Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
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June 11, 2025 Reference No. 2406-S114

Apcom Enterprises Inc.
15 Yorkton Boulevard
Unionville, Ontario
L6C 0J9

Re: Slope Stability Assessment
For Proposed Residential Redevelopment
1794 Appleview Road
City of Pickering

Dear Sir:

In accordance with your written authorization dated June 19, 2024, Soil Engineers Ltd. (SEL) has completed a slope stability assessment at the captioned site and we herein present our findings and results.

SITE DESCRIPTIONS

The investigated site is located between Appleview Road and Goldenridge Road, approximately 350 m north of Dunbarton Road in the City of Pickering. At the time of the investigation, the property consisted of an abandon residential dwelling with a gravel driveway access from Appleview Road. A natural valley is observed between the dwelling and Appleview Road. It is approximately 2 to 5 m in height, having slope gradients ranging from 1.6 to 2.4 Horizontal (H):1 Vertical (V). The slope is single-tiered and becomes two-tiered towards the south. In addition, a floodplain and the Dunbarton Creek were noted at the bottom of the slope.

FIELD WORK

The field work, consisting of 8 hand-dug test pits, extending to depths of 0.4 m to 0.6 m, was performed on June 20, 2024 at the locations shown on the enclosed Test Pit and Cross-Section Location Plan, Drawing No. 1. These test pits were located closely along the top of slope and on the flood plain where it is difficult to access with a regular drill rig.

During the field work, pocket penetrometer and vane shear equipment were used to estimate the relative density of the cohesionless strata and the consistency of the cohesive strata. The results were recorded by a Geotechnical Technician.

The ground elevation at each test pit location was interpretated from the topographic plan, prepared by R-PE Surveying Ltd., dated June 4, 2024.

GEOLOGY AND TEST PIT FINDINGS

Based on the publicly available geological information and experience with the local geology at nearby properties, the site is situated within a physiographical region known as the Iroquois Plains. The surficial geology at the site consists of glaciolacustrine deposit of silt and clay, overlying a glacial till deposit.

Based on the test pit findings, the site is generally underlain by strata of sandy silt and silty clay beneath a topsoil veneer. The sandy silt and silty clay deposits near the ground surface appeared to be weathered and permeated with rootlets. Excavation of the test pits beyond the weathered zone required additional effort.

At the termination depths of the test pits, in order to evaluate the subsoil strength, in-situ testing consisting of pocket penetrometer tests and/or vane shear tests was performed. The sandy silt has penetration resistances ranging between 1 kg/cm^2 and 3.5 kg/cm^2, indicating a loose to compact relative density. The silty clay has undrained shear strengths varying between 30 kPa and 45 kPa, indicating a generally firm consistency.

The subsurface findings and observation during test pit excavation are summarized in the table below.

Test Pit No.	Depth From (m)	Depth To (m)	Soil Stratigraphy	Notes
1	0	0.2	Topsoil	• Weathered soil extends to an approximate depth of 0.25 m. • No sign of water seepage at the bottom or the sides of test pit.
	0.2	0.4	Sandy silt	
2	0	0.2	Topsoil	• Weathered soil extends to an approximate depth of 0.30 m. • No sign of water seepage at the bottom or the sides of test pit.
	0.2	0.6	Sandy silt	
3	0	0.3	Topsoil	• Weathered soil extends to an approximate depth of 0.45 m. • No sign of water seepage at the bottom or the sides of test pit.
	0.3	0.6	Sandy silt	

Test Pit No.	Depth From (m)	Depth To (m)	Soil Stratigraphy	Notes
4	0	0.3	Topsoil	• Weathered soil extends to an approximate depth of 0.35 m. • No sign of water seepage at the bottom or the sides of test pit.
	0.3	0.4	Sandy silt	
5	0	0.2	Topsoil	• Weathered soil extends to an approximate depth of 0.30 m. • No sign of water seepage at the bottom or the sides of test pit.
	0.2	0.4	Sandy silt	
6	0	0.15	Topsoil	• Weathered soil extends to an approximate depth of 0.30 m. • No sign of water seepage at the bottom or the sides of test pit.
	0.15	0.4	Silty Sand	
7	0	0.25	Topsoil	• Weathered soil extends to an approximate depth of 0.40 m. • No sign of water seepage at the bottom or the sides of test pit.
	0.25	0.6	Silty Clay	
8	0	0.2	Topsoil	• Weathered soil extends to an approximate depth of 0.35 m. • No sign of water seepage at the bottom or the sides of test pit.
	0.2	0.6	Silty Clay	

As noted, water seepage was not evident within the depth of investigation of the test pits. It is anticipated that the local groundwater regime exists beyond the depth of investigation and is under direct influence of the nearby Dunbarton Creek.

