

Technical Memorandum

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Via Email:	Joe Mitchell <jmitchell@summerland.ca>
To:	Joe Mitchell, Director of Works and Infrastructure, Deputy CAO
From:	Brittany Linnett, P.Eng., Senior Geotechnical Engineer
cc:	Bobby Williamson, Manager of Development Service
Date:	September 25, 2026
Re:	Preliminary Slope Hazard Assessment, Revised Rainfall Criteria Response, Rev 1 Summerland, BC
Project No.	2605393

Introduction

Brittany Linnett, P.Eng. of Terrane Geoscience Inc (Terrane) was contacted by Bobby Williamson of the District of Summerland (DoS), on August 16, 2026 regarding slope hazard assessments for areas of Summerland impacted by the Bald Range Fire. From information discussed in a meeting on August 16, 2026 there are multiple areas of Summerland where the Bald Range Fire burnt slopes uphill of homes, potentially causing dangerous conditions. A consulting rate sheet was requested and provided by Terrane on August 16, 2026.

The Bald Range Fire started on August 7, 2026 and burned 25,163 hectares including portions of Hunters Hill, Cartwright, Garnet Valley, Deer Ridge, and outlying areas of the DoS.

As part of the preliminary slope hazard assessment Terrane provided recommended rainfall evacuation criteria. From phone conversations with Joe Mitchell on September 16 and 18, 2026, DoS has requested revised rainfall recommendations in response to rain events which occurred between August 29 and September 17, 2026, when no indications of slope instability were observed during inspections by DoS staff.

Rainfall Triggers

In the previous Preliminary Slope Hazard Assessment provided by Terrane (August 2026), rainfall triggers for post wildfire debris flows and slope instability were discussed (Statlu, 2021). Generally, post wildfire slopes are vulnerable to debris flows and/or landslide hazards during high intensity and/or prolonged rainfall events.

Statlu Environmental Consulting developed rainfall trigger guidelines which are detailed in the report “*Wet Weather Shutdown Criteria*” for the MFLNRORD Southern Engineering Group, dated April 29, 2021. For the purposes of the initial hazard assessment these criteria developed for the southern interior of British Columbia are considered to be applicable.

Table 1 details rainfall intensity and total shutdown criteria for different rainfall zones. In the case of wildfire experienced within the last 3 years the “Identified Unstable Conditions” triggers are recommended.

Table 1 - Proposed Shutdown Criteria (from Statlu, 2021)

Zone	Zone (annual precipitation)	Time Period			
		One hour	12 hour	24 hour	48 hour
1	Very wet (1,500 mm to 3,000 mm)	N/A	28 mm	35 mm	60 mm
2	Wet (1,100 mm to 1,500 mm)	N/A	25 mm	30 mm	50 mm
3	Average (600 mm to 1,100 mm)	10 mm	22 mm	25 mm	40 mm
4	Dry (100 mm to 600 mm)	8 mm	18 mm	20 mm	30 mm
5	Identified Unstable Conditions	6 mm	10 mm	15 mm	20 mm

Between August 29 and September 16, 2026 three rainfall events which approached the 12 hour, 10 mm, criteria occurred. During or immediately after each event DoS staff completed a visual assessment of the areas noted in Terrane’s previous memos and no visible signs of slope instability or debris flows were noted.

In the case that the Zone 5 criteria in Table 1 are met the response may be modified from previous recommendations to a visual inspection by DoS staff.

Based on the post-wildfire debris flow study, “Storm rainfall conditions for floods and debris flows from recently burned areas in southwestern Colorado and southern California” (Cannon et al, 2008), it was found that for the first year after a wildfire affected an area debris flows may be triggered by a rainfall event less than or equal to the 2 year return period storms and/or an intensity great than or equal to 10mm/hr for as little as 30 minutes. The 2 year rainfall amounts for Summerland from Environment and Climate Change Canada are in Table 2, below.

Table 2 - Summerland IDF Historical Data, ECC 2026

Duration	Total Precipitation (mm)	Intensity Rate (mm/hr)
5 min	3.1	37.1
10 min	4.4	26.2
15 min	5.1	20.5
30 min	6.4	12.8
1 h	8.2	8.2
2 h	10.3	5.1
6 h	14.0	2.3
12 h	17.2	1.4
24 h	20.5	0.9

If the 2 year IDF storm event in Table 2 is met or exceeded, or there is a rainfall intensity greater than or equal to 10 mm/hr for 30 minutes or longer, potentially affected properties should be alerted and a professional geotechnical engineer should be contacted.

The above rainfall criteria do not include rain on snow events. A more detailed evaluation of affected slopes and potential triggers should be completed prior to snowfall and/or freshet.

Recommendations

The following updated recommendations apply to the rainfall and response criteria:

- If the rainfall criteria in Table 1 are met, inspections by DoS staff should continue until 24 hours after the end of the rain event, or after an assessment by a qualified professional engineer.
- If the rainfall criteria in Table 2 are met, impacted properties should remain on alert until 24 hours after the end of the rain event for 30 minute, 1 hour, and 12 hour criteria; or, 48 hours after the end of the rainfall event if the 24 hour criteria is exceeded, or after an assessment by a qualified professional engineer.
- A rainfall gauge with remote monitoring and alarm capabilities should be placed within 3 km and 150 m of elevation of the impacted areas. If remote monitoring is not available, then the gauge should be checked hourly during significant rainfall.

In addition to measures resulting from the exceedance of the rainfall criteria, the public and DoS should remain aware of other indicators of geotechnical instability.

Potential indications of geotechnical instability which should trigger notification of a professional geotechnical engineer include:

- Significant surface runoff;
- Surficial erosion of soil or other materials; and,
- Minor repeated rockfall.

More critical indicators of potential debris flows or other instability include:

- Pulses of sediment-laden (turbid) water in streams, especially in gullies;
- Streams suddenly drying up when conditions are otherwise wet;
- Constant small rock falls;
- Cutslope slumps that block ditches and/or roads;
- Tension cracks appearing in road fills or slopes;
- Recent avalanches, landslides, or debris flows or their deposits observed that were not present during the previous day; and,
- Diverted streams with flow appearing in new stream courses that were previously dry.

If any of these critical indicators of instability are observed, potentially impacted properties should be evacuated until a qualified professional engineer has assessed the site.

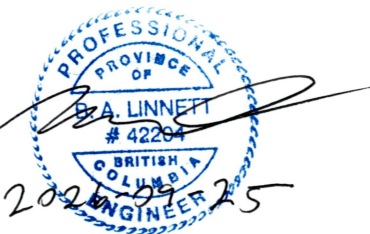
Long term slope stability and potential debris flow/debris flood hazards should be assessed by a Qualified Geotechnical Engineer prior to removal of the rainfall evacuation criteria noted above.

Closure

Please contact us with any questions, comments or concerns.

Regards,

Terrane Geoscience Inc.



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