CHUNG & VANDER DOELEN
ENGINEERING LTD.

311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1
519-742-8979

July 28, 2025
File No.: 2490 Rev.1

Knox United Church
92 Northumberland Street
Ayr, Ontario
N0B 1E0

Attention: Mr. Mike Schmidt

RE: Slope Stability Assessment
Proposed Apartment Building
92 Northumberland Street, Ayr, Ontario

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) is retained to conduct a geotechnical assessment of the slope at the above-noted site to addresses the setback requirements for the proposed apartment building from the present top of slope in accordance with GRCA policy/guidelines.

The methodology presented herein will follow the policy and the guidelines listed below:

- "Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation", Grand River Conservation Authority, May 24, 2025.

- "Technical Guide – River and Stream Systems: Erosion Hazard Limit" Ontario Ministry of Natural Resources, 2002

Reference is made to the following enclosed information gathered for this project, assessment, and recommendation:

Appendix A: Site Map (from GRCA Website)
Appendix B: Architectural Site Plan, January 2025
Appendix C: Topographical Plan with Setback Line
Appendix D: Selected Site Photographs
Appendix E: Slope Stability Rating Chart

SITE CONDITION

The site is the parking lot of Knox United Church as shown in the Site Map in Appendix A. Appendix B illustrates the location of a 4-storey apartment which is proposed to be located typically 10 m from the present top of slope to allow for the "Environmental Buffer".

Appendix C contains a topographic survey of the site from May 2023. The top of the slope is defined by a line of mature trees and the edge of a lawn area. The ground surface of the parking lot declines gently in a westerly direction towards the top of slope which ranges in elevation from 291.5± m at the south end to 289.3± m at the north end of the property. An apartment building (off Bute Street) locates immediately north of the north property boundary. This apartment building was constructed some 30 years ago onto the slope.

The toe of the slope has elevations ranging from 283.2± m at the south end to 283.0± m at the north end of the property. The toe of the slope is protected from erosion from the action of the Nith River by a well vegetated flood plain which is approximately 160 m wide at the site location.

The site was visited on May 13, 2025 to examine the stability features and geometry of the site and slope conditions. Selected photographs of the site and slope condition are shown in Appendix D.

The Ontario Ministry of Natural Resources Technical Guide provides a Slope Stability Rating Chart in Table 4.2, which has been used in assessing the slope condition. The completed Slope Stability Rating Chart which can be found in Appendix E, shows a rating value of 26, indicating a slight potential of instability.

The slope surface is fully covered by vegetation and the top of the slope is lined with matures trees. There are no signs of present or past slope instability. No seepage weas observed on the slope surface and at the toe of the slope.

Three (3) slope sections, the southern portion, middle and norther portion, were selected to calculate the average slope inclination, and the locations of these sections are shown in Appendix C. The average inclinations of the slope are calculated from the spot elevations on the topographic plan and summarized below:

Southern, Slope 1:	3.2 H : 1 V
Middle, Slope 2:	2.2 H : 1 V
Northern, Slope 3:	2.7 H : 1 V

Based on our observation, fill has been placed on the original/natural slope, as revealed by soil around the tree trunks and the steep slope (especially in the middle section).

SETBACK REQUIREMENT

The Erosion Hazard Limit of the Natural Hazards Training Manual (Policy 3.1) specifies three (3) setback allowances for developing adjacent to a natural slope, namely the Toe Erosion Allowance, Stable Slope Allowance and the Erosion Access Allowance.

As the toe of the slope is protected by a 160± m flood plain, the toe of the slope will not be subject to toe erosion due to the river action. Therefore, Toe Erosion Allowance is 0 m.

The Erosion Access Allowance at the top of the slope is to be 6 m as per the GRCA guideline.

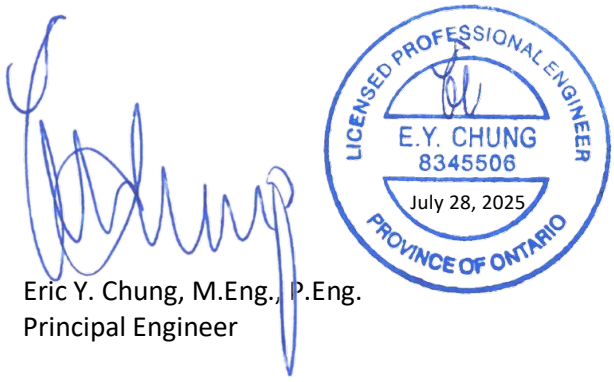
Slopes are considered to be stable when the slope inclination is 3H :1V or flatter. Therefore, the stable top of slope would be equal to a line having a distance of 3 times the height of the slope measured from the toe of the slope. The approximate setback line incorporating 3H : 1V slope and the 6 m Erosion Access Allowance is indicated on the topographic drawing in Appendix C.

