



Soil Engineers Ltd.

CONSULTING ENGINEERS

GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE

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March 27, 2026

Reference No. 1910-S052

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Northcape Investments Inc.
c/o Trinison Management Corp.
8600 Dufferin Street
Vaughan, Ontario
L4K 5P5

Attention: Mr. Giancarlo Pennino, MES, Development Manager

**Re: Slope Stability Assessment
12811 Tenth Line
Town of Whitchurch-Stouffville**

Dear Sir:

In accordance with the written authorization from Mr. Paul Tobia of Northcape Investments Inc., dated October 29, 2025, Soil Engineers Ltd. (SEL) has carried out a slope stability study for the subject property. In response to the memorandum issued by the Toronto and Region Conservation Authority (TRCA) on November 10, 2021, this study aims to evaluate the stability of the existing valley slope along the west slope of the Reesor Creek valley, which meanders through the east portion of the subject property and, to establish the Long-Term Stable Top of Slope (LTSTOS) in this area.

Site and Slope Description

The subject site is located within the Duffins Creek Watershed. The Reesor Creek meanders from north to south within a partially confined valley system through the east portion of the site. The east valley slope is relatively flat, with gradients exceeding 10H:1V, and is therefore not part of this study. Based on the Conceptual Demonstration Plan prepared by Bousfields Inc., updated February 2026, the proposed residential subdivision will consist of townhouse blocks and mixed-use residential buildings fronting Tenth Line, with a park block and a stormwater management (SWM) pond block abutting to the west valley slope.

A review of the LiDAR contours provided by SCS Consulting Group Ltd. and the topographic plan prepared by Holding Jones Vanderveen Inc., dated June 3, 2019, indicates that the west



valley slope is approximately 4.5 to 6.0 m high, with overall slope gradients ranging from 2.6 to 4.8+H:1V. In the southern portion of the valley land, some areas are flatter to 6.0+H:1V.

Visual inspection, conducted on December 22, 2025, revealed that Reesor Creek is approximately 2 to 3 m in width. It meanders through the valley at various distances from the toe of slope. At the southern end of the property, the creek passes through a concrete culvert, and two ponds were observed adjacent to the creek.

The slope is generally stable and well vegetated, with majority of trees observed in an upright position. Although some leaning and fallen trees were observed along the valley, no deep-seated slope failure was observed on the slope face; however, some leaning trees noted by the creek side indicate potential active erosion along the creek bank.

Due to presence of snow cover and the creek being frozen at the time of the inspection, a follow-up visit should be completed to confirm the actual slope condition and identify the water's edge or channel bank following spring thaw, as these features were also not defined on the existing topographic surveys.

Modeling

Three sections, Cross-Section NC-1, NC-2 and NC-3, were selected for the analysis at the tallest and/or steepest portion of the west valley slope; the locations of the cross-sections are shown on Drawing No. 1, enclosed.

The slope profiles at the cross-sections were interpreted from the contours presented on the aforementioned topographic survey plans. The subsurface profile at each cross-section was interpreted based on the Borehole Logs from the 2020 geotechnical investigation. Borehole data indicated that beneath the surficial topsoil veneer and a layer of ploughed soil, the slope is generally underlain by strata of silty clay/silty clay till and sandy silt till, overlying sandy silt and sand deposits near the creek level. The high groundwater levels recorded from the nearby monitoring wells, BH5 and 7D, was incorporated into the analysis as a phreatic surface.

The slope stability was analysed using the limit-equilibrium criteria of the Bishop Method, with the effective soil strength parameters shown in the following table:



Soil Strength Parameters

Soil Type	Unit Weight γ (kN/m ³)	Cohesion c' (kPa)	Internal Friction Angle ϕ' (degrees)
Ploughed Soil	20.0	0	26
Silty Clay	20.5	5	26
Sandy Silt Till/Silty Sand Till	22.5	2	31
Sandy Silt/Silty Sand	20.5	0	31

Results

The slope stability analysis results are presented on Drawing Nos. 2A to 4B, inclusive, and are summarized in the table below. The results indicate that the existing slope at Cross-Sections NC1, NC2 and NC3 has a minimum factor of safety (FOS) exceeding 1.5, which satisfies the Ontario Ministry of Natural Resources (OMNR) guideline requirements for active land use (minimum FOS 1.5).

