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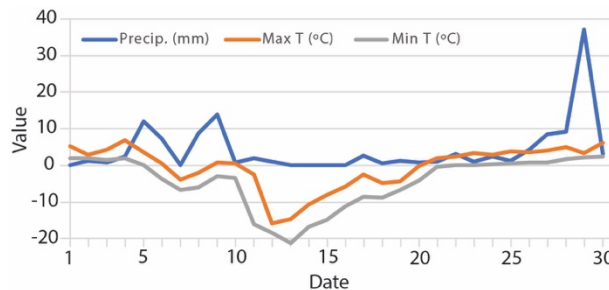
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January 31, 2024  
 File: SLRD24001

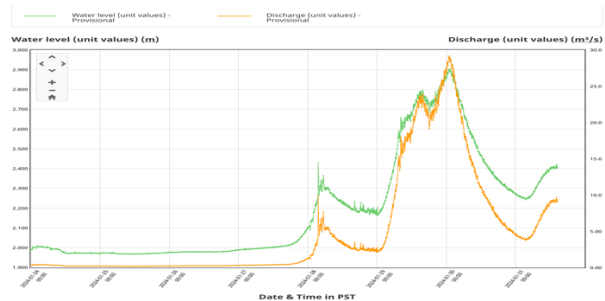
**Re:** Emergency hazard assessment, Jason Creek at Reid Road, near Pemberton, BC.

**Introduction**

The late January atmospheric river was notable *not* because of the amount of rain (Figure 1), but rather because it was a rain-on-snow event with freezing levels rising from valley bottom to over 2000 m elevation. This caused rapid runoff and a dramatic rise in water levels on streams and rivers. Pemberton Creek recorded a 10-year return flow on January 30, 2024 (Figure 2).



**Figure 1.** January 2024. Precipitation and temperature, Pemberton Airport.



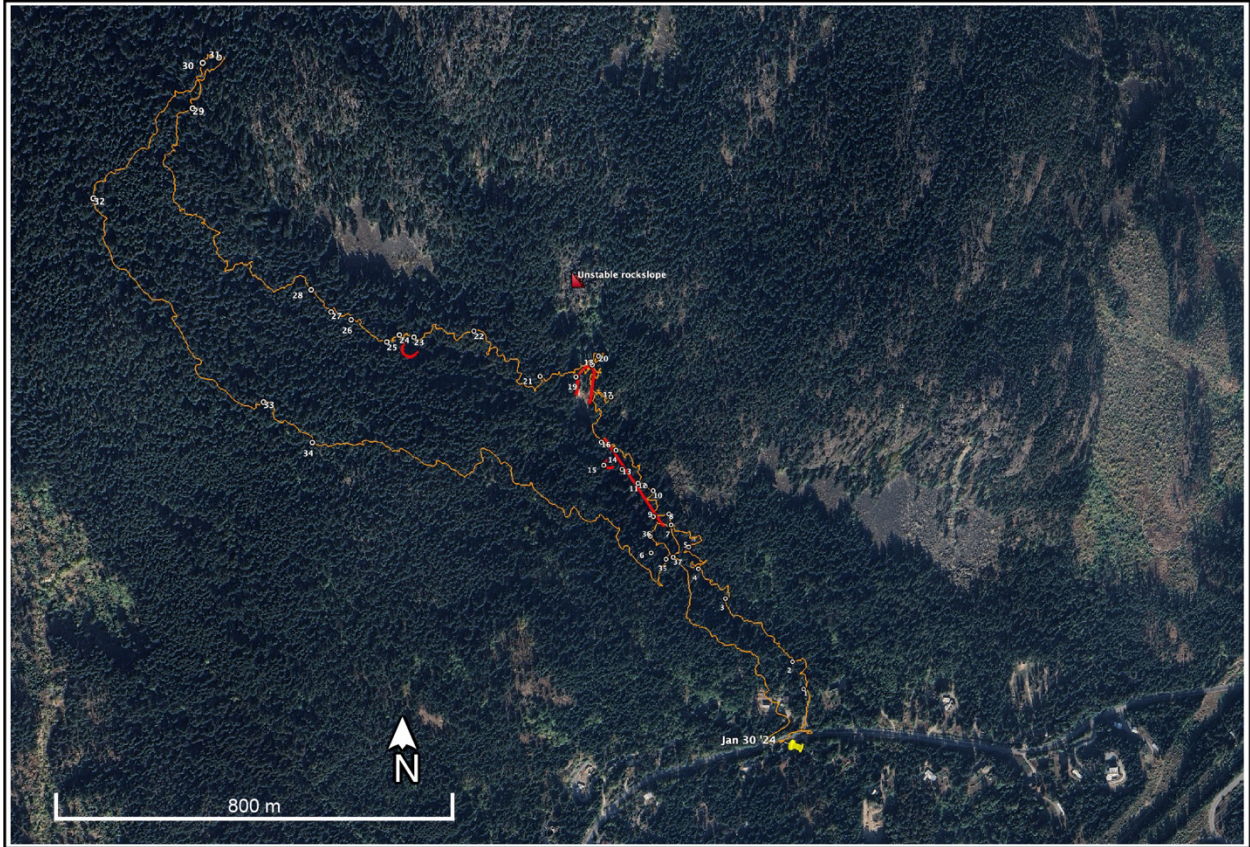
**Figure 2.** January 2024. Discharge, Pemberton Creek.