With the proposed location of the building plotted on Appendix C, the recommended setback line is located within the 10 m "Environmental Buffer" from the present top of slope and therefore the proposed building location meets the GRCA setback requirement.

CLOSURE

We trust this report is sufficient for your immediate requirements. If you have any questions, please do not hesitate to contact the undersigned.

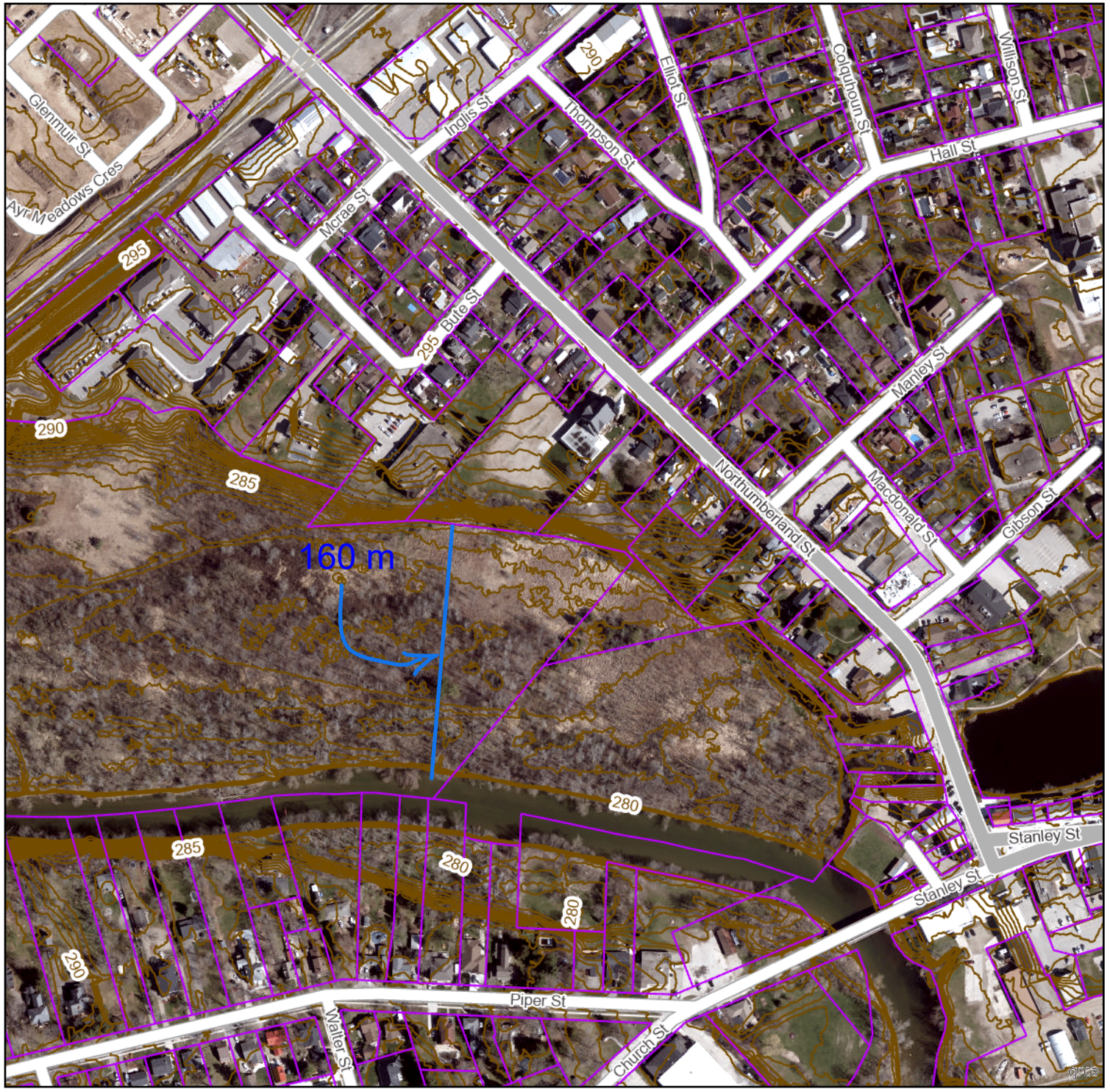
Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.



