 n              | n)                           | Enclosure:          | -           |           |              |
|          |              |   |                           |                              |                     |             |           |              |
| 10       | 0            |   |                           |                              |                     |             |           | 0            |
| 10       |              |   |                           |                              |                     |             |           | Ţ            |
| 9        | 0            |   |                           |                              |                     |             |           | - 10         |
| 8        | 0            |   |                           |                              |                     |             |           | - 20         |
| 7        |              |   |                           |                              |                     |             |           | - 30         |
| 5        |              |   |                           |                              |                     |             |           | pg 00        |
| Passing  | 0            |   |                           |                              |                     |             |           | Retaine      |
| 5 prcent |              |   |                           |                              |                     |             |           | 50 Di        |
| <b>č</b> |              |   |                           |                              | <b>4</b><br>60      |             |           |              |
|          |              |   |                           |                              |                     |             |           |              |
| 3        | 0            |   |                           |                              |                     |             |           | - 70         |
| 2        | 0            |   |                           |                              |                     |             |           | - 80         |
| 1        | 0            |   |                           |                              |                     |             |           | 90           |
|          |              |   |                           |                              |                     |             |           |              |
|          | 0.001        | 0.01  | 0.1<br>Diame              | eter (mm)                    |                     | 10          |           | ⊥ 100<br>100 |
|          |              |   |                           | Sand                         |                     | Gravel      |           |              |
|          |              | Particle-   | Fine<br>Size Limits a     | e Mediu<br>as per USCS (ASTN | um Coarse 1 D-2487) | Fine C      | oarse     |              |
|          |              |   |                           |                              |                     |             |           | _            |
|          |              | Soil Description  |                           | Gravel (%)                   | Sand (%)            | Clay & S    | Silt (%)  |              |
|          |              | Clay and Silt, trace sand, trace gra                    | vel                       | 2                            | 7                   | 9^          |           |              |
|          |              | Clay-size particles (<0.002 mm)                         | ):                        |                              |                     | 49          | %         |              |
| Rema     | rks:         |   |                           |                              |                     |             |           |              |
|          |              |   |                           |                              |                     |             |           |              |
| Perfo    | rmed by:     | Melanie Mitchel   | ll / Matt Flo             | od                           | Date:               | Novembe     | r 3, 2020 |              |
| Verifi   | ed by:       | Abdul Hafeez Khan, P.En                                 | g.; Laborat               | ory Manager                  | Date:               | Novembe     | r 4, 2020 |              |



| Client         |             | Clean Harbors - Lambton                                | Facility                     |                              | Lab No.:             | WLT 453-8  |            |                   |
|----------------|-------------|--|------------------------------|------------------------------|----------------------|------------|------------|-------------------|
| Projec         | t, Site:    | Geotechnical Investigation<br>Clean Harbors, 4090 Telf | n - Cell 20-1<br>ar Road, Co | l<br>orunna, ON              | Project No.:         | 044985-50- | 04         |                   |
| Во             | rehole No.: | BH4-2  | 20                           |                              | Sample No.:          | ST-2       |            |                   |
| De             | pth:        | 70.0 ft 72.0 ft. (21                                   | 1.3 m - 21.9 r               | n)                           | Enclosure:           | -          |            |                   |
|                |             |  |                              |                              |                      |            |            |                   |
| 100            |             |  |                              |                              |                      |            |            | 0                 |
| 100            |             |  |                              |                              |                      |            |            | $\prod_{i=1}^{n}$ |
| 90             |             |  |                              |                              |                      |            |            | 10                |
| 80             |             |  |                              |                              |                      |            |            | 20                |
| 70             |             |  |                              |                              |                      | 30         |            |                   |
| 70             |             |  |                              |                              |                      | 30         |            | - 30<br>          |
| assing         |             |  |                              |                              | Aetaine 05           |            |            |                   |
| 50 tue         |             |  |                              |                              | 50 50                |            |            |                   |
| <b>e</b><br>40 | 40 40       |  |                              |                              |                      |            |            | <b>B</b>          |
| 40             |             |  |                              |                              |                      |            |            | 00                |
| 30             |             |  |                              |                              |                      |            |            | 70                |
| 20             |             |  |                              |                              |                      |            |            | 80                |
| 10             |             |  |                              |                              |                      |            |            |                   |
| 10             |             |  |                              |                              |                      |            |            |                   |
| 0<br>0         | 0.001       | 0.01   | 0.1<br>Diame                 | 1<br>eter (mm)               |                      | 10         |            | 100 <u>100</u>    |
|                |             | Clay & Silt  |                              | Sand                         |                      | Gravel     |            |                   |
|                |             | Particle   | Fine<br>Size Limits          | e Mediu<br>as per USCS (ASTM | um Coarse 11 D-2487) | Fine (     | Coarse     |                   |
|                |             | Soil Description                                       |                              | Gravel (%)                   | Sand (%)             | Clay &     | Silt (%)   |                   |
|                | (           | Clay and Silt, trace sand, trace gra                   | avel                         | 1                            | 8                    | g          | 1          |                   |
|                |             | Clay-size particles (<0.002 mn                         | n):                          |                              |                      | 47         | %          |                   |
| Rema           | 'ks:        |  |                              |                              |                      |            |            |                   |
|                |             |  |                              |                              |                      |            |            |                   |
| Perfor         | med by:     | Melanie Mitche   | ell / Matt Flo               | od                           | Date:                | Novembe    | er 3, 2020 |                   |
| Verifie        | d by:       | Abdul Hafeez Khan, P.E                                 | ng.; Laborat                 | tory Manager                 | Date:                | Novembe    | er 4, 2020 |                   |



| Client:                  |                            | Clean                   | Harbors - Lamb                           | ton Facility                      |                               | Lab no.:                                | WLT 453-1                            |
|--------------------------|----------------------------|-------------------------|--|-----------------------------------|-------------------------------|---|--------------------------------------|
| Project/Site:            | (                          | Geotech<br>Clean Harbor | inical Investigatio<br>s, 4090 Telfar Ro | on - Cell 20-1<br>oad, Corunna, O | N                             | Project no.:                            | 044985-50-04                         |
| Borehole no.:            | BH1-20                     |                         | Sample no.:                              | ST                                | -1                            | Depth:                                  | 42.5 ft 44.5 ft. (13.0 m - 13.6 m)   |
| Soil description:        |                            | Silt and Cla            | y, trace sand, trace                     | e gravel                          |                               | Date sampled:                           | October 5, 2020                      |
| Apparatus:               | Hand                       | Crank                   | Balance no.:                             | WLG                               | 6-15                          | Porcelain bowl no.:                     | Br-12                                |
| Liquid limit device no.: | WLS                        | A-3B                    | Oven no.:                                | WLO                               | G-2                           | Spatula no.:                            | 2                                    |
| Sieve no.:               | VVL                        | 5-47                    | Glass plate no.:                         | 1                                 |                               |   |                                      |
| Γ                        | Liquid Limit (             | LL):                    |  | Soil Preparation                  |                               |   |                                      |
|                          | Test No. 1                 | Test No. 2              | Test No. 3                               |                                   | ohesive <425 µm               | n 🗸                                     | Dry preparation                      |
| Number of blows          | 35                         | 22                      | 16                                       |                                   | ohesive >425 µm               |   | Wet preparation                      |
| _                        | Water Conte                | ent:                    | 1  |                                   | on-cohesive                   |   |                                      |
| Tare no.                 | 11                         | 12                      | 23                                       | 22.5 -                            |                               | Results                                 |                                      |
| Wet soil+tare, g         | 32.04                      | 30.86                   | 31.93                                    |                                   |                               |   |                                      |
| Dry soil+tare, g         | 30.54                      | 29.10                   | 30.20                                    | -                                 |                               |   |                                      |
| Mass of water, g         | 1.50                       | 1.76                    | 1.73                                     | it (%)                            |                               |   |                                      |
| Tare, g                  | 25.53                      | 23.62                   | 24.98                                    | Conter                            |                               |   |                                      |
| Mass of soil, g          | 5.01                       | 5.48                    | 5.22                                     | 0 31.5 -<br>te                    |                               |   |                                      |
| Water content %          | 29.9%                      | 32.1%                   | 33.1%                                    | >                                 |                               |   |                                      |
| Plastic Limit (Pl        | -) - Water Cont            | ent:                    | _  |                                   |                               |   |                                      |
| Tare no.                 | 123                        | 135                     | _  | -                                 |                               |   |                                      |
| Wet soil+tare, g         | 20.45                      | 15.35                   | _  | 29.5 <b>–</b><br>14               | 16 18 2                       | 0 22 24 26 2                            | 28 30 32 34 36                       |
| Dry soil+tare, g         | 19.45                      | 14.15                   | _  |                                   |                               | Nb Blows                                |                                      |
| Mass of water, g         | 1.00                       | 1.20                    | _  | 70                                | Soil                          | Plasticity Chart                        |                                      |
| Tare, g                  | 13.65                      | 7.17                    | _  | 60                                |                               | LL 50                                   |                                      |
| Mass of soil, g          | 5.80                       | 6.98                    | _  |                                   | ow plasticity<br>organic clay | High plastic<br>Inorganic c             | sity<br>lay                          |
| Water content %          | 17.2%                      | 17.2%                   | _  |                                   |                               |   |                                      |
| Average water content %  | 17.                        | 2%                      | _  | ¥ 40                              |                               |   |                                      |
| Natural Wate             | r Content ( W <sup>n</sup> | ):                      | _  | - 30                              | (CL)                          |   | (MH) and (CH)                        |
| Tare no.                 | 99                         |                         | _  |                                   | w compressibility             | - High                                  |                                      |
| Wet soil+tare, g         | 64.40                      |                         | _  | 10                                |                               | ♦ inor<br>- Inorg                       | ganic silt<br>ganic day              |
| Dry soil+tare, g         | 54.60                      |                         | _  |                                   |                               | Inorganic si<br>ML and OL - Organic cla | npressibility<br>ilt<br>iy           |
| Mass of water, g         | 9.80                       |                         | _  | 0                                 | 10 20 3                       | 0 40 50 60                              | 70 80 90 100                         |
| Tare, g                  | 4.30                       |                         | _  | Linuid Linuid                     | Disstis Limit                 |   | 1                                    |
| Mass of soil, g          | 50.30                      |                         | _  | (LL)                              | (PL)                          | Plasticity Index (PI)                   | Natural Water Content W <sup>n</sup> |
| Water content %          | 19.5%                      |                         |  | 32                                | 17                            | 15                                      | 19                                   |
| Remarks:                 |                            |                         |  |                                   |                               |   |                                      |
|                          |                            |                         |  |                                   |                               |   |                                      |
| Performed by:            |                            | Melan                   | ie Mitchell                              |                                   | Date:                         | Nov                                     | ember 3, 2020                        |
| Verified by:             | Abdul Ha                   | feez Khan P             | Eng.: Laboratory                         | / Manager                         | Date:                         | Nov                                     | ember 4, 2020                        |
| vernieu by:              | 715441114                  |                         | Elig., Euboratory                        | y Manager                         | Bute.                         | 1107                                    |                                      |



