WILLS

PARTNERS IN
ENGINEERING, PLANNING &
ENVIRONMENTAL SERVICES

July 24, 2023

Lovesick Lake Beach Resort Ltd.
4738 Highway 28
Burleigh Falls, Ontario
K0L 2H0

Attention: Steve Purves, Manager

Re: Revised Slope Assessment and Setback Requirements to Support the Application of Official Plan and Zoning By-law Amendments
Lovesick Lake Beach Resort
3340 Strickers Lane, Selwyn, Ontario
D.M. Wills Project No. 18-10844

1.0 Introduction

D.M. Wills Associates Limited (Wills) was retained by Lovesick Lake Beach Resort (Client) to complete a Slope Assessment on a property located at 3340 Strickers Lane, Selwyn, Ontario (Subject Property). The assessment was requested in support of an application for Official Plan Amendment and Zoning By-law amendment to facilitate the development of approximately 40 additional trailer sites at Strickers Resort (Proposed Development).

The purpose of the Slope Assessment was to establish the Long-Term Stable Top of Slope (LTSTOS) and development setback for the proposed trailer sites. The Subject Property contains an approximately east-west trending bedrock escarpment that is bordered by Strickers Lane and Lovesick Lake to the North, Forest Hill Road to the west, undeveloped woodland to the south and Highway 28 to the east.

The natural features surrounding Lovesick Lake is within the jurisdiction of Otonabee Region Conservation Authority (ORCA), and therefore development within and adjacent to this area and associated slopes is regulated by ORCA.

The Slope Assessment included a review of readily available background information, a visual slope inspection as well as determination of the LTSTOS and development setback limit on the basis of the Ontario Ministry of Natural Resources' (MNR) Technical Guide River and Stream Systems: Erosion Hazard Limit (2002) (Slope Guideline).

Wills' Slope Assessment Report was originally submitted to the Client on November 20, 2019. Following circulation to the relevant agencies,

technical review comments were received from ORCA as summarized in their *Appendix A: Technical Services Memo* (File: PPLS-4585 & PPLS-4586), dated November 15, 2022. This Revised Slope Assessment Report addresses these comments, including detailed responses in **Section 5.0**.

2.0 Background Information

The Subject Property contains an approximately east-west trending bedrock escarpment that locally parallels the Lovesick Lake shoreline. Wills understands the Client wishes to expand Strickers Resort by developing approximately 40 additional trailer sites on the top of the escarpment. The north facing slope (Subject Slope) of the escarpment is under consideration for this Slope Assessment.

The Subject Slope is situated along a geological contact (Ontario Geological Survey, 2011) between overlying Paleozoic limestone / dolostone (calcareous) bedrock and underlying Pre-Cambrian plutonic and gneissic bedrock. The younger and more recessive calcareous bedrock defines the escarpment feature and Subject Slope.

A topographic survey completed by Elliott and Parr Ltd. on January 2, 2018, indicates the top of the escarpment gently slopes to the west, with elevations ranging from approximately 271 to 266 metres above sea level (masl) over the approximate 710 metres (m) property length. The toe of slope is generally flat and was considered to have an elevation of 244 masl along the length of the escarpment for the purpose of this Slope Assessment. The high water mark for Lovesick Lake is approximately 242 masl.

The survey contours, including the physical top of slope as determined by Elliott and Parr Ltd. is shown on the Slope Stability and Setback Plan in **Appendix A.**

3.0 Slope Inspection

Wills attended the Subject Property on October 15, 2019, and July 18, 2023, to inspect the conditions of the Subject Slope, including the toe of slope, slope face and crest.

The toe of slope was accessed by a narrow gravel roadway that extends west from Strickers Lane towards Forest Hill Road, parallel to the toe of slope. The gravel roadway is separated from Lovesick Lake by a narrow strip of land that maintained trailer sites at the time of the slope inspection. The toe of slope and gravel roadway are shown on Photographs No. 3 and No. 4 in **Appendix B**.

A road cut is located on the eastern half of the Subject Slope and extends west from Strickers Lane to the top of the escarpment. Wills understands the road cut has been in place since approximately 2017 and was determined to be stable as a result of a Slope Stability Assessment completed by Cambium in 2019.

