clarke geoscience ltd.

MEMORANDUM

To: Gareth Wells, P.Geo.
Research Geomorphologist
BC Ministry of Forests (MOF)

Date: September 12, 2024

Cc: Trevor Bohay, Director, All Hazards Response Coordination, MOF
Kathleen Louie, Natural Resource Team Lead, LSIB
Alex Terbasket, Band Manager, LSIB
Janet Terbasket, Councillor, LSIB
Sean Vaisler, Manager of Emergency Services, RDOS
Marco Gerhardt, EMCR Community Recovery Coordinator

From: Jennifer Clarke, M.Sc., P.Geo.

CGL Project Number: 24-0103

Subject: Crater Creek Post-Wildfire Natural Hazard Risk Analysis - Preliminary Results

Introduction and Study Objectives:

The 2023 Crater Creek Post-Wildfire Natural Hazard Risk Analysis (PWNHRA) is currently underway by Clarke Geoscience Ltd. on behalf of the Ministry of Forests – Wildfire Service. Ground-based field work was conducted for the fire-affected areas between July 29-31, 2024, and a helicopter overview flight was completed on August 1, 2024. We are grateful for the collaboration in the field and information sharing provided by the Lower Similkameen Indian Band (LSIB).

The overall purpose of the PWNHRA is to estimate the likelihood for post-fire natural hazards such as landslides, debris flows, debris floods and elevated peak flows, and to estimate the potential to impact elements at risk situated on public land, on Lower Similkameen (Smelqmix) IR Lands and within Traditional Territory, and on private property.

The following memo provides preliminary results identifying priority sites based on the completed field work. Early identification of potential risks may be used to identify the need for risk mitigation.

Preliminary Results:

Post-wildfire natural hazard risks are associated with:

- hydrologic effects, such as faster runoff and higher peak flows associated with the loss of forest cover and the presence of hydrophobic soils; and,
- geomorphic effects, such as increased soil erosion, landslides and debris flow, and sediment/debris transport.

Based on the field assessment and preliminary GIS analysis, areas identified as having a high to very high level of partial risk associated with post-wildfire natural hazards include the following:

- slopes and gullies upslope of Ashnola Road, to approx. 16 km. Small-scale rockfall and sediment-laden flooding has already been reported along the Ashnola Road (Aug. 2024);
- catchment areas and fans within the Lower Ashnola River watershed, including Red Bridge Creek, Crater Creek, Webster Creek, Ewart Creek, and Lakeview Creek. Road washouts have already occurred within Red Bridge Creek (July 2024), and larger-scale sediment-laden peak flow events have already occurred on Ewart Creek, and on Skwekust Creek (July-Aug 2024); and,
- fan areas associated with catchments on the west side of the Lower Similkameen River valley within and adjacent to the Chopaka 7 & 8 IR, Lower Similkameen 2 IR, Narcisse's Farm IR, and Range 13 IR. These catchments were impacted by the 2018 Snowy Mountain Wildfire, with some headwater areas impacted by the 2023 Crater Creek Wildfire. There is a higher likelihood of post-wildfire hydrologic and geomorphic effects on Sintlehahten Creek, Susap Creek, Robert (aka Moonshine) Creek [1], Shoudy Creek[1], and Snehumption Creek. Properties and access roads located on associated fan areas are subject to risk where there is a potential for debris flood and debris flow impact.

A summary list of these priority areas, the identified elements at risk, and the identified post-wildfire natural hazards, is provided in Table 1 and are identified on the enclosed Figure 1. Select photos obtained during the helicopter reconnaissance flight are included in Appendix A.