| Client:                  |                 | Clean                   | Harbors - Lamb                          | ton Facility                    |                                  | Lab no.:                      | WLT 453-2                                  |
|--------------------------|-----------------|-------------------------|---|---------------------------------|----------------------------------|-------------------------------|--|
| Project/Site:            | (               | Geotech<br>Clean Harbor | nical Investigatic<br>s, 4090 Telfar Ro | on - Cell 20-1<br>oad, Corunna, | ON                               | Project no.:                  | 044985-50-04                               |
| Borehole no.:            | BH1-20          |                         | Sample no.:                             | :                               | ST-2                             | Depth:                        | 75.0 ft 77.0 ft. (22.9 m - 23.5 m)         |
| Soil description:        |                 | Clay and Si             | lt, trace sand, trace                   | e gravel                        |                                  | Date sampled:                 | October 5, 2020                            |
| Apparatus:               | Hand            | Crank                   | Balance no.:                            | W                               | LG-15                            | Porcelain bowl no.:           | 15   |
| Liquid limit device no.: | WLS             | A-3B                    | Oven no.:                               | V                               | /LG-2                            | _Spatula no.:                 | 2  |
| Sieve no.:               | VVL             | 5-47                    | Glass plate no.:                        |                                 |                                  | -                             |  |
| Γ                        | Liquid Limit (  | LL):                    |   | Soil Preparati                  | on:                              |                               |  |
|                          | Test No. 1      | Test No. 2              | Test No. 3                              | <b>I</b>                        | Cohesive <425 µn                 | n 🗸                           | Dry preparation                            |
| Number of blows          | 32              | 25                      | 19                                      |                                 | Cohesive >425 µn                 | n 🗌                           | Wet preparation                            |
|                          | Water Conte     | ent:                    |   |                                 | Non-cohesive                     |                               |  |
| Tare no.                 | 125             | 18                      | 104                                     | 42.5                            |                                  | Results                       |  |
| Wet soil+tare, g         | 20.01           | 33.65                   | 20.78                                   | 42.5                            |                                  |                               |  |
| Dry soil+tare, g         | 18.24           | 31.47                   | 18.68                                   | _                               |                                  |                               |  |
| Mass of water, g         | 1.77            | 2.18                    | 2.10                                    | nt (%)                          |                                  |                               |  |
| Tare, g                  | 13.71           | 26.06                   | 13.67                                   | Conter                          |                                  |                               |  |
| Mass of soil, g          | 4.53            | 5.41                    | 5.01                                    | 0 40.5<br>ate                   |                                  |                               |  |
| Water content %          | 39.1%           | 40.3%                   | 41.9%                                   | 3                               |                                  |                               |  |
| Plastic Limit (PL        | -) - Water Cont | ent:                    | -                                       |                                 |                                  |                               |  |
| Tare no.                 | 2               | 7                       | _                                       |                                 |                                  |                               |  |
| Wet soil+tare, g         | 30.80           | 29.88                   | _                                       | 38.5                            | 17 19 21                         | 23 25 2                       | 27 29 31 33                                |
| Dry soil+tare, g         | 29.61           | 28.59                   | _                                       |                                 | 0                                | Nb Blows                      |  |
| Mass of water, g         | 1.19            | 1.29                    | _                                       | 70 —                            | 3011                             |                               |  |
| Tare, g                  | 23.88           | 22.30                   | -                                       | 60                              |                                  | LL 50                         |  |
| Mass of soil, g          | 5.73            | 6.29                    |   |                                 | Low plasticity<br>Inorganic clay | High plasti<br>Inorganic c    | city<br>clay                               |
| Water content %          | 20.8%           | 20.5%                   |   |                                 |                                  | C                             |  |
| Average water content %  | 20.             | 6%                      |   | 40 –                            |                                  |                               |  |
| Natural Water            | r Content ( W"  | ):                      | -                                       |                                 |                                  |                               | (MH) and (CH)                              |
| Tare no.                 | KH28            |                         |   | <sup>8</sup> 20 –               | Low compressibility              | - ніді                        | h compressibility                          |
| vvet soli+tare, g        | 74.00           |                         |   | 10 —                            |                                  | inor<br>- Inor<br>- Medium co | rganic şilt<br>ganic day<br>ompressibility |
| Dry soll+tare, g         | 60.40           |                         | -                                       | 0                               |                                  | ML and OL - Organic s         | silt<br>ay                                 |
| Taxa a                   | 13.60           |                         | -                                       | 0                               | 10 20 3                          | 0 40 50 60<br>Liquid Limit LL | 70 80 90 100                               |
| Tare, g                  | 4.50            |                         | -                                       | Liquid Limit                    | Plastic Limit                    |                               |  |
| Mass of soil, g          | 55.90           |                         | -                                       | (LL)                            | (PL)                             | Plasticity Index (PI)         | Natural Water Content W"                   |
| Water content %          | 24.3%           |                         |   | 41                              | 21                               | 20                            | 24   |
| Remarks:                 |                 |                         |   |                                 |                                  |                               |  |
|                          |                 |                         |   |                                 |                                  |                               |  |
| Performed by:            |                 | Melani                  | e Mitchell                              |                                 | Date:                            | Nov                           | vember 3, 2020                             |
| Verified by:             | Abdul Ha        | feez Khan, P.           | Eng.; Laboratory                        | y Manager                       | Date:                            | Nov                           | vember 4, 2020                             |