Exposed calcareous bedrock was observed along the top of the escarpment, along the south face of the road cut and intermittently along the slope face and toe of slope area. The buff to light grey coloured calcareous bedrock was observed to have horizontal bedding and can be described as thin (0.03 m to 0.1 m) to thick (0.3 m to 1.0 m). Bedrock exposure along the road cut is shown on Photographs No.1 and No.2 in **Appendix B.**

A joint (fracture) system comprising generally NE-SW and NW-SE oriented joint sets was observed in exposed bedrock along the top of the escarpment. Joint sets were near vertical, spaced approximately 0.5 m to > 2.0 m apart and showed preferential weathering at surface. Based on observations made along the exposed bedrock faces, the joint sets are vertically discontinuous and do not fully penetrate the various sedimentary beds. The massive to blocky rock mass conditions of the exposed bedrock is shown on Photographs No. 5 and No. 6 in **Appendix B**.

Overburden was described as silty sand topsoil with abundant roots / rootlets, and was less than 0.5 m thick where observed in profile along the exposed bedrock faces (e.g. road cut excavation), as shown on Photographs 5, 6, 8 and 9. Additionally, overburden thickness observed in 3 hand auger holes advanced on the face of the Subject Slope was less than 0.3 m. A thin veneer of overburden is interpreted to overlie the bedrock across the Subject Slope. Localized pockets of deeper overburden may be present; however, the observed overburden / bedrock relationship suggests the Subject Slope profile, and overall stability, is controlled by the underlying bedrock.

The Subject Slope face was observed to be free of groundwater seepage and near vertical rock faces (i.e., road cut and areas along the toe of slope) were observed to be stable. It was noted that the Subject Slope is well vegetated and no major disturbance in the form of slumping or tension cracking was observed. Additionally, no evidence of significant root or frost wedging of the bedrock was observed that would compromise the stability of the Subject Slope in context of the Proposed Development.

The toe of slope area was also observed to be well vegetated and there was no evidence of active toe erosion at the time of the slope inspection. The existing use of the area between the toe of slope and Lovesick Lake

for trailer sites and a gravel roadway suggests this area is not prone to significant flooding or erosional processes. The distance between the toe of slope and Lovesick Lake shoreline was observed to be less than 15 m within the limits of the Strickers Resort property, and greater than 15 m along the section of the Subject Slope between the Strickers Resort western property boundary and Forest Hill Rd.

4.0 Slope Assessment and Setback Determination

4.1 Slope Assessment

A Rating Value of 24 was determined for the Subject Slope on the basis of the MNR's Slope Guideline "Slope Stability Rating Chart" included in **Appendix C**. A value of 0 was assigned to Criteria No 7 "Proximity of watercourse to slope toe" due to the presence of a road and buildings between Lovesick Lake shoreline and the Subject Slope toe, which is therefore not exposed directly to erosion from the watercourse.

Based on this rating, this letter is provided to summarize results of Wills visual inspection of the Subject Slope.

An inferred LTSTOS was determined for the Subject Slope based on MNR's Slope Guideline. To determine the LTSTOS, a stability component (allowance for stable slope) and toe erosion component (toe erosion allowance) are applied as a function of the slope composition and susceptibility of the toe of slope to erosion. The stability component is applied as a setback gradient from the toe of slope (projected towards the slope crest) and a horizontal erosion component is applied in addition. Figure 95b in MNR's Slope Guideline (**Appendix C**) illustrates these determinations.

The steepest or "worse case" sections of the Subject Slope were determined to have inclinations ranging from approximately 1.5H:1V (horizontal: vertical) to 2H:1V using the topographic survey data. Based on the limestone / dolostone composition of the Subject Slope, a stability setback gradient of 1H:1V was applied from the toe of slope (244 masl). This stability setback gradient was determined on the basis of *Table 4.3 Observed Stable Slope Inclinations* under section 4.8 of the MNR's "Geotechnical Principles for Stable Slopes" document on which the MNR's Slope Guideline is based. *Table 4.3* provides a stable slope inclination for shale and limestone that ranges from near vertical to 1H:1V. Based on Wills' professional experience and observations of the bedrock composition and structure, the application of the 1H:1V gradient is considered conservative.

Because the inclination of Subject Slope is flatter than the recommended 1H:1V stability gradient, the stability gradient does not intersect the Subject Slope and is observed to extend above the slope face. As a result, the physical top of slope, as determined during the Elliott and Parr Ltd survey, was used to represent the stability setback component and is considered conservative. The physical top of slope is shown on the Slope Stability and Setback Plan in **Appendix A**.

