

**MINISTRY OF FORESTS: POST-WILDFIRE NATURAL HAZARD RISK ANALYSIS**  
**KOMONKO CREEK - LEVEL 2 RECONNAISSANCE REPORT**

*NOTE: The results given on this form are reconnaissance in nature and are intended to be a warning of potential hazards and risks. A more detailed report will follow and may alter the conclusions. Please read the appendix of this report for important limitations. Contact the author for more information.*

<b>FIRE NUMBER: N51210 Komonko Creek</b>		<b>FIRE YEAR: 2024</b>	<b>DATE OF REPORT: September 11, 2024</b>
<b>AUTHOR:</b> Sarah Crookshanks, P.Geo., Ministry of Forests			
<b>REPORT PREPARED FOR:</b> Southeast Fire Centre, District Manager			
<b>FIRE SIZE, LOCATION, AND LAND OWNERSHIP:</b> 4080 ha of provincially managed public land and private land south of Silverton			
<b>VALUES AT RISK:</b>			
<ol style="list-style-type: none"> <li>Private residences and/or potentially occupied buildings along Highway 6 and Red Mountain Road</li> <li>Domestic surface water quality on creeks originating from within the fire</li> <li>Highway 6 and Red Mountain Road</li> </ol>			
<b>WATERSHEDS AFFECTED</b>	<b>TOTAL AREA</b>	<b>AREA BURNED</b>	<b>BURN SEVERITY</b> (% of watershed area)
<i>Enterprise Creek</i>	10541 ha	1169 ha (11%)	1% H, 5% M
<i>Aylwin Creek</i>	652 ha	431 ha (66%)	24% H, 27% M
<i>Congo Creek</i>	111 ha	104 ha (93%)	25% H, 29% M
<i>Fingland Creek</i>	237 ha	131 ha (55%)	5% H, 20% M
<i>Baby Ruth Creek</i>	221 ha	90 ha (41%)	5% H, 10% M
<i>Vevey Creek</i>	532 ha	175 ha (33%)	2% H, 12% M

**SUMMARY OF POST-FIRE HAZARD AND RISK**

- Hazard = P(H), the probability of occurrence of a hazardous event*
- Probability of spatial impact, P(S:H), the probability of a hazard reaching or affecting an element at risk*
- Partial Risk, the probability of a hazard occurring and affecting an element at risk = P(H) x P(S:H)*
- Location with the highest risk rating given; at other locations the risk may be lower*

**Debris flow or flood on Allen/Cory Creek face impacting private residences or highway**

Hazard P(H)<sup>1</sup> = high                      Probability of spatial impact P(S:H)<sup>2</sup> = moderate                      Partial Risk<sup>3,4</sup> = high

The face unit south of Enterprise Creek burned extensively in the 2007 Springer Creek fire. In the Allen and Cory Creek drainages, the 2007 fire resulted in mostly low burn severity, with some patches of moderate burn severity. No debris flows occurred in these two creeks after the 2007 fire, but several post-wildfire events occurred on similar drainages with higher watershed burn severities to the south.

The 2024 Komonko Creek fire also burned the upper reaches of Allen and Cory Creeks at moderate to high severity. The rest of the face to the north of Allen Creek also burned at moderate to high severity, though this area had previously burned at high severity in 2007. No field verification of soil burn severity was undertaken in this area, and the reburn of the area complicates the assessment of hydrological impacts. This face is steep, and all drainages appear to be susceptible to debris flows.

There are six Regional District of Central Kootenay (RDCK) address points east of the highway potentially at risk. The spatial likelihood of a debris flow impacting any of these residences is estimated to be moderate but requires additional fieldwork to confirm their specific locations relative to the channels of Allen and

Cory Creeks. The closer a residence is to a channel, the higher the spatial likelihood of impact. The highway is also potentially at risk. The address points to the west of the highway are less likely to be at risk, as the slope flattens considerably here.