SLOPE STABILITY ASSESSMENT

A slope stability assessment was carried out to determine the stability of the existing slope and to establish the Long-Term Stable Top of Slope (LTSTOS) for the future development.

Visual Inspection

Visual inspection of the slope was carried out on the same date of the test pit program. The slope face is well vegetated with mature and upright trees; no sign of slope instability was observed. No active erosion was evident along the banks of the Creek. The bank full width of the Creek varies between 2 and 4 m.

As previously noted, the natural valley slope is approximately 2 to 5 m in height with slope gradients ranging from approximately 1.6 to 2.4 H:1 V, which conforms with the topographic survey prepared by R-PE Surveying Ltd. dated June 4, 2024.

Modelling

Slope stability analyzed using SLIDE by by Rocscience® in 3 cross-sections, Cross-Sections A-A, B-B and C-C. The locations of the cross-sections are shown on the enclosed Drawing No. 1. The slope profiles at the cross-sections were interpolated from the provided topographic survey. The subsurface profile at the cross-sections was interpreted from the test pit findings.

While groundwater seepage was not noted within the test pits, the creek water level has been incorporated into the analyses and modelled as a phreatic surface at the cross-sections.

The slope stability at the cross-sections was analysed using the Bishop Method with the following shear strength parameters of the subsoils, which were estimated based on the in-situ testing from the test pit program.

Soil Type	Unit Weight γ (kN/m^3)	Undrained Shear Strength, c (kPa)	Effective Internal Friction Angle ϕ'
Sandy Silt	20.5	-	30°
Silty Clay	21.0	30	-

Analytical Results

The result of the analysis at Cross-Sections A-A, under existing conditions, show that the minimum FOS is calculated to be 1.05, which fails to meet the Ontario Ministry of Natural Resources (MNR) guideline requirements for active land use (minimum FOS of 1.5), while Cross-Sections B-B and C-C yielded FOS above 1.50. The results of the analysis for the existing condition of the slope are presented on Drawing Nos. 2 to 4.

As noted during the visual inspection, active erosion was not evident along the creek bank. As per the MNR guideline requirement, a Toe Erosion Allowance (T.E.A.) of 2.0 m should be applied for the encountered soil type with bank full width less than 5.0 m.

For the cross-sections having a FOS less than 1.50 and/or where insufficient T.E.A. is identified, the slope cross-sections are remodelled with the stable slope gradients along with the required T.E.A., where necessary. The analytical results of the remodelled slope section yielded minimum FOS above 1.50, which meet MNR guideline requirement for active land use. The results are summarized in the table below and are presented on Drawing Nos. 5 and 6.

Cross-Section	Stable Slope Gradient	Applied T.E.A (m)	Resulting FOS
A-A	2.5H:1V	2.0	1.51
B-B	2.0H:1V	2.0	1.57
C-C	2.4H:1V	Not Applied, due to Sufficient Flood Plain	Upper-Tier- 2.36 Lower-Tier- 1.50

The LTSTOS, incorporating the stable slope gradient, T.E.A, as required and staked TRCA boundary, is established and is illustrated on Drawing No. 1. A development setback/Erosion Access Allowance will be required beyond the LTSTOS.

General Considerations

In order to prevent disturbance of the existing slope during construction of the proposed development, the following geotechnical constraints should be stipulated:

1. The prevailing vegetative cover on the slope must be maintained as its rooting system acts as reinforcement against soil erosion by weathering. If, for any reason, the vegetative cover is stripped, it must be reinstated to its original, or better than its original, protective condition. Restoration with selected native plantings including deep rooting systems which must be carried out after the development to ensure bank stability.
2. Any leafy topsoil cover on the slope face should not be disturbed, since this provides an insulation and screen against frost wedging and rainwash erosion, or the bare slope surface must be adequately sodded.
3. Grading of the land adjacent to the slope must be such that concentrated runoff is not allowed to drain onto the slope face. Landscaping features which may cause runoff to pond at the top of the slope, such as infiltration trenches, as well as saturating the crown of the bank, must not be permitted.
4. Where development is carried out adjacent to the slope, there are other factors to be considered related to possible human environmental abuse. These include soil saturation from frequent watering to maintain landscaping features, stripping of topsoil or vegetation, dumping of loose fill, and material storage close to the top of slope; none of these should be permitted.

