Gordon Lake Group - Geotechnical Services Program - TSCA Geotechnical Investigation for Dam Declassification

Client: Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Contaminants and Remediation Division (CARD)

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1 Introduction

Englobe Corp. (Englobe) was retained by (CIRNAC) Contaminants and Remediation Division (CARD) (the Client) to undertake a geotechnical investigation and assessment at the former Camlaren Mine site (e.g. the “Site”), specifically pertaining to the tailings and soil containment area (TSCA) at the site. Currently, the TSCA is assessed and classified as a mine tailings structure dam structure.

This geotechnical investigation was undertaken to evaluate the site's subsurface conditions and provide a site-specific geotechnical assessment to determine whether the TSCA would be a suitable candidate for conversion into a landform structure classification and therefore being delisting as a dam structure.

In 2021, Englobe completed a Dam Safety Review (DSR) and provided a report on the TSCA. In the DSR report, we noted insufficient information on the strength properties of the existing tailings material contained within TSCA, which could be considered a deficiency according to the Canadian Dam Association (CDA) guidelines. It was tentatively acknowledged at that time by Englobe and the prior Engineer-of-Record (EOR), Stantec Consulting Ltd. (Stantec), owing to the age of the TSCA structure and limited size of the structure, that the probable existing tailings strength was sufficient enough so as not to justify an elevated dam hazard classification as assessed by the CDA guidelines.

In the absence of any directly measured tailings strength properties of depositional histories thereof, at the time of the 2018 site remediation/rehabilitation works, including the construction of the liner system for the TSCA, the EOR was unable to substantiate that the contained tailings were not liquefiable and therefore capable of severe loss of strength under hypothetical extreme cases such as those arising from earthquakes. As such, the EOR considered the possibility that the soil embankment-contained tailings would fall under a classification similar to that of a mine tailings dam and that the engineering, policies and guidance documents as provided by the Canadian Dam Association would apply to the current TSCA structure.

A prior geotechnical investigation at the site undertaken by Thurber Engineering Ltd. (Thurber) in 2018 included the advancement of boreholes within the TSCA to install a variety of instrumentations or monitoring wells. Englobe did not review the original Thurber report and the Thurber data was obtained from the 2020 Operations, Maintenance and Surveillance Plan report prepared by Stantec.[1]

The 2018 Thurber boreholes were advanced without completing any in-situ soil strength testing, though disturbed samples were obtained to allow for their physical description of the soil types and limited properties of their strength. Englobe’s assessment provided in our 2021 dam safety review (DSR) report contended that in order to determine whether the existing TSCA should be classified as a mine tailings dam structure or as a landform waste containment structure, the acquisition of in-situ strength testing of the tailings materials contained within the TSCA would be required. This was the impetus and for this recent geotechnical site investigation mandate.

Englobe further contended within our 2021 DSR report that if the existing tailings contained within the TSCA are not potentially liquefiable or are otherwise demonstrably stable via sufficient soil strength properties as determined from in-situ testing as determined via a new geotechnical investigation, then a reasonable geotechnical engineering design basis recommendation could be established whereby the definition of a dam structure would not be substantiated for this site. The determination of the liquefiability of the tailings materials is defined based on the soil strength properties, groundwater pressure and specific soil classification types. A new geotechnical site investigation was required to obtain the requisite in-situ tailings soil strength information to establish if the tailings are potentially

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[1] Final Report: Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites. Stantec Consulting Ltd. Dartmouth, NS. March 31, 2020.

liquefiable. The existing investigations before this investigation only obtained limited information on the strength properties based on visual assessment and not on direct in-situ testing.

The geotechnical site investigation completed at the site entailed in-situ strength testing to characterize the engineering properties of the tailings materials. To complete the geotechnical investigation at the site, new boreholes were advanced using a specialty-purpose geotechnical drilling rig and in-situ testing methods.

Based on the information from previous investigation work and our recent geotechnical site investigation, we anticipated the existing tailings materials would not be liquefiable, based on the existing borehole data and descriptions made of the tailings materials, especially if the site's groundwater level would be at or near the bottom of the existing tailings stack. We further speculated that the surcharge weighting of the tailings stack with the addition of waste rock materials and its capping with the current TSCA liner system (for a maximum surcharging weight of about 4.5 m of soil equivalent) would possibly lead to additional compression and consolidation of tailings materials over time, thereby increasing their strength and the stability of the tailings contained within the TSCA.

Included in this report are the available 2018 Thurber borehole records replicated for this report from the 2018 Stantec Design-Brief Report[2]. As described herein, Englobe utilized these borehole records to further assist in defining the geotechnical soil model for the TSCA. Englobe replicated the factual information from Thurber borehole records within our template format to suit our own needs in developing the soil model and reporting herein.

This report presents the observations and engineering recommendations associated with the geotechnical investigation of the site. Included herein are the factual results of the field investigation and laboratory testing results, including a discussion of field procedures, subsurface conditions and geotechnical assessment for dam declassification.

An executive summary of the information contained within the report and the conclusion of the geotechnical assessment for dam declassification is provided in the next report section.

2 Executive Summary for Mining Dam Landform Closure

The site's rehabilitation plans, as prepared by the previous engineering consultant retained by the Client (e.g. Stantec Consulting Ltd.), resulted in the construction in 2018 of the current tailings and soil containment area (TSCA). The construction included the rehabilitation of the existing embankments by re-grading and placing sandy fill materials to appropriately designed slope angles that would satisfy the Canadian Dam Association's (CDA) long-term slope stability and other requirements. The TSCA was graded to form a shallow dome shape topography in the centre, and a bituminous geo-membrane liner was installed over the tailings stack area such that the shedding of surface water would be to the perimeter of the TSCA.

In the prior Stantec engineering design work products, they anticipated the presence of low-strength tailings materials would be contained within the TSCA. The result of this assumption was that the intended post-TSCA construction and landfill-type structure classification was later deemed by Stantec to be categorized as a dam structure as the TSCA design and construction process continued. Stantec did not verify via in situ testing whether the existing tailings would be too low of strength, and in the absence of any further confirmatory information on the tailings' strength, the dam classification status

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[2] Updated Report: Gordon Lake Group Design Basis. Stantec Consulting Ltd. Dartmouth, NS. September 2018.

was assigned to the TSCA. Stantec did anticipate within their prior reporting that the tailings would be stable and, following the post-TSCA construction period, would eventually become non-liquefiable.

Before the construction of the current TSCA, the center of the tailings stack was slightly under-elevated, which would occasionally result in the shallow ponding of water on a seasonal basis. Part of the design for the current TSCA was to super-elevate the overall tailings stack such that the area would longer retain surface water and shed any water to the perimeter of the TSCA. The TSCA was constructed to improve the environmental effects associated with metal leaching and allow the water table to lower within the tailings materials contained within the TSCA. The secondary effect was to prevent the recharging of the groundwater table and allow it to lower within the tailings stack.

The lowering of the water table is important for a mine tailings dam conversion to a landform-type closure process. The CDA and International Commission on Large Dams (ICOLD) state the rationale and importance for lowering the water table within mine tailings dams, including monitoring of the groundwater level(s), to ensure that the tailings would become more stabilized and less likely to be liquefiable. Many authorities, such as those presented below in Figure 2.1, consider these requirements to be the precursors for a dam-to-landform type course conversion.

Figure 2.1: Schematic Illustration For The Progression “Life of Mine” Dam Standards Presented by Various Authorities

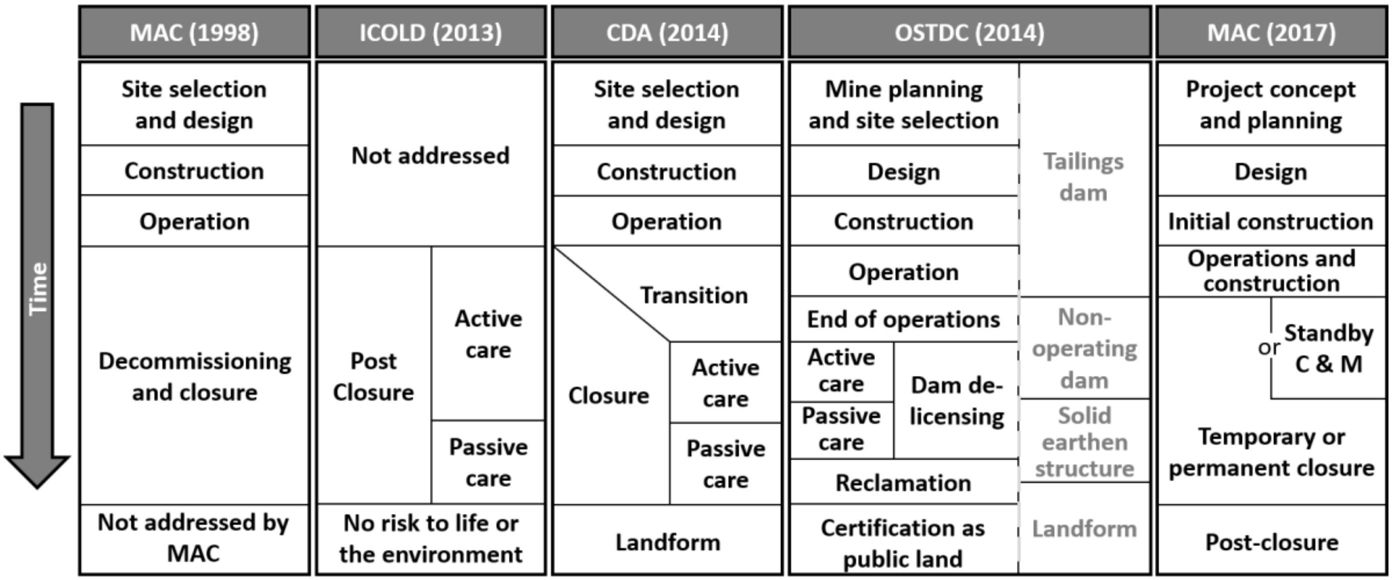

Figure Notes: MAC - Mining Association of Canada, ICOLD - International Commission on Large Dams, CDA - Canadian Dam Association, OSTDC - Oil Sands Tailings Dam Committee (Canada).

Figure 2.1 illustrates the generalized progression by various authorities and industry technical committees relied upon in Canada regarding the transition of mine tailings dam such that their delisting could be recommended to local governmental entities. The design standard to use may vary depending on the type of industry-specific mine or jurisdiction, though many concepts share similar progressive periods for the operation of a mine dam.

The Northwest Territories has chosen to adopt the Canadian Dam Association (CDA) guidelines for the licensing mining dam structures. Other jurisdictions within Canada, such as the provinces of Ontario, British Columbia, and Saskatchewan, have developed their own guidelines for dam structures not necessarily indicated in the figure above.

The general requirements for a mine tailings dam to be considered a landform structure and, therefore, no longer classified as a dam structure is an inherently site-specific evaluation. The site-specific CDA dam classification for the dam structure should also be assessed as “low”. The generalized evaluation should consider the following characteristics as being fulfilled:

- The dam at this site was previously assessed and classified by Englobe, following the CDA guidelines, as “low” as stated in the 2021 dam safety review (DSR) report[3] authored by Englobe. The classification review and assessment are provided in Section 5.5.
- Existing or future planned site development, e.g. mine development work, should not occur.
    - The site is currently not an active mine site, and we understand that government agencies with property ownership and development authority over the site would restrict any future development work.
- The site underwent an active care phase of rehabilitation and is currently in a passive care phase of maintenance and monitoring.
    - The site was previously rehabilitated by re-grading the existing embankments and with the capping of the TSCA with a liner system. These items would be considered to be part of the site’s closure phase process. In our opinion, the long-term monitoring currently undertaken at the site could be considered the active to the passive care phases. Tasks within the scope of passive care include monitoring the site for any changes such as erosion, human or animal activity, and site development plans or work. Should any issues arise at the site from a geotechnical or civil engineering perspective, these would be mitigated on a case-by-case basis, for example, by making repairs due to erosion. The current long-term monitoring plans provide for future inspection work and repairs as needed.
- During the passive closure phase, successive professionally-led inspections and reviews, over time measured in years, should confirm that there are now new or unanticipated major concerns with the site’s rehabilitation design, construction and maintenance.
    - Annual dam safety inspections have been completed yearly since the 2018 site rehabilitation construction.
        - A more comprehensive dam safety review (DSR) was completed by Englobe in 2021. The review was completed independently from the site’s original engineer-of-record and concluded that while there were minor deficiencies, these were not what we considered in the report to be significant and in contravention of the CDA guideline requirements.
        - The dam safety review indicated minor erosion of the soil liner cover material along the embankments as a recurring issue at the site. However, Englobe notes, as of our recent 2022 inspection, that the minor erosion appears to be self-healing and attributable to the establishment of significantly more plant growth observed at the site from prior years.
- The site’s embankments should be geotechnically stable per the CDA requirements.
    - Stantec's 2018 rehabilitation construction design indicated adequate slope stability for the planned design configuration. The 2021 dam safety review (DSR) completed by Englobe independently reviewed this design, and we conducted our own slope stability analysis of the as-built condition, which indicated that sufficient slope stability was achieved.
- The site’s contained tailings material should be considered stabilized and non-liquefiable.
    - As discussed in this report, the following characterizations are made, indicating the tailings are potentially non-liquefiable:
        - The tailings stack is of overall limited thickness, between about 4 to 4.5 m in maximum thickness;

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[3] Gordon Lake Group Geotechnical Services Program - 2021 Dam Safety Review (DSR). Final Report. Englobe Corp., Mount Pearl, NL.

- The tailings stack is underlaid by a solid foundation consisting of a granitic bedrock;
- The tailings stack is not being readily recharged by water infiltration or surface water inflows due to the TSCA liner system and thus would be permitted to become de-watered over time, e.g., via the lowering of the water table. The lowering of the water table would prevent the possible occurrence of liquefaction in most soil conditions. The presence of a static water table, or phreatic water pressure, within a sandy to fine-grained soil under cyclic loading is a precursor for liquefaction potential to occur;
- Cone penetration testing (CPT) testing results indicated the tailings to have sufficient strength (see Section 7.2 -Tailings Stability);
- The tailings were indicated to be of low liquefaction potential based on a CPT soil classification review methodology (see Section 6.4 - Review of Tailings Liquefaction Potential); and,
- The site does not have a significant mapped earthquake source to induce probable ground vibration-induced liquefaction at this site (see Section 6.4 - Review of Tailings Liquefaction Potential).

The above review is based on the geotechnical aspects of the mine tailings dam. If applicable to this site and jurisdiction, other requirements that the CDA does not directly discuss may include “non-geotechnical” considerations to attain a landform closure status. These “non-geotechnical” requirements could include the following additional criteria, depending on the local jurisdiction requirements:

- Chemical stability, non-polluting;
- Mitigated or no risk to human health or environment;
- Ecological sustainability; and,
- Restoration of mined areas equal or greater land capability to that before mining.

Based on the above summary, CDA guidelines and technical bulletins, Englobe recommends that the site be considered well-progressed into the passive closure phase for a mining dam structure as a precursor to attaining a landform-type closure status.

With this report and prior DSR and DSI reporting observations, Englobe concludes the site is currently in a passive closure status from a civil-geotechnical engineering perspective in that no future impending construction or modifications to the current condition have been recommended by Englobe or the prior engineer-of-record (Stantec) for this site. Accordingly, we recommend that a landform closure classification be assigned to this site within the next 1 to 2 years following subsequent progressive inspections to confirm that the noted minor deficiencies listed below in Section 7.3 (Closing Statement) are unchanged or otherwise mitigated.

With a landform closure status for the mining dams at this site, it is reasonable for Englobe to further recommend to regulatory authorities with jurisdiction over this site that it could be delisted as a mining dam structure.

3 Site Description

The former Camlaren Mine site was a former gold mine located on Muir Island within Gordon Lake, located about 85 km northeast of Yellowknife, NT, as illustrated below in Figure 3.1: Site Location Map. Tailings from the former Camlaren mining operations were deposited within a tailings stack confined within constructed earthen embankments and natural terrain. The mine was operated into the 1980s and then abandoned afterwards.

Environmental remedial works were undertaken at the site, including rehabilitating of the tailings stack area mentioned above stack which resulted in the construction in 2018 of a landfill-type stockpile utilizing earthen embankment dams for lateral containment of soil and rock mine waste materials. A site plan is provided in Appendix A for ease of reference for all site features discussed herein. Figure 3.2: Site Aerial View is provided below.

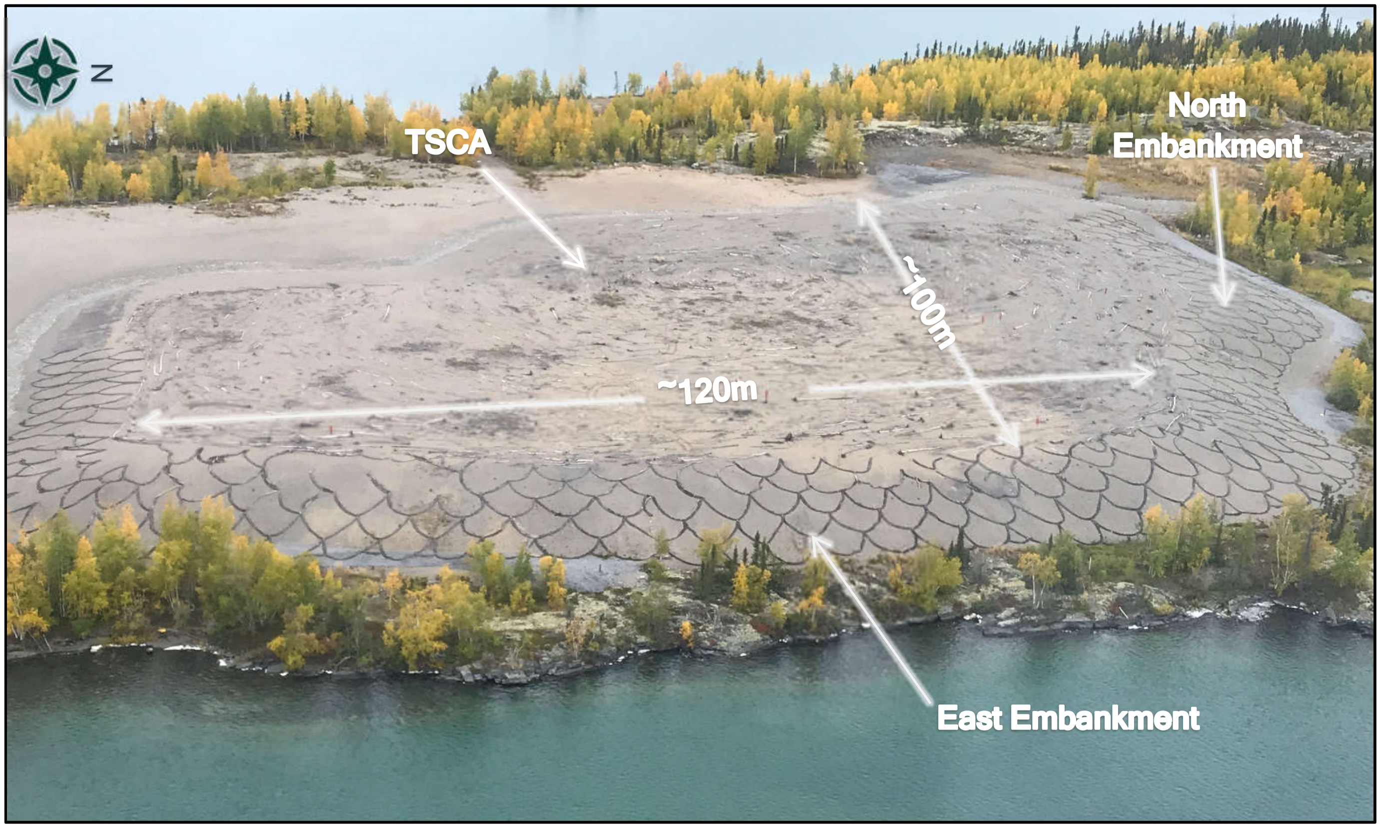
Figure 3.1: Site Location Map

Stantec has described the embankment dam structures at the site as a “dam earth structure containing tailings and mine waste, capped in 2018.” Based on Englobe’s assessment, the dam structure can be described as a mine waste rock and tailings containment facility (TCF) constructed with earthen embankments without a water-containing reservoir but rather built up with a raised dome feature within the reservoir area that grades higher in elevation than the existing dam embankments located along the perimeter of the TCF. Englobe notes that the standard industry term to describe this type of structure as a tailings containment facility (TCF); however, the term tailings soil containment area (TSCA) has been used in past reporting and will be used herein to be consistent with the existing reporting terminology. Based on the 2018 as-built drawings prepared by Stantec, the total embankment length is 575 m, as measured at the toe, with heights ranging from about 1.5 to 5 m. The embankments are subdivided and referred to as the “north, east and south” embankments, as noted in Drawing No. 1, attached in Appendix A.

It is Englobe’s understanding that the TSCA structure was originally intended to be designed and categorized as a raised mine waste landfill structure (e.g. waste containment facility), which was filled with tailings and similar solid mining-related detritus material from the site and also additional materials imported to the site from nearby former mining operations as part of the Gordon Lake Group Mines Rehabilitation project. The mine tailings and waste materials were contained within soil embankments and capped with a mastic liner and a nominal granular soil cover in 2018.

Further to our understanding, it was thought that due to possible low-strength tailings materials contained within the TSCA, the intended landfill structure was later deemed to be categorized as a dam structure by Stantec. A CDA dam hazard classification determination was not made for the site, and the previous reporting by Stantec had assumed the classification would likely be a “low” hazard classification. The 2021 dam safety review (DSR) completed by Englobe assigned a dam hazard classification of low for this site.

Figure 3.2: Site Aerial View From East to West (September 2021)



The following site geotechnical reporting are known to Englobe and reviewed for relevant information for this report:

Updated Report: Gordon Lake Group Design Basis Dam. Stantec Consulting Ltd. Dartmouth, NS (September 2018).
This report is comprised of the following pertinent information and design related to the site mitigation and construction work completed in 2018:

- Design of the final rehabilitated embankments to contain impacted soils within one tailings waste facility located at the Camlaren site (i.e., the TSCA);
- Design of a bituminous geomembrane (BGM) liner to cover the TSCA, some perimeter ditching, and the embankment side slopes;
- Design and use of borrow materials for the liner cover towards greater use of sandy materials, with erosion protection materials along berm slopes and perimeter ditches only.
- And the associated engineering design details related to the embankment slopes, BGM liner, ditch sizing, and hydrotechnical design review, including rip-rap and erosion control measures for the liner cover materials.

Stantec, 2018b. FINAL - 2018 As-Built Construction – Camlaren TSCA. Report prepared for Public Works and Government Services Canada and Indigenous and Northern Affairs Canada dated December 21, 2018.
This report is comprised of the following pertinent information and design information:

- As-built drawings and of the final rehabilitated embankments, liner cover, materials used, ditching and instrumentation;
- We note that a variance of the assessed slope stability model exists in the 2018 design-basis report and what transpired at the site in terms of as-built construction. Englobe is not currently aware if a separate slope model was updated by Stantec to account for this design change.
- We note that minor discrepancies are noted throughout the as-built drawings and are likely reflective of not updating the issued for construction drawings and/or possible differences in interpretations of works completed by other firms for the liner installation at the site;

Stantec, 2020. Final Report: Annual 2020 Geotechnical Inspection Report – Tailings and Soil Containment Area, Camlaren Mine Site, NT
This report is comprised of the following pertinent information and design information:

- Updated and year-two dam surveillance/inspection information and summary of observations, including the updated long-term monitoring (LTM) plan adaptive management trigger review.
- The report reiterated the recommendation that the dam structures be classified as per CDA (refer to Table 2.1 in CDA 2007 [2013 Edition]). Englobe provided a dam consequence classification of “low” within the report.

Englobe, 2021. Final Report: Gordon Lake Group Geotechnical Services Program
2021 Dam Safety Review (DSR) – Tailings and Soil Containment Area, Camlaren Mine Site, NT
This report is comprised of the following pertinent information and design information:

- CDA Dam hazard classification assessment;
- Review of all components and hydrotechnical aspects of the site;
- Liner veneer and slope stability review, and
- Concluding remarks.

4 Investigation Procedure

The geotechnical site investigation was conducted under the direct supervision of a senior geotechnical engineer from Englobe, Mr. Erich Lenz, P.Eng., who maintained detailed field records of the various soil strata and reviewed the cone penetration test (CPT) data as acquired in real-time to ensure the data was appropriate and valid. The field investigation was completed from July 30 to August 2, 2022, by advancing CPT boreholes using a helicopter-portable drilling setup provided under subcontract by Englobe for the investigation. The CPT probe drilling method is further described in the ASTM D3441 testing method - Standard Test Method for Mechanical Cone Penetration Testing of Soils. Additional testing was completed via solid stem auger drilling methods as part of the pre-drilling process to facilitate the CPT probe advancement.

The quantity and locations of CPT locations were selected by Englobe and were laid out by Englobe by measuring from known site features as noted on the Site Plan, Drawing No. 01, Attached in Appendix A. The positional coordinates and elevations at each testing location are obtained by interpolation based on the available topographic mapping completed, and the interpolation is within an estimated ± 2 meters horizontally and ± 0.25 m vertically positioning accuracy.

The CPT or solid stem auger borehole advancements ranged from 1.0 to 6.0 m depth below the existing ground surface. At the site, nine (9) boreholes were attempted, and partial data were acquired from two (2) boreholes. Full data acquisition on the underlying tailings layer was acquired from two (2) boreholes. A single (1) borehole was inferred to be terminated due to inferred bedrock at a depth of about 2.6 m via the solid stem drilling methodology. The remaining boreholes acquired data within the “consolidated waster” layer portion of the TSCA. The field program work plan had outlined six (6) boreholes to be advanced across the TSCA area. The as-built site plan for the completed boreholes is attached in Appendix A - Site Plan, Drawing No. 01. Additionally, the work plan had an allowance to install three (3) new vibrating wire piezometers; however, in the first attempt was unsuccessful for mechanical limitation reasons and the remaining piezometers were not attempted to save time on-site for the remaining fieldwork program.

Limited bedrock mapping of exposed bedrock outcropping adjacent to the TSCA was also completed and is utilized in our geotechnical soil model, as presented in Appendix A for this report. This bedrock mapping scope was not originally identified in the project work plan, but this was completed by Englobe while available and on-site.

Sufficient data was acquired at the site from the current field investigation to refine the geotechnical soil model further and attribute soil strength parameters to the existing boreholes with no strength data attributes indicated. For this investigation, select and representative soil samples were not obtained from the CPT boreholes, as this is not possible when using this type of technology. Instead, electronic-mechanical methods of the CPT allow for a continuous soil profile data acquisition and can collect up to five (5) independent readings in a single sounding interval, e.g. for every 2 cm of soil penetration as provided in this investigation. These readings, notably the cone tip resistance (Qc), sleeve friction (Ft), and penetration pore water pressure (u2) are interpreted to give the soil parameters used to assess subsurface stratigraphy. Correlations are used to further assess the soil classification and soil strengths.

The subsurface conditions and the soil classification of any layers observed within the CPT boreholes are described below in Section 0.

4.1 Suitability of Helicopter-Supported Drilling Rig Setup

In the planning for the field investigation program, discussions were held between Englobe and the drilling firm’s equipment capabilities in light of the available 2018 investigation borehole information and expected drilling conditions to be encountered at the site. Based on the review of the available information, the drilling firm reasoned that the upper sandier portions, including consolidated were feasible to pass a CPT probe through such layers with a heli-portable system. However, as an added measure in the event it would be needed, the drilling firm suggested adding equipment with the ability to pre-drill the borehole.

The pre-site deployment review was completed since the upward-resisting reaction mass from a typical heli-portable rig setup would be inherently limited by what the helicopter could reasonably sling into the site, which was also closely reviewed by the helicopter firm for weight acceptance. It was decided that the heli-portable rig was to be deployed with a solid stem auger drilling system to pre-drill any denser layers at the surface if needed, which has the added benefit that the auger cuttings and observations of the auger drilling performance could be analyzed for geotechnical classification purposes. During the field investigation, it was determined that pre-drilling of all boreholes would be required to suitably pass the CPT probe in what turned out to be much denser soil conditions than anticipated. In certain instances, as noted on the borehole records attached in Appendix B, the underlying “consolidated waste” and even the “upper sandy tailings” layer was too dense or contained too much over-size material, e.g. cobbles and boulder-sized materials, for which even the auger drilling was not effective in advancing past the layer. Despite the challenge regarding the unexpectantly denser material at the surface, suitable data was acquired from the field investigation.

We note that if future geotechnical investigations are planned at this site, the in situ sampling should consist of a system that is capable of performing CPT and SPT sampling, supported by a drilling rig setup utilizing a casing advancement system, such as an odex or rotary sonic drilling rig, bypass the interference caused by the “consolidated waste” layer. However, such a drilling rig setup would not be typically self-propelled for a helicopter-supported investigation as was the system supplied in this program, and these systems would require repeated breakdowns and helicopter lifts to move from hole to hole, presenting additional logistical issues and extended costs associated with time spent at the site.

Furthermore, Englobe is not aware of a North American drilling subcontractor that would both possess a helicopter-portable odex or rotary sonic system with a CPT-type data acquisition system. In this light, Englobe would alternatively recommend that a full-weight and track-mounted CPT drill rig setup be supplied by a single subcontractor for any future geotechnical investigations at this site; specifically, one that would be capable of developing at least 150 to 200 kilo-Pascals of tip pressure to penetrate through the upper portions of the TSCA soil cover and consolidated waste strata. This CPT track mount system would not be heli-portable and should weigh about 15 to 20 tons to develop sufficient downward tip pressures to penetrate the upper dense soil strata. Such a rig mobilization would necessitate the construction of a spur ice road to the site to allow for tractor-trailer transport of the equipment or for the track rig to be unloaded at the main ice road location and then be self-propelled into the site.

5 Subsurface Conditions

5.1 General Subsurface Description Methodology

The subsurface soil classification and methodology used herein are based on visual-manual field observations according to the Unified Soil Classification System (USCS) and described by ASTM Standards D2487 and D2488. The USCS provides for a descriptive classification of soils based on the engineering properties, the system of which is regularly or most prominently referenced in many geotechnical engineering design guidance documents and published literature. For consistency, the CPT soil behaviour type (SBT) definitions are aligned to be consistent with the USCS classification system.

The USCS also utilizes a shorthand abbreviation using two (2) parenthesized capitalized letters, e.g. (SP) for poorly graded sand, (SW) for well-graded sand, etc., which is described on the Symbols and Terms used on the Test Records, attached in Appendix A. Additionally, the USCS description discusses oversize particle fractions above 75 mm diameter as cobbles and particles greater than 300 mm as boulders and are assessed based on a volumetric percentage that is typically visually from excavated test pit material stockpiles or by inference on drilling conditions. According to this classification system, particle sizes smaller than 75 mm in diameter are described as soil.

A summary of the subsurface conditions encountered at the site is provided in the paragraphs below and in detail on the Borehole Records, attached in Appendix B. On the Borehole Records, any stratigraphic boundaries typically represent a transition of one soil type to another and do not necessarily indicate an exact plane of geologic change. Stratigraphic boundaries using a solid line indicate measured or observed boundaries. A dashed line represents inferred or estimated transitions or the continuation of the same geologic stratum description (e.g. for fill, etc.) but where the soil classification changes within the unit.

Further, subsurface conditions may vary between and beyond the testing and sampling locations, and the borehole information is provided for guidance and is only accurate for the exact location where completed; therefore, inference on subsurface conditions between borehole locations is left for the user(s) of the information to determine and to generalize and in estimation purposes.

5.2 Estimated Soil Profiles

Included in our report are the available borehole records completed by Thurber Engineering Ltd. in 2018, which were provided in the 2018 Stantec design brief report[4]. As described herein, Englobe utilized the prior geotechnical information to define the soil model for the TSCA further as presented in the Estimated Soil Profiles “A,” “B’ (prime),“ and “C.” These estimated soil profile lines are shown on the Site Plan - Drawing No. 1, attached in Appendix A. The remaining sections shown on the site plan do not have corresponding soil profiles associated with them, as Profiles A, B’, and C, were considered the most critical cross-section at this site in terms of the overall slope height and steepness for the slope stability model. Note that profile line B shown in Drawing No. 1, is distinct from profile B’, whereas B’ is oriented to be more perpendicular to the slope.

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[4] Updated Report: Gordon Lake Group Design Basis. Stantec Consulting Ltd. Dartmouth, NS. September 2018.

5.3 Subsurface Conditions

In general, the encountered subsurface soil conditions at this site can be described in four (4) major layer divisions as summarized in the following report sub-sections below (ordered in descending layer depth):

- Gravelly sand “composite soil cover” and “embankment fill”;
- Sandy gravel to silty sand “consolidated waste”;
- Silty sand to silt with sand “upper tailings”;
- Silt with sand to clay with sand “lower tailings”;
- Natural gravelly sand “overburden”;
- Bedrock

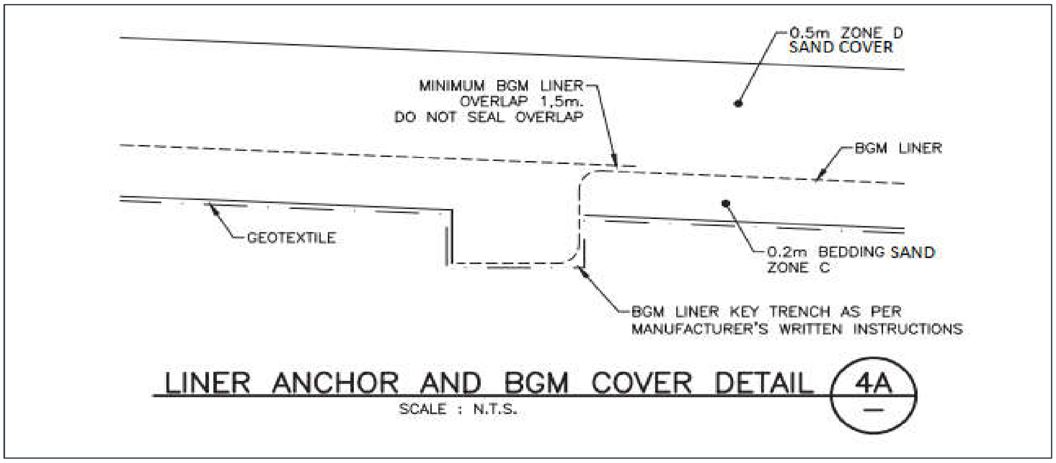
5.3.1 Composite Soil Cover and Embankment Fill

The surface of the TSCA is covered with a layer of gravelly sand underlain by a bituminous geo-membrane and geotextile materials and is referred to as the “composite soil cover” throughout this report in prior site reporting.

The soil is described based on visual identification as a light brown to brownish grey, poorly graded sand with gravel (SP) and contains occasional cobbles. The layer is underlain with a bituminous geo-membrane material. The layer varies from about 0.7 to 1.2 m in thickness.

In terms of soil density, it is loose at the surface but is otherwise considered to be compact based on observation during the borehole advancements. Figure 4.1 Below illustrates the typical design section of the soil liner system:

Figure 5.1: As-built design of soil liner system (Stantec Dwg. No. C-CAM-11A, 2018)



5.3.2 Consolidated Waste Materials

Underlying the “composite soil cover” and within the central portion of the TSCA is a layer of fill materials referred to as “consolidated waste.” These materials were imported from other nearby mine rehabilitation project sites. The materials are understood to range from tailings (e.g. sandy to fine-grained, silty) to waste rock material (e.g., coarse-rocky, up to boulder size). Based on the available as-built drawings prepared by Stantec, the layer ranges in thickness from nil at the edges/periphery of the TSCA to a maximum of about 3.5 m within the centre region of the TSCA.

Based on the available borehole information, the layer is described as light grey to grey, poorly graded with silt and gravel (SP-SM) to silty gravel with sand (GM) and contains cobbles and occasional boulders.

The layer is described as compact in terms of the relative density based on equipment excavation performance and compact to dense based on CPT testing results.

5.3.3 Tailings Materials

Underlying the “consolidated waste materials” are the post-mining tailings deposits. In prior reporting, the tailings were characterized as a single layer. With the available borehole information from the Thurber records and the CPT records, Englobe subdivided the layer based on soil classification and depth/elevation of occurrence as an “upper” and “lower” tailings layer.

Based on this subdivided layer model, the upper layer ranges from about 0.5 to 1.5 m in thickness, and the lower portion ranges from about 2 to 3 m in thickness.

Depending on the process employed by a mining company, tailings deposition can vary widely within a tailings stack and would depend on the sluice's discharge location. Generally, the finer particle-sized materials are deposited further with the sluice water within the tailings impoundment area, and sandier and heavier particles are deposited at the sluice discharge point. As the sluice discharge point becomes built up with enough sandier materials, the sluice point is moved, often repeatedly with a site of this limited size, to improve the discharge of tailings from the mill. This described process produces a varied deposition stratification, ranging from sands, silts and clays in repeated sequencing layers up to the final surface of the tailings stack, which was observed in the borehole records. In this manner, the tailings are not a homogenous soil layer but are rather defined by the depositional method.

Also observed at the site were predominately more fine-grained materials, silts, fine sands and clay-like seams, e.g. slimes in mining parlance, within the lower portions of the tailings containment facility. These usually occurred at this site elevation of 294 to 295 m elevation. For reference, the mining era top of the tailings dam embankment was about 297 m in elevation.

The Estimated Soil Profiles A, B’ and C, attached in Appendix A, are provided to assist in visually defining the above-described soil stratigraphy. An apparent discontinuity for the elevation of the lower and upper tailings materials is shown on Profile A between Stations 0+140 and 0+160, Profile B’ Stations 0+090 and 0+100, and Profile B’ between Stations 0+080 and 0+100. The discontinuity is about 1.0 m in difference, and we suspect it is due to the displacement and disturbance caused by the placement of the “consolidated waste” material.

5.3.3.1 Upper Sandy Tailings

The upper layer is described as poorly graded sand with silt and gravel (SP-SM) and contains occasional cobbles. The relative density of the soil was determined to be compact to dense based on the CPT testing results. The thickness of the layer ranged from about 0.5 to 1.5 m.

5.3.3.2 Lower Sandy Tailings

Underlying the sandier “upper tailings” is a layer of predominately more fine-grained materials. These are described as alternating layers of elastic silts with sand (MH) to silty lean clay with sand (CL), to silty sand with trace gravel (SM). The layering is characterized by alternating partings of the above-described soil types varying from less than 10 cm in thickness to about 70 cm in thickness. Table 2, below, indicates this alternating sequence of differing soil parting descriptions.

Based on this subdivided layer model, the upper layer ranges from about 0.5 to 1.5 m in thickness, and the lower portion ranges from about 2 to 3 m in thickness.

5.3.4 Sandy Embankment Fill

The dam shell at the site is comprised of a gravelly sand material and was investigated via two separate test pit investigation programs to ascertain the composition and extent of the material.

The soil is described based on visual identification as a light brown to brownish grey, poorly graded sand with gravel (SP) and contains occasional cobbles.

5.3.5 Bedrock

Bedrock was inferred based on drilling refusal where noted on the borehole records or as confirmed by drilling within the Thurber borehole records and from bedrock mapping methods completed by Englobe. Based on our visual examination of exposed bedrock outcrops at the site, we interpret the bedrock to be consistent with a granitic gneiss. Bedrock outcropping observed during the field investigation is denoted on the Site Plan attached in Appendix A.

5.3.6 Groundwater

The following Table 1 provides for a summary of the water level measurements from the existing instrumentations and groundwater monitoring well installed within the TSCA:

Table 1: Summary of Groundwater Level Instrumentation/Wells Located Within or Near the Tailings Containment Area

Instrument or Well ID	Location (1.)	Instrumentation Type	Avg. Water Elev., m (2.)
MW1	In TSCA/Tailings Stack	Open Piezometer Well	Blocked5.
MW2	In TSCA/Tailings Stack		293.70
MW3*	At North Embankment Toe		290.98
MW4*	At South Embankment Toe		290.98
VB1-TOP	South End of Tailings Stack	Vibrating Wire Piezometer	293.1 [3.]
VB1-BOTTOM	South End of Tailings Stack		293.4 [3.]
VB2-TOP	East End of Tailings Stack		294.4 [3.]
VB2- BOTTOM	East End of Tailings Stack		293.9 [4.]
VB3-TOP	North End of Tailings Stack		294.6 [3.]
VB3- BOTTOM	North End of Tailings Stack		294.8 [3.]
BH-22-06	Within Tailings Stack	CPT Measurement	293.8
Average of all Readings Located within the Tailings Stack:			**293.99**

** Located outside the central tailings stack - MW5 and MW6 are not listed in the table as they are outside the report study area.*
1. See Dwg. No. 1 - Site Plan for monitoring/instrumentation locations.
2. Reading on September 15, 2021.
3. Average reading over the period September 2018 - September 2021.
4. Average reading over the period September 2018 - September 2020.
5. Ice blockage at about 3.0 m depth (elevation 297.5 m).

Based on the site-specific data indicated above, Englobe recommends a design phreatic water level within the central tailings stack of at least 294.0 m elevation for any current slope stability modelling work. The above incorporates readings up through September of 2021. The phreatic water level should at least intercept the toe of the modelled embankment surface, which we would consider to be a conservative assumption given the existing and overlying impermeable BGM liner covering the central tailings stack.

6 TSCA Geotechnical Model

6.1 Soil Strength Model

Based on the acquired CPT data, the following summary is provided below in Table 2 to ascribe the most appropriate soil strength as a function of the soil layer classification. A further distinction is made to group the incremental soil layering within a more encompassing soil model grouping, e.g. upper tailings, lower tailings etc. Table 2 provides the derived soil layering obtained from the raw CPT data. The raw CPT data acquired from the investigation is attached in Appendix C.

Table 2: Summary of 2022 Site Investigation CPT Strength Data Categorized by Soil Layer Type

Ref. Borehole	Soil Model Layer Group Name	Depth Range (m)	Incremental Soil Layer Classification and Description	Effective strength, ϕ' (Deg.)	Average Undrained Shear Strength, Su (KPa)
BH-22-01	Consolidated Waste	2.6 - 3.1	Sand to silty sand	37.8	N/A
	Consolidated Waste	3.1 - 3.2	Clay to silty clay	18.7	163
	Consolidated Waste	3.2 - 3.8	Sand to silty sand	41.1	N/A
BH-22-02	Sand Cover & Consolidated Waste	0 - 2.6	Sand, gravelly sand and silty sand	Note 1.	
BH-22-03	Consolidated Waste	1.2 - 1.6	Gravelly sand to Silty sand & sandy silt	36.7	N/A
BH-22-05A	Sand Cover	0 - 1.0	Gravelly sand	42.8	N/A
BH-22-05B	Upper Tailings	2.5 - 3.4	Sand to silty sand	37.8	N/A
	Lower Tailings	3.4 - 4.1	Clay to silty clay	29.9	115.5
	Lower Tailings	4.1 - 4.8	Elastic silt	32.5	52.3
	Lower Tailings	4.8 - 5.0	Elastic silt to silty clay	32.5	88.8
	Lower Tailings	5.0 - 5.6	Sand to silty sand	35.1	N/A
	Lower Tailings	5.6 - 5.7	Clay	31.7	146.3
	Lower Tailings	5.7 - 5.8	Elastic silt	28.8	78.4
	Lower Tailings	5.8 - 6.0	Clay	32.1	169.8
BH-22-06	Consolidated Waste	2.4 - 2.9	Sand to silty sand	38.1	N/A
	Upper Tailings	2.9 - 4.6	Sand to silty sand	36.2	N/A
	Lower Tailings	4.6 - 4.9	Clay to silty clay	30.4	96
	Lower Tailings	4.9 - 5.5	Elastic silt	18.9	24.6
	Lower Tailings	5.5 - 5.6	Clay	29.5	98.7
	Lower Tailings	5.6 - 5.7	Gravelly sand	39.5	N/A

Table Notes:
1. Borehole was not assessed with CPT data due to pre-drilling refusal at depth.
N/A - Not applicable for non-cohesive (e.g., sand-like) soils.

