Geotechnical Engineering Report

Proposed Acorn Valley Development
83 Christie Drive, Dorchester, Ontario

Cyril J. Demeyere Limited (CJDL)
Revised Report

January 7, 2026
04-02208613.000.0100-0101-GS-R-0001-04

ENGLOBE

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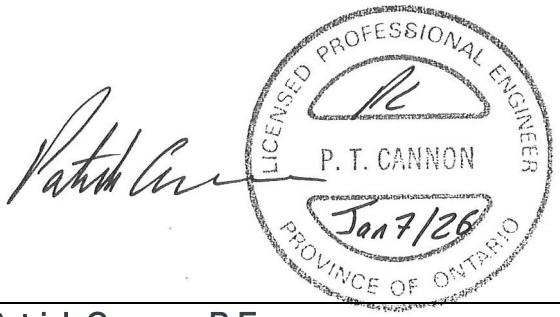

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Distribution

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APPENDICES

1 Introduction

Englobe Corp. (Englobe) was retained by Cyril J. Demeyere Ltd (hereinafter referred to as the “Client”) to undertake a geotechnical investigation in support of the proposed residential subdivision development at 83 Christie Drive in Dorchester, Ontario (herein after referred to as the ‘Site’). A site location plan is provided on Drawing 1 in Appendix A. This work was authorized by Mr. Deren Lyle of Cyril J. Demeyere Ltd. The report has been updated to address initial peer review comments of Englobes preliminary geotechnical investigation report[1], by Stantec and the UTRCA. Peer review comments and responses are presented in Appendix G.

It is our understanding that the project in general involves the proposed construction of a new residential subdivision in an approximately 44 ha plot that is currently used for agricultural purposes. The purpose of the work was to investigate and report on the subsurface soil and groundwater conditions at fourteen (14) borehole locations drilled at the site. Based on this information, advice is provided with respect to the geotechnical aspects of the proposed project, including the design of foundations and other elements. The anticipated construction conditions pertaining to excavation, backfill and temporary ground water control is also discussed, but only regarding how these might influence the design.

It should be noted that the geotechnical investigation is based on a limited number of boreholes and laboratory tests on representative soil samples. The data and interpretations are intended for general guidance and may not be sufficient to address all factors affecting construction, including the additional scope requested for the stormwater management pond and medium- to high-density residential blocks. Further site-specific investigation is recommended to provide detailed design and construction guidance for these features. Prospective contractors should review the available information, obtain additional subsurface data as needed, and select construction methods, sequencing, and equipment based on their experience with similar projects. It should also be noted that with this report, Englobe is providing an updated hydrogeological investigation report for the site. The results are provided in Report No. 160-P-0019257-0-01-300-HD-R-0001-0B.

Ongoing liaison with Englobe during the final design and construction phase of the project is recommended to ensure that the recommendations in this report are applicable and/or correctly interpreted and implemented. It should be noted that we are not aware of any changes regarding governing criteria/policies (MECP, UTRCA, Thames Centre, PPS) since the last report.

The recommendations and opinions in this report are applicable only to the proposed development as described above and the Limitations of the Investigation found in Section 8 is an integral part of this report.

[1] Geotechnical Engineering Report, Proposed Acorn Valley Development, 83 Christie Drive, Dorchester, Ontario, Reference 04-02208613.000.0100-0101-GS-R-0001-02, dated April 28, 2025 (Report Revision 2), Prepared by Englobe Corp for Cyril J. Demeyere Ltd.

2 Site and Project Description

2.1 Existing Site Conditions

The site was examined by a senior geotechnical engineer from our staff on August 18, 2023 in order to obtain general information regarding the existing slope features such as slope profile, slope drainage, water course features, vegetation cover, and structures in the vicinity of the slope. Drawing 1 presents the general arrangement of the subject property as derived from a 2023 Google Earth image.

The Site is located in Dorchester, Municipality of Thames Centre, Middlesex County, Ontario (Drawings 1, 2 and 3, Appendix A). The Site is currently used for agricultural purposes. The Site is bounded by a variety of land uses including a Provincially Significant Wetland (Tamarack Swamp) to the immediate north, an existing subdivision to the east, woodland and rural residential to the west and agricultural and woodland to the south. Recent environmental studies also identified an additional wetland area is located on the southwestern border of the site.

In addition to the wetlands, surface water features are also present in/near the west-central portion of the Site (the Shaw Drain) and in the southeastern portion of the Site (Rath Harris Drain).

The overall inclinations of the slopes were typically in the range of about 2.1 to 5.0 horizontal to 1 vertical. The slopes appeared to be relatively stable at their present configuration. Drawings 2A, 2B, 3A and 3B presents eight (8) representative cross-sections of the slopes, Section 1-1' to 8-8'. The water courses are partially confined.

2.2 Site Geology

Based on published geological information for the general area of the site, the near surface overburden soil at and in the vicinity of the subject property consists of Late Wisconsin stratified drift, predominately silt (some gravel, sand and till)[2]. The stratified drift is underlain by the Dundee Formation, a fine grained dark cherty limestone of Devonian Age[3]. The geological mapping and regional well records indicates that the bedrock beneath the site is about 20 to 28 metres below existing grade.

2.3 Slope Stability Rating

The results of the site inspection and the general setting of the site are described above, and cross sections developed from the topographical survey are shown on Drawings 2 and 3. This information was used to complete the Slope Stability Rating Chart as shown in Table 4.2 of the Technical Guide of the River and Stream Systems: Erosion and Hazard Limit (2002), by the Ontario Ministry of Natural Resources (MNR Guide). The results of the rating are shown in Appendix B. A slope stability rating of about 14 to 26 has been indicated for the slopes within the study area. As per MNR guideline, slope stability rating value of in the range of 14 to 26 indicates a low to slight potential for unstable slopes. The level of effort for this assessment is consistent with the approach outlined in the MNR guidelines.

[2] Quaternary Geology, Lucan Area, Southern Ontario; Ontario Division of Mines; Map No. P.1048; 1975.

[3] Bedrock Topography of the Lucan Area, Southern Ontario; Ministry of Natural Resources; Map No. P.0291; 1980.

2.4 Proposed Development

As noted previously, Drawing 1 illustrates the general layout of the subject property, based on the proposed site development plan prepared by CJDL Consulting Engineers, originally dated August 2023 and updated on December 24, 2025 by the client to address municipal and public comments. The current concept proposes the development of a residential subdivision comprising single-family dwellings, medium-density residential blocks, and high-density residential blocks. The subdivision layout also includes a public park and associated municipal roadways. Municipal servicing for the proposed development is planned to include sanitary sewers, storm sewers, and a stormwater management (SWM) pond.

It should be noted that preliminary recommendations for the SWM pond are provided in Section 6.9 of this report. A detailed review of the pond design can be provided upon request.

3 Investigation Procedures

3.1 Field Program

The fieldwork for this investigation was completed during the period of July 16 to August 13, 2019, and involved the drilling of fourteen boreholes (Boreholes BH-01-19 to BH-14-19) to depths ranging from 4.3 to 14.2 m. The boreholes' locations are shown on Drawing 1 in Appendix A.

The field investigation was carried out in general conformance with the professional standards set out in the Canadian Foundation Engineering Manual (CFEM 2023, 5th Edition), applicable Ontario Regulations and ASTM International. The following is a summary of field investigation tasks:

- Local utility companies were contacted prior to the start of drilling activities to demarcate underground utilities on site.
- The boreholes were advanced to sampling depth ranging from 4.3 to 14.2 m BGS using a Diedrich D 50-T drill rig equipped with hollow stem augers. The boreholes were logged by our geotechnical supervisor.
- Using an SXblue Platinum GNSS+MFREQ RTK GPS unit, the Englobe representative determined the geodetic ground surface elevation of the borehole locations.
- Soil samples were recovered from the boreholes at regular depth intervals using a 50 mm outside diameter split spoon sampler in accordance with ASTM D1586 Standard Penetration Test (SPT).
- Six monitoring wells were installed at Boreholes BH-03-19, BH-04-19, BH-05-19, BH-08-19, BH-10-19 and BH-14-19 by inserting a 50 mm diameter screen and pipe into the hollow stem augers. Sand filter material was added to pack the screen in place until the level of the sand was approximately 300 mm above the top of the screen. A bentonite seal was placed above the sand pack at the well location to prevent the infiltration of surface water. An above ground steel protector was installed at existing grade and concreted in place. The top of the riser pipe was vented to allow accurate measurement of the stabilized groundwater levels.
- Details of the groundwater observations and measurements are provided on the appended borehole logs (and summarized in Groundwater, Section 4.2 below).
- The boreholes without monitoring wells were backfilled with bentonite in accordance with Ontario Regulation 903 as amended, under the Ontario Water Resources Act.

3.2 Laboratory Testing

All soil samples recovered during this investigation were returned to our laboratory for visual examination and moisture content testing. The measured moisture contents are provided on the appended borehole logs. Selected soil samples were also submitted for Particle size analysis. A summary of the laboratory testing program is provided in Table 1.

Table 1: List of Laboratory tests conducted as per ASTM Standards

Test	Standard	Number of Samples
Natural moisture content	ASTM D2216	83
Particle size analysis (Sieve and Hydrometer)	ASTM D7298	9

Detailed descriptions and results of the laboratory testing are provided on the appended borehole logs in Appendix C, the laboratory test data sheets in Appendix D, and in Section 4 of this report. It is important to note that as per the standard policy of Englobe, the soil samples will be stored for a period of three months from the date of sampling. These soil samples will be discarded after the three-month period unless prior arrangements have been made for longer storage.

4 Subsurface Conditions

The subsurface soil and groundwater conditions encountered in the boreholes, and the results of the field and laboratory testing, are shown on the Log of Borehole sheets in Appendix C. A list of abbreviations and symbols are provided to assist in the interpretation of the borehole logs. It should be noted that the boundaries between the strata have been inferred from drilling observations and non-continuous samples. They generally represent a transition from one soil type to another and should not be inferred to represent exact planes of geological change. Further, conditions will vary beyond the locations investigated.

4.1 Soil Conditions

4.1.1 Topsoil

Topsoil was observed at all borehole locations advanced at the site, except for borehole BH-12-19. The topsoil thickness ranged from approximately 230 mm to 510 mm. The material generally consisted of sand some silt to silty sand soils. Topsoil found was brown to dark brown in color and was very moist at the time of field investigation. It should be noted that topsoil thickness may vary beyond the areas investigated by the boreholes, and such variations may be influenced by previous earthworks or site grading activities.

4.1.2 Sand and Silty Sand

Sand to silty sand deposits was observed in all boreholes drilled at the site except BH-12-19. Sand was observed directly beneath the topsoil layer; however, in BH-09-19 it was observed below the deposit. Standard Penetration Test (SPT) N-values within the sand ranged from 1 to 40 blows per 300 mm of split spoon sampler penetration, indicating compactness conditions ranging from very loose to dense. During the field investigation, the sand was observed to be moist to damp, and locally wet to saturated in some boreholes, based on moisture content values ranging from 1 to 22 percent. Six (6) particle size analyses were conducted on the samples from Sand and Silty Sand stratum, and the results are provided in the Appendix D of this report.

4.1.3 Silt

A silt deposit was also observed in Borehole BH-09-19 beneath the topsoil layer. The silt layer was approximately 1.0 m in thickness. Standard Penetration Test (SPT) N-value recorded within this deposit was 12 blows per 300 mm of sampler penetration, indicating a compactness condition of compact. The natural moisture content measured within the silt was approximately 19 percent.

4.1.4 Sand and Gravel to Gravelly Sand

A sand and gravel to gravelly sand deposit was also observed in Borehole BH-10-19 beneath the overlying sand stratum. This deposit was approximately 4.4 m thick. Standard Penetration Test (SPT) N-values recorded within this layer ranged from 12 to 42 blows per 300 mm of sampler penetration, indicating a compactness condition of compact to dense. Natural moisture content values measured within this stratum ranged from approximately 5 to 11 percent.

4.1.5 Peat (silty sand trace clay)

An organic peat deposit, approximately 1.98 m in thickness, was observed at the ground surface in Borehole BH-12-19. The peat consisted of silty sand trace clay and was observed to be black to brown in colour. SPT N-values recorded within the peat deposit was 2 blows per 300 mm of penetration indicating very loose compactness conditions. Natural moisture content values measured within the peat ranged from approximately 31 to 88 percent. Two (2) particle size analyses were conducted on the samples from the peat deposit, and the results are provided in the Appendix D of this report.

4.1.6 Silt and Clay

Silt and clay deposit was also observed underneath the glacial till deposit in borehole BH-05-19. This deposit was approximately 1.1 m thick. Standard Penetration Test (SPT) N-value recorded within this deposit ranged between 16 to 19 blows per 300 mm of sampler penetration, indicating a very stiff consistency. Natural moisture content values measured within this stratum ranged from approximately 10 to 17 percent.

4.1.7 Silt, and Silty Clay (Glacial Till)

A glacial till deposit consisting of silt with some clay and silty clay, and containing trace to some gravel, was encountered in Boreholes BH-1-19, BH-4-19, and BH-5-19. This deposit occurred at varying depths and exhibited variable thickness across the boreholes. Standard Penetration Test (SPT) N-values within the glacial till ranged from 9 to 19 blows per 300 mm of sampler penetration, indicating compactness conditions and consistencies ranging from loose/stiff to compact/very stiff. The glacial till was observed to be moist to wet at the time of the field investigation.

4.2 Groundwater

Groundwater observations and measurements obtained from the monitoring wells installed in Boreholes BH/MW-03-19, BH/MW-04-19, BH/MW-05-19, BH-08/MW-19, BH/MW-10-19, and BH/MW-14-19 are presented on the appended borehole logs and summarized in Appendix F.

It should be noted that the groundwater level measurements are also provided in the Hydrogeology Report No. 160-P-0019257-0-01-300-HD-R-0001-0B.

5 Slope Stability Assessment

5.1 Riverine Erosion Hazard Limit

A riverine erosion hazard means the potential loss of land, due to human or natural process, that poses a threat to life and property. The extent of the riverine erosion hazard limit depends on whether the erosion is occurring in an Apparent System (e.g. well-defined valley system) or whether it is a not apparent system (e.g. relatively flat landscape that is not confined or bound by valley walls). In keeping with the hazard avoidance approach of the UTRCA, development and site alteration is generally not permitted in riverine erosion hazard areas.

Apparent Valleys can exhibit three different conditions within which erosion hazards exist or may develop: valley slopes which are steep but stable, valley slopes which are over steepened and potentially unstable, and valley slopes which are subject to active stream bank erosion.

Slopes are generally considered over steepened when the gradient is 3H:1V (33 1/3 per cent slope) or greater. Where a watercourse is not contained within a clearly visible valley section, valleys are not apparent (unconfined). At this site the north and south tributaries within the study area are classified as confined valley systems.

The erosion hazard limit for river and stream systems is determined based on the potential for creek bank erosion to impact on the stability of the slope (toe erosion allowance), the stability of the slopes (stable slope allowance), and a need for access during emergencies (erosion access allowance). The following presents an assessment of each component to determine the erosion hazard limit.

5.1.1 Toe Erosion Allowance

A toe erosion allowance is recommended in areas where the water course position is within 15 m to the slope toe. A guideline table recommended for estimating the erosion allowance is presented as follows:

Table 2: MINIMUM TOE EROSION ALLOWANCE – River within 15 m of Slope Toe

Type of Material	Evidence of active erosion** or bankfull flow velocity>competent flow velocity***	No evidence of active erosion**or flow velocity<<competent flow velocity***		
		Bankfull Width		
		<5 m	5-30 m	>30 m
Hard Rock (granite)	0 - 2 m	0 m	0 m	1 m
Soft Rock (shale, limestone), Cobbles, Boulders	2 - 5 m	0 m	1 m	2 m
Stiff / Hard Cohesive Soil (clays, clayey silt)	5 - 8 m	1 m	2 m	4 m
Soft/Firm Cohesive Soil Fine Granular (sand, silt) Fills	8 - 15 m	1 - 2 m	5 m	7 m

Notes:

** Active Erosion is defined as: bank material is bare and exposed directly to stream flow under normal or flood flow conditions and, where undercutting, over steepening, slumping of a bank or high down stream sediment loading is occurring. An area may be exposed to river flow but may not display “active erosion” (i.e., is not bare or undercut) either as a result of well rooted vegetation or as a result of shifting of the channel or because flows are relatively low velocity. The toe erosion allowances presented in the right half of Table 4 are suggested for sites with this condition.

*** Competent Flow velocity; the flow velocity that the bed material in the stream can support without resulting in erosion or scour.

Consideration must also be given to potential future meandering of the watercourse channel.

Source: ‘*Geotechnical Principles for Stable Slopes’* (Terraprobe, June 1998), prepared for: Ontario Ministry of Natural Resources, Lands and Natural Heritage Branch.

Based on the subsurface conditions observed at the site, the soil profile at the site is predominantly non-cohesive and generally compact, with occasional localized loose layers. Given these conditions and consistent with our discussion in Section 2.1, a toe erosion allowance of 5 m is recommended.

5.2 Stable Slope Allowance

A detailed engineering analysis of slope stability was carried out for a selected slope cross-section utilizing a commercially available slope stability program Rocscience – Slide 6.0. The slope stability assessment was based on an effective stress limiting equilibrium analysis for long term slope stability using each of the Spencer, Bishop and Morgenstern-Price methods. The methods of analysis allow for the calculation of Factors of Safety for hypothetical or assumed failure surfaces through the slope. The analysis method is used to assess potential for movements of large masses of soil over a specific failure surface which is often curved or circular.

For a specific failure surface, the Factor of Safety is defined as the ratio of available strength resisting movement, divided by the gravitational forces tending to cause movement. The Factor of Safety of 1.0 represents a ‘limiting equilibrium’ condition where the slope is at the point of pending failure since the soil resistance is equal to the forces tending to cause movement. The analysis involves dividing the sliding mass into many thin slices and calculating the forces on each slice. The normal and shear forces acting on the slides and base of each slice are calculated. It is an iterative process that converges on a solution.

The typical Factor of Safety used for engineering design of slopes for stability in building applications, ranges from about 1.3 to 1.5. The Ministry of Natural Resources (MNR) Policy Guidelines allow a minimum Factor of Safety for slope stability as follows:

Table 3: Design Minimum Factor of Safety

Type	Land Uses	Design Minimum Factor Of Safety
A	PASSIVE: no buildings near slope; farm field, bush, forest, timberland, woods, wasteland, badlands, tundra	1.1
B	LIGHT: no habitable structures near slope; recreational parks, golf courses, buried small utilities, tile beds, barns, garages, swimming pools, sheds, decks, satellite dishes, dog houses	1.20 to 1.30
C	ACTIVE: habitable or occupied structures near slopes; residential, commercial, and industrial buildings, retaining walls, storage/warehousing of non-hazardous substances	1.30 to 1.50
D	INFRASTRUCTURE and PUBLIC USE: public use structures and buildings (i.e., hospitals, schools, stadiums), cemeteries, bridges, high voltage power transmission lines, towers, storage/warehousing of hazardous materials, waste management areas	1.40 to 1.50

The Upper Thames Conservation Authority (UTRCA) policies are likely based on a minimum Factor of Safety of 1.5 for all development applications and 1.4 for infrequent short-term elevated ground water conditions.

The soil strength parameters utilized in this assessment were based on effective stress analysis for long-term slope stability. Graphical depictions of the slope stability analysis results are presented in Appendix E.

5.2.1 Stability of Existing Slopes

The results of the slope stability analyses are summarized in the following table and are also presented in Appendix E.

Table 4: Existing Slope Stability Analysis

Section	Approximate Average Existing Slope Inclination	Approximate Slope Height (m)	Minimum Factor of Safety	
			Normal Groundwater Conditions	Short-Term Elevated Groundwater Conditions
Section 1-1’	2.4H : 1V	3.0	1.970	1.833
Section 2-2’	2.1H : 1V	3.0	2.114	1.559
Section 3-3’	5H : 1V	3.5	3.925	3.562
Section 4-4’	4H: 1V	3.0	2.696	2.515
Section 5-5	3H: 1V	10.5	1.573	1.573
Section 6-6’	3.7H: 1V	5.5	2.345	2.066
Section 7-7	2.7H: 1V	4.0	1.732	1.732
Section 8-8	2.6H: 1V	4.0	1.806	1.674

5.2.2 Long-Term Stable Slope Crest (LTSSC) Position

A representative trial slope profile was analyzed to obtain a minimum factor of safety of 1.5 for normal ground water conditions and 1.4 for temporary and infrequent elevated ground water condition in conformance to the policy guidelines. Based on the existing slope analyses, as summarized in Section 5.3.1, the slope at Section 5-5' was considered the critical slope section and was therefore selected for analyses. Graphical depictions of the slope stability analysis results are presented in Appendix E.

Based on the results of the analyses, the soil stratigraphy and the anticipated groundwater levels; it is our opinion that a stable slope profile of 2.5 horizontal to 1 vertical would be required to achieve a minimum Factor of Safety of 1.5. The stable slope allowance will therefore be a total of 2.5 times the height of the slope. Drawings 2A, 2B, 3A and 3B present the relevant details of the cross-sections analysed for determination of the Long-term Stable Top of Slope. Drawings 2 and 3 present the location of the Long-term Stable Top of Slope (Riverine Erosion Hazard) on the site plan. For planning purposes, the long-term refers to a 100-year planning horizon.

5.3 Erosion Access Allowance

The UTRCA requires an additional 6 m setback from the long-term stable top of slope. The intent is to control top of bank land use that could potentially impact slope stability and to ensure that future development is not impacted by slope deformations. This setback also provides a means of access to the slope. Policies for this component of the setback have been established by UTRCA in the document '*Environmental Planning Policy Manual for the Upper Thames River Conservation Authority (June, 2006, Revised October 24, 2017).* The policies that pertain specifically to new development or redevelopment on the property are outlined under Policy #2.2.7.2.2 d), where it states the following:

d) *Erosion Access Allowance – a six metre allowance added to the Valley Top of Slope or the combined Toe Erosion and Stable Slope Allowances.* The *erosion access allowance is required* for the purpose of maintaining sufficient *access* for emergencies, maintenance, and construction activities.

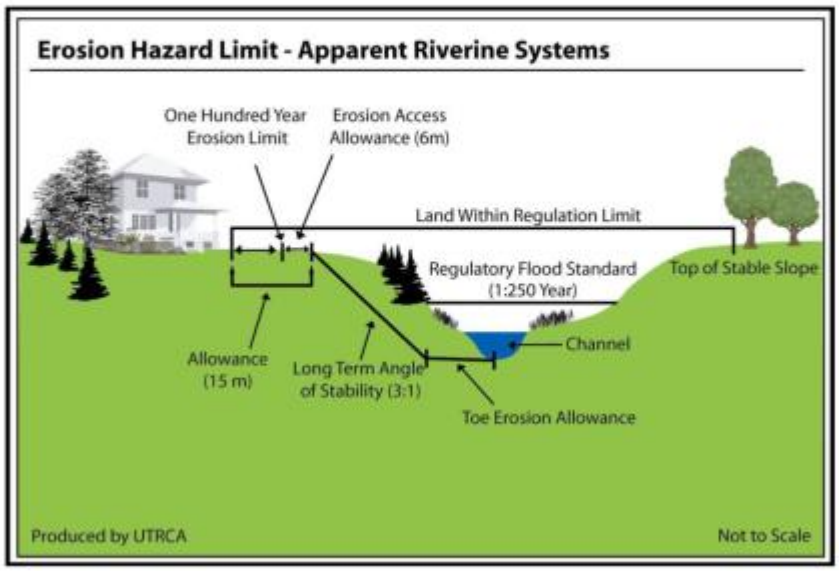


Figure 2-3

5.4 Review of Watermain Interconnection and Trail

Englobe has received the Mill Court watermain and trail connection drawing prepared by CJDL on February 5, 2025. The proposed work includes a 250 mm diameter watermain and an asphalt multi-use trail. The drawing is provided in Appendix A of this report.

A stability analyses was carried out for a selected slope Section A-A' utilizing a commercially available slope stability program Rocscience - Slide 6.0. The following average soil properties were assumed for the soil strata in the slope stability analysis.

Table 5: Soil Properties for Slope Stability Analysis

Stratigraphic Unit	Unit Weight (kN/cu.m)	Effective Shear Resistance c' (kPa)	Effective Angle of Internal Friction φ' (degrees)
Sand, very loose	19	0	28
Sand, compact	19	0	32
Sand, dense	19.5	0	37

In addition to the above soil properties, traffic loading (10 kPa) was assumed for the purposes of this assessment. A piezometric surface was incorporated in the analyses to simulate elevated ground water conditions. The slope at Section A-A' was selected for this analysis since it was considered the most critical section in the study area. Graphical depictions of the slope stability analysis results are presented in Appendix E.

The minimum Factors of Safety calculated by the analysis are summarized in the following table for various conditions:

Table 6: Minimum Factors of Safety for Section A-A'

Slope Condition - Section A-A'	Minimum Factor of Safety
Existing Slope	2.071
Proposed Grade Modifications with Muli-Use Trail and Watermain	1.926

Based on the results of the analyses, it is our opinion that the proposed watermain interconnection and trail can be safety constructed without adversely affecting the long-term stability of the valley slope. No risk to life or property damage is anticipated.

It is expected that any slope areas disturbed by the proposed works would be restored with suitable vegetation. For slopes with an overall inclination of about 3 horizontal to 1 vertical or flatter, the vegetation may be achieved with hydro-seeding or sod. Approved seed mixes would be selected in consultation with the Upper Thames Conservation Authority. Steeper slopes may warrant the application of vegetative/turf reinforcement mats. Periodic maintenance of the slope surface during the first couple of years will be required until the vegetation becomes well established.

6 Discussion and Recommendations

The following discussion is based on our interpretation of the factual data obtained during this investigation and is intended for the use of the design engineer only. Comments made regarding the construction aspects are provided only in as much as they may impact on design considerations. Contractors bidding on or undertaking any work at the site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction and make their own interpretation of the factual data as it affects their proposed construction techniques, schedule, equipment capabilities, costs, sequencing and the like.

The project involves the proposed construction of a new residential subdivision on an approximately 44 ha agricultural site. A preliminary geotechnical investigation was conducted to provide general guidance on subsurface soil and groundwater conditions, including considerations for foundation design, excavation, backfill, and temporary groundwater control. The investigation was limited in scope and may not address all factors affecting construction, including the stormwater management pond and medium- to high-density residential blocks. Further site-specific investigation is recommended, and contractors should obtain additional data and determine construction methods, sequencing, and equipment based on their experience with similar projects.

This report is provided on the basis of these terms of reference and on the assumption that the design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards and guidelines of practice. The pertinent sections of the Ontario Building Code may require additional considerations beyond the recommendations provided in this report and should be referred. If there are any changes to the site development features, or if there is any additional information relevant to the interpretations made of the subsurface information with respect to the geotechnical analyses or other recommendations, then Englobe should be retained to review the implications of these changes with respect to the contents of this report.

6.1 Site Preparation

At the time of the investigation the grading plan for the site had not yet been developed, however it can be expected that some cutting and/or filling will be required prior to construction. Any fill that will be required in areas to be developed for foundations or slabs-on-grade must be constructed as an engineered fill. It is expected that the site restoration and filling will be carried out in advance of construction. The design aspects of the engineered fill are discussed below.

All topsoil and existing earth fill must be stripped from areas designated to receive engineered fill. The exposed subgrade soil should then be proof rolled and any soft or wet areas which deflect excessively during the proof roll should be sub-excavated. The engineered fill should extend for a distance of at least 2 m beyond the perimeter of the building envelope as measured at the founding level, and should extend downwards from this point at a 1 to 1 (horizontal to vertical) slope, to the original ground. In addition, the engineered fill should extend to an elevation of at least 0.6 m above the proposed footing elevation. This is to ensure that the foundations are placed on the engineered fill both in plan and elevation. The engineered fill must be provided with a minimum of 1.2m of earth cover or equivalent insulation to provide adequate frost protection.

Engineered fill required to restore grade or to achieve the site grading plan must consist of clean earth materials, free of topsoil, rubble, wood, plant materials etc. and at a suitable placement water content to consistently achieve the compaction requirements outlined below.

Selective re-use of excavated soil consisting of the underlying native soils from the site for engineered fill may be feasible subject to the weather conditions at the time of construction. For this reason, we do not recommend undertaking pre-grading activities during spring or spring-like conditions.

Imported earth for use as engineered fill must meet the applicable MECP site condition standards for the site as established in a Phase Two Environmental Site Assessment (ESA), as well as the physical requirements outlined above. If a Phase Two ESA is not available, MECP Table 1 standards should be used as the acceptance criteria. Alternatively, consideration could be given to using OPSS 1010 Granular B Type I material from a commercial source. Source acceptance testing of materials imported for use as engineered fill must be carried out prior to the importation to the site.