The above recommendations are subject to the approval and requirements of the TRCA.

We trust this letter satisfies your present requirements; however, should any queries arise please feel free to contact this office.

Yours truly,
SOIL ENGINEERS LTD.

Daric Yang, P.Eng.

LICENSED PROFESSIONAL ENGINEER
June 11, 2025
W. YANG
100587036
PROVINCE OF ONTARIO

Kin Fung Li, P.Eng.
DY/KFL

LICENSED PROFESSIONAL ENGINEER
June 11, 2025
K. F. LI
100169280
PROVINCE OF ONTARIO

ENCLOSURES

Test Pit and Cross-Section Location Plan..... Drawing No. 1
Slope Stability Analysis – Existing Condition..... Drawing Nos. 2 to 4
Slope Stability Analysis – Stable Condition..... Drawing Nos. 5 and 6

ASIN
STORM
SANITARY

NE
RNES LIMITED, O.L.S.
LACE, O.L.S.
ACK, O.L.S.
CONTROL POINT

E FOUNDATION.

LOT

P.I.N. 26340-0087
PART 2, PLAN 40R-21830

Appleview Road

PART 5, PLAN 40R-21830

Missing or invalid reference
File: key plan.pdf
Sheet: 1

PART 4, PLAN 40R-9570
P.I.N. 26340-0171

58

TOP OF BANK

EDGE OF WATERS

END OF PWF
0.11 N
0.17 W

100.89

LTSTOS

TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8

IB
SIB-FOUND 2
IB-FOUND 4
SIB-FOUND 5
PILE ±1.4 E

EM ±0.1 S

BOTTOM OF BANK

EDGE OF WATERS

TOP OF BANK

VINYL SHED

SHED

SPIKE 96.395
SPIKE-FOUND

PWF
0.17 N

WIRE

FENCE

AND

PLAN

57

0087

1 1/2 STOREY
FRAME DWELLING
No. 1794
DS=97.31

BUILDING

RETAINING WALL

DOOR-SILL 97.31

STEP

SPIKE 96.513
SPIKE-FOUND

COMPILED

END OF
N FACE OF BF
0.11 N

END OF PWF
0.30 N

PWF
0.24 N

POST AND WIRE FENCE

FENCE-BOARD

93.44

1 STOREY
SRUCCO AND BRICK DWELLING
No. 1788
DS=96.85

CS=94.84

DOOR-SILL 1788

DRIVEWAY-ASPHALT

ASPHALT DRIVEWAY

PWF
0.66 N

DRIPLINE

END OF PWF
0.15 S
0.05 W

22.02

DRIVEWAY

GRAVEL

WV

CB

CATCHBASIN

CULVERT 91.40

INV=90.00 CULVERT-INVERT

CULVERT 91.76

SIGN 1865

POST

CC

CUT-CROSS-PLACED HV

PAVEMENT-EDGE

CROWN

CUT-CROSS-PLACED CURB

BENCHMARK PICKERING 1-087

MANHOLE

SIGN 1880

APPLEVIEW ROAD
(FORMERLY PINE RIDGE ROAD BY REGISTERED PLAN No. 330)
RENAMED BY BY-LAW No. 202-75 (UNREGISTERED)
P.I.N. 26348-0152