Eric Y. Chung, M.Eng., P.Eng.
Principal Engineer

APPENDIX A

Site Map
(from GRCA Website)



Map Centre (X,Y): 544257.77, 4792871.91 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)

Grand River Conservation Authority

Date: May 15, 2025

GRCA Web-GIS

Legend

- Parcel - Assessment (MPAC/MNRF)
- Contour 0.5m - CGVD2013 (GRCA)

Scale 1:3,743

NAD83 UTM zone 17 (EPSG:26917)

APPENDIX B

Architectural Site Plan, January 2025

1 SITE PLAN
1 : 250

SITE DATA

92 Northumberland St, Ayr, ON N0B 1E0

DATA		REQUIRED		PROVIDED
ZONING [BY-LAW 689-83]		Z.13	Z.5/5a	
LOT AREA (m²)				8,785.6 (m²)
SETBACKS	FRONT YARD (m)	--	7.5 (m)	EXISTING
	INTERIOR SIDE YARD (m)	4.5 (m) OR 1/2 HEIGHT	1.2m (1S) 2.4m (2S+)	4.5 (m)
	INTERIOR SIDE YARD (m)	4.5 (m) OR 1/2 HEIGHT	1.2m (1S) 2.4m (2S+)	EXISTING
	REAR YARD (m)	7.5 (m)	7.5 (m)	5.0 (m) TAKEN FROM TOP OF SLOPE SETBACK

BUILDING DATA

DATA	REQUIRED		PROVIDED
TOTAL DENSITY (# of units)	--		33 (units)
EXISTING BUILDING AREA (m²)	--		853.6 (m²)
BUILDING AREA (m²)	--		617.3 (m²)
GROSS FLOOR AREA (m²)	--		2,469.2 (m²)
GROSS CONSTRUCTION AREA (m²)	--		3086.6 (m²)
NUMBER OF STOREYS	3 MAX	3 MAX	4
BUILDING HEIGHT (m)	13.5 (m) MAX.	12 (m) MAX.	12 (m)
AMENITY AREA (m²)	--	--	59.1 (m²)

LOT COVERAGE DATA

DATA	REQUIRED	PROVIDED
LANDSCAPE AREA (%)	-- (%)	50.0 (%)
LANDSCAPE AREA (m²)	-- (m²)	4,391.3 (m²)
ASPHALT AREA (%)	-- (%)	33.3 (%)
ASPHALT AREA (m²)	-- (m²)	2,922.3 (m²)
BUILDING AREA - PROPOSED. (%)	50 (%) MAX (Z13)	7.0 (%)
BUILDING AREA (m²)	-- (m²)	617.3 (m²)
BUILDING AREA - EXISTING (%)	50 (%) MAX (Z13)	9.7 (%)
BUILDING AREA (m²)	-- (m²)	853.7 (m²)

VEHICLE PARKING DATA

DATA	REQUIRED	PROVIDED
RESIDENTIAL PARKING	1.5 per unit = 49	21
BARRIER FREE PARKING	--	4 (INCLUDED)
INSTITUTIONAL PARKING	8 per 100 (m²) = 68.3	65
	TOTAL	86

UNIT BREAKDOWN

DATA	PROVIDED	PERCENTAGE
1 BED	9 UNITS	27%
2 BED	24 UNITS	73%
TOTAL	**33 UNITS**	

Project North

True North

No.	Date	Revision

SRM↗
architects+
urban⋆designers

Project No: 23046
Issue Date: 2025-01-21
Drawn by: CRZ
Checked by: RPH
Plot Date / Time: 2025-01-22 10:32:43 AM

92 NORTHUMBERLAND
KNOX CHURCH UNITED

SITE PLAN

PRELIMINARY

Drawing Scale: As indicated
Status:

Drawing No. D1.1
Revision No.

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C:\Users\czehr\Documents\23046_Knox United Church_92 Northumberland_V2_cellenezehr.rvt

3 TYPICAL LEVEL - LEVEL 2 -LEVEL 4
1 : 125

2 LEVEL 1
1 : 125

1 BASEMENT
1 : 125

Project North

True North

No.	Date	Revision

SRM↗
architects+
urban×designers

Project No 23046
Issue Date 2025-01-21
Drawn by CRZ
Checked by RPH
Plot Date / Time 2025-01-22 10:32:44 AM

92 NORTHUMBERLAND
KNOX CHURCH UNITED

FLOOR PLANS

PRELIMINARY

Drawing Scale 1 : 125
Status

Drawing No. D2.1
Revision No.