Engineered fill must be placed and uniformly compacted in 200 mm thick lifts to at least 98 percent of standard Proctor maximum dry density. For optimal performance, the placement water content of the fill should be maintained within about 2 percent of the laboratory optimum water content for compaction. The limits of any engineered fill can best be determined by the geotechnical engineer during construction. Engineered fill will need to extend laterally a sufficient distance to develop adequate lateral resistance for foundations and pavements. The lateral distance required can be calculated by assuming a 10 horizontal to 7 vertical line extending down and away from the outer edge of the underside of any foundations, floor slabs and pavements constructed in engineered fill. Benches should be cut into the existing slopes at a maximum 600 mm height to allow placement of new fill in a horizontal manner.

All aspects of engineered fill construction including final excavation, material selection, placement and compaction must be verified by the geotechnical engineer. In-situ density testing is required during construction to confirm that each lift has been compacted to the specified degree and that the placement moisture content is within an acceptable range.

Engineered fill can be expected to experience post-construction settlement on the order of 1 percent of the depth of the engineered fill. The time period over which this settlement occurs depends on the composition of the engineered fill as follows (after initial placement):

a) Sand or gravel soil; several days

b) Silt soil; several weeks

c) Clay or clayey soil; several months

6.2 Building Foundations

The following discussion is provided with the understanding that any and all buildings proposed for the site will be designed in conformance to the current Ontario Building Code (OBC) or other regulatory bodies within the jurisdiction. This section addresses the feasibility of constructing conventional spread and/or strip footings at the site.

6.2.1 Spread Footing Foundations

All topsoil and any very loose to loose sand or silt deposits must be removed from new foundation areas. Conventional spread footings placed on approved native sand, silty sand, silt, or silty clay (glacial till) subgrades may be designed for a maximum serviceability limit state (SLS) bearing pressure of 75 kPa. For ultimate limit state (ULS) design, a factored geotechnical resistance of 112 kPa may be used, based on a resistance factor of 0.5. Table 7 provides the depths to competent bearing surfaces at the borehole locations.

Table 7: Depth to Competent Bearing Surface

Borehole No.	Ground Surface Elevation (m)	Depth to Bearing Stratum (mbgl)	Elevation of Bearing Strata (m)	Bearing Stratum
BH-01-19	257.74	0.8	256.94	Sand
BH-02-19	254.78	1.6	253.18	Sand
BH-03-19	262.27	3.8	258.47	Sand
BH-04-19	259.14	1.6	257.54	Sand
BH-05-19	260.10	1.8	258.30	Silt
BH-06-19	260.69	2.3	258.39	Sand
BH-07-19	261.34	0.8	260.54	Sand
BH-08-19	266.37	2.3	264.07	Silty Sand
BH-09-19	261.01	0.6	260.41	Silt
BH-10-19	257.33	2.2	255.13	Sand
BH-11-19	257.58	1.6	255.98	Sand
BH-13-19	262.26	2.3	259.96	Sand
BH-14-19	265.63	3.0	262.63	Sand

In order to minimize the disturbance of soil subgrades it is recommended that foundation excavations be carried out using a smooth-blade bucket.

Any unsuitable soil may be removed to the same width as the footing and replaced with minimum strength 10 MPa concrete to provide contact between the footing and the approved native subgrade.

The total and differential settlements of footings not more than three (3) metres in width and subjected to the maximum serviceability limit states design pressure is estimated to not exceed 20 mm and 15 mm, respectively.

To provide sufficient protection against heave due to frost action, all exterior footings and footings in non-heated areas must incorporate a minimum depth of soil cover of 1.2 m between the footing subgrade and the finished ground surface.

6.2.2 Foundations on Engineered Fill

Provided the engineered fill is constructed and compacted as indicated in Section 6.1, foundations may be designed using a factored geotechnical resistance at Ultimate Limit States (ULS) of 225 kPa and a bearing reaction at Serviceability Limit States (SLS) of 150 kPa. The minimum footing width of 500 mm is recommended for strip footings and a minimum footing width of 900 mm should be considered for spread footings supported on engineered fill.

The engineered fill must extend a minimum depth of about 800 mm below the underside of footing elevation to achieve the factored geotechnical resistance of 225 kPa ULS and a bearing reaction of 150 kPa SLS, otherwise a reduce bearing values of 112 kPa ULS / 75 kPa SLS will govern the specified design specification.

It is recommended that nominal reinforcement at a minimum comprising two (2) continuous 15 M bars at the top and two (2) continuous 15 M bars at the bottom of the foundation walls be provided. In addition, two (2) continuous 15M bars must also be provided in the strip footings.

6.3 Site Classification for Seismic Site Response

The Ministry of Municipal Affairs and Housing (MMAH) has adopted the 2024 Ontario Building Code (OBC) that came into effect on January 1, 2025. The 2024 OBC is further harmonized with the 2020 National Building Code (NBC) of Canada. This includes the use of the new 6th Generation Seismic Hazard Model for determining seismic hazard, which was developed for the 2020 NBC.

The 2024 OBC provides seismic hazard values based on Site Designation. The Site Designation shall be X_V, where V is the value of the average shear wave velocity, $V_{s30,}$ calculated from in-situ measurements of the shear wave velocity in top 30 m of the ground profile **except** for the four (4) specific ground profiles as set out in the Table 4.1.8.4.-A of 2024 OBC where Site Designation shall be determined in accordance with Table 4.1.8.4-A.

The 2024 OBC also provides an alternative method to determine the Site Designation (X_S), if V_{S30} calculated from in-situ measurements is not available. In this case, the Site Designation shall be X_S, where S is the Site Class determined using energy-corrected average Standard Penetration Resistance (N_{60}) or the average Undrained Shear Strength (S_u) in accordance with Table 4.1.8.4.-B (and associated notes), which defines 6 Site Classes (S) from A to F. Note that providing a Site Designation based on a Site Class approach (i.e., without direct measurement of shear wave velocities) will generally result in higher seismic demand for the site.

In-situ shear wave velocities were not measured at this site, therefore, the Site Designation was determined based on the Site Class approach using energy-corrected average Standard Penetration Resistance (N_{60}) or the average Undrained Shear Strength (Su), as applicable, in accordance with Table 4.1.8.4-B (and associated notes). Based on this approach, the Site Designation for seismic analysis may be taken as X_D as per the 2024 Ontario Building Code.

We recommend that a site-specific MASW test should be considered to determine the Site Designation for this site, as the Site Designation based on V_{S30} will likely result in a lower seismic demand than Site Designation X_D determined using the Site Class approach. The project structural engineer can advise if an in-situ shear wave velocity measurement (such as MASW test) is advantageous for the subject project.

6.4 Slab-on-Grade Construction

Depending on the final site grading levels selected, the subgrade for slab-on-grade construction could consist of native sand or silt or silty clay (glacial till) and/or engineered fill. The moduli of subgrade reaction appropriate for slab on grade design on the aforementioned soils are as follows:

- Engineered Fill: 18,000 kPa/m
- Undisturbed Sand or Silt or Silty Sand: 25,000 kPa/m

Concrete floor slabs should be placed on at least 150 mm of granular base (OPSS Granular A or 19 mm crusher run limestone) compacted to a minimum of 95 percent of standard Proctor maximum dry density. Prior to the placement of the granular materials, the subgrade should be assessed by a geotechnical engineer or its representative. Any incompetent subgrade areas as identified must be subexcavated and backfilled with suitable compacted clean earth fill materials. Similarly, any soft or wet areas should also be subexcavated and be backfilled with suitably compacted clean earth fill. The granular fill base should be placed either on the undisturbed native subgrade or clean earth fill compacted to at least 98 percent of standard Proctor maximum dry density.

Concrete slabs exposed to freezing temperatures should be provided with 50 mm thick rigid Styrofoam insulation below the slab to prevent differential settlements from frost heave and thaw settlement. All weather exposed concrete shall have 5 to 8% air entrainment or as otherwise specified in Tables 2 and 4 of CSA A23.1.

No underfloor drains are required provided the exterior grades are lower than the finished floor slab and positively sloped away from the building.

The water to cement ratio and slump of the concrete utilized in the floor slab should be strictly controlled to minimize shrinkage of the slab. Control joints should be sawed into the slab at maximum 4 m spacings within 12 hours of initial concrete placement in order to pre-locate shrinkage cracks. The saw-cut depths should be ¼ of the slab thickness. The slab should be wet cured for seven days to minimize problems with shrinkage and curling.

6.5 Basement Drainage

Given these conditions, it is recommended that basement floor elevations be maintained at least 1 m above the highest anticipated groundwater level to reduce the risk of seepage and hydrostatic pressure.

The basement wall must be provided with damp-proofing provisions in conformance to the Section 9.13.2 of the current Ontario Building Code. The basement wall backfill for a minimum lateral distance of 0.6 m out from the wall should consist of free-draining granular material (OPSS 1010 Granular 'B'), or provided with a suitable alternative drainage cellular media such as Miradrain 2000 (Mirafi) or Terradrain 200 (Terrafix). The flow to the building storm water sump from the subsurface drainage will be governed largely by the building perimeter drainage collection during rainfall and runoff events.

To assist in maintaining basements dry from seepage, it is recommended that exterior grades around the buildings be sloped away at a 2 percent gradient or more, for a distance of at least 1.2 m. As well, perimeter foundation drains should be provided, consisting of perforated pipe surrounded by a granular filter (minimum 150 mm thick). The granular filter should consist of OPSS HL 8 Coarse Aggregate.

The size of the sump pit should be adequate to accommodate the water seepage. Outlet provisions must conform to the plumbing code requirements.

6.6 Lateral Earth Pressures

The appropriate values for use in the design of structures subject to unbalanced earth pressures at this site are tabulated as follows:

Table 8: Coefficient of Lateral Earth Pressure

Stratum/Parameter	ϕ	γ	Ka	Ko	Kp
Compact Granular Fill Granular 'B' (OPSS 1010)	32	21.0	0.31	0.47	3.25
Silt, Sand or Similar Fill	30	19.0	0.33	0.50	3.00

Walls subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following equation:

$$P = K [\gamma (h-hw) + \gamma' hw + q] + \gamma w hw$$

where,
- P = the horizontal pressure at depth, h (m)
- K = the earth pressure coefficient,
- hw = the depth below the ground water level (m)
- γ = the bulk unit weight of soil, (kN/m3)
- γ' = the submerged unit weight of the exterior soil, (γ - 9.8 kN/m3)
- q = the complete surcharge loading (kPa)

Where the wall backfill can be drained effectively to eliminate hydrostatic pressures on the wall, acting in conjunction with the earth pressure, this equation can be simplified to:

$$P = K[\gamma h + q]$$

The factored geotechnical resistance to sliding of earth retaining structures is developed by friction between the base of the footing and the soil. This friction (R) depends on the normal load on the soil contact (N) and the frictional resistance of the soil (tan ϕ) expressed as: $R = N \tan \phi$. This is an unfactored resistance. The factored resistance at ULS is $Rf = 0.8 N \tan \phi$. The K value to be used for the design will depend on the rigidity of the wall.

6.7 Site Servicing

It is expected that site services will consist of storm and sanitary sewers and watermains. The invert elevation is expected to be within the undisturbed sand, silty sand, silt or silty clay (glacial till) stratum. Excavations for underground services should be made as outlined in Section 7.1 of this report. The locations and depths of any building foundations which would potentially be affected by the proposed utilities should be identified prior to commencing the excavation.

6.7.1 Bedding

After removal of all topsoil and organic deposits (e.g., BH-12-19), underground service lines will generally be installed on undisturbed sand, silty sand, silt, silty clay (glacial till) or engineered fill.. The native deposits in the area provide adequate support for buried services. However, suitability of the material must be verified during excavation and installation, by qualified geotechnical personnel experienced in such works.

The bedding materials should be adequately compacted to provide support and protection to the service pipes. Provided the base area for the sewer pipes and watermain are free of all soft and deleterious materials, the pipe bedding should comply with a Class B bedding configuration as per the requirements of OPSD 802.030 (rigid pipe) and/or OPSD 802.010 (flexible pipe). Where disturbance of the trench base has occurred, due to the presence of soft fine-grained soils, ground water seepage and the like, the disturbed soils should be sub-excavated and replaced with suitably compacted granular fill. If standing water is present in the base of the service and watermain trenches then High-Performance Bedding (HPB) and/or HL6 clear stone wrapped in geo-textile may be adopted as bedding material below the pipe to provide stabilization.

6.7.2 Backfill

Backfilling of trenches can be accomplished by reusing the excavated soils or similar fill material, provided the moisture content of the material is maintained within ±2 percent of optimum and the fill is free of topsoil, organics and any deleterious material. The fill placed in excavated trenches should be in loose lifts not exceeding 200 mm thick and compacted to not less than 95 percent of standard Proctor maximum dry density in non-settlement sensitive areas and 98 percent of standard Proctor maximum dry density in settlement sensitive areas. If narrow trenches are constructed in areas where the subgrade integrity is important, then use of compacted granular fill is recommended for backfill.

6.8 Pavement Design

6.8.1 Subgrade Preparation

Subsurface exploration revealed a layer of topsoil at the ground surface in all boreholes, except for Borehole BH-12-19. Beneath the topsoil, native soils consisting of sand, silty sand, silt, silt, silt (glacial till) and silty clay (glacial till) were encountered. Disturbed or weathered native soils were occasionally observed to contain organic inclusions and rootlets at certain borehole locations. These soil conditions may be suitable to support pavements for the potential roadway and parking areas provided the exposed subgrade is proof rolled, recompacted, and inspected as per Sections 6.1 and 6.7.

If new fill is required to raise the grade, selected on-site fill could be used, provided it is free of any topsoil and other deleterious material. The fill should be placed in large areas where it can be uniformly compacted by a heavy sheep-foot type roller in maximum 300 mm thick lifts with each lift uniformly compacted to at least 95 percent of standard Proctor maximum dry density. The upper 1 m of backfill beneath areas to be developed as pavements should be compacted to 98 percent of standard Proctor maximum dry density.

The most severe loading conditions on the subgrade may occur during construction. Consequently, special provisions such as end dumping and forward spreading of sub-base fills, restricted construction lanes, and half-loads during paving may be required, especially if construction is carried out during wet weather conditions.

Control of surface water is a significant factor in achieving good pavement life. Grading of adjacent pavement areas must be designed so that water is not allowed to pond adjacent to the outside edges of the pavement or curb. The existing earth fill and native soils are highly susceptible to frost heave, and pavements constructed on these materials must be designed accordingly. The subgrade must be free of depressions and sloped (preferably at a minimum grade of two percent) to provide effective drainage toward subgrade drains.

Continuous pavement subdrains should be installed along both sides of local and collector streets, driveways, access routes, and multi-use trails, with drainage directed to catch basins to facilitate removal of water from the subgrade and underlying granular materials. The subdrain invert should be maintained at a minimum of 0.3 m below subgrade level. Subdrains should also be provided at all catch basins within parking areas.

6.8.2 Asphaltic Concrete Pavement Design

Preparation of pavement subgrades should be carried out as outlined for slab-on-grade construction. The approved subgrade may be raised to design subgrade level with approved compactable on-site soil, providing it is placed in maximum 300 mm thick lifts and each lift is compacted to at least 98% of the material's MSPDD. As an alternative to subexcavation, a woven geotextile separator, such as Terratrack 24-15, Amoco 2002, Mirafi 500XL or equivalent, may be placed over spongy areas at design subgrade level prior to placing the Granular 'B' sub-base layer.

Under dry subgrade and weather conditions during construction, the following pavement designs are recommended for a local street, collector street and driveways.

Table 9: Pavement Design

Pavement Classification	HI 8 Surface Asphalt	HI 3 Base Asphalt	Granular 'A' Base	Granular 'B' Sub-Base
Local Street	40 mm	50 mm	150 mm	300 mm
Collector Street	80 mm	50 mm	150 mm	450 mm
Driveways	35 mm	40 mm	150 mm	300 mm
Multi-Use Trail (Mill Street)	n/a	75 mm	250 mm	n/a

The granular materials should be placed in lifts 200 mm thick or less, and compacted to a minimum of 98 percent SPMDD for granular base and granular sub-base. Asphalt materials should be rolled and compacted as per OPSS 310. The granular and asphalt pavement materials and their placement should conform to OPSS Forms 310, 501, 1010, 1101 and 1150 and pertinent municipal specifications. Municipal and other applicable specifications should be referred for use of higher grades of asphalt cement (PGAC 64-28) for asphaltic concrete where applicable.

It is recommended that the placement of the wearing surface be delayed for at least one year after construction of the binder course to minimize the effects of post construction settlement of subgrade fill. Prior to placing the wearing surface, the binder course should be evaluated and remedial work carried out as required in preparation for final construction.

6.9 Storm Water Management Pond

Based on the information provided by the client, it is understood that the proposed SWM Pond will be situated south of Christie Drive, to the east of Street 'B'. The existing and proposed grading information indicate that the construction of the proposed pond would require both cut and fill operations.

As noted previously, two of the boreholes (BH-10-19 and BH-12-19) were located on each side of the pond area and advanced to an approximate depth ranging between 4.3 to 9.6 m BGS, or to elevations in the range of about 247.7 to 250.9 m. In summary, the boreholes were advanced within a cultivated field and encountered an approximate 500 mm thick layer of topsoil pr about 2 m of Peat. The topsoil and peat deposits were underlain by sand and clay strata. Standard Penetration Test (SPT) N-values encountered within the sand and clay strata ranged from 5 to 7 blows per 300 mm penetration of split spoon sampler indicating cohesive soil deposits to be in soft consistency and non-cohesive soil deposits to be in loose condition.

6.9.1 Earth Berm and Liner

Prior to excavating for the pond, all topsoil and any otherwise deleterious material should be stripped and carefully stockpiled to minimize contamination of the underlying subgrade materials which may be reused for general site regrading, for the construction of berms, embankments, and other features. Due to the expected variability of the subsurface soils the pond slopes and base must be inspected by a geotechnical engineer to assess the exposed soil conditions, and to identify presence of any relatively permeable silt or sand layers, in order to provide recommendations for possible modification to the geotechnical design of the proposed pond. These modifications may include subexcavation of the relatively permeable soil zone(s) and backfilling with low permeability clay/silty clay soils.

The earth fill material used for the berm and liner should be of low permeability and free of organic/topsoil. It should consist of at least 25 percent clay size particles and a plasticity index of 10 or greater. The hydraulic conductivity should be in the range of 10-6 to 10-7 cm/s. Imported earth for use as engineered fill must meet the applicable MECP site condition standards for the site as established in a Phase Two Environmental Site Assessment (ESA), as well as the physical requirements outlined above. If a Phase Two ESA is not available, MECP Table 1 standards should be used as the acceptance criteria. Any cobbles or boulders greater than 100 mm in size should be excluded from the earth berm fill/liner, as should any earth fill/weathered/disturbed soils containing excessive amounts of sand or silt.

The approved earth fill materials should be placed in lifts not exceeding 150 mm and be compacted to a minimum of 95 percent of the SPMDD. The materials will be placed and compacted at a water content of between 2 percent dry and 3 percent wet of the optimum moisture content. In order to achieve required compaction of the berm fill at the final slope surface, consideration should be given to 'over-build' the berm (minimum 1.5 m beyond the design slope surface) and cut neatly to the final design slope configuration. The subgrade area beneath berm fill and pond base (for liner) should be stripped to remove all organics, topsoil and vegetation. Any loose, soft or otherwise deleterious materials must be removed to their full extent and replaced with approved compacted earth fill (as specified above) under the direction of a qualified geotechnical engineer. Similarly, areas of sand/silt soils must be identified, subexcavated and replaced with compacted approved low permeability earth fill soils. The subgrade should be compacted to at least 95 percent SPMDD prior to the berm fill placement.

On this site we recommend a minimum clay liner thickness of about 800 mm due to the non-cohesive nature of the native subgrade soils. Alternatively, much thinner prefabricated liners could also be considered. If you wish to explore prefabricated liner options, it is recommended that the project geotechnical information be provided to a specialized liner manufactures to confirm the feasibility, and provide further information on the methodology, detailed design, installation and certification.

6.9.2 Proposed Grading and Pond Slope Surface Treatment

A pond slope inclination of 3 horizontal to 1 vertical (above water level) and 4 horizontal to 1 vertical (below water level) should be used for pond design and construction. The final pond design should be reviewed by Englobe for pond side slope stability analysis for various conditions including different ground water levels as well as uplift consideration for the liner as applicable. Engineered fill slopes at these inclinations are considered inherently stable. The configuration of the slopes must not be altered without prior consultation from UTRCA and this office.

It is expected that any slope areas disturbed by the proposed works would be restored with suitable vegetation. For slopes with an overall inclination of about 3 horizontal to 1 vertical or flatter, the vegetation may be achieved with hydro-seeding or sod. Approved seed mixes would be selected in consultation with UTRCA. Steeper slopes may warrant the application of vegetative/turf reinforcement mats. Periodic maintenance of the slope surface during the first couple of years will be required until the vegetation becomes well established.

The emergency spillway must be provided with a significant erosion resistant lining consisting of either rip rap, gabion mattresses, or buried and staked Geoweb/Duramat Concrete Units or equivalent.

It is recommended that any piping or trenching in the area of the pond should be provided with seepage cut off collars (clay plugs, concrete plugs, or other barriers) to protect against water seepage through the pipe bedding and backfill.

6.9.3 Operational Considerations

The following general considerations are recommended with respect to the long-term operation and maintenance of the pond (depending upon the pond type):

A minimum operating freeboard of 0.3 m should be maintained between the high-water level and the pond rim/berm. Overtopping of the pond, as a result of overfilling or flooding, would result in severe damage and possible breaching or failure of the earth berm and the downstream slope. A provision of an overflow conveyance route/spillway is recommended to prevent pond overtopping.

The flat surface (maintenance/access roads) at the top of the pond/berm must be a minimum of 3.0 m wide to facilitate adequate compaction and to accommodate service vehicles for maintenance.

The pond should be carefully inspected each season for including but not limited to the following:

1. General condition of various components including areas of erosion, settlement, slump or deterioration.
2. Inspection of pond base and slope surfaces for discontinuities or holes as a result of burrowing animals, vandalism, settlement or the like.
3. Removal of unwanted vegetation (trees, seedlings and the like) from within the footprint of the pond area.

Any damaged or deteriorated areas must be repaired regularly.

It must be noted that regulatory agencies stipulate maximum pond slope inclinations and other requirements for stormwater management pond design. These specifications may include requirements above and beyond the geotechnical recommendations provided in this report.

A detailed review of the pond design can be provided upon request.

7 Construction Recommendations

7.1 Excavations

7.1.1 Topsoil

Topsoil was encountered at the ground surface at all borehole locations and varied in thickness between about 230 to 500 mm. The variability is likely due to tilling operation as part of the site agricultural activities.

Topsoil within the limits of the project shall be salvaged prior to beginning excavating, fill or hauling, operations by excavating topsoil and stockpiling the material at designated locations on drawings or as designated by the owner in a manner that will facilitate measurement, minimize sediment damage, and not obstruct natural drainage. All stockpiles (topsoil and/or earth fill) shall be protected from sediment transport by surface roughening and perimeter silt fencing.

7.1.2 Overburden Soil

All trench excavations and excavations for foundations must comply with Ontario Regulation 213/91 (Construction Projects) under the Occupational Health and Safety Act. The loose to compact sand contacted in the boreholes would be classified as Type 3 soils (O.Reg. 213/91, s. 226(4)). Temporary cut slopes within Type 3 soils should be at a slope of 1:1 (H: V) or flatter from the base of excavation as per O.Reg. 213/91, s. 234(2) (free of groundwater effects).

In absence of groundwater seepage, the intact native stiff to very stiff clayey silt contacted in the boreholes may be classified as Type 2 soils (O.Reg. 213, s. 226(3)) and temporary side slopes may be cut near vertical in the bottom 1.2 m and must be trimmed back not steeper than 1 horizontal to 1 vertical above this level as per O.Reg. 213/91 s. 234(2). If wet deposits are contacted, excavation side slopes may be expected to slough to flatter slopes, potentially as flat as 3:1 (H: V) or flatter. If an excavation contains more than one type of soil, the soil shall be classified as the type with the highest number as per section 227.3 of O.Reg. 213/91.

7.1.3 Groundwater

Groundwater seepage should be expected from the shallow silty sand/sandy silt layers. It is expected that the seepage may be handled using conventional sump pumping and trenching techniques. Where groundwater seepage and/or sloughing occurs, the excavation side slopes will need to be flattened or adequately braced to ensure stability. Every excavation that a worker may be required to enter shall be kept reasonably free of water (O.Reg. 213/91, s. 230). Care should be taken to direct surface runoff away from open excavations.

Minor to moderate groundwater inflow is expected where the excavations extend up to 0.5 m below the stabilized groundwater table. It is believed that this groundwater inflow can be controlled using a gravity dewatering system with perimeter interceptor ditches and (high capacity) pumps. Moderate to significant groundwater inflow should be expected for excavations extending more than 0.5 m below the stabilized groundwater table and a positive dewatering system installed by a dewatering specialist will most likely be required to lower the groundwater level in order to maintain a safe and adequately dry excavations.

An Environmental Activity and Sector Registry (EASR) or Permit to Take Water (PTTW) is required by the Ministry of Environment and Climate Change in the event that the daily taking of groundwater exceeds 50,000 L or 400,000 L per day, respectively.

It is recommended that several test pits be dug during the tendering stage of the project in order that prospective contractors may familiarize themselves with the soil and groundwater conditions to be contacted at the site.

7.2 Depth of Frost Penetration

The design frost penetration depth for the general area is 1.2 m. Therefore, a permanent soil cover of 1.2m or its thermal equivalent insulation is required for frost protection of foundations. All exterior footings, footings beneath unheated areas and foundations exposed to freezing temperatures should have at least such earth cover or equivalent synthetic insulation for frost protection. During winter construction exposed surfaces to support foundations must be protected against freezing by means of loose straw and tarpaulins, heating, etc.

For buried utility lines, variations from the above noted depth of frost penetration might be considered, depending on various factors such as the type of backfilling materials or the temperature and moisture exposure of the area (prevailing winds, drifting snow, etc.). However, these variations do not generally represent a concern unless special equipment and/or buried utilities have specific requirements regarding the subsurface temperature and moisture regime (i.e., water lines or sensitive electrical utilities etc.). In such special situations further tests and analysis should be conducted on a case-by-case basis.

The depth of frost penetration is also defined as the zone of active weathering where sizeable variations in the moisture content accompany the yearly temperature fluctuations. Therefore, the foundation grades should be established at or below this depth. For light poles and other light structures that are to be installed on a single footing, if some frost heave (25 mm to 50 mm) cannot be tolerated, the foundation elements should also be provided with the above noted minimum depth of soil cover or equivalent exterior-grade insulation.

7.3 Site Work

The soil at this site is fine-grained and will become weakened when subjected to traffic when wet. If there is site work carried out during periods of wet weather, then it can be expected that the subgrade will be disturbed unless an adequate granular working surface is provided to protect the integrity of the subgrade soils from construction traffic. Subgrade preparation works cannot be adequately accomplished during wet weather and the project must be scheduled accordingly. The disturbance caused by the traffic can result in the removal of disturbed soil and use of fill material for site restoration or underfloor fill that is not intrinsic to the project requirements. Attempting to build slabs and pavements at this site during wet weather could significantly increase earthworks and pavement costs.

The most severe loading conditions on the subgrade may occur during construction. Consequently, special provisions such as end dumping and forward spreading of earth and aggregate fills, restricted construction lanes, and half-loads during paving and other work are required, especially if construction is carried out during unfavourable weather.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the founding subgrade and concrete must be provided. The soil at this site is highly susceptible to frost damage. Consideration must be given to frost effects, such as heave or softening, on exposed soil surfaces in the context of this particular project development.

7.4 Construction Inspection and Testing

During construction of the new building, testing should be carried out for quality assurance. Soils testing for the project would include engineering site visits to confirm bearing capacity for footings for the new buildings. Compaction testing shall be carried out on structural fill beneath the building, foundation wall backfills, sub-slab granular fill, and service pipe bedding and trench backfill.

During the placement of concrete at the construction site, testing should be performed to determine the slump and air content of the concrete, and concrete cylinders should be cast for compressive strength testing in accordance with the requirements of CSA A23.1 and A23.2. Field sampling and testing of concrete shall be according to OPSS 904. Preparation of the test cylinders, curing, and testing should be carried out by Englobe.

Englobe maintains CCIL certified concrete laboratories in Kitchener and London and can provide concrete sampling and testing services for the project as required. Englobe staff also provide quality testing services for building envelope, structural steel, reinforcing steel, and roofing.

8 Statement of Limitations

The geotechnical recommendations provided in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known at the time of report preparation, we recommend that we be retained during the final design stage to verify that the geotechnical recommendations have been correctly interpreted in the design. Also, if any further clarification and/or elaboration are needed concerning the geotechnical aspects of the project, Englobe should be contacted. We recommend that we be retained during construction to confirm that the subsurface conditions do not deviate materially from those encountered in the test holes and to ensure that our recommendations are properly understood. Quality assurance testing and inspection services during construction are a necessary part of the evaluation of the subsurface conditions.