LOT

56

P.I.N. 26340-0212
PART 1, PLAN 40R-23134

LEGEND

Test Pit

LTSTOS

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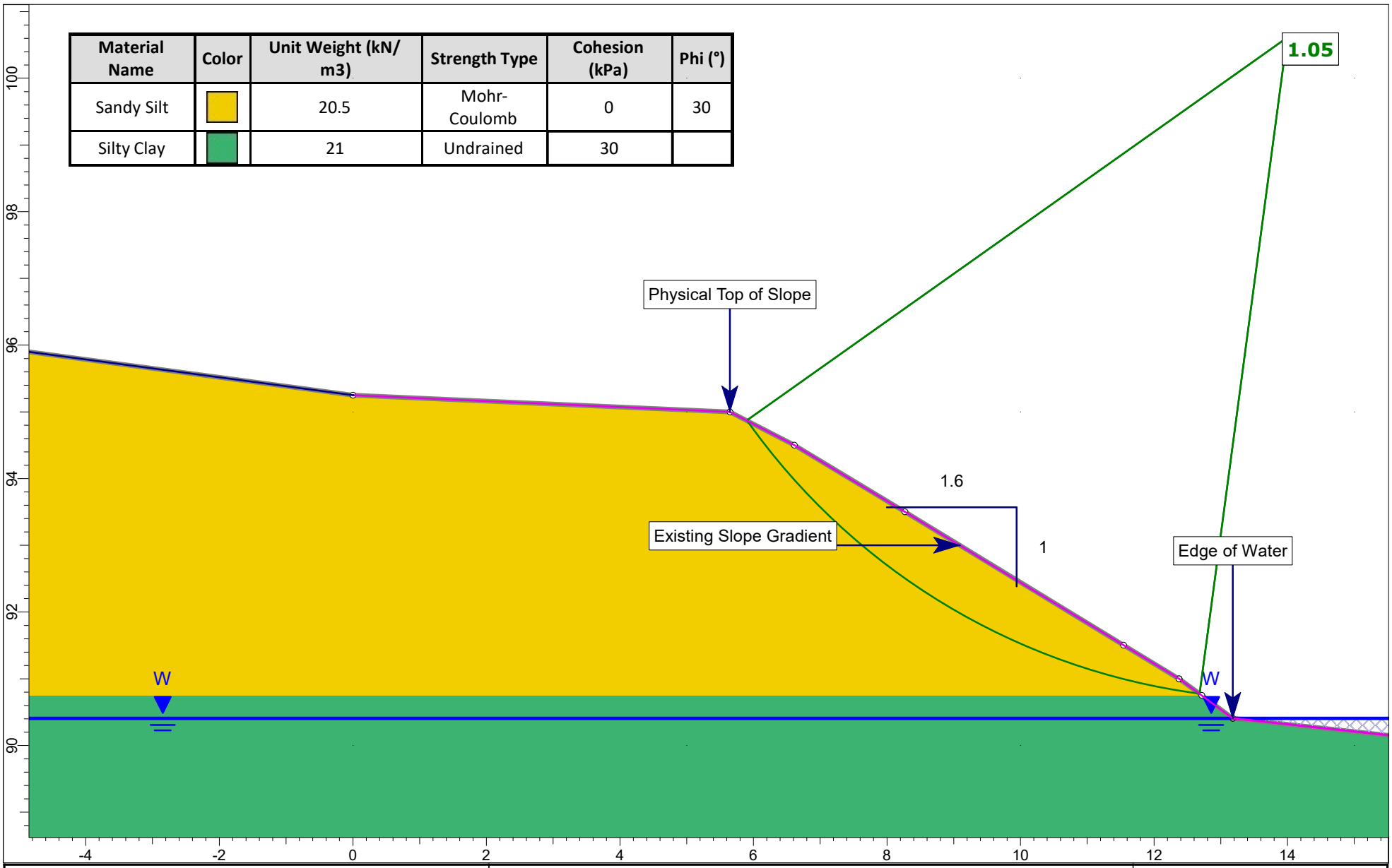
Test Pit and Cross Section Location Plan

SITE: 1794 Appleview Road, Lot 57, Town of Pickering			
DESIGNED BY: DY	CHECKED BY: KL	DWG NO.: 1	
SCALE: 1: 250	REF. NO.: 2406-S114	DATE: June 2025	REV 3

Material Name	Color	Unit Weight (kN/ m3)	Strength Type	Cohesion (kPa)	Phi (°)
Sandy Silt		20.5	Mohr-Coulomb	0	30
Silty Clay		21	Undrained	30	