The determination of the soil strength presented above in Table 2 is derived using the basic CPT data output by way of calculation based on the correlation put forth by the author(s) referenced below. There are several correlations relating effective friction angle strength, ϕ', to CPT parameters.

Englobe utilized the following two (2) authors, depending on the soil classification type, for calculating the soil strength based on the following criterion:

- Kulhawy and Mayne (1990) for clean sands:

  $\phi' = 17.6 + 11 \log Qtn;$

  Where:

  Q_{tn} - Is the normalized cone resistance where cone resistance can be expressed in a non-dimensional form, normalized for the in-situ vertical stress with the stress exponent, n, varying with soil type and stress level. When n=1, $Q_{tn} = Q_t$ (normalized cone resistance).

- For fine-grained soils, the following correlation presented by Mayne (2006) was used by Englobe with a Normalized Soil Behaviour Type of $SBT_n < 4.0$ (e.g., for cohesive soils such as clays and silts):

  $\phi'(\text{deg}) = 29.5 \cdot B_{q0.121}[0.256 + 0.336B_q + \log Q_t]$

  Where:

  B_q - Is the normalized pore pressure ratio defined as the difference in measured and equilibrium pore pressures normalized with respect to the net cone resistance.

  This is further defined as the following:

  $Bq = \Delta u/q_n$

  Where:

  $\Delta u = u_2 - u_0$ (The equilibrium pore pressure is calculated based on water table depth)

  $q_n = q_t - \sigma_{v0}$

Englobe had the choice of utilizing the strength correlation presented by Robertson and Campanella (1983), which provides for estimating the peak friction angle for sands. In reviewing the results presented by Mayne (2006) and Kulhawy and Mayne (1990) noted above, the results derived from Robertson and Campanella (1983) had consistently high strength values. In recognizing the peak strength nature of the correlation and for conservativeness in the soil model development, Englobe chose to use the two (2) authors as presented above. The full data presentation as acquired from the CPT probe and the calculation of strength values are presented in the CPT acquisition tables attached in Appendix C.

Table 3 below presents the weighted average soil layer strength result as a function of the incremental soil layer thickness. This approach considers averaging the resultant value based on individual soil minor soil layer thickness rather than an arithmetic average of all resultant values of the soil stratum. The weighted average equation is given as the following:

$$\bar{x} = \frac{w_1x_1 + w_2x_2 + \cdots + w_nx_n}{w_1 + w_n + \cdots w_n}$$

Where:

w = average soil strength value over the incremental minor soil layer; and,

x = Incremental minor soil layer thickness.

Table 3: Weighted Average Soil Group Strength from 2022 CPT Data Based on Soil Model Group as a Function of Layer Thickness

Soil Model Layer Group Name	Ref. Borehole	Layer Top Depth Range (m)	Layer Thickness Range (m)	Weighted Average Effective strength, ϕ' (Deg.)	Weighted Average Undrained Shear Strength, Su (KPa)
Sand Cover	BH-22-05A	0 to 1.4	1.0 to 1.4	42.8	NA
Consolidated Waste Tailings	BH-22-03	1.8 to 2.2	0.8 to 4.5	38.9	NA
Upper Tailings	BH-22-01, BH-22-03, BH-22-05B, BH-22-06	1.8 to 2.1	0.8 to 2.3	35.4	(1.)
Lower Tailings	BH-22-5B, BH-22-06	3.4 to 4.6	1.9 to 2.8	30.4	71.4

Notes:

1. Undrained shear strengths are not applicable when applied to non-cohesive (e.g. sand-like) soils.

2. CPT data not obtained from this borehole.

N/A - Not applicable for non-cohesive (e.g., sand-like) soils,

6.2 Summarized and Updated Soil Model Parameters

Table 4, below, provides the updated soil strength parameters used in the slope stability model. The parameters presented were determined from the values outlined above in Table 3. Perhaps the most distinguishable aspect of the updated model would be the sub-division of the modelled tailings stratum from one (1) layer as previously modelled by Englobe and Stantec to two (2) units; an “upper” and “lower” tailings layer.

The upper tailings layer was generally determined to be of different material composition and slightly higher strength than previously modelled. The lower tailings layer was determined to behave more consistently with a fine-grained or cohesive material, e.g. more clay-like in behaviour rather than sand-like as previously modelled. With this revised model, it is apparent that the prior soil model was overly conservative and reflective of the lack of any in situ testing to attest to the soil properties and strengths.

We also note that the slope stability modelling software has previously shown the optimized critical slip failure surface to be contained within the sandy embankment material region, meaning the chosen soil parameters associated with the tailings materials do not affect the static slope stability results.

Regardless, the result of the revised soil model presented herein is that the overall stability of the TSCA can be considered more stable than previously modelled. To account for the aggregated variability of the strength parameters provided in the weighted average value derivation, the assigned strength values presented below in Table 3 are capped by a maximum effective friction angle value of ϕ' = 35 degrees or rounded down by 2 degrees for the values listed per soil group type presented above in Table 3. The result of this exercise is the revised soil model presented below in Table 4. For ease of comparison, the previous model results are presented on the left-hand side of the table.

Table 4: Summary of Previous and Updated Geotechnical Soil Design Parameters

	Previous Design Parameters				Revised Design Parameters			
Material Description	*Unit Weight, γ_{Sat} (kN/m^3)*	*Effective strength, φ' (Deg.)*	*Soil Cohesion, c (kPa)*	*Avg. Thickness (m)*	Unit Weight, γ_{Sat} (kN/m^3)	Effective strength, φ' (Deg.)	Soil Cohesion, c (kPa)	Thickness (m)
Composite Cover	*20.0*	*32*	*0*	*0.7*	20.0	35	0	1.0
Embankment Fill	*20.0*	*32*	*0*	*4.1*	20.0	32	0	4.5 to 5
Mine Rock/Drain Rock or Fine Rockfill	*18.0*	*34*	*0*	*1.2*	18.0	34	0	1.2
Consolidated Mine Waste	*19.0*	*30*	*0*	*1.2*	19.0	35	0	0.8 to 4.5
Upper Tailings	*Not modelled in prior reporting*				18.0	33	0	0.8 to 2.3
Lower Tailings	*18.0*	*26*	*0*	*3.1*	16.0	28	Or 70	1.9 to 2.8
Peat	*17.0*	*0*	*15*	*0.25*	N/A	N/A	N/A	Not Encountered
Bedrock	*N/A*	*N/A*	*N/A*	*N/A*	N/A	N/A	N/A	N/A

6.3 Updated Slope Stability Review

6.3.1 Previous 2021 Slope Stability Review

In 2021 Englobe completed a slope stability analysis at the site as a result of completing a dam safety review report[5] (DSR) process. As stated in the DSR report, Englobe utilized the same soil model parameters in the referenced Stantec report, except that the as-built embankment profiles were utilized for the DSR review process. The previous soil model parameters used are presented on the left-hand side of Table 4.

It is noted from the DSR report that the slope stability slip surface was shown to interact only within the embankment fill materials (e.g. sandy material) and that the influence of the contained tailings within the slope stability model had no effect on the stability outcome. When slip surfaces were forced to interact with the tailings stratum, the resultant factor of safety exceeded values greater than 2.0.

6.3.2 Updated 2022 Slope Stability Review

The design basis and the updated soil model parameters are based on the values presented on the righthand side of Table 4. As stated in the prior report sections, the updated values were determined from the most recent CPT data acquired at the site during the 2022 field investigation. In addition to the CPT data, Englobe utilized the existing 2018 Thurber borehole records to supplement the 2022 investigation information and develop the approximated soil profile cross-sections attached in Appendix A. The analysis soil profile sections are estimated and based on a composite of information available from Stantec as-built Drawing No. C-CAM-10 for toe and dam shell regions, Stantec as-built Drawing No. 8 and Englobe Section C for tailings impoundment region. Additionally, information from Stantec as-built Drawing No. 8 (2018) was used for determining the final surface and thickness of the “consolidated waste” layer. The soil profiles

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[5] Gordon Lake Group Geotechnical Services Program 2021 - Dam Safety Review (DSR). Englobe Corp., Mount Pearl, NL. March 2021.

were utilized in the updated slope stability review, for which the resultant output from the slope stability software program is attached in Appendix D for both the static and pseudo-static analysis case.

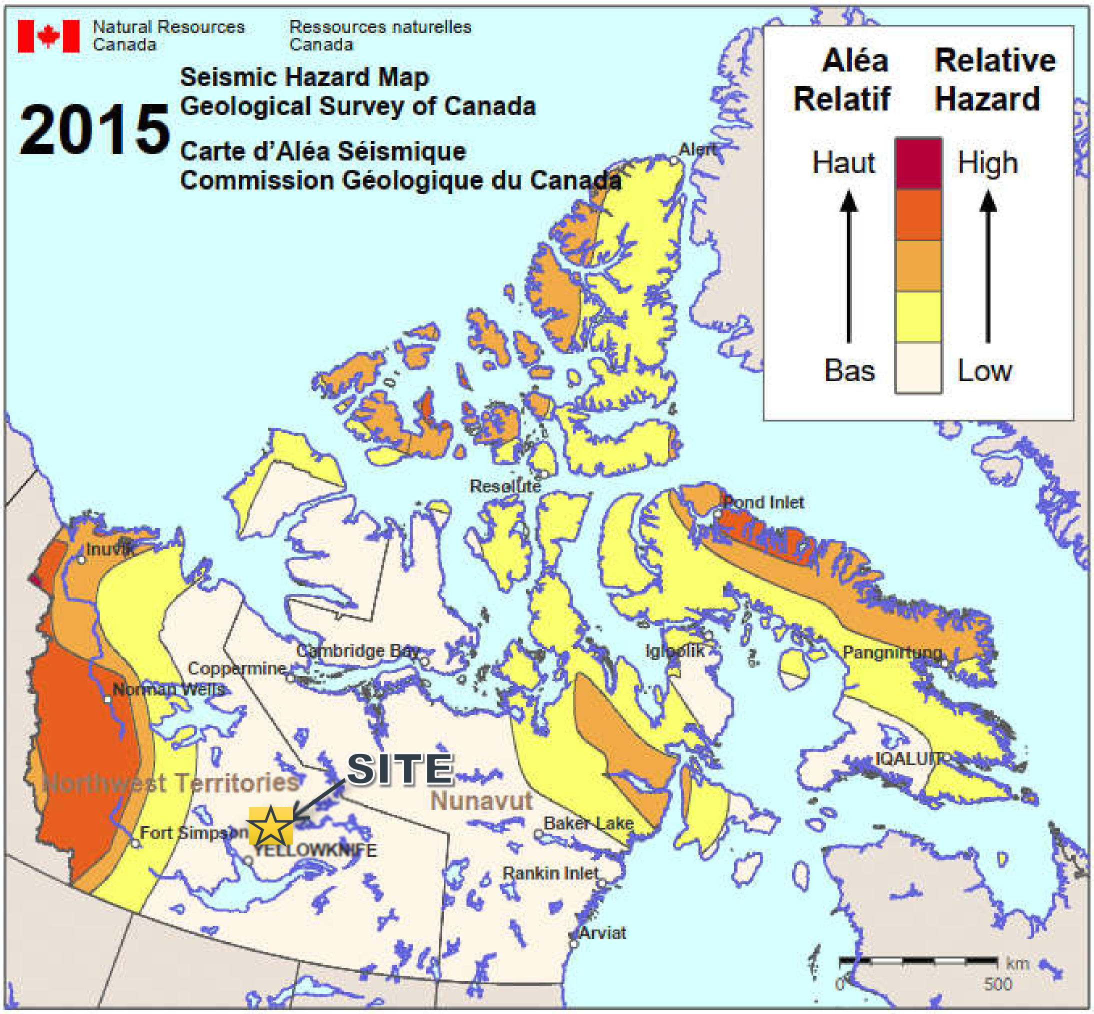
6.3.3 Site-Specific Seismic Design Review

Based on Englobe's review of the probable interpolated seismic hazard values of the site as provided by the 2015 National Building Code of Canada, web-based version[6], and by imputing the approximate site coordinates of; 62.9865°N, -113.2042°W; a peak ground acceleration (PGA) value of 0.030 g (where g = 9.81 m/s2) is provided for a 2% in 50 years (0.000404 per annum) reoccurrence probability.

Based on the relatively low ground acceleration input modelled at the site of 0.030 g (e.g. site-specific PGA) and the relative lack of a modelled/designed phreatic water surface within the tailings stack, seismic-induced liquefaction would be considered to be negligible or non-existent for this site.

The Stantec 2018 Updated Design Basis Report used a 5% in 50 years (0.001 per annum) year return period in their modelling work for a 0.015 g site-specific PGA result. The 0.000404 per annum reoccurrence probability used in Englobe's modelling work is more conservative.

Figure 6.1: Simplified seismic hazard map for Canada, the provinces and territories (2015)



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[6] Availble from the following website link: http://www.earthquakescanada. nrcan.gc.ca/hazard-alea/interpolat/index_2015-en.php

Further to the above assessments, the site's liquefaction potential would be classified based on the seismic hazard map published by Natural Resources Canada (NRC) as "low," as illustrated above in Figure 6.1.

Similarly to the liquefaction assessment above, based on Englobe's pseudo-static slope stability review, the site-specific PGA is too low to reduce the factor of safety threshold stipulated in the guidance provided by the CDA; therefore, the slope stability for the static case provided in Section 4.5 was noted to be the more critical analysis condition.

6.3.4 Slope Stability Analysis Methodology

Slope stability analyses were completed on the as-built dam embankment section, both under static and seismic conditions. Stability analyses were completed using the limit equilibrium methodology using the following computer program: GEOSTUDIO SLOPE/W (GEO-SLOPE International Ltd., 2020, with software updates to version 2021.3).

The resultant and critical slope stability Factor of Safety (FOS) were computed within the software program using the Morgernstern-Price method (Morgenstern & Price, 1965) and using the software-generated optimized slip surface and grid and radius method. The grid and radius method was utilized to force slip surfaces within the tailings zone and to assess the FOS for this configuration.

The cross-sections analyzed in this report represent the most critical sections of each embankment segment (i.e., Sections A, B' and C). The modelled cross-section alignments used in the stability analysis are shown on Drawing No. 1, attached in Appendix A.

The slope stability modelling work comprised checking the stability of the embankment for the following conditions:

- Static conditions;
- The maximum credible earthquake (MDE) events; and,
- Post-earthquake conditions using residual (post-liquefaction) tailings strengths.

In accordance with the CDA Guidelines, the minimum acceptable slope stability FOS requirements are as follows:

- FOS ≥ 1.5 under static conditions during operations and post-closure;
- FOS ≥ 1.0 under pseudo-static conditions;
- FOS ≥ 1.2 under post-seismic conditions; and,
- FOS ≥ 1.3 under temporary construction conditions (not applicable for this site).

Table 5: Summary of Geotechnical Slope Stability Factor of Safety Results

Slope Stability Section (Analysis STA Section)	Static Slope Stability Factor of Safety, As-Built Conditions 1.	Pseudo-Static Slope Stability Factor of Safety, As-Built Conditions 2.
Section A (@ STA 0+180)	1.76	1.63
Section B' (@ STA 0+120)	1.63	1.52
Section C (@ STA 0+120)	1.62	1.50

1. Downstream Static Slope Stability Factor of Safety (Required Final FOS ≥ 1.50).
2. Downstream Pseudo-Static Slope Stability Factor of Safety (Required Final FOS ≥ 1.00).

Previously within Englobe's 2021 DSR report, we had duplicated Stantec's slope stability sections and verified and generated very similar results (e.g. within 0.01-0.02 of the FOS result value). On that basis, we verified the previous Stantec results via duplication in the same software program, and we would generally indicate the results consistent with what we could verify independently.

Based on the results in Table 5 above, the as-constructed embankment slope stability FOS exceeds the minimum value that would be acceptable CDA for the post-closure case, e.g., landform closure.

The resultant output figures corresponding to the values in Table 5 above for the slope stability analyses are attached in Appendix D. The analyses soil profile sections are estimated and based on a composite of information available from Stantec as-built Drawing No. C-CAM-10 for toe and dam shell regions, Stantec as-built Drawing No. 8 and Englobe Section C for tailings impoundment region.

6.4 Review of Tailings Liquefaction Potential

Based on the relatively low ground acceleration input modelled at the site of 0.030 g (e.g. site-specific peak ground acceleration - PGA) and the relative lack of an elevated phreatic water surface within the tailings stack, or for that matter, a substantially thick tailings stack that would be greater than about 5.0 m in height, seismic-induced liquefaction would be considered to be negligible or non-existent for this site.

As described in this section, a further assessment of the tailings liquefaction susceptibility was made by evaluating the potential cyclic liquefaction potential using the cone penetration test (CPT) data (P.K. Robertson and C.E. Fear Wride)[7]. For low-risk, small-scale projects, the potential for cyclic liquefaction can be estimated using penetration tests such as the CPT. To complete this evaluation, which is similar to the strength evaluation approach outlined in Section 6.1 - Soil Strength Model, we assessed only the portions of the tailings materials that would have a phreatic surface (e.g. water table), which was assigned at an elevation of 294.0 m.

Again as completed in Section 6.1, an averaging of the normalized friction ratio, “F,” and the normalized penetration resistance, “Q,” was determined for each soil layer classification type. The result of this exercise is presented below in Table 6:

Table 6: Weighted Average Soil Properties from the 2022 CPT Data Set for Liquefaction Susceptibility Review (for Soil Layers Below the Design Water Table of 294.0 m Elevation)

Ref. Borehole	Soil Model Layer Group Name	Depth Range (m)	Elevation Range (m)	Incremental Soil Layer Classification and Description	Avg. Normal-ized Friction Ratio (F)	Avg. Normal-ized Pene. Resistance (Q)
BH-22-05B	Lower Tailings	4.1 - 4.8	294.7 - 294.0	Elastic silt	3.6	8.9
	Lower Tailings	4.8 - 5.0	294.0 - 293.8	Elastic silt to silty clay	2.4	13.7
	Lower Tailings	**5.0 - 5.6**	**298.8 - 293.2**	**Sand to silty sand**	**1.1**	**38.9**(1.)
	Lower Tailings	5.6 - 5.7	293.2 - 293.1	Clay	6.1	20.0
	Lower Tailings	5.7 - 5.8	293.1 - 293.0	Elastic silt	6.3	10.5
	Lower Tailings	5.8 - 6.0	293.0 - 292.8	Clay	5.5	22.0
BH-22-06	Lower Tailings	4.9 - 5.5	294.0 - 293.4	Elastic silt	4.3	4.1
	Lower Tailings	5.5 - 5.6	293.4 - 293.3	Clay	6.0	13.8
	Lower Tailings	5.6 - 5.7	293.3 - 293.2	Gravelly sand	1.1	112.6
Note 1 : This layer is determined to be potentially liquefiable; see report text for further context.						

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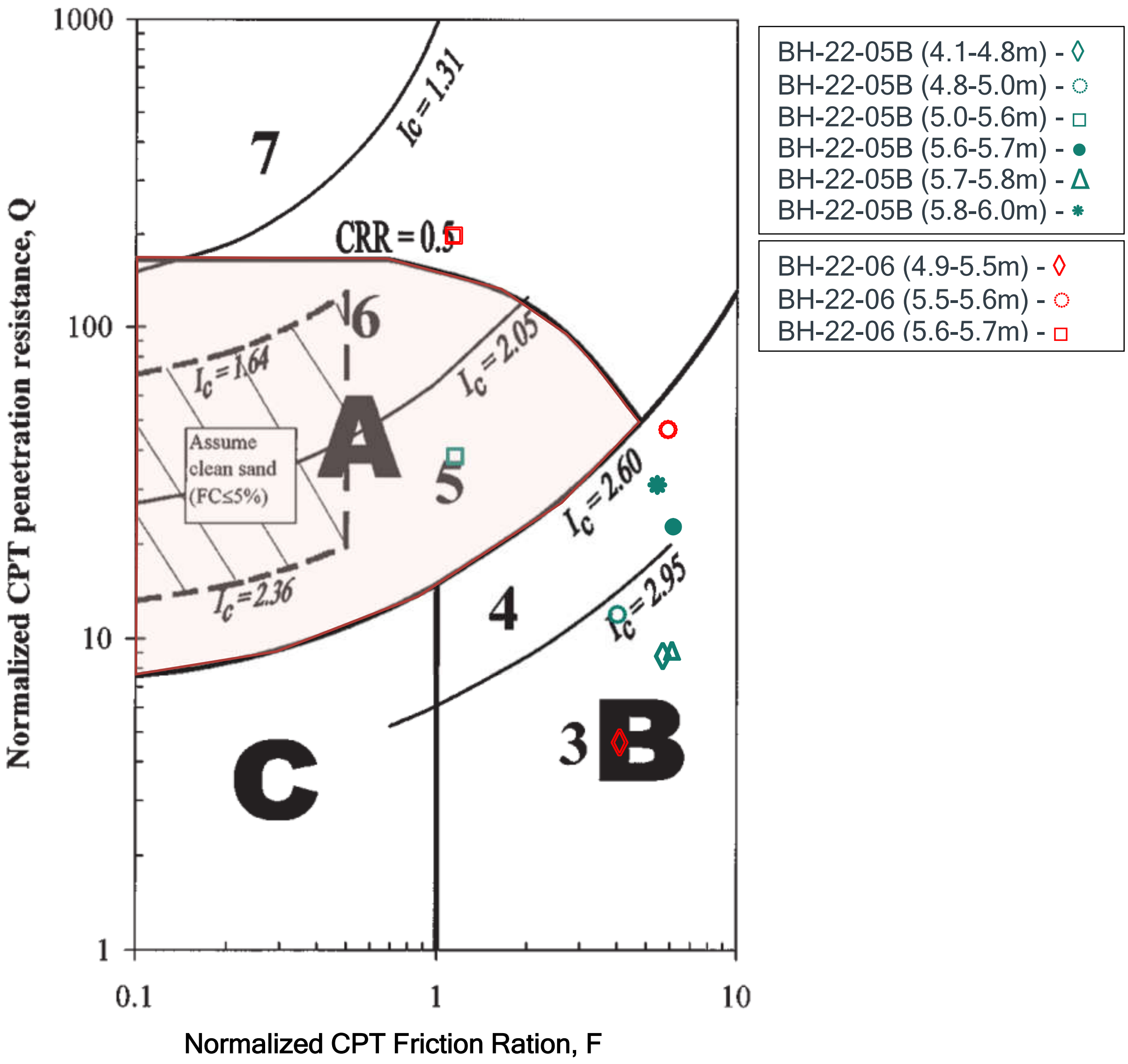
[7] Evaluating cyclic liquefaction potential using the cone penetration test. P.K. Robertson and C.E. (Fear) Wride. Geotechnical Group, University of Alberta, Edmonton. April 1997.

The determined “F & Q” values shown in Table 6 are then plotted on a liquefaction potential chart, Figure 6.2: Summary of Liquefaction Potential Soil Classification Chart By Robertson (1990), to describe the degree of susceptibility of the individual soil layers assessed based on the CPT soil behaviour type classification. Within the chart, the following regions are ascribed:

- ”Zone A” denotes susceptibility to cyclic liquefaction, depending on the magnitude and duration of cyclic loading (this region is shaded in orange);
- “Zone B” denotes that liquefaction is unlikely with a check of other specific criteria; and,
- “Zone C,” is susceptible to flow liquefaction and (or) cyclic liquefaction possible, depending on soil plasticity and sensitivity as well as the magnitude and duration of cyclic loading.

In summary, based on the nine (9) individual layers/values assessed with this methodology, a single isolated layer of 600 mm thickness was noted within borehole BH-22-05B that could be considered potentially liquefiable. Given the limited thickness of this layer within the overall soil profile and the lack of a significant seismic source, the overall liquefaction potential from this isolated occurrence would be negligible.

Figure 6.2: Summary of Liquefaction Potential Soil Classification Chart By Robertson (1990)



6.5 Site-Specific CDA Dam Classification Review

In prior reports completed by Stantec, a finalized or formal assignment of the CDA dam classification was not determined for the Calmaren site. However, Stantec had assumed the dam classification status would likely be considered as “low” according to the CDA classification criteria.

Table 7 below outlines the CDA classification criteria, which are based on the potential consequences of a dam failure, including loss of life, loss of environmental and cultural values, and losses to infrastructure and the economy:

Table 7: CDA Dam Safety Guidelines Classification Of Dams[8]

Dam Class	Population at Risk	Incremental Losses		
		Loss of Life	Environmental and Cultural Values	Infrastructure and Economics
Low	None	0	Minimal short-term loss. No long-term loss.	Low economic losses; area contains limited infrastructure or Services.
Significant	Temporary Only	Unspecified	No significant loss or deterioration of fish or wildlife habitat. Loss of marginal habitat only. Restoration or compensation in kind highly possible.	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes.
High	Permanent	10 or Fewer	Significant loss or deterioration of important fish or wildlife habitat. Restoration or compensation in kind highly possible.	High economic losses affecting infrastructure, public transportation, and commercial facilities.
Very high	Permanent	100 or Fewer	Significant loss or deterioration of critical fish or wildlife habitat. Restoration or compensation in kind is possible but impractical.	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances).
Extreme	Permanent	More than 100	Major loss of critical fish or wildlife habitat. Restoration or compensation in kind impossible.	Extreme losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances).

There is some debate amongst the Canadian dam safety community whether the above classifications should refer to actual or potential consequences if a dam fails and whether there is a credible failure mode. Further consideration must be made when new or existing deficiencies within a particular site should be factored into the ranking and factors arising due to construction or updated guidance from local jurisdictions and national guidance (e.g. CDA).

Other Canadian jurisdictions have considered delicencing dams if there is no credible failure mode which may be a consideration for this site. What is meant by important versus critical fish or wildlife habitat is also open for interpretation amongst other interpretations pertaining to economic losses. By contrast, the United States National Dam Safety Program provides for a prescriptive evaluation that considers actual real-dollar costs for the consequences of a dam failure of deficiencies that may arise for determining the risk of particular dams.

Based on Englobe’s assessment of the site, and our review of prior reporting and as-built documentation prepared by Stantec, we would consider a dam classification of “low” as most appropriate for the Camlaren site based on the current site use and, barring any future developments at or near the site. The dam classification should be re-assessed during any subsequent dam safety inspections and reviews (DSI/DSR) as warranted.

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[8] From Table 2.1 of the CDA Technical Bulletin: Inundation, Consequences, and Classification for Dam Safety (2007) - Updated to 2013 Edition.

The above assessment is based on the following assumptions or known facts from this site:

- Population at risk: None

  There is no permanent population near the site, and the site is only accessible by helicopter as the most direct and quickest mode of transportation. Other means to access this site with greater difficulty include access via small craft boat or snowmobile during the winter months. We understand that the site is not known to be used for temporary use, such as by transitory hunters.

- Loss of life: None

  There is no permanent population near the site. See also above “population at risk” assessment.

- Environmental and Cultural Values: Likely low to negligible.

  Englobe is not aware of any existing archeological sites or other similar traditional hunting grounds and similar pre-designated cultural areas of significance at the Camlaren site.

  From an environmental value perspective, the surrounding Camalren area is an unspoiled natural environment. The consequences of mine waste material entering into the system could be significant if it were not for the current environmental mitigation and monitoring strategies being implemented unrelated to this review (e.g. visa vi Gordon Lake long-term environmental monitoring program) and the containment and capping of the mine waste materials with the existing BGM liner system. An additional minimum 10 m buffer area exists around the tailings containment facility and the waters of Gordon Lake and proved an additional measure for release into the aquatic environment in the event of a hypothetical failure of the facility.

- Infrastructure and Economics: Non-existent.

  Other than the existing tailings containment facility and the existing instrumentation installed for the facility as part of the above-referenced environmental monitoring program, there is no existing infrastructure or effects on the local economy should a failure or damage to the facility occur other than the resulting costs to reinstate the facility(s) in such occurrences. Due to the site’s remoteness relative to the nearest serviceable community (e.g. Yellowknife), any mitigation and or repair work would, however, be at an elevated cost, and such work could likely only be performed during the summer and early fall months.

7 Concluding Remarks

Herewith this geotechnical site investigation and analysis, Englobe has reviewed the following geotechnical criteria for the consideration of mine tailings dam landform closure:

- The contained tailings material should be considered stabilized and non-liquefiable, which was reviewed in report sections 6.1 - Soil Strength Model and 6.4 - Review of Tailings Liquefaction;
- The site's embankments should be geotechnically stable per the CDA requirements, which were reviewed in Section 6.3 - Updated Slope Stability Review.

Additionally, prior dam safety inspections completed by Stantec and reviews by Englobe demonstrated no major outstanding issues with this site's design and maintenance procedures to date. Ultimately, short-term or intermediate maintenance protocols should not be required for the site in the case of a landform closure status. Based on current observations made by Englobe to date, only minor erosion of the surficial layer of the sand cover has occurred. Based on our current assessment, the erosion appears to be mitigated with the intended plant growth on the soil cover, which in prior years was slower than expected in being established.

Englobe's 2021 dam safety review was completed independently from the site's original engineer-of-record. The review concluded that while there were minor deficiencies, these were not what we considered in the report to be significant and in contravention of the CDA guideline requirements.

The dam safety review indicated minor erosion of the soil liner cover material along the embankments as a recurring issue at the site. However, Englobe notes, as of our 2022 inspection, that the minor erosion appears to be self-healing and attributable to the establishment of significantly more plant growth observed at the site from prior years.

7.1 Slope Stability

Stantec's 2018 rehabilitation construction design indicated adequate slope stability for the planned design configuration. The 2021 dam safety review (DSR) completed by Englobe independently reviewed this design, and we conducted our own slope stability analysis of the as-built condition, which indicated that sufficient slope stability was achieved.

7.2 Tailings Stability

For passive and landform closure status, the site's contained tailings material should be considered stabilized and non-liquefiable. As discussed in this report, the following characterizations are made regarding the stability of the tailings at this site:

- The tailings stack is of overall limited thickness, between about 4 to 4.5 m in maximum thickness;
- The tailings stack is underlaid by a solid foundation consisting of a granitic bedrock;
- The tailings stack is not being readily recharged by water infiltration or surface water inflows via the TSCA liner system and thus would be permitted to become de-watered over time. The lowering of the water table, which is thought would over time, would further prevent the possible occurrence of liquefaction. The presence of a static water table of phreatic water pressures within a sandy to fine-grained soil under cyclic loading is a precursor for liquefaction potential to occur;

- Cone penetration testing (CPT) testing results indicated the tailings to have sufficient strength;
- The tailings were indicated to be of low liquefaction potential based on a soil classification review; and,
- The site does not have a significant mapped earthquake source to induce probable ground vibration-induced liquefaction at this site.

7.3 Closing

Based on the above reporting, Englobe considers the TSCA well-progressed into the passive closure phase for a mining dam structure which is the precursor to attaining a landform-type closure status according to the CDA.

With this report and prior DSR and DSI reporting observations, Englobe concludes the site is currently in a passive closure status from a civil-geotechnical engineering perspective in that no future impending construction or modifications to the current condition have been recommended by Englobe or the prior engineer-of-record (Stantec) for this site.

Accordingly, we would recommend a landform closure classification be assigned to this site within the next 1 to 2 years period to confirm that the following minor deficiencies noted in the prior DSR and DSI reporting are documented to be unchanged and stabilized:

- Chronic erosion rilling on the embankments ceases to occur. The coco-mats should also be inspected for degradation and chronic dislodgement annually or until it has been established through mitigation or otherwise that any minor embankment surface erosion has ceased. This may occur with the establishment of more plant growth.
- From about Station 0+320 to 0+335 (e.g. about 15 m in length), the south perimeter ditch is slightly undercut by the south embankment. This deficiency was previously noted in prior post-inspection reviews completed by Stantec following construction in 2018. During this investigation, there appeared to be no change in condition, year-over-year.
- The depressions located in the northeast portion of the TSCA should be monitored for further settlement. During this investigation, there appeared to be no change in condition, year-over-year.
- The observed ice blockage in monitoring well MW1 should be removed to permit future water level measurements.
- Continue annual inspection or surveillance of the TSCA to monitor any changes in erosion is recommended until it is established that erosion is no longer occurring or otherwise further mitigated. The site surveillance, inspection and maintenance work should be completed according to the existing Operations, Maintenance and Surveillance (OMS) plan for the Camlaren site.
- As noted in prior inspection reporting completed by Stantec during the 2018 TSCA construction period, the intended vegetation growth for this site has been slow to establish. Slow vegetation growth and a reoccurrence of loose or dislodged coco-mats were observed in some areas, which can represent difficulty in controlling erosion of the soil liner system. During this investigation, we note about 25% more plant growth coverage based on year-over-year observations.

With a landform closure status for the mining dams at this site, it is reasonable for Englobe to further recommend to regulatory authorities with jurisdiction over this site that it could be delisted as a mining dam structure.

8 References

Report footnote references in numerical order:

1. Final Report: Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites. Stantec Consulting Ltd. Dartmouth, NS. March 31, 2020.
2. Updated Report: Gordon Lake Group Design Basis. Stantec Consulting Ltd. Dartmouth, NS. September 2018.
3. Gordon Lake Group Geotechnical Services Program - 2021 Dam Safety Review (DSR). Final Report. Englobe Corp., Mount Pearl, NL.
4. Updated Report: Gordon Lake Group Design Basis. Stantec Consulting Ltd. Dartmouth, NS. September 2018.
5. Gordon Lake Group Geotechnical Services Program 2021 - Dam Safety Review (DSR). Englobe Corp., Mount Pearl, NL. March 2021.
6. NRC website link: http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/index_2015-en.php
7. Evaluating cyclic liquefaction potential using the cone penetration test. P.K. Robertson and C.E. (Fear) Wride. Geotechnical Group, University of Alberta, Edmonton. April 1997.
8. From Table 2.1 of the CDA Technical Bulletin: Inundation, Consequences, and Classification for Dam Safety (2007) - Updated to 2013 Edition.

Other references reviewed or cited for this report:

9. CDA, 2013. Canadian Dam Association Dam Safety Guidelines, 2007, revised 2013.
10. CDA Technical Bulletin: Inundation, Consequences, and Classification for Dam Safety (2007) - Updated to 2013 Edition.
11. CDA, 2014. Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2014.
12. Englobe, 2021. Final Report: Gordon Lake Group Geotechnical Services Program 2021 Dam Safety Review (DSR) – Tailings and Soil Containment Area, Camlaren Mine Site, NT
13. Mayne, PW (2006). In situ test calibrations for evaluating soil parameters. Proc., Characterization and Engineering Properties of Natural Soils II, Singapore.
14. Robertson, PK (2009). Interpretation of cone penetration tests – a unified approach, Canadian Geotechnical Journal, 46(11):1337-1355.
15. Kulhawy, F.H., and Mayne, P.H., 1990. Manual on estimating soil properties for foundation design, Report EL-6800 Electric Power Research Institute, EPRI, August 1990.
16. Stantec, 2018b. FINAL - 2018 As-Built Construction – Camlaren TSCA. Report prepared for Public Works and Government Services Canada and Indigenous and Northern Affairs Canada dated December 21, 2018.

17. Stantec, 2018a. Updated Report: Construction and Post-Construction Monitoring Plan - Gordon Lake Group Sites, prepared for PSPC and INAC, report dated April 20, 2018.

18. Stantec, 2018. 2018 Post Construction Inspection – Camlaren TSCA, Part of GLG. Prepared for PSPC and INAC, report dated December 11, 2018.

9 Report Use and Conditions

This report has been prepared for the sole benefit of the Client, and their agents and may not be used by any third party without the express written consent of Englobe Corp. and the Client. Any use which a third party makes of this report is the responsibility of such a third party. The comments and recommendations made within this report are for preliminary planning and design purposes only. As project planning and design proceed, we would be pleased to provide additional geotechnical consultation, if applicable.

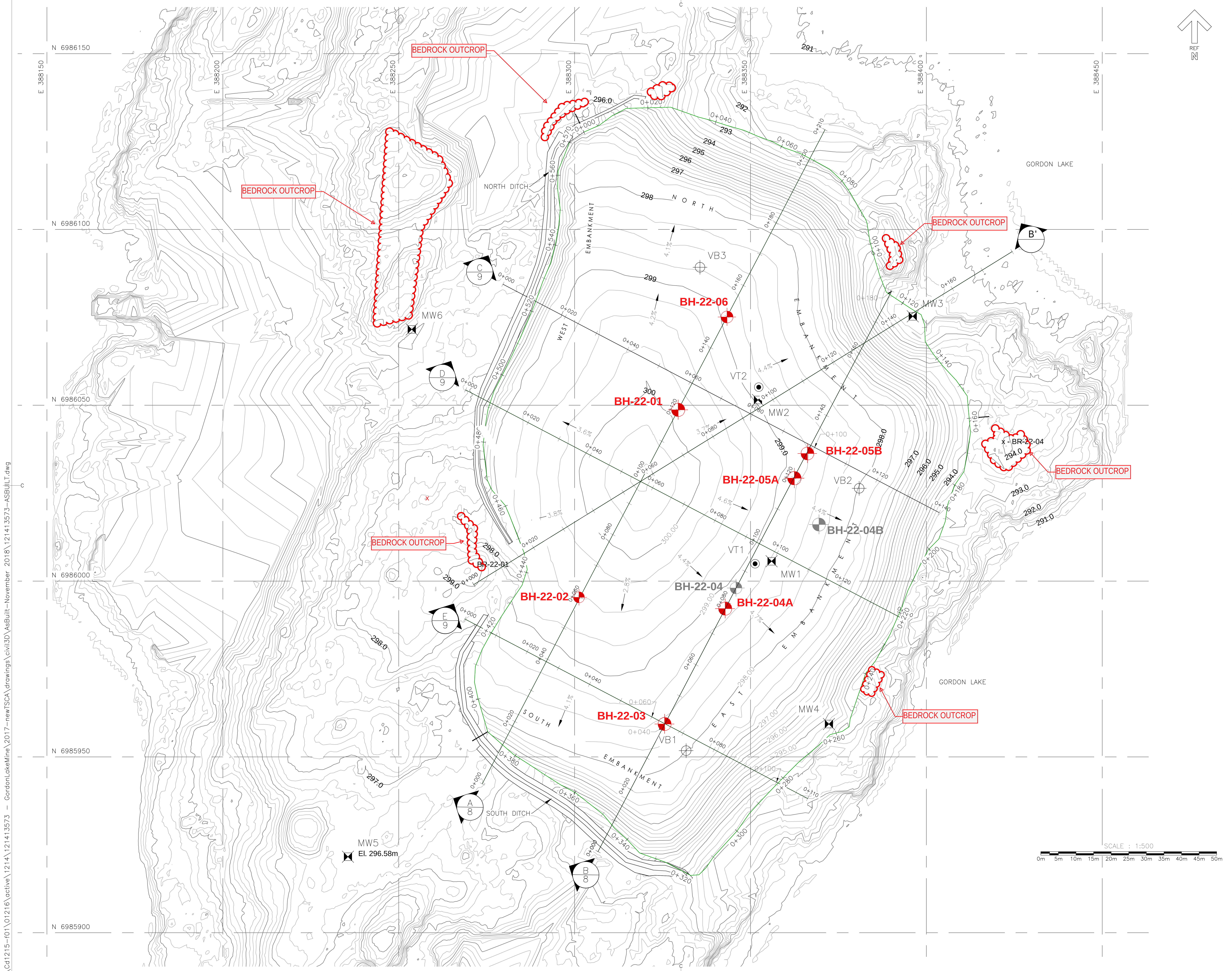
A subsurface investigation is a limited sampling of a site, and the geotechnical investigation undertaken has involved random sampling of site conditions. The comments and recommendations given herein are based on information gathered at specific sampling locations and can only be extrapolated to an undefined limited area around these locations. Variations throughout the site may differ from data collected at the sample locations. The extent of the limited area depends on the subsurface conditions encountered (e.g. soil, rock and groundwater), as well as the history of the site reflecting natural, construction and other activities. Should any conditions be encountered during construction that is contrary to those reported herein, we request immediate notification so that reassessment of our comments and recommendations can be undertaken. Further, and according to the City of St. John’s Specification Book, borehole/test pit information is provided for guidance and is only accurate for the exact location where completed; therefore, inference on subsurface conditions between borehole locations is left for the user(s) of this information to determine.

We trust the enclosed information meets with your satisfaction. Should additional information be required, please do not hesitate to contact us at our office.

Appendix A

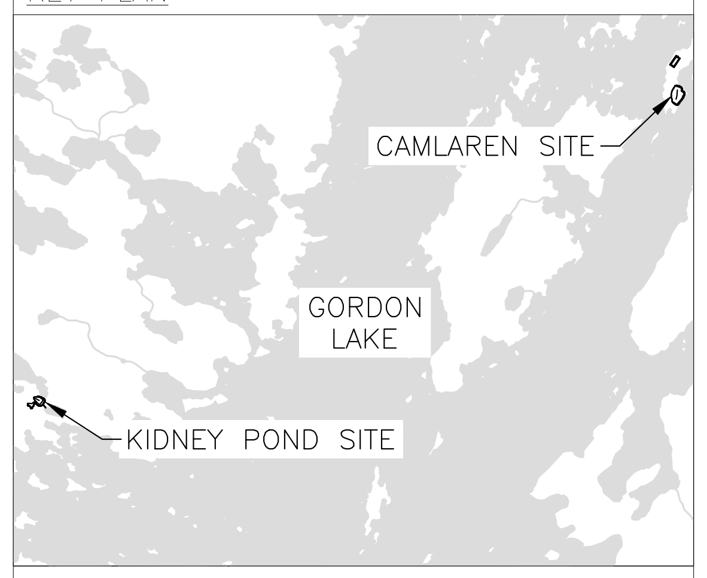
Drawing No. 1 - Site Plan

Estimated Soil Profiles A, B' and C



Public Works and Government Services Canada
Travaux Publics et Services gouvernementaux Canada

KEY PLAN



COORDINATE LISTING		
	NORTHING	EASTING
MW1	6986005.642	388355.990
MW2	6986051.515	388352.121
MW3	6986075.304	388396.132
MW4	6985959.345	388372.302
MW5	6985921.607	388235.566
MW6	6986071.579	388253.710
VB1	6985957.036	388334.663
VB2	6986026.390	388380.877
VB3	6986079.395	388352.537
VT1	6986004.930	388351.303
VT2	6986055.144	388352.342

NOTES:

1. DRAWING ADAPTED FROM STANTEC DWG. No. 1 (P/N R.057573) "AS-BUILT CONSTRUCTION SITE PLAN" DEC. 13, 2018.
2. 2022 ENGLOBE BOREHOLE LOCATIONS ARE APPROXIMATE AND WERE LOCATED BY MEASURING FROM EXISTING SITE WELL RISERS.