The geotechnical recommendations provided in this report are intended for the use of the Client or its agent and may not be used by a Third Party without the expressed written consent of Englobe and the Client. They are not intended as specifications or instructions to contractors. Any use which a contractor makes of this report, or decisions made based on it, are the responsibility of the contractor. The contractor must also accept the responsibility for means and methods of construction, seek additional information if required, and draw their own conclusions as to how the subsurface conditions may affect their work. Englobe accepts no responsibility and denies any liability whatsoever for any damages arising from improper or unauthorized use of the report or parts thereof.

It should be noted that the soil boundaries indicated on the borehole logs are inferred from noncontinuous sampling and observations during drilling and should not be interpreted as exact planes of geological change. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design. Also, the subsoil and groundwater conditions have been determined at the borehole locations only.

It is further noted that, depending on the time of year the field work was completed, water levels should be expected to vary, perhaps significantly from those observed at the time of this investigation.

It is important to note that the geotechnical assessment involves a limited sampling of the site gathered at specific test hole locations and the conclusions in this report are based on this information gathered and in accordance with normally accepted practices. The subsurface geotechnical, hydrogeological, environmental, and geologic conditions between and beyond the test holes will differ from those encountered at the test holes. Also, such conditions are not uniform and can vary over time. Should subsurface conditions be encountered which differ materially from those indicated at the test holes, we request that we be notified to assess the additional information and determine whether changes should be made as a result of the conditions. Englobe will not be responsible to any party for damages incurred because of failing to notify Englobe that differing site or subsurface conditions are present upon becoming aware of such conditions.

The professional services provided for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise stated specifically in the report. The recommendations and opinions given in this report are based on our professional judgment and are for the guidance of the Client or its Agent in the design of the specific project. No other warranties or guarantees, expressed or implied, are made. The Englobe recommendations are contingent upon provision of a consistently competent, stable subgrade, which is properly drained and free of soft spots and objectionable materials such as organics.

Appendix A
Drawings

ENGLOBE

Y:\SHARED\CA\KITCHENER\DATA\PROJECTS\160\2022 (BRANTFORD-KITCHENER-LONDON)\02208613.000 - SUBDIVISION, CHRISTIE STREET, DORCHESTER\Z4_CAD\02208613.000 FIG 1.DWG

0 50 100 150 200 250 m

SCALE 1:6000

NOTES:

1-REFERENCES: © Google Earth 2023.

2-Drawing scale may be distorted due to file conversion and/or copying. Measurements taken from the drawing must be verified in the field.

Project

Proposed Residential Subdivision

83 Christie Street, Dorchester, ON

Title

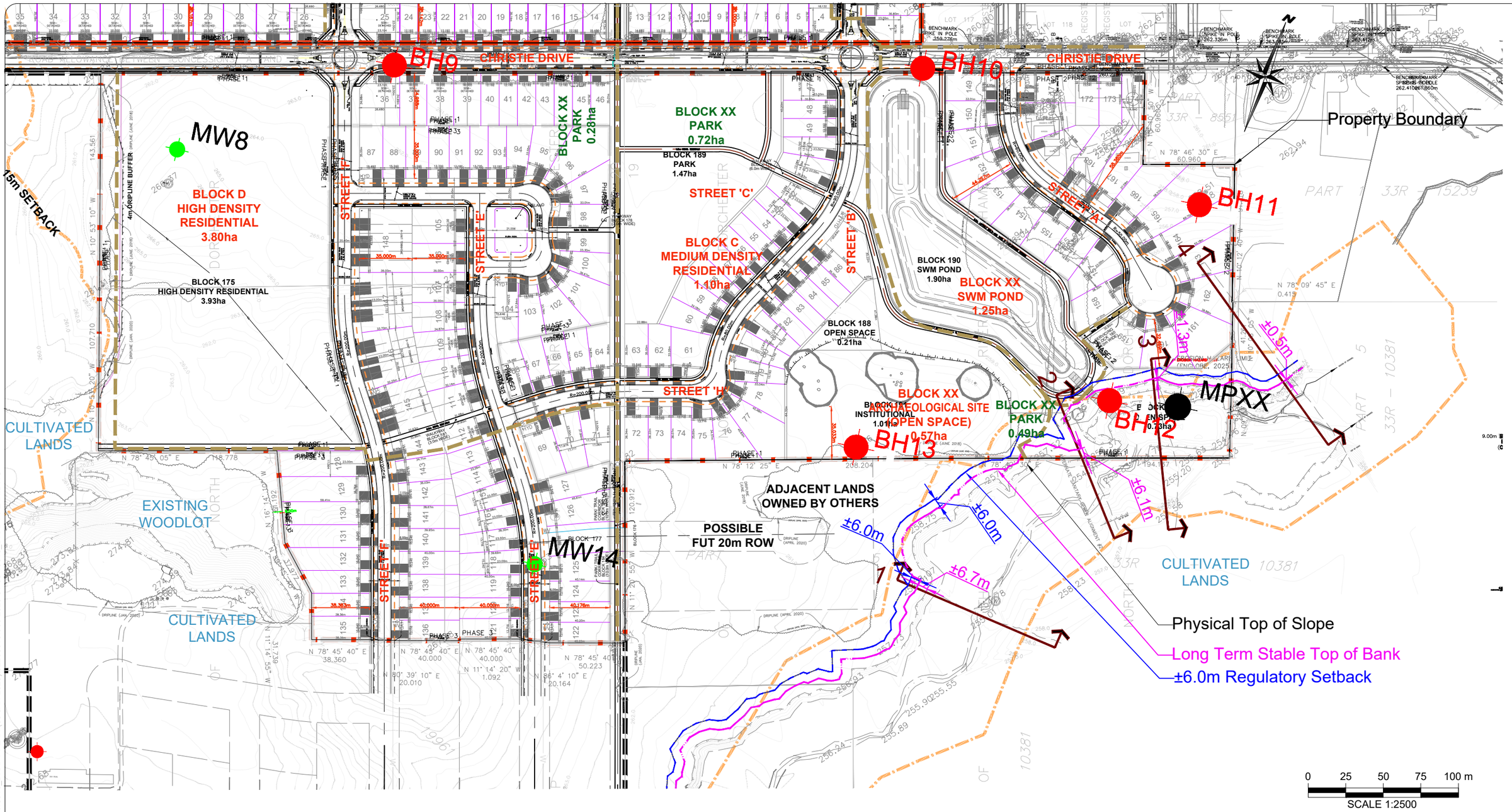
Site Location Plan

eNGLOBe

440, Hardy Road, Unit 3
Brantford (Ontario) N3T 5L8
Telephone : 519.720.0078
Fax : 519.720.0976

Prepared	A.Teka	Discipline	GEOTECHNICAL	Project manager	R.Helwing
Drawn	A.Teka	Scale	1:6000	Sequence no.	01 of 02
Checked	R.Helwing	Date	2024-01-31		

M. dept.	Project	Disc.	Dwg no.	Rev.
04	02208613.000	GE	001	00



LEGEND :

- MONITORING WELL LOCATION (Englobe 2019)
- BOREHOLE LOCATION (Englobe 2019)
- MINI PIEZOMETER P(Englobe 2019)
- SECTION LOCATION

REFERENCE
Concept Plan of Subdivision
South of the River Thames
Geographic Township of North Dorchester
Municipality of Thames Centre
County of Middlesex
Job No.: 18010, Date: December 24, 2025
By: CJDL Consulting Engineers

Project

Proposed Residential Subdivision South Side

83 Christie Street, Dorchester, ON

Title

BOREHOLE AND SECTION LOCATION PLAN

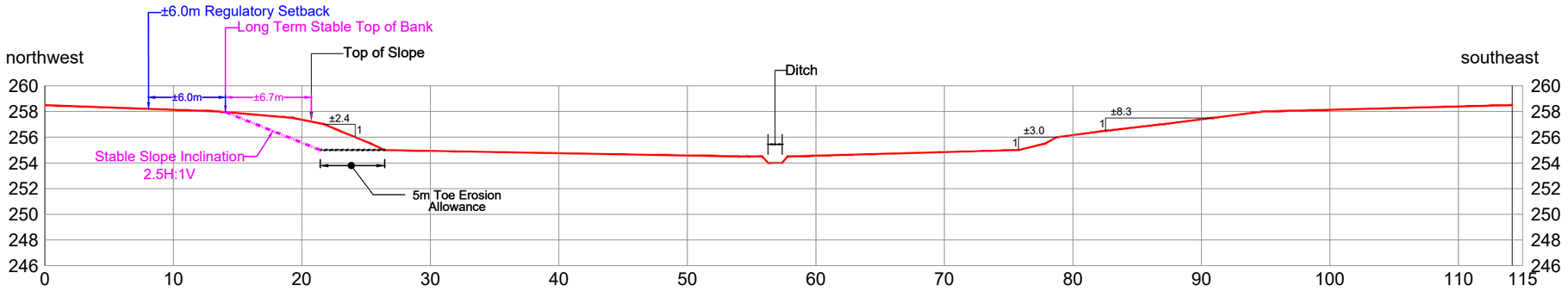
ENGLOBE

Prepared	C. Kamal	Discipline	GEOTECHNICAL	Project manager	R.Helwig
Drawn	C. Kamal	Scale	As Shown	Sequence no.	--
Checked	R.Helwig	Date	Jan. 2026		

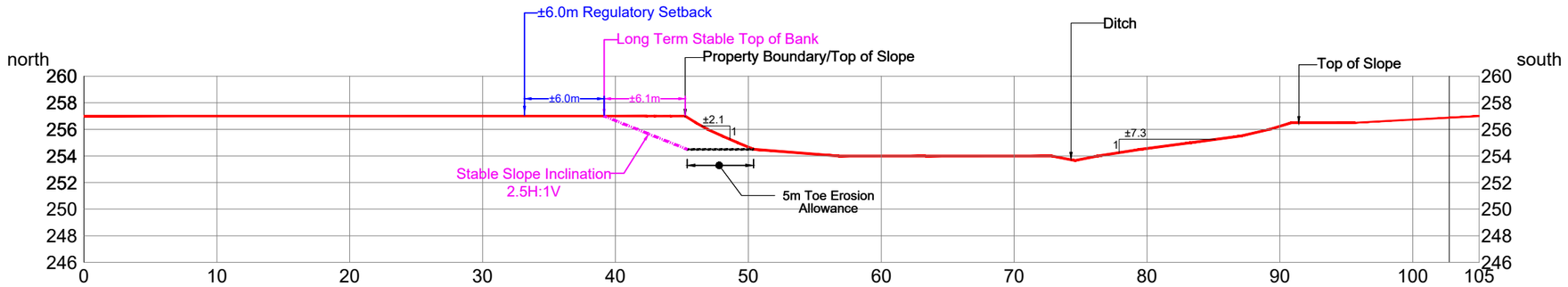
Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02208613.000	0100	GE	D	2	00

Y:\SHARED\CA\KITCHENER\DATA\PROJECTS\160\2022 (BRANTFORD-KITCHENER-LONDON)\02208613.000 - SUBDIVISION, DORCHESTER\Z4_CAD\DRAWINGS-JAN5, 2026\18010_DRAFT PLAN (05 JAN 2026)\02208613.000 2026-01-05 18010_DRAFT PLAN.DWG

CROSS SECTION 1-1'



CROSS SECTION 2-2'



1:400

0 2 4 6 8 10 15m

Project

Proposed Residential Subdivision
South Side

83 Christie Street, Dorchester, ON

Title

DETAILED CROSS SECTIONS
SECTION 1-1' AND SECTION 2-2'

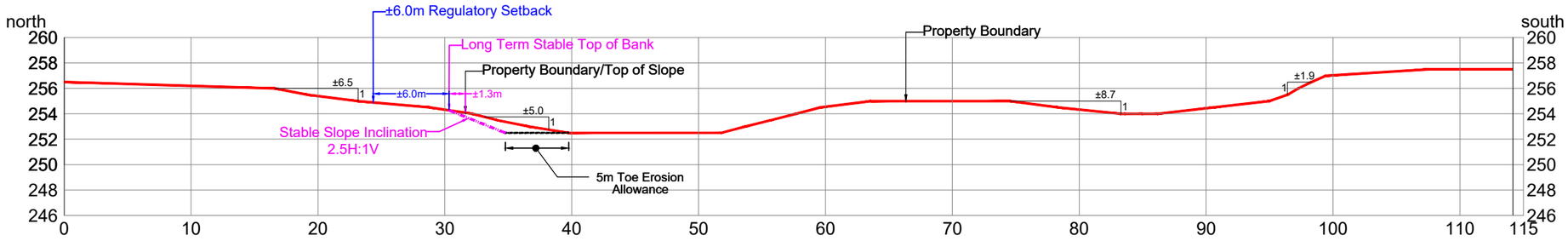
ENGLOBE

Prepared	C. Kamal	Discipline	GEOTECHNICAL	Project manager	R.Helwig	
Drawn	C. Kamal	Scale	As Shown	Sequence no.	--	
Checked	R.Helwig	Date	Jan. 2026			

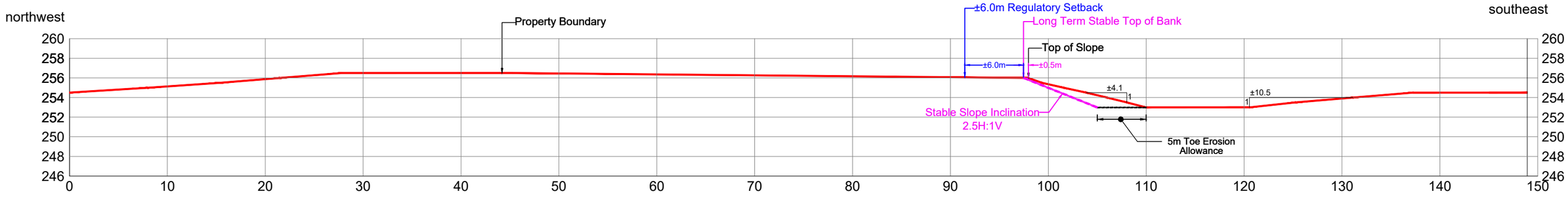
Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02208613.000	0100	GE	D	2A	00

Y:\SHARED\CA\KITCHENER\DATA\PROJECTS\160\2022 (BRANTFORD-KITCHENER-LONDON)\02208613.000 - SUBDIVISION, CHRISTIE STREET, DORCHESTER\Z4_CAD\DRAWINGS-JAN5, 2026\18010_DRAFT PLAN (05 JAN 2026)\02208613.000 2026-01-05 18010_DRAFT PLAN.DWG

CROSS SECTION 3-3'



CROSS SECTION 4-4'



1:400

0 2 4 6 8 10 15m

Project

Proposed Residential Subdivision
South Side

83 Christie Street, Dorchester, ON

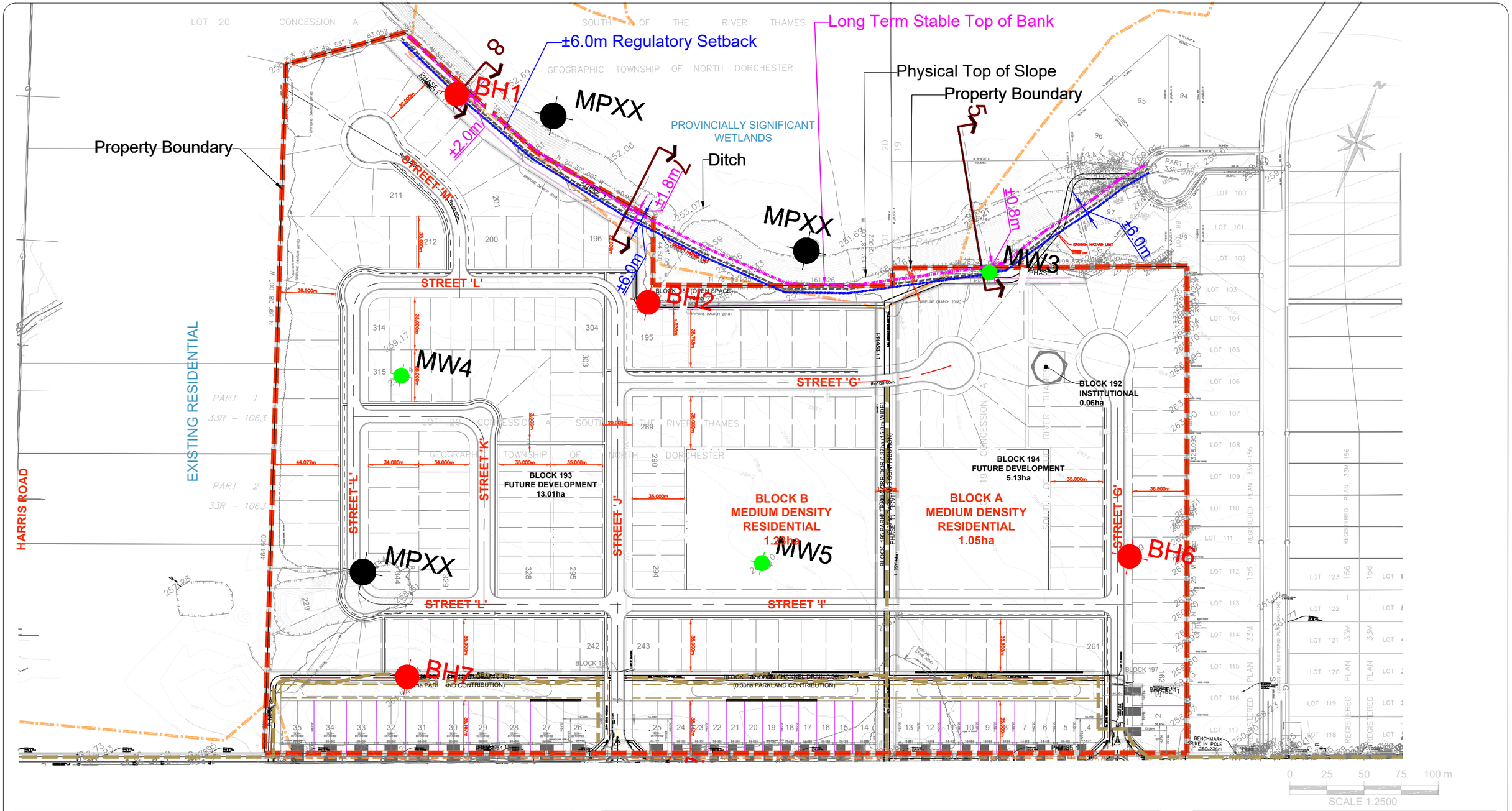
Title

DETAILED CROSS SECTIONS
SECTION 3-3' AND SECTION 4-4'

ENGLOBE

Prepared	C. Kamal	Discipline	GEOTECHNICAL	Project manager	R.Helwig	
Drawn	C. Kamal	Scale	As Shown	Sequence no.	--	
Checked	R.Helwig	Date	Jan. 2026			

Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02208613.000	0100	GE	D	2B	00



LEGEND :

- MONITORING WELL LOCATION (Englobe 2019)
- BOREHOLE LOCATION (Englobe 2019)
- MINI PIEZOMETER P(Englobe 2019)
- SECTION LOCATION

REFERENCE
Concept Plan of Subdivision
South of the River Thames
Geographic Township of North Dorchester
Municipality of Thames Centre
County of Middlesex
Job No.: 18010, Date: December 24, 2025
By: CJDL Consulting Engineers

Project

Proposed Residential Subdivision
North Side

83 Christie Street, Dorchester, ON

Title

BOREHOLE AND SECTION LOCATION PLAN

englobe

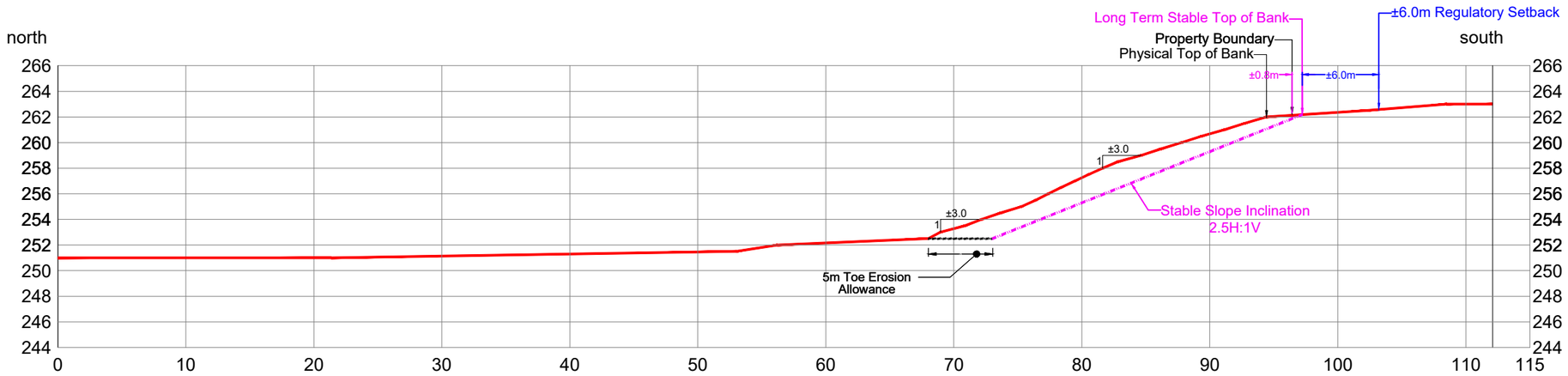
Prepared	C. Kamal	Discipline	GEOTECHNICAL
Drawn	C. Kamal	Scale	As Shown
Checked	R.Helwig	Date	Jan. 2026

Project manager: R.Helwig
Sequence no.: --

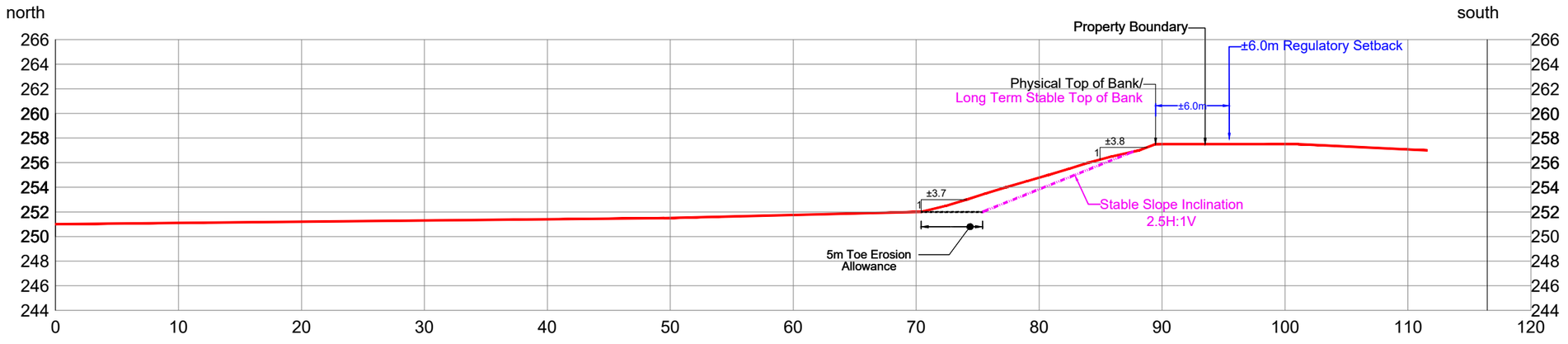
Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02208613.000	0100	GE	D	3	00

Y:\SHARED\CA\KITCHENER\DATA\PROJECTS\160\2022 (BRANTFORD-KITCHENER-LONDON)\02208613.000 - SUBDIVISION, CHRISTIE STREET, DORCHESTER\Z4_CAD\DRAWINGS-JAN5, 2026\18010_DRAFT PLAN (05 JAN 2026)\02208613.000 2026-01-05 18010_DRAFT PLAN.DWG

CROSS SECTION 5-5'



CROSS SECTION 6-6'



1:400

0 2 4 6 8 10 15m

Project

Proposed Residential Subdivision
North Side

83 Christie Street, Dorchester, ON

Title

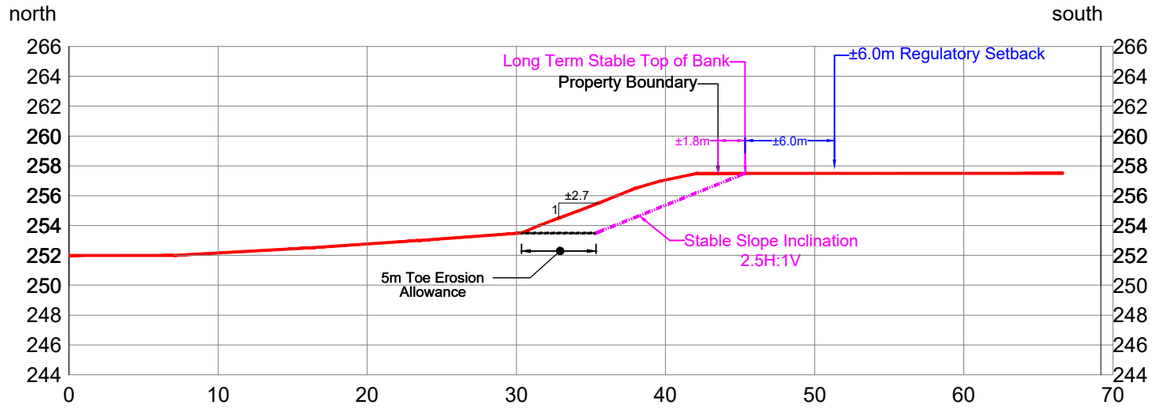
DETAILED CROSS SECTIONS
SECTION 5-5' AND SECTION 6-6'

eNGLOBE

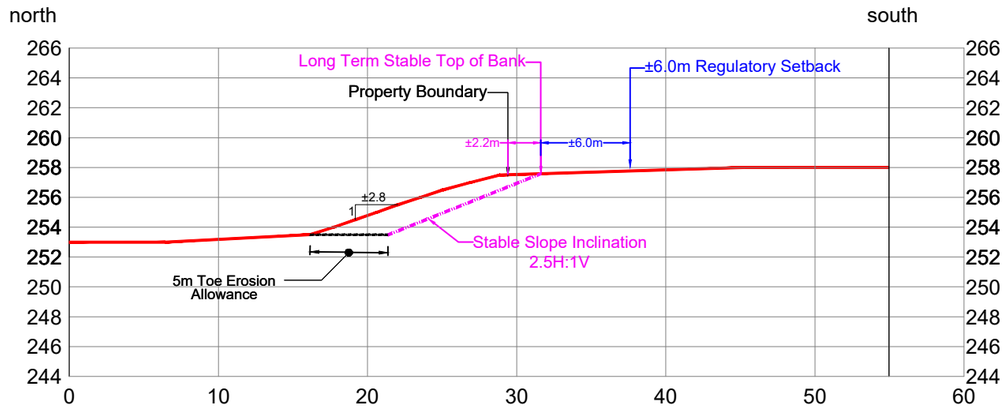
Prepared C. Kamal	Discipline GEOTECHNICAL	Project manager R.Helwig				
Drawn C. Kamal	Scale As Shown	Sequence no. --				
Checked R.Helwig	Date Jan. 2026					

Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02208613.000	0100	GE	D	3A	00

CROSS SECTION 7-7'



CROSS SECTION 8-8'



1:400 0 2 4 6 8 10 15m

Project

Proposed Residential Subdivision
North Side

83 Christie Street, Dorchester, ON

Title

DETAILED CROSS SECTIONS
SECTION 7-7', SECTION 8-8' AND SECTION 9-9'

ENGLOBE

Prepared	C. Kamal	Discipline	GEOTECHNICAL	Project manager	R.Helwig	
Drawn	C. Kamal	Scale	As Shown			
Checked	R.Helwig	Date	Jan. 2026	Sequence no.	--	

Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02208613.000	0100	GE	D	3B	00

Y:\SHARED\CA\KITCHENER\DATA\PROJECTS\160\2022 (BRANTFORD-KITCHENER-LONDON)\02208613.000 - SUBDIVISION, CHRISTIE STREET, DORCHESTER\Z4_CAD\DRAWINGS-JAN5, 2026\18010_DRAFT PLAN (05 JAN 2026)\02208613.000 2026-01-05 18010_DRAFT PLAN.DWG