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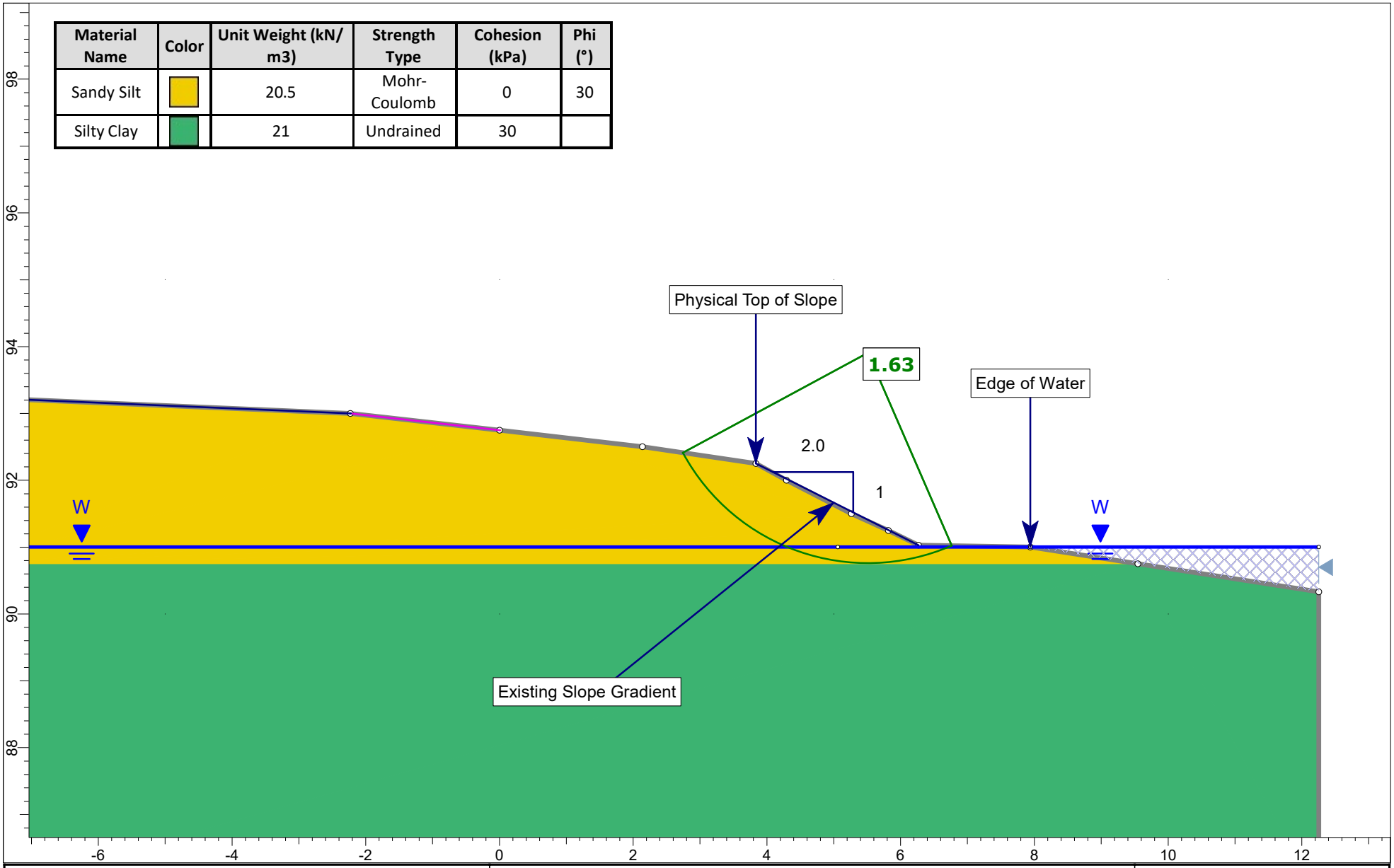
Project Title: Slope Stability Assessment			Load Case: Existing Condition. at Cross-Section A-A
Location: 1794 Appleview Road, City of Pickering			
Drawn By: DY	Checked By: KL	Scale: 1:80	Revision: -
Date: July 2024		Reference No.: 2406-S114	Drawing No.: 2

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)
Sandy Silt		20.5	Mohr-Coulomb	0	30
Silty Clay		21	Undrained	30	