Table 1: Priority Areas with High to Very High Partial Risk Associated with Post-Wildfire Natural Hazards

General Location	Elements at Risk	Post-Wildfire Natural Hazards[2]
Small tributaries, gullies and face unit slopes along the Lower Ashnola River (see Photo 1)	Ashnola Road, to approx. 16 km	Elevated likelihood of rockfall, small-scale sediment-laden flooding, and surface erosion that may plug culverts/ditches and deposit material on road surface.
Fan areas of catchments within the Lower Ashnola River watershed, including Red Bridge Creek, Crater Creek, Webster Creek (see Photo 2), Ewart	Ashnola Road Ewart Creek Road Crater Creek FSR Private properties located on Webster Creek fan, or within Ashnola River floodplain Water Survey of Canada hydrometric stations on	Elevated likelihood of post-wildfire hydrologic and geomorphic effects including: elevated peak flows and faster runoff, debris flood and debris flow, small-scale sediment-laden flooding, rockfall, landslide, and surface erosion. Some of the tributary catchments have the potential to temporarily dam, and then

[1] Shoudy Creek and Robert (aka Moonshine) Creek exhibit recent impacts that may be associated with the 2018 Snowy Mountain Wildfire.

General Location	Elements at Risk	Post-Wildfire Natural Hazards[2]
Creek, and Lakeview Creek (see Photo 3)	Ewart Creek and Ashnola River Trails and Provincial Park access within Lakeview Creek and Ewart Creek catchments	subsequently release, causing elevated peak flows on the Ashnola River.
Fan areas of catchments on the west side of the Lower Similkameen River valley, including Snehumption Creek (see Photo 4 & 5), Shoudy Creek (see Photo 6), Robert (aka Moonshine) Creek (see Photo 7), Susap Creek (see Photo 8), and Sintlehahten Creek (see Photo 9)	Private properties, and structures on IR Land Chopaka Road (North and South)	Elevated likelihood of high peak flows and debris flood events on Snehumption Creek and Susap Creek. Elevated likelihood for debris flows and sediment-laden flooding on smaller catchments such as Shoudy Creek, Robert Creek, Sintlehahten Creek, and other small catchments above Chopaka Road.

Climate Conditions Associated with High Hazard Scenarios:

Climate conditions associated with an elevated likelihood of occurrence will vary depending on the site and the identified hazards. Conditions that trigger debris flow/debris flood hazards are different from those that generate elevated peak flows on larger watersheds. Hazardous climate conditions may include the following:

- spring (freshet) snow melt stream flows (late May to early-July),
- rain on snow events and/or warm temperatures in the late fall (November-December) and early spring (May-June),
- localized, short-duration and high intensity convective rainstorm events (July to September),
- longer duration regional rainfall events leading to saturated soil conditions (any time).

To address immediate (short-term) hazards identified at the above-listed priority areas, short-duration intense rainstorms are considered most relevant. Rainfall intensities as low as 10 mm/hr for ~1-hour duration may be sufficient to generate hazardous runoff conditions.

Preliminary Recommended Mitigation Measures:

For the areas identified as having a high to very high partial risk for post-wildfire natural hazards, mitigation measures begin with increased awareness, monitoring, and emergency preparedness activities. In the short-term, downstream drainage structures in the identified areas should be inspected and maintained to ensure clear passage for sediment-laden water and debris. Other measures such as information bulletins and road signage will increase awareness among residents and the traveling public.

Strong consideration for the development of a weather-based early warning system is recommended for those properties situated on fans within the LSIB Community (including Chopaka 7 & 8 IR, Narcisse's Farm IR, and portions of Lower Similkameen 2 IR) and for parcels within RDOS Electoral Area B, situated on the west side of the Lower Similkameen River area. The rationale for a warning system is based on several damaging debris flow / debris flood events that have occurred since the 2018 Snowy Mountain Fire[2], and on the elevated potential likelihood for future damaging events. Considerations for a warning system should include the potential for false alarms. The candidate areas include properties on fan areas of Snehumption Creek, Shoudy Creek, Robert (aka Moonshine) Creek, Susap Creek, and Sintlehahten Creek.