Appendix B
Slope Stability Rating Charts

ENGLOBE

TABLE I - SLOPE STABILITY RATING CHART - VALLEY SLOPE

Site Location:	83 Christie Drive, Dorchester, Ontario							File No. 02208613.000		
Property Owner:	Cyril J. Demeyere Limited (CJDL)									
Inspection Date:	August 18, 2023									
Inspected By:	Behnoush Honarvar									
1. SLOPE INCLINATION		**Selected Slope Section(s)**								
Degrees	Horizontal / Vertical	**1-1'**	**2-2'**	**3-3'**	**4-4'**	**5-5'**	**6-6'**	**7-7'**	**8-8'**	
a) 18 or less	3:1 or flatter	0	0	0*	0*	0	0*	0	0	
b) 18 - 26	2:1 to more than 3:1	6*	6*	6	6	6*	6	6*	6*	
c) > 26	Steeper than 2:1	16	16	16	16	16	16	16	16	
2. SOIL STRATIGRAPHY										
a) Shale Limestone, Granite (Bedrock)		0	0	0	0	0	0	0	0	
b) Sand, Gravel		6*	6*	6*	6*	6*	6*	6*	6*	
c) Glacial Till		9	9	9	9	9	9	9	9	
d) Clay, Silt		12	12	12	12	12	12	12	12	
e) Fill		16	16	16	16	16	16	16	16	
f) Leda clay		24	24	24	24	24	24	24	24	
3. SEEPAGE FROM SLOPE FACE										
a) None or Near bottom only		0*	0*	0*	0*	0*	0*	0*	0*	
b) Near mid-slope only		6	6	6	6	6	6	6	6	
c) Near crest only or, From several levels		12	12	12	12	12	12	12	12	
4. SLOPE HEIGHT										
a) 2 m or less		0	0	0	0	0	0	0	0	
b) 2.1 to 5 m		2*	2*	2*	2*	2	2	2*	2*	
c) 5.1 to 10m		8	8	8	8	8*	8*	8	8	
5. VEGETATION COVER ON SLOPE FACE										
a) Well vegetated; heavy shrubs or forested with mature trees		0*	0*	0*	0*	0*	0*	0*	0*	
b) Light vegetation; mostly grass, weeds, occasional trees		4	4	4	4	4	4	4	4	
c) No vegetation, bare		8	8	8	8	8	8	8	8	
6. TABLE LAND DRAINAGE										
a) Table land flat, no apparent drainage over slope		0*	0*	0*	0*	0*	0*	0*	0*	
b) Minor drainage over slope, no active erosion		2	2	2	2	2	2	2	2	
c) Drainage over slope, active erosion, gullies		4	4	4	4	4	4	4	4	
7. PROXIMITY OF WATERCOURSE AT SLOPE TOE										
a) 15 metres or more from slope toe		0	0	0	0	0	0	0	0	
b) Less than 15 metres from slope toe		6*	6*	6*	6*	6*	6*	6*	6*	
8. PREVIOUS LANDSLIDE ACTIVITY										
a) No		0*	0*	0*	0*	0*	0*	0*	0*	
b) Yes		6	6	6	6	6	6	6	6	
SLOPE STABILITY RATING VALUE										
INVESTIGATION RATING SUMMARY	**TOTAL**	**20**	**20**	**14**	**14**	**26**	**24**	**20**	**20**	

SLOPE INSTABILITY	RATING	INVESTIGATION REQUIREMENTS
1. Low potential	< 24	Site inspection only, confirmation, report letter
2. Slight potential	25-35	Site inspection and surveying, preliminary study, detailed report
3. Moderate potential	> 35	Site inspection, boreholes, surveying, detailed report

Appendix C
Borehole Logs

ENGLOBE

List of Abbreviations

The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

Sample Types		Soil Test and Properties	
AS	Auger Sample	SPT	Standard Penetration Test
CS	Core Sample	UC	Unconfined Compression
RC	Rock Core	FV	Field Vane Test
SS	Split Spoon	ø	Angle of internal friction
TW	Thinwall, Open	γ	Unit weight
WS	Wash Sample	w_p	Plastic Limit
BS	Bulk Sample	w	Water content
GS	Grab Sample	w_L	Liquid Limit
WC	Water Content Sample	I_L	Liquidity Index
TP	Thinwall, Piston	I_p	Plastic Index
		PP	Pocket Penetrometer

Penetration Resistances	
Dynamic Penetration Resistance	The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) diameter 60˚ cone a distance 300 mm (12 in.) The cone is attached to 'A' size drill rods and casing is not used.
Standard Penetration Resistance, N (ASTM D1586)	The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) required to drive a standard split spoon sampler 300 mm (12 in.)
WH	Sampler advanced by weight of hammer
PH	Sampler advanced by hydraulic pressure
PM	Sampler advanced by manual pressure

Soil Description		
Cohesionless Soils Compactness Condition	**SPT N-Value** (blows per 0.3 m)	**Relative Density (D_r** (%)
Very Loose	0 to 4	0 to 20
Loose	4 to 10	20 to 40
Compact	10 to 30	40 to 60
Dense	30 to 50	60 to 80
Very Dense	Over 50	80 to 100
Cohesive Soils Consistency	**Undrained Shear Strength (C_u kPa**	**psf**
Very Soft	Less than 12	Less than 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very Stiff	100 to 200	2000 to 4000
Hard	over 200	over 4000
DTPL	Drier than plastic limit	Low Plasticity, W_L<30
APL	About plastic limit	Medium Plasticity, 30< W_L<50
WTPL	Wetter than plastic limit	High Plasticity, W_L>50

LOG OF BOREHOLE 01-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 July 16	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	257.7	**GROUND SURFACE**				
	257.4 / 0.3	250mm **TOPSOIL**, Sand some silt, brown				
		SAND, some silt, loose, brown, moist		1	SS	8
1						
		...compact		2	SS	18
2						
				3	SS	17
3						
				4	SS	19
		...saturated				
4				5	SS	19
		...fine to coarse				
				6	SS	14
5	252.2 / 5.5	**GRAVELLY SAND**, trace silt, compact, brown, saturated				
6	251.6 / 6.1	**SILT**, some gravel, some clay, loose, grey, wet (GLACIAL TILL)		7	SS	9
	251.1 / 6.6	**END OF BOREHOLE**				

Elevation Scale (m): 257, 256, 255, 254, 253, 252

Penetration Test Values (Blows / 0.3m)
Dynamic Cone: 10 20 30 40
Undrained Shear Strength (kPa)
Unconfined / Pocket Penetrometer / Field Vane / Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit | Natural Water Content | Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

Unstabilized water level measured at 3.8 m below ground surface; borehole caved to 3.8 m below ground surface upon completion of drilling.

file: p-0019257-100.gpj

LOG OF BOREHOLE 02-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 July 16	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	254.8	**GROUND SURFACE**				
	254.6	230mm **TOPSOIL**, Silty Sand, brown				
	0.2	**SAND**, some silt, loose / very loose, brown, very moist		1	SS	4
1		...wet				
		...trace to some silt, compact		2	SS	14
2				3	SS	16
3				4	SS	19
4		...loose		5	SS	9
				6	SS	8
5						
6				7	SS	10
	248.2					
	6.6	**END OF BOREHOLE**				

Elevation Scale (m): 254, 253, 252, 251, 250, 249

Penetration Test Values (Blows / 0.3m)
Dynamic Cone: 10 20 30 40
Undrained Shear Strength (kPa)
Unconfined / Pocket Penetrometer / Field Vane / Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit | Natural Water Content | Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

Unstabilized water level measured at 1.4 m below ground surface; borehole was open upon completion of drilling.

file: p-0019257-100.gpj

LOG OF BOREHOLE 03-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 July 16	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 2	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)
0	262.3	**GROUND SURFACE**					262
	262.0	300mm **TOPSOIL**, Sand, some silt, brown					
	0.3	**SAND**, some silt, very loose / loose, brown, moist					
1				1	SS	4	261
		...very loose		2	SS	2	
2							260
				3	SS	2	
3							
				4	SS	3	259
4		...trace gravel, compact		5	SS	10	
							258
				6	SS	11	
5							257
6							
				7	SS	17	256
7							
							255
8				8	SS	21	
							254
9							
				9	SS	21	253
10							
							252
11		...trace to some silt, saturated		10	SS	16	
							251
12							
		...dense, changed to grey		11	SS	36	250
13							
							249

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10 20 30 40
Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40 80 120 160
Moisture / Plasticity — Plastic Limit, Natural Water Content, Liquid Limit: PL MC LL; 10 20 30
Headspace Vapour (ppm)
Instrument Details
Unstabilized Water Level
Lab Data and Comments
GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

file: p-0019257-100.gpj

(continued next page)

LOG OF BOREHOLE 03-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 July 16	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 2 of 2	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
		(continued)											
14	248.1 14.2	**SAND**, some silt, very loose / loose, brown, moist *(continued)*		12	SS	40							

END OF BOREHOLE

Unstabilized water level measured at 10.5 m below ground surface; borehole was open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 30, 2019	10.5	251.8
Sep 13, 2019	10.5	251.7
Dec 9, 2019	10.6	251.7
Feb 26, 2020	10.5	251.8

file: p-0019257-100.gpj

LOG OF BOREHOLE 04-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 July 18	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
	259.1	**GROUND SURFACE**				
0	258.8	250mm **TOPSOIL**, Sand, some silt, dark brown				
	0.3	**SAND**, some silt, loose, brown, moist		1	SS	3
1				2	SS	10
2	256.8					
	2.3	**SILTY CLAY**, trace gravel, with dilatent silt seams, stiff to very stiff, brown, very moist (GLACIAL TILL)		3	SS	11
3	255.7			4	SS	17
	3.4	**SAND**, trace silt, compact, brown, saturated		5	SS	10
4						
		...loose, changed to grey		6	SS	9
5		...clayey silt seam				
6				7	SS	27
	252.5	...some gravel, compact				
	6.6	**END OF BOREHOLE**				

Elevation Scale (m): 259, 258, 257, 256, 255, 254, 253

Penetration Test Values (Blows / 0.3m)
Dynamic Cone: 10, 20, 30, 40
Undrained Shear Strength (kPa)
Unconfined / Pocket Penetrometer / Field Vane / Lab Vane
40, 80, 120, 160

Moisture / Plasticity
Plastic Limit / Natural Water Content / Liquid Limit
PL, MC, LL
10, 20, 30

=225 kPa
=225 kPa

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 30, 2019	2.6	256.6
Sep 13, 2019	2.6	256.5
Dec 9, 2019	2.3	256.8
Feb 26, 2020	2.1	257.0

file: p-0019257-100.gpj

LOG OF BOREHOLE 05-19

Project No. : P-0019257-100	Client : Cyril J. Demeyere Ltd.	Originated by : EV
Date started : 2019 July 18	Project : Proposed Residential Subdivision	Compiled by : MH
Sheet No. : 1 of 1	Location : 83 Christie Drive, Dorchester, ON	Checked by :

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	260.1	**GROUND SURFACE**				
0	259.9	230mm **TOPSOIL**, Sand, some silt to Silty, dark brown				
	0.2	**SAND**, some silt, loose, brown, very moist		1	SS	6
1						
	258.3			2	SS	9
2	1.8	**SILTY CLAY**, trace gravel, stiff, brown, wet (GLACIAL TILL) ...with silt seams				
	257.1			3	SS	14
3	3.0	**SILT AND CLAY**, very stiff, grey, wet		4	SS	19
4	256.0			5	SS	16
	4.1	**SAND**, trace to some silt, compact, brown, saturated		6	SS	11
5						
6				7	SS	22
7		...grey		8	SS	11
8	252.0					
	8.1	**END OF BOREHOLE**				

Penetration Test Values (Blows / 0.3m)
Dynamic Cone: 10 20 30 40
Undrained Shear Strength (kPa)
Unconfined, Field Vane, Pocket Penetrometer, Lab Vane: 40 80 120 160
Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit (PL, MC, LL): 10 20 30
Elevation Scale (m): 260 259 258 257 256 255 254 253
=225 kPa

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 30, 2019	3.6	256.5
Sep 13, 2019	3.7	256.4
Dec 9, 2019	3.8	256.3
Feb 26, 2020	3.4	256.7

file: p-0019257-100.gpj

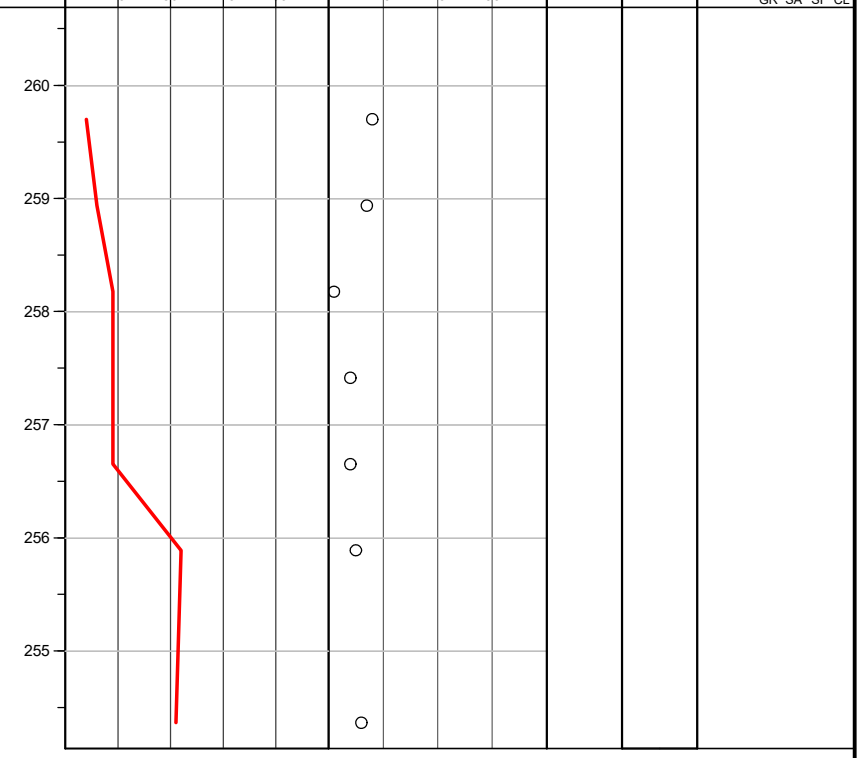
LOG OF BOREHOLE 06-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 July 16	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	260.7	**GROUND SURFACE**				
	260.4 (0.3)	250mm **TOPSOIL**, Sand some silt to silty, dark brown				
		SAND, some, trace rootlets, loose, brown, moist		1	SS	4
1				2	SS	6
2				3	SS	9
3				4	SS	9
4				5	SS	9
		...compact		6	SS	22
5						
6				7	SS	21
	254.1 (6.6)	**END OF BOREHOLE**				

Borehole was dry and open upon completion of drilling.



file: p-0019257-100.gpj

LOG OF BOREHOLE 07-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 July 16	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	261.3	**GROUND SURFACE**				
	261.0	250mm **TOPSOIL**, Sand some silt, dark brown				
	0.3	**SAND**, some silt, with silty sand seams, compact, brown, moist		1	SS	12
1						
				2	SS	13
2		...loose				
				3	SS	7
3				4	SS	4
4		...very moist		5	SS	4
		...compact, saturated		6	SS	11
5						
6				7	SS	14
	254.7					
	6.6	**END OF BOREHOLE**				

Elevation Scale (m): 261, 260, 259, 258, 257, 256, 255

Penetration Test Values (Blows / 0.3m)
Dynamic Cone: 10 20 30 40
Undrained Shear Strength (kPa)
Unconfined / Pocket Penetrometer / Field Vane / Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit | Natural Water Content | Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

Unstabilized water level measured at 4.3 m below ground surface; borehole was open upon completion of drilling.

file: p-0019257-100.gpj

LOG OF BOREHOLE 08-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 July 18	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	266.4	**GROUND SURFACE**				
	266.2 / 0.2	230mm **TOPSOIL**, Silty Sand, dark brown				
		SAND, some silt, loose, brown, moist		1	SS	5
1						
		...very loose		2	SS	3
2	264.1 / 2.3					
		SILTY SAND, some gravel, trace clay, compact, brown, moist		3	SS	13
3		...damp		4	SS	20
4						
5				5	SS	24
6				6	SS	29
7		...very moist to wet		7	SS	19
8						
9		...saturated		8	SS	20
10						
11	255.3 / 11.1			9	SS	23

Elevation Scale (m): 266, 265, 264, 263, 262, 261, 260, 259, 258, 257, 256

Penetration Test Values (Blows / 0.3m): Dynamic Cone (10, 20, 30, 40)
Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane (40, 80, 120, 160)

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit (PL, MC, LL; 10, 20, 30)

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

END OF BOREHOLE

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 30, 2019	8.0	258.4
Sep 13, 2019	8.1	258.3
Dec 9, 2019	8.1	258.3
Feb 26, 2020	7.8	258.5

file: p-0019257-100.gpj

LOG OF BOREHOLE 09-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: SJ
Date started	: 2019 August 1	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)
	261.0	**GROUND SURFACE**					261
0		500mm **TOPSOIL**					
	260.5						
	0.5	**SILT**, some gravel, trace sand, compact, brown, very moist		1	SS	12	
1							260
	259.5						
	1.5	**SAND**, some rootlets, trace silt, very loose, brown, moist		2	SS	2	
2							259
				3	SS	2	
3		...saturated		4	SS	1	258
		...loose					
4				5	SS	6	257
		...compact		6	SS	21	
5							256
6				7	SS	13	255
7							254
		...trace gravel		8	SS	14	
8							253
9		...very loose		9	SS	2	252
10							251
		...compact		10	SS	18	
11							250
12							249
	248.4			11	SS	15	
	12.6						

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40
Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane; 40 80 120 160
Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30
Headspace Vapour (ppm)
Instrument Details
Unstabilized Water Level
Lab Data and Comments
GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE
Unstabilized water level measured at 3.0 m below ground surface; borehole caved to 4.6 m below ground surface upon completion of drilling.

GROUND WATER ANALYSIS
WL @ 4.6m after completion of drilling

file: p-0019257-100.gpj

LOG OF BOREHOLE 10-19

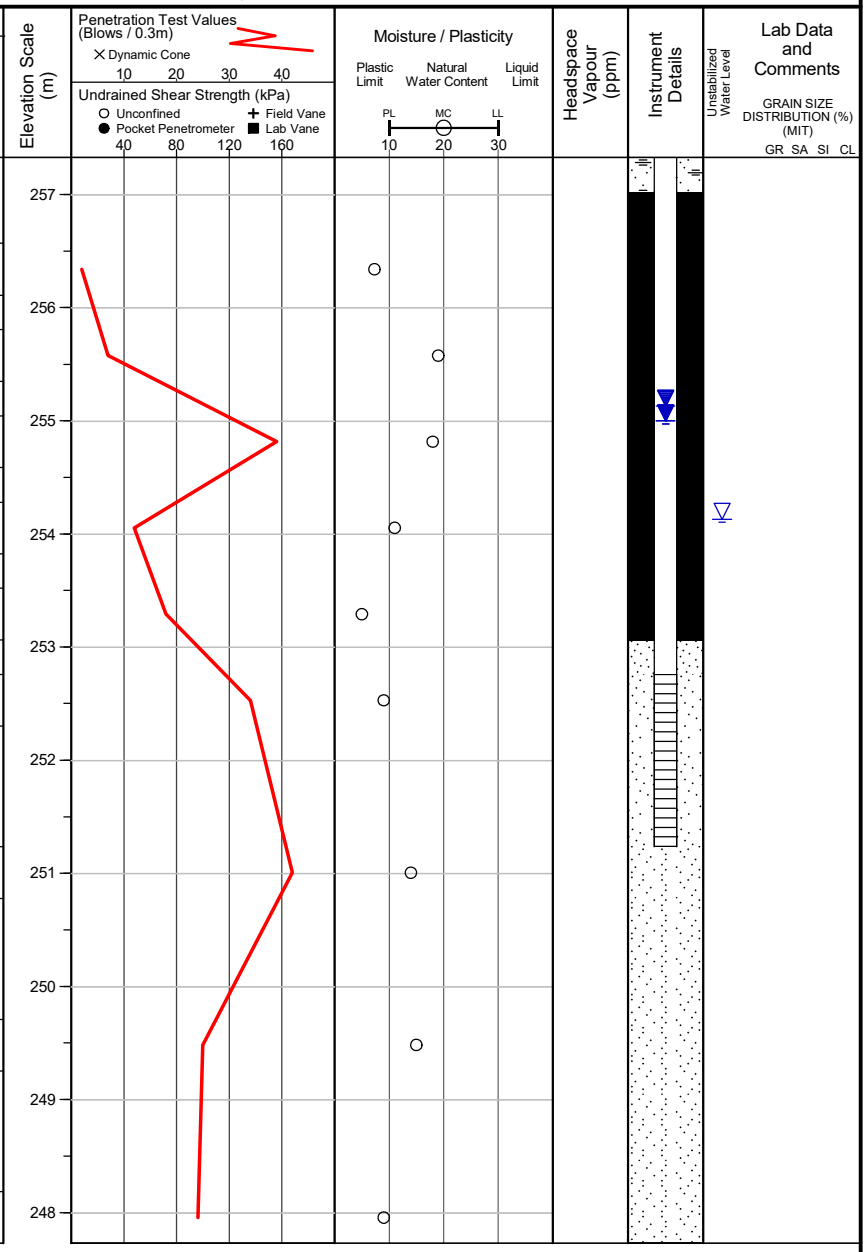
Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: SJ
Date started	: 2019 August 1	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
	257.3	**GROUND SURFACE**				
0	256.8	460mm **TOPSOIL**				
	0.5	**SAND**, trace silt, trace gravel, trace rootlets, very loose, brown, moist		1	SS	2
1						
		...loose		2	SS	7
2						
		...crushed gravel, dense, wet		3	SS	39
3	254.1					
	3.2	**SAND AND GRAVEL**, compact, brown, saturated		4	SS	12
		...gravelly sand, occassional cobbles		5	SS	18
4						
		...dense		6	SS	34
5						
6		...seams of gravel		7	SS	42
7	249.7					
	7.6	**SILT AND SAND**, silt to clayey silt at the bottom, compact, brown, very moist		8	SS	25
8						
9	248.2					
	9.1	**SILT to CLAYEY SILT**, very stiff, grey, very moist to wet		9	SS	24
	247.7					
	9.6	**END OF BOREHOLE**				

Unstabilized water level measured at 3.2 m below ground surface; borehole was open upon completion of drilling.

50 mm dia. monitoring well installed.



WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 30, 2019	2.3	255.0
Sep 13, 2019	2.3	255.0
Dec 9, 2019	2.4	255.0
Feb 26, 2020	2.2	255.1

file: p-0019257-100.gpj

LOG OF BOREHOLE 11-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: SJ
Date started	: 2019 August 1	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	257.6	**GROUND SURFACE**				
	257.1	460mm **TOPSOIL**				
	0.5	**SAND**, some silt, loose, brown, damp		1	SS	7
1				2	SS	9
2		...compact		3	SS	14
3				4	SS	17
4				5	SS	15
		...dense, wet		6	SS	36
5	252.6					
	5.0	**END OF BOREHOLE**				

Elevation Scale (m): 257, 256, 255, 254, 253

Penetration Test Values (Blows / 0.3m)
× Dynamic Cone
10 20 30 40
Undrained Shear Strength (kPa)
○ Unconfined + Field Vane
● Pocket Penetrometer ■ Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit | Natural Water Content | Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

Borehole was dry and open upon completion of drilling.

file: p-0019257-100.gpj

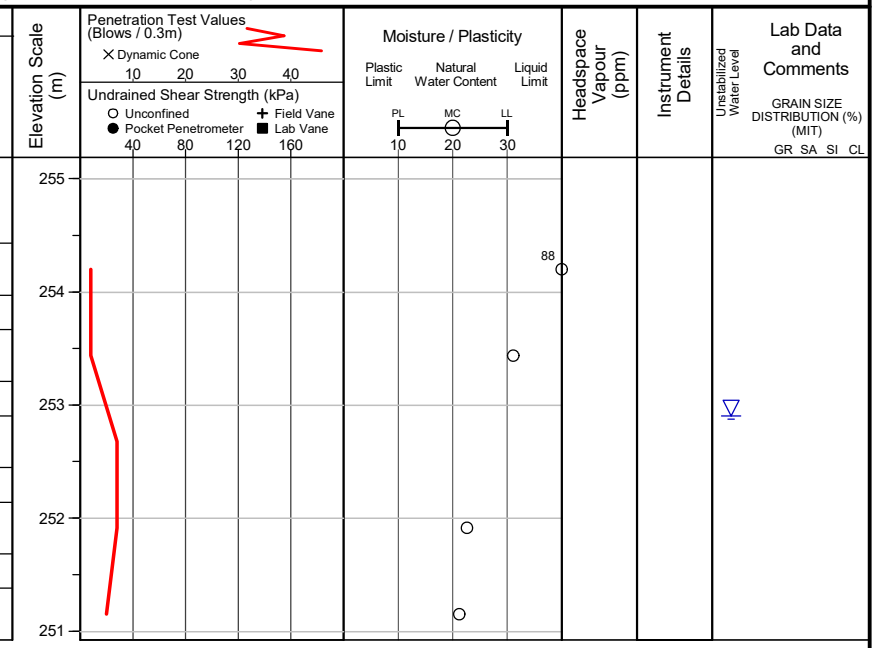
LOG OF BOREHOLE 12-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: SJ
Date started	: 2019 August 1	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	255.2	**GROUND SURFACE**				
		PEAT ; SILTY SAND, trace clay, very loose, brown and black, very moist		1	SS	2
1				2	SS	2
2	253.2					
	2.0	**SILT AND CLAY**, trace sand, with sand seam, firm, brown, very moist ...wet		3	SS	7
3				4	SS	7
4	250.9			5	SS	5
	4.3	**END OF BOREHOLE**				

Unstabilized water level measured at 2.3 m below ground surface; borehole was open upon completion of drilling.



file: p-0019257-100.gpj

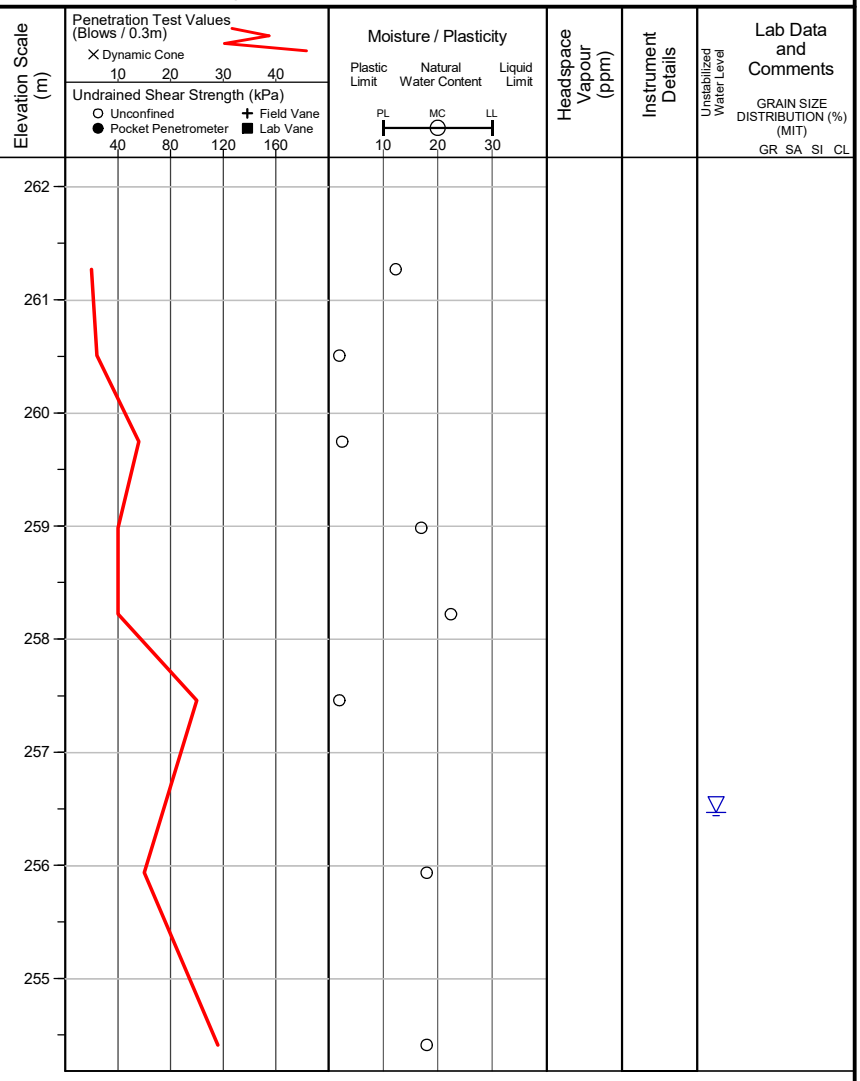
LOG OF BOREHOLE 13-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: SJ
Date started	: 2019 August 2	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
	262.3	**GROUND SURFACE**				
0	261.8	510mm **TOPSOIL**				
	0.5	**SAND**, some silt, trace gravel, trace rootlets, loose, brown, moist		1	SS	5
1						
		...grey		2	SS	6
2						
		...compact		3	SS	14
3						
		...layers of clayey silt, very moist		4	SS	10
	258.5					
	3.8	**CLAYEY SILT**, some sand, stiff, brown, wet		5	SS	10
4	257.7					
	4.6	**SAND**, some silt, compact, brown, wet		6	SS	25
5						
6				7	SS	15
7						
	254.7					
	7.6	**SILTY SAND**, with clayey silt seams, compact, brown, saturated		8	SS	29
8	254.2					
	8.1	**END OF BOREHOLE**				

Unstabilized water level measured at 5.8 m below ground surface; borehole was open upon completion of drilling.