Based on the existing conditions observed at the toe of slope area (width less than 15 m and no sign of active toe of slope erosion), and Table 3 of the MNR's Slope Guideline, a 2 m toe erosion setback is recommended. The additional 2 m toe erosion allowance does not significantly change the projection of the 1H:1V stability setback and was not applied as a result.

During the slope inspection, minor bedrock irregularities and locally steep bedrock exposures were observed directly above the physical top of slope. Wills determined that these irregularities constitute localized slope hazards and should be captured by the LTSTOS limit, as shown on the Slope Stability and Setback Plan in **Appendix A.** An example of these bedrock irregularities above the physical top of slope are shown on Photograph No. 7 in **Appendix B.**

4.2 Development Setback Determination

Based on ORCA's *Watershed Planning & Regulation Policy Manual* (updated December 4, 2015), a development setback of 6 m from the predicted LTSTOS is required for confined / apparent valley systems. This 6 m setback corresponds to the 6 m erosion access allowance of the MNR's Slope Guideline.

For the purpose of the Proposed Development, a 6 m development setback was determined suitable and was applied from the LTSTOS limit determined by Wills. This 6 m development setback is shown on the Slope Stability and Setback Plan in **Appendix A**.

5.0 Response to ORCA Comments

5.1 Comment 1. – Slope Stability Guideline

ORCA's comment:

"*The CVC's Slope Stability Definition & Determination Guideline is a document approved for the use within the CVC watershed. Otonabee Conservation has not prepared a slope definition guideline and relies on*

the criteria established in the Technical Guide – River & Stream Systems: Erosion Hazard Limit (MNRF 2002) for Erosion Hazard Limit."

Wills Response:

Wills' initial Slope Assessment (2019 submission) has been revised according to the Technical Guide – River & Stream Systems: Erosion Hazard Limit (MNRF 2002) for Erosion Hazard Limit. The only difference in the assessment results pertains to the toe erosion allowance modified from 1 m in Wills' initial assessment to 2 m in the present document. As mentioned in **Section 3.1,** the additional 2 m toe erosion allowance does not significantly change the projection of the 1H:1V stability setback and was not applied as a result.

5.2 Comments 1.a.i and 1.a.ii – Stability Gradient

ORCA's comment:

"*Within Section 3.1 Slope Assessment, there is reference to the existing slope of 1.5:1 being flatter than the recommended 1H:1V stability gradient. This statement assumes that Otonabee Conservation has agreed to or provided evidence that calcareous bedrock is stable 1:1 slope.*"

Wills Response:

According to ORCA's comment 1.a.i, ORCA relies on the criteria established in the *Technical Guide – River & Stream Systems: Erosion Hazard Limit (MNRF 2002)*. This Technical Guide is based in part on another MNR document from 1998 titled "Geotechnical Principles for Stable Slopes". Section 4.8 of the latter document indicates that slopes comprised of shale or limestone material generally have a stable inclination of near vertical to 1H:1V. Shallower stable slope inclinations are often reserved for shale bedrock due to its generally friable nature and poor structural properties. Based on Wills' professional experience and site-specific observations, a 1H:1V gradient was considered suitable for the Subject Slope (limestone / dolostone bedrock), and is considered conversative.

The present Slope Assessment assumes that ORCA agrees with Section 4.8 of the Geotechnical Principles for Stable Slopes (MNR 1998).

ORCA's comment:

"*The Slope Assessment needs to evaluate the soils and bedrock and make a statement of stability.*"

Wills Response:

Soils and bedrock constituting the Subject Slope are described in **Section 2.0** of this Assessment. It is Wills' opinion, based on the present assessment, that the Subject Slope is stable under existing conditions. Subject to the application of the LTSTOS and setbacks determined in this Assessment, the Subject Slope will remain stable following the Proposed Development.

Wills' field investigations confirmed that the Subject Slope maintains a thin and discontinuous veneer of overburden soils. These soils were observed to be well vegetated with no signs of active erosion or instability. Based on the nature of the bedrock escarpment (horizontal bedrock at or near surface), the shallow soils will not be subject to any structural loading from the Proposed Development and will remain in their current stable configuration.

ORCA's comment:

"Is it the opinion of D.M. Wills Associates, that the calcareous bedrock, within the escarpment is stable at a 1H:1V slope?"