LEGEND:

—— 293.00 ——	MAJOR CONTOUR
————	MINOR CONTOUR
MW ☒	MONITOR WELL
VT ◉	THERMISTOR
VB ⊕	VIBRATING WIRE PIEZOMETER
◐	PARTIALLY OR COMPLETED BOREHOLE LOCATION (ENGLOBE, 2022)
◐	BOREHOLE ATTEMPTED, NOT COMPLETED (ENGLOBE, 2022)

revisions date

project projet

drawing dessin

designed conçu

date

drawn dessiné

date

approved approuvé

date

Tender Soumission

project number no. du projet

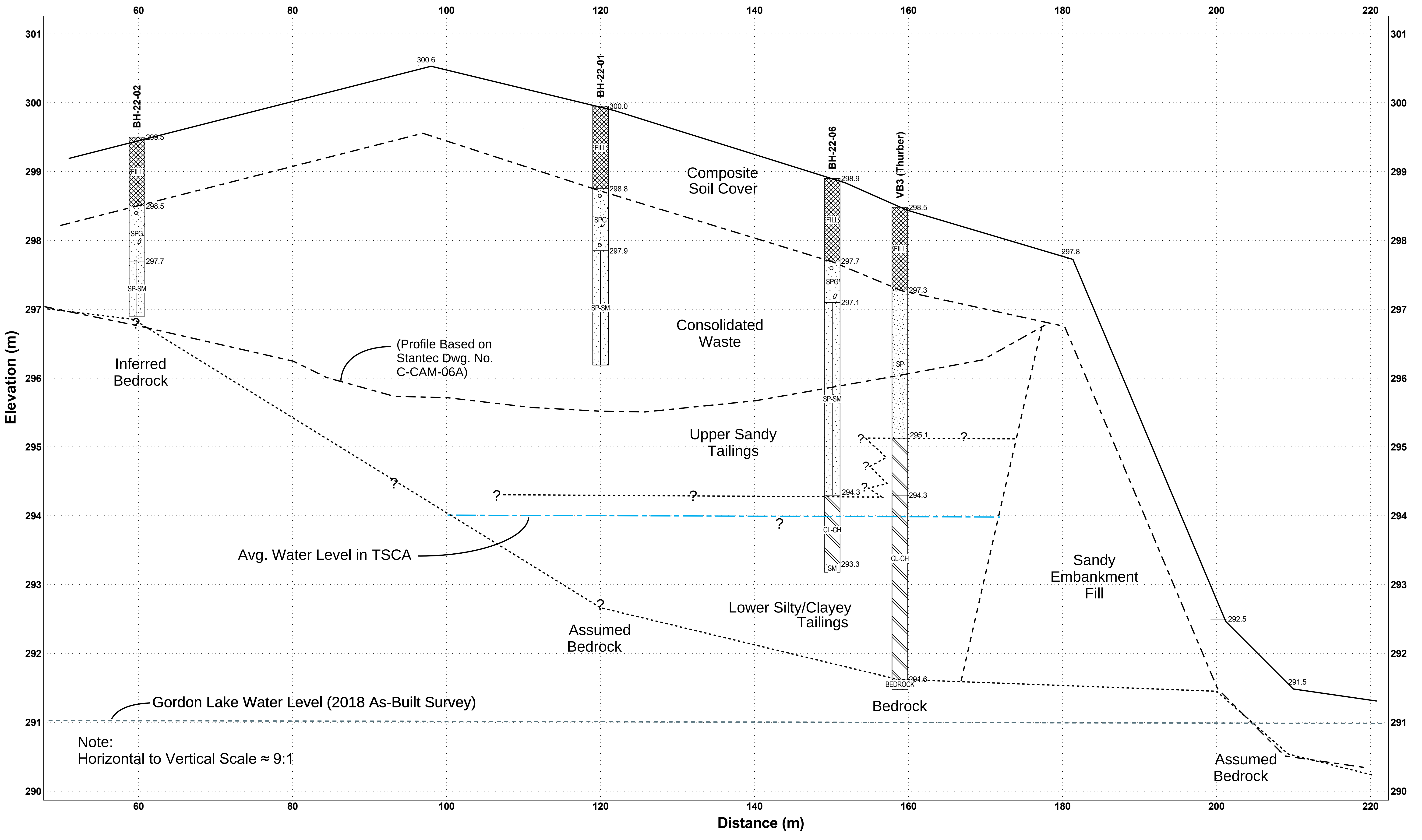
drawing no. no. du dessin

1

\\Cd1215-f01\01216\active\1214\121413573\121413573 - GordonLakeMine\2017-newTSCA\drawings\civil3D\AsBuilt-November 2018\121413573-ASBUILT.dwg

PWGSC A1 (2004)

E-DRM/GDD-E:

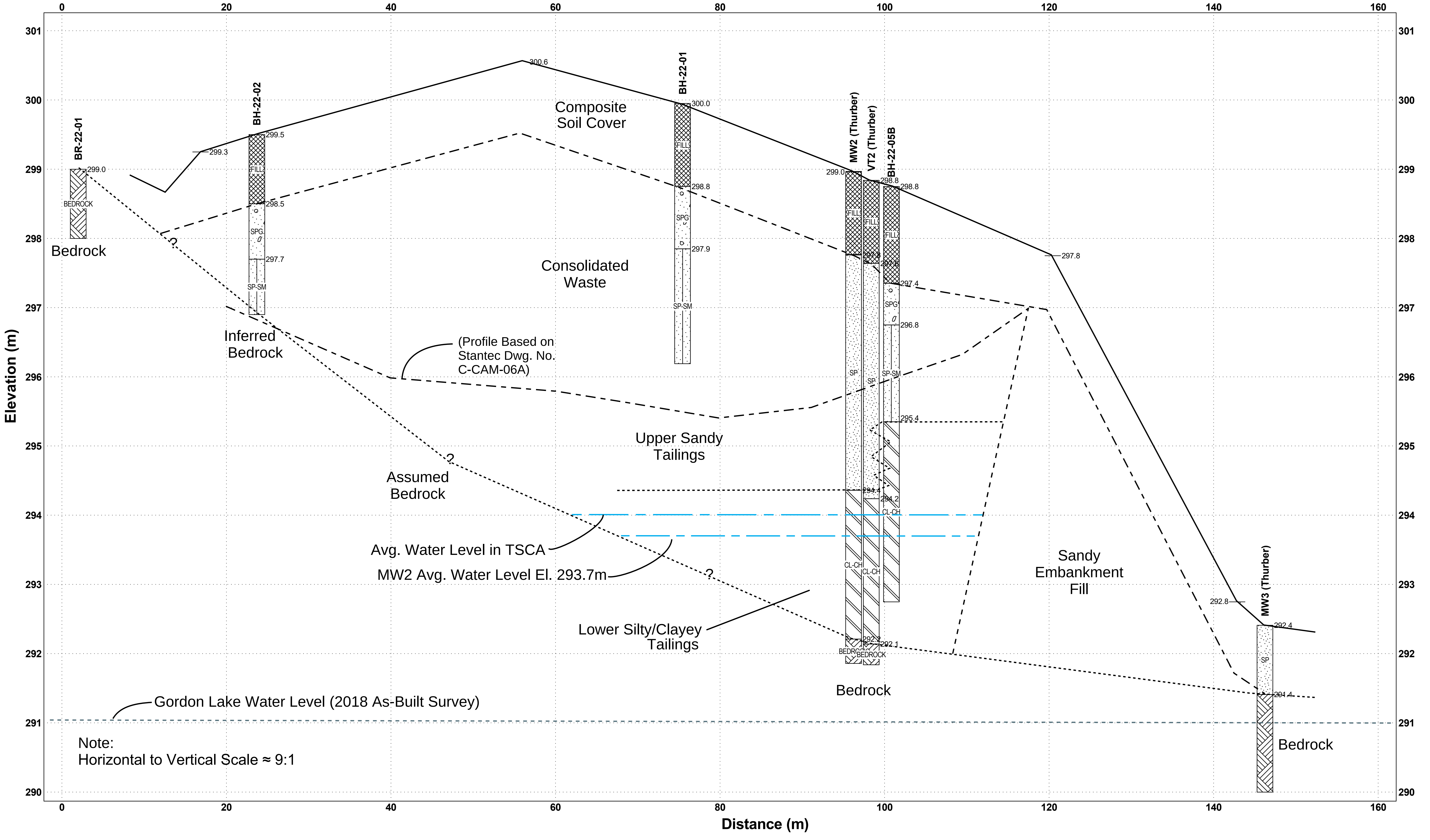


DWN.: EL

Project No.: 2007263.002

Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

Est. Soil Profile
A



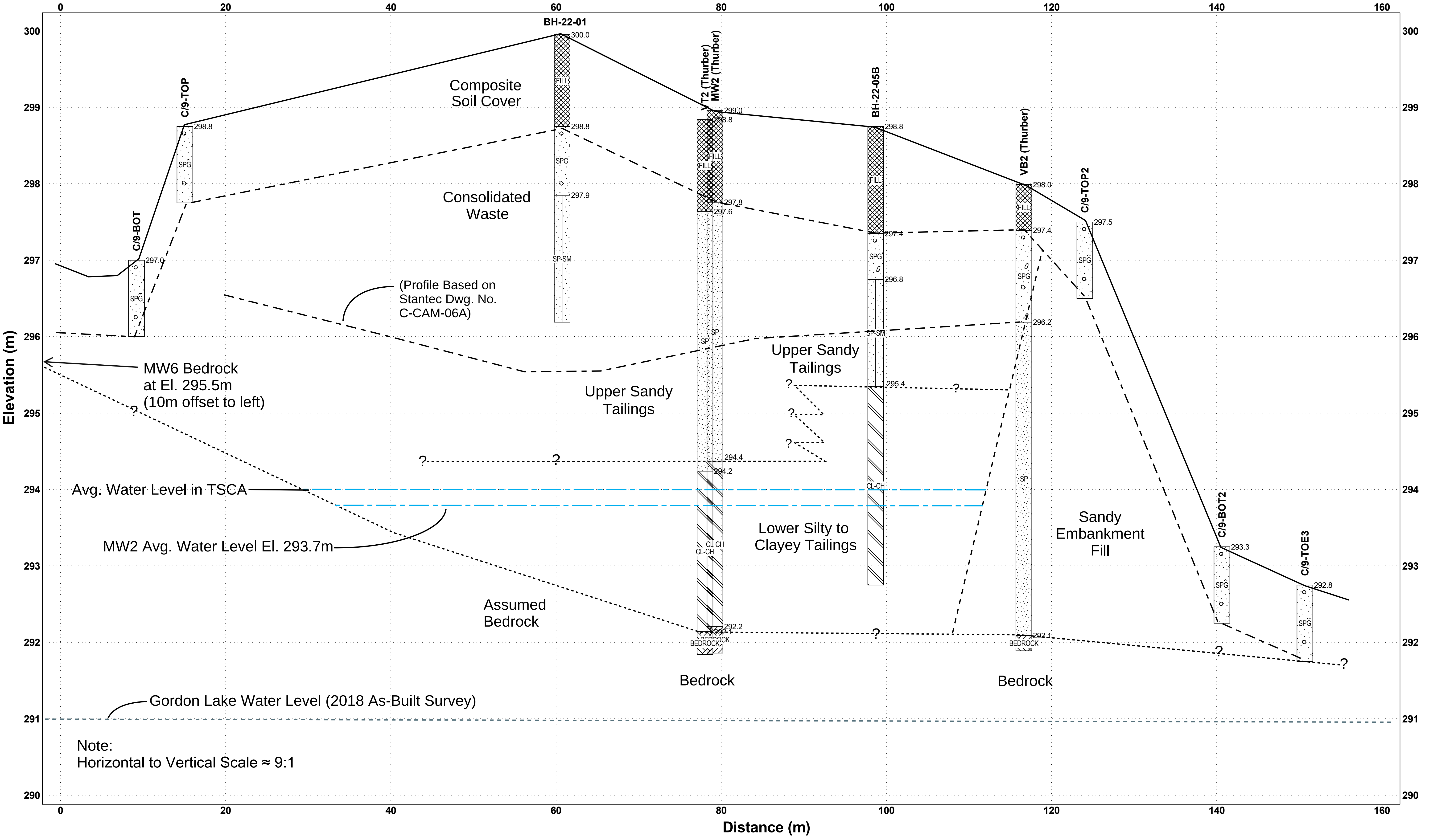
englobe

DWN.: EL

Project No.: 2007263.002

Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

Est. Soil Profile B'



ENGLOBE

DWN.: EL

Project No.: 2007263.002

Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

Est. Soil Profile
C

Appendix B

Symbols and Terms Used on the Test Records Borehole Records

Borehole Records

Soil Description and Unified Soil Classification System (USCS) - ASTM D2478/2488

Unified Soil Classification and Symbol Chart

Laboratory Classification Criteria

C_u - Hazen coefficient of uniformity
C_c - Coefficient of curvature or gradation
D_{10}, D_{30}, D_{60} - Effective grain size as % finer passing on gradation curve

Coarse-Grained Soils

(more than 50% of material is larger than No. 200 sieve size)

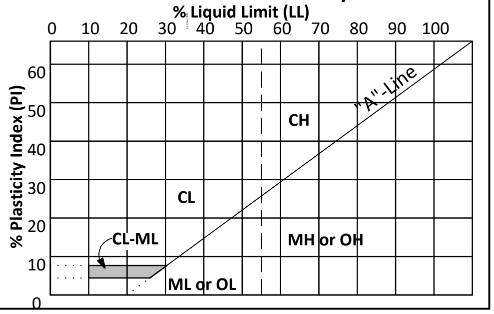
	Clean Gravels (less than 5% fines)				
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	**GW**	Well-graded GRAVEL or, Well-graded GRAVEL with sand	$C_u = \frac{D_{60}}{D_{10}}$ and > 4.0; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ >1.0 and <= 3.0		
	GP	Poorly graded GRAVEL or, Poorly graded GRAVEL with sand	Not meeting all gradation criteria above for GW		
	Gravels with fines (more than 12% fines)				
	GM	Silty GRAVEL or, Silty GRAVEL with sand	Atterberg limits below "A"-line or P.I. less than 4.0	Above "A" line with P.I. between 4 and 7 are borderline requiring dual symbols	
	GC	Clayey GRAVEL or, Clayey GRAVEL with sand	Atterberg limits above "A"-line with P.I. greater than 7.0		
	Clean Sands (less than 5% fines)				
SANDS More than 50% of coarse fraction larger than No. 4 sieve size	**SW**	Well-graded SAND or, Well-graded SAND with gravel	$C_u = \frac{D_{60}}{D_{10}}$ and > 4.0; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ >1.0 and <= 3.0		
	SP	Poorly graded SAND or, Poorly graded SAND with gravel	Not meeting all gradation criteria above for SW		
	Sands with fines (more than 12% fines)				
	SM	Silty SAND or, Silty SAND with gravel	Atterberg limits below "A"-line or P.I. less than 4.0	Above "A" line with P.I. between 4 and 7 are borderline requiring dual symbols	
	SC	Clayey SAND or, Clayey SAND with gravel	Atterberg limits above "A"-line with P.I. greater than 7.0		

Fine-Grained Soils

(50% or more of material is smaller than No. 200 sieve size)

SILTS and CLAYS Liquid Limit (LL) less than 50%	**ML**	SILT, SILT with sand, or gravel
	CL	LEAN CLAY, LEAN CLAY with sand/gravel
	OL	ORGANIC SILT or SOIL
SILTS and CLAYS Liquid Limit (LL) greater than 50%	**MH**	ELASTIC SILT
	CH	FAT CLAY
	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS	**PT**	Peat and other highly organic soils

Fine-Grained Soils Plasticity Chart



Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils. Terminology describing soil structure:

Desiccated:	Having visible signs of weathering by oxidation of clay minerals, shrinkage cracks etc.
Fissured:	Having cracks, and hence a blocky structure.
Varved:	Composed of regular alternating layers of silt and clay.
Stratified:	Composed of alternating layers or different soil types, e.g. silt and sand or silt and clay.
Well-Graded:	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes.
Poorly Graded:	Predominantly of one grain size.

The standard terminology to describe cohesionless soils includes the relative density, as determined by laboratory test or by the Standard Penetration Test (SPT) to obtain the 'N'-value: the number of blows of 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (e.g. 305 mm) into the soil. This is the Standard Penetration Test referred to in ASTM D1586.

Relative Density	'N'-Value	Relative Density %
Very loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by in situ vane tests, penetrometer tests, unconfined compression test, or occasionally by standard penetration tests (SPT).

Consistency	Undrained Shear Strength		'N'-Value
	(Kips/sq.ft.)	(kPa)	
Very Soft	<0.25	<12.5	<2
Soft	0.25-0.5	12.5-25	2-4
Firm	0.5-1.0	25-50	4-8
Stiff	1.0-2.0	50-100	8-15
Very Stiff	2.0-4.0	100-200	15-30
Hard	>4.0	>200	>30

Terminology used for describing soil strata based upon the proportion of individual particle size present:

Trace, or occasional	Less than 10%
Some	10-20%
Adjective (e.g. silty or sandy), or frequent	20-35%
And (e.g. silt and sand), or frequent	35-50%

Soil Samples

TYPE - The type of sample is indicated in this column as follows:

A - auger sample
B - block sample
C - rock core, or frozen soil core
D - drive sample
G - grab sample
O - other (see report text)
P - Pitcher tube sample
SS - split spoon (SPT)
U - thin-wall sample
W - wash sample

Condition of the sample is indicated as follows:

◩ Undisturbed ☒ Disturbed ▱ Not Recovered

Note: Dashed/dotted lines seperating subsurface descriptions on the records indicates inferred stratigraphy boundaries.

Typical laboratory test symbols:

F - Percentage by weight smaller than #200 sieve
S - Mechanical sieve/gradation and moisture content
M - Moisture Content

Other typical material symbols use on the records:

▩ Fill ▨ Till ▧ Bedrock ▦ Sod/Topsoil

Classification of Particle Sizes

Clay: <0.002 mm
Silt: 0.002 to 0.075 mm
Sand: 0.075 to 4.75 mm
Gravel: <3 inches (<75 mm)
Cobbles*: 3 to 12 inches (75 to 305 mm)
Boulders*: >12 inches (>305 mm)

**NOTE: Boulders and cobbles are not considered soil or part of the soil classification or description, except under miscellaneous descriptions and are described as percent of total volume content for each of cobbles and boulders.*

ENGLOBE

Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

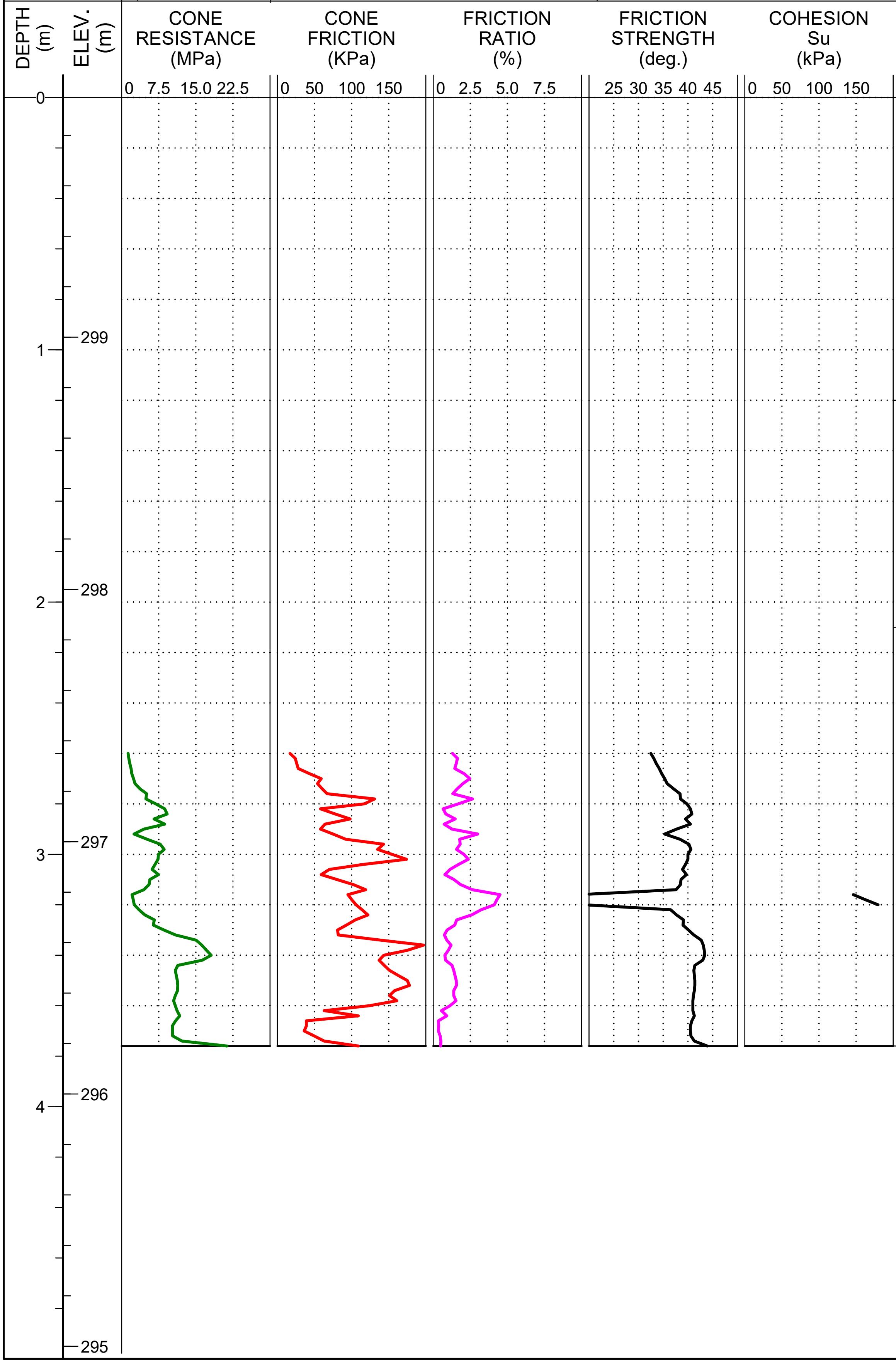
Project No.: 2007263.002

Symbols and Terms Used on the Records

BOREHOLE RECORD BH-22-01

PROJECT:
Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

LOCATION: Gordon Lake Group former Camlaren Mine Site, NWT	**JOB NO.:** 2007263.002	**HOLE NO.:** BH-22-01	Pg 1 of 1
DWN.:	**CKD.:**	**DATE(S) DRILLED:**22/8/1	**COORD.:**N 6986049 E 388329 UTM NAD83 Zone 12 **ELEV.** 299.95 m



SUBSURFACE DESCRIPTION

Loose to compact, light brown to brownish grey, poorly graded SAND with gravel (SP); occasional cobbles. [Composite Soil Cover]
- BMG Liner at bottom of layer.

Compact, light grey to grey, poorly graded SAND with silt and gravel (SP-SM); occasional to some cobbles. [Consolidated Mine Waste]

Compact, poorly graded SAND with silt and gravel (SP-SM) to silty SAND with gravel (SM); trace cobbles. [Upper Tailings]

- At 3.1m, approx. 100 mm lens of very stiff silty clay.

End of Borehole at 3.76 m depth

CPT probe ended on push refusal. Pre-drilled with solid stem flight augers to 2.3 m depth.

BOREHOLE RECORD BH-22-02

PROJECT:
Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

LOCATION: Gordon Lake Group former Camlaren Mine Site, NWT
JOB NO.: 2007263.002
HOLE NO.: BH-22-02 Pg 1 of 1

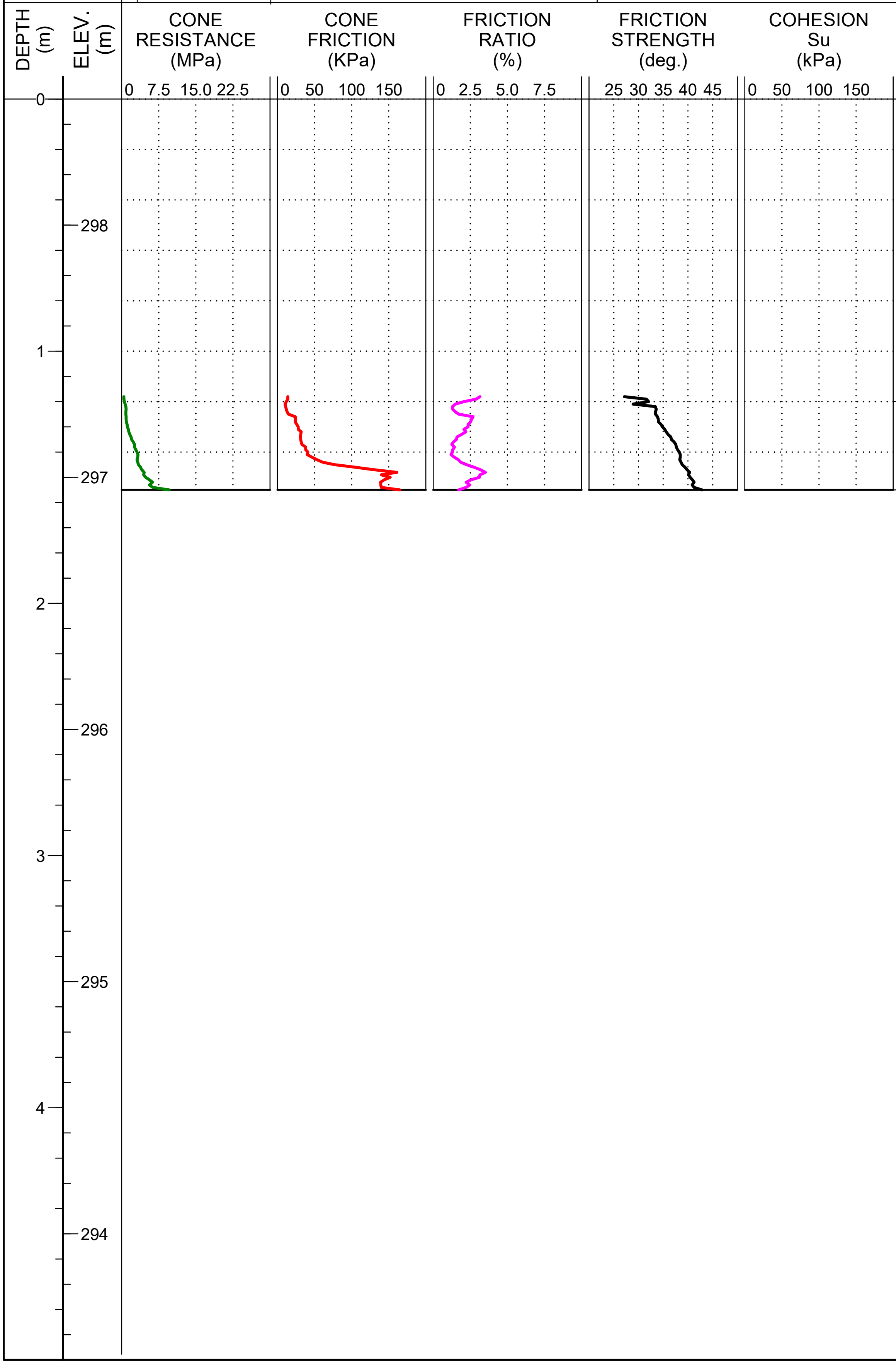
DWN.:
CKD.:
DATE(S) DRILLED:22/8/2
COORD.:N 6985995 E 388302 UTM NAD83 Zone 12
ELEV. 299.5 m

DEPTH (m)	ELEV. (m)	CONE RESISTANCE (MPa)	CONE FRICTION (KPa)	FRICTION RATIO (%)	FRICTION STRENGTH (deg.)	COHESION Su (kPa)	SUBSURFACE DESCRIPTION
		0 7.5 15.0 22.5	0 50 100 150	0 2.5 5.0 7.5	25 30 35 40 45	0 50 100 150	
0							Loose to compact, light brown to brownish grey, poorly graded SAND with gravel (SP); occasional cobbles. [Composite Soil Cover] - BMG Liner at bottom of layer.
	299						
1							Compact, light grey to grey, poorly graded SAND with silt and gravel (SP-SM) to silty GRAVEL with sand (GM); occasional to some cobbles. [Consolidated Mine Waste]
	298						
							Compact, poorly graded SAND with silt and gravel (SP-SM); trace cobbles. [Upper Tailings]
2							
	297						
							End of Borehole at 2.6 m depth *Borehole terminated due to auger drilling refusal.*
3							
	296						
4							
	295						

BOREHOLE RECORD BH-22-03

PROJECT:
Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

LOCATION: Gordon Lake Group former Camlaren Mine Site, NWT		**JOB NO.:** 2007263.002	**HOLE NO.:** BH-22-03	Pg 1 of 1
DWN.:	**CKD.:**	**DATE(S) DRILLED:** 22/7/31	**COORD.:** N 6985959 E 388326 UTM NAD83 Zone 12	**ELEV.** 298.50 m



SUBSURFACE DESCRIPTION

Loose to compact, light brown, poorly graded SAND with gravel (SP); occasional cobbles. [Composite Soil Cover]
- BMG Liner at bottom of layer.

Compact, light grey to grey, poorly graded SAND with silt and gravel (SP-SM) to silty GRAVEL with sand (GM); occasional to some cobbles. [Consolidated Mine Waste]

End of Borehole at 1.55 m depth
CPT probe ended on push refusal.
Pre-drilled with solid stem flight augers to 1.1 m depth.

BOREHOLE RECORD BH-22-04A

PROJECT:
Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

LOCATION: Gordon Lake Group former Camlaren Mine Site, NWT		**JOB NO.:** 2007263.002	**HOLE NO.:** BH-22-04A Pg 1 of 1
DWN.:	**CKD.:**	**DATE(S) DRILLED:** 22/7/31	**COORD.:** N 6985994 E 388344 UTM NAD83 Zone 12 **ELEV.** 298.8 m

DEPTH (m)	ELEV. (m)	CONE RESISTANCE (MPa)	CONE FRICTION (KPa)	FRICTION RATIO (%)	FRICTION STRENGTH (deg.)	COHESION Su (kPa)	SUBSURFACE DESCRIPTION
		0 7.5 15.0 22.5	0 50 100 150	0 2.5 5.0 7.5	25 30 35 40 45	0 50 100 150	
0							Loose to compact, light brown to brownish grey, poorly graded SAND with gravel (SP); occasional cobbles. [Composite Soil Cover] - BMG Liner at bottom of layer.
	298						
1							
							Compact, light grey to grey, poorly graded SAND with silt and gravel (SP-SM) to silty GRAVEL with sand (GM); occasional to some cobbles. [Consolidated Mine Waste]
							End of Borehole at 1.6 m depth *Borehole terminated due to auger drilling refusal.*
	297						
2							
	296						
3							
	295						
4							
	294						

BOREHOLE RECORD BH-22-04B

PROJECT:
Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

LOCATION: Gordon Lake Group former Camlaren Mine Site, NWT

JOB NO.: 2007263.002

HOLE NO.: BH-22-04B Pg 1 of 1

DWN.:

CKD.:

DATE(S) DRILLED:22/8/2

COORD.:N 6986016 E 388368 UTM NAD83 Zone 12 **ELEV.** 298.5 m

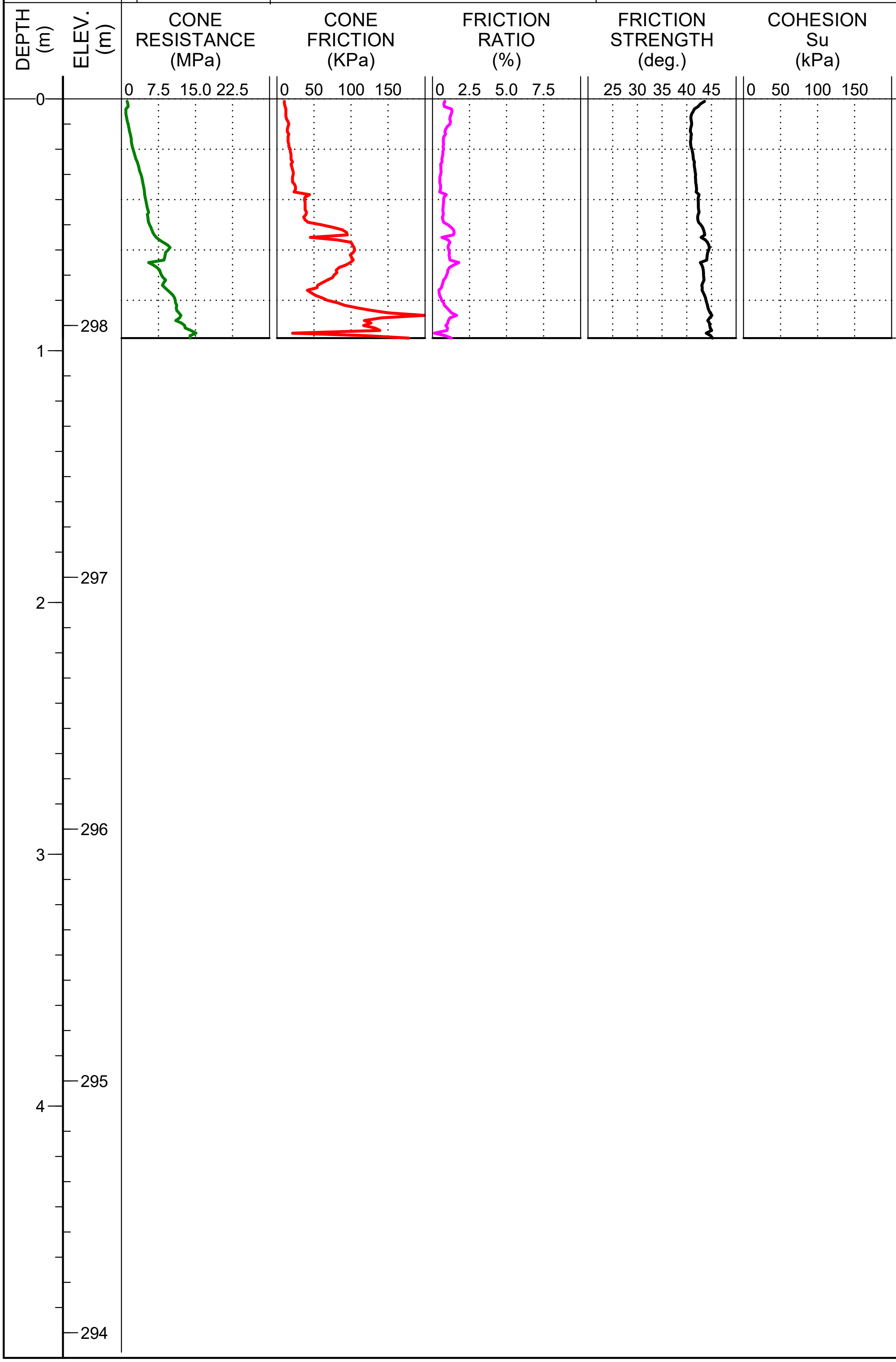
DEPTH (m)	ELEV. (m)	CONE RESISTANCE (MPa)	CONE FRICTION (KPa)	FRICTION RATIO (%)	FRICTION STRENGTH (deg.)	COHESION Su (kPa)	SUBSURFACE DESCRIPTION
		0 7.5 15.0 22.5	0 50 100 150	0 2.5 5.0 7.5	25 30 35 40 45	0 50 100 150	
0							Loose to compact, light brown to brownish grey, poorly graded SAND with gravel (SP); occasional cobbles. [Composite Soil Cover] - BMG Liner at bottom of layer.
	298						
1							
							Compact, light grey to grey, poorly graded SAND with silt and gravel (SP-SM) to silty GRAVEL with sand (GM); occasional to some cobbles. [Consolidated Mine Waste]
	297						
							End of Borehole at 1.6 m depth *Borehole terminated due to auger drilling refusal.*
2							
	296						
3							
	295						
4							
	294						

BOREHOLE RECORD BH-22-05A

PROJECT:
Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

LOCATION: Gordon Lake Group former Camlaren Mine Site, NWT
JOB NO.: 2007263.002
HOLE NO.: BH-22-05A Pg 1 of 1

DWN.:
CKD.:
DATE(S) DRILLED:22/7/31
COORD.:N 6986029 E 388362 UTM NAD83 Zone 12
ELEV. 298.9 m



SUBSURFACE DESCRIPTION

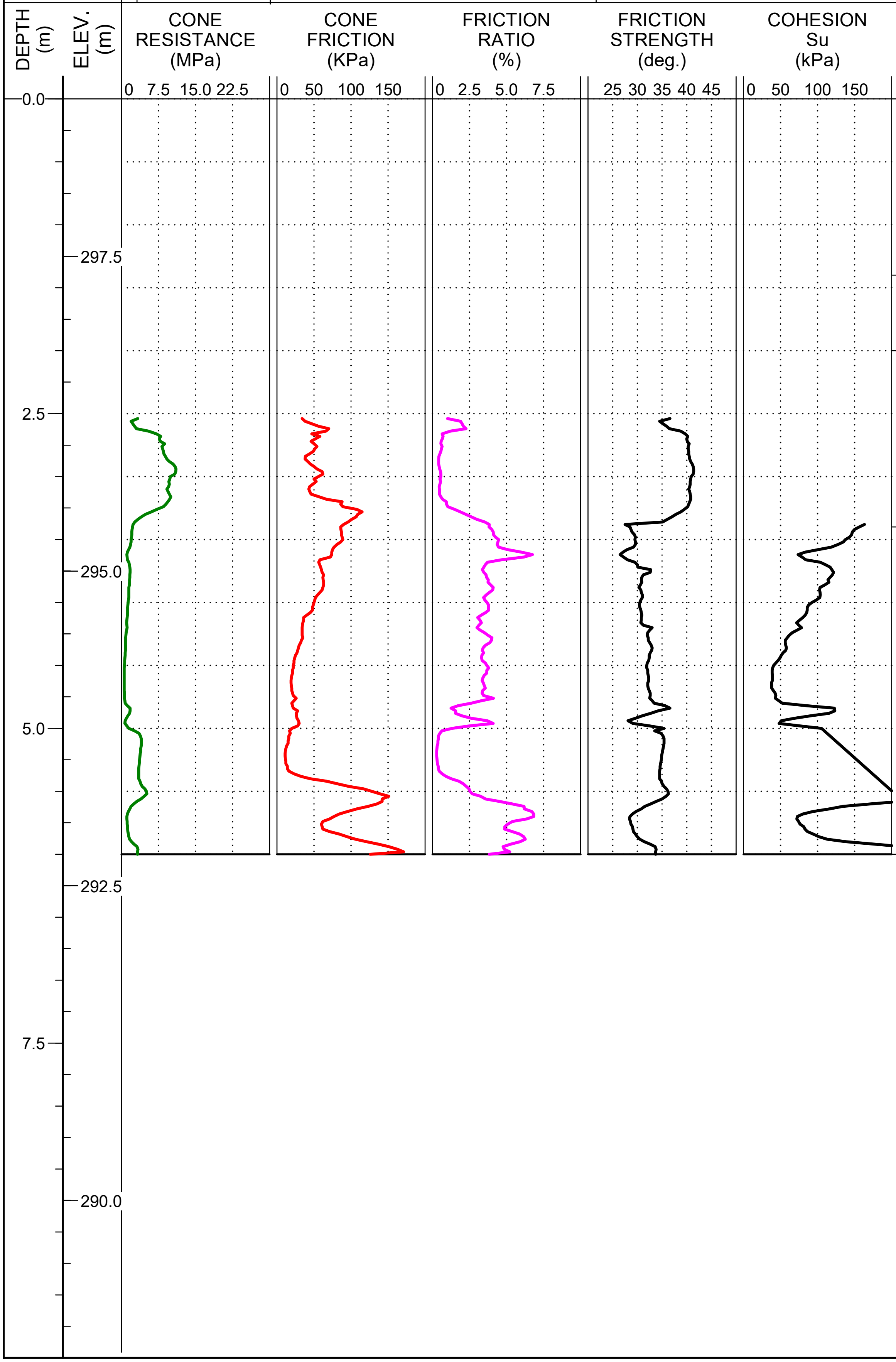
Loose to compact, light brown, poorly graded SAND with gravel (SP); occasional cobbles. [Composite Soil Cover]
- BMG Liner at bottom of layer.

End of Borehole at 0.95 m depth
CPT probe ended on push refusal.

BOREHOLE RECORD BH-22-05B

PROJECT:
Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

LOCATION: Gordon Lake Group former Camlaren Mine Site, NWT	**JOB NO.:** 2007263.002	**HOLE NO.:** BH-22-05B Pg 1 of 1
DWN.: **CKD.:**	**DATE(S) DRILLED:** 22/8/1	**COORD.:** N 6986037 E 388366 UTM NAD83 Zone 12 **ELEV.** 298.75 m



SUBSURFACE DESCRIPTION

Loose to compact, light brown, poorly graded SAND with gravel (SP); occasional cobbles. [Composite Soil Cover]
- BMG Liner at bottom of layer.

Compact, light grey to grey, poorly graded SAND with silt and gravel (SP-SM) to silty GRAVEL with sand (GM); occasional to some cobbles. [Consolidated Mine Waste]

Compact, poorly graded SAND with silt and gravel (SP-SM); trace cobbles. [Upper Tailings]

Loose to compact, ELASTIC SILT with sand (MH) to silty SAND (SM) and, stiff to very stiff low plasticity silty CLAY (CL-ML); trace gravel. [Lower Tailings]
- Layer alternates between CH and CL-MH throughout.
- Cohesive layers are assessed as stiff to very stiff.

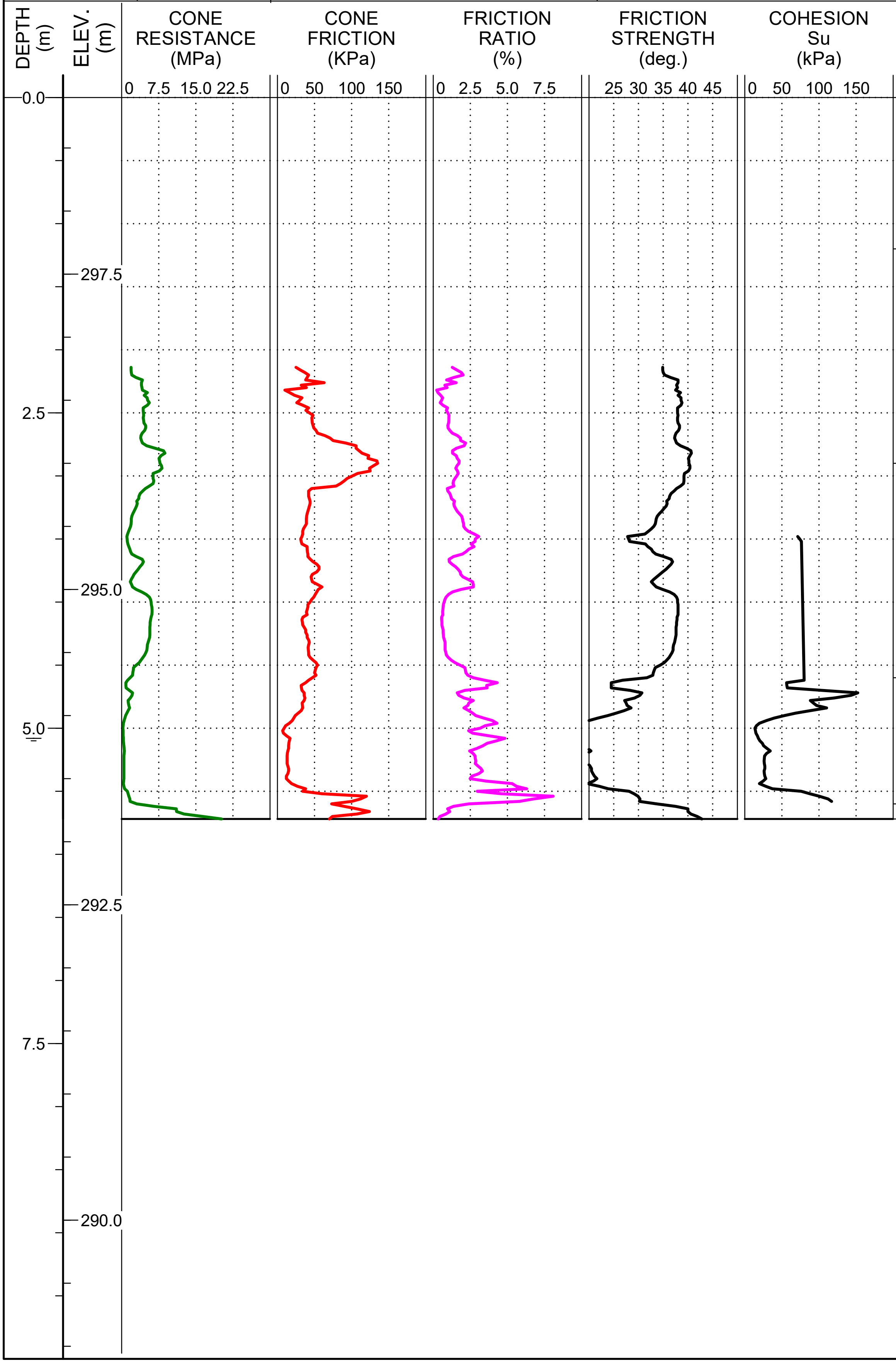
End of Borehole at 6 m depth
CPT probe ended on push refusal.
Pre-drilled with solid stem flight augers to 2.5 m depth.