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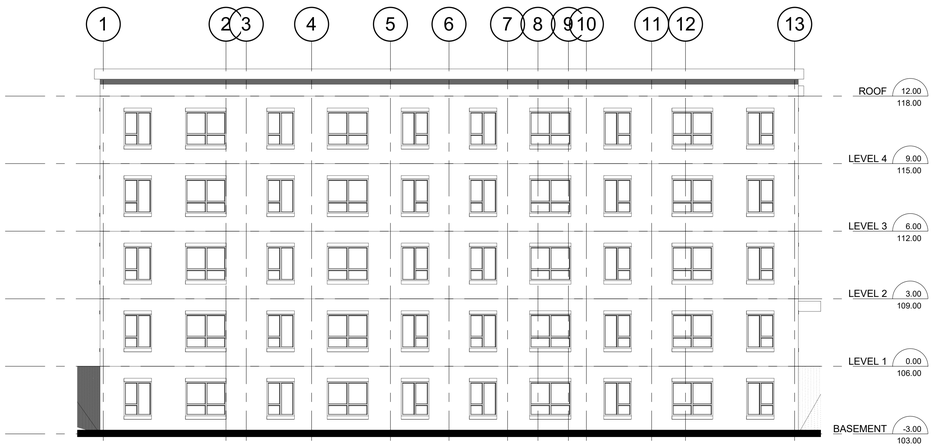
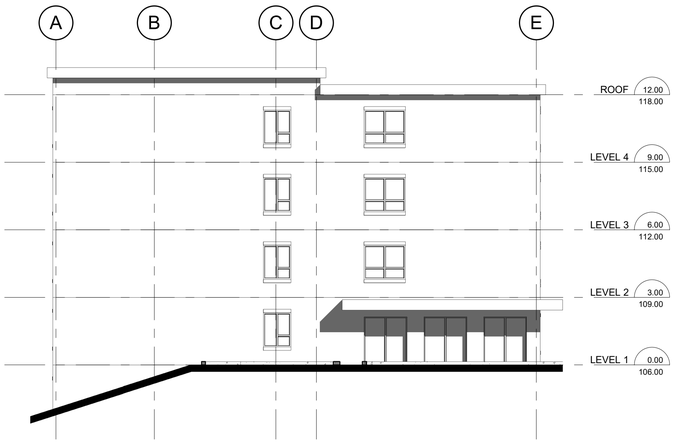
4 WEST ELEVATION
1 : 125



3 SOUTH ELEVATION
1 : 125



2 EAST ELEVATION
1 : 125

1 NORTH ELEVATION
1 : 125

No.	Date	Revision

SRM↗
architects+
urban⋆designers

Project No
23046
Issue Date
2025-01-21
Drawn by
CRZ
Checked by
RPH
Plot Date / Time
2025-01-22 10:32:47 AM

92 NORTHUMBERLAND
KNOX CHURCH UNITED

ELEVATIONS

PRELIMINARY

Drawing Scale
1 : 125
Status

Drawing No. D3.1
Revision No.

APPENDIX C

Topographical Plan with Setback Line

PLAN ILLUSTRATING TOPOGRAPHY OF
92 NORTHUMBERLAND STREET

TOWNSHIP OF NORTH DUMFRIES

REGIONAL MUNICIPALITY OF WATERLOO

SCALE 1 : 250

5 0 5 10 15 metres

J.D. BARNES LIMITED

METRIC DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NOTES

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99956.

ELEVATION NOTES

ELEVATIONS SHOWN HEREON ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM REGION OF WATERLOO BENCHMARK No. 57.
WITH A PUBLISHED OF ELEVATION: 296.06m.

LOCAL BENCHMARK

TOP NUT OF FIRE HYDRANT WITH AN ELEVATION OF 294.79m

(SHOWN ON THE VILLAGE PLAN OF AYR(1884))

NORTHUMBERLAND STREET

PIN 03853-0001(LT)

LOCAL BENCHMARK:
TOP NUT OF FIRE HYDRANT
ELEV=294.79

LOT 11
PIN 03853-0476LT)

PIN 03853-0477(LT)

LOT 10
PIN 03853-0478(LT)

LOT
PIN 03853-0479(LT)

CONDO BLOCK 22918
WATERLOO SOUTH
CONDOMINIUM PLAN 18

LOT 11
VILLAGE PLAN OF WEST AYR(1884)

PART 9, PLAN 67R-722
PIN 03853-1062(LT)
OF NORTHUMBERLAND

Approximate Setback Line, incorporating 3H:1V slope and 6 m Erosion Access Allowance

Proposed Building Location

Slope 1:
25.0 m/7.8 m = 3.2H:1V

Slope 2:
16.6 m/7.6 m = 2.2H:1V

Slope 3:
17.7 m/6.6 m = 2.7H:1V

LIMIT OF PLAN 67R-722

CAUTION

THIS IS NOT A PLAN OF SURVEY AND BE USED FOR TRANSACTION OR MORTGAGE PURPOSES.