In the absence of a clearly defined channel bank or water's edge, an 8.0-m toe erosion allowance (TEA), as recommended by GEO Morphix Ltd., is applied from the apparent toe of slope in the remodeling. This represents a conservative approach, as the presence of any existing floodplain has been excluded in establishing the LTSTOS. The cross-sections were subsequently reanalysed using a projection to the existing top of slope, resulting in geotechnically stable gradients of 2.4 to 2.9H:1V. The FOS for the remodeled slopes are greater than 1.5, which satisfies the OMNR requirements.

Slope Stability Analysis Results - West Valley Bank

Cross-Section	Existing Gradient (H:V)	Existing FOS	Stable Gradient	Stable FOS	Toe Erosion Allowance (m)	LTSTOS ^a Distance from TOS (m)
NC1	2.6 to 4.2:1	2.18	2.4:1	1.52	8.0	0.0
NC2	3.2 to 4.8:1	2.25	2.9:1	1.70	8.0	0.0
NC3	3.9 to 4.5:1	2.86	2.8:1	2.08	8.0	0.0

^a LTSTOS - Long-Term Stable Top of Slope; TOS - top of slope

The LTSTOS, incorporating the projected stable slope gradient and TEA presented in the table above, coincides with the existing top of slope and is shown on Drawing No. 1. This LTSTOS is preliminary in nature, and will be subject to refinement upon completion of additional field survey to identify the water's edge and/or channel bank. As previously



discussed, the east valley slope is relatively flat, with gradients exceeding 10H:1V; therefore, no LTSTOS has been established.

Lastly, a development setback buffer to account for man-made and environmental degradation of the valley land, as well as to provide the required access allowance, will be required. This setback is subject to the discretion of the TRCA.

In order to prevent disturbance of the existing slope, 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.
2. Any leafy topsoil cover on the slope face should not be disturbed, since this provides insulation and screening against frost wedging and rainwash erosion.
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 slope, 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 degradation. These include, but not limited to, soil saturation from frequent watering to maintain landscaping features, stripping of topsoil or vegetation, dumping of loose fill over the slope, and material storage close to the top of slope. These actions must be prohibited.

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.


Hui Wing Yang, P.Eng.
HWY/KH




Kelvin Hung, P.Eng.





Northcape Investments Inc.
March 27, 2026

Reference No. 1910-S052
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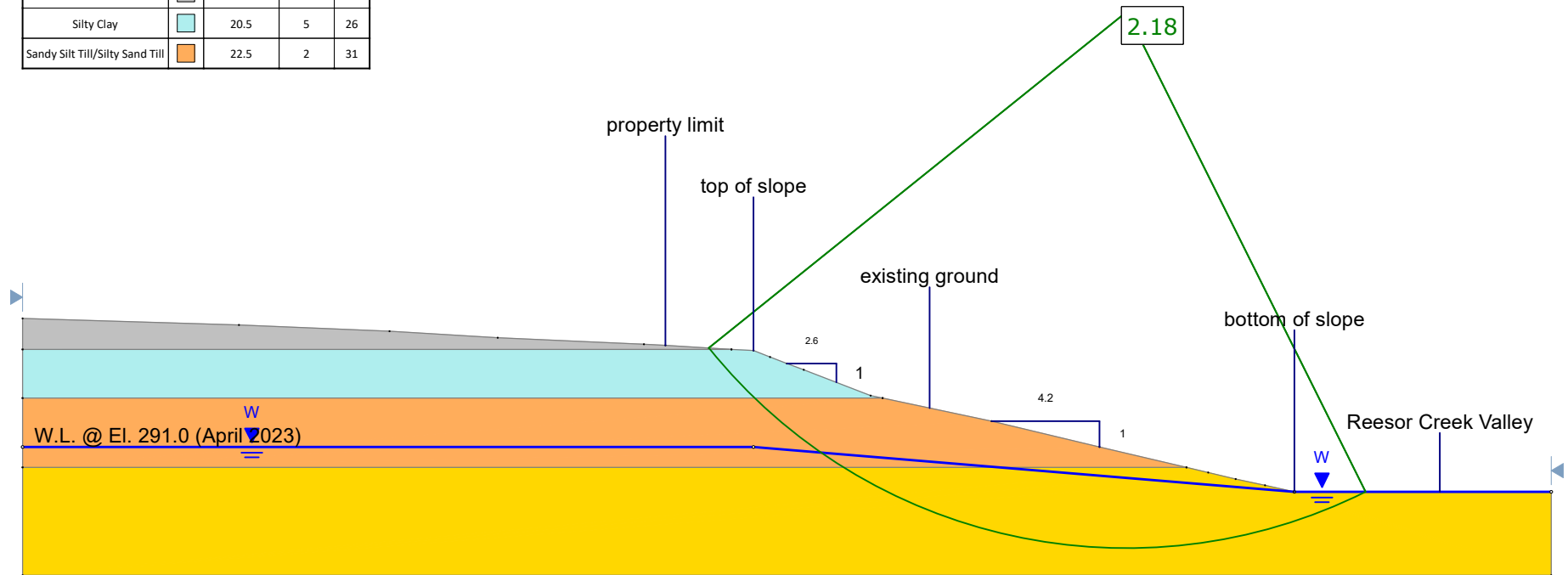
ENCLOSURE