The results presented here are preliminary, based on field work and preliminary GIS analysis, and do not necessarily report on all post-wildfire natural hazards occurring within the study area. It is likely that additional risk sites have not yet been identified. Further investigation and refinement of the study is required and is currently underway. Thus, the preliminary results presented here are subject to change. Professional judgment has been applied in the analysis and in developing the recommendations.

If you have any questions or comments, please do not hesitate to contact me at jen@clarkegeoscience.com.

[2] Damaging flows have occurred on Sintlehahten Creek, Robert (aka Moonshine) Creek (May 2023), and Shoudy Creek (June 2023)

Figure 1

N

ASHNOLA 10

Similkameen Subcatchment 1

Similkameen Subcatchment 2

Paul Creek

Rattlesnake Creek

ALEXIS 9

Hwy 3

Hwy 3A

Watershed 1

Red Bridge Creek

Keremeos

Watershed 3

Etches Creek

Ikwadli Creek

Spring Creek

Tweddle Creek

Ashnola Sub Catchment 1

Bullock Creek

Watershed 2

Daly Slough

Cawston

BLIND CREEK 6

Meausette Creek

Crater Creek

Watershed 11

Sintlehahten Creek

NARCISSE'S FARM 4

Barrington Creek

RANGE 13

LOWER SIMILKAMEEN 2

Gillanders Creek

Webster Creek

Hunter Creek

Skwekust Creek

Watershed 16

2023 Crater Creek Wildfire (K52125)

2018 Snowy Mountain Wildfire (K51238)

Susap Creek

Upper Ashnola River

Lower Ashnola River

Juniper Creek

Lakeview Creek

Coulthard Creek

Robert Creek

Hwy 3

CATHEDERAL PROVINCIAL PARK

Ewart Creek

SNOWY PROTECTED AREA

Shoudy Creek

CHOPAKA 7 & 8

Mountain Goat Creek

Snehumption Creek

LEGEND

- Priority Areas with Elevated Partial Risk for Post-Wildfire Natural Hazards
- Catchment / Sub-basin
- Park / Protected
- First Nations Reserve
- Fire Perimiter

Burn Severity (Source: BC Data Catalogue)

- High
- Medium
- Low

Roads (Source: Data BC Digital Roads

- Highway / Major Road
- Arterial Road
- Local Road / Street
- Resource Road
- Forest Tenure Road (Active)
- Forest Tenure Road (Inactive)
- Skid / Trail / Unclassified

Post Wildfire Natural Hazards include:

- Elevated peak stream flows
- Elevated sediment-laden flows and debris transport
- Debris flood & debris flow
- Landslide & rockfall

Further refinement of natural hazards and associated partial risk to be provided in the 2023 Crater Creek Post-Wildfire Natural Hazard Risk Analysis Report (in progress)

1,400 700 0 1,400 2,800
metres

Client:
MINISTRY OF FORESTS - BC WILDFIRE SERVICE

Project:
POST-WILDFIRE NATURAL HAZARD RISK ANALYSIS FOR THE 2023 CRATER CREEK WILDFIRE (K52125)

Title:
PRELIMINARY RESULTS

Scale: 1:125,000 NAD 1983 UTM Zone 11 U

Figure No. 001A

Project No: 24-0103 Date: Sept.12,2024

Clarke geoscience ltd.