#### **Debris flow or flood on south tributary to Enterprise Creek impacting Highway 6**

Hazard  $P(H)^1 = \text{high}$       Probability of spatial impact  $P(S:H)^2 = \text{high}$       Partial Risk<sup>3,4</sup> = very high

At the Enterprise Creek hairpin on Highway 6, a small tributary to Enterprise Creek enters from the south. A debris flow in this channel is anticipated to impact the highway, though further field work is needed to confirm the probability of spatial impact. This drainage burned in the 2007 Springer Creek fire at high severity in the headwaters area. No debris flows are known to have occurred in this drainage after this fire. The burn severity mapping from the 2024 fire also shows high burn severity in this watershed. Given that the 2007 fire burned at high severity, there was likely limited fuel available to burn in 2024, though the cumulative impact of two fires on the soils is not well understood at this time. Additional work should be undertaken to confirm the crossing infrastructure. Regular inspection and maintenance at this site are recommended.

#### **Rockfall impacting Highway 6 north of Slocan Lake View Point**

Hazard  $P(H)^1 = \text{high}$       Probability of spatial impact  $P(S:H)^2 = \text{high}$       Partial Risk<sup>3,4</sup> = very high

Rockfall onto the highway occurred at this location during the fire. The rocks were mostly small, and likely came from surficial rocks being dislodged as the organic matter burned. It is likely that some additional rocks may be dislodged, particularly during periods of intense rainfall. MOTI is aware of this hazard and will be regularly inspecting and maintaining this section of road in the coming months.

#### **Debris flow or flood on Johnson Creek, Highland View Creek, or Harte Creek impacting private residences or highway**

Hazard  $P(H)^1 = \text{low}$       Probability of spatial impact  $P(S:H)^2 = \text{moderate}$       Partial Risk<sup>3,4</sup> = low

#### **Debris flow or flood on Kegel Brook impacting private residences or highway**

Hazard  $P(H)^1 = \text{moderate}$       Probability of spatial impact  $P(S:H)^2 = \text{moderate}$       Partial Risk<sup>3,4</sup> = moderate

The face between Enterprise and Aylwin Creeks was burned mostly at low severity, with a few small patches of moderate severity and high burn severity. Lidar hillshade imagery shows indistinct, parallel draws draining this face (from south to north: Johnson Creek, Highland View Creek, Harte Creek and Kegel Brook). Due to the low burn severity, the drainages to the south are rated as low hazard, whereas Kegel Brook at the north end has a patch of high burn severity in its headwaters and thus is rated as a moderate hazard.

There are seven RDCK address points east of the highway at the base of this slope that are potentially at risk. The spatial likelihood of a debris flow impacting these residences is estimated to be moderate based on a desktop assessment using satellite imagery and base mapping, but this rating requires additional fieldwork to confirm. The address points to the west of the highway are less likely to be impacted, as the slope flattens considerably here.

#### **Debris flow or flood on Aylwin Creek impacting private structure**

Hazard  $P(H)^1 = \text{high}$       Probability of spatial impact  $P(S:H)^2 = \text{low}$       Partial Risk<sup>3,4</sup> = moderate

The Aylwin Creek watershed is composed of two parts: the lower portion is susceptible to debris flows, whereas the upper basin is a cirque-like feature with a small lake near the outlet that drains into the lower portion. The upper basin is only partially burned; therefore, the burned area of the entire watershed is only

66%. However, the burned area of the lower watershed area is almost 100%, most of which is moderate and high burn severity. Given the high burn severity over steep terrain, the likelihood of a post-wildfire debris flow is rated as high.

There is one structure on private property on the Aylwin Creek fan, but it has not been verified if it is a occupied residence. The structure is located away from the main channel, and on the lower third of the fan; therefore, the likelihood of spatial impact is rated as low. Field verification as part of a more detailed (level 3) assessment is recommended to confirm the location of the structure relative to potential avulsion paths.

***Debris flow or flood on Aylwin Creek impacting Highway 6 or Red Mountain Road***

Hazard  $P(H)^1 = \text{high}$       Probability of spatial impact  $P(S:H)^2 = \text{high}$       Partial Risk<sup>3,4</sup> = very high

Red Mountain Road and Highway 6 cross the Aylwin Creek fan mid-way down the fan. The creek flows under the highway in a large culvert (~ 1.5 m diameter), which is likely to be plugged in a debris flow or flood event. Furthermore, there is little to no channel confinement along the right bank immediately upstream of the culvert. The combination of these factors results in a very high potential for a diversion along the highway ditch line to the north.