Cross-Section Location Plan Drawing No. 1
Slop Stability Analysis Results..... Drawing Nos. 2A to 4B

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Borehole/Groundwater Info: BH5

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silty Sand/Sandy Silt		20.5	0	31
Earth Fill/Ploughed Soil		20	0	26
Silty Clay		20.5	5	26
Sandy Silt Till/Silty Sand Till		22.5	2	31



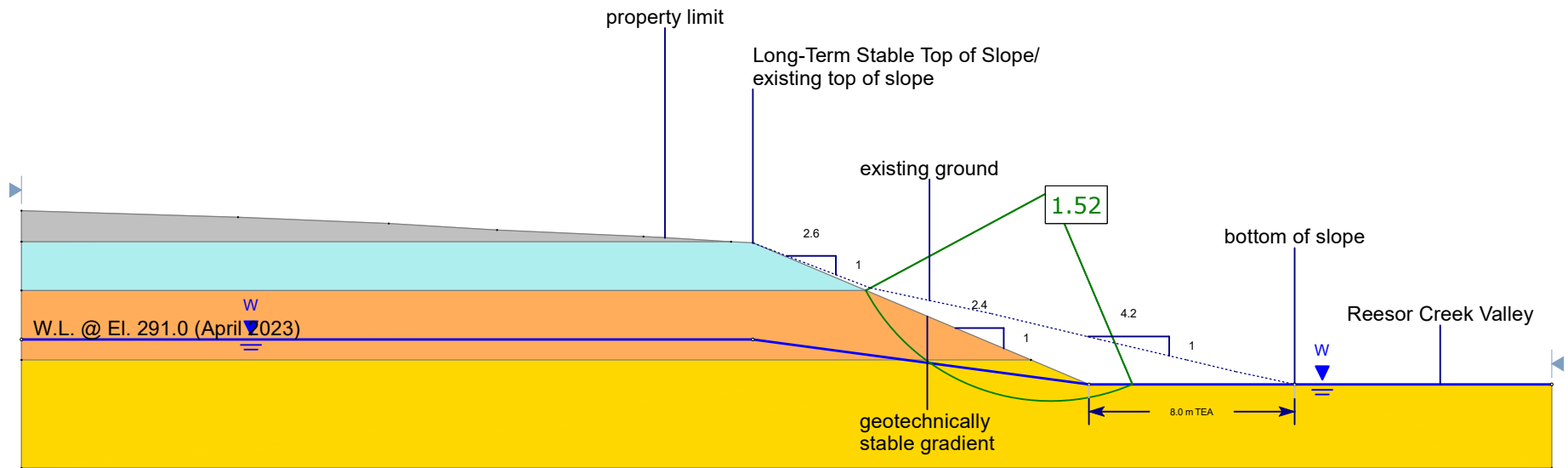
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Project Title			Cross-Section NC1		Load Case		Existing Condition																
Location			12811 Tenth Line, Town of Whitchurch-Stouffville																				
Drawn By		HWY		Checked By		KH		Scale		1:250		Revision		-									
Date				March 2026				Reference No.				1910-S052				Drawing No.				2A			

Borehole/Groundwater Info: BH5

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silty Sand/Sandy Silt		20.5	0	31
Earth Fill/Ploughed Soil		20	0	26
Silty Clay		20.5	5	26
Sandy Silt Till/Silty Sand Till		22.5	2	31