THIS PLAN IS PROTECTED BY COPYRIGHT.

BEFORE DIGGING, UNDERGROUND SERVICES SHOULD BE LOCATED ON SITE BY THE RESPECTIVE AGENCIES.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE LOCAL BENCHMARKS HAVE NOT BEEN ALTERED OR DISTURBED AND THAT THE RELATIVE ELEVATIONS AGREE WITH THE INFORMATION SHOWN ON THIS PLAN.

LEGEND

CB	DENOTES CATCHBASIN
GV	DENOTES GAS VALVE
MH	DENOTES MANHOLE
TMH	DENOTES TELEPHONE MANHOLE
HP	DENOTES HYDRO POLE
LS	DENOTES LIGHT STANDARD
H	DENOTES FIRE HYDRANT
WV	DENOTES WATER VALVE
WELL	DENOTES WELL

J.D.BARNES LIMITED
SURVEYING MAPPING GIS
LAND INFORMATION SPECIALISTS
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DH	RL	23-40-014-00
PLOTTED: 5/26/2023		DATED: 5/26/2023

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APPENDIX D

Selected Site Photographs

Photograph 1, Southern portion of top of slope (Slope 1)

Photograph 2, Middle portion of top of slope (Slope 2)

Photograph 3, Northern portion of top of slope (Slope 3)

Photograph 4, View of flood plain from top of slope, slope surface fully vegetated

Photograph 5, View of flood plain from top of slope, slope surface fully vegetated

Photograph 6, View of middle portion of slope from parking lot, mature trees line the top of slope

APPENDIX E

Slope Stability Rating Chart

TABLE 4.2 - SLOPE STABILITY RATING CHART

Site Location: 92 Northumberland Street, Ayr
File No. 2490
Property Owner: Know United Church
Inspection Date: May 13, 2025
Inspected By: Eric Chung
Weather: 15 degree C, sunny

1. SLOPE INCLINATION	**degrees**	**horiz. : vert.**	
a)	18 or less	3 : 1 or flatter	0 ○
b)	18 - 26	2 : 1 to more than 3 : 1	6 ◉
c)	more than 26	steeper than 2 : 1	16 ○
2. SOIL STRATIGRAPHY			
a)	Shale, Limestone, Granite (Bedrock)		0 ○
b)	Sand, Gravel		6 ○
c)	Glacial Till		9 ○
d)	Clay, Silt		12 ○
e)	Fill		16 ◉
f)	Leda Clay		24 ○
3. SEEPAGE FROM SLOPE FACE			
a)	None or Near bottom only		0 ◉
b)	Near mid-slope only		6 ○
c)	Near crest only or, From several levels		12 ○
4. SLOPE HEIGHT			
a)	2 m or less		0 ○
b)	2.1 to 5 m		2 ◉
c)	5.1 to 10 m		4 ○
d)	more than 10 m		8 ○
5. VEGETATION COVER ON SLOPE FACE			
a)	Well vegetated; heavy shrubs or forested with mature trees		0 ◉
b)	Light vegetation; Mostly grass, weeds, occasional trees, shrubs		4 ○
c)	No vegetation, bare		8 ○
6. TABLE LAND DRAINAGE			
a)	Table land flat, no apparent drainage over slope		0 ○
b)	Minor drainage over slope, no active erosion		2 ◉
c)	Drainage over slope, active erosion, gullies		4 ○
7. PROXIMITY OF WATERCOURSE TO SLOPE TOE			
a)	15 metres or more from slope toe		0 ◉
b)	Less than 15 metres from slope toe		6 ○
8. PREVIOUS LANDSLIDE ACTIVITY			
a)	No		0 ◉
b)	Yes		6 ○

SLOPE INSTABILITY RATING VALUES INVESTIGATION RATING SUMMARY **TOTAL** 26

SUMMARY OF RATING VALUES AND RESULTING 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	Boreholes, piezometers, lab tests, surveying, detailed report.

NOTES:

a) Choose only one from each category; compare total rating value with above requirements.

b)If there is a water body (stream, creek, river, pond, bay, lake) at the slope toe; the potential for toe erosion and undercutting should be evaluated in detail and, protection provided if required.