BOREHOLE RECORD BH-22-06

PROJECT:
Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

LOCATION: Gordon Lake Group former Camlaren Mine Site, NWT | **JOB NO.:** 2007263.002 | **HOLE NO.:** BH-22-06 Pg 1 of 1

DWN.: | **CKD.:** | **DATE(S) DRILLED:**22/8/1 | **COORD.:**N 6986075 E 388343 UTM NAD83 Zone 12 **ELEV.** 298.9 m



SUBSURFACE DESCRIPTION

Loose to compact, light brown, poorly graded SAND with gravel (SP); occasional cobbles. [Composite Soil Cover]
- BMG Liner at bottom of layer.

Compact, light grey to grey, poorly graded SAND with silt and gravel (SP-SM) to silty GRAVEL with sand (GM); occasional to some cobbles. [Consolidated Mine Waste]

Compact, poorly graded SAND with silt and gravel (SP-SM); trace cobbles. [Upper Tailings]

Loose, ELASTIC SILT with sand [MH] to silty LEAN CLAY (CL) with sand; trace gravel. [Lower Tailings]
- At 4.9-5.5m: zone of loose/soft elastic silt (MH) to clayey silt (CL).

Compact, silty SAND with gravel (SM).

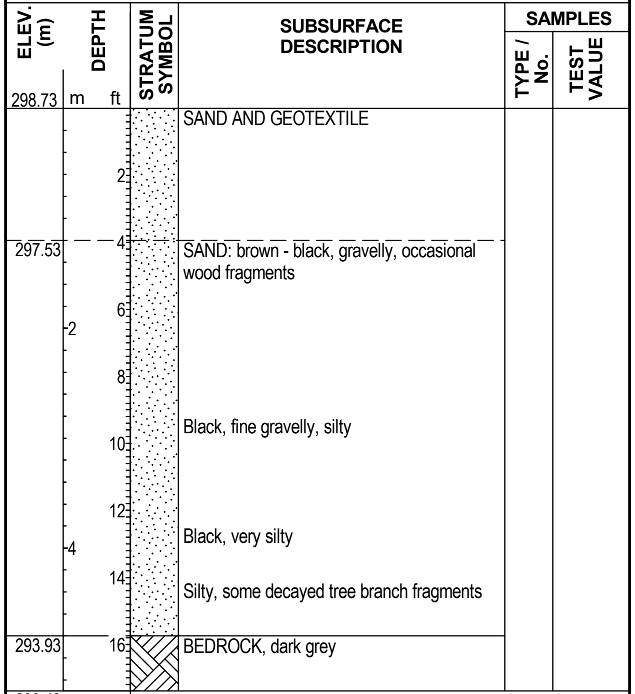
End of Borehole at 5.72 m depth

CPT probe ended on push refusal.
Pre-drilled with solid stem flight augers to 2.0 m depth.
Pore water dissipation test at 5.14 m depth.
Inferred groundwater at 1.6m depth.

MW1 (Thurber)

LOCATION: N 6986006 N 388356 Elev.: 298.73 m UTM NAD83

EQUIP./METHOD: Heli-Portable / Odex Drilling



ELEV. (m)	SUBSURFACE DESCRIPTION
298.73	SAND AND GEOTEXTILE
297.53	SAND: brown - black, gravelly, occasional wood fragments Black, fine gravelly, silty Black, very silty Silty, some decayed tree branch fragments
293.93	BEDROCK, dark grey
293.43	

End of Borehole at 5.30m depth

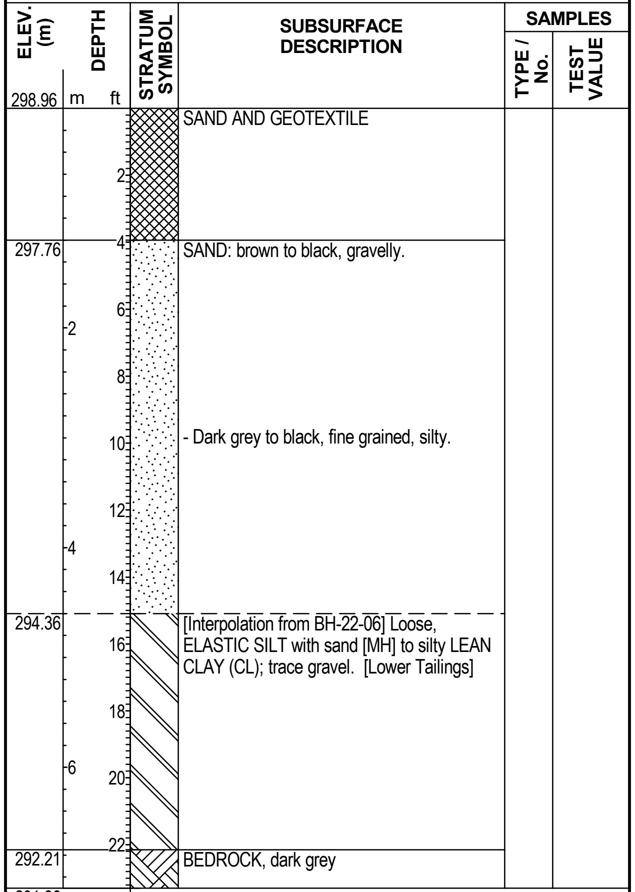
Borehole terminated in bedrock.

Borehole advanced by Thurber Engineering Ltd. on 9/12/2018.

MW2 (Thurber)

LOCATION: N 6986052 N 388352 Elev.: 298.96 m UTM NAD83

EQUIP./METHOD: Heli-Portable / Odex Drilling



ELEV. (m)	SUBSURFACE DESCRIPTION
298.96	SAND AND GEOTEXTILE
297.76	SAND: brown to black, gravelly. - Dark grey to black, fine grained, silty.
294.36	[Interpolation from BH-22-06] Loose, ELASTIC SILT with sand [MH] to silty LEAN CLAY (CL); trace gravel. [Lower Tailings]
292.21	BEDROCK, dark grey
291.86	

End of Borehole at 7.10m depth

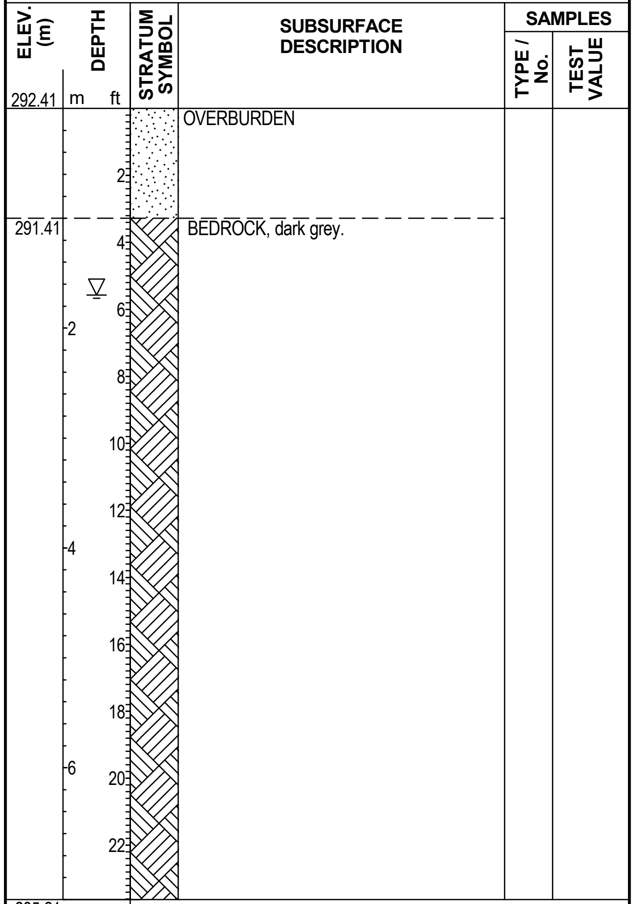
Borehole terminated in bedrock.

Borehole advanced by Thurber Engineering Ltd. on 9/12/2018. Note: minor annotations are added to this record by Englobe to illustrate probable changes in material conditions from as-built drawings.

MW3 (Thurber)

LOCATION: N 6986075 N 388396 Elev.: 292.41 m UTM NAD83

EQUIP./METHOD: Heli-Portable / Odex Drilling



ELEV. (m)	SUBSURFACE DESCRIPTION
292.41	OVERBURDEN
291.41	BEDROCK, dark grey.
285.21	

End of Borehole at 7.20m depth

Borehole terminated in bedrock.

Borehole advanced by Thurber Engineering Ltd. on 9/14/2018.

Inferred groundwater at 1.7m depth.

ENGLOBE

Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

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MW6 (Thurber)

LOCATION: N 6986072 N 388253 Elev.: 295.45 m UTM NAD83

EQUIP./METHOD: Heli-Portable / Odex Drilling

ELEV. (m)	DEPTH (m)	SUBSURFACE DESCRIPTION	SAMPLES TYPE / No.	SAMPLES TEST VALUE
295.45		BEDROCK, dark grey		
	▼			
290.05		**End of Borehole at 5.40m depth** *Borehole terminated in bedrock.* *Borehole advanced by Thurber Engineering Ltd. on 9/15/2018.* *Groundwater at 2.6m depth.*		

VB1 (Thurber)

LOCATION: N 6985957 N 388335 Elev.: 298.11 m UTM NAD83

EQUIP./METHOD: Heli-Portable / Odex Drilling

ELEV. (m)	DEPTH (m)	SUBSURFACE DESCRIPTION	SAMPLES TYPE / No.	SAMPLES TEST VALUE
298.11		[Ex. description: SAND AND GEOTEXTILE]		
296.91		[Ex. description: SAND: black to light grey, clay shale chips, occasional rootlets		
293.81		[Ex. description: SILT: black, fine sandy, highly dilatant]		
292.01		[Ex. description: BEDROCK, dark grey]		
291.71		**End of Borehole at 6.40m depth** *Borehole terminated in bedrock.* *Borehole advanced by Thurber Engineering Ltd. on 9/10/2018.*		

VB2 (Thurber)

LOCATION: N 6986026 N 388381 Elev.: 297.99 m UTM NAD83

EQUIP./METHOD: Heli-Portable / Odex Drilling

ELEV. (m)	DEPTH (m)	SUBSURFACE DESCRIPTION	SAMPLES TYPE / No.	SAMPLES TEST VALUE
297.99		[Ex. description: SAND AND GEOTEXTILE]		
297.39		[Ex. description: WASTE ROCK: bedrock fragments, sand, and gravel]		
296.19		[Ex. description: SAND: black, medium to fine grained, silty, trace decayed wood fragments and rootlets]		
292.09	6	[Ex. description: BEDROCK, dark grey]		
291.89		**End of Borehole at 6.10m depth** *Borehole terminated in bedrock.* *Borehole advanced by Thurber Engineering Ltd. on 9/11/2018. Note: minor annotations are added to this record by Englobe to illustrate probable changes in material conditions from as-built drawings.*		

ENGLOBE

Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

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VB3 (Thurber)

LOCATION: N 6986089 N 388336 Elev.: 298.48 m UTM NAD83

EQUIP./METHOD: Heli-Portable / Odex Drilling

ELEV. (m)	DEPTH m ft	STRATUM SYMBOL	SUBSURFACE DESCRIPTION	SAMPLES TYPE / No.	SAMPLES TEST VALUE
298.48	2		[Ex. description: SAND AND GEOTEXTILE]		
297.28	4 6 2 8		[Ex. description: SAND: brown - black, gravelly, occasional wood fragments]		
	10		[Ex. description: -black, fine gravelly, silty]		
295.13	12 4 14		[Ex. description: SILT: black, trace bedrock fragments]		
	16 18 6 20 22		[Interpolation from BH-22-06:] Loose, ELASTIC SILT with sand [MH] to silty LEAN CLAY (CL); trace gravel. [Lower Tailings]		
291.63			[Ex. description: BEDROCK, dark grey]		
291.48			**End of Borehole at 7.00m depth** *Borehole terminated in bedrock.* *Borehole advanced by Thurber Engineering Ltd. on 9/11/2018. Note: minor annotations are added to this record by Englobe to illustrate probable changes in material conditions from as-built drawings.*		

VT2 (Thurber)

LOCATION: N 6986055 N 388352 Elev.: 298.84 m UTM NAD83

EQUIP./METHOD: Heli-Portable / Odex Drilling

ELEV. (m)	DEPTH m ft	STRATUM SYMBOL	SUBSURFACE DESCRIPTION	SAMPLES TYPE / No.	SAMPLES TEST VALUE
298.84	2		SAND AND GEOTEXTILE		
297.64	4 6 2 8		SAND: brown - black, gravelly.		
	10 12 4 14		Dark grey to black, fine grained, silty.		
294.24	16 18 6 20		[Interpolation from BH-22-06] Loose, ELASTIC SILT with sand [MH] to silty LEAN CLAY (CL); trace gravel. [Lower Tailings]		
292.14	22		BEDROCK, dark grey.		
291.84			**End of Borehole at 7.00m depth** *Borehole terminated in bedrock.* *Borehole advanced by Thurber Engineering Ltd. on 9/11/2018. Note: minor annotations are added to this record by Englobe to illustrate probable changes in material conditions from as-built drawings.*		

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Geotechnical Investigation: TSCA Dam Declassification Study
Gordon Lake Group former Camlaren Mine Site, NWT

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Appendix C

Tables C.1 to C.3 - CPT Summary Tables

CPT Data

ENGLOBE

Summary of 2022 investigation acquired CPT data and strength

Project: Geotechnical Investigation: TSCA Dam Declassification Study

Project No. 2007263.002 Date: Oct. 15, 2022

Table C.1: Summary of 2022 investigation acquired CPT data and strength categorized by soil layer type

Ref. Borehole	Soil Model Layer Group Name	Soil Layer Description	Layer Depth Range (m)	Layer Thickness (m)	Avg. Effect. Friction	Average Undrained Shear Strength
BH-22-01	Consolidated Waste	Sand to silty sand	2.6 - 3.1	0.5	37.8	NA
	Consolidated Waste	Clay to silty clay	3.1 - 3.2	0.1	18.7	163
	Consolidated Waste	Sand to silty sand	3.2 - 3.8	0.6	41.1	NA
BH-22-02	Sand Cover, Waste Rock & Upper Tailings	Sand, Gravelly sands and silty sand	0 - 2.6	2.6	NA	NA
BH-22-03	Consolidated Waste	Gravelly sand to Silty sand & sandy silt	1.2 - 1.6	0.4	36.7	NA
BH-22-05A	Sand Cover	Gravelly sand	0 - 1.0	1	42.8	
BH-22-05B	Upper Tailings	Sand to silty sand	2.5 - 3.4	0.9	37.8	NA
	Upper Tailings	Clay to silty clay	3.4 - 4.1	0.7	29.9	115.5
	Lower Tailings	Elastic silt	4.1 - 4.8	0.7	32.5	52.3
	Lower Tailings	Elastic silt to silty clay	4.8 - 5.0	0.2	32.5	88.8
	Lower Tailings	Sand to silty sand	5.0 - 5.6	0.6	35.1	NA
	Lower Tailings	Clay	5.6 - 5.7	0.1	31.7	146.3
	Lower Tailings	Elastic silt	5.7 - 5.8	0.1	28.8	78.4
	Lower Tailings	Clay	5.8 - 6.0	0.2	32.1	169.8
BH-22-06	Consolidated Waste	Sand to silty sand	2.4 - 2.9	0.5	38.1	
	Upper Tailings	Sand to silty sand	2.9 - 4.7	1.8	36.1	NA
	Lower Tailings	Clay to silty clay	4.6 - 4.9	0.3	30.4	96
	Lower Tailings	Elastic silt	4.9 - 5.5	0.6	18.9	24.6
	Lower Tailings	Clay	5.5 - 5.6	0.1	29.5	98.7
	Lower Tailings	Gravelly sand	5.6 - 5.7	0.1	39.5	NA

Summary of 2022 investigation acquired CPT data and strength

Project: Geotechnical Investigation: TSCA Dam Declassification Study

Project No. 2007263.002 Date: Oct. 15, 2022

Table C.2: Weighted average soil strength based on borehole & soil model group as function of layer thickness

Ref. Borehole	Soil Model Layer Group Name	Soil Layer Description	Layer Depth Range (m)	Layer Thickness Range (m)	Weighted Average Effective strength, φ' (Deg.)	Weighted Average Undrained Shear Strength, Su (KPa)
BH-22-01	Upper Tailings	Sand to silty sand to Clay to silty clay	2.6 - 3.8	1.2	37.9	N/A(1.)
BH-22-02	Sand Cover, Waste Rock & Upper Tailings	Sand, Gravelly sands and silty sand	N/A(2.)			
BH-22-03	Upper Tailings	Gravelly sand to Silty sand & sandy silt	1.2 - 1.6	0.4	36.7	N/A(1.)
BH-22-04	Sand Cover, Waste Rock & Upper Tailings	Sand, Gravelly sands and silty sand	N/A(2.)			
BH-22-05A	Sand Cover	Gravelly sand	0 - 1.0	1.0	42.8	N/A(1.)
BH-22-05B	Upper Tailings	Sand to silty sand, to Clay to silty clay	2.5 - 4.1	1.6	34.3	N/A(1.)
	Lower Tailings	Clay to silty clay, Elastic silt to silty sand	4.1 - 6.0	1.9	36.5	85.2
BH-22-06	Upper Tailings	Sand to silty sand	2.9 - 4.7	1.8	37.3	N/A(1.)
	Lower Tailings	Clay to silty clay, Elastic silt to gravelly sand	4.6 - 4.9	2.1	24.9	53.4

Notes:

1. Su strength not applicable when applied to non-cohesive soils. Use effective friction angle strength instead.
2. CPT data not obtained from this borehole.

N/A - Not applicable for non-cohesive (e.g., sand-like) soils.

Table C.3: Weighted average soil strength from 2022 CPT data based on soil model group as function of layer thickness

Soil Model Layer Group Name	Ref. Borehole	Layer Top Depth Range (m)	Layer Thickness Range (m)	Weighted Average Effective strength, φ' (Deg.)	Weighted Average Undrained Shear Strength, Su (KPa)
Sand Cover	BH-22-05A	0 -1.4	1.0 - 1.4	42.8	NA
Consolidated Waste Tailings	BH-22-01, BH-22-03, BH-22-06	1.8 - 2.2	0.8 - 2.0	38.9	NA
Upper Tailings	BH-22-05B, BH-22-06	1.8 - 2.1	0.8 - 2.3	35.4	(1.)
Lower Tailings Tailings	BH-22-5B, BH-22-06	4.16 - 4.6	1.9 - 2.8	30.4	71.4

Notes:

1. Undrained shear strength not applicable when applied to non-cohesive soils.
2. CPT data not obtained from this borehole.

N/A - Not applicable for non-cohesive (e.g., sand-like) soils.

Borehole No.: BH-22-01 **Date:** 8/1/2022 **Project No.** 2007263.002 **Project:** Geotechnical Investigation: TSCA Dam Declassification Study

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT						
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	SBTn deg. Kulhway vs Mayne	Soil Type	Avg. Layer Strength (de. Or Kpa)
130	2.6	1.297	17	-0.24	-3.4	1.29694	1.31078	4	2.7151	16.34666	48.77268	0	48.77268	25.59153	1.362	-0.00019	5	0.8309	1.83588	2.51188	22.61517	-0.00492	32.35574	6	FALSE	30.9	32.5	#NUM!	32.5	Sands, clean to silty sands	37.8
131	2.62	1.458	24	-0.01	-3.4	1.458	1.64609	4	2.72187	16.78822	49.10844	0	49.10844	28.68935	1.70347	-0.00001	4	0.83541	1.83142	2.52323	25.46527	-0.0002	31.28019	5	FALSE	31.6	33.1	#NUM!	33.1	Silty sand & sandy silt	
132	2.64	1.668	26	-0.07	-3.4	1.66798	1.55877	4	2.65976	16.93188	49.44708	0	49.44708	32.73268	1.60639	-0.00004	5	0.81406	1.79325	2.46679	28.64491	-0.00142	33.3103	7	FALSE	32.4	33.6	#NUM!	33.6	Sands, clean to silty sands	
133	2.66	1.931	28	-0.13	-3.4	1.93097	1.45005	4	2.58922	17.07327	49.78854	0	49.78854	37.78337	1.48843	-0.00007	5	0.78971	1.75264	2.40247	32.53924	-0.00261	35.9186	7	FALSE	33.3	34.2	#NUM!	34.2	Sands, clean to silty sands	
134	2.68	2.083	43.5	0.23	-3.4	2.08306	2.08828	4	2.65022	17.60912	50.14073	0	50.14073	40.54422	2.13978	0.00011	5	0.81446	1.77353	2.46684	35.58288	0.00459	31.19132	5	FALSE	33.7	34.7	18.3	34.7	Silty sand & sandy silt	
135	2.7	2.393	59	0.2	-3.4	2.39305	2.46547	4	2.64474	18.0129	50.50098	0	50.50098	46.3862	2.51862	0.00009	5	0.81474	1.76357	2.46707	40.77215	0.00396	29.4008	5	FALSE	34.5	35.3	18.4	35.3	Silty sand & sandy silt	
136	2.72	2.695	54	0.17	-3.6	2.69504	2.00368	4	2.54924	17.95661	50.86012	0	50.86012	51.98931	2.04222	0.00006	5	0.78077	1.71284	2.37751	44.69824	0.00334	33.91432	7	FALSE	35.2	35.8	17.9	35.8	Sands, clean to silty sands	
137	2.74	3.717	60.5	0.15	-3.8	3.71704	1.62764	5	2.38335	18.21063	51.22433	0	51.22433	71.56391	1.65038	0.00004	5	0.7226	1.63705	2.22443	59.22645	0.00293	41.26852	7	FALSE	36.9	37.1	18.3	37.1	Sands, clean to silty sands	
138	2.76	5.085	67	-0.24	-3.9	5.08494	1.31762	5	2.21944	18.44818	51.59329	0	51.59329	97.55816	1.33112	-0.00005	5	0.66527	1.56677	2.07357	77.82988	-0.00465	50.59293	7	FALSE	38.6	38.4	#NUM!	38.4	Sands, clean to silty sands	
139	2.78	4.94	131	-0.01	-4	4.94	2.65182	5	2.4242	19.20838	51.97746	0	51.97746	94.04115	2.68002	0	5	0.74308	1.64218	2.27704	79.22031	-0.00019	31.60343	5	FALSE	38.4	38.5	0.0	38.5	Silty sand & sandy silt	
140	2.8	6.902	117	0.13	-4.1	6.90203	1.69515	5	2.18612	19.20661	52.36159	0	52.36159	130.8148	1.70811	0.00002	5	0.65801	1.54402	2.05337	104.3774	0.00248	46.06638	7	FALSE	40.1	39.8	18.9	39.8	Sands, clean to silty sands	
141	2.82	8.722	58	0.27	-4.3	8.72207	0.66498	6	1.85579	18.48914	52.73138	0	52.73138	164.4057	0.66902	0.00003	6	0.53697	1.42007	1.73561	121.501	0.00512	86.92143	7	FALSE	41.3	40.5	20.7	40.5	Sands, clean to silty sands	
142	2.84	9.195	78	0.125	-4	9.19503	0.84828	6	1.89889	18.85018	53.10838	0	53.10838	172.1371	0.85321	0.00001	6	0.55453	1.43078	1.78104	129.0908	0.00235	77.21182	7	FALSE	41.5	40.8	18.3	40.8	Sands, clean to silty sands	
143	2.86	6.571	98	0.0575	-4.4	6.57101	1.4914	5	2.16595	18.98392	53.48806	0	53.48806	121.8501	1.50364	0.00001	5	0.65188	1.5166	2.03585	97.55233	0.00108	49.63571	7	FALSE	39.8	39.5	17.2	39.5	Sands, clean to silty sands	
144	2.88	8.723	64	0.02375	-4.6	8.72301	0.73369	6	1.88009	18.60241	53.86011	0	53.86011	160.9567	0.73825	0	6	0.54809	1.41391	1.76319	120.9711	0.00044	82.21304	7	FALSE	41.2	40.5	0.0	40.5	Sands, clean to silty sands	
145	2.9	4.532	58	-0.01	-4.7	4.532	1.27979	5	2.25202	18.2381	54.22487	0	54.22487	82.57784	1.29529	0	5	0.68152	1.53125	2.1127	67.66919	-0.00018	49.26653	7	FALSE	37.7	37.7	0.0	37.7	Sands, clean to silty sands	
146	2.92	2.502	75	0.67	-4.25	2.50217	2.9974	4	2.68226	18.30602	54.59099	0	54.59099	44.83481	3.06426	0.00027	4	0.83901	1.68017	2.52531	40.58576	0.01227	26.02615	5	FALSE	34.3	35.3	20.8	35.3	Silty sand & sandy silt	
147	2.94	5.1585	92	0.385	-3.8	5.1586	1.78343	5	2.29639	18.81845	54.96736	0	54.96736	92.84836	1.80264	0.00008	5	0.7012	1.53549	2.16327	77.34101	0.007	41.70656	7	FALSE	38.3	38.4	21.0	38.4	Sands, clean to silty sands	
148	2.96	7.815	143	0.2425	-3.7	7.81506	1.8298	5	2.16858	19.48508	55.35706	0	55.35706	140.1755	1.84285	0.00003	5	0.65833	1.48881	2.05021	114.0166	0.00438	44.27331	7	FALSE	40.5	40.2	20.1	40.2	Sands, clean to silty sands	
149	2.98	8.624	135	0.20125	-3.3	8.62405	1.56539	5	2.09112	19.45663	55.74619	0	55.74619	153.7021	1.57557	0.00002	6	0.63086	1.45784	1.97765	123.2788	0.00361	50.43951	7	FALSE	40.9	40.6	19.5	40.6	Sands, clean to silty sands	
150	3	7.449	154.5	0.19062	-3.2	7.44905	2.07409	5	2.22113	19.55566	56.1373	0	56.1373	131.6934	2.08984	0.00003	5	0.67904	1.49331	2.1035	108.9552	0.0034	39.95822	7	FALSE	40.2	40.0	19.9	40.0	Sands, clean to silty sands	
151	3.02	7.348	174	0.31531	-3.2	7.34808	2.36797	5	2.26554	19.68716	56.53105	0	56.53105	128.9831	2.38632	0.00004	5	0.69639	1.50136	2.14849	108.0408	0.00558	36.00776	7	FALSE	40.0	40.0	20.5	40.0	Sands, clean to silty sands	
152	3.04	6.764	115	0.44	-3.35	6.76411	1.70015	5	2.19354	19.17904	56.91463	0	56.91463	117.8466	1.71458	0.00007	5	0.66893	1.47083	2.07599	97.36124	0.00773	45.31285	7	FALSE	39.6	39.5	21.6	39.5	Sands, clean to silty sands	
153	3.06	6.18	70	0.39	-3.425	6.1801	1.13267	5	2.11226	18.57335	57.2861	0	57.2861	106.8813	1.14327	0.00006	6	0.63792	1.43877	1.99422	86.94142	0.00681	57.22731	7	FALSE	39.1	38.9	20.8	38.9	Sands, clean to silty sands	
154	3.08	7.468	59	0.32	-3.4125	7.46808	0.79003	6	1.95375	18.44928	57.65508	0	57.65508	128.5303	0.79618	0.00004	6	0.5807	1.3874	1.84364	101.4675	0.00555	73.92431	7	FALSE	40.0	39.7	20.5	39.7	Sands, clean to silty sands	
155	3.1	5.72	80.5	0.38	-3.4	5.72009	1.40732	5	2.19661	18.70446	58.02917	0	58.02917	97.57275	1.42174	0.00007	5	0.67038	1.45305	2.07838	81.19667	0.00655	49.17833	7	FALSE	38.6	38.6	20.8	38.6	Sands, clean to silty sands	
156	3.12	5.544	102	0.36	-3.4	5.54409	1.8398	5	2.28122	18.96478	58.40847	0	58.40847	93.91929	1.85939	0.00007	5	0.70278	1.47277	2.16286	79.73477	0.00616	41.11413	7	FALSE	38.4	38.5	20.7	38.5	Sands, clean to silty sands	
157	3.14	4.496	119	0.34	-3	4.49609	2.64675	5	2.45385	19.06176	58.7897	0	58.7897	75.47743	2.68181	0.00008	5	0.76684	1.51808	2.33044	66.48064	0.00578	30.80311	5	FALSE	37.2	37.6	20.1	37.6	Silty sand & sandy silt	
158	3.16	2.108	95	0.33	-3.1	2.10808	4.50646	3	2.85335	18.51223	59.15995	0	59.15995	34.63361	4.63658	0.00016	4	0.91342	1.63477	2.71351	33.05706	0.00558	19.28459	3	146.4	32.8	34.3	18.4	18.4	Clay & silty clay	Kpa=163 Phi=19
159	3.18	2.342	100.5	0.32	-3.3	2.34208	4.29106	3	2.80494	18.61733	59.53229	0	59.53229	38.34134	4.40297	0.00014	4	0.89662	1.61097	2.66879	36.29033	0.00538	20.14503	3	163.0	33.4	34.8	18.5	18.5	Clay & silty clay	
160	3.2	2.576	106	0.365	-3.35	2.57609	4.11476	4	2.76189	18.71514	59.9066	0	59.9066	42.0018	4.21273	0.00015	4	0.88181	1.58952	2.6293	39.47217	0.00609	20.93746	3	179.7	33.9	35.2	19.1	19.1	Clay & silty clay	
161	3.22	3.522	114	0.41	-3.325	3.5221	3.2367	4	2.59113	18.91877	60.28497	0	60.28497	57.42422	3.29307	0.00012	4	0.81972	1.53057	2.46723	52.29263	0.0068	25.71916	5	FALSE	35.7	36.5	19.9	36.5	Silty sand & sandy silt	41.1
162	3.24	4.703	122	0.36	-3.3	4.70309	2.59404	5	2.43349	19.10766	60.66712	0	60.66712	76.52288	2.62794	0.00008	5	0.76316	1.47912	2.31831	67.76911	0.00593	31.34675	5	FALSE	37.3	37.7	20.2	37.7	Silty sand & sandy silt	
163	3.26	6.604	105	0.18	-3.1	6.60405	1.58993	5	2.18228	19.06521	61.04843	0	61.04843	107.1772	1.60477	0.00003	5	0.67179	1.40547	2.07805	90.7572	0.00295	46.72378	7	FALSE	39.1	39.1	19.1	39.1	Silty sand & sandy silt	
164	3.28	6.417	93	0.49	-3.1	6.41712	1.44925	5	2.16588	18.91459	61.42672	0	61.42672	103.4679	1.46325	0.00008	5	0.66598	1.39559	2.06235	87.53957	0.00798	49.23937	7	FALSE	38.9	39.0	21.4	39.0	Silty sand & sandy silt	
165	3.3	8.555	81	0.295	-2.9	8.55507	0.94681	6	1.9528	18.86594	61.80404	0	61.80404	137.4226	0.9537	0.00003	6	0.58865	1.33778	1.85896	112.1353	0.00477	69.02521	7	FALSE	40.4	40.1	20.0	40.1	Silty sand & sandy silt	
166	3.32	10.898	82	0.2625	-2.9	10.89807	0.75243	6	1.80863	18.97287	62.1835	0	62.1835	174.2566	0.75675	0.00002	6	0.53701	1.29978	1.72296	139.0007	0.00422	85.05184	7	FALSE	41.5	41.2	19.9	41.2	Silty sand & sandy silt	
167	3.34	15.058	139.5	0.23	-2.2	15.05806	0.92641	6	1.75874	19.70806	62.57766	0	62.57766	239.6299	0.93028	0.00002	6	0.52176	1.28589	1.68233	190.3032	0.00368	81.08282	7	FALSE	43.0	42.7	21.0	42.7	Silty sand & sandy silt	
168	3.36	16.24	197	1.1	-2.1	16.24027	1.21303	6	1.81676	20.13406	62.98034	0	62.98034	256.8626	1.21776	0.00007	6	0.54496	1.29581	1.74265	206.8856	0.01747	67.36912	7	FALSE	43.4	43.1	24.7	43.1	Silty sand & sandy silt	
169	3.38	17.175	175	1.97	-2	17.17549	1.01889	6	1.74582	20.01931	63.38072	0	63.38072	269.9892	1.02267	0.00012	6	0.51921	1.27583	1.67456	215.4672	0.03108	77.65324	7	FALSE	43.6	43.3	26.6	43.3	Silty sand & sandy silt	
170	3.4	18.11	143.5	2.41	-1.9	18.1106	0.79235	6	1.65378	19.81135	63.77695	0	63.77695	282.9678	0.79515	0.00013	6	0.48544	1.25199	1.58545	222.9894	0.03779	94.20913	7	FALSE	43.8	43.4	27.1	43.4	Silty sand & sandy silt	
171	3.42	16.319	137.25	2.105	-1.5	16.31953	0.84102	6	1.70463	19.7202	64.17136	0	64.17136	253.3117	0.84434	0.00013	6	0.50426	1.25902	1.63432	201.9821	0.0328	88.12722	7	FALSE	43.3	43.0	26.6	43.0	Silty sand & sandy silt	
172	3.44	11.346	144.125	1.8	-1.3	11.34645	1.27022	6	1.94203	19.63706	64.5641	0	64.5641	174.7393	1.27749	0.00016	6	0.59142	1.30544	1.86252	145.352	0.02788	60.75896	7	FALSE	41.6	41.4	25.6	41.4	Silty sand & sandy silt	
173	3.46	10.843	151	1.79	-1.3	10.84345	1.39255	6	1.98372	19.67328	64.95756	0	64.95756	165.9313	1.40094	0.00017	6	0.60741	1.31003	1.90396	139.3553	0.02756	56.312	7	FALSE	41.3	41.2	25.6	41.2	Silty sand & sandy silt	
174	3.48	11.0665	163	1.78	-1.3	11.06694	1.47285	6	1.99417	19.76907	65.35294	0	65.35294	168.3412	1.4816	0.00016	6	0.61213	1.30792	1.91583	142.0104	0.02724	54.21138	7	FALSE	41.4	41.3	25.4	41.3	Silty sand & sandy silt	
175	3.5	11.29	175	1.51	-1.3	11.29038	1.54999	6	2.00349	19.85844	65.75011	0	65.75011	170.7165	1.55907	0.00013	6	0.61642	1.3055	1.92657	144.6213	0.02297	52.32974	7	FALSE	41.4	41.4	24.9	41.4	Silty sand & sandy silt	
176	3.52	11.344	178	2.26	-1.4	11.34456	1.56903	6	2.00575	19.87983	66.14771	0	66.14771	170.5035	1.57824	0.0002	6	0.61792	1.30148	1.92997	144.8674	0.03417	51.85844	7	FALSE	41.4	41.4	26.2	41.4	Silty sand & sandy silt	
177	3.54	11.33	158	2.14	-1.4	11.33053	1.39446	6	1.97032	19.74225	66.54255	0	66.54255	169.275	1.4027	0.00019	6	0.60508	1.28973	1.89577	143.375	0.03216	56.57255	7	FALSE	41.4	41.3	26.0	41.3	Silty sand & sandy silt	
178	3.56	10.879	151	2.9	-1.6	10.87972	1.3879	6	1.98167	19.67456	66.93605	0	66.93605	161.5391	1.39649	0.00027	6	0.60965	1.28757	1.90724	137.4016	0.04332	56.28581	7	FALSE	41.2	41.1	26.9	41.1	Silty sand & sandy silt	
179	3.58	10.51	161	3.66	-1.8	10.51092	1.53174	5	2.0221	19.7351	67.33075	0	67.33075	155.1087	1.54162	0.00035	6	0.62528	1.29119	1.94776	133.0831	0.05436	51.99938	7	FALSE	41.0	41.0	27.6	41.0	Silty sand & sandy silt	
180	3.6	10.8535	124	5.87	-2.1	10.85497	1.14233	6	1.92526	19.44707	67.71969	0	67.71969	159.2926	1.14951	0.00054	6	0.58944	1.2681	1.85321	135.0042	0.08668	64.39249	7	FALSE	41.1	41.0	29.2	41.0	Silty sand & sandy silt	
181	3.62	11.197	63	2.83	-2.3	11.19771	0.56262	6	1.72524	18.68006	68.09329	0	68.09329	163.4466	0.56606	0.00025	6	0.51456	1.22693	1.65625	134.7667	0.04156	98.96163	7	FALSE	41.2	41.0	26.7	41.0	Silty sand & sandy silt	
182	3.64	11.781	109	1.91	-2.4	11.78148	0.92518	6	1.83842	19.33017	68.47989	0	68.47989	171.0429	0.93059	0.00016	6	0.5583	1.2445	1.77049	143.8625	0.02789	75.46829	7	FALSE	41.4	41.3	25.5	41.3	Silty sand & sandy silt	
183	3.66	10.937	39	2.15	-2.4	10.93754	0.35657	6	1.63113	18.11939	68.84228	0	68.84228	157.8782	0.35883	0.0002	6	0.47991	1.20381	1.56438	129.1274	0.03123	119.5924	7	FALSE	41.1	40.8	25.8	40.8	Silty sand & sandy silt	
184	3.68	10.262	39	3.425	-2.45	10.26286	0.38001	6	1.66862	18.09497	69.20418	0	69.20418	147.2982	0.38259	0.00034	6	0.49416	1.20733	1.6013	121.4614	0.04949	112.8714	7	FALSE	40.7	40.5	27.2	40.5	Silty sand & sandy silt	
185	3.7	10.2955	36	4.7	-2.325	10.29668	0.34963	6	1.65031	18.00416	69.56426	0	69.56426	147.0167	0.35201	0.00046	6	0.48779	1.20135	1.58411	121.257	0.06756	116.4833	7	FALSE	40.7	40.5	28.2	40.5	Silty sand & sandy silt	
186	3.72	10.329	49.5	2.45	-2.2	10.32961	0.4792	6	1.71677	18.37171	69.9317	0	69.9317	146.71	0.48247	0.00024	6	0.51348	1.20974	1.65102	122.4925	0.03503	102.6285	7	FALSE	40.7	40.6	26.1	40.6	Silty sand & sandy silt	

Borehole No.: **BH-22-01** **Date:** **8/1/2022** **Project No.** **2007263.002** **Project:** **Geotechnical Investigation: TSCA Dam Declassification Study**

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT						
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m^3)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	SBTn deg. Kulhway vs Mayne	Soil Type	Avg. Layer Strength (de. Or Kpa)
187	3.74	12.237	63	3.02	-2.2	12.23775	0.5148	6	1.67169	18.71412	70.30598	0	70.30598	173.0642	0.51777	0.00025	6	0.49809	1.19966	1.61014	144.0597	0.04296	106.549	7	FALSE	41.5	41.3	27.0	41.3	Silty sand & sandy silt	
188	3.76	21.324	109	3.59	-2	21.3249	0.51114	6	1.4756	19.55768	70.69713	0	70.69713	300.6374	0.51284	0.00017	6	0.42823	1.16664	1.42624	244.7184	0.05078	130.2898	7	FALSE	44.1	43.9	28.2	43.9	Silty sand & sandy silt	

Borehole No.: BH-22-03 **Date:** 7/31/2022 **Project No.** 2007263.002 **Project:** Geotechnical Investigation: TSCA Dam Declassification Study