| Client:                  |                              | Clean                    | Harbors - Lambi                         | ton Facility                    |                                  | Lab no.:                      | WLT 453-3                            |
|--------------------------|------------------------------|--------------------------|---|---------------------------------|----------------------------------|-------------------------------|--------------------------------------|
| Project/Site:            | (                            | Geotech<br>Clean Harbors | nical Investigatic<br>s, 4090 Telfar Ro | on - Cell 20-1<br>oad, Corunna, | ON                               | Project no.:                  | 044985-50-04                         |
| Borehole no.:            | BH2-20                       |                          | Sample no.:                             |                                 | ST-1                             | Depth:                        | 35.0 ft 37.0 ft. (10.7 m - 11.3 m)   |
| Soil description:        |                              | Silt and Clay            | /, some sand, trace                     | e gravel                        |                                  | Date sampled:                 | October 8, 2020                      |
| Apparatus:               | Hand                         | Crank                    | Balance no.:                            | W                               | LG-15                            | Porcelain bowl no.:           | Bts                                  |
| Liquid limit device no.: | WLS                          | A-3B                     | Oven no.:                               | V                               | /LG-2                            | Spatula no.:                  | 2                                    |
| Sieve no.:               | VL                           | 5-47                     | Glass plate no.:                        |                                 | 1                                | -                             |                                      |
|                          | Liquid Limit (               | LL):                     |   | Soil Preparati                  | on:                              |                               |                                      |
|                          | Test No. 1                   | Test No. 2               | Test No. 3                              | ✓                               | Cohesive <425 µm                 | ו<br>ער די די די              | Dry preparation                      |
| Number of blows          | 34                           | 28                       | 20                                      |                                 | Cohesive >425 µm                 |                               | Wet preparation                      |
|                          | Water Conte                  | ent:                     |   |                                 | Non-cohesive                     |                               |                                      |
| Tare no.                 | Q6                           | 5                        | 1                                       |                                 |                                  | Results                       |                                      |
| Wet soil+tare, g         | 22.40                        | 33.01                    | 31.55                                   | - 31.1                          | •                                |                               |                                      |
| Dry soil+tare, g         | 20.70                        | 31.38                    | 29.90                                   | _                               |                                  |                               |                                      |
| Mass of water, g         | 1.70                         | 1.63                     | 1.65                                    | nt (%)                          |                                  |                               |                                      |
| Tare, g                  | 14.89                        | 25.91                    | 24.56                                   | Conter                          |                                  |                               |                                      |
| Mass of soil, g          | 5.81                         | 5.47                     | 5.34                                    | ater C                          |                                  |                               |                                      |
| Water content %          | 29.3%                        | 29.8%                    | 30.9%                                   | 3                               |                                  | · ·                           |                                      |
| Plastic Limit (Pl        | L) - Water Cont              | ent:                     | -                                       |                                 |                                  |                               |                                      |
| lare no.                 | 25                           | 138                      |   |                                 |                                  |                               |                                      |
| Wet soil+tare, g         | 34.05                        | 20.71                    | -                                       | 29.1                            | 19 21 23                         | 25 27 2                       | 29 31 33 35                          |
| Dry soil+tare, g         | 33.04                        | 18.91                    |   |                                 | Soil                             | Nb Blows                      |                                      |
| Mass of water, g         | 1.01                         | 1.80                     | -                                       | 70 —                            | 3011                             |                               |                                      |
| Tare, g                  | 26.50                        | 7.20                     | -                                       | 60                              |                                  | LL 50                         |                                      |
| Mass of soil, g          | 6.54                         | 11.71                    | -                                       | 뤽                               | Low plasticity<br>Inorganic clay | Inorganic c                   | lay                                  |
| Average water content %  | 15.4%                        | 15.4%                    | -                                       |                                 |                                  | C                             | H                                    |
| Average water content %  | n Contont ( )8/ <sup>n</sup> | 4 70                     | -                                       | 40 –                            |                                  |                               |                                      |
|                          |                              | ).                       |   | - 06 asticity                   |                                  |                               | (MH) and (CH)                        |
| Wet soil+tare a          | TA31<br>76.10                |                          |   | ā 20 —                          | Low compressibility              | - High                        | n compressibility                    |
| Dry soil+tare a          | 64.60                        |                          |   | 10 -                            |                                  | - Inorg<br>- Medium co        | ganic clay<br>mpressibility          |
| Mass of water g          | 11.50                        |                          |   | 0                               |                                  | ML and OL Organic cla         | ay                                   |
| Tare, q                  | 4 30                         |                          |   | 0                               | 10 20 3                          | 0 40 50 60<br>Liquid Limit LL | 70 80 90 100                         |
| Mass of soil. q          | 60.30                        |                          |   | Liquid Limit                    | Plastic Limit                    | Plasticity Index (PI)         | Natural Water Content W <sup>n</sup> |
| Water content %          | 19.1%                        |                          |   | (LL)<br>30                      | (PL)<br>15                       | 15                            | 19                                   |
| Bomorkoj                 | 10.170                       |                          |   | 00                              | 10                               |                               |                                      |
| Nemarks:                 |                              |                          |   |                                 |                                  |                               |                                      |
|                          |                              |                          |   |                                 | _                                |                               |                                      |
| Performed by:            |                              | Melani                   | e Mitchell                              |                                 | Date:                            | Nov                           | vember 3, 2020                       |
| Verified by:             | Abdul Ha                     | feez Khan, P.            | Eng.; Laboratory                        | y Manager                       | Date:                            | Nov                           | vember 4, 2020                       |



| Client:                  |                            | Clean                   | Harbors - Lamb                       | ton Facility                    |                                       | Lab no.:                    | WLT 453-6                            |
|--------------------------|----------------------------|-------------------------|--------------------------------------|---------------------------------|---------------------------------------|-----------------------------|--------------------------------------|
| Project/Site:            | (                          | Geotech<br>Clean Harbor | nical Investigations, 4090 Telfar Ro | on - Cell 20-1<br>oad, Corunna, | ON                                    | Project no.:                | 044985-50-04                         |
| Borehole no.:            | BH3-20                     |                         | Sample no.:                          |                                 | ST-2                                  | Depth:                      | 70.0 ft 72.0 ft. (21.3 m - 21.9 m)   |
| Soil description:        |                            | Clay and S              | Silt, trace sand, trac               | ce gravel                       |                                       | Date sampled:               | October 7, 2020                      |
| Apparatus:               | Hand                       | Crank                   | Balance no.:                         | W                               | LG-15                                 | Porcelain bowl no .:        | 12                                   |
| Liquid limit device no.: | WLS                        | A-3B                    | Oven no.:                            | V                               | /LG-2                                 | Spatula no.:                | 2                                    |
| Sieve no.:               | VVL                        | 5-47                    | Glass plate no.:                     |                                 | 1                                     | -                           |                                      |
| [                        | Liquid Limit (             | LL):                    | 1                                    | Soil Preparati                  | on:                                   |                             |                                      |
|                          | Test No. 1                 | Test No. 2              | Test No. 3                           | $\checkmark$                    | Cohesive <425 µn                      | n 🗸                         | Dry preparation                      |
| Number of blows          | 28                         | 22                      | 18                                   |                                 | Cohesive >425 µn                      | n 🗌                         | Wet preparation                      |
|                          | Water Conte                | ent:                    | 1                                    |                                 | Non-cohesive                          |                             |                                      |
| Tare no.                 | 17                         | 14                      | 146                                  | 43.0                            |                                       | Results                     |                                      |
| Wet soil+tare, g         | 30.99                      | 31.72                   | 20.51                                | 43.0                            |                                       |                             |                                      |
| Dry soil+tare, g         | 29.12                      | 29.83                   | 18.49                                | 4                               |                                       |                             |                                      |
| Mass of water, g         | 1.87                       | 1.89                    | 2.02                                 | ıt (%)                          |                                       |                             |                                      |
| Tare, g                  | 24.42                      | 25.26                   | 13.69                                | Conter                          |                                       |                             |                                      |
| Mass of soil, g          | 4.70                       | 4.57                    | 4.80                                 | 0 41.0<br>te                    |                                       | +                           |                                      |
| Water content %          | 39.8%                      | 41.4%                   | 42.1%                                | Š                               |                                       |                             |                                      |
| Plastic Limit (PL        | L) - Water Cont            | ent:                    | 4                                    |                                 |                                       |                             |                                      |
| Tare no.                 | 3                          | 24                      | -                                    |                                 |                                       |                             |                                      |
| Wet soil+tare, g         | 31.68                      | 34.34                   | -                                    | 39.0                            | 17 19                                 | 21 23                       | 25 27 29                             |
| Dry soil+tare, g         | 30.46                      | 32.66                   | 4                                    |                                 |                                       | Nb Blows                    | 20 2                                 |
| Mass of water, g         | 1.22                       | 1.68                    | -                                    | 70 —                            | Soil                                  | Plasticity Chart            |                                      |
| Tare, g                  | 24.62                      | 24.62                   | -                                    | 60                              |                                       | LL 50                       |                                      |
| Mass of soil, g          | 5.84                       | 8.04                    | -                                    |                                 | Low plasticity<br>Inorganic clay      | High plastic<br>Inorganic c | city<br>lay                          |
| Water content %          | 20.9%                      | 20.9%                   | 4                                    | 50 <del> </del>                 |                                       |                             |                                      |
| Average water content %  | 20.                        | 9%                      | 4                                    | 40 +                            |                                       |                             |                                      |
| Natural Water            | r Content ( W <sup>n</sup> | ):                      |                                      | - 06 sticity                    |                                       |                             | (MH) (CH)                            |
| Tare no.                 | KH12                       |                         |                                      | 20 —                            | Low compressibility<br>Inorganic silt | - Hint                      | a compressibility                    |
| Wet soil+tare, g         | 89.90                      |                         |                                      | 10 -                            |                                       | irlor<br>- Inpr             | ganic silt<br>ganic day              |
| Dry soil+tare, g         | 72.60                      |                         | 4                                    |                                 |                                       | ML and OL - Organic cla     | ilt ay                               |
| Mass of water, g         | 17.30                      |                         | 4                                    | 0                               | 10 20 3                               | 0 40 50 60                  | 70 80 90 100                         |
| Tare, g                  | 4.30                       |                         | -                                    | Liquid Limit                    | Diactic Limit                         |                             | 1                                    |
| Mass of soil, g          | 68.30                      |                         | _                                    | (LL)                            | (PL)                                  | Plasticity Index (PI)       | Natural Water Content W <sup>n</sup> |
| Water content %          | 25.3%                      |                         |                                      | 41                              | 21                                    | 20                          | 25                                   |
| Remarks:                 |                            |                         |                                      |                                 |                                       |                             |                                      |
|                          |                            |                         |                                      |                                 |                                       |                             |                                      |
| Performed by:            |                            | Melani                  | ie Mitchell                          |                                 | Date:                                 | Nov                         | vember 3, 2020                       |
| Verified by:             | Abdul Ha                   | feez Khan. P.           | .Eng.: Laborator                     | / Manager                       | Date:                                 | Nov                         | rember 4. 2020                       |