On January 29, 2024 residents on Reid Road noted muddy flows on Jason Creek (Photo 1). Concern was expressed by residents on lots affected by the landslide hazard alert (1782, 1788, 1794, 1802 Reid Road) ongoing from November 2021, and in response SLRD requested a site visit by a qualified professional to review the terrain along Jason Creek between Reid Road and the 2021 debris flow source area (Figure 3).

Cordilleran conducted a 3.5 hour long site visit on January 30, 2024 (Figure 3, Appendix 1). This work was done under contract as “Emergency Operations Centre Task#24-0773” titled “Emergency Geotechnical assessment for Reid Road at Jason Creek.” This memo presents observations from the site visit. Field observation site locations and observations are presented in Appendix 1. If desired, locations can be compared with similar Appendix of sites in Cordilleran (2021). A brief iMessage summary was provided to SLRD January 30, 2024 immediately following the field assessment.







**Figure 3.** January 30, 2024 field-traverse of the incised reach of Jason Creek. Numbered waypoints are provided in Appendix 1.



**Photo 1.** Jason Creek, Monday January 29, ~9 am. Photo by Peter Jean.



**Photo 2.** Jason Creek, Wednesday January 31, ~12 noon. Photo by Peter Jean.



## **Qualifications**

Cordilleran (2021) conducted the emergency assessment in November/December 2021 and was involved in field work (field traverses, test-pitting) and report preparation for the BGC (2022) risk assessment report. As such, Cordilleran is familiar with both the previous field conditions and the risk assessment, and is able to judge with confidence any significant change in terrain conditions between 2021 and 2024 (see before-after photo pairs, Appendix 2).

## **Observations**

Cordilleran walked up the river left bank, staying above the channel floor by >5-10 m elevation; this to keep out of the hazard area posed by a debris flow, but within the ravine so as to be able to observe changed conditions. A few selected photos are provided below showing before (2021, 2022) and after (2024) conditions (Appendix 2). There were several areas where small bank failures had occurred, there were sections of bank erosion, and there were numerous trees that have fallen across the channel. But otherwise, there were no dramatically worsened conditions observed at any of the key sites of concern.

## **Conclusions**

The hazard/risk conditions along Jason Creek remain similar to that described by Cordilleran (2021) and BGC (2022). There is visible evidence of ongoing creep in two locations: 1) in old landslide debris forming a valley fill between 570-640 m elevation, and 2) at 720 m elevation at the headscarp of the 1991/2021 debris flow. Slope creep of debris towards the channel conveys material to the channel banks, and the high streamflow condition then flushed this material downstream resulting in the muddy conditions noted January 29, 2024. Given the unstable terrain within the Jason Creek ravine, there remains an imminent landslide hazard on Jason Creek during periods of wet weather.

## **References**

- BGC 2022. Quantitative Landslide Hazard and Risk Assessment – Reid Road Area, Electoral Area C. BGC Project No.: 1358010. Report to Squamish-Lillooet Regional District, Pemberton, BC.
- Cordilleran, 2021. Emergency assessment report for Jason Creek at Reid Road, during the atmospheric rivers of November 2021. Report to Sarah Morgan, SLRD EOC Director, Squamish Lillooet Regional District, Pemberton, BC.

## **Closure**

This report was prepared for use by Squamish Lillooet Regional District, including distribution as required for purposes for which the report was commissioned. The report may be distributed to other third parties without prior written consent by Cordilleran Geoscience. The work has been carried out in accordance with generally accepted geoscience practice. Judgment has been applied in developing the conclusions stated herein. No other warranty is made, either expressed or implied to our clients, third parties, and any regulatory agencies affected by the conclusions.