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT						
No	**Depth (m)**	**qc (MPa)**	**fs (kPa)**	**u (kPa)**	**Other**	**qt (MPa)**	**Rf (%)**	**SBT**	**Ic SBT**	**γ (kN/m³)**	**σ,v (kPa)**	**u0 (kPa)**	**σ',vo (kPa)**	**Qt1**	**Fr (%)**	**Bq**	**SBTn**	**n**	**Cn**	**Ic**	**Qtn**	**U2**	**I(B)**	**Mod. SBTn**	**Su**	**Robertson & Campalla, 1983**	**Kulhawy & Mayne (1990)**	**Mayne (for fine-grained) (2006)**	**SBTn deg. Kulhway vs Mayne**	**Soil Type**	**Avg. Layer Strength**
118	1.18	0.443	14	5.705	0.025	0.44443	3.15013	3	3.30904	15.71266	21.71114	0	21.71114	19.46996	3.31192	0.0135	3	0.93585	4.22778	2.82349	17.63779	0.26277	21.52224	0	30.19	29.22	31.31	27.16	27.16	Predrill	
119	1.19	0.486	14	5.71	0	0.48743	2.87222	3	3.25396	15.74808	21.86862	0	21.86862	21.2889	3.00714	0.01226	4	0.91783	4.08486	2.77644	18.76872	0.2611	22.75284	5	FALSE	29.78	31.61	27.51	31.61	Silty sand & sandy silt	
120	1.2	0.577	12	5.74	0	0.57843	2.07456	3	3.1185	15.63639	22.02498	0	22.02498	25.26267	2.15668	0.01032	4	0.87113	3.77911	2.65507	20.75235	0.26061	26.79798	5	FALSE	30.85	32.09	28.19	32.09	Silty sand & sandy silt	
121	1.21	0.708	10.5	5.74	-0.05	0.70943	1.48005	3	2.97026	15.56107	22.1806	0	22.1806	30.98449	1.52782	0.00835	5	0.82059	3.47837	2.52384	23.59264	0.25878	31.67764	4	49.09	32.10	32.70	28.93	28.93	Clay & silty clay	
122	1.22	0.863	11.25	5.71	-0.1	0.86443	1.30144	4	2.8683	15.7162	22.33776	0	22.33776	37.69804	1.33596	0.00678	5	0.78997	3.30182	2.43692	27.44067	0.25562	35.10292	6	FALSE	33.28	33.42	29.58	33.42	Sands, clean to silty sands	
123	1.23	0.908	12	5.715	-0.1	0.90943	1.31951	4	2.85162	15.8099	22.49586	0	22.49586	39.4265	1.35298	0.00644	5	0.78571	3.26248	2.42555	28.55764	0.25405	35.49191	6	FALSE	33.54	33.61	29.70	33.61	Sands, clean to silty sands	
124	1.24	0.8715	13	5.72	-0.15	0.87293	1.48924	4	2.89227	15.88626	22.65472	0	22.65472	37.53193	1.52892	0.00673	5	0.79859	3.3077	2.46567	27.7568	0.25249	33.58016	7	FALSE	33.25	33.48	29.52	33.48	Gravelly sands	
125	1.25	0.86075	15	5.76	-0.175	0.86219	1.73976	4	2.93005	16.04613	22.81518	0	22.81518	36.79019	1.78704	0.00686	5	0.8134	3.36254	2.50363	27.85524	0.25246	31.60436	5	FALSE	33.13	33.49	29.45	33.49	Silty sand & sandy silt	
126	1.26	0.89487	24	5.77	-0.1875	0.89631	2.67764	3	3.01362	16.60166	22.9812	0	22.9812	38.00199	2.7481	0.00661	4	0.84691	3.5132	2.58995	30.28066	0.25107	26.29042	5	FALSE	33.32	33.89	29.54	33.89	Silty sand & sandy silt	
127	1.27	0.929	24	5.76	-0.19375	0.93044	2.57942	3	2.99116	16.61599	23.14736	0	23.14736	39.19638	2.64523	0.00635	4	0.84011	3.45696	2.57201	30.9546	0.24884	26.96473	5	FALSE	33.51	34.00	29.61	34.00	Silty sand & sandy silt	
128	1.28	0.954	24	5.8	-0.19688	0.95545	2.51191	3	2.97523	16.62616	23.31362	0	23.31362	39.98248	2.57473	0.00622	4	0.83551	3.41306	2.55976	31.39837	0.24878	27.44479	5	FALSE	33.62	34.07	29.67	34.07	Silty sand & sandy silt	
129	1.29	1.101	26	5.74	-0.19844	1.10244	2.35842	3	2.90821	16.77311	23.48135	0	23.48135	45.94939	2.40974	0.00532	4	0.81451	3.29012	2.50477	35.03463	0.24445	29.16289	5	FALSE	34.44	34.59	30.06	34.59	Silty sand & sandy silt	
130	1.3	1.187	28	5.73	-0.19922	1.18843	2.35604	4	2.88073	16.88715	23.65022	0	23.65022	49.25038	2.40388	0.00492	4	0.80678	3.23439	2.48429	37.18094	0.24228	29.60305	5	FALSE	34.84	34.87	30.24	34.87	Silty sand & sandy silt	
131	1.31	1.352	28	5.74	-0.19961	1.35344	2.06881	4	2.80251	16.93701	23.81959	0	23.81959	55.82025	2.10587	0.00432	5	0.78125	3.09911	2.41756	40.66744	0.24098	32.55416	7	FALSE	35.55	35.30	30.60	35.30	Gravelly sands	
132	1.32	1.446	32	5.75	-0.2	1.44744	2.2108	4	2.79421	17.11636	23.99075	0	23.99075	59.33314	2.24806	0.00404	5	0.78059	3.0789	2.41538	43.25344	0.23968	31.84319	5	FALSE	35.90	35.60	30.75	35.60	Silty sand & sandy silt	
133	1.33	1.651	31.5	5.76	-0.2	1.65244	1.90627	4	2.71059	17.14903	24.16224	0	24.16224	67.38934	1.93456	0.00354	5	0.75311	2.94353	2.34355	47.30209	0.23839	35.47926	7	FALSE	36.61	36.02	31.08	36.02	Gravelly sands	
134	1.34	1.936	31	5.76	-0.3	1.93744	1.60005	4	2.61106	17.19164	24.33416	0	24.33416	78.61811	1.6204	0.00301	5	0.72229	2.80195	2.25702	52.90328	0.2367	40.39394	7	FALSE	37.45	36.56	31.45	36.56	Gravelly sands	
135	1.35	2.001	31.5	5.74	-0.35	2.00243	1.57308	4	2.59502	17.22269	24.50639	0	24.50639	80.71074	1.59258	0.0029	5	0.71777	2.76987	2.24493	54.06957	0.23422	41.04134	7	FALSE	37.59	36.66	31.48	36.66	Gravelly sands	
136	1.36	2.345	32	5.72	-0.375	2.34643	1.36377	5	2.50353	17.3016	24.6794	0	24.6794	94.07645	1.37827	0.00246	5	0.68824	2.64333	2.16709	60.56908	0.23177	45.97916	7	FALSE	38.41	37.20	31.80	37.20	Gravelly sands	36.69
137	1.37	2.622	33	5.72	-0.4	2.62343	1.2579	5	2.44378	17.37978	24.8532	0	24.8532	104.557	1.26993	0.0022	5	0.66937	2.56176	2.1173	65.69891	0.23015	49.33687	7	FALSE	38.97	37.59	32.02	37.59	Gravelly sands	
138	1.38	2.633	38	5.7	-0.4	2.63442	1.44244	5	2.47489	17.54367	25.02864	0	25.02864	104.2564	1.45628	0.00218	5	0.68165	2.5939	2.14945	66.79992	0.22774	45.91125	7	FALSE	38.95	37.67	31.97	37.67	Gravelly sands	
139	1.39	2.862	38	5.67	-0.6	2.86342	1.32709	5	2.42468	17.57563	25.20439	0	25.20439	112.6079	1.33887	0.002	5	0.6656	2.52455	2.10706	70.71522	0.22496	49.01381	7	FALSE	39.35	37.94	32.10	37.94	Gravelly sands	
140	1.4	3.13	41	5.72	-0.6	3.13143	1.30931	5	2.38914	17.69734	25.38137	0	25.38137	122.3752	1.32001	0.00184	5	0.65516	2.47676	2.07943	75.92337	0.22536	50.47806	7	FALSE	39.78	38.28	32.28	38.28	Gravelly sands	
141	1.41	3.339	40	5.66	-0.65	3.34042	1.19746	5	2.34424	17.69371	25.55831	0	25.55831	129.6978	1.20669	0.00171	6	0.64061	2.41658	2.04095	79.05861	0.22145	53.84467	7	FALSE	40.07	38.48	32.33	38.48	Gravelly sands	
142	1.42	3.268	46	5.64	-0.7	3.26941	1.40698	5	2.39138	17.84624	25.73677	0	25.73677	126.0327	1.41815	0.00174	5	0.6582	2.46454	2.08705	78.8961	0.21914	48.87459	7	FALSE	39.93	38.47	32.23	38.47	Gravelly sands	
143	1.43	3.1285	53.5	5.49	-0.7	3.12987	1.70933	5	2.45598	18.00326	25.9168	0	25.9168	119.7662	1.72361	0.00177	5	0.68015	2.52779	2.14964	77.43557	0.21183	42.97253	7	FALSE	39.67	38.38	32.00	38.38	Gravelly sands	
144	1.44	3.27525	61	5.52	-0.8	3.27663	1.86167	5	2.46222	18.17175	26.09852	0	26.09852	124.5485	1.87662	0.0017	5	0.68433	2.53012	2.16003	81.16687	0.21151	41.00722	7	FALSE	39.87	38.60	32.07	38.60	Gravelly sands	
145	1.45	3.422	77	5.42	-0.8	3.42336	2.24926	4	2.49796	18.45649	26.28308	0	26.28308	129.2494	2.26666	0.0016	5	0.69963	2.57045	2.19928	86.17807	0.20622	36.24762	7	FALSE	40.06	38.89	32.06	38.89	Gravelly sands	
146	1.46	3.793	104	5.465	-0.9	3.79437	2.74091	4	2.51905	18.84171	26.4715	0	26.4715	142.3378	2.76016	0.00145	5	0.71093	2.59675	2.22811	96.56323	0.20645	31.66528	5	FALSE	40.54	39.43	32.24	39.43	Silty sand & sandy silt	
147	1.47	4.072	129	5.51	-0.9	4.07338	3.16691	4	2.53804	19.11672	26.66267	0	26.66267	151.7746	3.18777	0.00136	5	0.7206	2.61705	2.25283	104.5195	0.20666	28.40377	5	FALSE	40.86	39.81	32.36	39.81	Silty sand & sandy silt	
148	1.48	4.562	161	5.72	-1	4.56343	3.52805	4	2.53448	19.41518	26.85682	0	26.85682	168.917	3.54893	0.00126	5	0.72284	2.61117	2.25816	116.9084	0.21298	26.17206	5	FALSE	41.39	40.35	32.67	40.35	Silty sand & sandy silt	
149	1.49	4.442	140	5.66	-1.1	4.44341	3.15073	4	2.50889	19.24419	27.04926	0	27.04926	163.2712	3.17003	0.00128	5	0.71301	2.56423	2.23232	111.7648	0.20925	28.69798	5	FALSE	41.22	40.13	32.54	40.13	Silty sand & sandy silt	
150	1.5	4.873	152	5.71	-1.15	4.87443	3.11831	4	2.47664	19.37429	27.243	0	27.243	177.924	3.13584	0.00118	5	0.70379	2.52051	2.20782	120.576	0.2096	29.13946	5	FALSE	41.64	40.49	32.70	40.49	Silty sand & sandy silt	
151	1.51	5.605	144	5.78	-1.125	5.60645	2.56847	5	2.37455	19.36574	27.43666	0	27.43666	203.3414	2.5811	0.00104	5	0.66935	2.39761	2.11746	132.0135	0.21067	34.57499	7	FALSE	42.28	40.93	32.95	40.93	Gravelly sands	
152	1.52	6.246	139	5.73	-1.1	6.24743	2.22491	5	2.29759	19.3666	27.63033	0	27.63033	225.1078	2.2348	0.00092	5	0.64358	2.30776	2.04978	141.661	0.20738	39.23109	7	FALSE	42.75	41.26	33.03	41.26	Gravelly sands	
153	1.53	5.637	139.5	5.94	-1.1	5.63848	2.47407	5	2.36161	19.33141	27.82364	0	27.82364	201.6509	2.48634	0.00106	5	0.66568	2.36399	2.10732	130.901	0.21349	35.62927	7	FALSE	42.24	40.89	32.98	40.89	Gravelly sands	
154	1.54	6.311	140	5.83	-1.1	6.31246	2.21784	5	2.29336	19.37882	28.01743	0	28.01743	224.3047	2.22772	0.00093	5	0.64329	2.28634	2.04845	141.8049	0.20808	39.33766	7	FALSE	42.74	41.27	33.05	41.27	Gravelly sands	
155	1.55	9.616	165	5.75	-1.1	9.61744	1.71563	5	2.08408	19.72926	28.21472	0	28.21472	339.8659	1.72068	0.0006	6	0.57548	2.08703	1.87037	197.513	0.20379	50.63058	7	FALSE	44.62	42.85	33.51	42.85	Gravelly sands	

Borehole No.: BH-22-05 **Date:** 8/1/2022 **Project No.** 2007263.002 **Project:** Geotechnical Investigation: TSCA Dam Declassification Study

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT						
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	SBTn deg. Kulhway vs Mayne	Soil Type	Avg. Layer Strength (de. Or Kpa)
1	0.01	1.186	10	-0.3	2.5	1.18592	0.84322	4	2.66104	15.70196	0.15702	0	0.15702	7551.721	0.84334	-0.00025	6	0.4619	19.85325	1.59119	232.335	-1.91059	91.1252	7	FALSE	55.54	43.63	#NUM!	43.63	Gravelly sands	
2	0.02	1.307	10	0.09	2.6	1.30702	0.7651	4	2.60483	15.73924	0.31441	0	0.31441	4156.038	0.76528	0.00007	6	0.47143	15.22104	1.61368	196.2937	0.28625	93.67618	7	FALSE	53.81	42.82	35.92	42.82	Gravelly sands	
3	0.03	1.373	11	-0.33	2.6	1.37292	0.80121	4	2.59411	15.86773	0.47309	0	0.47309	2901.026	0.80149	-0.00024	6	0.4784	13.03302	1.66112	176.5319	-0.69754	88.19956	7	FALSE	52.69	42.32	#NUM!	42.32	Gravelly sands	
4	0.04	0.926	12	-0.02	2.6	0.926	1.2959	4	2.84102	15.81682	0.63126	0	0.63126	1465.905	1.29679	-0.00002	6	0.55298	16.58072	1.85476	151.4256	-0.03168	60.60275	7	FALSE	50.39	41.58	#NUM!	41.58	Gravelly sands	
5	0.05	0.909	12	-0.23	2.6	0.90894	1.32022	4	2.85193	15.80969	0.78935	0	0.78935	1150.501	1.32136	-0.00025	6	0.57095	15.98903	1.8773	143.3061	-0.29138	59.10952	7	FALSE	49.52	41.32	#NUM!	41.32	Gravelly sands	
6	0.06	0.938	12	-0.36	2.6	0.93791	1.27944	4	2.83351	15.82172	0.94757	0	0.94757	988.8038	1.28073	-0.00038	6	0.5736	14.58437	1.88628	134.8632	-0.37992	59.68228	7	FALSE	48.96	41.03	#NUM!	41.03	Gravelly sands	
7	0.07	1.002	12	-0.52	2.6	1.00187	1.19776	4	2.7948	15.84702	1.10604	0	1.10604	904.8157	1.19908	-0.00052	6	0.57013	13.13914	1.87829	129.7723	-0.47014	61.95364	7	FALSE	48.63	40.85	#NUM!	40.85	Gravelly sands	
8	0.08	1.113	13	-0.54	2.6	1.11286	1.16816	4	2.74937	15.97938	1.26584	0	1.26584	878.1545	1.16949	-0.00049	6	0.5656	11.92684	1.86821	130.8449	-0.4266	63.15311	7	FALSE	48.51	40.88	#NUM!	40.88	Gravelly sands	
9	0.09	1.232	15	-0.4	2.6	1.2319	1.21763	4	2.71906	16.18295	1.42767	0	1.42767	861.8775	1.21904	-0.00033	6	0.56104	10.928	1.87627	132.7076	-0.28018	61.57124	7	FALSE	48.44	40.95	#NUM!	40.95	Gravelly sands	
10	0.1	1.349	16	-0.36	2.6	1.34891	1.18614	4	2.67904	16.29199	1.59058	0	1.59058	847.0591	1.18754	-0.00027	6	0.55712	10.119	1.86405	134.5525	-0.22633	62.90719	7	FALSE	48.37	41.02	#NUM!	41.02	Gravelly sands	
11	0.11	1.486	15	-0.46	2.6	1.48588	1.0095	4	2.60876	16.25483	1.75313	0	1.75313	846.5597	1.01069	-0.00031	6	0.54127	8.98813	1.82311	131.6513	-0.26239	69.75872	7	FALSE	48.37	40.91	#NUM!	40.91	Gravelly sands	
12	0.12	1.558	14	-0.5	2.6	1.55788	0.89866	5	2.56715	16.19361	1.91507	0	1.91507	812.4823	0.89977	-0.00032	6	0.53273	8.28265	1.80092	127.1894	-0.26109	74.3813	7	FALSE	48.21	40.75	#NUM!	40.75	Gravelly sands	
13	0.13	1.683	14	-0.48	2.6	1.68288	0.83191	5	2.52205	16.2232	2.0773	0	2.0773	809.128	0.83294	-0.00029	6	0.52449	7.68164	1.77863	127.4248	-0.23107	78.0217	7	FALSE	48.20	40.76	#NUM!	40.76	Gravelly sands	
14	0.14	1.812	16	-0.49	2.6	1.81188	0.88306	5	2.50544	16.40513	2.24135	0	2.24135	807.3858	0.88416	-0.00027	6	0.52662	7.44155	1.7815	132.9039	-0.21862	76.21228	7	FALSE	48.19	40.96	#NUM!	40.96	Gravelly sands	
15	0.15	1.926	15	-0.36	2.6	1.92591	0.77885	5	2.45686	16.35429	2.4049	0	2.4049	799.829	0.77983	-0.00019	6	0.51539	6.87574	1.75233	130.5258	-0.14969	81.80213	7	FALSE	48.15	40.87	#NUM!	40.87	Gravelly sands	
16	0.16	2.012	15	-0.04	2.5	2.01199	0.74553	5	2.43135	16.37106	2.56861	0	2.56861	782.3003	0.74648	-0.00002	6	0.51164	6.55514	1.74172	129.998	-0.01557	83.81037	7	FALSE	48.07	40.85	#NUM!	40.85	Gravelly sands	
17	0.17	2.008	15	-0.23	2.6	2.00794	0.74703	5	2.43252	16.37028	2.73231	0	2.73231	733.8885	0.74805	-0.00011	6	0.51502	6.42934	1.74956	127.2359	-0.08418	83.08315	7	FALSE	47.82	40.75	#NUM!	40.75	Gravelly sands	
18	0.18	2.112	16	-0.33	2.6	2.11192	0.75761	5	2.41573	16.46388	2.89695	0	2.89695	728.0147	0.75865	-0.00016	6	0.51456	6.22822	1.74708	129.6367	-0.11391	82.9451	7	FALSE	47.79	40.84	#NUM!	40.84	Gravelly sands	
19	0.19	2.24	16	-0.46	2.6	2.23989	0.71432	5	2.38138	16.48644	3.06181	0	3.06181	730.5553	0.7153	-0.00021	6	0.50778	5.91149	1.72884	130.5004	-0.15024	86.01349	7	FALSE	47.80	40.87	#NUM!	40.87	Gravelly sands	
20	0.2	2.378	18	-0.28	2.5	2.37793	0.75696	5	2.3698	16.64486	3.22826	0	3.22826	735.5979	0.75799	-0.00012	6	0.50941	5.787	1.73164	135.6269	-0.08673	84.27297	7	FALSE	47.83	41.06	#NUM!	41.06	Gravelly sands	
21	0.21	2.54	18	-0.35	2.6	2.53991	0.70869	5	2.3312	16.67013	3.39496	0	3.39496	747.1417	0.70963	-0.00014	6	0.50544	5.56492	1.70454	139.3092	-0.10309	88.42263	7	FALSE	47.89	41.18	#NUM!	41.18	Gravelly sands	
22	0.22	2.684	19	-0.44	2.5	2.68389	0.70793	5	2.30974	16.75346	3.5625	0	3.5625	752.3734	0.70887	-0.00016	6	0.50236	5.37533	1.69733	142.1924	-0.12351	89.10785	7	FALSE	47.92	41.28	#NUM!	41.28	Gravelly sands	
23	0.23	2.815	19	0	2.6	2.815	0.67496	5	2.2818	16.77175	3.73021	0	3.73021	753.6484	0.67585	0	6	0.49664	5.15426	1.6824	143.0053	0	91.8122	7	FALSE	47.92	41.31	0.00	41.31	Gravelly sands	
24	0.24	2.979	19	-0.35	2.5	2.97891	0.63782	5	2.2487	16.79345	3.89815	0	3.89815	763.1865	0.63865	-0.00012	6	0.48939	4.92506	1.66337	144.6052	-0.08979	95.22813	7	FALSE	47.97	41.36	#NUM!	41.36	Gravelly sands	
25	0.25	3.198	21	-0.54	2.5	3.19786	0.65669	5	2.22719	16.93578	4.06751	0	4.06751	785.1979	0.65752	-0.00017	6	0.48661	4.78076	1.6572	150.6912	-0.13276	95.03679	7	FALSE	48.08	41.56	#NUM!	41.56	Gravelly sands	
26	0.26	3.385	19	-0.18	2.5	3.38495	0.56131	5	2.17414	16.84245	4.23593	0	4.23593	798.1054	0.56201	-0.00005	6	0.47228	4.47886	1.61828	149.4376	-0.04249	103.5407	7	FALSE	48.15	41.52	#NUM!	41.52	Gravelly sands	
27	0.27	3.501	20	-0.07	2.5	3.50098	0.57127	5	2.16449	16.91438	4.40507	0	4.40507	793.7612	0.57199	-0.00002	6	0.4719	4.39152	1.61802	151.5448	-0.01589	103.1038	7	FALSE	48.12	41.59	#NUM!	41.59	Gravelly sands	
28	0.28	3.623	21	-0.29	2.5	3.62293	0.57964	5	2.15411	16.98363	4.57491	0	4.57491	790.9122	0.58037	-0.00008	6	0.47124	4.30501	1.6169	153.7335	-0.06339	102.8328	7	FALSE	48.11	41.65	#NUM!	41.65	Gravelly sands	
29	0.29	3.75	22	-0.46	2.5	3.74988	0.58668	5	2.14322	17.05035	4.74541	0	4.74541	789.2123	0.58743	-0.00012	6	0.47037	4.22011	1.61511	155.9822	-0.09694	102.6938	7	FALSE	48.10	41.72	#NUM!	41.72	Gravelly sands	
30	0.3	3.974	22	-0.27	2.5	3.97393	0.55361	5	2.10926	17.0726	4.91614	0	4.91614	807.344	0.55429	-0.00007	6	0.46233	4.05079	1.59387	158.6743	-0.05492	106.7882	7	FALSE	48.19	41.81	#NUM!	41.81	Gravelly sands	
31	0.31	4.096	21	-0.72	2.5	4.09582	0.51272	5	2.08251	17.03067	5.08645	0	5.08645	804.2419	0.51336	-0.00018	6	0.45564	3.90853	1.57588	157.7966	-0.14155	111.1194	7	FALSE	48.18	41.78	#NUM!	41.78	Gravelly sands	
32	0.32	4.223	21	-0.58	2.4	4.22286	0.49729	6	2.06472	17.04238	5.25687	0	5.25687	802.302	0.49791	-0.00014	6	0.45202	3.80925	1.5664	158.5578	-0.11033	113.1655	7	FALSE	48.17	41.80	#NUM!	41.80	Gravelly sands	
33	0.33	4.326	21	-0.4	2.4	4.3259	0.48545	6	2.0507	17.05163	5.42739	0	5.42739	796.0502	0.48606	-0.00009	6	0.44941	3.72608	1.55958	158.879	-0.0737	114.7086	7	FALSE	48.14	41.81	#NUM!	41.81	Gravelly sands	
34	0.34	4.418	24	-0.32	2.4	4.41792	0.54324	6	2.06464	17.2133	5.59952	0	5.59952	787.9819	0.54393	-0.00007	6	0.4564	3.74933	1.57904	163.269	-0.05715	109.1066	7	FALSE	48.10	41.94	#NUM!	41.94	Gravelly sands	
35	0.35	4.521	25	-0.37	2.4	4.52091	0.55299	6	2.05937	17.26909	5.77221	0	5.77221	782.2194	0.55369	-0.00008	6	0.45675	3.70145	1.58022	164.94	-0.0641	108.4387	7	FALSE	48.07	41.99	#NUM!	41.99	Gravelly sands	
36	0.36	4.62	25	-0.55	2.4	4.61986	0.54114	6	2.04667	17.2774	5.94499	0	5.94499	776.1025	0.54184	-0.00012	6	0.4544	3.62762	1.57399	165.1867	-0.09251	109.8318	7	FALSE	48.04	42.00	#NUM!	42.00	Gravelly sands	
37	0.37	4.667	23	-0.47	2.4	4.66688	0.49283	6	2.02414	17.18536	6.11684	0	6.11684	761.9566	0.49348	-0.0001	6	0.44811	3.51827	1.55692	161.834	-0.07684	114.6615	7	FALSE	47.97	41.90	#NUM!	41.90	Gravelly sands	
38	0.38	4.729	44	-0.36	2.3	4.72891	0.93045	5	2.15788	17.93663	6.2962	0	6.2962	750.0731	0.93169	-0.00008	6	0.49562	3.96312	1.69197	184.7153	-0.05718	80.42866	7	FALSE	47.90	42.53	#NUM!	42.53	Gravelly sands	
39	0.39	4.82	38	-0.37	2.3	4.81991	0.7884	5	2.11206	17.7753	6.47396	0	6.47396	743.5071	0.78946	-0.00008	6	0.4807	3.75167	1.65363	178.2225	-0.05715	89.33239	7	FALSE	47.87	42.36	#NUM!	42.36	Gravelly sands	
40	0.4	4.917	37	-0.59	2.3	4.91685	0.75251	5	2.09406	17.75226	6.65148	0	6.65148	738.2117	0.75353	-0.00012	6	0.47624	3.65843	1.64173	177.2873	-0.0887	91.99153	7	FALSE	47.84	42.34	#NUM!	42.34	Gravelly sands	
41	0.41	5	38	-0.37	2.3	4.99991	0.76001	5	2.09014	17.78936	6.82937	0	6.82937	731.118	0.76105	-0.00007	6	0.47687	3.61885	1.64272	178.329	-0.05418	91.54721	7	FALSE	47.80	42.36	#NUM!	42.36	Gravelly sands	
42	0.42	5.121	38	-0.59	2.3	5.12085	0.74206	5	2.07585	17.79852	7.00736	0	7.00736	729.7821	0.74308	-0.00012	6	0.47391	3.54657	1.63458	178.9944	-0.0842	93.09734	7	FALSE	47.80	42.38	#NUM!	42.38	Gravelly sands	
43	0.43	5.222	38	-0.65	2.3	5.22184	0.72771	6	2.06418	17.80601	7.18542	0	7.18542	725.7269	0.72872	-0.00012	6	0.47169	3.48412	1.62836	179.3089	-0.09046	94.34065	7	FALSE	47.78	42.39	#NUM!	42.39	Gravelly sands	
44	0.44	5.379	38	-0.34	2.3	5.37891	0.70646	6	2.04647	17.81737	7.36359	0	7.36359	729.4742	0.70743	-0.00006	6	0.46764	3.40773	1.61739	180.6545	-0.04617	96.38725	7	FALSE	47.80	42.43	#NUM!	42.43	Gravelly sands	
45	0.45	5.506	40	-0.35	2.3	5.50591	0.72649	6	2.04423	17.88533	7.54245	0	7.54245	728.9903	0.72749	-0.00006	6	0.46904	3.38203	1.62035	183.5247	-0.0464	95.09249	7	FALSE	47.79	42.50	#NUM!	42.50	Gravelly sands	
46	0.46	5.259	39	-0.4	2.2	5.2589	0.7416	6	2.06588	17.8386	7.72083	0	7.72083	680.1312	0.74269	-0.00008	6	0.47623	3.40765	1.63878	176.602	-0.05181	92.7627	7	FALSE	47.52	42.32	#NUM!	42.32	Gravelly sands	
47	0.47	5.352	36	-0.14	2.2	5.35197	0.67265	6	2.0373	17.75325	7.89837	0	7.89837	676.6042	0.67364	-0.00003	6	0.4675	3.29664	1.61603	173.871	-0.01773	98.25989	7	FALSE	47.50	42.24	#NUM!	42.24	Gravelly sands	
48	0.48	5.412	38	-0.46	2.2	5.41188	0.70216	6	2.04282	17.81972	8.07656	0	8.07656	669.0728	0.70321	-0.00009	6	0.47117	3.29291	1.62492	175.6156	-0.05695	95.92822	7	FALSE	47.45	42.29	#NUM!	42.29	Gravelly sands	42.76
49	0.49	5.515	42	-0.28	2.2	5.51493	0.76157	6	2.05454	17.94208	8.25598	0	8.25598	666.9919	0.76271	-0.00005	6	0.47746	3.3108	1.64048	179.9306	-0.03391	91.64986	7	FALSE	47.44	42.41	#NUM!	42.41	Gravelly sands	
50	0.5	5.716	60	-0.15	2.2	5.71596	1.04969	5	2.11989	18.3661	8.43964	0	8.43964	676.2753	1.05124	-0.00003	6	0.50444	3.50341	1.70937	197.3431	-0.01777	74.73014	7	FALSE	47.50	42.85	#NUM!	42.85	Gravelly sands	
51	0.51	5.964	75	-0.42	2.1	5.9639	1.25757	5	2.15216	18.63906	8.62603	0	8.62603	690.3832	1.25939	-0.00007	6	0.52205	3.61863	1.74574	212.681	-0.04869	65.91157	7	FALSE	47.58	43.21	#NUM!	43.21	Gravelly sands	
52	0.52	6.164	88	-0.48	2.1	6.16388	1.42767	5	2.17526	18.83559	8.81439	0	8.81439	698.2974	1.42972	-0.00008	6	0.53264	3.67183	1.77463	223.0479	-0.05446	59.92561	7	FALSE	47.62	43.43	#NUM!	43.43	Gravelly sands	
53	0.53	6.385	94	-0.43	2.1	6.38489	1.47223	5	2.17192	18.92497	9.00364	0	9.00364	708.1457	1.4743	-0.00007	6	0.53374	3.64013	1.77775	229.0558	-0.04776	58.63552	7	FALSE	47.68	43.56	#NUM!	43.56	Gravelly sands	
54	0.54	6.681	95	-0.22	2.1	6.68095	1.42195	5	2.14714	18.95452	9.19319	0	9.19319	725.728	1.42391	-0.00003	6	0.52735	3.54513	1.76083	233.4293	-0.02393	60.49688	7	FALSE	47.77	43.65	#NUM!	43.65	Gravelly sands	
55	0.55	7.087	45	-0.65	2.1	7.08684	0.63498	6	1.92029	18.1176	9.37436	0	9.37436	754.9808	0.63582	-0.00009	6	0.4444	2.88012	1.5517	201.174	-0.06934	106.7017	7	FALSE	47.93	42.94	#NUM!	42.94	Gravelly sands	
56	0.56	7.679	81	-0.57	2.1	7.67886	1.05484	6	2.01865	18.8245	9.56261	0	9.56261	802.0089	1.05616	-0.00007	6	0.48753	3.16073	1.65455	239.2359	-0.05961	77.24142	7	FALSE	48.16	43.77	#NUM!	43.77	Gravelly sands	
57	0.57	8.467	100	-0.52	2.1	8.46687	1.18107	6	2.0165	19.10436	9.75365	0	9.75365	867.072	1.18244	-0.00006	6	0.49108	3.1565	1.66502	263.4582	-0.05331	71.67551	7	FALSE	48.46	44.23	#NUM!	44.23	Gravelly sands	

Borehole No.: BH-22-05 **Date:** 8/1/2022 **Project No.** 2007263.002 **Project:** Geotechnical Investigation: TSCA Dam Declassification Study

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT						
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	SBTn deg. Kulhway vs Mayne	Soil Type	Avg. Layer Strength (de. Or Kpa)
58	0.58	9.375	102	-0.33	2	9.37492	1.08801	6	1.95969	19.1662	9.94531	0	9.94531	941.6469	1.08917	-0.00004	6	0.4749	3.01121	1.6223	278.3115	-0.03318	77.26897	7	FALSE	48.78	44.49	#NUM!	44.49	Gravelly sands	
59	0.59	9.843	104	-0.49	2	9.84288	1.0566	6	1.9353	19.20722	10.13738	0	10.13738	969.9485	1.05769	-0.00005	6	0.46856	2.94075	1.60556	285.3752	-0.04834	79.43637	7	FALSE	48.89	44.61	#NUM!	44.61	Gravelly sands	
60	0.6	9.461	105	-0.53	2	9.46087	1.10983	6	1.9622	19.20305	10.32941	0	10.32941	914.9152	1.11105	-0.00006	6	0.47774	2.97676	1.62967	277.6409	-0.05131	76.00051	7	FALSE	48.67	44.48	#NUM!	44.48	Gravelly sands	
61	0.61	8.959	103	0.54	2	8.95913	1.14966	6	1.99017	19.16003	10.52101	0	10.52101	850.5467	1.15102	0.00006	6	0.4868	3.01191	1.65331	265.9998	0.05133	73.37101	7	FALSE	48.39	44.27	28.99	44.27	Gravelly sands	
62	0.62	8.881	99	-0.79	1.5	8.8808	1.11476	6	1.98451	19.1111	10.71213	0	10.71213	828.042	1.11611	-0.00009	6	0.48522	2.97507	1.64882	260.4403	-0.07375	74.98065	7	FALSE	48.29	44.17	#NUM!	44.17	Gravelly sands	
63	0.63	8.765	101	-0.78	1.3	8.76481	1.15234	6	1.99811	19.12907	10.90342	0	10.90342	802.8586	1.15377	-0.00009	6	0.4905	2.98456	1.66269	257.849	-0.07154	72.88433	7	FALSE	48.17	44.13	#NUM!	44.13	Gravelly sands	
64	0.64	8.639	103	-0.66	1.2	8.63883	1.19229	6	2.01244	19.14607	11.09488	0	11.09488	777.6328	1.19382	-0.00008	6	0.49601	2.99545	1.67714	255.0602	-0.05949	70.77768	7	FALSE	48.04	44.07	#NUM!	44.07	Gravelly sands	
65	0.65	5.536	99	-0.01	1.1	5.536	1.7883	5	2.2737	18.92988	11.28418	0	11.28418	489.5983	1.79195	0	6	0.57684	3.5471	1.88983	193.4045	-0.00089	48.82831	7	FALSE	46.18	42.75	0.00	42.75	Gravelly sands	
66	0.66	6.474	93	-0.52	1.1	6.47387	1.43654	5	2.1605	18.91797	11.47336	0	11.47336	563.2525	1.43909	-0.00008	6	0.54166	3.25405	1.79675	207.5398	-0.04532	59.00674	7	FALSE	46.76	43.09	#NUM!	43.09	Gravelly sands	
67	0.67	7.239	84	0.74	1.1	7.23918	1.16035	5	2.06439	18.84373	11.66179	0	11.66179	619.7609	1.16222	0.0001	6	0.51118	3.01979	1.71586	215.402	0.06346	70.36219	7	FALSE	47.15	43.27	29.50	43.27	Gravelly sands	
68	0.68	7.745	80	0.46	0.7	7.74512	1.03291	6	2.0101	18.81351	11.84993	0	11.84993	652.6002	1.03449	0.00006	6	0.49446	2.88962	1.6714	220.5398	0.03882	77.3243	7	FALSE	47.35	43.38	27.94	43.38	Gravelly sands	
69	0.69	7.902	81	0.32	0.7	7.90208	1.02505	6	2.00118	18.83549	12.03828	0	12.03828	655.4126	1.02661	0.00004	6	0.49264	2.85603	1.6665	222.3955	0.02658	77.90309	7	FALSE	47.37	43.42	26.62	43.42	Gravelly sands	
70	0.7	8.095	77	0.72	0.5	8.09518	0.95118	6	1.97303	18.78649	12.22615	0	12.22615	661.1202	0.95262	0.00009	6	0.48394	2.78268	1.64319	221.9813	0.05889	82.41945	7	FALSE	47.41	43.41	29.40	43.41	Gravelly sands	
71	0.71	8.454	75	-0.45	0.3	8.45389	0.88717	6	1.93974	18.77284	12.41388	0	12.41388	680.003	0.88847	-0.00005	6	0.47399	2.70514	1.61668	225.3672	-0.03625	87.09816	7	FALSE	47.52	43.48	#NUM!	43.48	Gravelly sands	
72	0.72	8.991	68	-0.66	0.3	8.99083	0.75633	6	1.87707	18.68375	12.60071	0	12.60071	712.5179	0.75739	-0.00007	6	0.45401	2.57645	1.56331	228.2949	-0.05238	98.10103	7	FALSE	47.70	43.54	#NUM!	43.54	Gravelly sands	
73	0.73	8.579	61	-1.07	0.2	8.57873	0.71106	6	1.8782	18.54079	12.78612	0	12.78612	669.9409	0.71212	-0.00012	6	0.45365	2.55752	1.56169	216.2106	-0.08368	101.0012	7	FALSE	47.46	43.28	#NUM!	43.28	Gravelly sands	
74	0.74	8.299	55	-1.03	0.1	8.29874	0.66275	6	1.8729	18.40897	12.97021	0	12.97021	638.8309	0.66379	-0.00012	6	0.45141	2.52933	1.55513	206.8336	-0.07941	104.6021	7	FALSE	47.27	43.07	#NUM!	43.07	Gravelly sands	
75	0.75	8.82	54	-1.6	-0.1	8.8196	0.61227	6	1.83185	18.4112	13.15432	0	13.15432	669.4716	0.61319	-0.00018	6	0.4366	2.43843	1.52432	211.9306	-0.12163	110.9913	7	FALSE	47.46	43.19	#NUM!	43.19	Gravelly sands	
76	0.76	9.356	41	-1.74	-0.1	9.35557	0.43824	6	1.73393	18.11701	13.33549	0	13.33549	700.5537	0.43887	-0.00019	6	0.40331	2.26566	1.43746	208.895	-0.13048	135.3902	7	FALSE	47.64	43.12	#NUM!	43.12	Gravelly sands	
77	0.77	9.935	46	-1.67	-0.1	9.93458	0.46303	6	1.7235	18.2724	13.51822	0	13.51822	733.9033	0.46366	-0.00017	6	0.40218	2.24815	1.43396	220.1236	-0.12354	133.7442	7	FALSE	47.82	43.37	#NUM!	43.37	Gravelly sands	
78	0.78	10.469	52	-1.04	-0.1	10.46874	0.49672	6	1.72008	18.43351	13.70255	0	13.70255	762.9993	0.49737	-0.0001	6	0.40334	2.24112	1.43644	231.2457	-0.0759	130.3931	7	FALSE	47.97	43.60	#NUM!	43.60	Gravelly sands	
79	0.79	10.773	61	-0.88	-0.2	10.77278	0.56624	6	1.74072	18.62812	13.88883	0	13.88883	774.6432	0.56697	-0.00008	6	0.41483	2.28045	1.45845	242.1431	-0.06336	121.6387	7	FALSE	48.03	43.82	#NUM!	43.82	Gravelly sands	
80	0.8	10.928	68	-0.93	-0.2	10.92777	0.62227	6	1.75888	18.75856	14.07642	0	14.07642	775.3173	0.62307	-0.00009	6	0.42232	2.30157	1.47867	247.9016	-0.06607	114.8986	7	FALSE	48.03	43.94	#NUM!	43.94	Gravelly sands	
81	0.81	10.945	82	-0.84	-0.2	10.94479	0.74921	6	1.80602	18.97451	14.26616	0	14.26616	766.1852	0.75019	-0.00008	6	0.43996	2.36911	1.52587	255.5698	-0.05888	101.4684	7	FALSE	47.99	44.08	#NUM!	44.08	Gravelly sands	
82	0.82	11.213	91	0.38	-0.2	11.21309	0.81155	6	1.81901	19.10359	14.4572	0	14.4572	774.6063	0.8126	0.00003	6	0.446	2.38318	1.54203	263.3933	0.02628	96.25404	7	FALSE	48.03	44.23	26.31	44.23	Gravelly sands	
83	0.83	11.097	109	0.38	-0.3	11.09709	0.98224	6	1.87505	19.30722	14.65027	0	14.65027	756.4668	0.98354	0.00003	6	0.46675	2.4661	1.59704	269.7304	0.02594	83.4294	7	FALSE	47.94	44.34	26.23	44.34	Gravelly sands	
84	0.84	11.217	128	-0.23	-0.3	11.21694	1.14113	6	1.91432	19.49617	14.84523	0	14.84523	754.5922	1.14264	-0.00002	6	0.48214	2.52444	1.63773	279.0925	-0.01549	74.33535	7	FALSE	47.93	44.50	#NUM!	44.50	Gravelly sands	
85	0.85	11.647	151	-1.37	-0.3	11.64666	1.29651	6	1.93985	19.70068	15.04224	0	15.04224	773.2635	1.29819	-0.00012	6	0.4934	2.56292	1.66747	294.2105	-0.09108	67.31215	7	FALSE	48.02	44.76	#NUM!	44.76	Gravelly sands	
86	0.86	12.085	199	-1.53	-0.2	12.08462	1.64672	6	2.00142	20.03235	15.24256	0	15.24256	791.8205	1.6488	-0.00013	6	0.51812	2.6683	1.73265	317.8353	-0.10038	55.18674	7	FALSE	48.11	45.12	#NUM!	45.12	Gravelly sands	
87	0.87	11.819	141	-1.47	-0.2	11.81863	1.19303	6	1.91053	19.62748	15.43884	0	15.43884	764.513	1.19459	-0.00012	6	0.48425	2.48702	1.64284	289.7089	-0.09521	72.03088	7	FALSE	47.98	44.68	#NUM!	44.68	Gravelly sands	
88	0.88	11.015	118	-1.42	-0.2	11.01464	1.0713	6	1.90208	19.39562	15.6328	0	15.6328	703.5858	1.07282	-0.00013	6	0.4795	2.45022	1.62978	265.9753	-0.09083	77.66414	7	FALSE	47.65	44.27	#NUM!	44.27	Gravelly sands	
89	0.89	12.188	127	-0.68	-0.5	12.18783	1.04202	6	1.86114	19.51898	15.82799	0	15.82799	769.0178	1.04338	-0.00006	6	0.46816	2.38491	1.5999	286.4951	-0.04296	80.36781	7	FALSE	48.00	44.63	#NUM!	44.63	Gravelly sands	
90	0.9	12.823	117	-0.47	-0.7	12.82288	0.91243	6	1.80653	19.44412	16.02243	0	16.02243	799.3084	0.91357	-0.00004	6	0.4502	2.29406	1.55227	289.955	-0.02933	89.56687	7	FALSE	48.15	44.69	#NUM!	44.69	Gravelly sands	
91	0.91	12.892	132	-0.28	-0.9	12.89193	1.0239	6	1.83789	19.58494	16.21828	0	16.21828	793.9014	1.02519	-0.00002	6	0.46245	2.33335	1.58455	296.5061	-0.01726	81.95922	7	FALSE	48.12	44.79	#NUM!	44.79	Gravelly sands	
92	0.92	14.049	139	-0.14	-1.3	14.04896	0.9894	6	1.80025	19.67733	16.41505	0	16.41505	854.8588	0.99055	-0.00001	6	0.45175	2.27562	1.55632	315.1516	-0.00853	85.07931	7	FALSE	48.41	45.08	#NUM!	45.08	Gravelly sands	
93	0.93	15.101	21	-0.02	-1.3	15.101	0.13906	6	1.34662	17.53098	16.59036	0	16.59036	909.2271	0.13922	0	7	0.28759	1.6827	1.13124	250.5067	-0.00121	248.3981	7	FALSE	48.64	43.99	0.00	43.99	Gravelly sands	
94	0.94	13.898	119	-0.1	-1.9	13.89797	0.85624	6	1.76203	19.49449	16.7853	0	16.7853	826.9847	0.85728	-0.00001	6	0.43839	2.19933	1.52045	301.3009	-0.00596	94.82272	7	FALSE	48.28	44.87	#NUM!	44.87	Gravelly sands	
95	0.95	13.899	178	-0.21	-1.8	13.89895	1.28067	6	1.88103	19.9577	16.98488	0	16.98488	817.3129	1.28224	-0.00002	6	0.48288	2.3689	1.63788	324.5494	-0.01236	68.81608	7	FALSE	48.24	45.22	#NUM!	45.22	Gravelly sands	

Borehole No.: BH-22-05B **Date:** 7/31/2022 **Project No.** 2007263.002 **Project:** Geotechnical Investigation: TSCA Dam Declassification Study