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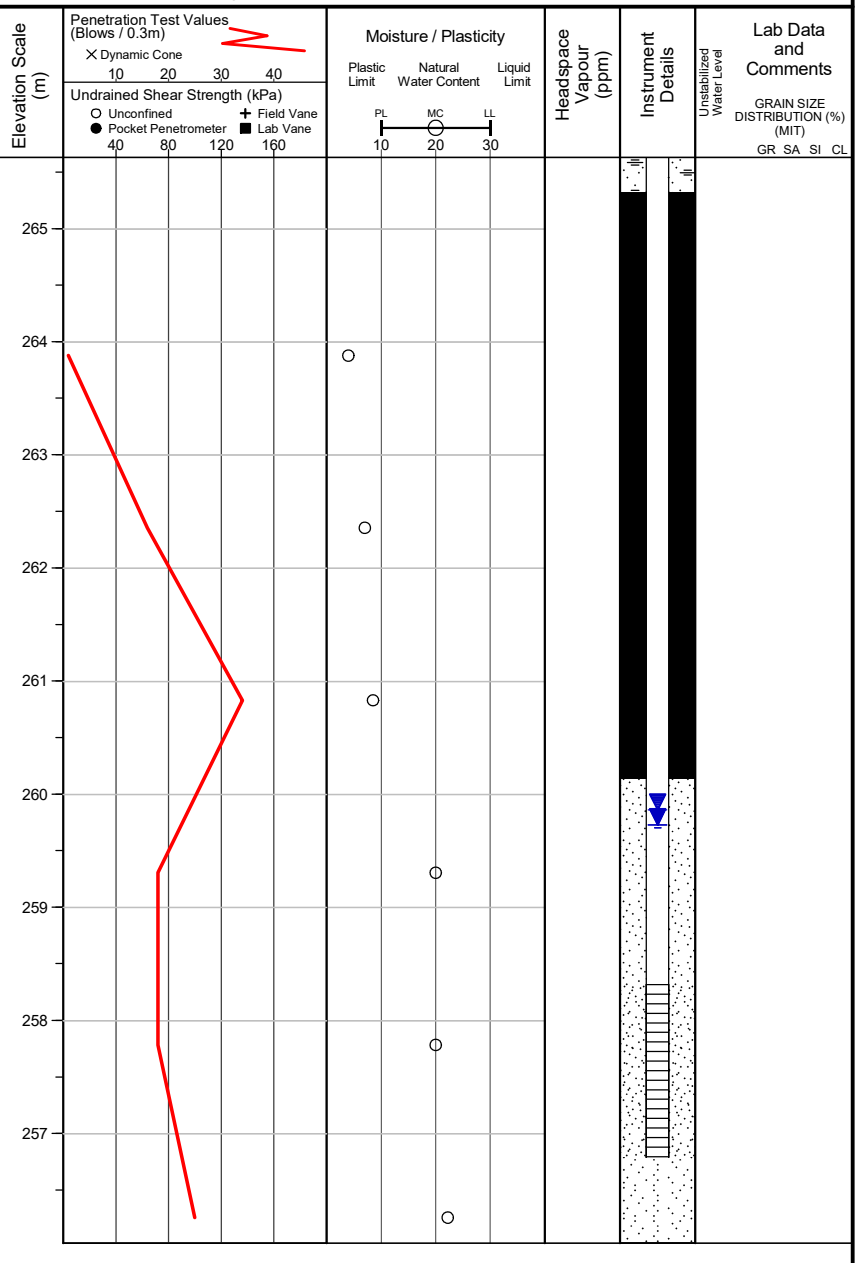
LOG OF BOREHOLE 14-19

Project No.	: P-0019257-100	Client	: Cyril J. Demeyere Ltd.	Originated by	: EV
Date started	: 2019 August 13	Project	: Proposed Residential Subdivision	Compiled by	: MH
Sheet No.	: 1 of 1	Location	: 83 Christie Drive, Dorchester, ON	Checked by	:

Position :
Elevation Datum : Geodetic (NAD83)
Rig type : D50, track-mounted
Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	265.6	**GROUND SURFACE**				
	265.3	300mm **TOPSOIL**				
	0.3	**SAND**, some silt, very loose, mottled brown, moist		1	SS	1
1						
2				2	SS	16
3		...compact				
4				3	SS	34
5		...dense				
6	259.5			4	SS	18
	6.1	**SILTY SAND**, compact, brown, saturated				
7				5	SS	18
8						
9				6	SS	25
	256.0					
	9.6	**END OF BOREHOLE**				



Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 30, 2019	5.9	259.7
Sep 13, 2019	5.9	259.7
Dec 9, 2019	6.1	259.6
Feb 26, 2020	5.8	259.9

file: p-0019257-100.gpj

Appendix D
Geotechnical Laboratory Analyses

ENGLOBE

PARTICLE SIZE ANALYSIS

Project: **Proposed Residential Subdivision**

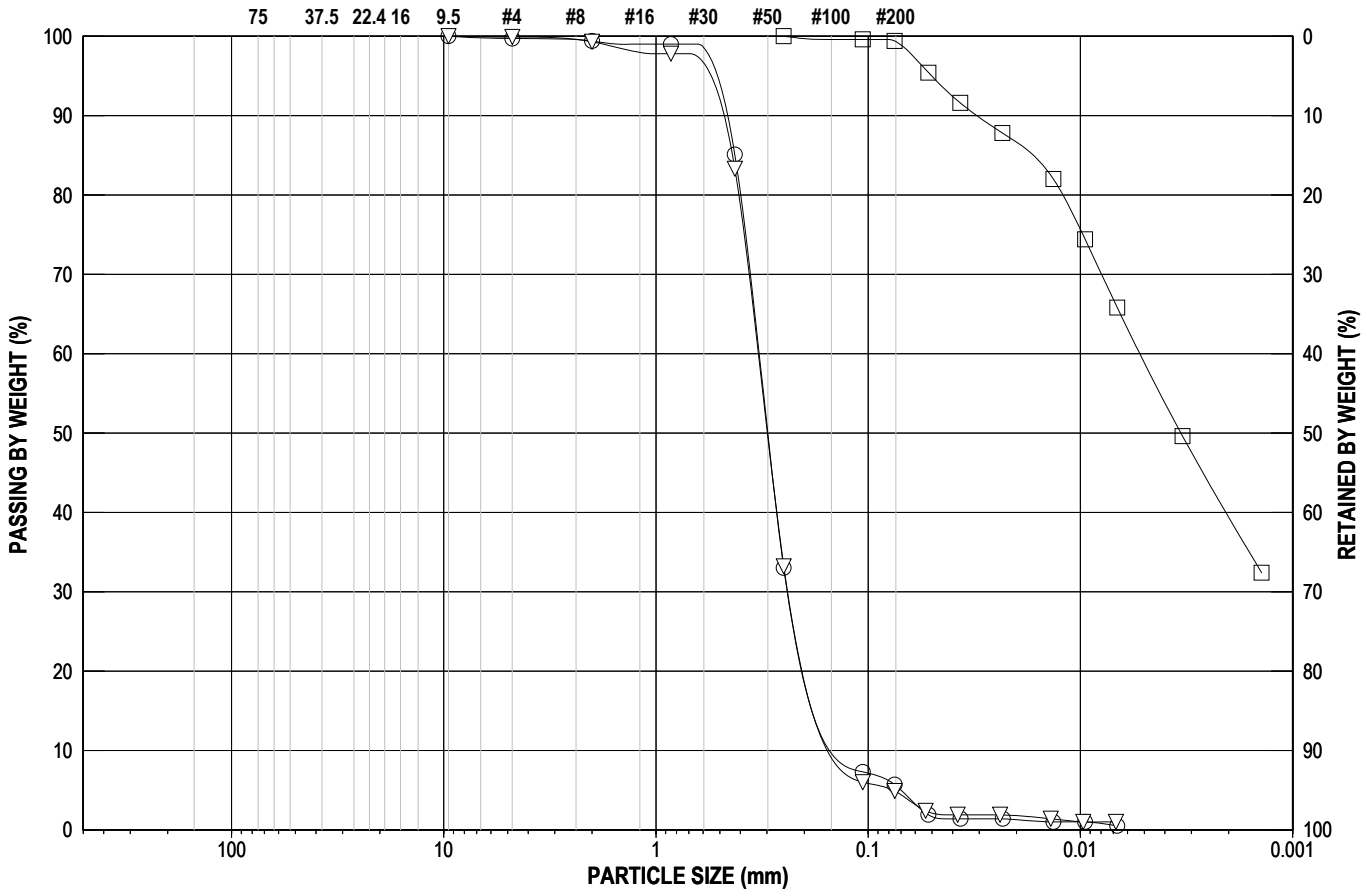
Figure No : **1**

Location: **83 Christie Street, Dorchester, Ontario**

File No : **P-0019257-0-01-100**

UNIFIED SOIL CLASSIFICATION

COBBLES	*GRAVEL*		*SAND*			*SILT OR CLAY*
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN MILLIMETRES			*U.S. STANDARD SIEVE No.*			*HYDROMETER*



Symbol	Borehole n°	Sample n°	Depth (m)	Description
○	BH-03-19	SA-3	2.29 - 2.74	SAND, trace Silt
□	BH-05-19	SA-4	3.05 - 3.51	SILT and CLAY
▽	BH-06-19	SA-3	2.29 - 2.74	SAND, trace Silt

Englobe

PARTICLE SIZE ANALYSIS

Project: **Proposed Residential Subdivision**

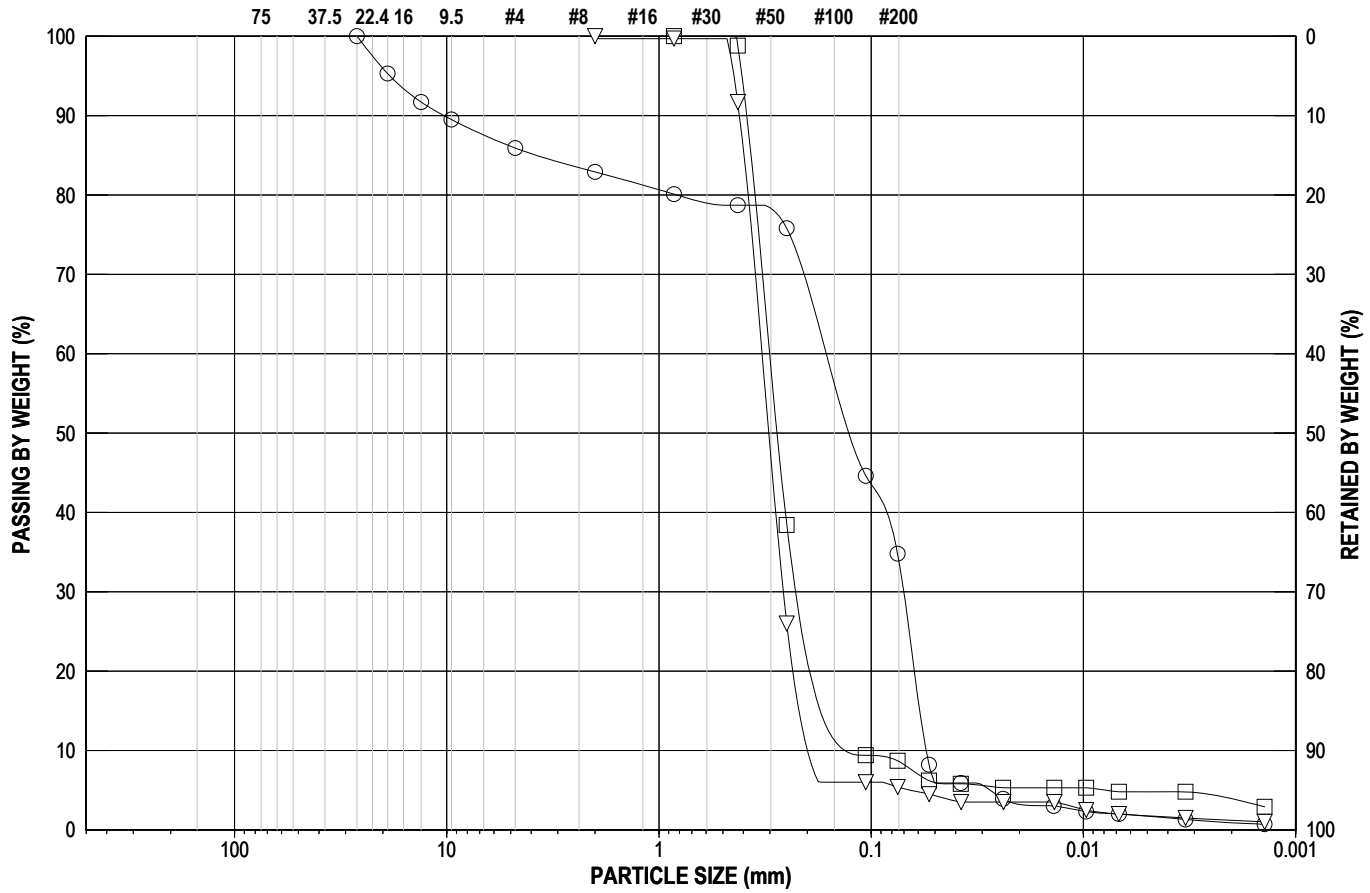
Figure No : **2**

Location: **83 Christie Street, Dorchester, Ontario**

File No : **P-0019257-0-01-100**

UNIFIED SOIL CLASSIFICATION

COBBLES	*GRAVEL*		*SAND*			*SILT OR CLAY*
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN MILLIMETRES			*U.S. STANDARD SIEVE No.*			*HYDROMETER*



Symbol	Borehole n°	Sample n°	Depth (m)	Description
○	BH-08-19	SA-3	2.29 - 2.74	Silty SAND, some Gravel, trace Clay
□	BH-09-19	SA-2	1.52 - 1.98	SAND, trace Silt and Clay
▽	BH-09-19	SA-5	3.81 - 4.27	SAND, trace Silt and Clay

PARTICLE SIZE ANALYSIS

Project: **Proposed Residential Subdivision**

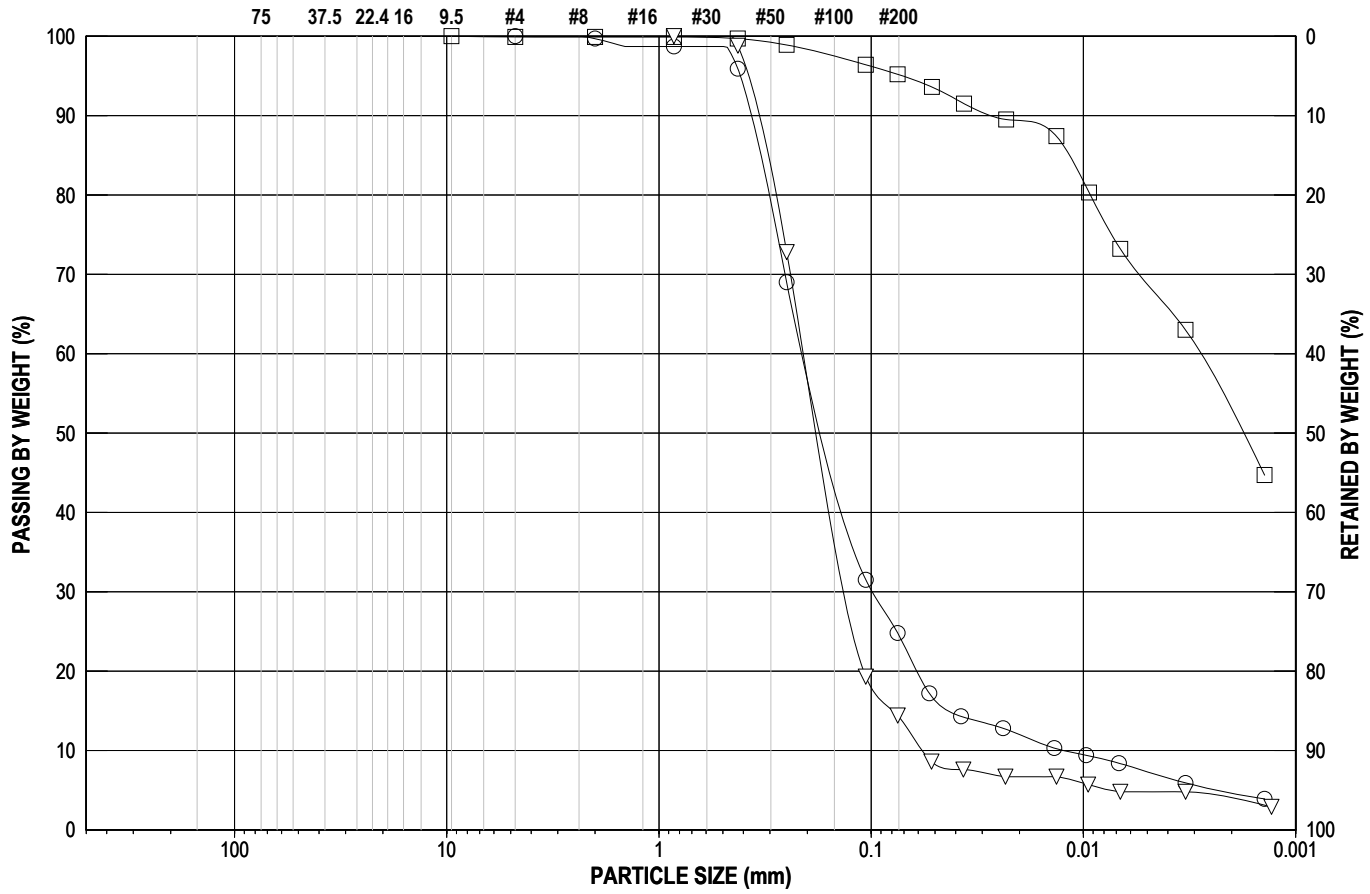
Figure No : **3**

Location: **83 Christie Street, Dorchester, Ontario**

File No : **P-0019257-0-01-100**

UNIFIED SOIL CLASSIFICATION

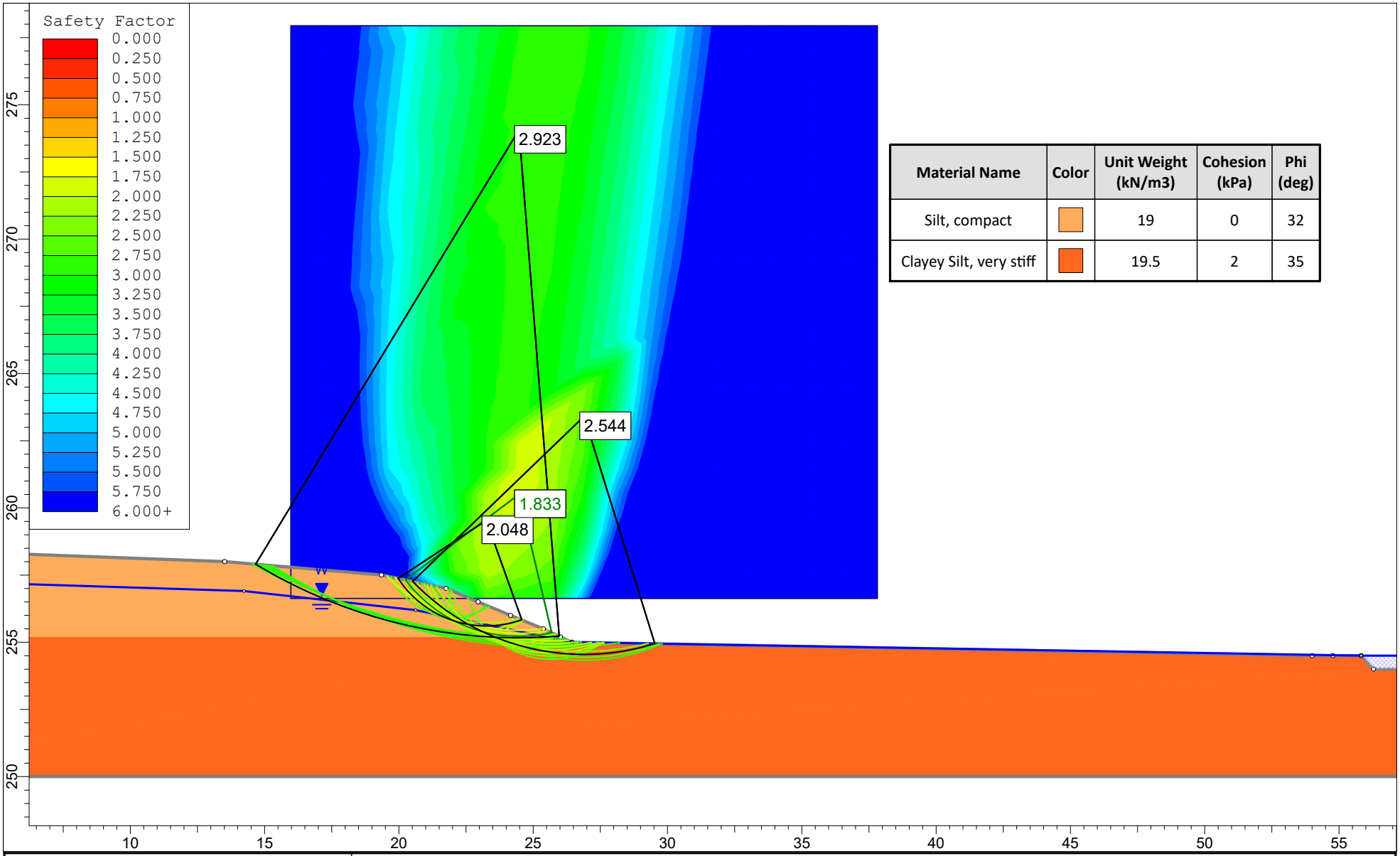
COBBLES	*GRAVEL*		*SAND*			*SILT OR CLAY*
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN MILLIMETRES			*U.S. STANDARD SIEVE No.*			*HYDROMETER*



Symbol	Borehole n°	Sample n°	Depth (m)	Description
○	BH-12-19	SA-2	1.52 - 1.98	SAND and SILT, trace Clay
□	BH-12-19	SA-3	2.29 - 2.74	SILT and CLAY, trace Sand
▽	BH-13-19	SA-2	1.52 - 1.98	SAND, some SILT, trace Clay

Appendix E
Slope Stability Analyses

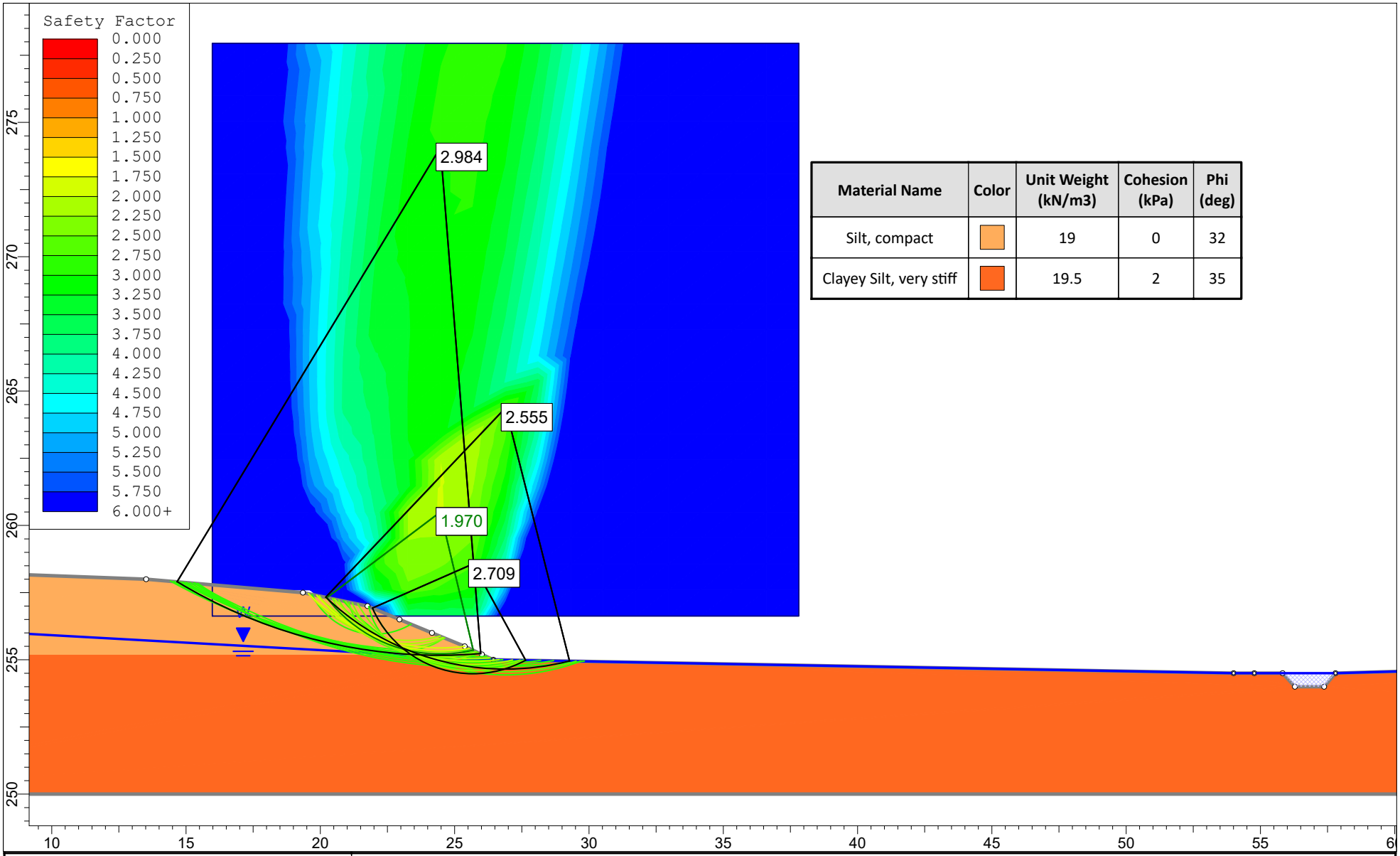
ENGLOBE



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silt, compact		19	0	32
Clayey Silt, very stiff		19.5	2	35

SLIDEINTERPRET 6.035

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 1-1 Elev. GW		
Drawn By P.Cannon	*Scale* 1:200	*Company*	
Date		*File Name*	02208613.000 Section 1 Existing Elevated GW.slim