| Client:                  |                              | Clean                    | Harbors - Lambi                      | ton Facility                    |                       | Lab no.:  | WLT 453-8                               |
|--------------------------|------------------------------|--------------------------|--------------------------------------|---------------------------------|-----------------------|---|---|
| Project/Site:            | (                            | Geotech<br>Clean Harbor: | nical Investigations, 4090 Telfar Ro | on - Cell 20-1<br>oad, Corunna, | ON                    | Project no.:  | 044985-50-04                            |
| Borehole no.:            | BH4-20                       |                          | Sample no.:                          |                                 | ST-2                  | Depth:  | 70.0 ft 72.0 ft. (21.3 m - 21.9 m)      |
| Soil description:        |                              | Clay and Sil             | It, trace sand, trace                | e gravel                        |                       | Date sampled:   | October 6, 2020                         |
| Apparatus:               | Hand                         | Crank                    | Balance no.:                         | W                               | LG-15                 | Porcelain bowl no .:  | B3                                      |
| Liquid limit device no.: | WLS                          | A-3B                     | Oven no.:                            | V                               | /LG-2                 | Spatula no.:  | 2                                       |
| Sieve no.:               |                              | 5-47                     | Glass plate no                       |                                 | 1                     | -   |   |
| [                        | Liquid Limit (               | LL):                     |                                      | Soil Preparati                  | on:                   | _   |   |
|                          | Test No. 1                   | Test No. 2               | Test No. 3                           | $\checkmark$                    | Cohesive <425 µm      | n 🗸   | Dry preparation                         |
| Number of blows          | 32                           | 29                       | 22                                   | ✓<br>                           | Cohesive >425 µm      | n 🗌   | Wet preparation                         |
|                          | Water Conte                  | /nt:                     | T                                    |                                 | Non-cohesive          |   |   |
| Tare no.                 | 8                            | 135                      | 115                                  | 42.0                            |                       | Results   |   |
| Wet soil+tare, g         | 29.08                        | 19.56                    | 20.49                                | 42.0                            |                       |   |   |
| Dry soil+tare, g         | 27.46                        | 17.91                    | 18.46                                | -                               |                       |   |   |
| Mass of water, g         | 1.62                         | 1.65                     | 2.03                                 | nt (%)                          |                       |   |   |
| lare, g                  | 23.27                        | 13.70                    | 13.53                                | Contei                          |                       |   |   |
| Mass of soil, y          | 4.19                         | 4.15                     | 4.93                                 | 0.04 (                          |                       |   |   |
| Plastic Limit (Pl        | 38.7%                        | 39.0%                    | 41.270                               | \$                              |                       |   |   |
|                          | -) - Water Joint             | 127                      | -                                    |                                 |                       |   |   |
| Wet soil+tare a          | 10 30                        | 21 32                    | -                                    |                                 |                       |   |   |
| Drv soil+tare g          | 18.30                        | 21.02                    | -                                    | 38.0                            | 21 23                 | 25 27   | 29 31 33                                |
| Mass of water. d         | 0.96                         | 1 28                     | -                                    |                                 | Soil                  | Plasticity Chart  |   |
| Tare, q                  | 13.60                        | 13,71                    | -                                    | 70                              |                       | ,   |   |
| Mass of soil, g          | 4.74                         | 6.33                     | -                                    | 60 -                            | Low plasticity        | High plastic  | sity                                    |
| Water content %          | 20.3%                        | 20.2%                    | -                                    | 14<br>                          | Inorganic clay        | Inorganic c   |   |
| Average water content %  | 20.                          | 2%                       | -                                    | =<br>=<br>                      |                       | Ľ ľ   |   |
| Natural Water            | r Content ( W <sup>n</sup> ) | ):                       | -                                    | ty Inde                         |                       |   |   |
| Tare no.                 | JA                           |                          | -                                    |                                 | Low compressibility   |   | (MH) and (CH)                           |
| Wet soil+tare, g         | 91.20                        |                          | 1                                    | - 20 +                          | Inorganic silt        | - High<br>irlor   | i compressibility<br>ganic <b>ş</b> ilt |
| Dry soil+tare, g         | 72.80                        |                          | 1                                    | 10 +                            |                       | - inpro-<br>- Medium co<br>norganic si  | ganic clay<br>mpressibility<br>ilt      |
| Mass of water, g         | 18.40                        |                          | 1                                    | 0                               | 10 20 3               | <sup>ML</sup> ) <sub>and</sub> ( <sup>OL</sup> ) - Organic ¢la<br>60 40 50 60 | 70 80 90 100                            |
| Tare, g                  | 4.50                         |                          | 1                                    |                                 |                       | Liquid Limit LL   |   |
| Mass of soil, g          | 68.30                        |                          | 1                                    | Liquid Limit<br>(LL)            | Plastic Limit<br>(PL) | Plasticity Index (PI)   | Natural Water Content W <sup>n</sup>    |
| Water content %          | 26.9%                        |                          | 1                                    | 41                              | 20                    | 21  | 27                                      |
| Remarks:                 |                              |                          |                                      | •                               |                       | I   |   |
|                          |                              |                          |                                      |                                 |                       |   |   |
| Daufarmand hur           |                              | Malani                   | ia Mitaball                          |                                 | Date:                 | Neu   | ambar 2, 2020                           |
| Performed by:            |                              |                          |                                      |                                 |                       | Nov   | emper 3, 2020                           |
| Verified by:             | Abdul Hat                    | ieez Khan, P.            | Eng.; Laboratory                     | y Manager                       | Date:                 | Nov   | ember 4, 2020                           |