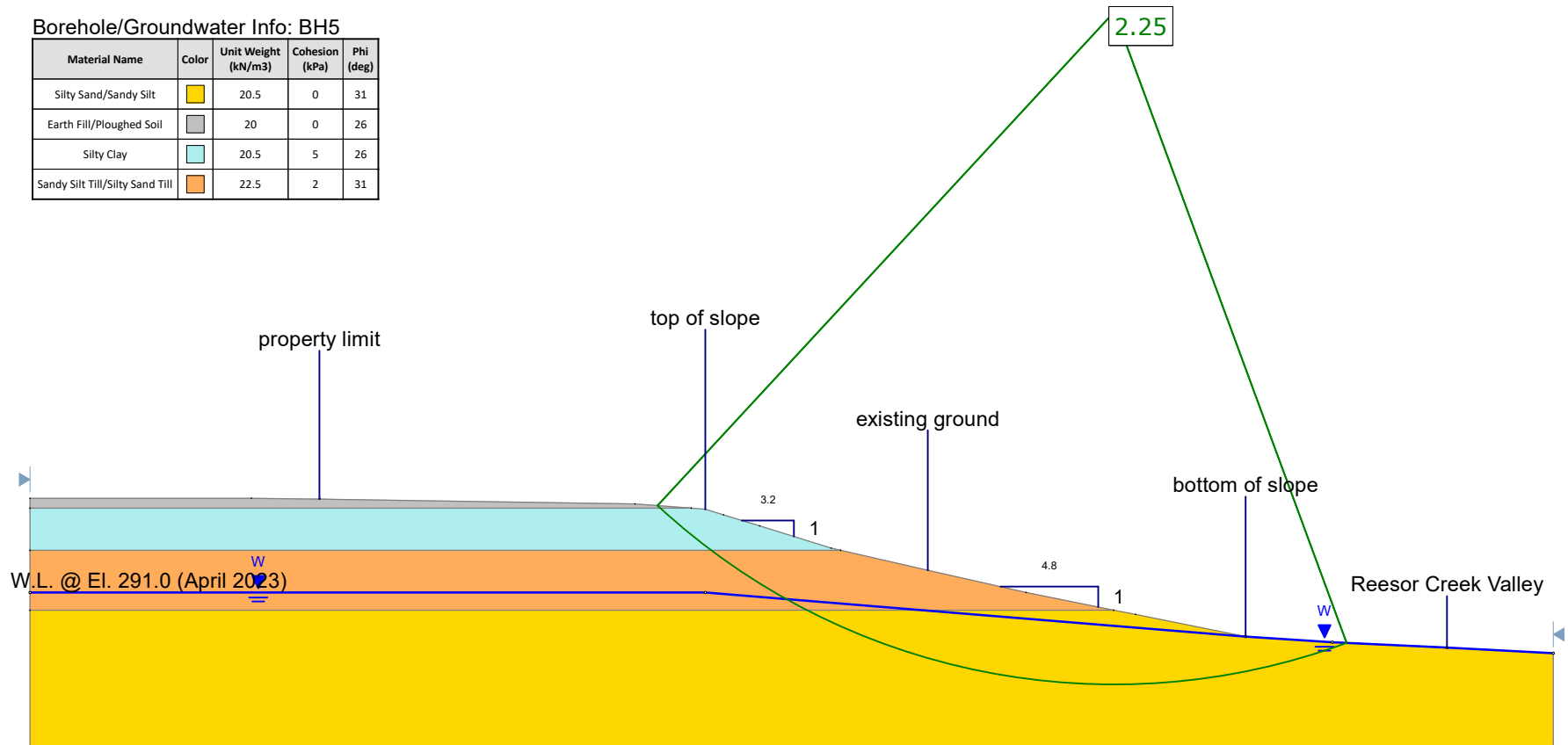
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Project Title		Cross-Section NC1		Load Case	
Location		12811 Tenth Line, Town of Whitchurch-Stouffville		Geotechnically Stable Condition	
Drawn By	HWY	Checked By	KH	Scale	1:250
Date	March 2026	Reference No.	1910-S052	Revision	-
				Drawing No.	2B

Borehole/Groundwater Info: BH5

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silty Sand/Sandy Silt		20.5	0	31
Earth Fill/Ploughed Soil		20	0	26
Silty Clay		20.5	5	26
Sandy Silt Till/Silty Sand Till		22.5	2	31