G:\Projects\6800-6899\6860\02-01\MXD\24-0103_0010a_Preliminary_Results.mxd

Appendix A - Photos

APPENDIX A – PHOTOS

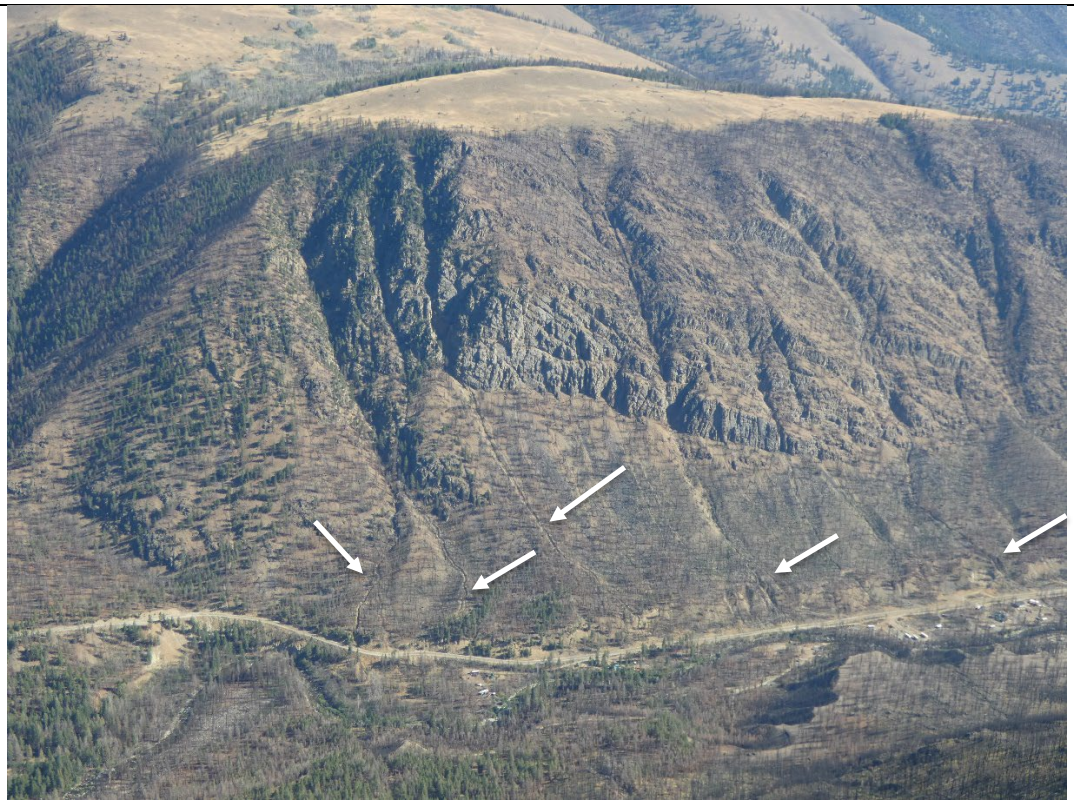

Photo 1: Small tributary gullies and face unit slopes on north side of Ashnola River. Post-wildfire surface erosion and sediment-laden flows are visible (arrows).

Photo 2: View south to fan area of Webster Creek. Note bridge crossing Ashnola River from Ashnola Road to Ewart Road. Residences (approx.) along Ewart Road are circled.