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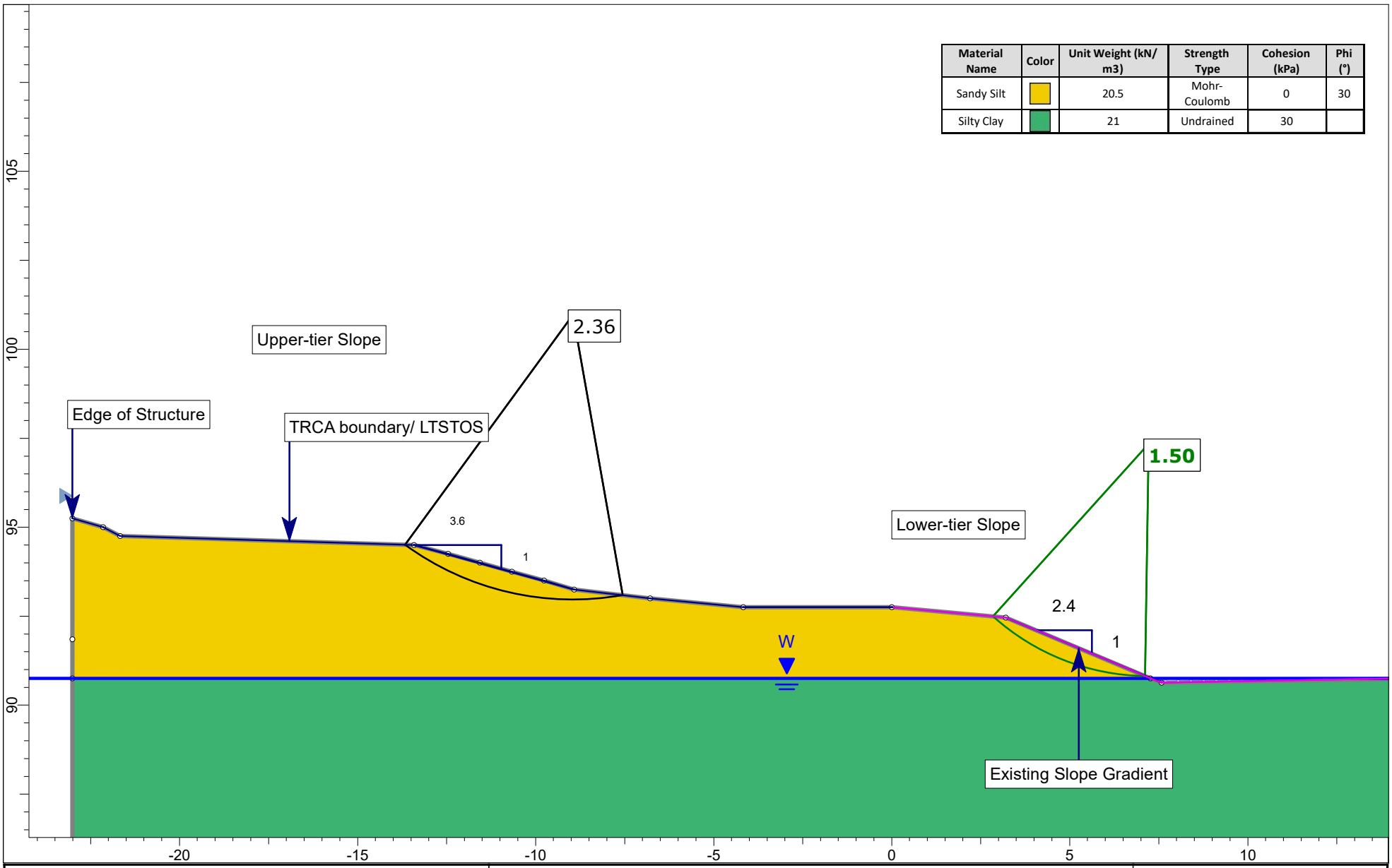
Project Title: Slope Stability Assessment			Load Case: Existing Condition, at Cross-Section B-B
Location: 1794 Appleview Road, City of Pickering			
Drawn By: DY	Checked By: KL	Scale: 1:80	Revision: -
Date: July 2024		Reference No.: 2406-S114	Drawing No.: 3

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)
Sandy Silt		20.5	Mohr-Coulomb	0	30
Silty Clay		21	Undrained	30	