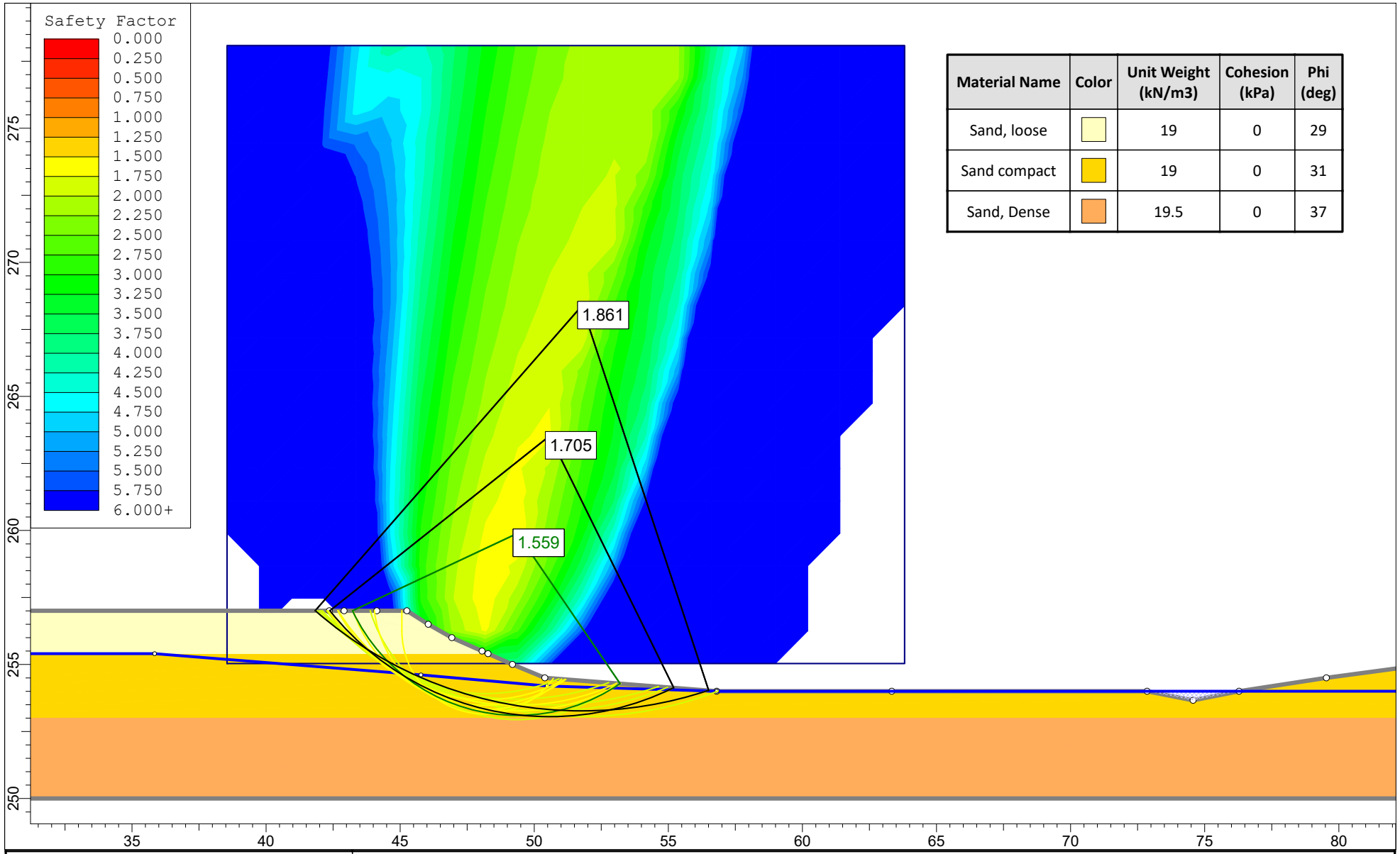


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silt, compact		19	0	32
Clayey Silt, very stiff		19.5	2	35

rocscience

SLIDEINTERPRET 6.035

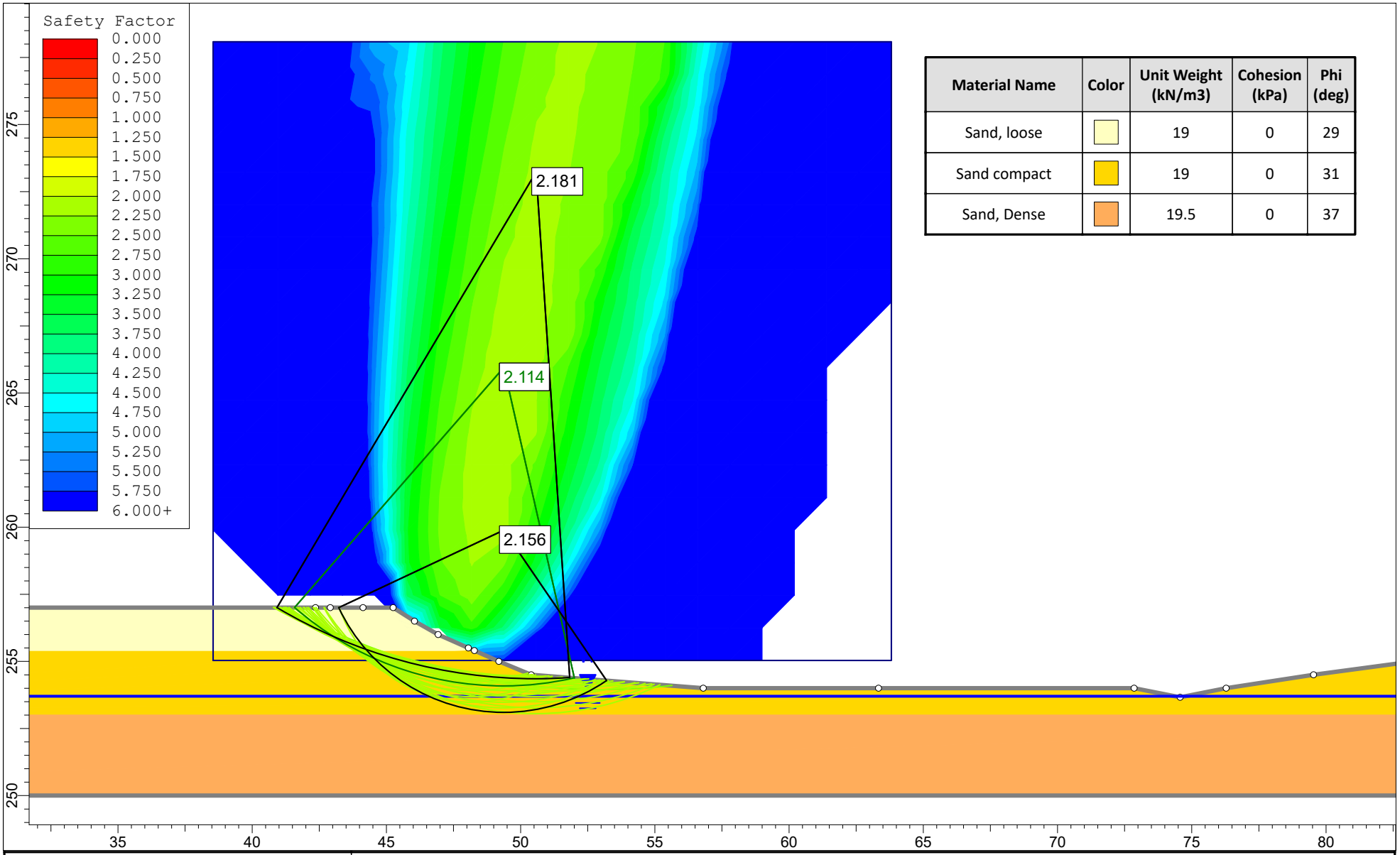
Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 1-1		
Drawn By	P.Cannon	*Scale* 1:200	*Company*
Date		*File Name*	02208613.000 Section 1 Existing.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, loose		19	0	29
Sand compact		19	0	31
Sand, Dense		19.5	0	37

SLIDEINTERPRET 6.035

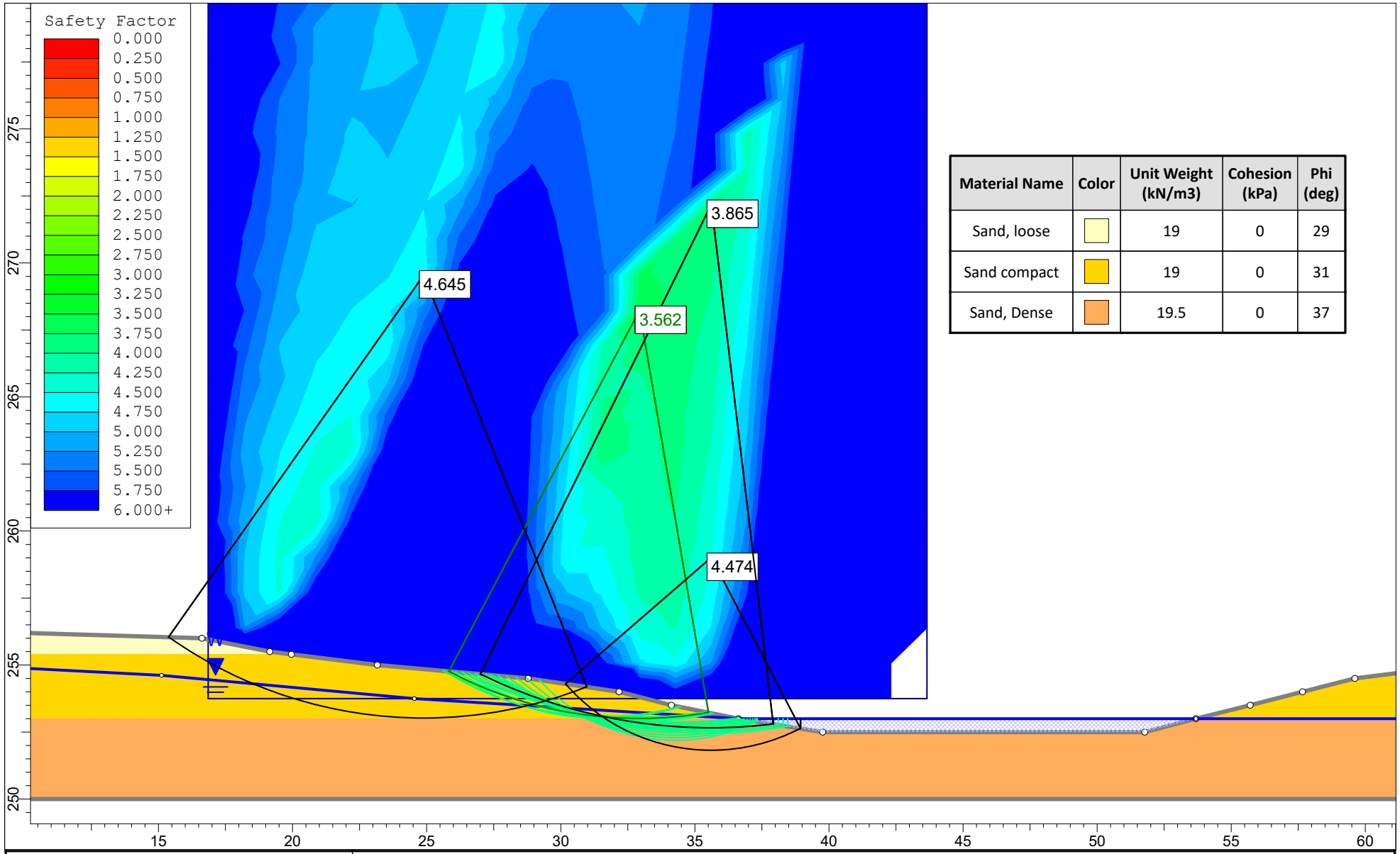
Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 2-2 Elev GW		
Drawn By P.Cannon	*Scale* 1:200	*Company*	
Date		*File Name*	02208613.000 Section 2 Existing Elevated GW.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, loose		19	0	29
Sand compact		19	0	31
Sand, Dense		19.5	0	37

SLIDEINTERPRET 6.035

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 2-2		
Drawn By	P.Cannon	*Scale* 1:200	*Company*
Date		*File Name*	02208613.000 Section 2 Existing.slim

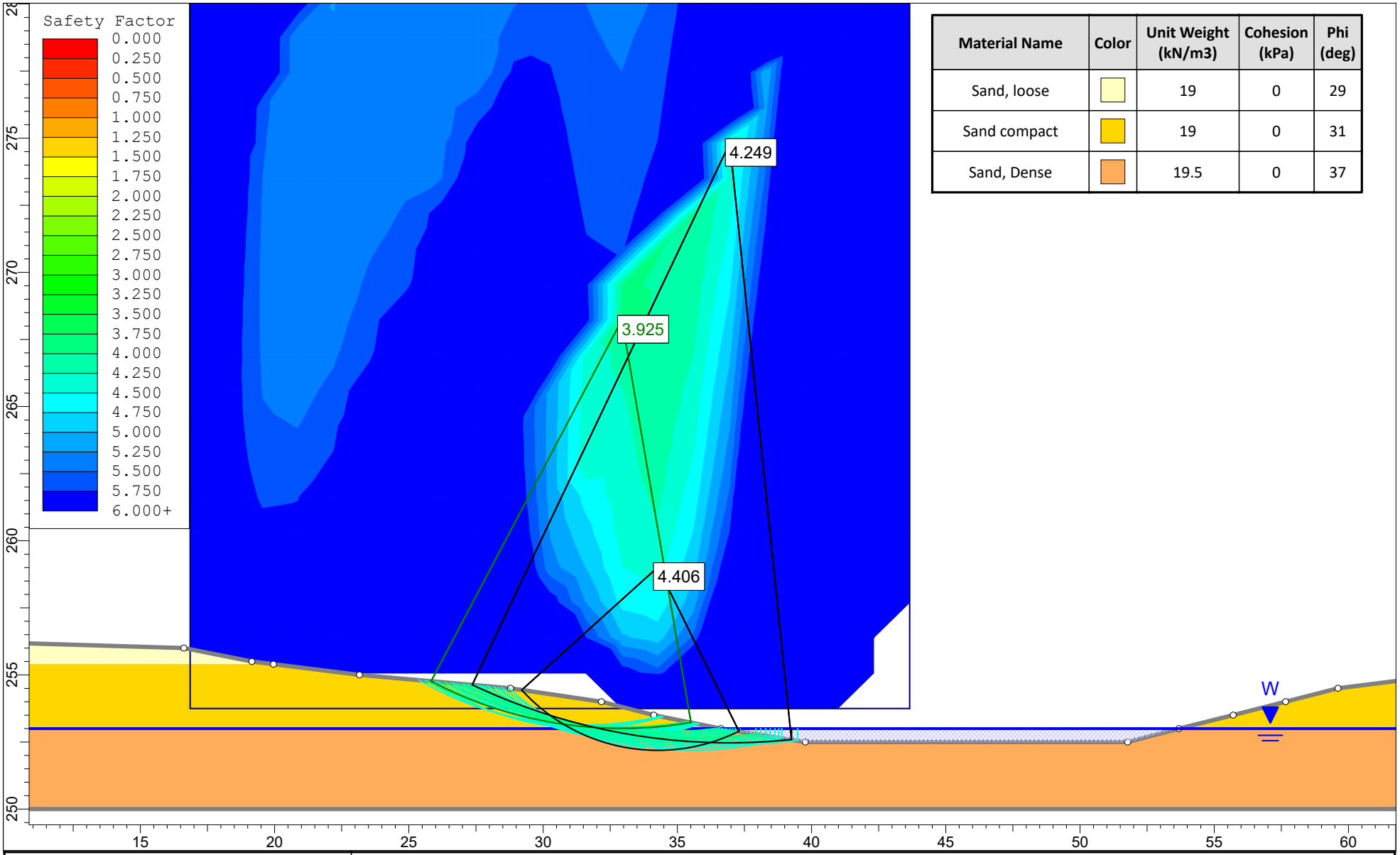


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, loose		19	0	29
Sand compact		19	0	31
Sand, Dense		19.5	0	37

rocscience

SLIDEINTERPRET 6.035

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 3-3		
Drawn By P.Cannon	*Scale* 1:200	*Company*	
Date		*File Name* 02208613.000 Section 3 Existing Elevated GW.slim	

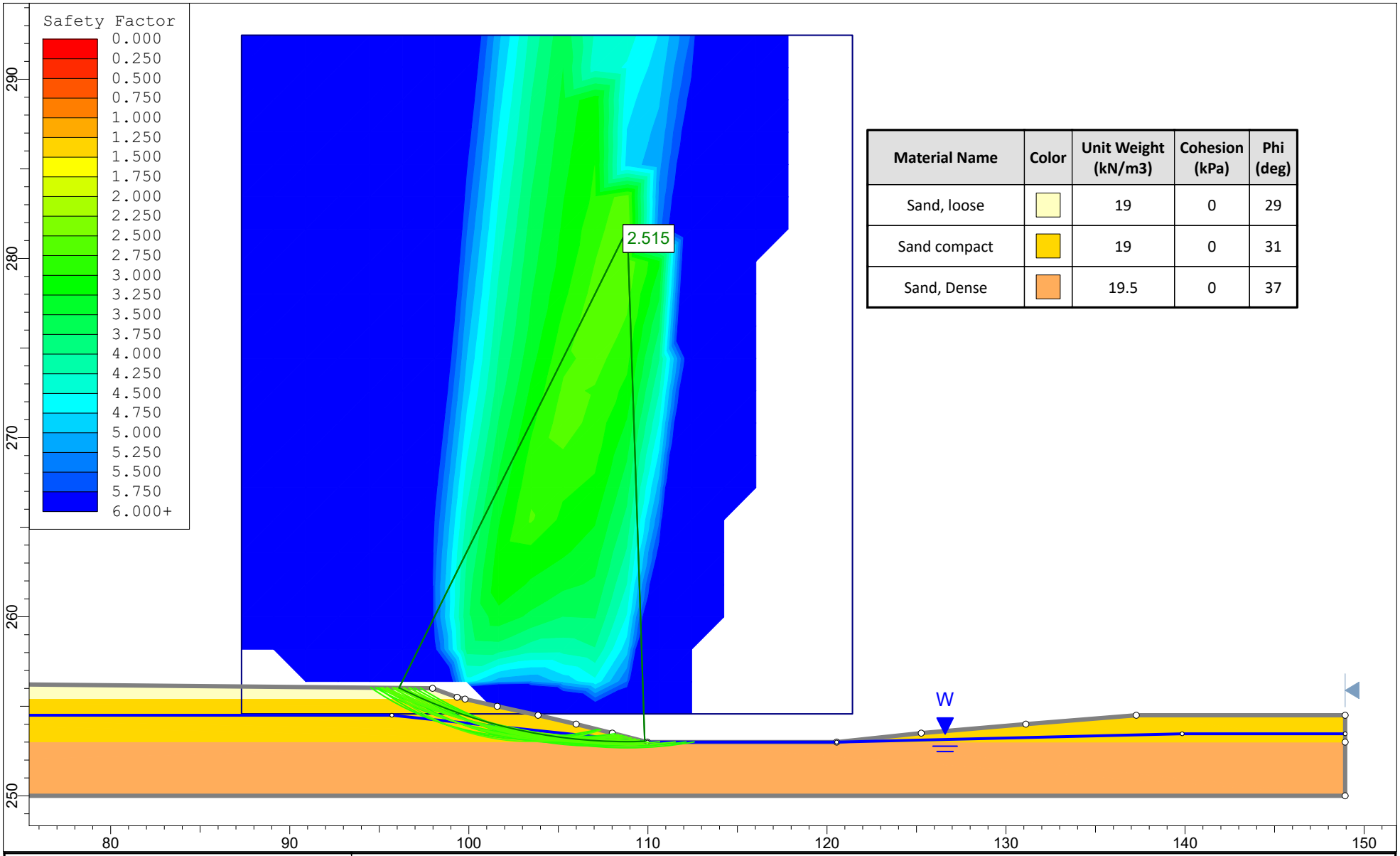


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, loose		19	0	29
Sand compact		19	0	31
Sand, Dense		19.5	0	37

rocscience

SLIDEINTERPRET 6.035

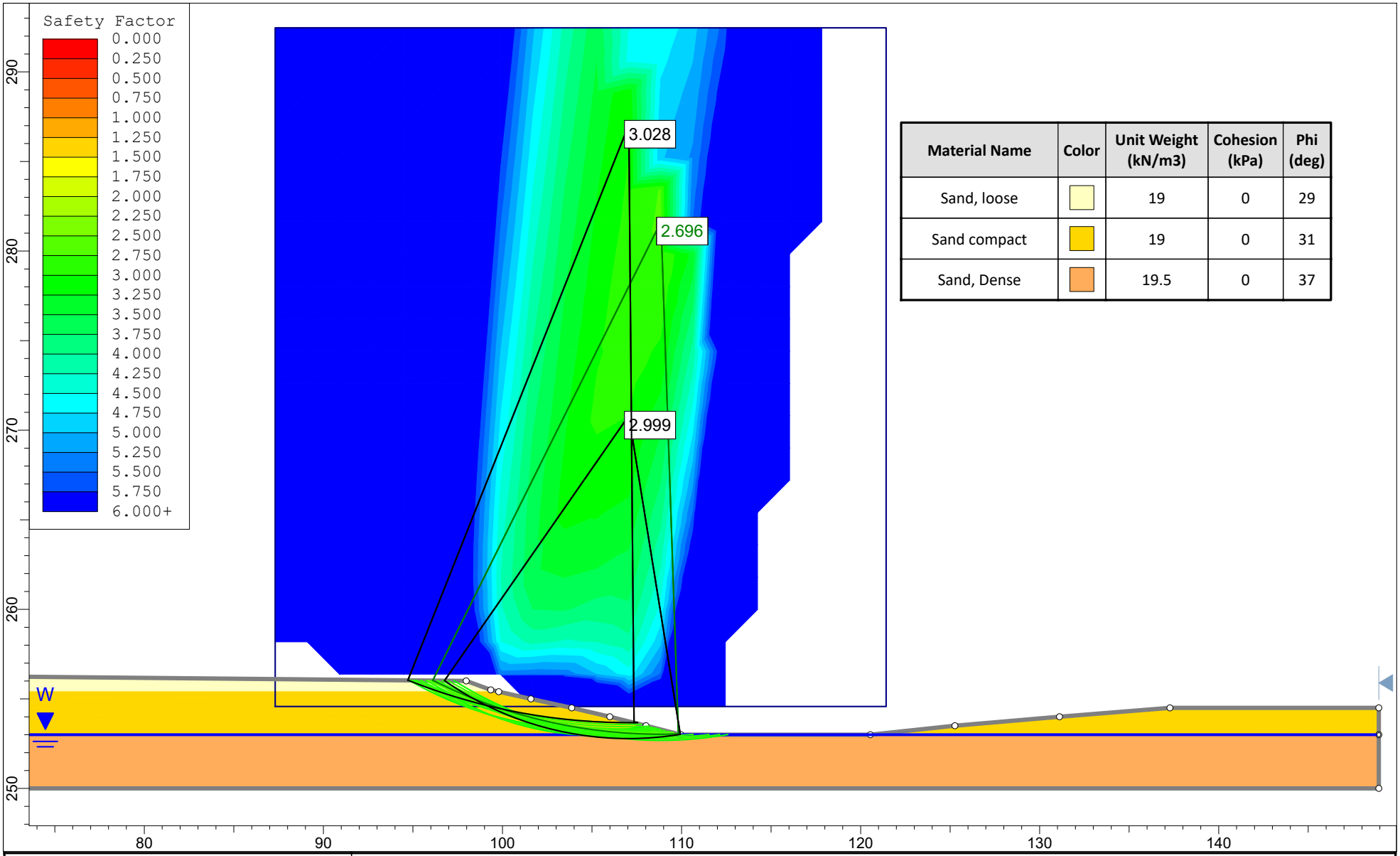
Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 3-3		
Drawn By P.Cannon	*Scale* 1:200	*Company*	
Date		*File Name*	02208613.000 Section 3 Existing.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, loose		19	0	29
Sand compact		19	0	31
Sand, Dense		19.5	0	37

SLIDEINTERPRET 6.035

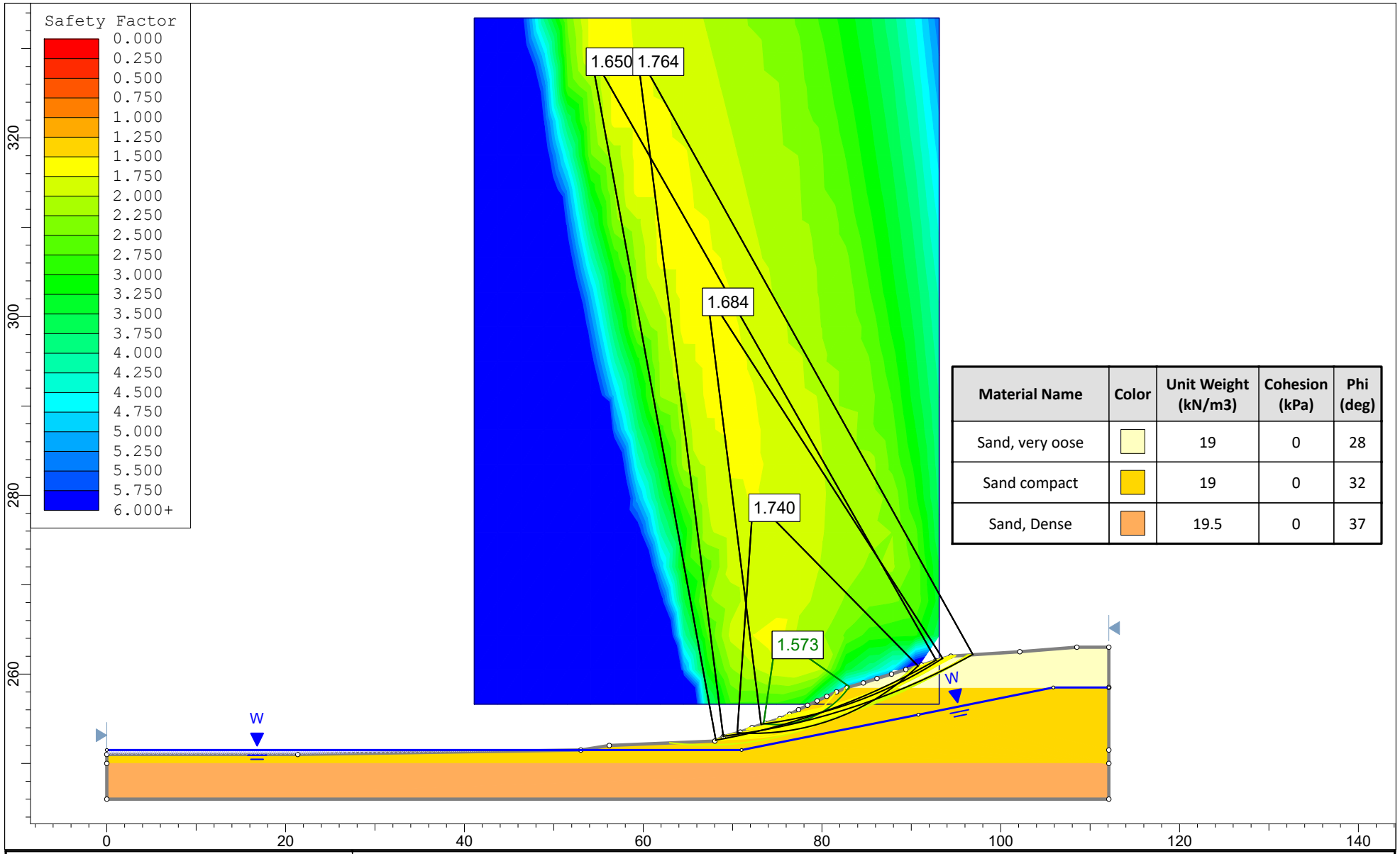
Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 4-4 Elev GW		
Drawn By	P.Cannon	*Scale* 1:300	*Company*
Date		*File Name*	02208613.000 Section 4 Existing.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, loose		19	0	29
Sand compact		19	0	31
Sand, Dense		19.5	0	37

SLIDEINTERPRET 6.035

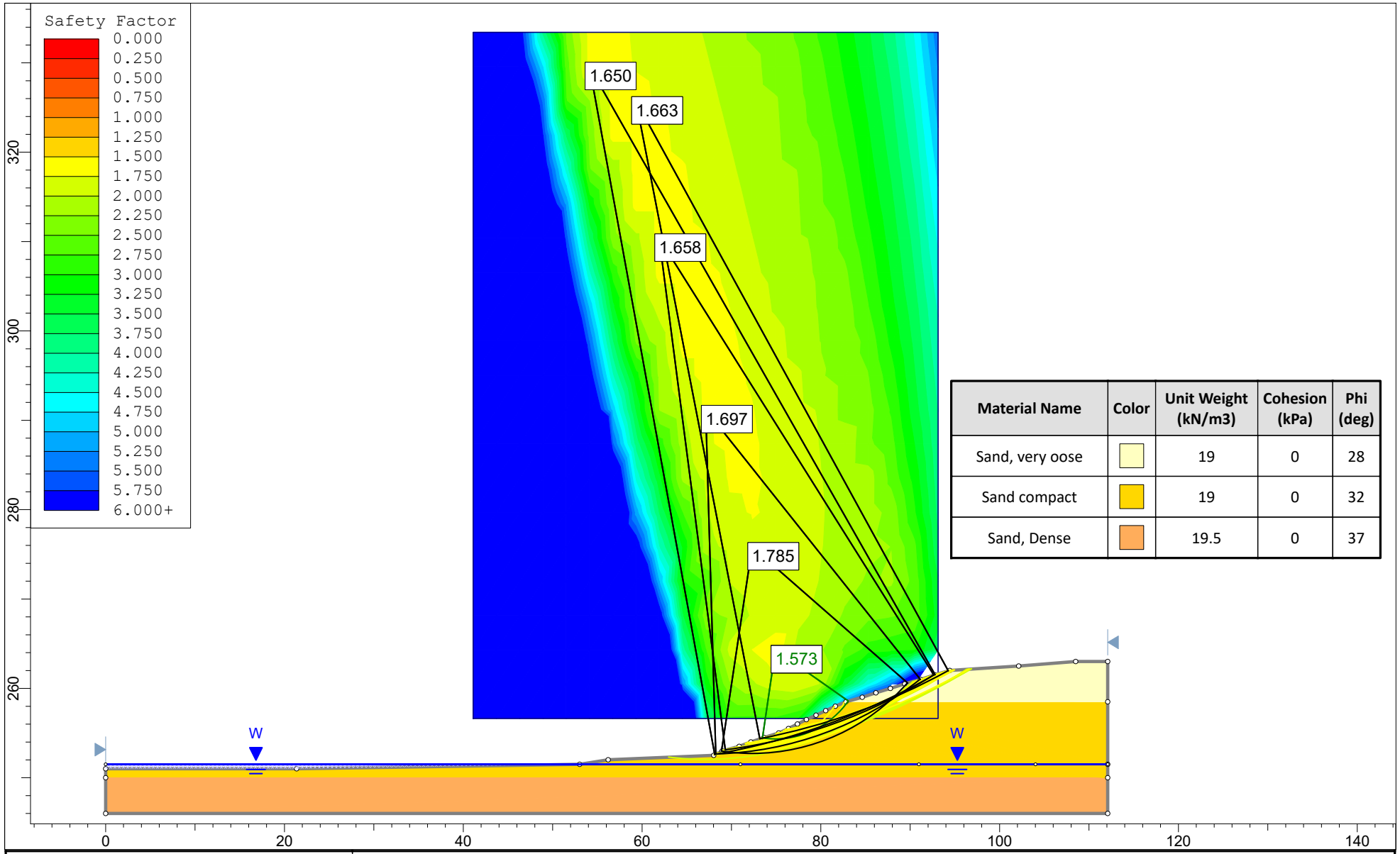
Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 4-4		
Drawn By	P.Cannon	*Scale* 1:300	*Company*
Date		*File Name*	02208613.000 Section 4 Existing.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, very oose		19	0	28
Sand compact		19	0	32
Sand, Dense		19.5	0	37