Wills Response:

It is Wills' opinion that the calcareous bedrock, within the escarpment is stable at a 1H:1V slope, based on section 4.8 of the *Geotechnical Principles for Stable Slopes (MNR 1998)* document and Wills' professional experience.

5.3 Comment 2. – Fractured Bedrock

ORCA's comment:

"How does the fractured nature of the bedrock affect its stability?"

Wills Response:

Based on the horizontal bedding and discontinuous nature/vertical orientation of the observed joint sets (fractures), the fractures are not expected to significantly affect the bedrock stability. Fractures dipping out of the slope face were not observed, which would typically indicate the potential for a sliding failure, if present. Conversely, steeply dipping fractures into the slope face were not observed, which can indicate the potential for toppling failures. The possibility for toppling failures is further mitigated by the observation of joint sets that do not fully penetrate the sedimentary beds, therefore precluding the development of tall slabs that are prone to this type of instability. Wills observed that all potential planes of weakness were either horizontal (bedding planes) or near vertical (joint

sets), which limit the potential for instability as advantageous slip surfaces are not present.

5.4 Comment 3. – Forest Hill Road Connection

ORCA's comment:

"The LTSTOS plus the 6.0 m Access Allowance needs to be added to the slope between Forest Hill Road and Lot #1. The access road and connection to Forest Hill Road will need to be outside the Erosion Hazard Limit.

Wills Response:

Wills completed a second site visit on July 18, 2023, to assess the stability of the section of the slope located between the western limit of the Subject Property and Forest Hill Road. Photographs captured during that second visit are included as Photographs No. 8 to No. 11 in **Appendix C**. Wills findings have been included in the present Slope Assessment, in particular on the Slope Stability and Setback Plan provided in **Appendix A**.

6.0 Closing

As a result of Wills' Slope Assessment, a predicted LTSTOS including a development setback limit/erosion hazard allowance was determined for the Subject Slope in context of the Proposed Development. Based on the shallow inclination of the Subject Slope with respect to generalized stability setback guidelines, Wills determined that the physical top of slope generally represents a conservative stable top of slope limit. Minor adjustments to the physical top of slope were made on the basis of Wills' observations in determining the LTSTOS limit.

A 6 m development setback/erosion access allowance aligns with the Slope Guideline as well as ORCA's *Watershed Planning & Regulation Policy Manual* and is applied south from the LTSTOS.

The Slope Assessment represents the conditions at the Subject Property only at the time of the slope inspections and is based on the information referenced and contained in this report. Wills attests that to the best of our knowledge, the information presented in this report is accurate. The use of this report for other projects without written permission of the Client and Wills is solely at the user's own risk. This report must be reviewed and approved by the relevant regulating agencies prior to being relied upon for planning and / or construction purposes.

We trust that the information presented in this report meet your needs at this time. Do not hesitate to contact the undersigned if you have any questions or concerns.

Respectfully submitted,

Ian Ames, M.Sc., P.Geo.
Group Lead, Environmental Monitoring and Management

IA/RB/mp

Encl. Appendix A – Slope Stability and Setback Plan
Appendix B – Photographic Log
Appendix C – Ontario Ministry of Natural Resources' Technical Guide River and Stream Systems: Erosion Hazard Limit (2002)