***Debris flow or flood on Congo Creek impacting private residences or Red Mountain Road***

Hazard  $P(H)^1 = \text{high}$       Probability of spatial impact  $P(S:H)^2 = \text{low}$       Partial Risk<sup>3,4</sup> = moderate

Congo Creek is a short, steep drainage with a high Melton ratio, which would indicate a susceptibility to debris flows. The southern fork in the upper watershed is mostly composed of high and moderate burn severity, whereas the northern fork in the upper watershed is composed of a mixture of high, moderate and low burn severity. Fan hazard mapping indicates there is one RDCK address point near the base of the fan, with several houses located just beyond the fan area. Red Mountain Road bounds the lower portion of the fan. Field investigation as part of a more detailed (level 3) assessment is recommended to confirm the hazard and probability of spatial impact.

***Debris flow or flood on Fingland Creek impacting private residences or Red Mountain Road***

Hazard  $P(H)^1 = \text{moderate}$       Probability of spatial impact  $P(S:H)^2 = \text{low}$       Partial Risk<sup>3,4</sup> = low

The upper Fingland Creek drains steep sub-alpine terrain and could be susceptible to debris floods, or possibly debris flows. However, the channel's gradient moderates substantially upslope of private property, as it turns southwest to flow around a ridge. Given the patchy high, moderate and low burn severity in the upper watershed, the likelihood of a post wildfire debris flood or flow is rated as moderate. The likelihood of spatial impact to private property and Red Mountain Road is low given the channel configuration above the elements at risk.

***Debris flow or flood on Baby Ruth Creek or Vevey Creek impacting private residences or Red Mountain Road***

Hazard  $P(H)^1 = \text{low}$       Probability of spatial impact  $P(S:H)^2 = \text{low}$       Partial Risk<sup>3,4</sup> = very low

Like Fingland Creek, Baby Ruth and Vevey Creeks have steep upper watersheds with tributaries that are likely to be susceptible to small debris flows or floods, but the main channel gradients moderate substantially before reaching elements at risk downslope. Therefore, the likelihood of spatial impact is rated as low. Baby Ruth's watershed is 41% burned and Vevey Creek's watershed is 33% burned (both a mixture of patchy high, moderate and low burn severities), resulting in low hazard of a debris flow or flood.

**FURTHER ACTIONS**

A more detailed (level 3) assessment for the Komonko Creek fire is recommended to verify the hazard and risk to private residences, infrastructure, and drinking water quality.

**COMMENTS**

The Komonko Creek and Aylwin Creek fires were identified on July 19, 2024 and burned over 4000 ha. They were subsequently amalgamated into one fire and will be treated as such in this assessment. Only limited field assessment was conducted for this fire (focused around Aylwin Creek fan), given that a more detailed assessment is forthcoming. This analysis relies heavily on vegetation burn severity mapping which was corroborated with visual observations made during helicopter overflight of the fire on August 23.

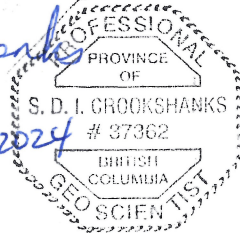
The fire burned the western facing drainages from Vevey Creek in the north to Enterprise Creek in the south, as well as flatter terrain to the west of Highway 6 immediately above Highway 6. Many of the drainages burned are steep and debris-flow prone. The southern portion of the Komonko Creek fire re-burned a portion of the 2007 Springer Creek fire, including several Enterprise Creek tributaries and two drainages (Cory Creek and Allen Creek) on the face south of Enterprise Creek. The burned area slopes range from lake level (~550 m) up to the alpine above 2000 m.

Due to the high risks identified in this report, further analysis of post-wildfire natural hazards for the Komonko Creek fire is recommended. A more detailed report will be released at a later date that will expand on the hazards and risks outlined here and may alter conclusions.

All members of the public, and specifically water users, should avoid spending time in debris flow prone creek channels during or immediately after intense rainstorms, or during periods of rapid snowmelt. Episodic water quality impacts to surface domestic water users on sources originating from within the fire perimeter are anticipated. More detail on this risk will be included in the Level 3 report.