| ENT:                        |  | ambton Facility          | y LAB No.: WLT 453-3             |                 |              |                       |                |          |
|-----------------------------|--|--------------------------|----------------------------------|-----------------|--------------|-----------------------|----------------|----------|
| OJECT/ SITE:                | Geotechnical Investigat  | ion Cell 20-1, Cle<br>Ol | ean Harbors, 409<br>N            | 0 Telfar Rd. Co | orunna,<br>P | ROJECT No             | 0.:044985-50   | 0-04     |
| ehole No.:                  |  | BH2-20                   |                                  | Sample No.:     |              |                       | ST 1           |          |
| th:                         |  |                          | Sample desc                      | cription        | Silt and C   | lay, some sand, trace | gravel         |          |
|                             |  |                          |                                  | _               |              |                       |                |          |
| Diamete                     | er   | le Parameters            | 5.03                             | _               |              |                       |                |          |
| Height                      |  | cm                       | 10.46                            |                 |              | -                     |                |          |
| Volume                      | 4  | om <sup>3</sup>          | 207.6                            |                 |              | 1                     | - 1.7.         |          |
| Height-t                    | to-Diameter Ratio  | CIII                     | 21                               |                 |              | 11. *                 |                |          |
| Wet Ma                      |  | 0                        | 444.9                            |                 |              | 1                     | ·              |          |
| Dry Der                     | nsitv  | g ka/m <sup>3</sup>      | 1800                             | _               |              |                       | - / 1 - "      |          |
| *Water                      | Content  | %                        | 19.1                             | _               |              | 1 Cites               | - j Fi         |          |
| Specific                    | Gravity  | assumed                  | 2.68                             |                 |              | 1                     | atter Diskelow |          |
| Void Ra                     | atio   |                          | 0.49                             |                 |              | 14 : 1                | It is a is     |          |
| Degree                      | of Saturation  |                          | 1.0                              |                 |              | *****                 |                |          |
| *The wa                     | ater content was obtained after                                | shear from the en        | tire specimen.                   |                 |              | · · · ·               | the second     |          |
| Unconfi                     | ined Compressive Strength                                      | kPa                      | 127 1                            |                 |              | 1                     | -              |          |
| Shear S                     | Strength   | kPa                      | 63.5                             |                 |              | No.                   | · · · · · ·    |          |
| Rate of                     | Strain   | %/min                    | 0.9                              |                 | 10           | AL. T                 |                |          |
| Strain a                    | t Failure  | %                        | 9.6                              |                 | -            |                       |                |          |
| Maximu                      | m strain reached   | %                        | % 9.6<br>% 15.3                  |                 | 449          | 985 BH2               | 2 ST-1         |          |
|                             |  | 1                        |                                  |                 |              |                       |                |          |
| 150                         |  |                          |                                  | 200             |              |                       | Cu =           | 63.5 kPa |
|                             |  |                          |                                  | 180             |              |                       |                |          |
| 125                         |  |                          |                                  | 160             |              |                       |                |          |
|                             |  |                          |                                  | 140             |              |                       |                |          |
| 100 —                       | 1  |                          |                                  | е<br>4<br>120   |              |                       |                |          |
| ess,<br>kR<br>22 − 22 − − − |  |                          |                                  | Stress, 1       |              |                       |                |          |
| ssive Str                   |  |                          |                                  | - Shear         |              |                       |                |          |
| 50                          |  |                          |                                  | 60              |              |                       |                | -        |
| č                           |  |                          |                                  | 40              |              |                       |                |          |
| 25                          |  |                          |                                  | 20              |              |                       |                |          |
|                             |  |                          |                                  |                 |              |                       |                |          |
| o 🗕                         |  |                          |                                  | 0               |              | 50                    | 100            | 150      |
| 0.0                         | 0 4.0 8.0 12.0 16.0 20.0<br>Axial Strain. % Normal Stress, kPa |                          |                                  |                 |              |                       |                |          |
|                             | Axiai Stra   | , /0                     |                                  |                 |              |                       | -              |          |
| ARKS:                       |  |                          |                                  |                 |              |                       |                |          |
|                             |  |                          |                                  |                 |              |                       |                |          |
| FORMED BY                   | ':   | O.Rey                    | nolds                            |                 | D            | ATE:                  | 28-Oct-2       | 20       |
| IFIED BY:                   | DBY: Michael Braverman DATE: 9-Nov-20                          |                          | Michael Braverman DATE: 9-Nov-20 |                 | 20           |                       |                |          |



| CLIENT:   | (                                  | Clean Harbors -         | LAB No.: WLT 453-4    |   |                       |   |  |
|---|------------------------------------|-------------------------|-----------------------|---|-----------------------|---|--|
| PROJECT/ SIT  | Geotechnical Investigat            | ion Cell 20-1, Cl<br>Ol | ean Harbors, 409<br>N | 0 Telfar Rd. Corunna  | ,<br>PROJECT No.:     | . 044985-50-04  |  |
| Borehole No.:   |                                    | BH2-20                  |                       | Sample No.:   | ST 2                  |   |  |
| Depth:  |                                    | 21.3-21.9 m             |                       |   | Clay and S            | ilt, trace sand, trace gravel   |  |
| Depth:  |                                    |                         |                       |   |                       |   |  |
|   | Initial Sampl                      | le Parameters           |                       |   |                       |   |  |
| Diar  | neter                              | cm                      | 5.04                  | _   | (manufacture)         | and the second se |  |
| Heiç  | ght                                | cm                      | 11.38                 | _   |                       |   |  |
| Volu  | ime                                | cm <sup>3</sup>         | 226.6                 |   | 1.1                   |   |  |
| Heiç  | ght-to-Diameter Ratio              |                         | 2.3                   |   | 1 - 3                 | The later   |  |
| Wet   | Mass                               | g                       | 419.0                 |   | FA: A                 |   |  |
| Dry   | Density                            | kg/m <sup>3</sup>       | 1466                  |   | and the second second | and the second se |  |
| *Wa   | ater Content                       | %                       | 26.1                  |   |                       |   |  |
| Spe   | cific Gravity                      | assumed                 | 2.65                  |   | 11200                 |   |  |
| Void  | d Ratio                            |                         | 0.81                  |   | 1 4 4 1 1             | A CONTRACTOR OF   |  |
| Deg   | ree of Saturation                  |                         | 0.9                   |   | All and and a         |   |  |
| *The  | e water content was obtained after | shear from the er       | tire specimen.        |   | Constant and          | A   |  |
| Unc   | onfined Compressive Strength       | kPa                     | 128.6                 |   | E la la la            |   |  |
| She   | ar Strength                        | kPa                     | 64.3                  | -   | CHAR S                | Share and the second second   |  |
| Rate  | e of Strain                        | %/min                   | 0.8                   | -  🗾  |                       | the strong the state of the   |  |
| Stra  | in at Failure                      | %                       | 11 1                  | -  📃  | 44985 E               | BH2 ST-2  |  |
| Max   | rimum strain reached               | %                       | 14.0                  | -   |                       | -   |  |
| IVIAA   |                                    | 70                      | 14.0                  |   |                       |   |  |
| 150 -<br>125 -<br>100 -<br>4<br>5<br>5<br>5<br>5<br>5<br>75 -<br>5<br>5<br>75 - |                                    |                         |                       | 200<br>180<br>180<br>160<br>140<br>40<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$<br>\$ |                       |   |  |
| 25 -<br>0 -   |                                    |                         |                       |   | 50                    | 100 150   |  |
| 0.  | .u 4.0 8.0<br>Axial Stra           | 12.0 16.0<br>in, %      | J 20.0                |   | Norma                 | ll Stress, kPa  |  |
|   |                                    |                         |                       |   |                       |   |  |
| REMARKS:  |                                    |                         |                       |   |                       |   |  |
| PERFORMED   | BY:                                | O.Rev                   | nolds                 |   | DATE:                 | 28-Oct-20   |  |
| VERIFIED BY:  |                                    | Michael B               | raverman              |   | DATE:                 | 9-Nov-20  |  |