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 5-5 Elev GW		
Drawn By P.Cannon	*Scale* 1:600	*Company*	
Date		*File Name*	02208613.000 Section 5 Existing.slim

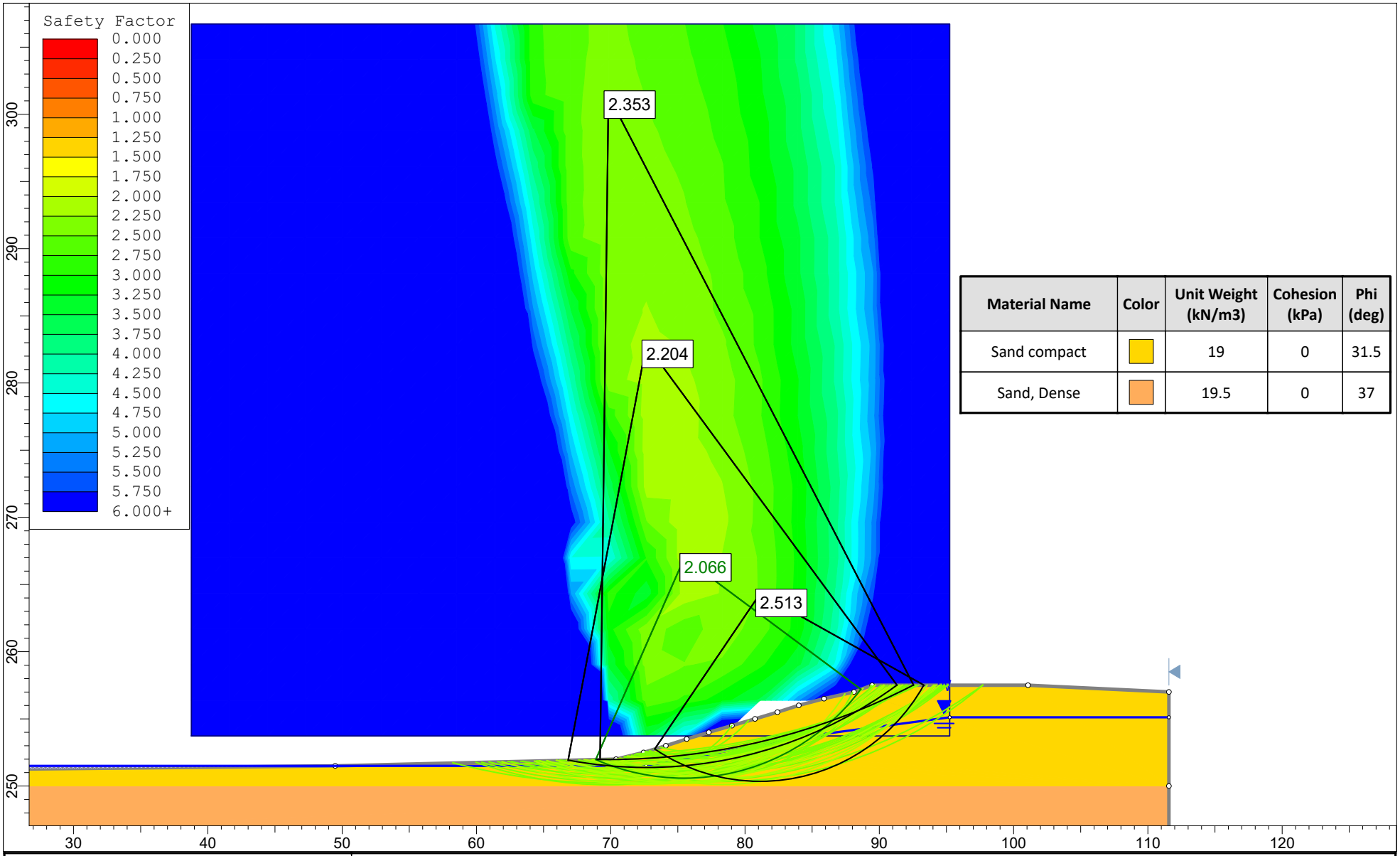
SLIDEINTERPRET 6.035



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, very oose		19	0	28
Sand compact		19	0	32
Sand, Dense		19.5	0	37

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 5-5		
Drawn By P.Cannon	*Scale* 1:600	*Company*	
Date		*File Name* 02208613.000 Section 5 Existing.slim	

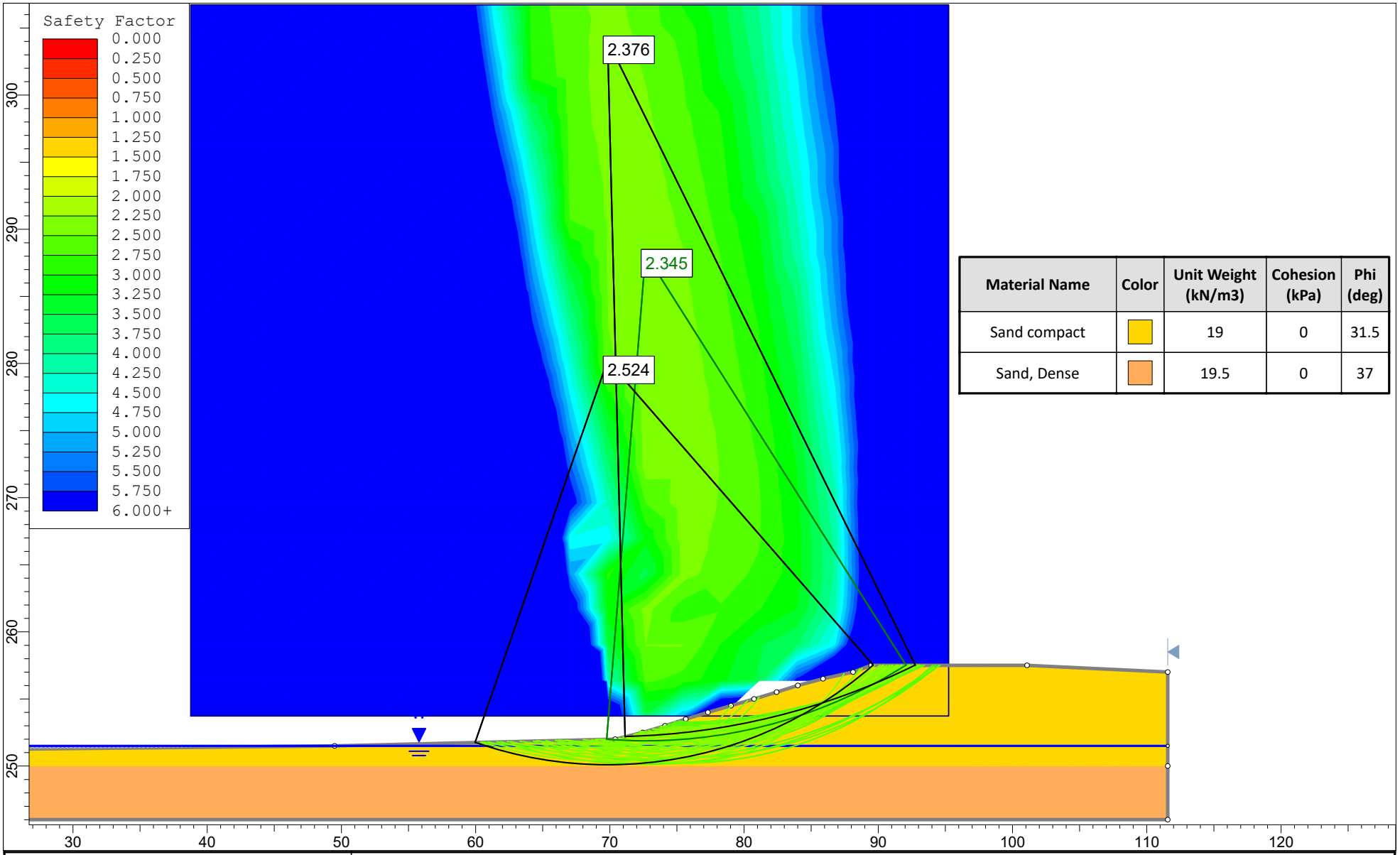
SLIDEINTERPRET 6.035



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand compact		19	0	31.5
Sand, Dense		19.5	0	37

SLIDEINTERPRET 6.035

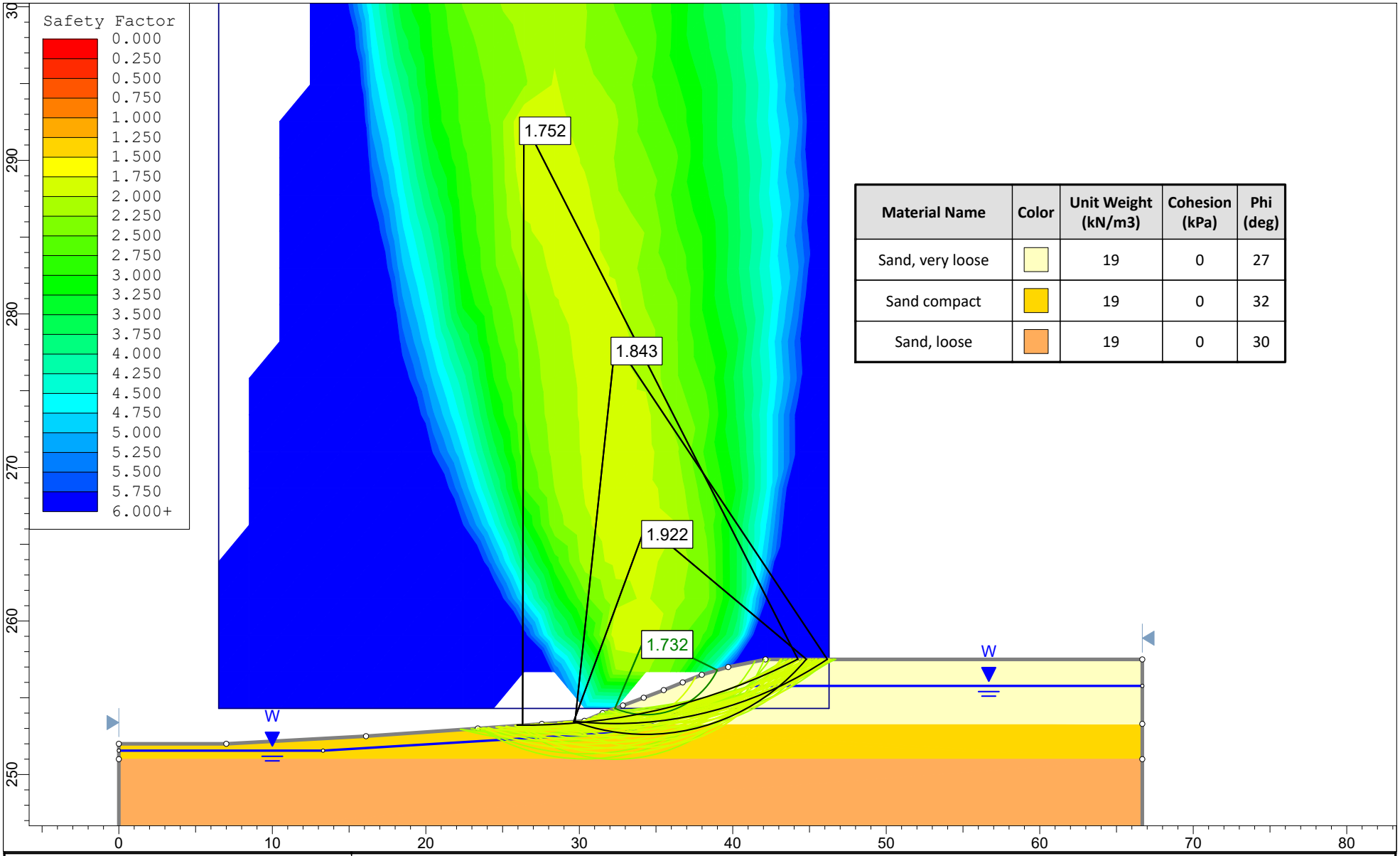
Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 6-6 Elev GW		
Drawn By	P.Cannon	*Scale* 1:400	*Company*
Date		*File Name*	02208613.000 Section 6 Existing.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand compact		19	0	31.5
Sand, Dense		19.5	0	37

SLIDEINTERPRET 6.035

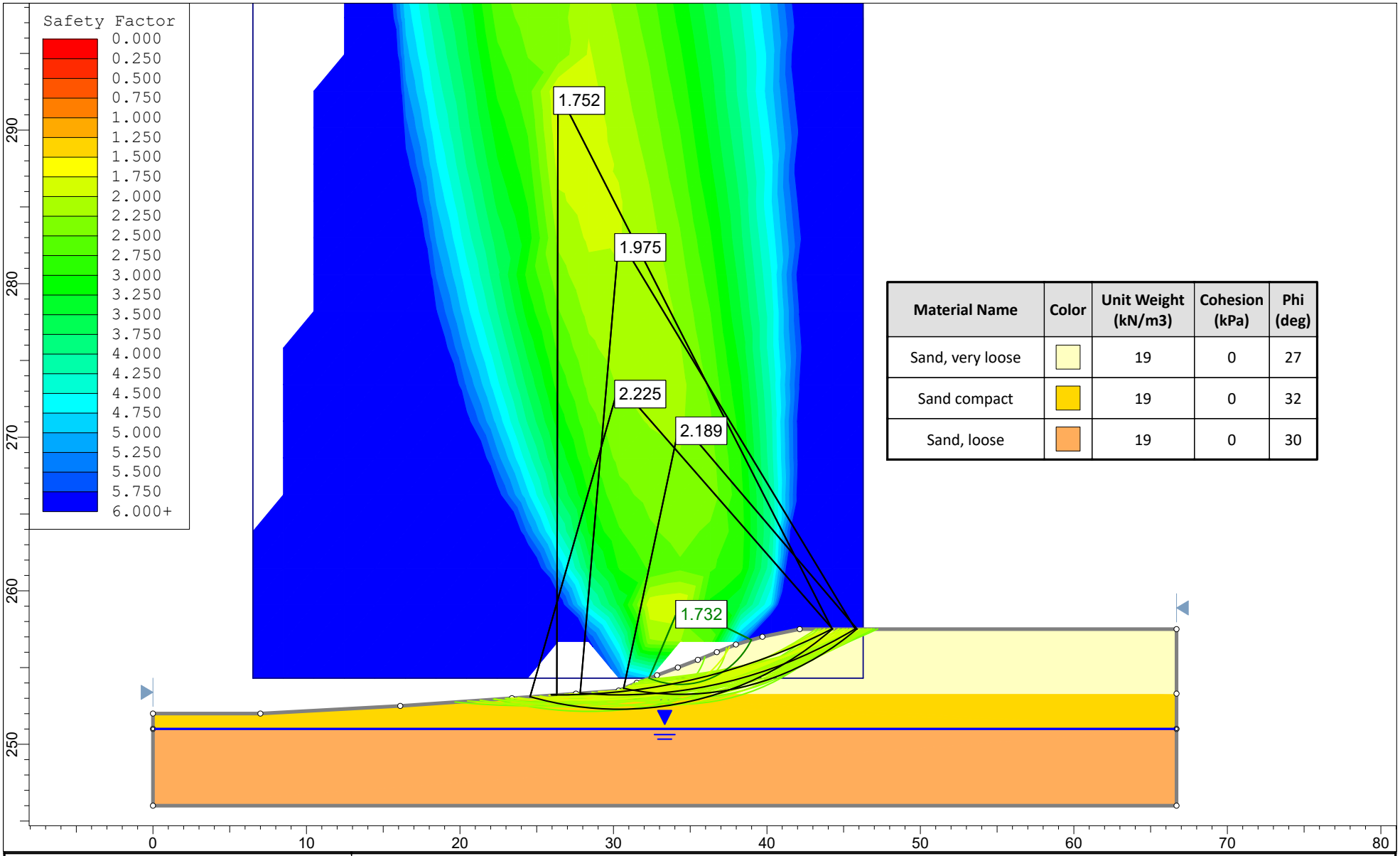
Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 6-6		
Drawn By	P.Cannon	*Scale* 1:400	*Company*
Date			*File Name* 02208613.000 Section 6 Existing.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, very loose		19	0	27
Sand compact		19	0	32
Sand, loose		19	0	30

SLIDEINTERPRET 6.035

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 7-7 Elev GW		
Drawn By	P.Cannon	*Scale* 1:350	*Company*
Date			*File Name* 02208613.000 Section 7 Existing.slim

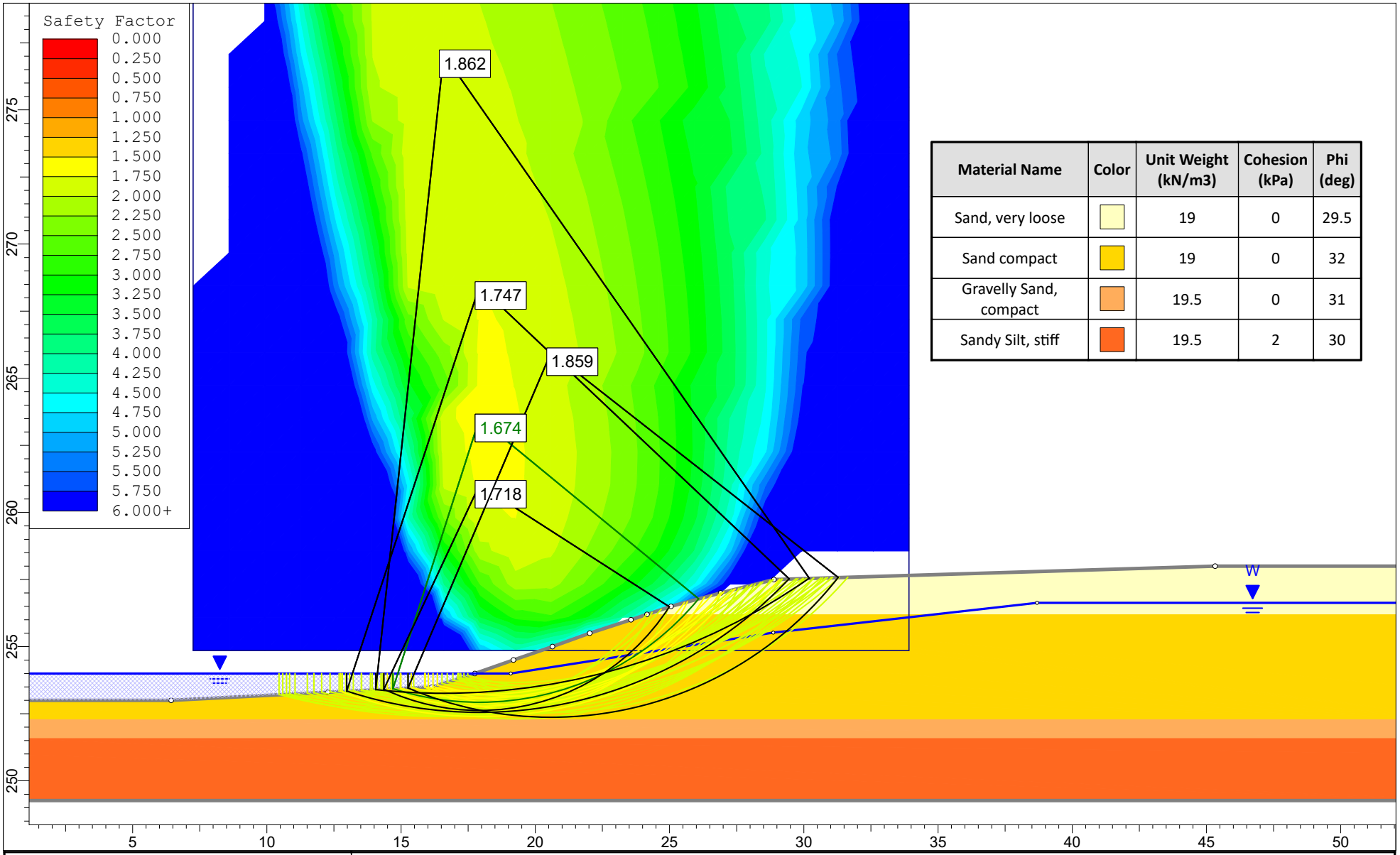


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, very loose		19	0	27
Sand compact		19	0	32
Sand, loose		19	0	30

rocscience

SLIDEINTERPRET 6.035

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 7-7		
Drawn By	P.Cannon	*Scale* 1:350	*Company*
Date			*File Name* 02208613.000 Section 7 Existing.slim

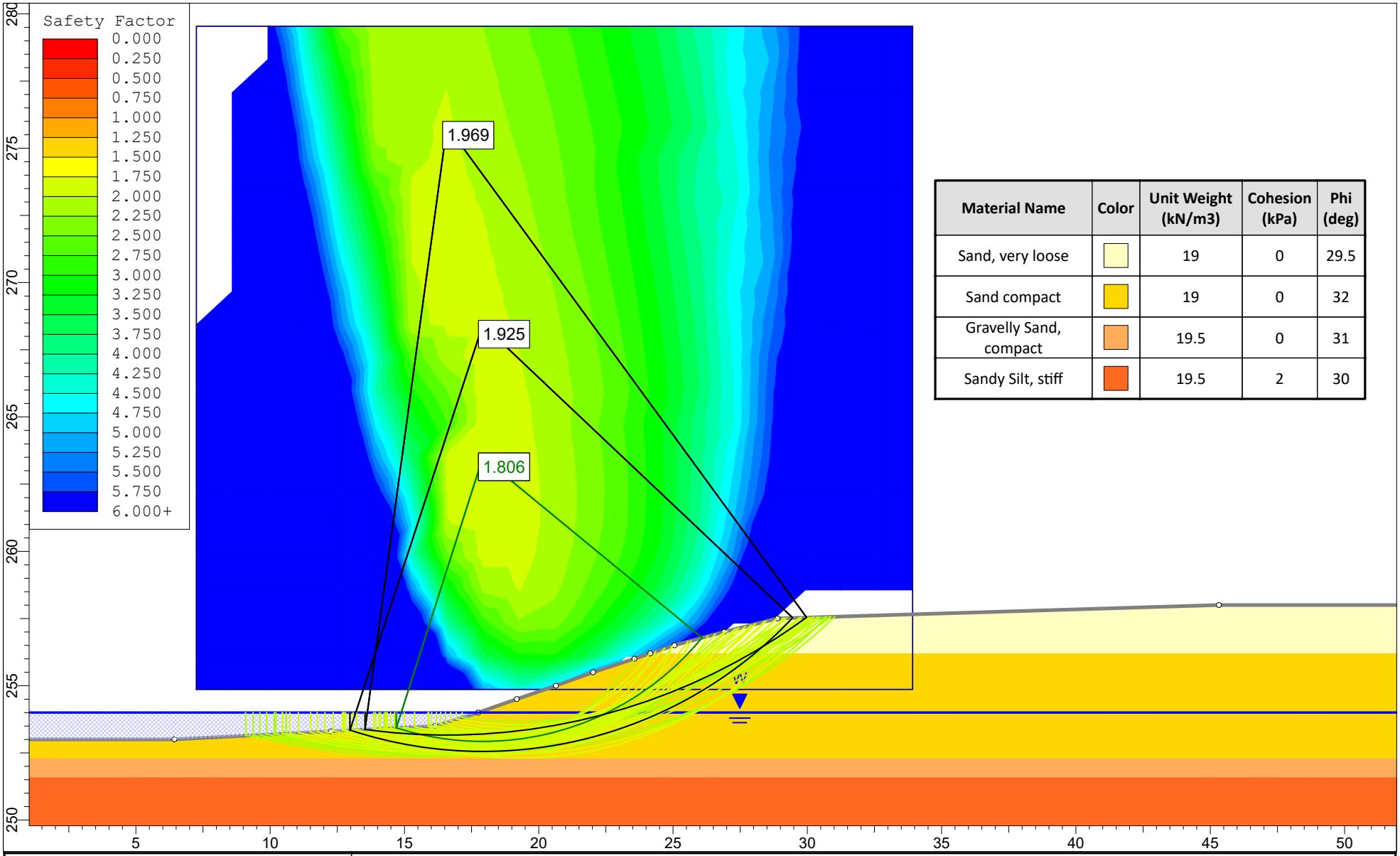


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, very loose		19	0	29.5
Sand compact		19	0	32
Gravelly Sand, compact		19.5	0	31
Sandy Silt, stiff		19.5	2	30

rocscience

SLIDEINTERPRET 6.035

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - Existing Slope Section 8-8 Elev GW		
Drawn By	P.Cannon	*Scale* 1:200	*Company*
Date		*File Name*	02208613.000 Section 8 Existing.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, very loose		19	0	29.5
Sand compact		19	0	32
Gravelly Sand, compact		19.5	0	31
Sandy Silt, stiff		19.5	2	30

rocscience

SLIDEINTERPRET 6.035

Project: 02208613.000 - Subdivision, Christie Street, Dorchester

Analysis Description: Stability Analyses - Existing Slope Section 8-8

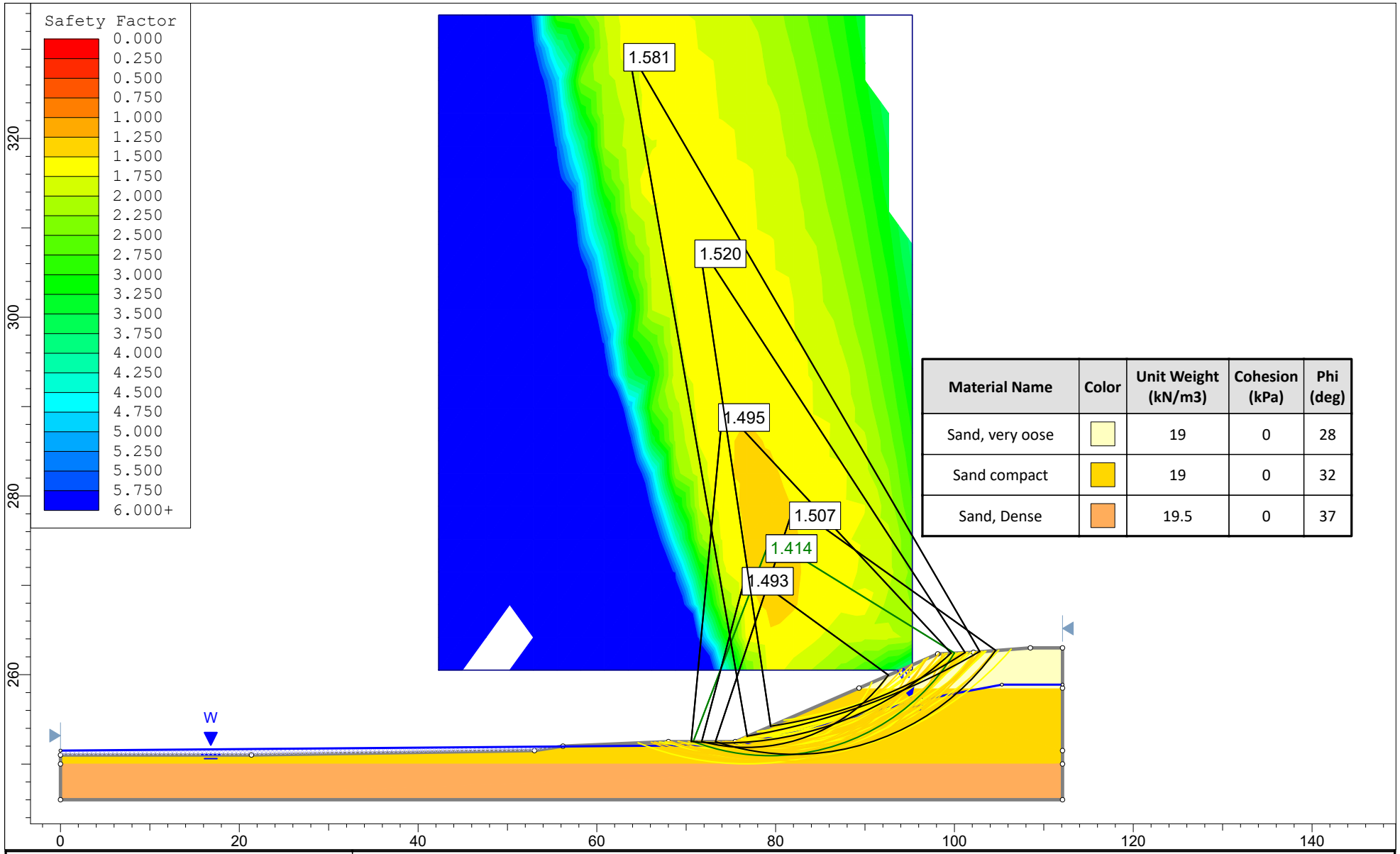
Drawn By: P.Cannon

Scale: 1:200

Company:

Date:

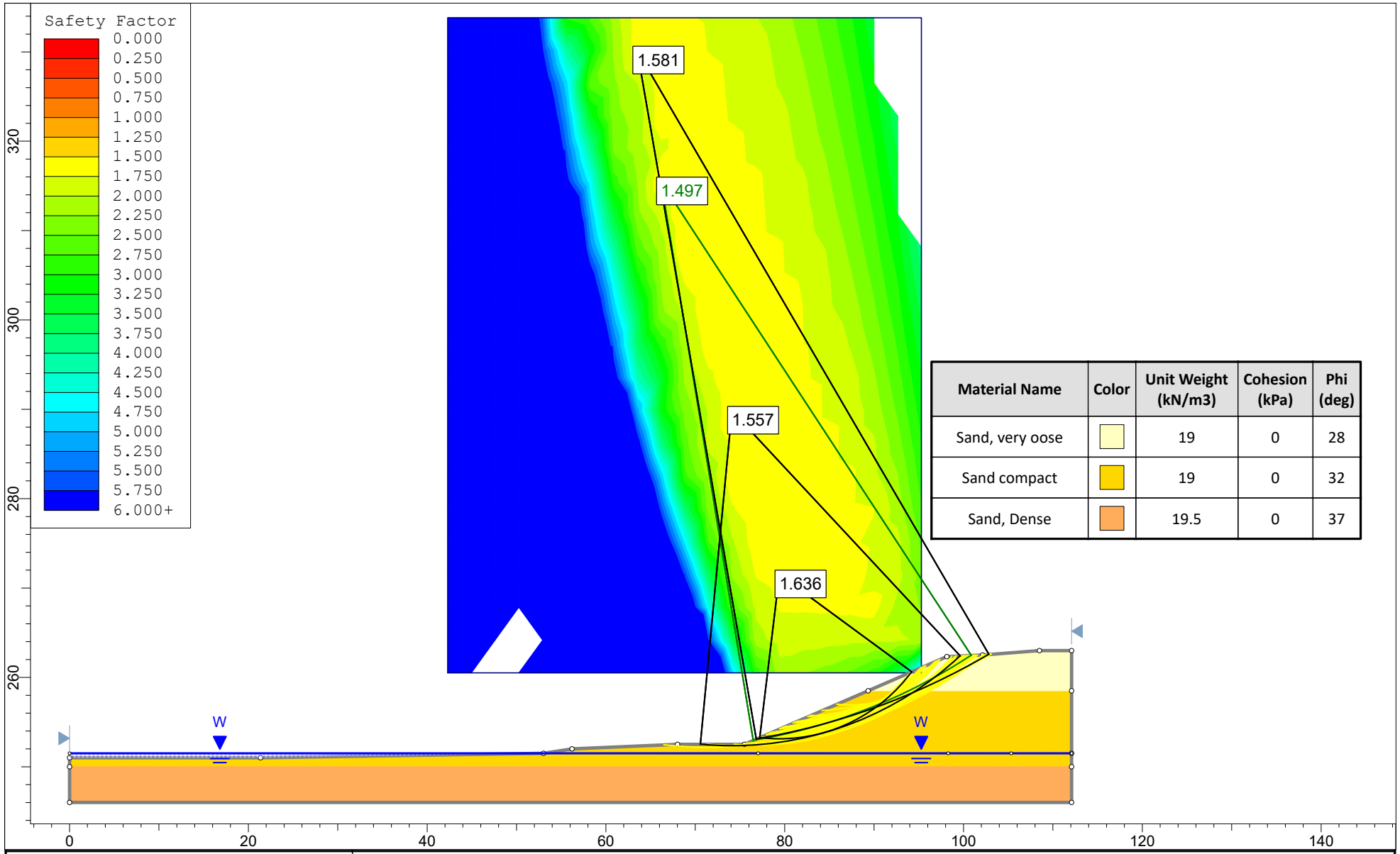
File Name: 02208613.000 Section 8 Existing.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, very oose		19	0	28
Sand compact		19	0	32
Sand, Dense		19.5	0	37

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - 2.5H:1V Slope Section 5-5 Elev GW		
Drawn By P.Cannon	*Scale* 1:600	*Company*	
Date		*File Name* 02208613.000 Section 5 Stable Slope Analyses.slim	

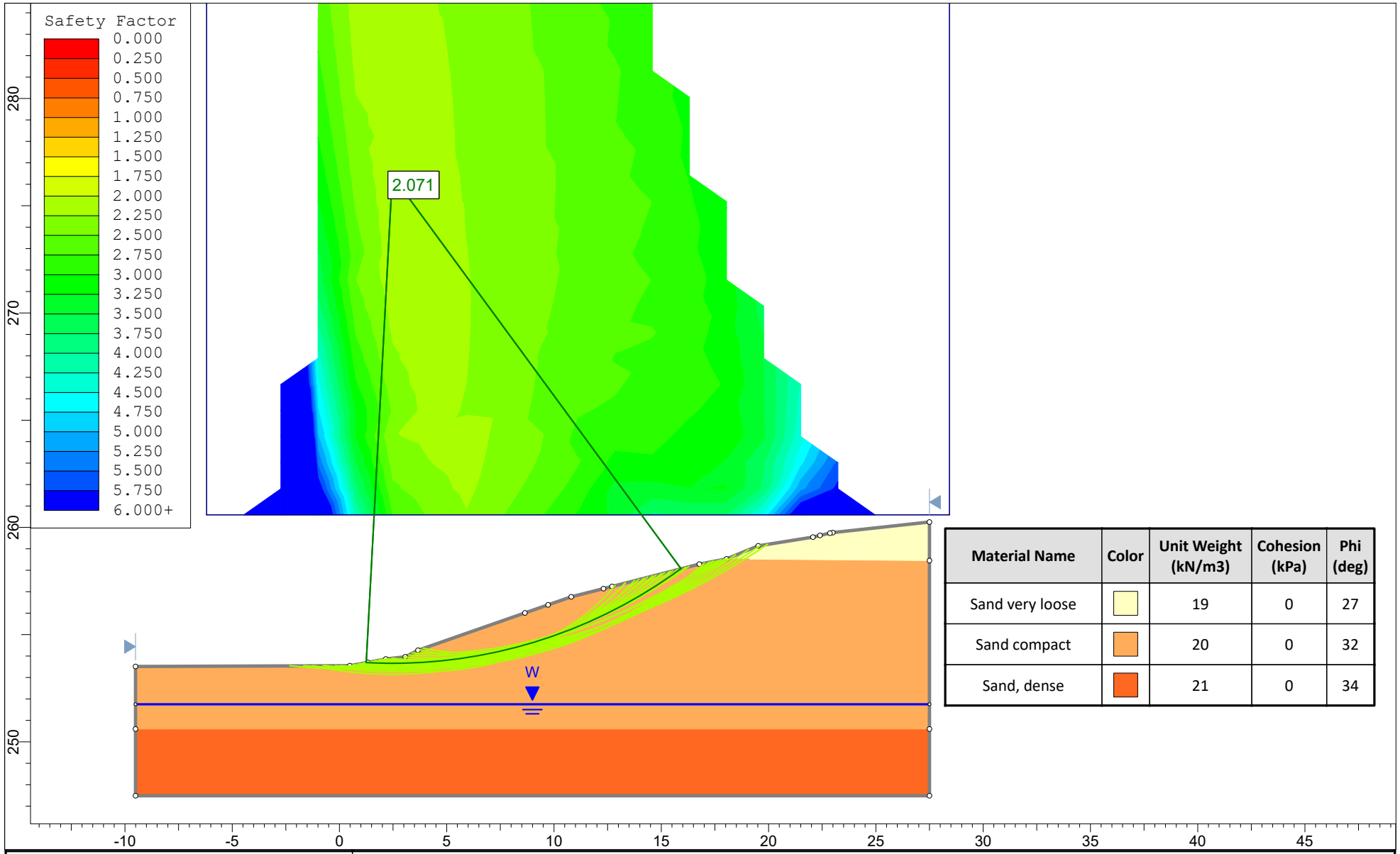
SLIDEINTERPRET 6.035



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand, very oose		19	0	28
Sand compact		19	0	32
Sand, Dense		19.5	0	37

SLIDEINTERPRET 6.035

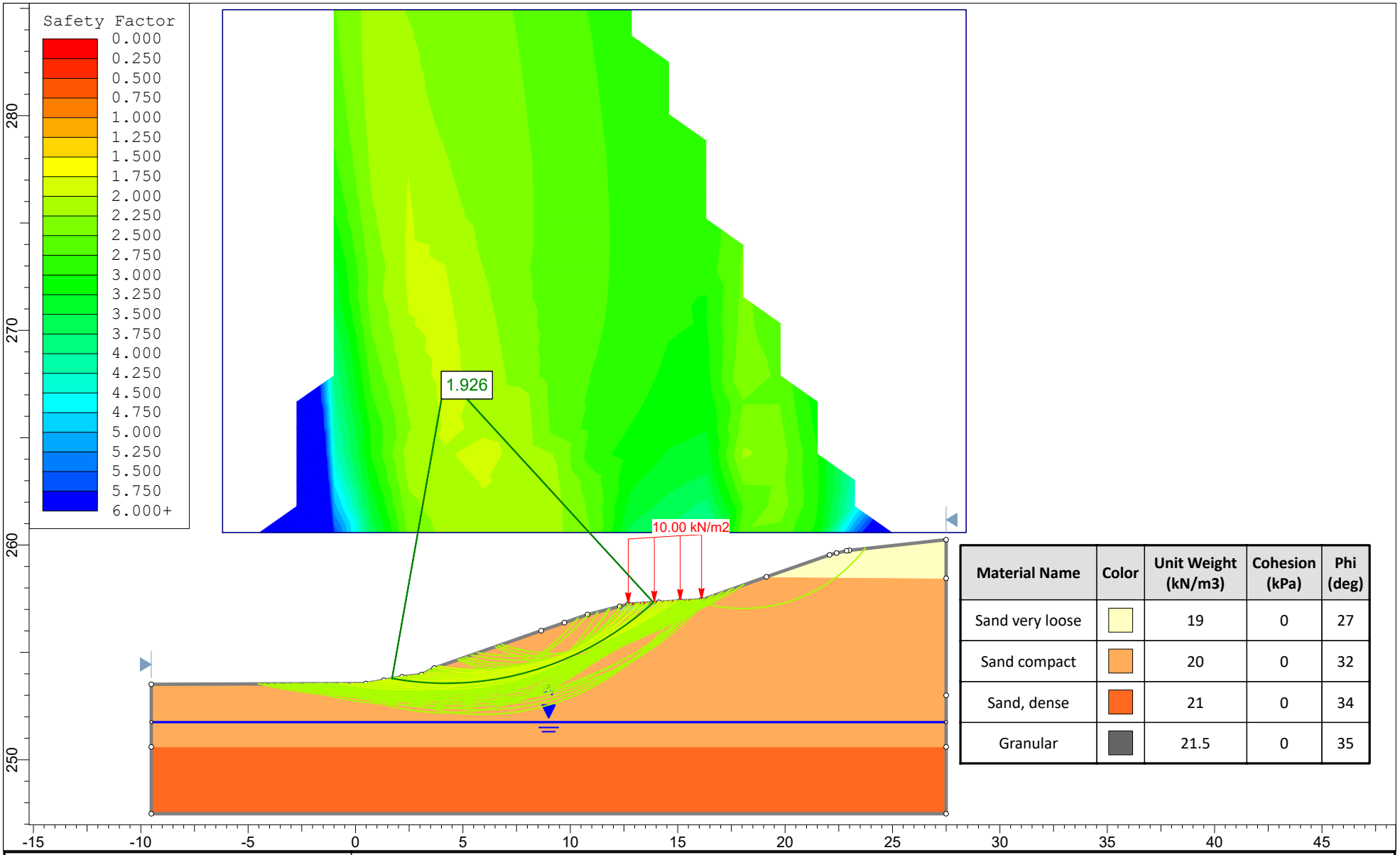
Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Stability Analyses - 2.5H:1V Slope Section 5-5		
Drawn By P.Cannon	*Scale* 1:600	*Company*	
Date		*File Name*	02208613.000 Section 5 Stable Slope Analyses.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand very loose		19	0	27
Sand compact		20	0	32
Sand, dense		21	0	34

SLIDEINTERPRET 6.035

Project	02208613.000 - Subdivision, Christie Street, Dorchester		
Analysis Description	Global Stability Analyses - Existing Slope Section A-A		
Drawn By	P.Cannon	*Scale* 1:250	*Company*
Date		*File Name*	02208613.000 Section AA.slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Sand very loose		19	0	27
Sand compact		20	0	32
Sand, dense		21	0	34
Granular		21.5	0	35

SLIDEINTERPRET 6.035

Project: 02208613.000 - Subdivision, Christie Street, Dorchester

Analysis Description: Global Stability Analyses - Modified Slope Section A-A

Drawn By: P.Cannon

Scale: 1:250

Company:

Date:

File Name: 02208613.000 Modified Section AA with trail.slim

Appendix F
Groundwater Measurements

ENGLOBE

Summary of Well Locations and Groundwater Elevations
83, Christie Dr., Dorchester

Well ID	Northing (m) (UTM NAD83 - Zone 17N)	Easting (m) (UTM NAD83 - Zone 17N)	Ground surface elevation (m ASL)	Date	Water level (m BGS)	Water levels (m ASL)
BH/MW-03-19	4758756	494189	262.27	30-08-2019	10.52	251.75
				13-09-2019	10.54	251.73
				09-12-2019	10.61	251.66
				27-01-2020	10.53	251.75
				26-02-2020	10.49	251.78
				30-03-2020	10.44	251.83
				29-04-2020	10.43	251.84
				09-06-2020	10.50	251.77
				07-01-2021	10.60	251.67
				16-09-2022	10.58	251.69
BH/MW-04-19	4758609	493813	259.14	08-08-2019	2.51	256.64
				30-08-2019	2.63	256.52
				13-09-2019	2.67	256.47
				09-12-2019	2.36	256.79
				27-01-2020	1.85	257.30
				26-02-2020	2.19	256.96
				30-03-2020	1.96	257.19
				29-04-2020	2.17	256.98
				09-06-2020	2.24	256.91
				07-01-2021	2.19	256.96
				16-09-2022	2.72	256.43
BH/MW-05-19	4758532	494078	260.10	08-08-2019	3.49	256.61
				30-08-2019	3.64	256.46
				13-09-2019	3.71	256.39
				09-12-2019	3.78	256.32
				27-01-2020	3.39	256.72
				26-02-2020	3.37	256.73
				30-03-2020	3.28	256.82
				29-04-2020	3.30	256.80
				09-06-2020	3.34	256.76
				07-01-2021	3.68	256.42
				16-09-2022	3.87	256.23
BH/MW-08-19	4758277	493908	266.37	08-08-2019	7.92	258.42
				30-08-2019	8.02	258.32
				13-09-2019	8.06	258.28
				09-12-2019	8.11	258.23
				27-01-2020	7.92	258.42
				26-02-2020	7.83	258.51
				30-03-2020	7.77	258.57
				29-04-2020	7.76	258.58
				09-06-2020	7.84	258.50
				07-01-2021	8.10	258.24
				16-09-2022	8.95	257.39
BH/MW-10-19	4758447	494386	257.33	08-08-2019	2.23	255.10
				30-08-2019	2.33	255.00
				13-09-2019	2.33	255.00
				09-12-2019	2.38	254.95
				27-01-2020	2.17	255.16
				26-02-2020	2.20	255.14
				30-03-2020	2.10	255.23
				29-04-2020	2.16	255.17
				09-06-2020	2.18	255.15
				07-01-2021	2.32	255.01
				16-09-2022	2.43	254.90
BH/MW-14-19	4758073	494200	265.63	30-08-2019	5.82	259.81
				13-09-2019	5.90	259.73
				09-12-2019	6.08	259.55
				27-01-2020	5.88	259.75
				26-02-2020	5.77	259.86
				30-03-2020	5.71	259.92
				29-04-2020	5.65	259.98
				09-06-2020	5.17	260.46
				07-01-2021	6.14	259.49
				16-09-2022	6.11	259.52

Appendix G
Peer Review Responses

ENGLOBE

STANTEC COMMENTS

Document Title: Geotechnical Peer Review-Acorn Valley Development-83 Christie Drive, Dorchester, ON-County File Application 39T-TC2501, O3-25, Z20-25

Date: 2025-10-10			**Document No.: 161414695, Stantec**	**Rev :0**
ITEM No.	**Section**	**STANTEC COMMENTS**	**Englobe Response**	**CLIENT DECISION/CONCLUSION**
1	2.3	**For Consideration1-**This Section refers to the Technical Guide of the River and Stream Systems: Erosion and Hazard Limit, by the Ontario Ministry of Natural Resources (MNR Guide). It is suggested that the current date of this document be provided for additional reference.	Current date (2002) updated in the report.	
2	2.4	**Recommendation 1**-This section references a Draft Plan dated August 2023. The current Draft Plan is dated 24 June 2025. It is recommended that this section be updated for the content of the current plan and the date referenced be revised accordingly. **For Consideration 2**-The drawings in the appendices illustrate the scope of development is to include single family residential units (the bulk of the development) but also medium-density and high-density residential blocks. Could the authors consider clarifying if the content of the report is intended to apply to all components of the residential development, in consideration of the subsurface conditions reported and reflecting the design recommendations for foundations provided in Section 6.2 may limit the development of medium-density and high-density residential structures.	Revised accordingly Current Draft Plan dated December 24, 2025	
3	3.1	**For Consideration 3**-Typos and Grammar: The authors may consider reviewing Bullet 2, Sentence 2(use of borehole or boreholes) and Bullet 3(use of borehole or boreholes). **For Consideration 4-**Bullet 7 references backfilling the boreholes with bentonite. For purposes of clarity, could the authors consider editing this line to reference only the boreholes without monitoring wells were backfilled as described.	Revised accordingly	

STANTEC COMMENTS

Document Title: Geotechnical Peer Review-Acorn Valley Development-83 Christie Drive, Dorchester, ON-County File Application 39T-TC2501, O3-25, Z20-25				
Date: 2025-10-10			Document No.: 161414695, Stantec	Rev :0
ITEM No.	**Section**	**STANTEC COMMENTS**	**Englobe Response**	**CLIENT DECISION/CONCLUSION**
4	3.2	**For Consideration 5-**Typos and Grammar: There are mixed upper case and lower-case letters in Table 1 and Paragraph 1, Sentence 3("list. are") and Paragraph2, Sentence1 ("boreholes log"). **Recommendation 2-**Paragraph 1, Sentence 2 refers to Atterberg Limits laboratory testing though there is no indication of this testing be completed. Assuming this testing was not completed, this reference should be removed from this paragraph.	Revised accordingly	
5	4.1	**For Consideration 6-**Borehole 12-19 includes reference to a stratum of predominantly clay soil. Although this is the only reference to this soil, could the authors consider including it in the soil conditions section	Revised accordingly	
6	4.1.2	**Recommendation3-**Sentence 3 characterizes the sand as having a loose to dense relative density based on the N-values obtained from the Standard Penetration Tests. The Canadian Foundation Engineering Manual (CFEM)references the unit for Relative Density as a percentage and the unit for Compactness (for cohesionless soils) as a description (loose, compact, dense, etc.). It is recommended that the authors consider referencing the condition in the context of Compactness for this purpose or change the unit referenced to a percentage if characterization in terms of Relative Density is preferred (reference Table 4.3 in CFEM). This would apply to similar characterization in the following section describing the Silt stratum encountered in the boreholes.	Revised accordingly	
7	4.2	**For Consideration7-**Paragraph 1, Sentence 3: The statement regarding minimal variation in the levels recorded in the monitoring wells is acknowledged. However, as stated in Sentence 4, there was additional	Groundwater level measurements Table 2, updated with recent data	

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		data collected subsequent to the September 13, 2019 readings provided in Table 3 in this section. For purposes of understanding and convenience, would the authors consider including the additional groundwater depth/elevation data to the geotechnical report (perhaps as an attachment in the appendices) or could the most recent monitoring data (16 / 09 / 2022) be added as an additional column to the table.		
8	5.1	**For Consideration 8-**For purposes of background information for the reader, it is suggested that reference be provided in this section to the classification of the hazard as an Apparent System (e.g. well-defined valley system), consistent with that explained/described in the UTRCA Policy Manual.	Revised accordingly	
9	5.2	**For Consideration 9-**In Table 4 there is a single asterisk at the end of the table title but there is no explanation provided as to what the asterisk refers to. **Recommendation 4-**Paragraph 2: The conclusion in the paragraph references the site conditions described in Section 2.1. However, the information in Section 2.1 does not include a description of the Type of Material present (Column 1 in Table 4) or the Bank full Width (Right hand side of Table 4) on which the conclusion is based. It is recommended that this information be referenced in or included in this paragraph to support the conclusion provided.	Revised accordingly (now Table 3) Removed asterisk	
10	5.5	**For Consideration10-**Typos and Grammar: Could the authors review Paragraph 1, Sentence 1 for grammar.	Revised accordingly	
11	6.1	**Recommendation 5-**Paragraph 9: The potential for consolidation of the prevailing soils under the application of load from engineered fill is acknowledged. It is recommended that a general estimate of the Potential	Already discussed in paragraph 8	

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		magnitude of settlement be provided for a typical, average, or representative thickness of engineered fill, and an approximate timeline for the settlement to occur be provided. This information will assist the designers in understanding potential adverse effects in this respect and in completing the design and preparing the construction specifications.		
12	6.2.1	**Recommendation 6-**Paragraph 1, Sentence 1: The sentence refers to construction of foundations on “approved native silt subgrades”. The recommended depths/elevations for placement of foundations shown in Table 8 correspond to the native silt in some of the boreholes but correspond to native sand (the predominant soil type shown on the borehole records) in other boreholes. It is recommended that this sentence be edited to reference both the silt and sand strata.	Revised accordingly	
13	6.3	**Recommendation 7-**It is inferred that the authors used the SPT method for the Site Classification assessment. However, the boreholes terminated at a maximum depth of 14.2 m (the OBC requires an assessment to a depth of 30 m) and the N-values obtained from the SPTs to the maximum termination depth achieved do not appear to support a conclusion of Site Class C as stated. Any additional geology information used in the assessment to support the conclusion stated should be referenced. Alternatively, the authors may consider recommending Shear Wave Velocity testing to determine/confirm the Seismic Site Classification.	Revised accordingly Updated to current code requirements Recommended Site Class D (X_D). Recommend a site-specific MASW test be considered to determine the Site Designation for this site. The project structural engineer can advise if an in-situ shear wave velocity measurement (such as MASW test) is advantageous for the subject project.	

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14	6.4	**For Consideration 11**–Paragraph 1, Sentence 1: Consistent with previous discussion and recommendations in the report, the native founding soil could consist of either native sand or native silt. **For Consideration 12**–Paragraph 2, Sentence 5: It is inferred that the 95% compaction reference applies to the "granular fill base" material and not to the "clean earth fill" as clean earth fill placed as engineered fill on the project is to be compacted to 98% (Section 6.1 Site Preparation).	Revised accordingly Updated the bearing stratum. Updated both to 98 percent SPMDD.	
15	6.5	**For Consideration 13**–In the absence of reference/recommendation for waterproofing and/of an under-slab drainage system, it is inferred that all basement floor slabs should be established above the elevation of the prevailing ground water table. Could the authors add a comment to this section in this respect.	Revised accordingly Recommended that basement floor elevations be maintained at least 1 m above the highest anticipated groundwater level to reduce the risk of seepage and hydrostatic pressure.	
16	6.7	**Recommendation 8**–Paragraph 1, Sentence 2: The sentence states that the invert elevation for municipal services is expected to be in the clayey silt till. The authors may wish to consider adding the predominant soil types of sand and silt to this statement given the conditions shown on the borehole records.	Revised accordingly	
17	6.7.1	**For Consideration 14**–Typos and Grammar: Paragraph 1, Sentence 1 references fill material though fill material is not shown on the borehole records. **Recommendation 9**–Paragraph 1, Sentence 1: Same comment as Recommendation 8 above regarding the anticipated soil type; This sentence refers to the presence of clayey silt till at the base of the service trenches. The	Revised accordingly Updated the paragraph to reflect all applicable bearing stratum.	

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		authors may wish to consider adding sand and silt to this statement given the conditions shown on the borehole records.		
18	6.8.1	**Recommendation 10-**Paragraph 1, Sentence 1: Same comment as Recommendation 8 above regarding the anticipated soil type; This sentence references the presence of clayey silt (predominantly) beneath the ground cover. Could the authors consider adding sand and silt to this statement given the conditions shown on the borehole records. **For Consideration15-**Paragraph 5: This paragraph refers to driveways/access routes and parking areas, suggesting a possible commercial development context. For consistency and clarity, can the authors review and confirm that the wording is consistent with that used in Table 10 in Section 6.8.2 Asphalt Concrete Pavement Design, referencing “Streets, Driveways and Multi-use Trails”, if and as applicable	Updated the paragraph to reflect all applicable bearing stratum and updated to be consistent with Table.	
19	6.8.2	**Recommendation 11-**Paragraph 1, Sentence 2: The sentence recommends 95% compaction for fill to grade in the areas of planned roads. This appears to contradict the statement in Section 6.8.1 that requires the upper1 m of backfill beneath areas of pavements to be compacted to 98%. Can the authors please review and edit if and as appropriate.	Updated both to 98%.	

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ITEM No.	**Section**	**STANTEC COMMENTS**	**Englobe Response**	**CLIENT DECISION/CONCLUSION**
20		**For Consideration 16**-The scope of development shown on the drawings and outlined in the geotechnical report includes a stormwater management pond. If the scope of services for the geotechnical Investigation and associated report included addressing the stormwater management pond, design and construction recommendations should be provided regarding containment berms, inlet & outlet structures, infiltration rates and/or requirement for a liner, slope and erosion protection, and access road. If the scope of services for the geotechnical investigation did not include addressing the stormwater management pond, it is suggested that a statement be included in the report in that regard. **For Consideration 17**-The scope of development shown on the drawings and outlined in the geotechnical report includes medium-density and high-density residential blocks (see Comment for Consideration 2). If the scope of services for the geotechnical investigation included addressing these blocks, the authors should consider including discussion and recommendation regarding possible multi-level underground infrastructure (basements or parking levels), temporary construction shoring requirements, bath-tubbing or permanent drainage infrastructure, and higher bearing reactions and resistances or alternative foundation systems if warranted. If the scope of services for the geotechnical investigation did not include addressing the medium-density and high-density blocks, it is suggested that a statement be included in the report in that regard.	Added a note for both considerations.	

UTRCA COMMENTS

File Nos. 39T-TC20-25 & Z20-25
83 Christie Drive, Dorchester
Date : 2025-10-03

ITEM No.	Section	CLIENT COMMENTS	Englobe Response	CLIENT DECISION/CONCLUSION
G1		It is understood that a stable slope inclination of 2H:1V has been proposed for the site which is considered relatively steep. Please provide strong justification and/or supporting information. The UTRCA has concerns due to the known history of slope failures/highly erodible soils in areas of Dorchester.	Based on the results of supplementary analyses, the soil stratigraphy and the anticipated groundwater levels; we have recommended a stable slope profile of 2.5 horizontal to 1 vertical. Drawings 2A, 2B, 3A and 3B present the relevant details of the cross-sections analysed for determination of the Long-term Stable Top of Slope. Drawings 2 and 3 present the location of the Long-term Stable Top of Slope (Riverine Erosion Hazard) on the site plan. For planning purposes, the long-term refers to a 100-year planning horizon.	
G2	4.2	shows groundwater levels around 3.23m for borehole 10 which is in the vicinity of the proposed SWM pond. Please confirm if a liner is required and provide any design recommendations.	Discussed in section 6.9.1.	
G3	4.2	It is understood from Section 4.2 that two groundwater level measurements were taken within 2 weeks between August and September of 2019. Please confirm that the seasonally high groundwater levels were also considered.	Table 2 updated with new sets of water level readings.	
G4		Please confirm that all potential failure modes were considered in the Factor of Safety analysis (shallow transitional, medium rotational, deep rotational), and all meet the minimum requirement of 1.4. Only one is shown in Table 7.	All slope analyses include shallow, medium and deep rotational type slope failures in search of the most critical failure mode. This is presented schematically in Appendix E. We also analysed critical short-term elevated groundwater conditions. We added Table 4 to present this data in manner the best addresses UTRCA comments.	

UTRCA COMMENTS

File Nos. 39T-TC20-25 & Z20-25
83 Christie Drive, Dorchester
Date : 2025-10-03

ITEM No.	Section	CLIENT COMMENTS	Englobe Response	CLIENT DECISION/CONCLUSION
G5		The log for borehole 10 in Appendix C shows the groundwater level at approximately 2.25 m below ground but is stated as 3.23m in the body of the report. Please confirm.	Updated borehole logs.	
G6		Please confirm that the 8 cross-sections shown are considered critical sections of the corresponding slopes.	As summarized in Table 5, the slope at Section 5-5' was considered the critical slope section and was therefore selected for analyses.	
G7		Please also include the 6m erosion access allowance on the detailed cross-sections.	Updated as requested	
G8	5.5	states that based on the findings of the analysis the proposed trail (in the vicinity of cross-section A-A') can be safely constructed without adversely affecting the long-term stability of the valley slope. No risk to life or property damage is anticipated. Please include decision on watermain as well as the trail.	Revised accordingly. Added recommendations for slope restoration.	

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