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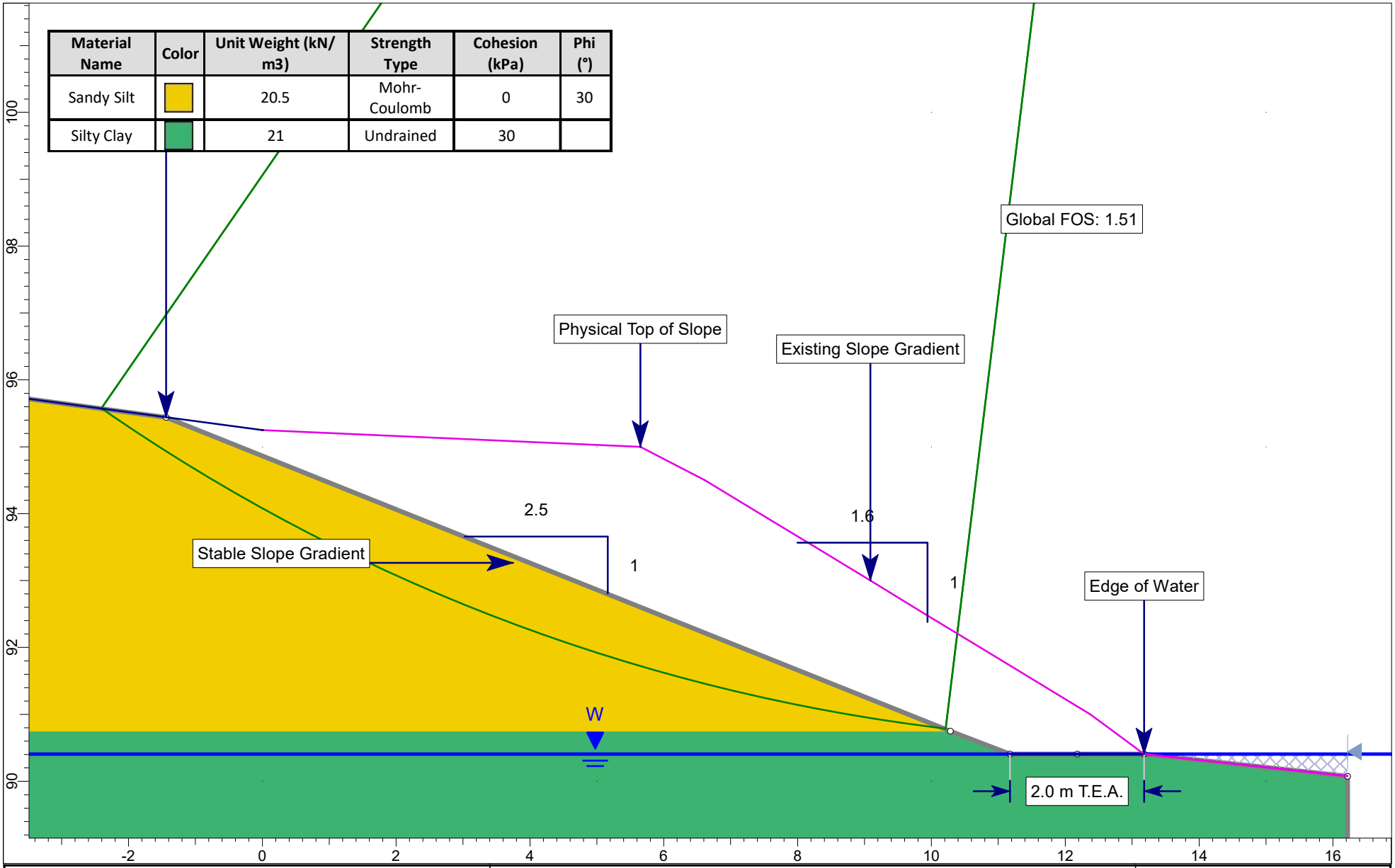
Project Title: Slope Stability Assessment			Load Case: Existing Condition, , at Cross-Section C-C
Location: 1794 Appleview Road, City of Pickering			
Drawn By: DY	Checked By: KL	Scale: 1:150	Revision: 2
Date: July 2024		Reference No.: 2406-S114	Drawing No.: 4

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)
Sandy Silt		20.5	Mohr-Coulomb	0	30
Silty Clay		21	Undrained	30	