| ENT:                             | (                             | Clean Harbors - L                              | ambton Facility       |                       | LAB No.:                                 | WLT 453-5               |           |
|----------------------------------|-------------------------------|--|-----------------------|-----------------------|--|-------------------------|-----------|
| DJECT/ SITE:                     | Geotechnical Investigat       | ion Cell 20-1, Cle<br>ON                       | ean Harbors, 409<br>N | 90 Telfar Rd. Corunna | PROJECT No.:                             | 044985-50-0             | 4         |
| hole No.:                        |                               | BH3-20   |                       | Sample No.:           |  | ST 1                    |           |
| th:                              |                               | 10.7-11.3 m                                    |                       | Sample description    | Clay and Sil                             | , trace sand, trace gra | avel      |
| Initial Sample Parameters        |                               |  |                       |                       |  |                         |           |
|                                  | Initial Sampl                 | e Parameters                                   |                       |                       |  |                         |           |
| Diameter                         |                               | cm   | 5.01                  | _                     |  |                         |           |
| Height                           |                               | cm   | 10.46                 | _                     | The second                               | 1 1 1                   |           |
| Volume                           |                               | cm <sup>3</sup>                                | 206.5                 | _                     | 1  |                         |           |
| Height-to                        | D-Diameter Ratio              |  | 2.1                   |                       | 1  | A A                     |           |
| Wet Mas                          | S                             | g  | 440.4                 |                       | and the set                              | 1 . 1                   |           |
| Dry Dens                         | sity                          | kg/m <sup>3</sup>                              | 1795                  | _                     |  |                         |           |
| *Water C                         | Content                       | %  | 18.8                  |                       | a start and                              |                         |           |
| Specific 0                       | Gravity                       | assumed  | 2.65                  |                       | at a second                              | 1.18                    |           |
| Void Rati                        | io                            |  | 0.48                  |                       | -  | 1                       |           |
| Degree o                         | of Saturation                 |  | 1.0                   |                       | 1. A                                     | A Barris                |           |
| *The wate                        | er content was obtained after | ontent was obtained after shear from the entir |                       | _                     | a up a                                   |                         |           |
| Unconfine                        | ed Compressive Strength       | kPa  | 210.0                 |                       | 71.                                      |                         |           |
| Shear Str                        | rength                        | kPa  | 105.0                 |                       | 1 the                                    |                         | -         |
| Rate of S                        | Strain                        | %/min  | 0.9                   | -                     | CI C | A COLORED               | 6         |
| Strain at                        | Failure                       | %  | 3.5                   | -                     | 14005 0                                  | UD OT 1                 |           |
| Maximum                          | n strain reached              | %  | 15.3                  | -                     | 44985 B                                  | H3 51-1                 |           |
| maximum                          |                               | 70   | 1010                  |                       |  |                         |           |
| 225                              | Compressive Stress v          | vs. Axial Strain                               |                       | 300                   | Iohr Stress Circle                       | Cu =                    | 105.0 kPa |
| 200                              |                               |  |                       | 250                   |  |                         |           |
| 150<br>8 2125 × Lag<br>125 = 010 |                               |  |                       | hear Stress, kPa      |  |                         |           |
| ssiv                             |                               |  |                       | N N                   |  |                         |           |
| bre                              |                               |  |                       | 100                   |  |                         |           |
| δ <sup>75</sup>                  |                               |  |                       |                       |  |                         |           |
| 0                                |                               |  |                       |                       |  |                         |           |
| 50                               |                               |  |                       |                       |  |                         |           |
|                                  |                               |  |                       | 50                    |  |                         |           |
|                                  |                               |  |                       |                       |  |                         |           |
| 25                               |                               |  |                       | <del> </del>          |  | <u> </u> \              |           |
|                                  |                               |  |                       |                       |  |                         |           |
|                                  |                               |  |                       | 0                     |  |                         |           |
| 0                                | 10 00                         | 42.0 40.0                                      |                       | 0                     | 100                                      | 200                     | 300       |
| 0.0                              | 4.0 δ.0<br>Δvial Stra         | 12.0 16.0<br>in %                              | 5 20.0                |                       | Normal                                   | Stress, kPa             |           |
|                                  |                               | iii, 70  |                       |                       |  |                         |           |
| MARKS:                           |                               |  |                       |                       |  |                         |           |
| FORMED BY:                       |                               | O.Rey  | nolds                 |                       | DATE:                                    | 28-Oct-20               |           |
|                                  |                               | Michael Br                                     | raverman              |                       |  | 0 Nov 20                |           |















| CLIENT:       |                    | Clean Harb             | ors - Lambton Facility                       |                          | LAB No.:                             | WLT                                      | 453                         |                            |
|---------------|--------------------|------------------------|--|--------------------------|--------------------------------------|--|-----------------------------|----------------------------|
| PROJECT/SITE: | Geotechnical Inves | stigation - Cell 20-1/ | 'Clean Harbors, 4090 Telfar Road, Corunna, ( | ON                       | PROJECT No.:                         | 04498                                    | 5-50-04                     |                            |
| Lab<br>No.    | Sample<br>I.D.     | Sample<br>Depth (m)    | Sample<br>Description (visual)               | Moisture<br>Content<br>% | Bulk Density<br>(kg/m <sup>3</sup> ) | Bulk Unit Weight<br>(kN/m <sup>3</sup> ) | Dry Bulk Density<br>(kg/m³) | Dry Unit Weight<br>(kN/m³) |
| WLT 453-1     | BH1-20 ST-1        | 13.0-13.6              | Clay and Silt, trace sand, trace gravel      | 21.3                     | 2054                                 | 20.1                                     | 1694                        | 16.6                       |
| WLT 453-2     | BH1-20 ST-2        | 22.9-23.5              | Clay and Silt, trace sand, trace gravel      | 23.3                     | 2038                                 | 20.0                                     | 1653                        | 16.2                       |
| WLT 453-3     | BH2-20 ST-1        | 10.7-11.3              | Clay and Silt, some sand, trace gravel       | 19.1                     | 2142                                 | 21.0                                     | 1798                        | 17.6                       |
| WLT 453-4     | BH2-20 ST-2        | 21.3-21.9              | Clay and Silt, trace sand, trace gravel      | 26.1                     | 1846                                 | 18.1                                     | 1464                        | 14.4                       |
| WLT 453-5     | BH3-20 ST-1        | 10.7-11.3              | Clay and Silt, trace sand, trace gravel      | 18.8                     | 2137                                 | 21.0                                     | 1799                        | 17.6                       |
| WLT 453-6     | BH3-20 ST-2        | 21.3-21.9              | Clay and Silt, trace sand, trace gravel      | 24.1                     | 2027                                 | 19.9                                     | 1634                        | 16.0                       |
| WLT 453-7     | BH4-20 ST-1        | 10.7-11.3              | Clay and Silt, trace sand, trace gravel      | 17.9                     | 2152                                 | 21.1                                     | 1825                        | 17.9                       |
| WLT 453-8     | BH4-20 ST-2        | 21.3-21.9              | Clay and Silt, trace sand, trace gravel      | 24.7                     | 2039                                 | 20.0                                     | 1636                        | 16.0                       |
|               |                    |                        |  |                          |                                      |  |                             |                            |
|               |                    |                        |  |                          |                                      |  |                             |                            |
|               |                    |                        |  |                          |                                      |  |                             |                            |
|               |                    |                        |  |                          |                                      |  |                             |                            |
|               |                    |                        |  |                          |                                      |  |                             |                            |
| TESTED BY:    | M.Mitchel          | П                      |  |                          | TEST DATE:                           | Novembe                                  | er 4, 2020                  |                            |
| APPROVED BY:  | M. Braverm         | an                     |  |                          | APPROVED DATE:                       | Novembe                                  | r 13, 2020                  |                            |
|               |                    |                        |  |                          |                                      |  |                             |                            |