**SIGNATURE, SEAL, FIRM PRACTICE #**

*S. Crookshanks*  
*September 12, 2024*



Sarah Crookshanks, P. Geo.  
Ministry of Forests  
Permit to Practice #1003022

Reviewed by: Gareth Wells, P. Geo

**ATTACHMENTS**

See attached map, photos and Appendix

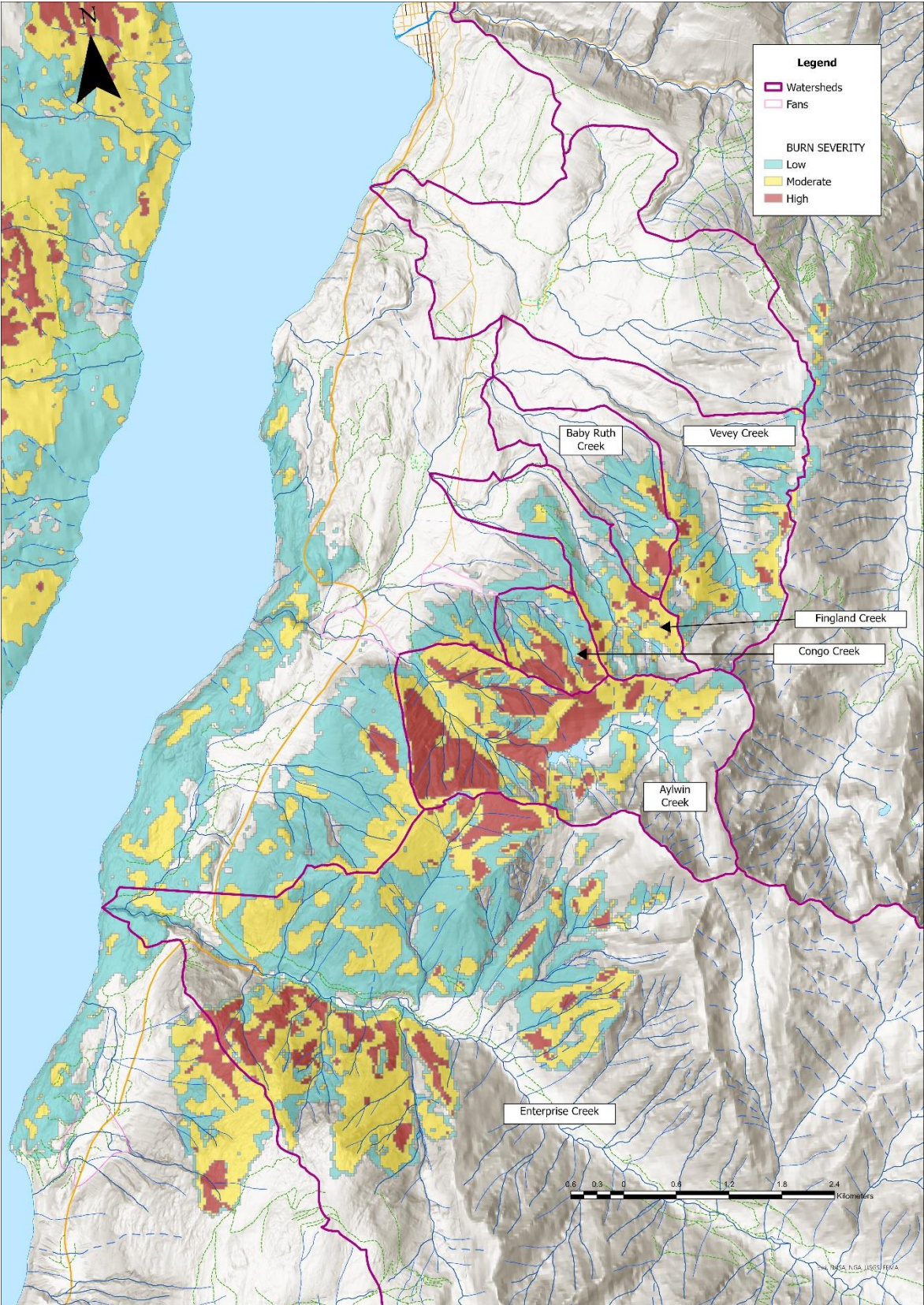


Figure 1. Burn severity map of the Komonko Creek fire showing estimated classes derived from Sentinel-2 imagery (prefire: July 11, 2024; post-fire: August 20, 2024). Further work may alter the estimated burn severity classes.