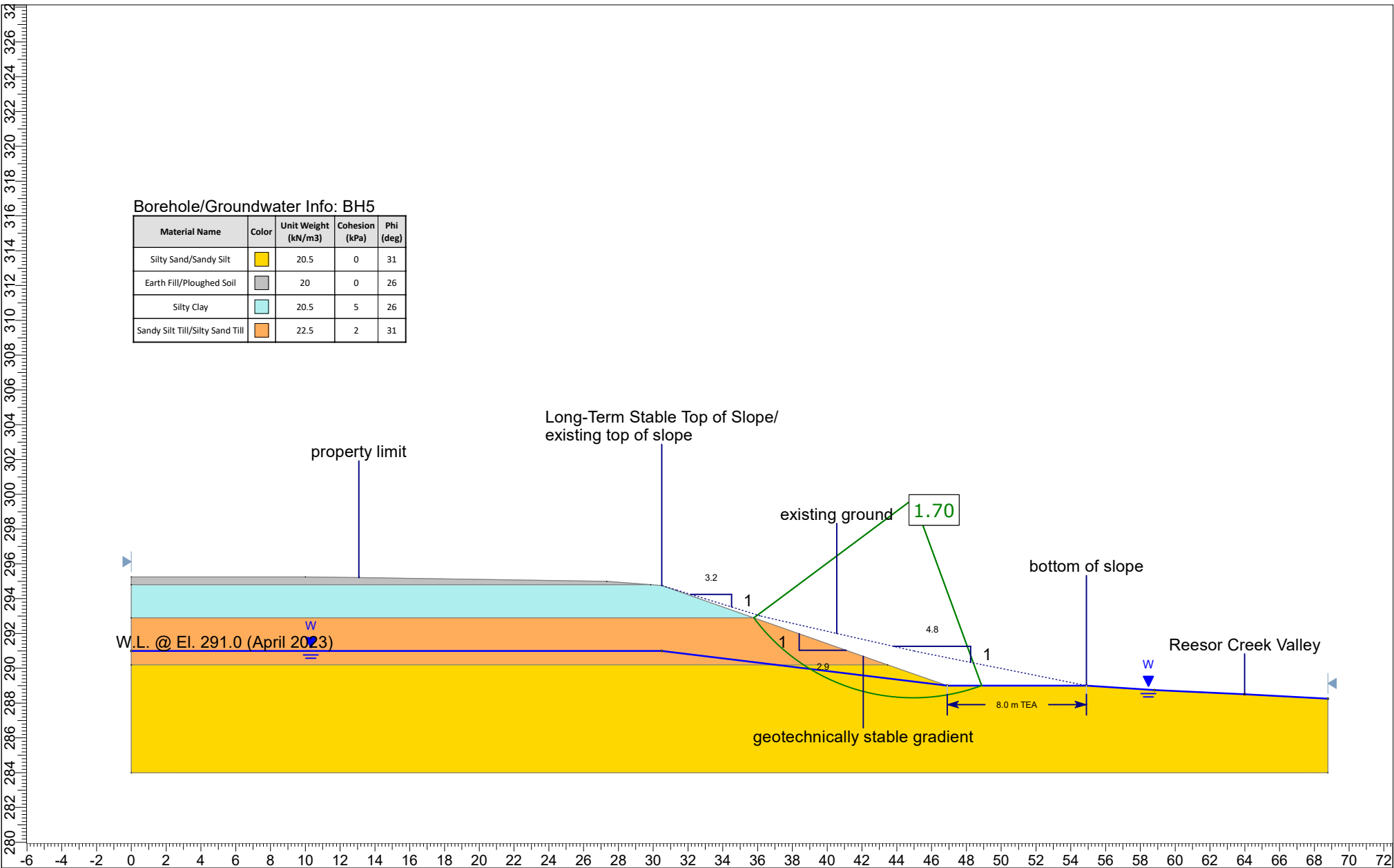


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Project Title				Cross-Section NC2		Load Case	
						Existing Condition	
Location				12811 Tenth Line, Town of Whitchurch-Stouffville			
Drawn By		HWY		Checked By		KH	
				Scale		1:300	
				Revision		-	
Date				March 2026		Reference No.	
						1910-S052	
				Drawing No.		3A	