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT						
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	SBTn deg. Kulhway vs Mayne	Soil Type	Avg. Layer Strength (de. Or Kpa)
127	2.54	3.305	34	1.56	0.9	3.30539	1.02862	5	2.31221	17.50272	48.23005	0	48.23005	67.53382	1.04385	0.00048	5	0.68759	1.66601	2.13682	53.55499	0.03234	50.47909	7	FALSE	36.6	36.6	24.4	36.6	Sands, clean to silty sands	39.5
128	2.56	1.987	38	1.585	1.1	1.9874	1.91205	4	2.64494	17.4356	48.57877	0	48.57877	39.9108	1.95996	0.00082	5	0.80802	1.81124	2.45205	34.65751	0.03263	32.37758	7	FALSE	33.6	34.5	23.2	34.5	Sands, clean to silty sands	
129	2.58	2.3345	47	1.61	1	2.3349	2.01293	4	2.60065	17.7419	48.9336	0	48.9336	46.71573	2.05602	0.0007	5	0.79398	1.78231	2.41472	40.21024	0.0329	32.88742	7	FALSE	34.5	35.2	23.6	35.2	Sands, clean to silty sands	
130	2.6	2.682	56	1.61	1.05	2.6824	2.08768	4	2.56155	17.99664	49.29354	0	49.29354	53.41692	2.12676	0.00061	5	0.78168	1.75635	2.38198	45.64173	0.03266	33.30461	7	FALSE	35.3	35.9	23.9	35.9	Sands, clean to silty sands	
131	2.62	3.083	70	1.62	1.1	3.08341	2.27022	4	2.53592	18.30675	49.65967	0	49.65967	61.09072	2.30738	0.00053	5	0.77452	1.73732	2.36269	52.01669	0.03262	32.63655	7	FALSE	36.1	36.5	24.2	36.5	Sands, clean to silty sands	
132	2.64	5.505	66	1.63	1.1	5.50541	1.19882	5	2.1672	18.46134	50.0289	0	50.0289	109.0446	1.20982	0.0003	6	0.64342	1.57473	2.01838	84.78397	0.03258	54.92401	7	FALSE	39.2	38.8	25.4	38.8	Sands, clean to silty sands	
133	2.66	7.123	47	2.1	1.05	7.12352	0.65979	6	1.92732	18.1696	50.39229	0	50.39229	140.3614	0.66449	0.0003	6	0.55708	1.47568	1.79163	103.012	0.04167	81.62654	7	FALSE	40.5	39.7	26.6	39.7	Sands, clean to silty sands	
134	2.68	7.946	58	1.7	1.025	7.94642	0.72989	6	1.91201	18.45343	50.76136	0	50.76136	155.5448	0.73458	0.00022	6	0.55345	1.46601	1.78151	114.2372	0.03349	80.71732	7	FALSE	41.0	40.2	26.1	40.2	Sands, clean to silty sands	
135	2.7	7.665	52	6.56	1.0125	7.66664	0.67826	6	1.90711	18.31407	51.12764	0	51.12764	148.951	0.68282	0.00086	6	0.5518	1.45854	1.77672	109.6226	0.12831	82.58253	7	FALSE	40.8	40.0	30.5	40.0	Sands, clean to silty sands	
136	2.72	7.843	46	6.43	1.00625	7.84461	0.58639	6	1.86455	18.18184	51.49128	0	51.49128	151.3483	0.59026	0.00083	6	0.53672	1.43809	1.73674	110.6066	0.12488	89.14861	7	FALSE	40.8	40.1	30.5	40.1	Sands, clean to silty sands	
137	2.74	8.76	50	3.83	1.00313	8.76096	0.57071	6	1.81769	18.32011	51.85768	0	51.85768	167.9423	0.57411	0.00044	6	0.52115	1.41776	1.69537	121.8596	0.07386	94.21162	7	FALSE	41.4	40.5	28.7	40.5	Sands, clean to silty sands	
138	2.76	8.22	54	4.985	1	8.22125	0.65683	6	1.87413	18.38426	52.22537	0	52.22537	156.4187	0.66103	0.00061	6	0.54224	1.43244	1.75015	115.4862	0.09545	85.7496	7	FALSE	41.0	40.3	29.5	40.3	Sands, clean to silty sands	
139	2.78	8.379	51	6.14	1	8.38054	0.60855	6	1.84897	18.32587	52.59188	0	52.59188	158.3504	0.6124	0.00074	6	0.53366	1.41901	1.72716	116.6287	0.11675	89.539	7	FALSE	41.1	40.3	30.3	40.3	Sands, clean to silty sands	
140	2.8	8.5085	49	25.5	0.95	8.51487	0.57546	6	1.83006	18.28595	52.9576	0	52.9576	159.7866	0.57906	0.00301	6	0.52737	1.40801	1.71019	117.587	0.48152	92.39375	7	FALSE	41.1	40.4	36.0	40.4	Sands, clean to silty sands	
141	2.82	8.638	44	-27.21	0.925	8.6312	0.50978	6	1.79737	18.16734	53.32095	0	53.32095	160.8725	0.51295	-0.00317	6	0.51586	1.39261	1.67954	117.8946	-0.51031	98.02325	7	FALSE	41.2	40.4	#NUM!	40.4	Sands, clean to silty sands	
142	2.84	8.907	38.5	-33.235	0.9625	8.89869	0.43265	6	1.7501	18.02544	53.68146	0	53.68146	164.7684	0.43527	-0.00376	6	0.49905	1.37304	1.63502	119.8574	-0.61912	106.2917	7	FALSE	41.3	40.5	#NUM!	40.5	Sands, clean to silty sands	
143	2.86	9.223	38.25	-19.5975	1	9.2181	0.41494	6	1.72788	18.03147	54.04209	0	54.04209	169.5726	0.41739	-0.00214	6	0.49172	1.36217	1.61532	123.198	-0.36263	109.6986	7	FALSE	41.4	40.6	#NUM!	40.6	Sands, clean to silty sands	
144	2.88	9.697	41.625	-5.96	0.95	9.69551	0.42932	6	1.71604	18.1481	54.40505	0	54.40505	177.2098	0.43175	-0.00062	6	0.48847	1.35496	1.60627	128.9246	-0.10955	110.5537	7	FALSE	41.6	40.8	#NUM!	40.8	Sands, clean to silty sands	
145	2.9	10.478	45	-1.51	0.925	10.47762	0.42949	6	1.68697	18.26753	54.7704	0	54.7704	190.3008	0.43174	-0.00014	6	0.47905	1.34273	1.58102	138.1202	-0.02757	114.2616	7	FALSE	42.0	41.1	#NUM!	41.1	Sands, clean to silty sands	
146	2.92	10.846	50	0.3	0.9625	10.84608	0.461	6	1.68991	18.40198	55.13844	0	55.13844	195.7062	0.46335	0.00003	6	0.48115	1.34014	1.586	142.7227	0.00544	112.1882	7	FALSE	42.1	41.3	21.3	41.3	Sands, clean to silty sands	
147	2.94	11.084	54	0.84	1	11.08421	0.48718	6	1.69461	18.49883	55.50842	0	55.50842	198.6852	0.48963	0.00008	6	0.48376	1.33794	1.59232	145.6275	0.01513	110.1368	7	FALSE	42.2	41.4	24.1	41.4	Sands, clean to silty sands	
148	2.96	11.039	61	0.94	1	11.03923	0.55257	6	1.72599	18.63749	55.88116	0	55.88116	196.5484	0.55539	0.00009	6	0.49613	1.34346	1.62421	145.6279	0.01682	103.147	7	FALSE	42.1	41.4	24.4	41.4	Sands, clean to silty sands	
149	2.98	10.807	62	1.37	1	10.80734	0.57368	6	1.74274	18.64805	56.25413	0	56.25413	191.1164	0.57669	0.00013	6	0.5028	1.3443	1.64118	142.6371	0.02435	100.2498	7	FALSE	42.0	41.3	25.4	41.3	Sands, clean to silty sands	
150	3	9.923	56	1.52	1	9.92338	0.56432	6	1.7696	18.49825	56.62409	0	56.62409	174.2501	0.56756	0.00015	6	0.51256	1.34751	1.66632	131.2172	0.02684	97.74577	7	FALSE	41.5	40.9	25.4	40.9	Sands, clean to silty sands	
151	3.02	9.805	50	1.5	0.95	9.80537	0.50992	6	1.75022	18.3633	56.99136	0	56.99136	171.0502	0.51291	0.00015	6	0.50573	1.33778	1.64792	128.7067	0.02632	101.9794	7	FALSE	41.4	40.8	25.3	40.8	Sands, clean to silty sands	
152	3.04	9.628	53	1.6	0.925	9.6284	0.55045	6	1.77469	18.42334	57.35982	0	57.35982	166.8597	0.55375	0.00017	6	0.51535	1.34075	1.67266	126.6458	0.02789	97.51319	7	FALSE	41.3	40.7	25.6	40.7	Sands, clean to silty sands	
153	3.06	9.739	48.5	1.65	0.9125	9.73941	0.49798	6	1.74728	18.32567	57.72634	0	57.72634	167.717	0.50095	0.00017	6	0.50574	1.32915	1.64697	127.0012	0.02858	102.5299	7	FALSE	41.4	40.7	25.6	40.7	Sands, clean to silty sands	
154	3.08	9.583	44	1.23	0.90625	9.58331	0.45913	6	1.73506	18.20746	58.09049	0	58.09049	163.9721	0.46193	0.00013	6	0.50155	1.32185	1.63552	124.2622	0.02117	105.3858	7	FALSE	41.2	40.6	24.7	40.6	Sands, clean to silty sands	
155	3.1	9.2065	43	0.32	0.95313	9.20658	0.46706	6	1.75384	18.16564	58.4538	0	58.4538	156.5018	0.47004	0.00003	6	0.5088	1.32298	1.65405	119.4457	0.00547	102.617	7	FALSE	41.0	40.4	20.5	40.4	Sands, clean to silty sands	
156	3.12	9.45625	44.5	0.655	1	9.45641	0.47058	6	1.7455	18.21535	58.81811	0	58.81811	159.7739	0.47353	0.00007	6	0.50652	1.31717	1.64757	122.1641	0.01114	103.3761	7	FALSE	41.1	40.6	22.8	40.6	Sands, clean to silty sands	
157	3.14	9.706	46	0.99	1	9.70625	0.47392	6	1.73736	18.26349	59.18338	0	59.18338	163.0029	0.47683	0.0001	6	0.50431	1.31149	1.64125	124.8655	0.01673	104.1115	7	FALSE	41.2	40.7	23.9	40.7	Sands, clean to silty sands	
158	3.16	10.031	57	2.17	1.05	10.03154	0.56821	6	1.76731	18.52277	59.55383	0	59.55383	167.445	0.5716	0.00022	6	0.51652	1.31588	1.67276	129.5036	0.03644	96.86109	7	FALSE	41.3	40.8	26.4	40.8	Sands, clean to silty sands	
159	3.18	9.786	67	2.09	1.1	9.78652	0.68461	6	1.82194	18.69922	59.92782	0	59.92782	162.3052	0.68883	0.00021	6	0.53748	1.32615	1.72722	127.3028	0.03488	87.07112	7	FALSE	41.2	40.8	26.1	40.8	Sands, clean to silty sands	
160	3.2	9.398	88	2.345	1.1	9.39859	0.93631	6	1.91767	18.99734	60.30776	0	60.30776	154.8437	0.94236	0.00025	6	0.57384	1.34683	1.82206	124.1258	0.03888	71.73618	7	FALSE	41.0	40.6	26.4	40.6	Sands, clean to silty sands	
161	3.22	9.019	86	2.6	1.15	9.01965	0.95347	6	1.93658	18.95511	60.68686	0	60.68686	147.6261	0.95993	0.00029	6	0.5812	1.34706	1.84087	119.1049	0.04284	70.03908	7	FALSE	40.7	40.4	26.7	40.4	Sands, clean to silty sands	
162	3.24	8.504	89	2.69	1.2	8.50467	1.04648	6	1.98173	18.97202	61.06631	0	61.06631	138.2695	1.05405	0.00032	6	0.59832	1.35388	1.88529	112.8215	0.04405	65.01253	7	FALSE	40.4	40.2	26.7	40.2	Sands, clean to silty sands	
163	3.26	7.184	108	2.895	1.2	7.18472	1.50319	5	2.13864	19.12993	61.4489	0	61.4489	115.9219	1.51616	0.00041	5	0.65674	1.38882	2.03805	97.63575	0.04711	49.36716	7	FALSE	39.5	39.5	26.6	39.5	Sands, clean to silty sands	
164	3.28	6.071	115	3.1	1.2	6.07177	1.89401	5	2.25973	19.13763	61.83166	0	61.83166	97.19849	1.9135	0.00052	5	0.70173	1.41425	2.1556	83.88398	0.05014	40.72852	7	FALSE	38.6	38.8	26.5	38.8	Sands, clean to silty sands	
165	3.3	4.844	109	3.46	1.15	4.84487	2.2498	5	2.38271	18.98944	62.21145	0	62.21145	76.87739	2.27907	0.00072	5	0.74709	1.43969	2.27412	67.95481	0.05562	34.66604	7	FALSE	37.3	37.8	26.3	37.8	Sands, clean to silty sands	
166	3.32	4.073	107	4.3	1.125	4.07408	2.62636	4	2.4836	18.9017	62.58948	0	62.58948	64.09201	2.66734	0.00107	5	0.78468	1.45937	2.37227	57.77704	0.0687	30.24261	5	FALSE	36.3	37.0	26.6	37.0	Silty sand & sandy silt	
167	3.34	3.37	101	5.78	1.1125	3.37145	2.99575	4	2.58311	18.76273	62.96473	0	62.96473	52.54497	3.05276	0.00175	4	0.82179	1.47842	2.46917	48.2736	0.0918	26.80876	5	FALSE	35.2	36.1	27.1	36.1	Silty sand & sandy silt	
168	3.36	2.714	96	6.77	1.1	2.71569	3.53501	4	2.70117	18.62139	63.33716	0	63.33716	41.87676	3.61942	0.00255	4	0.86644	1.50247	2.58462	39.3296	0.10689	23.23027	5	FALSE	33.9	35.1	26.9	35.1	Silty sand & sandy silt	
169	3.38	2.349	90	9.51	1.1	2.35138	3.82754	4	2.7711	18.49191	63.707	0	63.707	35.90925	3.93413	0.00416	4	0.89293	1.51339	2.6539	34.16871	0.14928	21.60639	3	163.4	33.0	34.5	27.5	27.5	Clay	
170	3.4	2.249	86	13.11	1.05	2.25228	3.81836	4	2.78465	18.42311	64.07546	0	64.07546	34.15039	3.93017	0.00599	4	0.89866	1.50958	2.66853	32.60066	0.2046	21.5018	3	156.3	32.7	34.2	28.5	28.5	Clay	
171	3.42	2.163	86.5	14.79	1.025	2.1667	3.99225	3	2.81	18.41492	64.44376	0	64.44376	32.62153	4.11463	0.00704	4	0.90889	1.50879	2.695	31.3038	0.2295	20.77618	3	150.2	32.4	34.1	28.7	28.7	Clay	
172	3.44	2.122	87	16.3	1.0125	2.12607	4.09205	3	2.82321	18.4143	64.81205	0	64.81205	31.8037	4.22071	0.00791	4	0.91461	1.50484	2.70963	30.61312	0.2515	20.38717	3	147.2	32.3	33.9	28.9	28.9	Clay	
173	3.46	2.107	87	18.86	1.00625	2.11172	4.11987	3	2.82736	18.4117	65.18028	0	65.18028	31.39807	4.25109	0.00922	4	0.91696	1.49862	2.71535	30.26862	0.28935	20.26863	3	146.2	32.2	33.9	29.4	29.4	Clay	
174	3.48	2.07	88	20.76	1.00313	2.07519	4.24058	3	2.84126	18.41815	65.54864	0	65.54864	30.65878	4.37889	0.01033	4	0.92297	1.4948	2.7307	29.64724	0.31671	19.84128	3	143.5	32.0	33.8	29.6	29.6	Clay	
175	3.5	1.99	89	21.36	1.00156	1.99534	4.46039	3	2.86849	18.41611	65.91697	0	65.91697	29.27051	4.61278	0.01107	3	0.93397	1.49414	2.7592	28.45123	0.32404	19.10723	3	137.8	31.8	33.6	29.5	29.5	Clay	
176	3.52	1.946	86	22.63	1	1.95166	4.40651	3	2.87236	18.36818	66.28433	0	66.28433	28.44372	4.56143	0.012	3	0.93619	1.4878	2.76458	27.68382	0.34141	19.19922	3	134.7	31.6	33.5	29.6	29.6	Clay	
177	3.54	1.851	81	24	1	1.857	4.36187	3	2.88597	18.28021	66.64993	0	66.64993	26.86199	4.52425	0.01341	3	0.94206	1.4838	2.77956	26.2179	0.36009	19.20188	3	127.9	31.2	33.2	29.6	29.6	Clay	
178	3.56	1.722	77	23.85	1	1.72796	4.45612	3	2.9159	18.19434	67.01382	0	67.01382	24.78517	4.6359	0.01436	3	0.95412	1.48359	2.81083	24.31945	0.3559	18.78021	3	118.6	30.7	32.8	29.2	29.2	Clay	
179	3.58	1.472	75	20	1	1.477	5.07786	3	3.00457	18.10389	67.3759	0	67.3759	20.92179	5.32057	0.01419	3	0.98853	1.49686	2.90093	20.82412	0.29684	17.0491	3	100.7	29.7	32.1	27.9	27.9	Clay	

Borehole No.: BH-22-05B **Date:** 7/31/2022 **Project No.** 2007263.002 **Project:** Geotechnical Investigation: TSCA Dam Declassification Study

In situ data						Basic output data																			ENGLOBE ANALYTICAL RESULT						
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	SBTn deg. Kulhway vs Mayne	Soil Type	Avg. Layer Strength (de. Or Kpa)
180	3.6	1.233	74	20.18	0.95	1.23805	5.97717	3	3.10879	18.02078	67.73631	0	67.73631	17.27742	6.32312	0.01724	3	1	1.49587	3.01136	17.27742	0.29792	15.21777	3	83.6	28.5	31.2	27.1	27.1	Clay	
181	3.62	1.095	74	20.36	0.975	1.10009	6.72672	3	3.18108	17.97548	68.09582	0	68.09582	15.15503	7.17058	0.01973	3	1	1.48798	3.09022	15.15503	0.29899	14.07901	3	73.7	27.6	30.6	26.5	26.5	Clay	
182	3.64	1.168	72	23.32	1	1.17383	6.13377	3	3.13374	17.96884	68.4552	0	68.4552	16.14742	6.51363	0.0211	3	1	1.48017	3.04181	16.14742	0.34066	14.92618	3	79.0	28.0	30.9	27.2	27.2	Clay	
183	3.66	1.241	58	27.57	1	1.24789	4.64784	3	3.03709	17.74358	68.81007	0	68.81007	17.13532	4.91908	0.02338	3	1	1.47253	2.94202	17.13532	0.40067	17.58722	3	84.2	28.4	31.2	28.0	28.0	Clay	
184	3.68	1.516	56.5	32.54	1	1.52414	3.70702	3	2.9081	17.79011	69.16587	0	69.16587	21.03594	3.88324	0.02236	3	0.95608	1.44059	2.81323	20.68612	0.47046	20.41261	3	103.9	29.7	32.1	29.5	29.5	Clay	
185	3.7	1.613	57.75	34.57	1	1.62164	3.5612	3	2.87615	17.83906	69.52265	0	69.52265	22.32538	3.72072	0.02227	4	0.94471	1.4274	2.78286	21.86521	0.49725	21.05339	3	110.9	30.1	32.3	30.0	30.0	Clay	
186	3.72	1.699	59	33.24	1	1.70731	3.45573	3	2.8505	17.88344	69.88032	0	69.88032	23.43191	3.60321	0.0203	4	0.93574	1.41577	2.75882	22.87911	0.47567	21.56881	3	117.0	30.4	32.6	30.1	30.1	Clay	
187	3.74	1.777	60	47.78	1.05	1.78895	3.35393	3	2.82652	17.92068	70.23874	0	70.23874	24.46949	3.491	0.0278	4	0.92742	1.40472	2.73648	23.82731	0.68025	22.08322	5	FALSE	30.6	32.7	31.6	32.7	Silty sand & sandy silt	111.5
188	3.76	1.7585	61	62.32	1.1	1.77408	3.4384	3	2.83605	17.93649	70.59747	0	70.59747	24.12951	3.5809	0.03658	4	0.93182	1.40032	2.7476	23.54232	0.88275	21.738	3	121.7	30.5	32.7	32.6	32.6	Clay	
189	3.78	1.74	63	44.77	1.1	1.75119	3.59755	3	2.85267	17.96862	70.95684	0	70.95684	23.67969	3.74947	0.02665	4	0.93891	1.39724	2.7658	23.16993	0.63095	21.14417	3	120.0	30.4	32.6	31.2	31.2	Clay	
190	3.8	1.6995	62	43.58	1	1.7104	3.62489	3	2.86273	17.94118	71.31566	0	71.31566	22.98344	3.78261	0.02659	4	0.94354	1.3929	2.77751	22.53217	0.61109	20.95734	3	117.1	30.2	32.5	30.9	30.9	Clay	
191	3.82	1.659	62.5	43.965	0.9	1.66999	3.74253	3	2.87949	17.94125	71.67449	0	71.67449	22.29966	3.91036	0.02751	3	0.95072	1.38977	2.79593	21.92242	0.6134	20.49927	3	114.2	30.0	32.3	30.8	30.8	Clay	
192	3.84	1.676	63	44.35	0.9	1.68709	3.73425	3	2.87543	17.95432	72.03357	0	72.03357	22.42085	3.9008	0.02746	3	0.94995	1.38282	2.79346	22.04121	0.61569	20.54209	3	115.4	30.1	32.4	30.9	30.9	Clay	
193	3.86	1.6	63	44.58	0.8	1.61115	3.91026	3	2.90354	17.93666	72.39231	0	72.39231	21.25575	4.09423	0.02897	3	0.9615	1.38166	2.82336	20.98234	0.61581	19.87239	3	109.9	29.7	32.1	30.6	30.6	Clay	
194	3.88	1.508	62	44.73	0.8	1.51918	4.08114	3	2.93508	17.89572	72.75022	0	72.75022	19.88217	4.28641	0.03092	3	0.97442	1.38103	2.85689	19.71439	0.61484	19.23213	3	103.3	29.3	31.8	30.3	30.3	Clay	
195	3.9	1.5	61	50.65	0.75	1.51266	4.03262	3	2.9333	17.87537	73.10773	0	73.10773	19.69087	4.23742	0.03518	3	0.97456	1.37451	2.8568	19.52805	0.69281	19.33115	3	102.8	29.3	31.8	30.7	30.7	Clay	
196	3.92	1.506	58	52.39	0.725	1.5191	3.81806	3	2.91713	17.81899	73.46411	0	73.46411	19.67809	4.01208	0.03624	3	0.96921	1.36566	2.84226	19.48422	0.71314	19.89861	3	103.3	29.3	31.8	30.8	30.8	Clay	
197	3.94	1.512	55	54.63	0.7125	1.52566	3.605	3	2.90032	17.75954	73.8193	0	73.8193	19.66746	3.7883	0.03763	3	0.9636	1.35688	2.82706	19.44203	0.74005	20.49535	3	103.7	29.2	31.8	31.0	31.0	Clay	
198	3.96	1.503	52	55.48	0.70625	1.51687	3.42811	3	2.88898	17.69281	74.17316	0	74.17316	19.45039	3.60436	0.03846	3	0.9601	1.34916	2.81741	19.20982	0.74798	20.97817	3	103.0	29.2	31.7	31.0	31.0	Clay	
199	3.98	1.438	51	55.44	0.70313	1.45186	3.51274	3	2.91052	17.65368	74.52623	0	74.52623	18.48119	3.70281	0.04025	3	0.96925	1.34681	2.84101	18.30745	0.7439	20.54407	3	98.4	28.8	31.5	30.7	30.7	Clay	
200	4	1.355	50	56.51	0.70156	1.36913	3.65196	3	2.94102	17.6084	74.8784	0	74.8784	17.28468	3.86324	0.04366	3	0.98192	1.34581	2.87385	17.19039	0.75469	19.93274	3	92.4	28.4	31.2	30.5	30.5	Clay	
201	4.02	1.295	49	59.31	0.70078	1.30983	3.74095	3	2.96265	17.56818	75.22976	0	75.22976	16.41103	3.9689	0.04804	3	0.99084	1.3432	2.89781	16.36632	0.78838	19.53692	3	88.2	28.1	31.0	30.4	30.4	Clay	
202	4.04	1.267	48	62.6	0.75039	1.28265	3.74225	3	2.97	17.53642	75.58049	0	75.58049	15.97065	3.97657	0.05186	3	0.99472	1.33855	2.90714	15.94594	0.82826	19.44824	3	86.2	27.9	30.8	30.5	30.5	Clay	
203	4.06	1.264	48	66.81	0.8	1.2807	3.74794	3	2.97092	17.53584	75.93121	0	75.93121	15.86662	3.98416	0.05545	3	0.99593	1.33287	2.90975	15.84801	0.87988	19.41401	3	86.1	27.9	30.8	30.7	30.7	Clay	
204	4.08	1.256	45	71.02	0.8	1.27375	3.53286	3	2.95739	17.45952	76.2804	0	76.2804	15.69833	3.75791	0.05931	3	0.99146	1.32511	2.89799	15.66032	0.93104	19.91487	3	85.5	27.8	30.7	30.8	30.8	Clay	
205	4.1	1.227	40.5	74.98	0.8	1.24575	3.25107	3	2.94375	17.32979	76.62699	0	76.62699	15.25726	3.46415	0.06413	3	0.98755	1.31772	2.8864	15.20427	0.97851	20.54642	3	83.5	27.6	30.6	30.9	30.9	Clay	
206	4.12	1.181	36	77.61	0.8	1.2004	2.99899	3	2.93639	17.18009	76.9706	0	76.9706	14.5956	3.20447	0.06908	3	0.98583	1.31129	2.88143	14.53884	1.00831	21.04726	2	80.2	27.3	30.4	30.8	30.8	Elastic silt	
207	4.14	1.124	36	82.08	0.8	1.14452	3.14542	3	2.96526	17.16181	77.31383	0	77.31383	13.80356	3.37329	0.07691	3	0.99794	1.30984	2.91303	13.79588	1.06165	20.41907	2	76.2	26.9	30.1	30.8	30.8	Elastic silt	
208	4.16	1.061	35	87.61	0.8	1.0829	3.23205	3	2.99169	17.10818	77.65599	0	77.65599	12.94487	3.48173	0.08715	3	1	1.30479	2.9434	12.94487	1.12818	19.93982	2	71.8	26.5	29.8	30.7	30.7	Elastic silt	
209	4.18	1.1015	34.5	94.58	0.8	1.12514	3.06627	3	2.96492	17.10631	77.99812	0	77.99812	13.42528	3.29467	0.09032	3	0.99963	1.29894	2.91642	13.42399	1.21259	20.50642	2	74.8	26.7	30.0	31.2	31.2	Elastic silt	
210	4.2	1.142	34.25	134.18	0.8	1.17554	2.91354	3	2.9366	17.11474	78.34042	0	78.34042	14.0056	3.12157	0.12229	3	0.98924	1.28982	2.88864	13.96689	1.71278	21.09787	2	78.4	26.9	30.2	33.0	33.0	Elastic silt	
211	4.22	1.061	34.125	132.14	0.75	1.09403	3.11919	3	2.97916	17.08298	78.68208	0	78.68208	12.9045	3.3609	0.13014	3	1	1.28778	2.93534	12.9045	1.67942	20.20319	2	72.5	26.4	29.8	32.5	32.5	Elastic silt	
212	4.24	0.972	34.0625	134.89	0.7	1.00572	3.38687	3	3.02964	17.0486	79.02305	0	79.02305	11.72695	3.67568	0.14556	3	1	1.28222	2.99188	11.72695	1.70697	19.20962	2	66.2	25.8	29.4	32.1	32.1	Elastic silt	
213	4.26	0.907	34	143.08	0.7	0.94277	3.60639	3	3.06831	17.0217	79.36348	0	79.36348	10.87914	3.93789	0.16572	3	1	1.27672	3.03589	10.87914	1.80284	18.50317	2	61.7	25.2	29.0	32.0	32.0	Elastic silt	
214	4.28	0.869	35	155.2	0.6	0.9078	3.85547	3	3.09853	17.04055	79.70429	0	79.70429	10.3896	4.22656	0.18742	3	1	1.27126	3.07032	10.3896	1.9472	17.89938	2	59.1	24.9	28.8	32.2	32.2	Elastic silt	
215	4.3	0.827	33	165.57	0.6	0.86839	3.80012	3	3.11057	16.95585	80.04341	0	80.04341	9.84902	4.18596	0.21002	3	1	1.26588	3.08639	9.84902	2.0685	17.8454	2	56.3	24.5	28.5	32.2	32.2	Elastic silt	
216	4.32	0.826	32	174.05	0.55	0.86951	3.68022	3	3.10208	16.92095	80.38183	0	80.38183	9.81728	4.0551	0.22056	3	1	1.26055	3.0793	9.81728	2.16529	18.04688	2	56.4	24.5	28.5	32.5	32.5	Elastic silt	
217	4.34	0.836	30	182.98	0.525	0.88175	3.40234	3	3.07758	16.85207	80.71887	0	80.71887	9.92365	3.7452	0.22843	3	1	1.25528	3.05514	9.92365	2.26688	18.59139	2	57.2	24.5	28.6	32.8	32.8	Elastic silt	
218	4.36	0.846	29	189.14	0.5	0.89328	3.24644	3	3.06138	16.81805	81.05523	0	81.05523	10.0207	3.57042	0.23287	3	1	1.25007	3.03957	10.0207	2.33347	18.92707	2	58.0	24.6	28.6	33.0	33.0	Elastic silt	
219	4.38	0.832	28	189.08	0.5	0.87927	3.18446	3	3.06232	16.77162	81.39066	0	81.39066	9.80308	3.5093	0.23698	3	1	1.24492	3.04297	9.80308	2.32312	18.96811	2	57.0	24.4	28.5	32.9	32.9	Elastic silt	
220	4.4	0.782	27	191.445	0.4	0.82986	3.25356	3	3.08834	16.70761	81.72482	0	81.72482	9.15434	3.60897	0.2559	3	1	1.23983	3.07425	9.15434	2.34256	18.58964	2	53.4	24.0	28.2	32.6	32.6	Elastic silt	
221	4.42	0.747	25	193.81	0.4	0.79545	3.14287	3	3.09522	16.60285	82.05687	0	82.05687	8.69392	3.50437	0.27167	3	1	1.23481	3.08524	8.69392	2.3619	18.60708	2	51.0	23.6	27.9	32.4	32.4	Elastic silt	
222	4.44	0.724	24	199.6	0.3	0.7739	3.10118	3	3.10194	16.54536	82.38778	0	82.38778	8.39338	3.47065	0.28864	3	1	1.22985	3.0954	8.39338	2.42269	18.55471	2	49.4	23.3	27.8	32.4	32.4	Elastic silt	
223	4.46	0.687	23	203.69	0.3	0.73792	3.11686	3	3.12041	16.47815	82.71734	0	82.71734	7.92101	3.51035	0.31088	3	1	1.22495	3.11892	7.92101	2.46248	18.32311	2	46.8	22.9	27.5	32.3	32.3	Elastic silt	52.3
224	4.48	0.643	23	208.24	0.3	0.69506	3.30907	3	3.15641	16.4552	83.04645	0	83.04645	7.36953	3.75809	0.34025	3	1	1.2201	3.16152	7.36953	2.50751	17.77928	2	43.7	22.4	27.1	32.0	32.0	Elastic silt	
225	4.5	0.6	22	213.9	0.3	0.65348	3.36662	3	3.1829	16.38041	83.37406	0	83.37406	6.83787	3.85897	0.3752	3	1	1.21531	3.19484	6.83787	2.56555	17.46901	2	40.7	21.9	26.8	31.9	31.9	Elastic silt	
226	4.52	0.578	22	221	0.3	0.63325	3.47414	3	3.20181	16.36836	83.70142	0	83.70142	6.56558	4.00329	0.40215	3	1	1.21055	3.21841	6.56558	2.64034	17.20493	2	39.3	21.5	26.6	31.9	31.9	Elastic silt	
227	4.54	0.572	21	227.1	0.3	0.62877	3.33983	3	3.19501	16.31213	84.02766	0	84.02766	6.48295	3.855	0.41689	3	1	1.20585	3.2137	6.48295	2.70268	17.35198	2	38.9	21.4	26.5	32.1	32.1	Elastic silt	
228	4.56	0.572	21	230.09	0.3	0.62952	3.33586	3	3.1943	16.31258	84.35392	0	84.35392	6.46287	3.85202	0.42205	3	1	1.20119	3.21463	6.46287	2.72767	17.34849	2	38.9	21.4	26.5	32.1	32.1	Elastic silt	
229	4.58	0.5725	20	234.37	0.3	0.63109	3.16911	3	3.18129	16.25741	84.67906	0	84.67906	6.45276	3.66023	0.42892	3	1	1.19658	3.20279	6.45276	2.76774	17.57424	2	39.0	21.4	26.5	32.2	32.2	Elastic silt	
230	4.6	0.573	19.5	237.28	0.35	0.63232	3.08388	3	3.17419	16.22903	85.00365	0	85.00365	6.43874	3.56284	0.43353	3	1	1.19201	3.19707	6.43874	2.79141	17.68744	2	39.1	21.4	26.5	32.3	32.3	Elastic silt	
231	4.62	0.575	19.25	237.75	0.4	0.63444	3.03418	3	3.16917	16.21547	85.32795	0	85.32795	6.43528	3.50568	0.43297	3	1	1.18748	3.19337	6.43528	2.78631	17.75635	2	39.2	21.4	26.5	32.3	32.3	Elastic silt	
232	4.64	0.557	19.125	238.49	0.4	0.61662	3.10157	3	3.18473	16.19706	85.6519	0	85.6519	6.19917	3.60189	0.44916	3	1	1.18299	3.2134	6.19917	2.78441	17.5451	2	37.9	21.1	26.3	32.1	32.1	Elastic silt	

Borehole No.: BH-22-05B **Date:** 7/31/2022 **Project No.** 2007263.002 **Project:** Geotechnical Investigation: TSCA Dam Declassification Study

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT						
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	SBTn deg. Kulhway vs Mayne	Soil Type	Avg. Layer Strength (de. Or Kpa)
233	4.66	0.558	19.5625	240.2	0.4	0.61805	3.1652	3	3.18863	16.22396	85.97638	0	85.97638	6.1886	3.67665	0.45144	3	1	1.17852	3.21896	6.1886	2.79379	17.45339	2	38.0	21.1	26.3	32.1	32.1	Elastic silt	
234	4.68	0.559	20	242.12	0.4	0.61953	3.22825	3	3.19239	16.25032	86.30138	0	86.30138	6.17868	3.75074	0.45406	3	1	1.17408	3.22435	6.17868	2.80552	17.36383	2	38.1	21.1	26.3	32.2	32.2	Elastic silt	
235	4.7	0.589	20	245.87	0.45	0.65047	3.07471	3	3.16314	16.26901	86.62676	0	86.62676	6.50885	3.5471	0.43606	3	1	1.16967	3.19209	6.50885	2.83827	17.73476	2	40.3	21.4	26.5	32.4	32.4	Elastic silt	
236	4.72	0.625	21	246.1	0.5	0.68653	3.05888	3	3.14223	16.34582	86.95368	0	86.95368	6.8953	3.5025	0.41046	3	1	1.16528	3.16821	6.8953	2.83024	17.94493	2	42.8	21.8	26.8	32.6	32.6	Elastic silt	
237	4.74	0.638	22	244.04	0.5	0.69901	3.14731	3	3.1424	16.40624	87.2818	0	87.2818	7.00866	3.59637	0.39894	3	1	1.16089	3.16875	7.00866	2.796	17.86516	2	43.7	22.0	26.9	32.6	32.6	Elastic silt	
238	4.76	0.632	26	243.605	0.5	0.6929	3.75234	3	3.18794	16.59504	87.6137	0	87.6137	6.90859	4.29548	0.40246	3	1	1.1565	3.21773	6.90859	2.78044	16.9636	2	43.2	21.9	26.8	32.5	32.5	Elastic silt	
239	4.78	0.6975	23	245.7375	0.5	0.75893	3.03057	3	3.10352	16.48891	87.94348	0	87.94348	7.6298	3.42777	0.36623	3	1	1.15216	3.12652	7.6298	2.79427	18.33512	2	47.9	22.6	27.3	33.0	33.0	Elastic silt	
240	4.8	0.763	20	247.87	0.5	0.82497	2.42434	3	3.0207	16.36013	88.27068	0	88.27068	8.34588	2.71482	0.33646	3	1	1.14789	3.03807	8.34588	2.80807	19.79966	2	52.6	23.2	27.7	33.4	33.4	Elastic silt	
241	4.82	1.211	21	252.73	0.55	1.27418	1.64812	4	2.77203	16.58294	88.60234	0	88.60234	13.38091	1.77128	0.21317	4	0.94836	1.1357	2.76804	13.28853	2.85241	24.89746	4	84.7	26.5	30.0	35.6	35.6	Clay & silty clay	88.8
242	4.84	1.751	22	225.72	0.6	1.80743	1.2172	4	2.57418	16.77051	88.93775	0	88.93775	19.32242	1.28019	0.13135	4	0.87003	1.12013	2.56192	18.99769	2.53795	30.74372	4	122.7	29.0	31.7	36.6	36.6	Clay & silty clay	
243	4.86	1.785	28	140.65	0.6	1.82016	1.53832	4	2.62463	17.05061	89.27877	0	89.27877	19.38741	1.61767	0.08126	4	0.88991	1.11922	2.61369	19.11913	1.5754	28.85126	4	123.6	29.1	31.7	34.2	34.2	Clay & silty clay	
244	4.88	1.68	26	109.605	0.6	1.7074	1.52278	4	2.64578	16.94084	89.61758	0	89.61758	18.05208	1.60714	0.06775	4	0.89918	1.11673	2.6376	17.82999	1.22303	28.20934	4	115.6	28.7	31.4	32.7	32.7	Clay & silty clay	
245	4.9	1.337	26.5	98.6025	0.55	1.36165	1.94617	4	2.78585	16.87599	89.9551	0	89.9551	14.137	2.08383	0.07754	4	0.95571	1.12047	2.78558	14.06267	1.09613	24.23126	4	90.8	27.1	30.2	31.0	31.0	Clay & silty clay	
246	4.92	1.033	27	100.90625	0.525	1.05823	2.55144	3	2.94185	16.80083	90.29112	0	90.29112	10.72016	2.78944	0.10425	3	1	1.1222	2.95408	10.72016	1.11757	20.74022	2	69.1	25.2	28.9	29.6	29.6	Elastic silt	
247	4.94	0.781	29	103.21	0.5125	0.8068	3.59444	3	3.12288	16.77901	90.6267	0	90.6267	7.90248	4.04929	0.14411	3	1	1.11805	3.15527	7.90248	1.13885	17.55156	2	51.2	23.2	27.5	28.1	28.1	Elastic silt	
248	4.96	0.732	30	136.83	0.50625	0.76621	3.91539	3	3.16249	16.79821	90.96266	0	90.96266	7.42332	4.44283	0.20264	3	1	1.11392	3.20079	7.42332	1.50424	16.91904	2	48.2	22.7	27.2	29.1	29.1	Elastic silt	
249	4.98	1.122	28	167.54	0.50313	1.16388	2.40574	3	2.8933	16.87915	91.30025	0	91.30025	11.74788	2.61052	0.1562	3	1	1.1098	2.90501	11.74788	1.83504	21.60356	2	76.6	25.8	29.4	32.5	32.5	Elastic silt	
250	5	1.512	20	219.59	0.50156	1.5669	1.27641	4	2.63813	16.60611	91.63237	0	91.63237	16.09983	1.35569	0.14885	4	0.9011	1.09484	2.64005	15.94051	2.39642	28.31613	4	105.4	27.8	30.8	35.4	35.4	Clay & silty clay	
251	5.02	2.679	17	221.49	0.50078	2.73437	0.62171	5	2.27691	16.63266	91.96502	0	91.96502	28.73274	0.64335	0.08382	5	0.75965	1.07641	2.26829	28.07112	2.40842	43.23334	6	FALSE	31.5	33.5	38.1	33.5	Sands, clean to silty sands	35.1
252	5.04	3.549	18	125.86	0.50039	3.58046	0.50273	5	2.13122	16.80179	92.30106	0	92.30106	37.79116	0.51603	0.03608	5	0.7036	1.06783	2.12072	36.76064	1.36358	52.55798	6	FALSE	33.2	34.8	36.4	34.8	Sands, clean to silty sands	
253	5.06	3.874	16	68.48	0.5502	3.89112	0.41119	6	2.06186	16.6982	92.63502	0	92.63502	41.00485	0.42122	0.01803	6	0.67743	1.06263	2.0516	39.83584	0.73925	57.42801	6	FALSE	33.8	35.2	34.0	35.2	Sands, clean to silty sands	
254	5.08	4.028	16	54.03	0.6	4.04151	0.39589	6	2.04016	16.71274	92.96928	0	92.96928	42.47143	0.40521	0.01368	6	0.66959	1.05932	2.03059	41.2807	0.58116	59.12855	6	FALSE	34.0	35.4	33.1	35.4	Sands, clean to silty sands	
255	5.1	4.081	15	28.75	0.6	4.08819	0.36691	6	2.02255	16.64291	93.30213	0	93.30213	42.81666	0.37548	0.0072	6	0.66336	1.05625	2.01383	41.64403	0.30814	60.3061	6	FALSE	34.0	35.4	30.7	35.4	Sands, clean to silty sands	
256	5.12	4.086	15	20.28	0.65	4.09107	0.36665	6	2.02215	16.64318	93.635	0	93.635	42.69168	0.37524	0.00507	6	0.66374	1.05378	2.0144	41.57352	0.21659	60.24939	6	FALSE	34.0	35.4	29.4	35.4	Sands, clean to silty sands	
257	5.14	4.01	13	19.09	0.7	4.01477	0.3238	6	2.00945	16.47135	93.96443	0	93.96443	41.72652	0.33156	0.00487	6	0.65944	1.05099	2.0027	40.66847	0.20316	60.69227	6	FALSE	33.9	35.3	29.1	35.3	Sands, clean to silty sands	
258	5.16	3.934	12	17.9	0.6	3.93847	0.30469	6	2.0078	16.37191	94.29186	0	94.29186	40.76898	0.31216	0.00466	6	0.65937	1.04858	2.0021	39.78211	0.18984	60.40171	6	FALSE	33.7	35.2	28.8	35.2	Sands, clean to silty sands	
259	5.18	3.893	11.5	17.87	0.55	3.89747	0.29506	6	2.00723	16.31894	94.61824	0	94.61824	40.1915	0.3024	0.0047	6	0.6597	1.04621	2.00254	39.26567	0.18886	60.17245	6	FALSE	33.7	35.1	28.7	35.1	Sands, clean to silty sands	
260	5.2	3.822	11.25	17.945	0.525	3.82649	0.294	6	2.01419	16.28661	94.94397	0	94.94397	39.30257	0.30148	0.00481	6	0.66293	1.04406	2.01062	38.45024	0.18901	59.38102	6	FALSE	33.5	35.0	28.6	35.0	Sands, clean to silty sands	
261	5.22	3.758	11.125	18.02	0.5	3.7625	0.29568	6	2.02192	16.2673	95.26932	0	95.26932	38.49335	0.30336	0.00491	6	0.66646	1.04193	2.01947	37.71022	0.18915	58.58338	6	FALSE	33.4	34.9	28.6	34.9	Sands, clean to silty sands	
262	5.24	3.719	11.5625	18.25	0.5	3.72356	0.31052	6	2.03351	16.30768	95.59547	0	95.59547	37.95124	0.3187	0.00503	6	0.67146	1.03986	2.03219	37.23238	0.19091	57.69465	6	FALSE	33.3	34.9	28.6	34.9	Sands, clean to silty sands	
263	5.26	3.682	12	18.49	0.45	3.68662	0.3255	6	2.04481	16.34658	95.92241	0	95.92241	37.43338	0.3342	0.00515	6	0.67635	1.03776	2.04461	36.7754	0.19276	56.842	6	FALSE	33.2	34.8	28.6	34.8	Sands, clean to silty sands	
264	5.28	3.602	12	18.76	0.425	3.60669	0.33272	6	2.05712	16.33817	96.24917	0	96.24917	36.47243	0.34184	0.00534	6	0.68167	1.03565	2.05816	35.8806	0.19491	55.77149	6	FALSE	33.1	34.7	28.5	34.7	Sands, clean to silty sands	
265	5.3	3.551	14	18.73	0.4125	3.55568	0.39374	5	2.09031	16.51003	96.57937	0	96.57937	35.81617	0.40473	0.00541	5	0.69499	1.0339	2.09269	35.29597	0.19393	53.74124	6	FALSE	33.0	34.6	28.4	34.6	Sands, clean to silty sands	
266	5.32	3.52	14	17.97	0.40625	3.52449	0.39722	5	2.09533	16.50665	96.9095	0	96.9095	35.36891	0.40845	0.00524	5	0.69748	1.03156	2.09881	34.89537	0.18543	53.28634	6	FALSE	32.9	34.6	28.2	34.6	Sands, clean to silty sands	
267	5.34	3.503	16	18.125	0.40313	3.50753	0.45616	5	2.12144	16.65841	97.24267	0	97.24267	35.06988	0.46917	0.00531	5	0.70805	1.02955	2.12613	34.65135	0.18639	51.76529	6	FALSE	32.8	34.5	28.2	34.5	Sands, clean to silty sands	
268	5.36	3.5	23	18.28	0.40156	3.50457	0.65629	5	2.19195	17.07554	97.58418	0	97.58418	34.9133	0.67508	0.00537	5	0.7356	1.02806	2.19799	34.56777	0.18733	47.74975	6	FALSE	32.8	34.5	28.2	34.5	Sands, clean to silty sands	
269	5.38	3.515	32	18.66	0.40078	3.51966	0.90918	5	2.26077	17.45707	97.93332	0	97.93332	34.9394	0.9352	0.00545	5	0.76245	1.0263	2.26802	34.65796	0.19054	43.60614	6	FALSE	32.8	34.5	28.3	34.5	Sands, clean to silty sands	
270	5.4	3.53	45	19.03	0.40039	3.53476	1.27307	5	2.33879	17.85088	98.29034	0	98.29034	34.96241	1.30948	0.00554	5	0.79279	1.0244	2.34721	34.74282	0.19361	38.73999	7	FALSE	32.8	34.5	28.3	34.5	Sands, clean to silty sands	
271	5.42	3.763	67	19.4	0.4502	3.76785	1.7782	5	2.40196	18.33323	98.65701	0	98.65701	37.19141	1.82601	0.00529	5	0.81714	1.02204	2.41065	37.01038	0.19664	34.16912	7	FALSE	33.2	34.9	28.6	34.9	Sands, clean to silty sands	
272	5.44	3.912	81	20.59	0.5	3.91715	2.06783	5	2.42951	18.56641	99.02833	0	99.02833	38.55583	2.12146	0.00539	5	0.82804	1.01917	2.43878	38.40412	0.20792	31.95562	5	FALSE	33.4	35.0	28.9	35.0	Silty sand & sandy silt	
273	5.46	4.226	97	21.37	0.5	4.23134	2.29242	5	2.43249	18.80335	99.4044	0	99.4044	41.56695	2.34757	0.00517	5	0.82938	1.016	2.44181	41.43146	0.21498	30.74884	5	FALSE	33.9	35.4	29.3	35.4	Silty sand & sandy silt	
274	5.48	4.748	117	22.79	0.55	4.7537	2.46124	5	2.41476	19.06363	99.78567	0	99.78567	46.63908	2.51401	0.0049	5	0.82267	1.01267	2.4237	46.51264	0.22839	30.23142	5	FALSE	34.5	35.9	29.9	35.9	Silty sand & sandy silt	
275	5.5	5.054	128	16.9	0.6	5.05823	2.53053	5	2.40287	19.1908	100.16949	0	100.1695	49.49666	2.58166	0.00341	5	0.81846	1.00943	2.41214	49.39371	0.16871	30.07008	5	FALSE	34.9	36.2	29.0	36.2	Silty sand & sandy silt	
276	5.52	5.165	139	13.75	0.7	5.16844	2.6894	5	2.41397	19.2939	100.55537	0	100.5554	50.39892	2.74276	0.00271	5	0.82318	1.0063	2.42404	50.33102	0.13674	28.99888	5	FALSE	35.0	36.3	28.3	36.3	Silty sand & sandy silt	
277	5.54	4.64	151	2.94	0.7	4.64073	3.25379	4	2.50482	19.34786	100.94232	0	100.9423	44.97412	3.32614	0.00065	4	0.8589	1.00326	2.51731	44.95012	0.02913	25.03302	5	FALSE	34.3	35.8	23.2	35.8	Silty sand & sandy silt	
278	5.56	3.952	142	-4.76	0.9	3.95081	3.5942	4	2.58525	19.21545	101.32663	0	101.3266	37.99083	3.68881	-0.00124	4	0.89106	0.99999	2.60121	37.9909	-0.04698	22.83747	5	FALSE	33.3	35.0	#NUM!	35.0	Silty sand & sandy silt	
279	5.58	3.128	142	-10.06	0.9	3.12549	4.54329	4	2.72912	19.1256	101.70915	0	101.7092	29.72964	4.69612	-0.00333	3	0.94815	0.99642	2.75056	29.73547	-0.09891	18.95404	3	216.0	31.9	33.8	#NUM!	#NUM!	Clay	146.3
280	5.6	2.507	135	-13.29	0.9	2.50368	5.39207	3	2.85024	18.98239	102.08879	0	102.0888	23.52451	5.62128	-0.00553	3	0.99696	0.99254	2.87816	23.52505	-0.13018	16.57679	3	171.5	30.4	32.7	#NUM!	#NUM!	Clay	
281	5.62	1.985	123	-16.78	0.9	1.98081	6.2096	3	2.96647	18.78549	102.4645	0	102.4645	18.33162	6.54833	-0.00893	3	1	0.98888	3.00263	18.33162	-0.16376	14.90812	3	134.2	28.9	31.5	#NUM!	#NUM!	Clay	
282	5.64	1.739	108	-16.49	0.9	1.73488	6.22522	3	3.00974	18.58505	102.8362	0	102.8362	15.8703	6.61748	-0.0101	3	1	0.9853	3.05199	15.8703	-0.16035	14.78122	3	116.6	28.0	30.8	#NUM!	#NUM!	Clay	
283	5.66	1.415	95	-16.2	0.9	1.41095	6.73305	3	3.09942	18.35827	103.20337	0	103.2034	12.67155	7.2644	-0.01239	3	1	0.9818	3.15197	12.67155	-0.15697	13.99036	3	93.4	26.5	29.7	#NUM!	#NUM!	Clay	
284	5.68	1.227	84	-15.48	0.8	1.22313	6.86763	3	3.15185	18.16194	103.56661	0	103.5666	10.81008	7.50292	-0.01383	3	1	0.97836	3.21324	10.81008	-0.14947	13.77173	2	80.0	25.5	29.0	#NUM!	#NUM!	Elastic silt	
285	5.7	1.125	77	-13.14	0.8	1.12172	6.86449	3	3.1803	18.02866	103.92718	0	103.9272	9.79328	7.56543	-0.01291	3	1	0.97496	3.24821	9.79328	-0.12643	13.73671	2	72.7	24.8	28.5	#NUM!	#NUM!	Elastic silt	