Photos taken on August 1, 2024

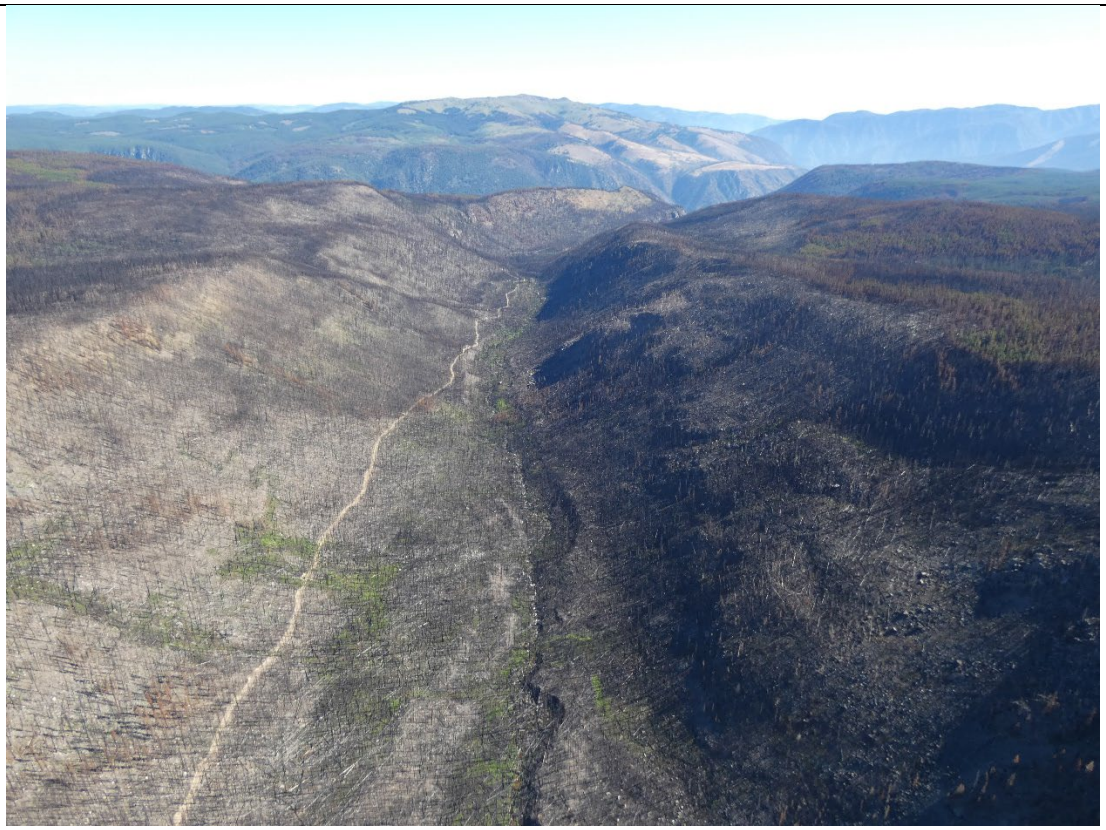

Photo 3: View north (downstream) along Lakeview Creek with access road to Cathedral Provincial Park visible on the left.

Photo 4: Burned headwater area within the Snehumption Creek watershed.