Appendix A

Slope Stability and Setback Plan

Appendix B

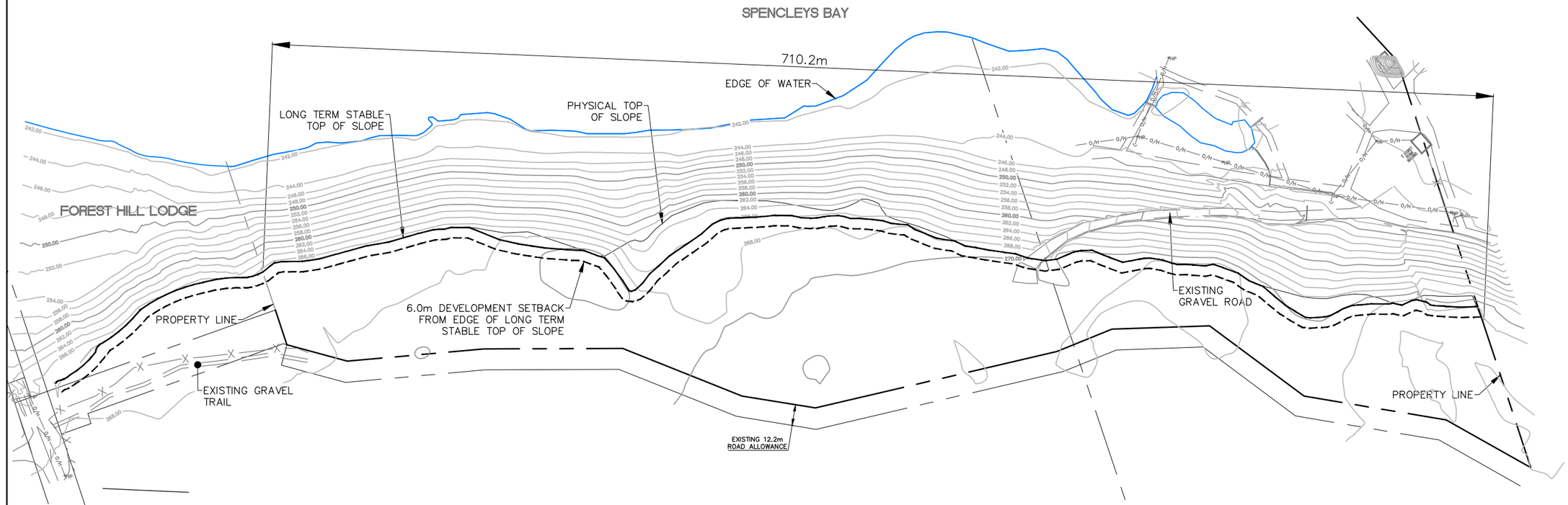
Photographic Log

Appendix C

Ontario Ministry of Natural Resources'
Technical Guide River and Stream Systems:
Erosion Hazard Limit (2002)

Appendix A

Slope Stability and Setback Plan



TRUE NORTH

KEY PLAN

REVISIONS

No.	Description	Date
2	ISSUED FOR WILLS SLOPE ASSESSMENT	07/20/23
1	ISSUED TO MECP	04/26/23

METRIC Dimensions are in METRES and/or MILLIMETRES unless otherwise shown

LEGEND TO BE READ IN CONJUNCTION WITH OPSD 100 SERIES

- EX R.O.W/PROPERTY BOUNDARY
- EDGE OF LONG TERM STABLE TOP OF SLOPE
- 6.0m SETBACK FROM LONG TERM STABLE SLOPE
- TOP OF SLOPE

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Project Name/Location

LOVESICK LAKE TRAILER PARK

BURLEIGH FALLS, ONTARIO

Drawing Title

SLOPE STABILITY AND SETBACK PLAN

Drawn By:	SCALE: Horz. 1: 2500 Vert. –	
Designed By:	Plot Date: July 20, 2023	
Checked By:	Project No.: 19-10844	Sht. No.:
Engineer:	Dwg File No.:10844-ENV	00

Appendix B

Photographic Log

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Appendix B – Site Investigation Photographic Log

Client Name: Lovesick Lake Beach Resort Ltd.	**Site Location:** 3340 Strickers Lane, Selwyn, ON

Photograph No.: 1
Date: October 15, 2019
Direction: East
Description: Exposed limestone / dolostone bedrock on south side of road cut.

Photograph No.: 2
Date: October 15, 2019
Direction: Southeast
Description: Exposed limestone / dolostone bedrock on south side of road cut.

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Appendix B – Site Investigation Photographic Log

Photograph No.: 3
Date: October 15, 2019
Direction: East
Description: Gravel roadway adjacent to toe of slope. Vegetated toe of slope and exposed bedrock visible on right side of photograph.

Photograph No.: 4
Date: October 15, 2019
Direction: West
Description: Gravel roadway adjacent to toe of slope. Vegetated toe of slope visible on left side of photograph.

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Appendix B – Site Investigation Photographic Log

Photograph No.: 5
Date: October 15, 2019
Direction: East
Description: Massive to blocky limestone / dolostone bedrock. NE / NW jointing visible. Top of escarpment, east side.

Photograph No.: 6
Date: October 15, 2019
Direction: East
Description: Exposed Massive to blocky limestone / dolostone bedrock. Top of escarpment, central area.

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Appendix B – Site Investigation Photographic Log

Photograph No.: 7
Date: October 15, 2019
Direction: West
Description: Exposed limestone / dolostone bedrock along escarpment slope crest. Irregular bedrock topography above physical top of slope.