Borehole No.: **BH-22-05B** **Date:** **7/31/2022** **Project No.** **2007263.002** **Project:** **Geotechnical Investigation: TSCA Dam Declassification Study**

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT						
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	SBTn deg. Kulhway vs Mayne	Soil Type	Avg. Layer Strength (de. Or Kpa)
286	5.72	1.1175	71	-11.33	0.75	1.11467	6.36961	3	3.16149	17.93292	104.28584	0	104.2858	9.68858	7.02705	-0.01121	3	1	0.97161	3.23118	9.68858	-0.10864	14.2586	2	72.2	24.8	28.4	#NUM!	#NUM!	Elastic silt	78.4
287	5.74	1.14825	62	-9.6	0.7	1.14585	5.41083	3	3.10727	17.78758	104.64159	0	104.6416	9.95023	5.95462	-0.00922	3	1	0.96831	3.17664	9.95023	-0.09174	15.4354	2	74.4	24.9	28.6	#NUM!	#NUM!	Elastic silt	
288	5.76	1.179	60	-8.18	0.7	1.17695	5.0979	3	3.08199	17.76013	104.99679	0	104.9968	10.20944	5.59723	-0.00763	3	1	0.96503	3.1511	10.20944	-0.07791	15.89485	2	76.6	25.1	28.7	#NUM!	#NUM!	Elastic silt	
289	5.78	1.249	61	-6.6	0.65	1.24735	4.89037	3	3.05101	17.80142	105.35282	0	105.3528	10.83974	5.34152	-0.00578	3	1	0.96177	3.1181	10.83974	-0.06265	16.29369	2	81.6	25.5	29.0	#NUM!	#NUM!	Elastic silt	
290	5.8	1.271	62	-5.65	0.625	1.26959	4.88348	3	3.04465	17.8269	105.70936	0	105.7094	11.01017	5.32702	-0.00485	3	1	0.95852	3.11207	11.01017	-0.05345	16.33109	2	83.1	25.6	29.1	#NUM!	#NUM!	Elastic silt	
291	5.82	1.318	71	-4.41	0.6125	1.3169	5.39146	3	3.05952	17.99685	106.0693	0	106.0693	11.41544	5.86376	-0.00364	3	1	0.95527	3.12619	11.41544	-0.04158	15.63886	2	86.5	25.8	29.2	#NUM!	#NUM!	Elastic silt	
292	5.84	1.425	84	-3.26	0.60625	1.42419	5.89811	3	3.05865	18.22029	106.4337	0	106.4337	12.38096	6.3745	-0.00247	3	1	0.952	3.12245	12.38096	-0.03063	15.02861	3	94.1	26.4	29.6	#NUM!	#NUM!	Clay	169.8
293	5.86	1.538	95	-1.83	0.60312	1.53754	6.17869	3	3.04676	18.39122	106.80153	0	106.8015	13.39626	6.63992	-0.00128	3	1	0.94872	3.10808	13.39626	-0.01713	14.71925	3	102.2	26.9	30.0	#NUM!	#NUM!	Clay	
294	5.88	1.69	106	-0.33	0.60156	1.68992	6.2725	3	3.02041	18.55348	107.1726	0	107.1726	14.76819	6.69723	-0.00021	3	1	0.94544	3.07876	14.76819	-0.00308	14.6639	3	113.1	27.5	30.5	#NUM!	#NUM!	Clay	
295	5.9	2.045	121	0.8	0.60078	2.0452	5.91629	3	2.94201	18.77889	107.54818	0	107.5482	18.01659	6.24467	0.00041	3	1	0.94214	2.99425	18.01659	0.00744	15.35091	3	138.4	28.8	31.4	17.4	17.4	Clay	
296	5.92	2.588	137	1.68	0.60039	2.58842	5.2928	3	2.83418	19.01207	107.92842	0	107.9284	22.98275	5.5231	0.00068	3	1	0.93882	2.88034	22.98275	0.01557	16.74795	3	177.2	30.3	32.6	19.7	19.7	Clay	
297	5.94	3.168	151	2.24	0.6502	3.16856	4.76557	3	2.73914	19.20154	108.31245	0	108.3125	28.25389	4.93424	0.00073	3	0.96289	0.93781	2.78067	28.3239	0.02068	18.27062	3	218.6	31.6	33.6	21.0	21.0	Clay	
298	5.96	3.353	163	-1.09	0.7	3.35273	4.86171	3	2.72756	19.31117	108.69867	0	108.6987	29.84424	5.02462	-0.00034	3	0.95855	0.93488	2.76879	29.93126	-0.01003	18.1182	3	231.7	31.9	33.8	#NUM!	#NUM!	Clay	
299	5.98	3.275	171	-2.245	0.7	3.27444	5.22227	3	2.75666	19.35722	109.08582	0	109.0858	29.01709	5.40224	-0.00071	3	0.97051	0.93088	2.79968	29.08031	-0.02058	17.2085	3	226.1	31.7	33.7	#NUM!	#NUM!	Clay	
300	6	3.28	126	-2.3075	0.75	3.27942	3.84214	4	2.66416	19.00652	109.46595	0	109.466	28.95839	3.97482	-0.00073	4	0.93584	0.93023	2.70818	29.10233	-0.02108	21.05939	3	226.4	31.7	33.7	#NUM!	#NUM!	Clay	

Borehole No.: **BH-22-06** **Date:** **8/1/2022** **Project No.** **2007263.002** **Project:** **Geotechnical Investigation: TSCA Dam Declassification Study**

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT					
No	**Depth (m)**	**qc (MPa)**	**fs (kPa)**	**u (kPa)**	**Other**	**qt (MPa)**	**Rf (%)**	**SBT**	**Ic SBT**	**γ (kN/m³)**	**σ,v (kPa)**	**u0 (kPa)**	**σ',vo (kPa)**	**Qt1**	**Fr (%)**	**Bq**	**SBTn**	**n**	**Cn**	**Ic**	**Qtn**	**U2**	**I(B)**	**Mod. SBTn**	**Su**	**Robertson & Campalla, 1983**	**Kulhawy & Mayne (1990)**	**Mayne (for fine-grained) (2006)**	**Soil Type**	**Avg. Layer Strength (de. Or Kpa)**
107	2.14	1.9315	25	-8.37	0.6	1.92941	1.29573	4	2.56378	16.9426	40.61885	0	40.61885	46.5003	1.3236	-0.00443	5	0.75561	1.99511	2.32565	37.19064	-0.20606	39.58099	7	FALSE	34.5	34.9	#NUM!	Gravelly sands	
108	2.16	1.94075	31	-8.6	0.6	1.9386	1.59909	4	2.6107	17.19186	40.96269	0	40.96269	46.32599	1.63361	-0.00453	5	0.77438	2.01643	2.37425	37.76421	-0.20995	36.26964	7	FALSE	34.5	34.9	#NUM!	Gravelly sands	
109	2.18	1.95	37	-8.18	0.6	1.94795	1.89943	4	2.65048	17.39724	41.31063	0	41.31063	46.15384	1.94058	-0.00429	5	0.79046	2.03239	2.41584	38.24365	-0.19801	33.4526	7	FALSE	34.5	35.0	#NUM!	Gravelly sands	
110	2.2	2.08	42	-7.76	0.65	2.07806	2.02112	4	2.64285	17.56783	41.66199	0	41.66199	48.87904	2.06247	-0.00381	5	0.78951	2.01713	2.41285	40.53966	-0.18626	32.90093	7	FALSE	34.8	35.3	#NUM!	Gravelly sands	
111	2.22	2.894	40	-7.5	0.7	2.89213	1.38307	5	2.43107	17.63846	42.01476	0	42.01476	67.83593	1.40345	-0.00263	5	0.71555	1.87744	2.21861	52.80939	-0.17851	43.58265	7	FALSE	36.7	36.5	#NUM!	Gravelly sands	
112	2.24	4.23	38	-7.32	0.7	4.22817	0.89873	5	2.1905	17.72507	42.36926	0	42.36926	98.79334	0.90783	-0.00175	6	0.63179	1.73475	1.99874	71.66349	-0.17277	60.46534	7	FALSE	38.7	38.0	#NUM!	Gravelly sands	
113	2.26	4.034	63	-7.36	0.6	4.03216	1.56244	5	2.34444	18.28841	42.73503	0	42.73503	93.35257	1.57917	-0.00184	5	0.68994	1.81418	2.1503	71.42878	-0.17222	44.54564	7	FALSE	38.4	38.0	#NUM!	Gravelly sands	
114	2.28	4.0215	32	-7.28	0.6	4.01968	0.79608	5	2.18155	17.508	43.08519	0	43.08519	92.2961	0.80471	-0.00183	6	0.62926	1.71277	1.9912	67.21942	-0.16897	62.22753	7	FALSE	38.3	37.7	#NUM!	Gravelly sands	
115	2.3	4.12725	39	-7.2	0.65	4.12545	0.94535	5	2.21132	17.74552	43.4401	0	43.4401	93.9687	0.95541	-0.00176	6	0.64172	1.72203	2.02323	69.3744	-0.16575	58.24314	7	FALSE	38.4	37.9	#NUM!	Gravelly sands	
116	2.32	4.233	10	-7.235	0.7	4.23119	0.23634	6	1.94217	16.18968	43.76389	0	43.76389	95.68224	0.23881	-0.00173	6	0.5414	1.57542	1.76103	65.1068	-0.16532	87.79476	6	FALSE	38.5	37.5	#NUM!	Sands, clean to silty sands	
117	2.34	5.224	16.5	-7.27	0.7	5.22218	0.31596	6	1.89946	16.84641	44.10082	0	44.10082	117.4146	0.31865	-0.0014	6	0.52944	1.55335	1.72886	79.38188	-0.16485	93.79483	7	FALSE	39.6	38.5	#NUM!	Gravelly sands	
118	2.36	4.574	23	-7.36	1.15	4.57216	0.50304	6	2.03611	17.1775	44.44437	0	44.44437	101.8738	0.50798	-0.00163	6	0.57956	1.61223	1.85932	72.04248	-0.1656	76.96559	7	FALSE	38.8	38.0	#NUM!	Gravelly sands	
119	2.38	5.188	33	-7.81	1.6	5.18605	0.63632	6	2.03681	17.64109	44.79719	0	44.79719	114.7672	0.64187	-0.00152	6	0.58255	1.60877	1.86641	81.62948	-0.17434	74.86357	7	FALSE	39.5	38.6	#NUM!	Gravelly sands	
120	2.4	5.26	30	-7.735	1.6	5.25807	0.57055	6	2.00818	17.53674	45.14793	0	45.14793	115.4631	0.57549	-0.00148	6	0.57273	1.58881	1.84024	81.74056	-0.17133	78.38317	7	FALSE	39.5	38.6	#NUM!	Gravelly sands	
121	2.42	5.597	26	-7.66	1.1	5.59509	0.46469	6	1.94235	17.39595	45.49585	0	45.49585	121.9801	0.4685	-0.00138	6	0.54962	1.55285	1.77932	85.04978	-0.16837	86.52996	7	FALSE	39.8	38.8	#NUM!	Gravelly sands	
122	2.44	5.205	34	-7.57	1.1	5.20311	0.65346	6	2.04141	17.67669	45.84938	0	45.84938	112.4826	0.65927	-0.00147	6	0.58658	1.59224	1.87544	81.04197	-0.16511	73.76112	7	FALSE	39.4	38.6	#NUM!	Gravelly sands	
123	2.46	4.347	42	-8	0.9	4.345	0.96663	5	2.1977	17.85065	46.20639	0	46.20639	93.0346	0.97702	-0.00186	6	0.64361	1.6576	2.02426	70.32491	-0.17314	57.90905	7	FALSE	38.4	37.9	#NUM!	Gravelly sands	
124	2.48	4.366	38.5	-8.055	0.9	4.36399	0.88222	5	2.17459	17.75223	46.56144	0	46.56144	92.72533	0.89174	-0.00187	6	0.63573	1.63939	2.00318	69.8537	-0.173	60.36215	7	FALSE	38.3	37.9	#NUM!	Gravelly sands	
125	2.5	4.406	43.25	-8.0375	0.95	4.40399	0.98206	5	2.1966	17.88956	46.91923	0	46.91923	92.86323	0.99264	-0.00184	6	0.64495	1.64304	2.02677	70.65223	-0.17131	57.5544	7	FALSE	38.3	37.9	#NUM!	Gravelly sands	
126	2.52	4.446	48	-8.02	1	4.444	1.08011	5	2.21643	18.01289	47.27949	0	47.27949	92.99414	1.09172	-0.00182	6	0.65334	1.64545	2.04824	71.3996	-0.16963	55.01882	7	FALSE	38.4	38.0	#NUM!	Gravelly sands	38.1
127	2.54	4.386	46.5	-7.97	1	4.38401	1.06067	5	2.21686	17.97116	47.63891	0	47.63891	91.02577	1.07233	-0.00184	6	0.65409	1.63825	2.04973	70.11173	-0.1673	55.17997	7	FALSE	38.2	37.9	#NUM!	Gravelly sands	
128	2.56	4.453	46.75	-8.66	1	4.45083	1.05036	5	2.20904	17.98313	47.99857	0	47.99857	91.72848	1.06182	-0.00197	6	0.65212	1.62782	2.04408	70.73312	-0.18042	55.63752	7	FALSE	38.3	37.9	#NUM!	Gravelly sands	
129	2.58	4.52	47	-9.38	0.9	4.51765	1.04036	5	2.20135	17.99498	48.35847	0	48.35847	92.42013	1.05162	-0.0021	6	0.6502	1.6176	2.03853	71.35017	-0.19397	56.09071	7	FALSE	38.3	38.0	#NUM!	Gravelly sands	
130	2.6	4.85	48	-9.13	0.85	4.84772	0.99016	5	2.16395	18.04624	48.7194	0	48.7194	98.50282	1.00021	-0.0019	6	0.63781	1.59526	2.00555	75.55554	-0.1874	58.77225	7	FALSE	38.7	38.3	#NUM!	Gravelly sands	
131	2.62	4.886	49	-9.71	0.825	4.88357	1.00336	5	2.16454	18.07278	49.08085	0	49.08085	98.50056	1.01355	-0.00201	6	0.63889	1.589	2.00788	75.81556	-0.19784	58.4404	7	FALSE	38.7	38.3	#NUM!	Gravelly sands	
132	2.64	4.663	52	-13.5	0.8125	4.65963	1.11597	5	2.2076	18.12314	49.44332	0	49.44332	93.24176	1.12794	-0.00293	5	0.65527	1.60025	2.05031	72.80954	-0.27304	54.43532	7	FALSE	38.4	38.1	#NUM!	Gravelly sands	
133	2.66	4.177	54	-18.03	0.80625	4.17249	1.29419	5	2.28395	18.12421	49.8058	0	49.8058	82.77523	1.30983	-0.00437	5	0.68342	1.62477	2.12363	66.10822	-0.36201	48.60343	7	FALSE	37.7	37.6	#NUM!	Gravelly sands	
134	2.68	3.905	64	-22.02	0.8	3.89949	1.64124	5	2.36893	18.2937	50.17167	0	50.17167	76.72304	1.66263	-0.00572	5	0.71545	1.65347	2.20709	62.81522	-0.43889	41.74264	7	FALSE	37.3	37.4	#NUM!	Gravelly sands	
135	2.7	3.8575	71	-22.21	0.8	3.85195	1.84322	5	2.40399	18.4084	50.53984	0	50.53984	75.21606	1.86773	-0.00584	5	0.72935	1.66082	2.24302	62.30899	-0.43946	38.79731	7	FALSE	37.2	37.3	#NUM!	Gravelly sands	
136	2.72	4.02475	75	-21.515	0.75	4.01937	1.86596	5	2.39281	18.48776	50.9096	0	50.9096	77.95115	1.8899	-0.00542	5	0.72644	1.64871	2.2349	64.57297	-0.42261	38.8327	7	FALSE	37.4	37.5	#NUM!	Gravelly sands	
137	2.74	4.192	92	-20.82	0.7	4.1868	2.19738	5	2.4241	18.73842	51.28437	0	51.28437	80.63882	2.22463	-0.00503	5	0.73957	1.65468	2.2688	67.53462	-0.40597	35.20463	7	FALSE	37.6	37.7	#NUM!	Gravelly sands	
138	2.76	5.055	106	-17.98	0.7	5.0505	2.0988	5	2.34926	18.97327	51.66383	0	51.66383	96.75707	2.12049	-0.0036	5	0.71438	1.618	2.2022	79.82342	-0.34802	37.54141	7	FALSE	38.6	38.5	#NUM!	Gravelly sands	
139	2.78	6.742	106	-11.06	0.6	6.73923	1.57288	5	2.17255	19.08388	52.04551	0	52.04551	128.4874	1.58512	-0.00165	5	0.65199	1.54398	2.03802	101.8986	-0.21251	48.33183	7	FALSE	40.0	39.7	#NUM!	Gravelly sands	
140	2.8	8.468	110	-11.17	0.6	8.46521	1.29944	5	2.04339	19.21392	52.42979	0	52.42979	160.458	1.30753	-0.00133	6	0.60682	1.49154	1.91902	123.8389	-0.21305	57.70817	7	FALSE	41.1	40.6	#NUM!	Gravelly sands	
141	2.82	8.748	114	-10.16	0.5	8.74546	1.30353	6	2.03359	19.2675	52.81514	0	52.81514	164.5862	1.31145	-0.00117	6	0.60421	1.48241	1.91166	127.1752	-0.19237	57.93254	7	FALSE	41.3	40.7	#NUM!	Gravelly sands	
142	2.84	7.943	123	-10.41	0.45	7.9404	1.54904	5	2.11463	19.31787	53.2015	0	53.2015	148.2514	1.55949	-0.00132	6	0.63429	1.50477	1.99003	117.1322	-0.19567	50.31622	7	FALSE	40.7	40.4	#NUM!	Gravelly sands	
143	2.86	7.55	122	-6.68	0.425	7.54833	1.61625	5	2.14332	19.28907	53.58728	0	53.58728	139.8605	1.62781	-0.00089	5	0.6452	1.50834	2.01814	111.5676	-0.12466	48.31577	7	FALSE	40.5	40.1	#NUM!	Gravelly sands	
144	2.88	7.6505	134	3.2	0.4125	7.6513	1.75134	5	2.16237	19.40218	53.97532	0	53.97532	140.7555	1.76378	0.00042	5	0.65327	1.50898	2.03877	113.1427	0.05929	45.68307	7	FALSE	40.5	40.2	27.7	Gravelly sands	
145	2.9	7.751	135	2.8	0.40625	7.7517	1.74155	5	2.15656	19.41574	54.36363	0	54.36363	141.5898	1.75385	0.00036	5	0.65192	1.50067	2.03472	114.0011	0.05151	45.93633	7	FALSE	40.5	40.2	27.2	Gravelly sands	
146	2.92	8.086	129.5	2	0.40313	8.0865	1.60143	5	2.11842	19.3841	54.75132	0	54.75132	146.6951	1.61235	0.00025	6	0.6387	1.48163	1.99953	117.4443	0.03653	49.13772	7	FALSE	40.7	40.4	26.2	Gravelly sands	
147	2.94	8.182	124	1.11	0.40156	8.18228	1.51547	5	2.09857	19.33869	55.13809	0	55.13809	147.3961	1.52575	0.00014	6	0.63202	1.46899	1.98149	117.8259	0.02013	51.17681	7	FALSE	40.7	40.4	24.4	Gravelly sands	
148	2.96	7.609	125	0.67	0.4	7.60917	1.64276	5	2.14544	19.32009	55.52449	0	55.52449	136.0416	1.65483	0.00009	5	0.64957	1.47805	2.02703	110.1864	0.01207	47.62879	7	FALSE	40.3	40.1	22.8	Gravelly sands	
149	2.98	6.389	108	1.865	0.4	6.38947	1.69028	5	2.2105	19.08495	55.90619	0	55.90619	113.2891	1.7052	0.00029	5	0.67288	1.49203	2.08771	93.26265	0.03336	45.08662	7	FALSE	39.4	39.3	25.4	Gravelly sands	
150	3	6.386	101	3.06	0.35	6.38677	1.5814	5	2.19181	19.0077	56.28635	0	56.28635	112.4692	1.59546	0.00048	5	0.66651	1.47968	2.0705	92.44616	0.05436	47.10303	7	FALSE	39.3	39.2	27.0	Gravelly sands	
151	3.02	6.383	94	1.78	0.3	6.38345	1.47256	5	2.17206	18.92488	56.66484	0	56.66484	111.6527	1.48575	0.00028	5	0.65973	1.4673	2.05222	91.61878	0.03141	49.30021	7	FALSE	39.3	39.2	25.3	Gravelly sands	
152	3.04	6.524	90	-4.1	0.3	6.52297	1.37974	5	2.14683	18.88315	57.04251	0	57.04251	113.3529	1.39191	-0.00063	6	0.65111	1.45366	2.02911	92.76386	-0.07188	51.60927	7	FALSE	39.4	39.2	#NUM!	Gravelly sands	
153	3.06	6.381	85	-14.32	0.25	6.37742	1.33283	5	2.14497	18.80874	57.41868	0	57.41868	110.0687	1.34494	-0.00227	6	0.65085	1.44725	2.02795	90.26984	-0.2494	52.38562	7	FALSE	39.2	39.1	#NUM!	Gravelly sands	
154	3.08	5.594	79	-16.245	0.2	5.58994	1.41325	5	2.20557	18.674	57.79216	0	57.79216	95.72486	1.42802	-0.00294	5	0.6731	1.45926	2.08583	79.67298	-0.28109	48.79515	7	FALSE	38.5	38.5	#NUM!	Gravelly sands	
155	3.1	4.798	46	-16.5125	0.2	4.79387	0.95956	5	2.16035	17.993	58.15202	0	58.15202	81.43689	0.97134	-0.00349	6	0.65517	1.43878	2.03838	67.2458	-0.28395	57.08438	7	FALSE	37.7	37.7	#NUM!	Gravelly sands	
156	3.12	4.265	42	-16.78	0.15	4.2608	0.98573	5	2.20947	17.84315	58.50888	0	58.50888	71.82321	0.99945	-0.00399	5	0.67332	1.44739	2.08554	60.02806	-0.28679	53.8697	7	FALSE	37.0	37.2	#NUM!	Gravelly sands	
157	3.14	3.751	42	-16.76	0.175	3.74681	1.12095	5	2.28685	17.79386	58.86476	0	58.86476	62.65115	1.13885	-0.00454	5	0.70215	1.46423	2.16068	53.29381	-0.28472	48.42923	7	FALSE	36.2	36.6	#NUM!	Gravelly sands	

Borehole No.: **BH-22-06** **Date:** **8/1/2022** **Project No.** **2007263.002** **Project:** **Geotechnical Investigation: TSCA Dam Declassification Study**

In situ data						Basic output data																			ENGLOBE ANALYTICAL RESULT					
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	Soil Type	Avg. Layer Strength (de. Or Kpa)
158	3.16	3.532	42	-19.18	0.2	3.5272	1.19074	5	2.32324	17.7707	59.22018	0	59.22018	58.56087	1.21108	-0.00553	5	0.71612	1.46904	2.19687	50.27975	-0.32388	46.0528	7	FALSE	35.8	36.3	#NUM!	Gravelly sands	36.2
159	3.18	3.465	43	-12.83	0.2	3.46179	1.24213	5	2.34024	17.79059	59.57599	0	59.57599	57.10718	1.26388	-0.00377	5	0.72313	1.4682	2.21478	49.29818	-0.21536	44.8186	7	FALSE	35.7	36.2	#NUM!	Gravelly sands	
160	3.2	3.05	44	-6.48	0.1	3.04838	1.44339	5	2.42268	17.76827	59.93135	0	59.93135	49.86453	1.47234	-0.00217	5	0.75407	1.48585	2.29548	43.82311	-0.10812	40.01054	7	FALSE	34.9	35.7	#NUM!	Gravelly sands	
161	3.22	3.161	44	-20.19	0.05	3.15595	1.39419	5	2.40172	17.78157	60.28698	0	60.28698	51.34882	1.42134	-0.00652	5	0.74713	1.47392	2.27683	45.03092	-0.3349	41.06652	7	FALSE	35.1	35.8	#NUM!	Gravelly sands	
162	3.24	3.018	43	-26.9	0.025	3.01127	1.42797	5	2.4244	17.73713	60.64173	0	60.64173	48.65682	1.45731	-0.00912	5	0.75611	1.47425	2.29992	42.93093	-0.44359	39.92863	7	FALSE	34.8	35.6	#NUM!	Gravelly sands	
163	3.26	2.763	42	-34.62	0.0125	2.75434	1.52486	5	2.47247	17.67586	60.99524	0	60.99524	44.15672	1.5594	-0.01285	5	0.77445	1.48151	2.34756	39.38038	-0.56759	37.57745	7	FALSE	34.2	35.1	#NUM!	Gravelly sands	
164	3.28	2.53	41	-36.67	0.05625	2.52083	1.62645	5	2.52005	17.61418	61.34753	0	61.34753	40.09102	1.66702	-0.01491	5	0.79266	1.48846	2.39488	36.12961	-0.59774	35.42202	7	FALSE	33.7	34.7	#NUM!	Gravelly sands	
165	3.3	2.251	40	-37.66	0.1	2.24158	1.78445	4	2.58489	17.54075	61.69834	0	61.69834	35.33137	1.83496	-0.01728	5	0.81733	1.49999	2.45915	32.27046	-0.61039	32.71329	7	FALSE	32.9	34.2	#NUM!	Gravelly sands	
166	3.32	2.054	39.5	-37.535	0.1	2.04462	1.9319	4	2.63736	17.49102	62.04816	0	62.04816	31.95208	1.99237	-0.01893	4	0.83755	1.50795	2.51175	29.50523	-0.60493	30.67529	5	FALSE	32.3	33.8	#NUM!	Silty sand & sandy silt	
167	3.34	1.984	39.25	-37.41	0.1	1.97465	1.9877	4	2.65684	17.47036	62.39757	0	62.39757	30.64622	2.05256	-0.01956	4	0.84557	1.50672	2.53234	28.43556	-0.59954	29.94226	5	FALSE	32.1	33.6	#NUM!	Silty sand & sandy silt	
168	3.36	1.944	39	-37.4	0.1	1.93465	2.01587	4	2.66762	17.45517	62.74667	0	62.74667	29.83271	2.08344	-0.01998	4	0.85037	1.50308	2.54447	27.76837	-0.59605	29.54029	5	FALSE	31.9	33.5	#NUM!	Silty sand & sandy silt	
169	3.38	1.902	39	-37.27	0.1	1.89268	2.06057	4	2.68088	17.44676	63.09561	0	63.09561	28.99706	2.13163	-0.02037	4	0.8567	1.50051	2.55898	27.0941	-0.59069	29.03544	5	FALSE	31.7	33.4	#NUM!	Silty sand & sandy silt	
170	3.4	1.799	37	-37.25	0.1	1.78969	2.0674	4	2.70166	17.36474	63.4429	0	63.4429	27.20942	2.14338	-0.02158	4	0.86515	1.49939	2.58082	25.54463	-0.58714	28.49226	5	FALSE	31.4	33.1	#NUM!	Silty sand & sandy silt	
171	3.42	1.612	35	-37.19	0.1	1.6027	2.18381	4	2.75463	17.25851	63.78807	0	63.78807	24.12543	2.27433	-0.02417	4	0.88569	1.50662	2.63452	22.88233	-0.58302	26.94346	5	FALSE	30.6	32.6	#NUM!	Silty sand & sandy silt	
172	3.44	1.431	34	-36.95	0.1	1.42176	2.3914	4	2.81984	17.17923	64.13166	0	64.13166	21.16943	2.50436	-0.02722	4	0.911	1.51693	2.7008	20.32494	-0.57616	25.08245	5	FALSE	29.8	32.0	#NUM!	Silty sand & sandy silt	
173	3.46	1.228	34	-36.98	0.1	1.21876	2.78973	3	2.91294	17.12016	64.47406	0	64.47406	17.90303	2.94556	-0.03204	4	0.9471	1.53443	2.79551	17.47999	-0.57356	22.61945	5	FALSE	28.8	31.3	#NUM!	Silty sand & sandy silt	
174	3.48	1.076	33	-36.91	0.1	1.06677	3.09344	3	2.98606	17.03474	64.81476	0	64.81476	15.45879	3.29355	-0.03684	3	0.97594	1.54659	2.87105	15.29352	-0.56947	21.01314	3	71.6	27.8	30.6	#NUM!	Clay	74.0
175	3.5	1.111	31.5	-36.84	0.1	1.10179	2.85898	3	2.95503	16.99362	65.15463	0	65.15463	15.91039	3.03868	-0.03554	3	0.96495	1.53126	2.84165	15.66601	-0.56542	21.82411	3	74.0	28.0	30.7	#NUM!	Clay	
176	3.52	1.146	32.25	-36.12	0.1	1.13697	2.83649	3	2.94184	17.03274	65.49528	0	65.49528	16.35957	3.00987	-0.03371	4	0.96071	1.52076	2.83007	16.08151	-0.55149	22.0277	3	76.5	28.2	30.9	#NUM!	Clay	
177	3.54	1.289	33	-36.545	0.1	1.27986	2.5784	3	2.87599	17.10457	65.83737	0	65.83737	18.43978	2.71823	-0.0301	4	0.93637	1.49737	2.76551	17.94075	-0.55508	23.52568	5	FALSE	28.9	31.4	#NUM!	Silty sand & sandy silt	35.7
178	3.56	1.449	40	-35.7925	0.1	1.44005	2.77768	4	2.8527	17.37108	66.1848	0	66.1848	20.75805	2.91149	-0.02605	4	0.92826	1.48488	2.74375	20.13344	-0.5408	23.42858	5	FALSE	29.7	31.9	#NUM!	Silty sand & sandy silt	
179	3.58	1.666	40	-35.04	0.1	1.65724	2.41365	4	2.7676	17.42494	66.53329	0	66.53329	23.90843	2.51461	-0.02203	4	0.89688	1.45828	2.66068	22.8936	-0.52665	25.78507	5	FALSE	30.6	32.6	#NUM!	Silty sand & sandy silt	
180	3.6	1.818	40.5	-34.31	0.1	1.80942	2.23828	4	2.71752	17.47292	66.88275	0	66.88275	26.05365	2.32419	-0.01969	4	0.87881	1.44059	2.61266	24.77455	-0.51299	27.25687	5	FALSE	31.1	32.9	#NUM!	Silty sand & sandy silt	
181	3.62	2.075	41	-33.91	0.1	2.06652	1.98401	4	2.64019	17.53798	67.23351	0	67.23351	29.73649	2.05073	-0.01696	4	0.85055	1.41746	2.53784	27.96848	-0.50436	29.81292	5	FALSE	31.9	33.5	#NUM!	Silty sand & sandy silt	
182	3.64	2.989	41	-33.51	0.1	2.98062	1.37555	5	2.4189	17.67842	67.58708	0	67.58708	43.10048	1.40747	-0.0115	5	0.76811	1.36482	2.32231	39.23773	-0.4958	39.31916	7	FALSE	34.1	35.1	#NUM!	Gravelly sands	
183	3.66	4.157	44.5	-34.06	0.1	4.14848	1.07268	5	2.23946	17.89942	67.94507	0	67.94507	60.05645	1.09054	-0.00835	5	0.70241	1.32407	2.14942	53.3225	-0.50129	49.41263	7	FALSE	36.0	36.6	#NUM!	Gravelly sands	
184	3.68	4.424	48	-38.57	0	4.41436	1.08736	5	2.22047	18.01033	68.30528	0	68.30528	63.62689	1.10445	-0.00887	5	0.69622	1.31594	2.1327	56.44351	-0.56467	50.20703	7	FALSE	36.3	36.9	#NUM!	Gravelly sands	
185	3.7	4.188	53	-43.845	0	4.17704	1.26884	5	2.27857	18.10313	68.66734	0	68.66734	59.83007	1.29005	-0.01067	5	0.7186	1.32257	2.19096	53.62563	-0.63851	45.71474	7	FALSE	36.0	36.6	#NUM!	Gravelly sands	
186	3.72	3.701	56	-49.12	0	3.68872	1.51814	5	2.36798	18.11879	69.02971	0	69.02971	52.4367	1.54709	-0.01357	5	0.75256	1.33486	2.2796	47.68612	-0.71158	40.12253	7	FALSE	35.2	36.1	#NUM!	Gravelly sands	
187	3.74	3.346	56	-49.21	0	3.3337	1.67982	5	2.42944	18.07999	69.39131	0	69.39131	47.042	1.71553	-0.01508	5	0.77611	1.34153	2.34094	43.21916	-0.70917	36.92094	7	FALSE	34.6	35.6	#NUM!	Gravelly sands	
188	3.76	2.913	53	-49.235	-0.05	2.90069	1.82715	5	2.49974	17.9633	69.75058	0	69.75058	40.58663	1.87217	-0.01739	5	0.80345	1.34988	2.41089	37.71458	-0.70587	33.93445	7	FALSE	33.7	34.9	#NUM!	Gravelly sands	
189	3.78	2.524	47	-49.26	-0.075	2.51168	1.87125	4	2.5564	17.76989	70.10598	0	70.10598	34.82697	1.92498	-0.02018	5	0.82521	1.35519	2.46767	32.65543	-0.70265	32.10526	7	FALSE	32.8	34.3	#NUM!	Gravelly sands	
190	3.8	2.261	45.5	-49.3	-0.1	2.24867	2.02341	4	2.61523	17.69016	70.45978	0	70.45978	30.91431	2.08887	-0.02263	4	0.84799	1.36079	2.52718	29.25334	-0.69969	29.94009	5	FALSE	32.1	33.7	#NUM!	Silty sand & sandy silt	
191	3.82	1.971	46.25	-49.21	-0.1	1.9587	2.36126	4	2.70312	17.65603	70.8129	0	70.8129	26.66018	2.44983	-0.02607	4	0.8819	1.3716	2.61597	25.55558	-0.69493	26.81277	5	FALSE	31.2	33.1	#NUM!	Silty sand & sandy silt	
192	3.84	1.775	47	-48.87	-0.2	1.76278	2.66624	4	2.77123	17.63413	71.16558	0	71.16558	23.77015	2.77841	-0.02889	4	0.9085	1.3785	2.6855	23.01394	-0.68671	24.64792	5	FALSE	30.5	32.6	#NUM!	Silty sand & sandy silt	
193	3.86	1.997	54	-48.53	-0.2	1.98487	2.72058	4	2.73524	17.83933	71.52237	0	71.52237	26.7517	2.82228	-0.02536	4	0.89557	1.36608	2.65106	25.79604	-0.67853	25.0666	5	FALSE	31.3	33.1	#NUM!	Silty sand & sandy silt	
194	3.88	2.219	60	-37.5	-0.25	2.20962	2.71539	4	2.69778	18.00166	71.8824	0	71.8824	29.73944	2.8067	-0.01754	4	0.88215	1.3537	2.61535	28.56029	-0.52169	25.67944	5	FALSE	31.9	33.6	#NUM!	Silty sand & sandy silt	
195	3.9	2.946	55	-37.52	-0.275	2.93662	1.8729	5	2.50183	18.01063	72.24262	0	72.24262	39.64941	1.92014	-0.0131	5	0.80907	1.31483	2.42267	37.16931	-0.51936	33.36581	7	FALSE	33.6	34.9	#NUM!	Gravelly sands	
196	3.92	4.073	53	-38.02	-0.3	4.0635	1.3043	5	2.29526	18.09256	72.60447	0	72.60447	54.96756	1.32802	-0.00953	5	0.73197	1.27631	2.22092	50.26998	-0.52366	44.06997	7	FALSE	35.5	36.3	#NUM!	Gravelly sands	
197	3.94	4.949	51	-42.07	-0.3	4.93848	1.03271	5	2.16764	18.12309	72.96693	0	72.96693	66.68111	1.04819	-0.00865	5	0.68498	1.25219	2.09712	60.12899	-0.57656	52.71794	7	FALSE	36.6	37.2	#NUM!	Gravelly sands	
198	3.96	5.61	49	-48.59	-0.3	5.59785	0.87534	5	2.08221	18.12512	73.32943	0	73.32943	75.33841	0.88695	-0.0088	6	0.65374	1.23541	2.01467	67.35794	-0.66263	59.62379	7	FALSE	37.2	37.7	#NUM!	Gravelly sands	
199	3.98	5.883	46	-49.175	-0.3	5.87071	0.78355	6	2.0384	18.0707	73.69085	0	73.69085	78.6667	0.79351	-0.00848	6	0.63795	1.22526	1.97274	70.09995	-0.66731	63.76109	7	FALSE	37.5	37.9	#NUM!	Gravelly sands	
200	4	5.96	44	-48.9375	-0.35	5.94777	0.73977	6	2.02009	18.02456	74.05134	0	74.05134	79.31949	0.7491	-0.00833	6	0.63165	1.21905	1.95575	70.66703	-0.66086	65.61673	7	FALSE	37.5	37.9	#NUM!	Gravelly sands	
201	4.02	6.025	41	-48.7	-0.375	6.01283	0.68188	6	1.99722	17.9475	74.41029	0	74.41029	79.80637	0.69042	-0.0082	6	0.62361	1.21232	1.93418	71.05092	-0.65448	68.07857	7	FALSE	37.5	38.0	#NUM!	Gravelly sands	
202	4.04	6.117	41	-38.9	-0.4	6.10727	0.67133	6	1.9879	17.95348	74.76936	0	74.76936	80.68152	0.67965	-0.00645	6	0.62072	1.20762	1.92614	71.89727	-0.52027	68.89936	7	FALSE	37.6	38.0	#NUM!	Gravelly sands	
203	4.06	6.164	40	-22.65	-0.4	6.15834	0.64953	6	1.9773	17.92827	75.12792	0	75.12792	80.97135	0.65755	-0.00372	6	0.61732	1.20282	1.91673	72.21297	-0.30149	69.97833	7	FALSE	37.6	38.0	#NUM!	Gravelly sands	
204	4.08	6.181	39	-15.82	-0.45	6.17704	0.63137	6	1.96977	17.90031	75.48593	0	75.48593	80.83042	0.63918	-0.00259	6	0.61505	1.19849	1.91031	72.17035	-0.20958	70.75727	7	FALSE	37.6	38.0	#NUM!	Gravelly sands	
205	4.1	6.094	40	-10.75	-0.475	6.09131	0.65667	6	1.98383	17.92407	75.84441	0	75.84441	79.31327	0.66495	-0.00179	6	0.62091	1.19703	1.92521	71.06545	-0.14174	69.13594	7	FALSE	37.5	38.0	#NUM!	Gravelly sands	
206	4.12	5.962	34.5	-9.86	-0.4875	5.95953	0.5789	6	1.96398	17.74553	76.19932	0	76.19932	77.20982	0.5864	-0.00168	6	0.61386	1.19117	1.90626	69.16424	-0.1294	71.60423	7	FALSE	37.4	37.8	#NUM!	Gravelly sands	
207	4.14	5.869	33.25	-10.18	-0.49375	5.86646	0.56678	6	1.96534	17.69704	76.55326	0	76.55326	75.63233	0.57428	-0.00176	6	0.61488	1.18813	1.90849	67.89198	-0.13298	71.46793	7	FALSE	37.2	37.8	#NUM!	Gravelly sands	
208	4.16	5.791	33.625	-9.89	-0.5	5.78853	0.58089	6	1.97568	17.70481	76.90736	0	76.90736	74.26624	0.58871	-0.00173	6	0.61933	1.18622	1.9197	66.86627	-0.1286	70.28417	7	FALSE	37.1	37.7	#NUM!	Gravelly sands	