|               | Geotechnical Investigation Ce                 | Il 20-1, Clean Harbor        | s, 4090 Telfar Rd.       |                        | WET 400-2           |
|---------------|---|------------------------------|--------------------------|------------------------|---------------------|
| ROJECT/ SITE: | Cc  | orunna, ON                   | -,                       | PROJECT No.:           | 044985-50-04        |
|               | BH No.  |                              |                          | BH1-20                 | ]                   |
|               | Sample ID                                     |                              |                          |                        |                     |
|               | Depth m                                       |                              |                          | 22 9-23 5 m (75'-77    | <b>'</b>            |
|               | Sampling Da                                   | ato                          |                          | -                      | /                   |
|               | Sample Descrip                                | ntion                        | Silt and (               | -<br>Nav trace cand tr |                     |
|               | Venticel stacks of feilure                    |                              | Sint and C               | Slay, trace sailu, tr  | ace graver          |
|               | vertical strain at failure t                  | aken based on<br>Specim      | WidXIII<br>on Parameters | ium Deviator Stres     | SRAIIO              |
|               | Initial Specimen Parameters                   | Opeening                     | Specimen A               | Specimen B             | Specimen C          |
|               | Diameter                                      | cm                           | 3.69                     | 3.68                   | 3.65                |
|               | Height  | cm                           | 7.84                     | 7.95                   | 7.95                |
|               | Height-to-Diameter Ratio                      |                              |                          | 2.2                    | 2.2                 |
|               | Volume  | cm <sup>3</sup>              | 84.0                     | 84.6                   | 83.0                |
|               | Wet Mass                                      |                              | 161.0                    | 167.3                  | 171.0               |
|               |   | y                            | 161.9                    | 107.3                  | 1670                |
|               | Motor Content                                 | kg/m                         | 1320                     | 1377                   | 1079                |
|               |   | %                            | 26.2                     | 25.4                   | 23.3                |
|               | Specific Gravity                              |                              | 2.75                     | 2.75                   | 2.75                |
|               | Void Ratio                                    |                              | 0.80                     | 0.74                   | 0.64                |
|               | Degree of Saturation                          | %                            | 90                       | 94                     | 100                 |
|               | B-Value at end of Saturation                  |                              | 0.99                     | 0.99                   | 0.97                |
|               | Volume change due to the cor                  | nsolidation, cm <sup>3</sup> | 4.2                      | 6.8                    | 8.7                 |
|               | Before Shear                                  |                              |                          | -<br>                  |                     |
|               | Volume  | cm³                          | 79.8                     | 77.8                   | 74.3                |
|               | Dry Density                                   | g                            | 159.5                    | 162.9                  | 163.0               |
|               | Water Content                                 | <u> </u>                     | 24.4                     | 22.0                   | 16.9                |
|               | Water Content<br>Void Ratio                   |                              | 0.71                     | 0.60                   | 0.47                |
|               | Degree of Saturation                          | %                            | 94                       | 100                    | 100                 |
|               |   |                              |                          |                        |                     |
|               |   |                              | Specimen A               | Specimen B             | Specimen C          |
|               | Cell pressure                                 | kPa                          | 802.4                    | 800.1                  | 807.2               |
|               | Back pressure                                 | kPa                          | 403.4                    | 602.3                  | 158.4               |
|               | Consolidation stress                          | kPa                          | 399                      | 197.8                  | 648.8               |
|               | Rate of strain                                | %/hour                       | 0.6                      | 0.6                    | 0.6                 |
|               | Vertical strain at failure                    | %                            | 5.70                     | 5.70                   | 14.00               |
|               | Deviator stress at failure                    | kPa                          | 347                      | 240                    | 532                 |
|               | Excess pore pressure at foilure               | kPa                          | 195.2                    | 82.8                   | 329.1               |
|               | A <sub>f</sub> coefficient                    |                              | 0.56                     | 0.35                   | 0.62                |
|               |   |                              | 1                        |                        |                     |
|               | Total Stresse                                 | es                           | Specimen A               | Specimen B             | Specimen C          |
|               | Minor principal stress, $\sigma_3$            | kPa                          | 399                      | 197.8                  | 648.8               |
|               | Major principal stress, $\sigma_1$            | kPa                          | 745.7                    | 437.6                  | 1180.8              |
|               | Radius, $(\sigma_1 - \sigma_3)/2$             | kPa                          | 173.4                    | 119.9                  | 266.0               |
|               | Intersection point, $(\sigma_1+\sigma_3)/2$   | kPa                          | 572.4                    | 317.7                  | 914.8               |
|               | Effective Stres                               | ses                          | Specimen A               | Specimen B             | Specimen C          |
|               | Minor principal stress, σ'2                   | kPa                          | 203.8                    | 115                    | 319.7               |
|               | Major principal stress $\sigma'$              | kPa                          | 550.5                    | 254.9                  | 951.7               |
|               | Padius $(\sigma', \sigma')/2$                 | kDo                          | 172.4                    | 110.0                  | 266.0               |
|               | Radius, $(\sigma_1 - \sigma_3)/2$             | кра                          | 173.4                    | 119.9                  | 200.0               |
|               | intersection point, $(\sigma_1 + \sigma_3)/2$ | кРа                          | 3/7.2                    | 234.9                  | 585.7               |
|               | Shear Termination Criteria                    |                              | Maxir                    | num Deviator Stres     | s Ratio             |
| EMARKS:       | Sample Reconstituted                          |                              |                          |                        |                     |
|               |   |                              |                          |                        |                     |
| ERFORMED BY:  |   | C.Ackley                     |                          | DATE:                  | Oct 28 -Nov 5, 2020 |
| ERIFIED BY:   | Micha   | ael Braverman                |                          | DATE:                  | 11-Nov-20           |













#### CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS (ASTM D4767 - 11)

| CLIENT:        | Clean Harb  | ors - Lambton Facility       | /            | LAB No.:                  | WLT 453-3  |                     |  |
|----------------|---|------------------------------|--------------|---------------------------|------------|---------------------|--|
| PROJECT/ SITE: | Geotechnical Investigation Cell 20-1, Clean Harbors, 4090 Telfar Rd.<br>Corunna, ON |                              |              | PROJECT No.: 044985-50-04 |            |                     |  |
|                |   |                              |              |                           |            |                     |  |
|                | BH No.  |                              |              | BH2                       |            |                     |  |
|                | Sample IE   |                              | ST-1         |                           |            |                     |  |
|                | Depth, m  |                              | ʻ)           |                           |            |                     |  |
|                | Sampling D  |                              |              |                           |            |                     |  |
|                | Sample Descri   | Silt and C                   | ace gravel   |                           |            |                     |  |
|                | Vertical strain at failure  | Maxim                        | s Ratio      |                           |            |                     |  |
|                |   | Specimo                      | n Parameters |                           |            |                     |  |
|                | Initial   |                              | Specimen A   | Specimen B                | Specimen C |                     |  |
|                | Diameter  | cm                           | 4.98         | 4.99                      | 4.99       |                     |  |
|                | Height  | cm                           | 10.43        | 10.44                     | 10.42      |                     |  |
|                | Height-to-Diameter Ratio  |                              | 2.1          | 2.1                       | 2.1        |                     |  |
|                | Volume  | cm <sup>3</sup>              | 203.2        | 204.0                     | 204.1      |                     |  |
|                | Wet Mass  | g                            | 435.4        | 439.6                     | 441.8      |                     |  |
|                | Dry Density   | kg/m <sup>3</sup>            | 1816         | 1813                      | 1838       |                     |  |
|                | Water Content   | %                            | 18.0         | 18.9                      | 17.8       |                     |  |
|                | Specific Gravity (Assumed)  |                              | 2.75         | 2.75                      | 2.75       |                     |  |
|                | Void Ratio  |                              | 0.51         | 0.52                      | 0.50       |                     |  |
|                | Degree of Saturation  | %                            | 96           | 100                       | 99         |                     |  |
|                | B-Value at end of Saturation  | 3                            | 0.95         | 0.95                      | 1.00       |                     |  |
|                | Volume change due to the co   | nsolidation, cm <sup>*</sup> | 6.2          | 9.3                       | 8.6        |                     |  |
|                | Volume  | cm <sup>3</sup>              | 197.0        | 194 7                     | 195.5      |                     |  |
|                | Wet Mass  | g                            | 429.1        | 435.1                     | 440.2      |                     |  |
|                | Dry Density   | kg/m <sup>3</sup>            | 1873         | 1899                      | 1918       |                     |  |
|                | Water Content   | %                            | 16.3         | 17.6                      | 17.4       |                     |  |
|                |   | 0/                           | 0.47         | 0.45                      | 0.43       |                     |  |
|                | Degree of Saturation  | %                            | 96           | 100                       | 100        |                     |  |
|                |   |                              | Specimen A   | Specimen B                | Specimen C |                     |  |
|                |   | kPa                          | 400.6        | 600.4                     | 601.7      |                     |  |
|                | Back pressure   | kPa                          | 306          | 400.2                     | 203.5      |                     |  |
|                | Consolidation stress  | kPa                          | 94.6         | 200.2                     | 398.2      |                     |  |
|                | Rate of strain  | %/hour                       | 0.5          | 0.6                       | 0.6        |                     |  |
|                | Vertical strain at failure  | %                            | 4 00         | 4 00                      | 5.00       |                     |  |
|                | Deviator stress at failure  | kPa                          | 178          | 256                       | 394        |                     |  |
|                | Excess pore pressure at   | kDe                          | 21.6         | 20 F                      | 100.0      |                     |  |
|                | failure   | кра                          | 31.0         | 80.5                      | 199.9      |                     |  |
|                | A <sub>f</sub> coefficient  |                              | 0.18         | 0.31                      | 0.51       |                     |  |
|                | Total Stress  | Specimen A                   | Specimen B   | Specimen C                |            |                     |  |
|                | Minor principal stress, σ <sub>3</sub> kPa  |                              | 94.6         | 200.2                     | 398.2      |                     |  |
|                | Major principal stress, $\sigma_1$  | kPa                          | 272.6        | 455.8                     | 792.2      |                     |  |
|                | Radius, (σ <sub>1</sub> -σ <sub>3</sub> )/2   | kPa                          | 89.0         | 127.8                     | 197.0      |                     |  |
|                | Intersection point, $(\sigma_1 + \sigma_3)/2$                                       | kPa                          | 183.6        | 328.0                     | 595.2      |                     |  |
|                | Effective Stre  | Specimen A                   | Specimen B   | Specimen C                |            |                     |  |
|                | Minor principal stress, $\sigma'_3$   | kPa                          | 63           | . 119.7                   | 198.3      |                     |  |
|                | Maior principal stress. σ'  | kPa                          | 241.0        | 375.3                     | 592.3      |                     |  |
|                | Radius. $(\sigma'_1 - \sigma'_3)/2$   | kPa                          | 89.0         | 127.8                     | 197.0      |                     |  |
|                | Intersection point, $(\sigma'_1 + \sigma'_3)/2$                                     | kPa                          | 152.0        | 247.5                     | 395.3      |                     |  |
|                | Shear Termination Criteria  |                              | Maxin        | num Principal Stres       | s Ratio    |                     |  |
| REMARKS:       |   |                              |              |                           |            |                     |  |
|                |   |                              |              |                           |            |                     |  |
| PERFORMED BY:  | O. Reynolds   |                              |              | DATE:                     |            | Oct 28 -Nov 6, 2020 |  |
|                | Michael Braverman   |                              | DATE         |                           | 24-Nov-20  |                     |  |











#### CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS (ASTM D4767 - 11)

| CLIENT:        | Clean Harbors - Lambton Facility LAB No.: WLT 453-8 |                                       |                     |   |            | -8                     |  |  |  |
|----------------|---|---------------------------------------|---------------------|---|------------|------------------------|--|--|--|
| PROJECT/ SITE: | Geotechnical Investigation Ce                       | ell 20-1, Clean Harbor<br>Corunna, ON | rs, 4090 Telfar Rd. | PROJECT No.: 044985                     |            | -04                    |  |  |  |
|                |   |                                       |                     | _                                       |            |                        |  |  |  |
|                | BH No. BH4  |                                       |                     |   |            |                        |  |  |  |
|                | Sample II   | ST2                                   |                     |   |            |                        |  |  |  |
|                | Depth, m  | 21.3-21.9 (70'-72')                   |                     |   |            |                        |  |  |  |
|                | Sampling D  |                                       |                     |   |            |                        |  |  |  |
|                | Sample Descr  | iption                                | Clay and            | Clay and Silt, trace sand, trace gravel |            |                        |  |  |  |
|                | Vertical strain at failure                          | Maximum Stress Ratio                  |                     |   |            |                        |  |  |  |
|                |   | Specime                               | en Parameters       |   |            |                        |  |  |  |
|                | Initial   | 1                                     | Specimen A          | Specimen B                              | Specimen C |                        |  |  |  |
|                | Diameter  | cm                                    | 5.03                | 4.99                                    | 5.01       |                        |  |  |  |
|                | Height  | cm                                    | 10.41               | 10.42                                   | 10.39      |                        |  |  |  |
|                | Height-to-Diameter Ratio                            |                                       | 2.1                 | 2.1                                     | 2.1        |                        |  |  |  |
|                | Volume  | cm <sup>3</sup>                       | 206.5               | 203.7                                   | 205.2      |                        |  |  |  |
|                | Wet Mass  | g                                     | 409.3               | 404.5                                   | 412.0      |                        |  |  |  |
|                | Dry Density   | kg/m <sup>3</sup>                     | 1593                | 1564                                    | 1589       |                        |  |  |  |
|                | Water Content                                       | %                                     | 24.4                | 27.0                                    | 26.3       |                        |  |  |  |
|                | Specific Gravity (Assumed)                          |                                       | 2.78                | 2.78                                    | 2.78       |                        |  |  |  |
|                | Void Ratio  |                                       | 0.74                | 0.78                                    | 0.75       |                        |  |  |  |
|                | Degree of Saturation                                | %                                     | 91                  | 96                                      | 98         |                        |  |  |  |
|                | B-Value at end of Saturation                        |                                       | 0.99                | 0.99                                    | 1.00       |                        |  |  |  |
|                | Volume change due to the co                         | onsolidation, cm <sup>3</sup>         | 7.4                 | 12.5                                    | 14.5       |                        |  |  |  |
|                | Before Shear  | 3                                     | 400.4               | 404.0                                   | 100.7      |                        |  |  |  |
|                | Wet Mass  |                                       | 409.4               | 395.2                                   | 399.7      |                        |  |  |  |
|                | Dry Density   | ka/m <sup>3</sup>                     | 1653                | 1666                                    | 1710       |                        |  |  |  |
|                | Water Content                                       | %                                     | 24.4                | 24.0                                    | 22.6       |                        |  |  |  |
|                | Void Ratio  |                                       | 0.68                | 0.67                                    | 0.63       |                        |  |  |  |
|                | Degree of Saturation                                | %                                     | 99                  | 100                                     | 100        |                        |  |  |  |
|                |   |                                       | Specimen A          | Specimen B                              | Specimen C |                        |  |  |  |
|                | Cell pressure                                       | kPa                                   | 799.8               | 800.4                                   | 801.6      |                        |  |  |  |
|                | Back pressure                                       | kPa                                   | 600.9               | 407.4                                   | 200.3      |                        |  |  |  |
|                | Consolidation stress                                | kPa                                   | 198.9               | 393                                     | 601.3      |                        |  |  |  |
|                | Rate of strain                                      | %/hour                                | 0.6                 | 0.6                                     | 0.6        |                        |  |  |  |
|                | Vertical strain at failure                          | %                                     | 6.00                | 7.50                                    | 9.00       |                        |  |  |  |
|                | Deviator stress at failure                          | kPa                                   | 193                 | 288                                     | 386        |                        |  |  |  |
|                | Excess pore pressure at                             | kPa                                   | 91.1                | 188.3                                   | 299.4      |                        |  |  |  |
|                | A <sub>f</sub> coefficient                          |                                       | 0.47                | 0.65                                    | 0.78       |                        |  |  |  |
|                | Total Stresses                                      |                                       | Specimen A          | Specimen B                              | Specimen C |                        |  |  |  |
|                | Minor principal stress, $\sigma_3$ kPa              |                                       | 198.9               | 393                                     | 601.3      |                        |  |  |  |
|                | Major principal stress, $\sigma_1$                  | kPa                                   | 392.0               | 681.1                                   | 987.0      |                        |  |  |  |
|                | Radius, $(\sigma_1 - \sigma_3)/2$                   | kPa                                   | 96.5                | 144.1                                   | 192.8      |                        |  |  |  |
|                | Intersection point, $(\sigma_1 + \sigma_3)/2$       | kPa                                   | 295.4               | 537.1                                   | 794.1      |                        |  |  |  |
|                | Effective Stre                                      | Specimen A                            | Specimen B          | Specimen C                              |            |                        |  |  |  |
|                | Minor principal stress, $\sigma'_3$                 | kPa                                   | 107.8               | 204.7                                   | 301.9      |                        |  |  |  |
|                | Major principal stress, $\sigma'_1$                 | kPa                                   | 300.9               | 492.8                                   | 687.6      |                        |  |  |  |
|                | Radius, (σ'₁-σ'₃)/2                                 | kPa                                   | 96.5                | 144.1                                   | 192.8      |                        |  |  |  |
|                | Intersection point, $(\sigma'_1 + \sigma'_3)/2$     | kPa                                   | 204.3               | 348.8                                   | 494.7      |                        |  |  |  |
|                | Shear Termination Criteria                          |                                       | Ν                   | Aaximum Stress Ra                       | tio        |                        |  |  |  |
| REMARKS:       |   |                                       |                     |   |            |                        |  |  |  |
|                |   |                                       |                     |   |            | <u> </u>               |  |  |  |
| PERFORMED BY:  | M. R. Metupalli                                     |                                       |                     | DATE:                                   |            | Oct 28 - Nov 10 , 2020 |  |  |  |
| VERIFIED BY:   | Michael Braverman                                   |                                       | DATE:               |   | 24-Nov-20  |                        |  |  |  |











# about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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