Photograph No.: 8
Date: July 18, 2023
Direction: East / Southeast
Description: Exposed limestone / dolostone bedrock along the east side of Forest Hill Rd extension to the north.

Appendix B – Site Investigation Photographic Log

Photograph No.: 9
Date: July 18, 2023
Direction: East / Northeast
Description: Exposed limestone / dolostone bedrock along the east side of Forest Hill Rd private extension to the north.

Photograph No.: 10
Date: July 18, 2023
Direction: East
Description: Vegetated slope between the western property line and Forest Hill Rd.

Appendix B – Site Investigation Photographic Log

Photograph No.: 11
Date: July 18, 2023
Direction: South
Description: Exposed limestone / dolostone bedrock along escarpment slope crest between the western property line and Forest Hill Rd.

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Appendix C

Ontario Ministry of Natural Resources'
Technical Guide River and Stream Systems:
Erosion Hazard Limit (2002)

TABLE 4.2 - SLOPE STABILITY RATING CHART

Site Location: 3340 Strickers Lane, Selwyn, Ontario File No. 10844

Property Owner: Strickers Resort Inspection Date: July 18, 2023

Inspected By: Ralf BOLVIN Weather: 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** 24

Defining the *erosion hazards* limit for the two basic types of *river and stream systems* landforms should be based on the following approaches:

Confined systems (see Figures 95a and 95b)

toe erosion allowance* (from Table 2; OR 100 times the average annual recession rate of the toe) **OR** as determined by a study using accepted geotechnical and engineering principles

+ allowance for stable slope 3:1 (h:v) minimum **OR** as determined by a study using accepted geotechnical principles

+ erosion access allowance 6 metres **OR** as determined by a study using accepted scientific, geotechnical and engineering principles

* Note:

.where the soil type is not known, Table 3 recommends the use of a 15 m toe erosion allowance; and

.when using average annual recession rates to determine the toe erosion allowance a minimum of 25 years of reliable information is recommended.

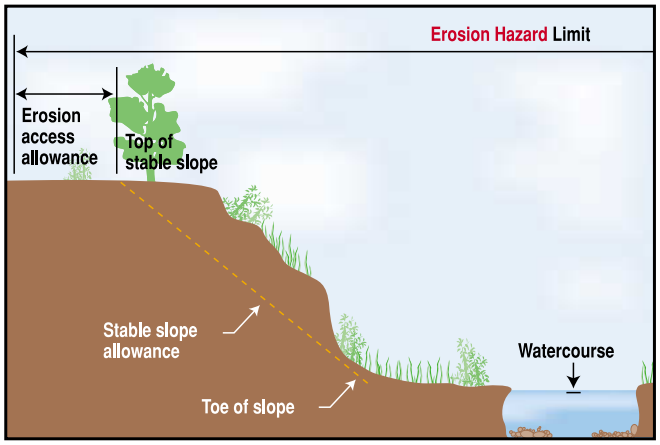


Figure 95 a Confined System, Erosion hazard limit where toe of valley slope is located more than 15 metres from the watercourse

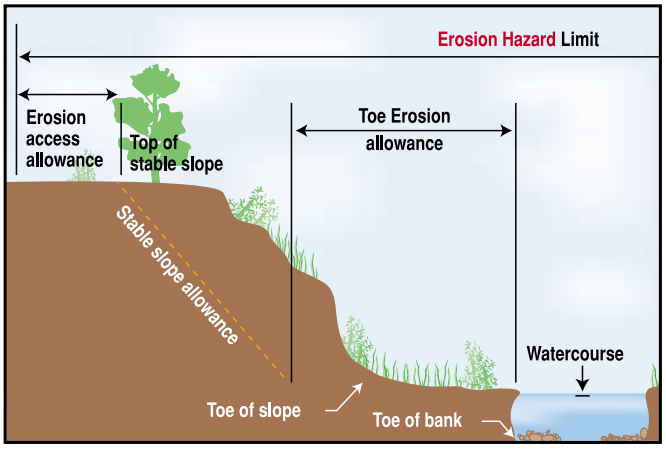
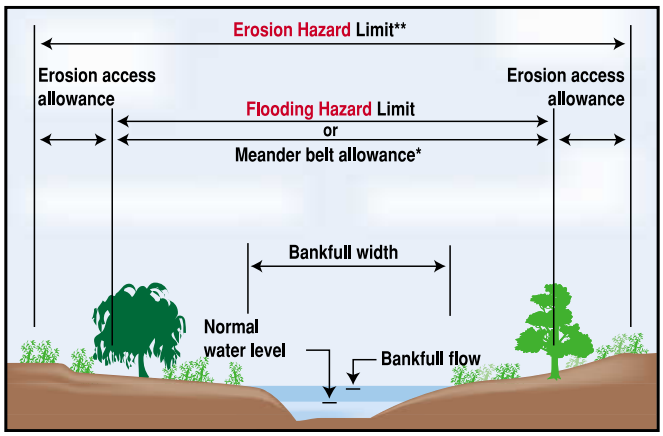