This was a rapid emergency site assessment completed to determine if conditions have changed considerably from previous observations in 2021 and 2022, and if so, whether an evacuation



order was required. Land owners are encouraged to consult with Qualified Practitioners to develop site-specific risk management measures.

If you have any questions please call,

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**Appendix 1.** Observation sites, January 30, 2024 along Jason Creek above Reid Road.

Title	Latitude	Longitude	Description
1	50.3479918	-122.75226	Right bank, fresh skin failures, 1-2 m wide, 2 and 6 m above bed, 25 cm thick
2	50.3484574	-122.75256	Two trees thrown across channel at 2021 bank failure site
3	50.3495791	-122.75437	Two trees thrown from right bank across channel
4	50.3500952	-122.75508	Tree throw left bank, and 6-7 new trees from both banks in next 100 m
5	50.3504591	-122.75533	Tension crack at top of undermined left bank 10 m above water level
6	50.3504102	-122.75626	New sidewall failure 10 m tall, 7 m wide, 1 m thick
7	50.3508148	-122.75577	Tree throw left bank, at toe of lateral tension crack, throw from creep
8	50.3509897	-122.75583	Fresh tension cracks 10 m upslope
9	50.3509622	-122.7562	Two logs form jam at high water level
10	50.351354	-122.75621	Lateral at toe of slope, fresh exposed bits, poss creep
11	50.3514258	-122.7564	Transverse crack, probably 2021
12	50.3514729	-122.75657	Right bank from here to end of valley fill, lots of bank erosion, and a large windthrow
13	50.351692	-122.75695	Fresh tree throw right bank
14	50.351979	-122.75709	Transverse cracks at concave break, head of zone of depletion from creep in old landslide debris
15	50.3517612	-122.75737	Slump in right bank, 20 m wide, 10 m tall, 5 m thick, dropped 2-3 m, present in 2021.
16	50.3521007	-122.75742	Old slough right bank
17	50.3527658	-122.7572	Vertical tension crack in rock bluff left side of unstable area
18	50.3532116	-122.75761	Possible new tension crack 5 m long at top of unstable area
19	50.3530427	-122.75798	Top right active unstable area. Maybe minor creep and some old tree throw, but nothing dramatically different from 2021.
20	50.3533356	-122.75747	Spring feeding left side of failure area
21	50.3530501	-122.75879	Ncd in draw, flowing hard
22	50.353645	-122.76014	Spring
23	50.3535515	-122.76139	Existing 10 m dia. slump on right bank (new in Nov 2021), at least 6 trees at toe have fallen across creek, root balls form buttress, although wood could form jam and initiate debris flow in future.
24	50.3535662	-122.76165	Spring
25	50.3534584	-122.76185	Spring, seep
26	50.3537417	-122.76254	Seep spring
27	50.3538331	-122.76292	Bottom end existing 1 m tall antislope parallel with creek on right bank ravine sidewall
28	50.3541	-122.76324	Top end existing antislope lineament
29	50.3561695	-122.76505	Top of steep incised channel
30	50.3566638	-122.76476	10 m wide overland flow area, within new logging cutblock ribbons
31	50.3567033	-122.76441	Same as previous.
32	50.3550475	-122.76679	Creek
33	50.3526479	-122.76419	Spring
34	50.3521225	-122.76331	Local high point on rock outcrop.
35	50.3502884	-122.75589	Tension crack inside edge of old landslide debris, creep. Fresh treethrow
36	50.3506665	-122.75628	Tension crack photos.
37	50.3503096	-122.75572	Tension crack downslope extent.

**Appendix 2. Before and after photo pairs.**



Dec 12, 2021. Right bank erosion site, just above Reid Road. Waypoint 2, Appendix 1.



January 30, 2024. Two trees have fallen, but otherwise bank failure has not grown.



Dec 12, 2021. View upstream. Reach with large boulder resting on fallen cedar tree. Waypoint 4, Appendix 1.



January 30, 2024. More trees fallen across channel.





July 22, 2022. Slump on right bank below main failure site. Waypoint 15, Appendix 1.



January 30, 2024. No change observed.



July 20, 2022. Headscarp of main instability. Waypoint 19, Appendix 1.



January 30, 2024. No change observed.



December 1, 2021. Slump on right bank upstream of main instability. Waypoint 23 Appendix 1.



January 30, 2024. No change.