Borehole No.: **BH-22-06** **Date:** **8/1/2022** **Project No.** **2007263.002** **Project:** **Geotechnical Investigation: TSCA Dam Declassification Study**

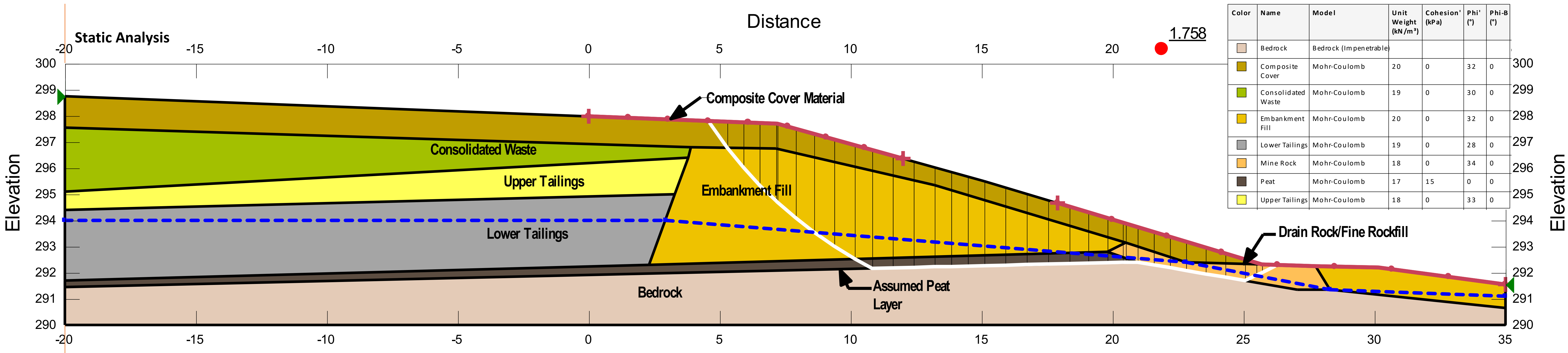
In situ data						Basic output data																			ENGLOBE ANALYTICAL RESULT					
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	Soil Type	Avg. Layer Strength (de. Or Kpa)
209	4.18	5.778	34	-8.87	-0.5	5.77578	0.58866	6	1.97939	17.71673	77.26169	0	77.26169	73.7561	0.59665	-0.00156	6	0.62131	1.18348	1.92442	66.55886	-0.1148	69.78161	7	FALSE	37.1	37.7	#NUM!	Gravelly sands	
210	4.2	5.727	36	-8.55	-0.6	5.72486	0.62884	6	1.99719	17.77908	77.61727	0	77.61727	72.75758	0.63748	-0.00151	6	0.62861	1.18241	1.94312	65.90019	-0.11016	67.76199	7	FALSE	37.0	37.6	#NUM!	Gravelly sands	
211	4.22	5.711	38	-3.11	-0.7	5.71022	0.66547	6	2.0108	17.84029	77.97408	0	77.97408	72.23232	0.67469	-0.00055	6	0.63434	1.18077	1.9577	65.63447	-0.03989	66.18193	7	FALSE	37.0	37.6	#NUM!	Gravelly sands	
212	4.24	5.695	38	-12.45	-0.75	5.69189	0.66762	6	2.01271	17.83906	78.33086	0	78.33086	71.66469	0.67693	-0.00222	6	0.63564	1.17775	1.96063	65.24922	-0.15894	65.91019	7	FALSE	37.0	37.6	#NUM!	Gravelly sands	
213	4.26	5.741	40	-14.73	-0.775	5.73732	0.69719	6	2.01961	17.90111	78.68888	0	78.68888	71.91141	0.70689	-0.0026	6	0.63886	1.1753	1.96861	65.63614	-0.18719	64.98106	7	FALSE	37.0	37.6	#NUM!	Gravelly sands	
214	4.28	5.664	40	-15.24	-0.7875	5.66019	0.70669	6	2.0277	17.89592	79.0468	0	79.0468	70.60555	0.7167	-0.00273	6	0.64247	1.17295	1.97763	64.60784	-0.1928	64.14878	7	FALSE	36.9	37.5	#NUM!	Gravelly sands	
215	4.3	5.537	42	-19.92	-0.79375	5.53202	0.75922	6	2.05268	17.94326	79.40567	0	79.40567	68.66782	0.77027	-0.00365	6	0.65247	1.1724	2.00342	63.09025	-0.25086	61.62925	7	FALSE	36.7	37.4	#NUM!	Gravelly sands	
216	4.32	5.391	43	-20.115	-0.79688	5.38597	0.79837	5	2.07424	17.96007	79.76487	0	79.76487	66.5231	0.81037	-0.00379	6	0.66118	1.17138	2.02579	61.34327	-0.25218	59.59633	7	FALSE	36.5	37.3	#NUM!	Gravelly sands	
217	4.34	5.214	42	-19.9925	-0.79844	5.209	0.8063	5	2.08876	17.92019	80.12327	0	80.12327	64.01235	0.81889	-0.0039	6	0.6672	1.16957	2.04115	59.20146	-0.24952	58.4079	7	FALSE	36.3	37.1	#NUM!	Gravelly sands	
218	4.36	5.168	41.5	-19.87	-0.74922	5.16303	0.80379	5	2.09128	17.90302	80.48133	0	80.48133	63.15193	0.81652	-0.00391	6	0.66872	1.16651	2.04468	58.51295	-0.24689	58.17179	7	FALSE	36.3	37.0	#NUM!	Gravelly sands	
219	4.38	5.131	41.75	-19.18	-0.7	5.12621	0.81444	5	2.09698	17.90718	80.83948	0	80.83948	62.41215	0.82749	-0.0038	6	0.67146	1.16377	2.05139	57.94845	-0.23726	57.60692	7	FALSE	36.2	37.0	#NUM!	Gravelly sands	
220	4.4	4.925	42	-18.84	-0.75	4.92029	0.85361	5	2.12299	17.89833	81.19744	0	81.19744	59.59661	0.86793	-0.00389	5	0.68216	1.16307	2.0782	55.54614	-0.23203	55.44879	7	FALSE	35.9	36.8	#NUM!	Gravelly sands	
221	4.42	4.682	42	-22.72	-0.775	4.67632	0.89814	5	2.15353	17.87883	81.55502	0	81.55502	56.33945	0.91408	-0.00494	5	0.69427	1.16264	2.10956	52.72206	-0.27858	53.06777	7	FALSE	35.6	36.5	#NUM!	Gravelly sands	
222	4.44	4.314	44	-22.955	-0.7875	4.30826	1.02129	5	2.21396	17.90091	81.91304	0	81.91304	51.59555	1.04109	-0.00543	5	0.71771	1.16491	2.17074	48.58916	-0.28024	48.5872	7	FALSE	35.1	36.2	#NUM!	Gravelly sands	
223	4.46	3.91	48	-22.8125	-0.79375	3.9043	1.22941	5	2.29465	17.96325	82.2723	0	82.2723	46.45579	1.25588	-0.00597	5	0.74891	1.16882	2.25227	44.08855	-0.27728	43.14318	7	FALSE	34.5	35.7	#NUM!	Gravelly sands	
224	4.48	3.552	52	-22.67	-0.79688	3.54633	1.4663	5	2.37294	18.01845	82.63267	0	82.63267	41.91683	1.50128	-0.00655	5	0.77928	1.17224	2.33161	40.07198	-0.27435	38.46972	7	FALSE	33.9	35.2	#NUM!	Gravelly sands	
225	4.5	2.986	54	-22.57	-0.79844	2.98036	1.81186	5	2.4881	17.99519	82.99258	0	82.99258	34.91113	1.86376	-0.00779	5	0.82385	1.17872	2.44823	33.70512	-0.27195	32.90594	7	FALSE	32.8	34.4	#NUM!	Gravelly sands	
226	4.52	2.422	52	-22.23	-0.79922	2.41644	2.15192	4	2.60576	17.87136	83.35	0	83.35	27.99151	2.2288	-0.00953	4	0.86973	1.18512	2.56829	27.28842	-0.26671	28.50351	5	FALSE	31.5	33.4	#NUM!	Silty sand & sandy silt	
227	4.54	2.344	51	-21.86	-0.79961	2.33854	2.18085	4	2.62065	17.83645	83.70673	0	83.70673	26.93724	2.26181	-0.00969	4	0.87619	1.18218	2.58478	26.30764	-0.26115	28.03615	5	FALSE	31.3	33.2	#NUM!	Silty sand & sandy silt	
228	4.56	2.266	50	-21.42	-0.7998	2.26064	2.21176	4	2.63611	17.80069	84.06275	0	84.06275	25.89235	2.29718	-0.00984	4	0.88288	1.17927	2.6019	25.33211	-0.25481	27.56178	5	FALSE	31.0	33.0	#NUM!	Silty sand & sandy silt	
229	4.58	2.217	52	-21.27	-0.8	2.21168	2.35115	4	2.65957	17.83741	84.41949	0	84.41949	25.19872	2.44446	-0.01	4	0.89258	1.17695	2.62693	24.70944	-0.25196	26.61744	5	FALSE	30.9	32.9	#NUM!	Silty sand & sandy silt	
230	4.6	1.741	47	-22.36	-0.8	1.73541	2.70829	4	2.78074	17.62813	84.77206	0	84.77206	19.47149	2.84738	-0.01355	4	0.94075	1.1827	2.75297	19.26678	-0.26377	23.43969	5	FALSE	29.3	31.7	#NUM!	Silty sand & sandy silt	
231	4.62	1.211	42	-22.385	-0.8	1.2054	3.48431	3	2.97306	17.359	85.11924	0	85.11924	13.16136	3.74905	-0.01998	3	1	1.19039	2.95702	13.16136	-0.26298	19.40746	2	80.0	26.8	29.9	#NUM!	Elastic silt	
232	4.64	0.88	38	-21.8775	-0.8	0.87453	4.34519	3	3.14214	17.12084	85.46165	0	85.46165	9.23302	4.8158	-0.02773	3	1	1.18562	3.14539	9.23302	-0.25599	16.80262	2	56.4	24.5	28.2	#NUM!	Elastic silt	
233	4.66	0.8865	32	-21.37	-0.8	0.88116	3.63159	3	3.09403	16.92605	85.80017	0	85.80017	9.26988	4.02335	-0.02687	3	1	1.18094	3.09738	9.26988	-0.24907	17.95956	2	56.8	24.5	28.2	#NUM!	Elastic silt	
234	4.68	0.893	32.5	-18.49	-0.85	0.88838	3.65835	3	3.09297	16.94701	86.13911	0	86.13911	9.31329	4.05116	-0.02305	3	1	1.17629	3.0975	9.31329	-0.21465	17.92755	2	57.3	24.5	28.3	#NUM!	Elastic silt	
235	4.7	1.549	33	-16.38	-0.9	1.5449	2.13605	4	2.76239	17.17674	86.48265	0	86.48265	16.86376	2.26272	-0.01123	4	0.93819	1.16021	2.74405	16.69946	-0.1894	24.77076	4	104.2	28.3	31.0	#NUM!	Clay & silty clay	
236	4.72	2.226	36	-14.61	-0.9	2.22235	1.61991	4	2.56431	17.41625	86.83097	0	86.83097	24.59395	1.68577	-0.00684	4	0.86091	1.14213	2.54068	24.07151	-0.16826	30.81188	4	152.5	30.7	32.8	#NUM!	Clay & silty clay	
237	4.74	2.099	36	-14.53	-0.95	2.09537	1.71808	4	2.59978	17.39369	87.17885	0	87.17885	23.03527	1.79266	-0.00724	4	0.8754	1.14069	2.57829	22.6077	-0.16667	29.50177	4	143.4	30.3	32.5	#NUM!	Clay & silty clay	96.0
238	4.76	1.771	37	-14.39	-0.975	1.7674	2.09347	4	2.70923	17.35994	87.52605	0	87.52605	19.19287	2.20254	-0.00857	4	0.91893	1.144	2.69215	18.96644	-0.16441	25.91509	4	120.0	29.2	31.7	#NUM!	Clay & silty clay	
239	4.78	1.33	36	-14.25	-1	1.32644	2.71404	3	2.87597	17.21837	87.87041	0	87.87041	14.09538	2.90658	-0.01151	3	0.98601	1.15082	2.86784	14.06732	-0.16217	21.7042	2	88.5	27.2	30.2	#NUM!	Elastic silt	
240	4.8	1.388	33.5	-13.45	-1	1.38464	2.41941	4	2.83217	17.15204	88.21345	0	88.21345	14.69644	2.58403	-0.01037	4	0.96953	1.14379	2.82412	14.63452	-0.15247	22.84866	4	92.6	27.5	30.4	#NUM!	Clay & silty clay	
241	4.82	1.446	33.75	-12.51	-1.05	1.44287	2.33908	4	2.80913	17.17639	88.55698	0	88.55698	15.29315	2.49203	-0.00924	4	0.961	1.13818	2.80129	15.21304	-0.14126	23.36457	4	96.7	27.7	30.6	#NUM!	Clay & silty clay	
242	4.84	1.637	34	-12.2	-1.075	1.63395	2.08085	4	2.73587	17.23257	88.90163	0	88.90163	17.3793	2.20058	-0.0079	4	0.93252	1.12973	2.72606	17.22658	-0.13723	25.23119	4	110.4	28.5	31.2	#NUM!	Clay & silty clay	
243	4.86	1.332	32	-12.05	-1.1	1.32899	2.40785	4	2.84571	17.08362	89.24331	0	89.24331	13.89173	2.58118	-0.00972	4	0.97737	1.13212	2.84336	13.85187	-0.13502	22.55408	4	88.6	27.1	30.2	#NUM!	Clay & silty clay	
244	4.88	1.057	28	-11.68	-1.1	1.05408	2.65634	3	2.95298	16.84115	89.58013	0	89.58013	10.7669	2.90306	-0.01211	3	1	1.13111	2.96233	10.7669	-0.13039	20.50911	2	68.9	25.5	29.0	#NUM!	Elastic silt	
245	4.9	0.838	24	-7.16	-1.15	0.83621	2.87009	3	3.05535	16.57505	89.91163	0	89.91163	8.30035	3.21587	-0.00959	3	1	1.12694	3.08069	8.30035	-0.07963	18.92627	2	53.3	23.8	27.7	#NUM!	Elastic silt	
246	4.92	0.647	22	-6.59	-1.175	0.64535	3.40899	3	3.19043	16.37562	90.23914	0	90.23914	6.15158	3.96315	-0.01187	3	1	1.12285	3.23931	6.15158	-0.07303	17.11341	2	39.7	21.8	26.3	#NUM!	Elastic silt	
247	4.94	0.502	20	-5.73	-1.1875	0.50057	3.99547	3	3.3205	16.16857	90.56251	0	90.56251	4.52731	4.87799	-0.01398	3	1	1.11884	3.40013	4.52731	-0.06327	15.77612	2	29.3	19.9	24.8	#NUM!	Elastic silt	
248	4.96	0.371	16	-4.47	-1.19375	0.36988	4.3257	3	3.44955	15.79587	90.87843	0	90.87843	3.07008	5.73468	-0.01602	3	1	1.11495	3.57937	3.07008	-0.04919	14.91917	2	19.9	17.5	23.0	#NUM!	Elastic silt	
249	4.98	0.314	11	-3.09	-1.19687	0.31323	3.51182	3	3.46362	15.3011	91.18445	0	91.18445	2.4351	4.95399	-0.01392	3	1	1.11121	3.62973	2.4351	-0.03389	15.15303	2	15.9	16.1	21.9	#NUM!	Elastic silt	
250	5	0.284	9	-0.8	-1.2	0.2838	3.17125	3	3.47842	15.03244	91.4851	0	91.4851	2.10214	4.67982	-0.00416	2	1	1.10756	3.67134	2.10214	-0.00874	15.15844	2	13.7	15.3	21.1	#NUM!	Elastic silt	
251	5.02	0.2925	7	2.27	-1.2	0.29307	2.38853	3	3.40684	14.75567	91.78022	0	91.78022	2.19314	3.47762	0.01128	3	1	1.104	3.59059	2.19314	0.02473	15.70737	2	14.4	15.5	21.4	10.3	Elastic silt	
252	5.04	0.301	8	3.9	-1.25	0.30197	2.64923	3	3.41677	14.92075	92.07863	0	92.07863	2.27953	3.8114	0.01858	3	1	1.10042	3.59575	2.27953	0.04236	15.6053	2	15.0	15.7	21.5	11.3	Elastic silt	
253	5.06	0.33	12.5	6.58	-1.275	0.33165	3.76909	3	3.45814	15.47006	92.38803	0	92.38803	2.5897	5.22451	0.0275	3	1	1.09673	3.61936	2.5897	0.07122	15.07209	2	17.1	16.4	22.1	13.0	Elastic silt	
254	5.08	0.351	17	8.88	-1.2875	0.35322	4.81286	3	3.49148	15.84793	92.70499	0	92.70499	2.81015	6.52554	0.03409	2	1	1.09298	3.64249	2.81015	0.09579	14.50133	2	18.6	16.9	22.5	14.0	Elastic silt	
255	5.1	0.374	16	10.77	-1.29375	0.37669	4.2475	3	3.43861	15.80286	93.02105	0	93.02105	3.04954	5.64033	0.03797	3	1	1.08927	3.57783	3.04954	0.11578	14.965	2	20.3	17.4	22.9	15.0	Elastic silt	
256	5.12	0.425	15.5	13.09	-1.3	0.42827	3.61919	3	3.35437	15.81555	93.33736	0	93.33736	3.58844	4.62776	0.03908	3	1	1.08558	3.47166	3.58844	0.14024	15.68987	2	23.9	18.3	23.7	16.4	Elastic silt	
257	5.14	0.447	15	15.15	-1.3	0.45079	3.32751	3	3.31621	15.79748	93.65331	0	93.65331	3.81336	4.2001	0.04242	3	1	1.08192	3.42668	3.81336	0.16177	16.05897	2	25.5	18.7	24.0	17.1	Elastic silt	
258	5.16	0.509	15	27.24	-1.65	0.51581	2.90805	3	3.23573	15.84914	93.97029	0	93.97029	4.48908	3.55585	0.06457	3	1	1.07827	3.32813	4.48908	0.28988	16.85511	2	30.1	19.7	24.8	19.7	Elastic silt	
259	5.18	0.571	14	26.6	-1.825	0.57765	2.42361	3	3.15284	15.81319	94.28656	0	94.28656	5.12654	2.89637	0.05503	3	1	1.07465	3.23221	5.12654	0.28212	17.82773	2	34.5	20.6	25.4	20.4	Elastic silt	24.6

Borehole No.: **BH-22-06** **Date:** **8/1/2022** **Project No.** **2007263.002** **Project:** **Geotechnical Investigation: TSCA Dam Declassification Study**

In situ data						Basic output data																			ENGLOBE ANALYITICAL RESULT					
No	Depth (m)	qc (MPa)	fs (kPa)	u (kPa)	Other	qt (MPa)	Rf (%)	SBT	Ic SBT	γ (kN/m³)	σ,v (kPa)	u0 (kPa)	σ',vo (kPa)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn	Su	Robertson & Campalla, 1983	Kulhawy & Mayne (1990)	Mayne (for fine-grained) (2006)	Soil Type	Avg. Layer Strength (de. Or Kpa)
260	5.2	0.502	13.5	28.23	-1.9125	0.50906	2.65196	3	3.22	15.72289	94.60101	0	94.60101	4.3811	3.25728	0.06811	3	1	1.07108	3.31704	4.3811	0.29841	17.06541	2	29.6	19.5	24.7	19.6	Elastic silt	
261	5.22	0.461	13	30.97	-2	0.46874	2.77338	3	3.26074	15.64784	94.91397	0	94.91397	3.9386	3.47753	0.08285	3	1	1.06755	3.37131	3.9386	0.3263	16.65372	2	26.7	18.8	24.1	19.2	Elastic silt	
262	5.24	0.457	13	34.12	-2	0.46553	2.79252	3	3.26483	15.6452	95.22687	0	95.22687	3.88864	3.51064	0.09214	3	1	1.06404	3.37819	3.88864	0.3583	16.60296	2	26.5	18.8	24.1	19.4	Elastic silt	
263	5.26	0.453	13	37.28	-2.05	0.46232	2.81191	3	3.26895	15.64255	95.53972	0	95.53972	3.83903	3.54436	0.10164	3	1	1.06055	3.38511	3.83903	0.3902	16.5525	2	26.2	18.7	24.0	19.6	Elastic silt	
264	5.28	0.458	13	39.83	-2.025	0.46796	2.77803	3	3.26173	15.6472	95.85267	0	95.85267	3.88205	3.49364	0.10704	3	1	1.05709	3.37771	3.88205	0.41553	16.61278	2	26.6	18.7	24.1	19.8	Elastic silt	
265	5.3	0.463	14	43.42	-2	0.47386	2.95449	3	3.2708	15.73725	96.16741	0	96.16741	3.9274	3.70677	0.11496	3	1	1.05363	3.38693	3.9274	0.4515	16.47083	2	27.0	18.8	24.1	20.2	Elastic silt	
266	5.32	0.466	15	47.44	-2	0.47786	3.13899	3	3.28136	15.81984	96.48381	0	96.48381	3.95275	3.93312	0.12439	3	1	1.05018	3.39823	3.95275	0.49169	16.3101	2	27.2	18.8	24.2	20.5	Elastic silt	
267	5.34	0.451	15	50.68	-2	0.46367	3.23506	3	3.29937	15.80828	96.79998	0	96.79998	3.78998	4.08864	0.13814	3	1	1.04675	3.42267	3.78998	0.52355	16.12941	2	26.2	18.5	24.0	20.5	Elastic silt	
268	5.36	0.4565	14	54.43	-2	0.47011	2.97804	3	3.27553	15.7342	97.11466	0	97.11466	3.84075	3.75342	0.14593	3	1	1.04335	3.39802	3.84075	0.56047	16.39589	2	26.6	18.6	24.0	20.8	Elastic silt	
269	5.38	0.462	12	58.44	-2	0.47661	2.51778	3	3.23327	15.56215	97.4259	0	97.4259	3.89203	3.16469	0.15412	3	1	1.04002	3.35454	3.89203	0.59984	16.87624	2	27.1	18.7	24.1	21.1	Elastic silt	
270	5.4	0.481	12	61.61	-2	0.4964	2.41739	3	3.20912	15.57775	97.73746	0	97.73746	4.07894	3.01005	0.15454	3	1	1.03671	3.3259	4.07894	0.63036	17.11147	2	28.5	19.0	24.3	21.6	Elastic silt	
271	5.42	0.431	15.5	64.88	-2	0.44722	3.46586	3	3.32846	15.83215	98.0541	0	98.0541	3.56095	4.43915	0.18581	3	1	1.03336	3.46469	3.56095	0.66168	15.8039	2	24.9	18.1	23.7	20.9	Elastic silt	
272	5.44	0.357	19	67.11	-2.05	0.37378	5.08324	3	3.48397	15.99757	98.37405	0	98.37405	2.79955	6.89897	0.24368	2	1	1.03	3.6574	2.79955	0.68219	14.33095	2	19.7	16.5	22.5	19.5	Elastic silt	
273	5.46	0.48	27	70.66	-2.075	0.49766	5.42534	3	3.39726	16.51155	98.70428	0	98.70428	4.04198	6.76758	0.17711	3	1	1.02655	3.52184	4.04198	0.71588	14.42356	2	28.5	18.9	24.3	22.1	Elastic silt	
274	5.48	0.603	38	74.88	-2.0875	0.62172	6.11208	3	3.34941	16.99001	99.04408	0	99.04408	5.2772	7.27028	0.14326	3	1	1.02303	3.44705	5.2772	0.75603	14.09769	2	37.3	20.6	25.5	23.9	Elastic silt	
275	5.5	1.144	34	76.83	-2.09375	1.16321	2.92295	3	2.94115	17.10227	99.38613	0	99.38613	10.70392	3.19603	0.07222	3	1	1.01951	2.98833	10.70392	0.77305	19.8675	2	76.0	25.3	28.9	28.1	Elastic silt	98.7
276	5.52	1.307	60	82.92	-2.09687	1.32773	4.51899	3	3.00841	17.80635	99.74226	0	99.74226	12.31161	4.88604	0.06753	3	1	1.01587	3.05074	12.31161	0.83134	17.14233	3	87.7	26.2	29.6	29.1	Clay	
277	5.54	1.484	120	83.93	-2.09844	1.50498	7.97351	3	3.12779	18.65174	100.11529	0	100.1153	14.03249	8.54173	0.05974	3	1	1.01208	3.1662	14.03249	0.83833	12.65789	3	100.3	27.1	30.2	29.9	Clay	
278	5.56	1.655	112	82.89	-2.1	1.67572	6.68368	3	3.04161	18.61358	100.48756	0	100.4876	15.67592	7.11005	0.05262	3	1	1.00833	3.07688	15.67592	0.82488	14.1499	3	112.5	27.8	30.7	30.3	Clay	
279	5.58	1.722	100	76.11	-2.1	1.74103	5.74373	3	2.9853	18.49788	100.85752	0	100.8575	16.26225	6.09693	0.0464	3	1	1.00464	3.02039	16.26225	0.75463	15.52603	3	117.2	28.0	30.9	30.2	Clay	
280	5.6	3.061	73	58.14	-2.3	3.07553	2.37357	4	2.54885	18.35404	101.2246	0	101.2246	29.38328	2.45435	0.01955	4	0.87874	1.00087	2.56899	29.37974	0.57437	27.7111	5	FALSE	31.8	33.7	31.7	Silty sand & sandy silt	39.5
281	5.62	6.568	90	59.45	-2.5	6.58286	1.36719	5	2.14124	18.88665	101.60233	0	101.6023	63.79047	1.38862	0.00917	5	0.71982	0.99803	2.15141	63.83934	0.58512	46.54272	7	FALSE	36.3	37.5	34.5	Gravelly sands	
282	5.64	11.068	107	18.52	-3	11.07263	0.96635	6	1.87121	19.28507	101.98804	0	101.988	107.5679	0.97533	0.00169	6	0.61593	0.99599	1.87821	107.8377	0.18159	67.26765	7	FALSE	39.1	40.0	31.2	Gravelly sands	
283	5.66	11.115	124	5.71	-3.15	11.11643	1.11547	6	1.91066	19.4562	102.37716	0	102.3772	107.5831	1.12583	0.00052	6	0.63145	0.9935	1.91846	107.9935	0.05577	61.58876	7	FALSE	39.1	40.0	27.0	Gravelly sands	
284	5.68	12.617	107	5.74	-3.225	12.61844	0.84797	6	1.79126	19.33518	102.76386	0	102.7639	121.7906	0.85493	0.00046	6	0.58614	0.99177	1.79902	122.5034	0.05586	75.83253	7	FALSE	39.8	40.6	27.3	Gravelly sands	
285	5.7	16.474	74	5.49	-3.2625	16.47537	0.44916	6	1.53162	19.01325	103.14413	0	103.1441	158.7316	0.45198	0.00034	6	0.48707	0.99137	1.53851	160.187	0.05323	119.5116	7	FALSE	41.1	41.9	27.6	Gravelly sands	
286	5.72	20.229	70	5.24	-3.3	20.23031	0.34602	6	1.39444	19.02805	103.52469	0	103.5247	194.4153	0.3478	0.00026	6	0.43484	0.9907	1.40092	196.7895	0.05062	149.3686	7	FALSE	42.1	42.8	27.6	Gravelly sands	

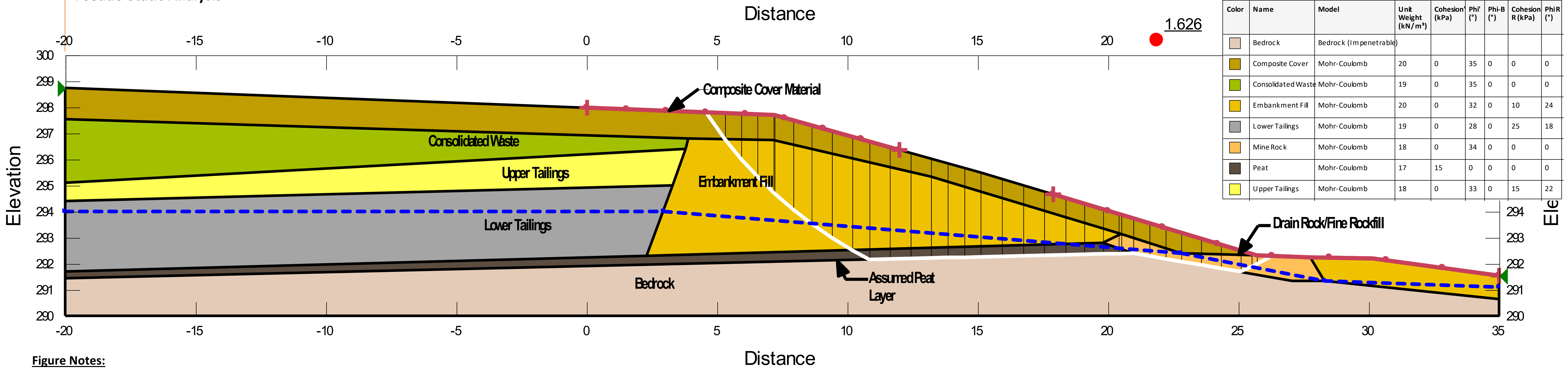
Appendix D
Slope Stability Output Results

Static Analysis



Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)
⬜	Bedrock	Bedrock (Impenetrable)				
🟫	Composite Cover	Mohr-Coulomb	20	0	32	0
🟩	Consolidated Waste	Mohr-Coulomb	19	0	30	0
🟨	Embankment Fill	Mohr-Coulomb	20	0	32	0
⬜	Lower Tailings	Mohr-Coulomb	19	0	28	0
🟧	Mine Rock	Mohr-Coulomb	18	0	34	0
🟫	Peat	Mohr-Coulomb	17	15	0	0
🟨	Upper Tailings	Mohr-Coulomb	18	0	33	0

Pseudo Static Analysis



Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)
⬜	Bedrock	Bedrock (Impenetrable)						
🟫	Composite Cover	Mohr-Coulomb	20	0	35	0	0	0
🟩	Consolidated Waste	Mohr-Coulomb	19	0	35	0	0	0
🟨	Embankment Fill	Mohr-Coulomb	20	0	32	0	10	24
⬜	Lower Tailings	Mohr-Coulomb	19	0	28	0	25	18
🟧	Mine Rock	Mohr-Coulomb	18	0	34	0	0	0
🟫	Peat	Mohr-Coulomb	17	15	0	0	0	0
🟨	Upper Tailings	Mohr-Coulomb	18	0	33	0	15	22

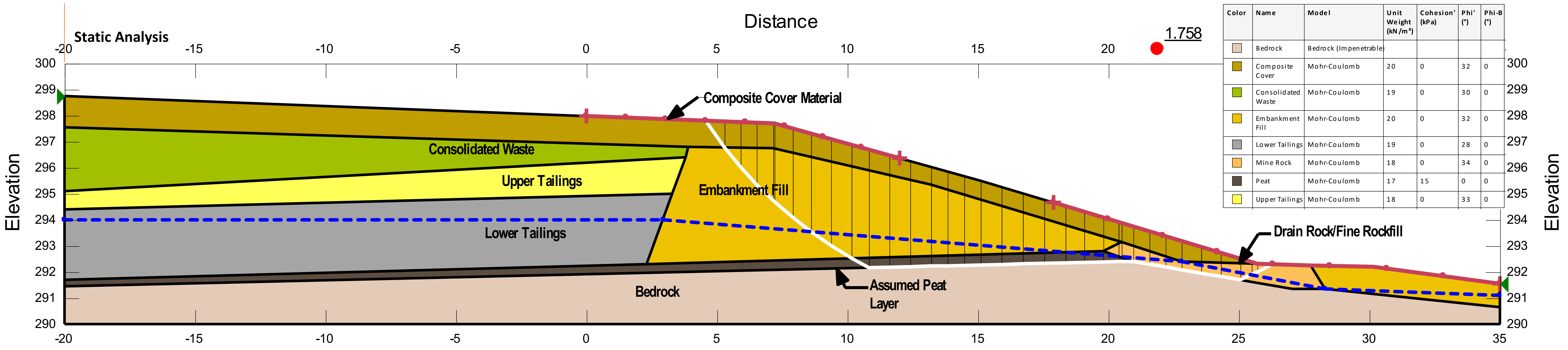
Figure Notes:

Section based on Stantec As-Built Drawing No. C-CAM-10, Section A/C07 for toe and dam shell region, Stantec As-Built Drawing No.8 and Englobe Section C for tailings impoundment area.

Horiz. to Vert. Scale = 1:1.

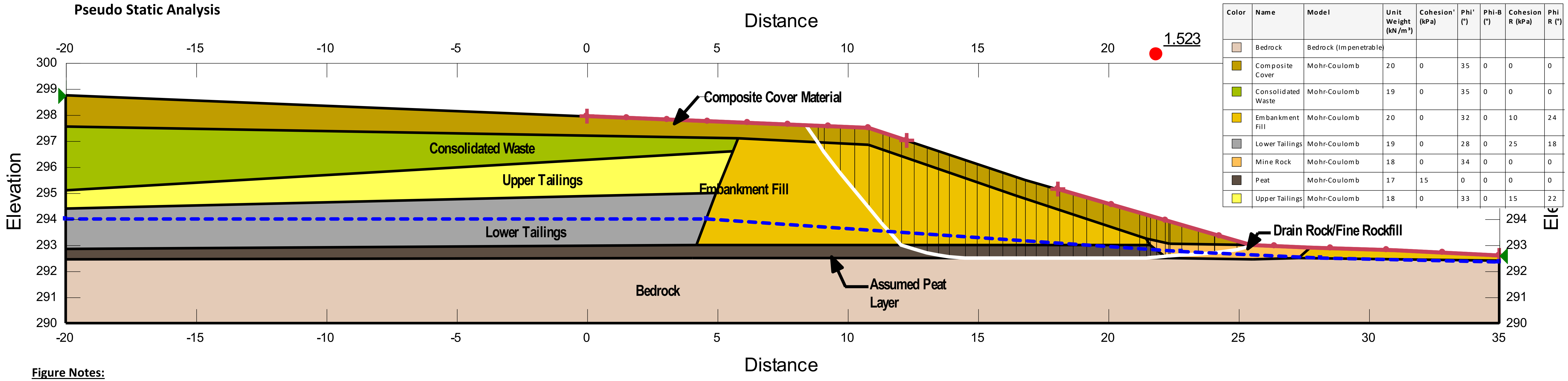
Figure D-1

Section "A" - Slope Stability Results
Static & Pseudo Static Case



Static Analysis

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)
🟫	Bedrock	Bedrock (Impenetrable)				
🟫	Composite Cover	Mohr-Coulomb	20	0	32	0
🟩	Consolidated Waste	Mohr-Coulomb	19	0	30	0
🟨	Embankment Fill	Mohr-Coulomb	20	0	32	0
⬜	Lower Tailings	Mohr-Coulomb	19	0	28	0
🟧	Mine Rock	Mohr-Coulomb	18	0	34	0
🟫	Peat	Mohr-Coulomb	17	15	0	0
🟨	Upper Tailings	Mohr-Coulomb	18	0	33	0



Pseudo Static Analysis

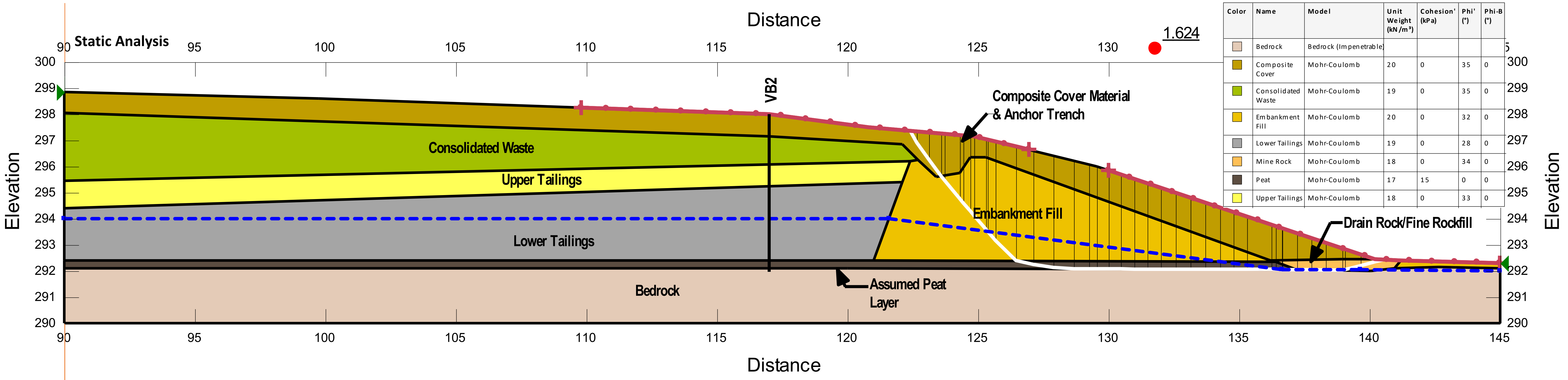
Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)
🟫	Bedrock	Bedrock (Impenetrable)						
🟫	Composite Cover	Mohr-Coulomb	20	0	35	0	0	0
🟩	Consolidated Waste	Mohr-Coulomb	19	0	35	0	0	0
🟨	Embankment Fill	Mohr-Coulomb	20	0	32	0	10	24
⬜	Lower Tailings	Mohr-Coulomb	19	0	28	0	25	18
🟧	Mine Rock	Mohr-Coulomb	18	0	34	0	0	0
🟫	Peat	Mohr-Coulomb	17	15	0	0	0	0
🟨	Upper Tailings	Mohr-Coulomb	18	0	33	0	15	22

Figure Notes:

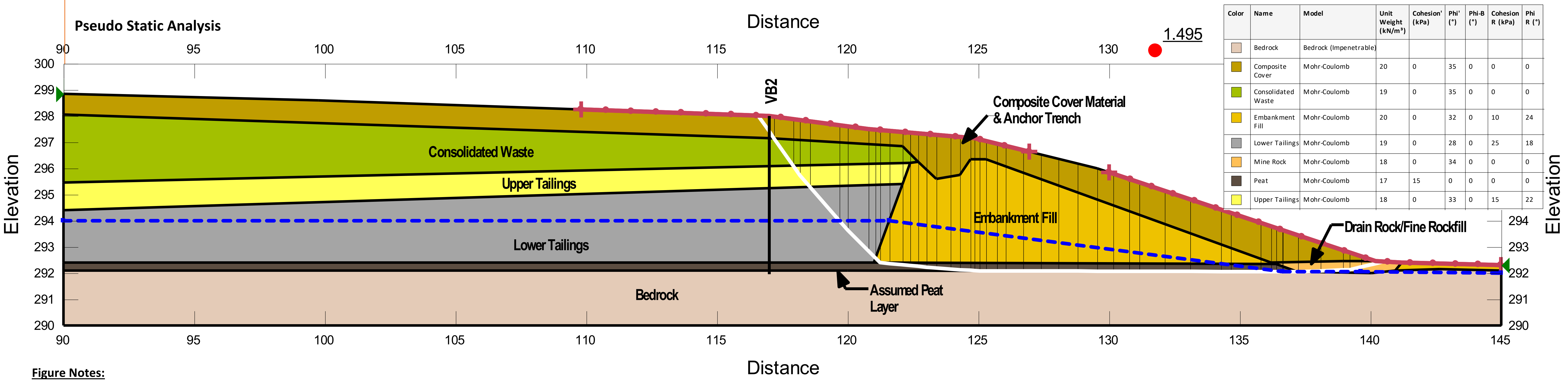
Section based on Stantec As-Built Drawing No. C-CAM-10, Section B/C07 for toe and dam shell region, Stantec As-Built Drawing No.8 and Englobe Section C for tailings impoundment area.
Horiz. to Vert. Scale = 1:1.

Figure D-2

Section "B`" - Slope Stability Results
Static & Pseudo Static Case



Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)
■	Bedrock	Bedrock (Impenetrable)				
■	Composite Cover	Mohr-Coulomb	20	0	35	0
■	Consolidated Waste	Mohr-Coulomb	19	0	35	0
■	Embankment Fill	Mohr-Coulomb	20	0	32	0
■	Lower Tailings	Mohr-Coulomb	19	0	28	0
■	Mine Rock	Mohr-Coulomb	18	0	34	0
■	Peat	Mohr-Coulomb	17	15	0	0
■	Upper Tailings	Mohr-Coulomb	18	0	33	0



Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)
■	Bedrock	Bedrock (Impenetrable)						
■	Composite Cover	Mohr-Coulomb	20	0	35	0	0	0
■	Consolidated Waste	Mohr-Coulomb	19	0	35	0	0	0
■	Embankment Fill	Mohr-Coulomb	20	0	32	0	10	24
■	Lower Tailings	Mohr-Coulomb	19	0	28	0	25	18
■	Mine Rock	Mohr-Coulomb	18	0	34	0	0	0
■	Peat	Mohr-Coulomb	17	15	0	0	0	0
■	Upper Tailings	Mohr-Coulomb	18	0	33	0	15	22

Figure Notes:
Section based on Stantec As-Built Drawing No. C-CAM-10, Section C/C07 for toe and dam shell region, Stantec As-Built Drawing No.8 and Englobe Section C for tailings impoundment area.
Horiz. to Vert. Scale = 1:1.

Figure D-3

Section "C" - Slope Stability Results
Static & Pseudo Static Case