Figure 95 b Confined System, Erosion hazard limit where toe of valley slope is located less than 15 metres from the watercourse

Unconfined systems (see Figure 96)

an allowance for the *flooding hazard* limit OR meander belt allowance 20 times the bankfull channel width centred over the meander belt axis **OR** as determined by a study using accepted engineering principles

+ erosion access allowance 6 metres **OR** as determined by a study using accepted scientific, geotechnical and engineering principles



(NOT TO SCALE)

* The bankfull channel width with the largest amplitude meander in the reach is used to determine Meander Belt Width.

** Erosion access allowance is also added to the flooding hazard limit, when known, to define the erosion hazard limit.

Figure 96 Erosion Hazard Limit

The following subsections clarify how each of these components for defining *erosion hazards* should be determined and where flexibility may be provided to undertake studies to address unique, local situations (e.g., where the approach(es) may be considered excessive or insufficient to define the area of provincial interest). Where studies using accepted scientific, geotechnical and/or engineering principles were used to determine the landward limit of the *erosion hazards* are approved by the municipality, they should be applied only within the area studied.

Table 3: Determination of Toe Erosion Allowance

MINIMUM TOE EROSION ALLOWANCE - River Within 15 m of Slope Toe*

Type of Material Native Soil Structure	**Evidence** of Active Erosion** **OR** Bankfull Flow Velocity > Competent Flow Velocity***	**No evidence** of Active Erosion** **OR** Bankfull Flow Velocity <Competent Flow Velocity***		
	RANGE OF SUGGESTED TOE **EROSION ALLOWANCES**	Bankfull Width		
		< 5m	5-30m	> 30m
1.Hard Rock (granite) *	0 - 2 m	0 m	0 m	1 m
2.Soft Rock (shale, limestone) Cobbles, Boulders *	2 - 5 m	0 m	1 m	2 m
3.Stiff/Hard Cohesive Soil (clays, clay silt), Coarse Granular (gravels) Tills *	5 - 8 m	1 m	2 m	4 m
4.Soft/Firm Cohesive Soil, loose granular, (sand, silt) Fill *	8 - 15 m	1-2 m	5 m	7 m

*Where a combination of different native soil structures occurs, the greater or largest range of applicable toe erosion allowances for the materials found at the site should be applied

****Active Erosion** is defined as: bank material is exposed directly to stream flow under normal or flood flow conditions where undercutting, oversteepening, slumping of a bank or down stream sediment loading is occurring. An area may have erosion but there may not be evidence of 'active erosion' either as a result of well rooted vegetation or as a result of a condition of net sediment deposition. The area may still suffer erosion at some point in the future as a result of shifting of the channel. The toe erosion allowances presented in the right half of Table 3 are suggested for sites with this condition. See Step 3.

*****Competent Flow Velocity** is the flow velocity that the bed material in the stream can support without resulting in erosion or scour. For *bankfull width* and *bankfull flow velocity*, see Section 3.1.2.

Where there is evidence of high variability in soil composition, the soil composition is not known, and/or evidence of high erosion activity, the 15 metre toe erosion allowance should be applied.

STEP 2: Determine whether or not there is evidence of active erosion OR if the bankfull velocity is greater than the competent flow velocity.

Visible on-site evidence of active erosion may include a bare or vegetation-free river or stream bank which is directly exposed to water flows, and where undercutting, over-steepening, slumping of the bank or high downstream sediment loading is occurring. Slumping, scars, and bare stream banks that are not directly exposed to river flows are slope stability issues and should not be considered as evidence of "active erosion".

If field investigations determine that active erosion is occurring and as long as the soils at the site can be identified, it may not be necessary to determine the bankfull or competent flow velocities at the site. The Toe Erosion Allowances from Table 3 can be applied directly without any further calculations.