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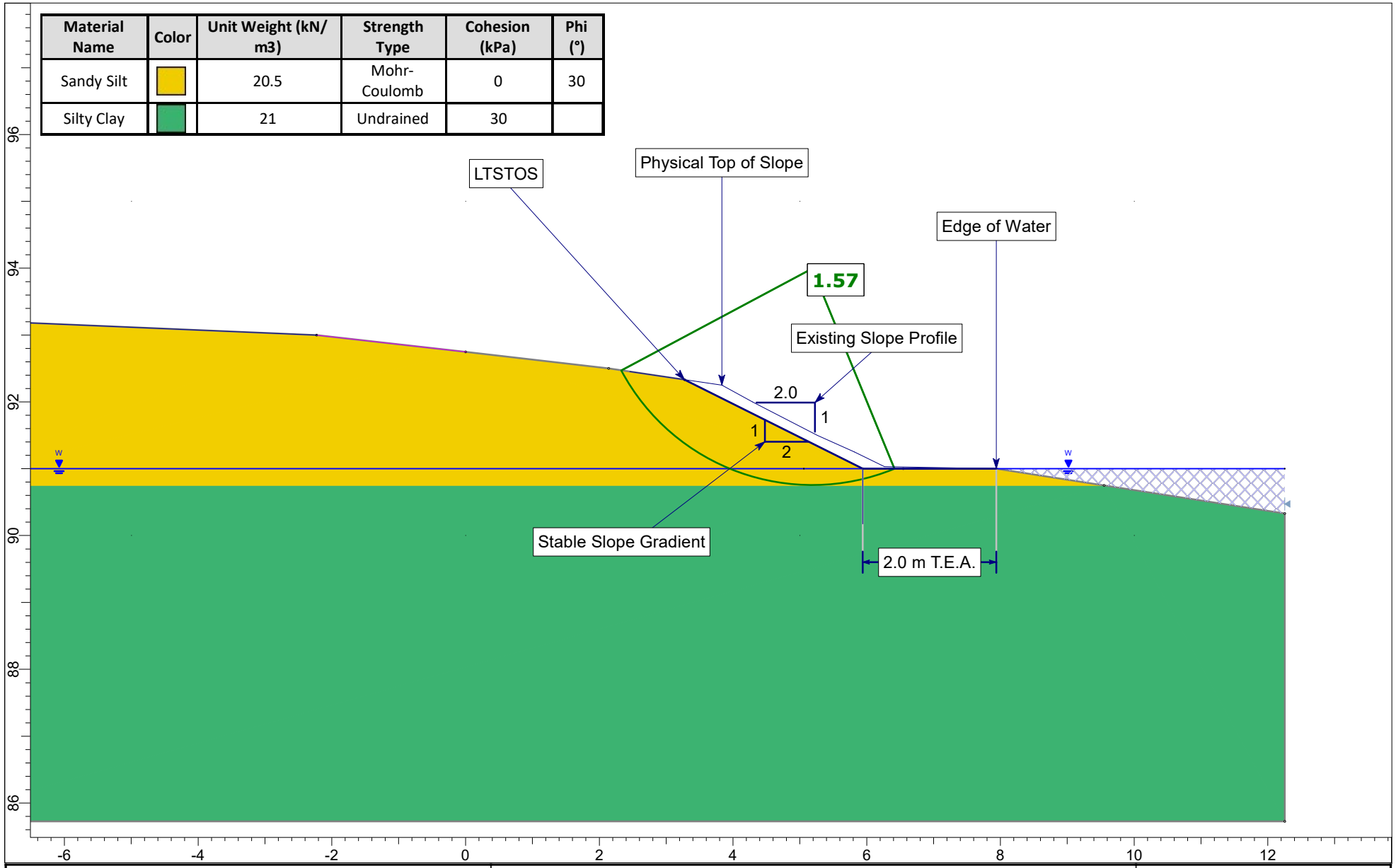
Project Title: Slope Stability Assessment			Load Case: Stable Condition at Cross-Section A-A
Location: 1794 Appleview Road, City of Pickering			
Drawn By: DY	Checked By: KL	Scale: 1:80	Revision: -
Date: July 2024		Reference No.: 2406-S114	Drawing No.: 5

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)
Sandy Silt		20.5	Mohr-Coulomb	0	30
Silty Clay		21	Undrained	30	



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Project Title: Slope Stability Assessment			Load Case: Stable Condition, at Cross-Section B-B
Location: 1794 Appleview Road, City of Pickering			
Drawn By: DY	Checked By: KL	Scale: 1:80	Revision: -
Date: July 2024		Reference No.: 2406-S114	Drawing No.: 6