Photos taken on August 1, 2024

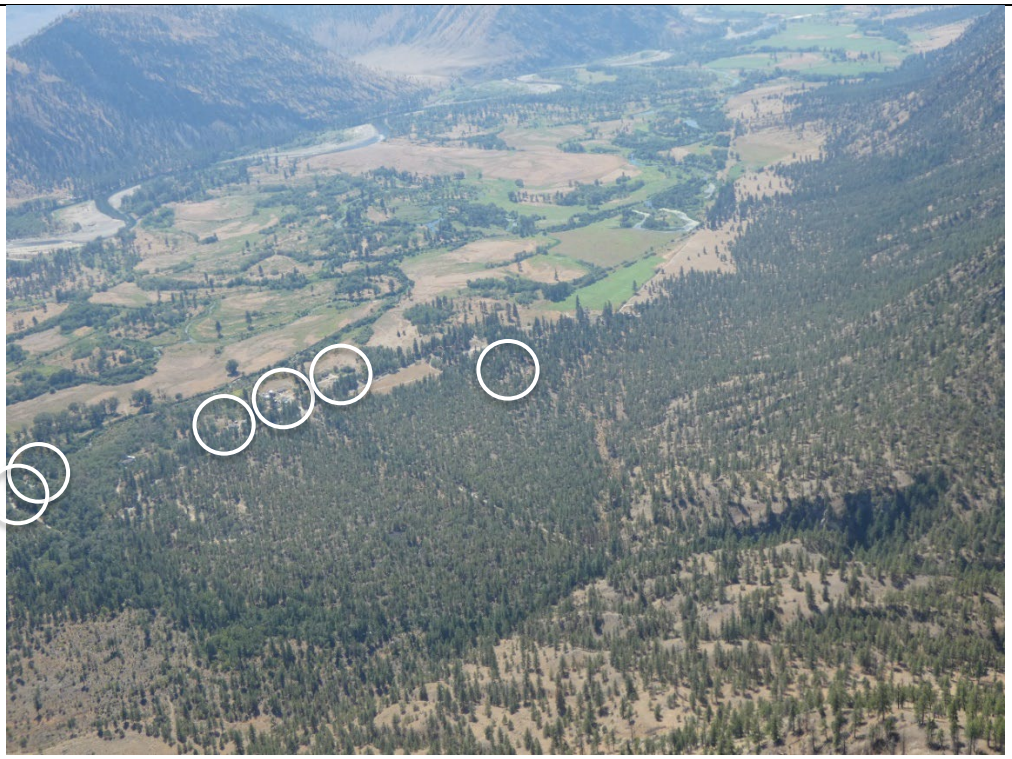

Photo 5: View south-east showing Snehumption Creek fan area. Note residences (circled) and access along Chopaka Road.

Photo 6: Shoudy Creek fan area showing multiple channels (arrows) that experienced recent sediment-laden flooding events resulting in impacts to Chopaka Road. Note residences (circled).

Photo 7: View north showing Robert (aka Moonshine) Creek fan area. Note evidence of May 2023 flood event, nearby residences (circled) and Chopaka Road. Similkameen River is in the background.

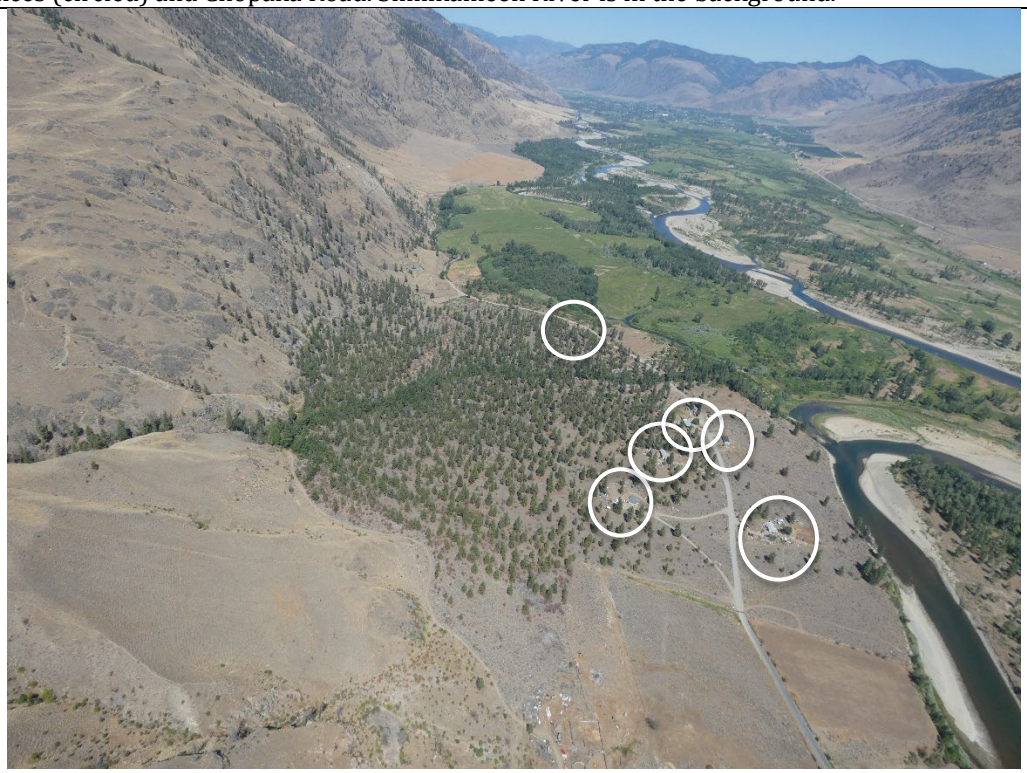

Photo 8: View north showing Susap Creek fan area. Note residences (circled) and Chopaka Road.

Photos taken on August 1, 2024

Photo 9: View north showing Sintelhahten Creek fan area (arrow) and other small tributaries. Note Chopaka Road north access road (faint, unpaved trail).