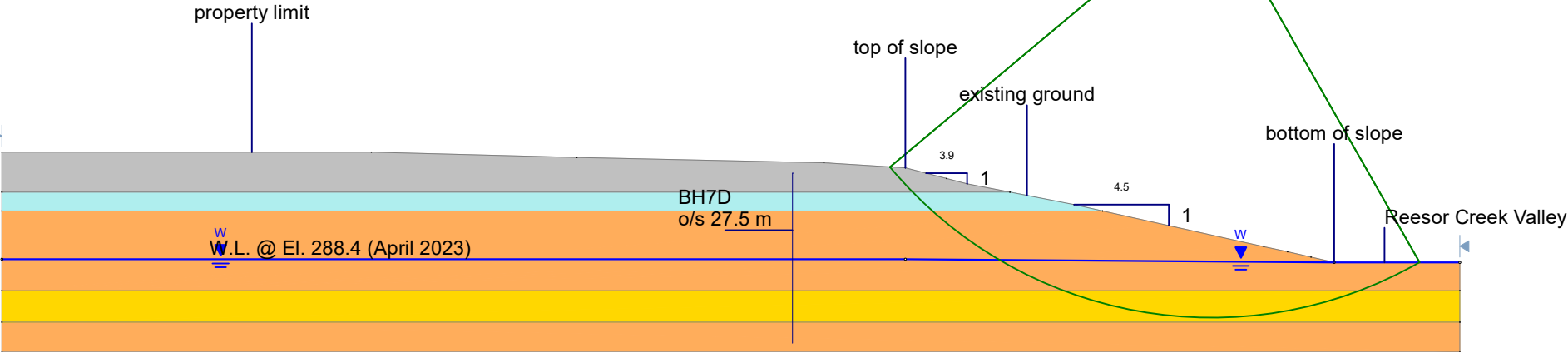
Material Name	Color	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (deg)
Silty Sand/Sandy Silt		20.5	0	31
Earth Fill/Ploughed Soil		20	0	26
Silty Clay		20.5	5	26
Sandy Silt Till/Silty Sand Till		22.5	2	31



278 280 282 284 286 288 290 292 294 296 298 300 302 304 306 308 310 312 314 316 318 320 322 324 326

Borehole/Groundwater Info: BH7D

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silty Sand/Sandy Silt		20.5	0	31
Earth Fill/Ploughed Soil		20	0	26
Silty Clay		20.5	5	26
Sandy Silt Till/Silty Sand Till		22.5	2	31

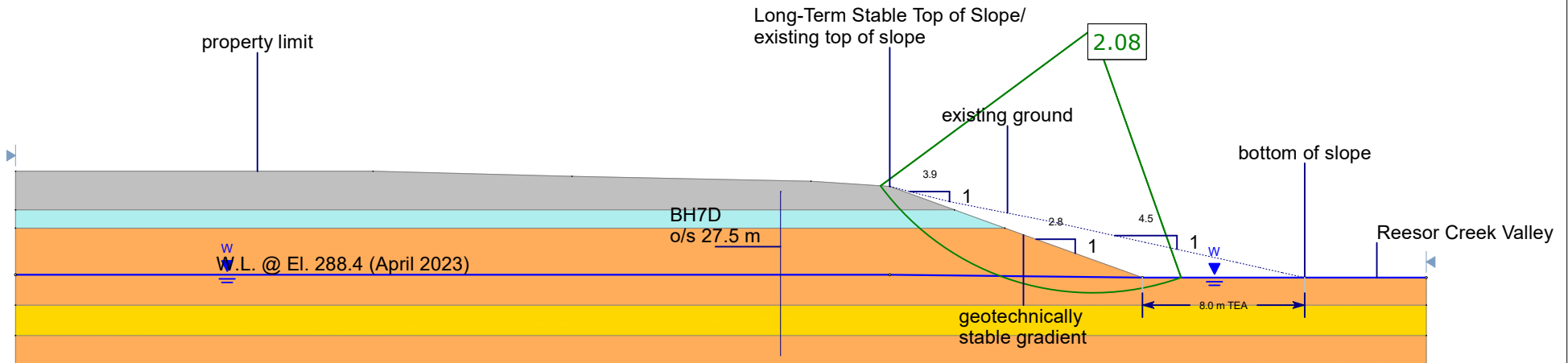


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	Location				12811 Tenth Line, Town of Whitchurch-Stouffville							
	Drawn By	HWY		Checked By	KH		Scale	1:300		Revision	-	
	Date	March 2026				Reference No.	1910-S052		Drawing No.	4A		

Borehole/Groundwater Info: BH7D

Material Name	Color	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (deg)
Silty Sand/Sandy Silt		20.5	0	31
Earth Fill/Ploughed Soil		20	0	26
Silty Clay		20.5	5	26
Sandy Silt Till/Silty Sand Till		22.5	2	31



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Project Title		Cross-Section NC3		Load Case	
Location		12811 Tenth Line, Town of Whitchurch-Stouffville		Geotechnically Stable Condition	
Drawn By	HWY	Checked By	KH	Scale	1:300
Date	March 2026	Reference No.	1910-S052	Revision	-
				Drawing No.	4B