*Figure 2. Enterprise Creek (Photo: T. Giles, SNT Geotechnical).*



*Figure 3. Headwaters of Cory Creek.*



*Figure 4. Photo of high burn severity in the Aylwin Creek watershed.*

## **Appendix to PWNHRA Reconnaissance Reports**

### **Scope of Reconnaissance (Level 2) Reports**

Reconnaissance (Level 2) reports are primarily intended to identify whether post-wildfire hazards are likely to occur and need detailed investigation to protect identified elements at risk. Identified elements at risk are generally limited to public safety and infrastructure. Reconnaissance reports may also be used to assess safety conditions for wildfire fighters. In some cases, the MOF District Manager or other MOF personnel may request assessments for non-standard elements at risk or for other reasons.

### **Definitions of Hazard and Risk**

Wildfire may produce conditions conducive to a suite of hazards. Debris flows, debris floods, and floods are often the most important hazards, but other types of landslide hazards including rockfall, debris slides and earthflows can also occur in response to wildfire. Wildfire can also cause snow avalanches and may affect water quality, cause erosion and result in sedimentation. Terrain, watershed, and channel conditions that produce post-wildfire hazards may also produce similar hazards in unburned conditions; these hazards may be mentioned but are not evaluated in this report.

P(H), P(S:H) and partial risk are presented for each identified elements at risk. Multiple types of channel hazards (debris flows, debris floods, floods) may affect an element at risk. These hazards are ranked by severity, with debris flow as the most damaging and destructive and flood as the least damaging and dangerous, and ratings are given for the highest rating hazard that may affect an element at risk. For example, where a channel has the potential for a debris flow and an element at risk may be affected, the lower ranking debris flood and flood hazards are not rated, since discharge and velocity are likely to be less than for a debris flow. These processes may cause erosion or sedimentation that affects the element at risk. Hazards that are unlikely to affect an identified element at risk are not discussed.

Table A1 shows the annual probability ranges for qualitative definitions of P(H). The probability of the hazard occurrence is for the post-wildfire period of elevated hazard, which in many cases may be less than five years, but in some cases may extend for several more years.



**Table A1. Qualitative descriptions of post-wildfire hazard likelihood, hazard criteria, and related quantitative probabilities.**

<b>Post-wildfire hazard rating</b>	<b>Description</b>	<b>Annual Probability Range</b>
Very High	An event is expected to occur. Most of the catchment or face unit has burned with a significant proportion burned at moderate and/or high severity	>0.2
High	An event is probable under adverse conditions. Most of the catchment or face unit has burned with a significant proportion (i.e., >50 %) of terrain conducive to post-wildfire natural hazard initiation burned at moderate or high severity. Existing indicators of pre-fire terrain instability within stream channels, on fans or face units.	0.01 - 0.2
Moderate	An event could occur under adverse conditions. It is not probable but possible over a several year period. More than 20% of the terrain conducive to post-wildfire natural hazards in the catchment or on the face-unit has burned with moderate and/or high severity. Historic geomorphic indicators of instability are present.	0.002 – 0.01
Low	An event could occur under very adverse conditions. It is considered unlikely over a several year period. Only a limited proportion of the catchment or face unit has burned. Few or no signs of pre-fire instability present along stream channels, fans or face units.	0.0004 – 0.002
Very Low	An event will not occur or is conceivable though considered exceptionally unlikely. A limited proportion/none of the catchment was burned. No terrain instability indicators are present	<0.0004

Table A2 defines spatial impact to an element of risk. Post-wildfire event magnitude is considered when rating spatial impact.

**Table A2. Post-wildfire spatial impact.**

<b>Likelihood of spatial impact</b>	<b>Description</b>	<b>Probability range</b>
<b>H</b>	It is probable that the event will impact the element at risk.	>0.5
<b>M</b>	It is possible that the event will impact the element at risk.	0.5 - 0.1
<b>L</b>	It is unlikely that the event will impact the element at risk.	< 0.1.

Table A3 is a matrix which combines the hazard likelihood (Table A1) with the spatial impact likelihood (Table A2) to determine partial risk.

**Table A3. Post-wildfire risk matrix partial risk matrix.**

Hazard Likelihood P(HA) (Table 1)	Spatial Impact Likelihood (P(S:H)) (Table 2)		
	High	Moderate	Low
Very High	Very High	Very High	High
High	Very High	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Very Low
Very Low	Low	Very Low	Very Low

### Report Standards

FLNRORD Land Management Handbook 69 is the primary standard followed in this report. LMH 69 describes the process to complete a detailed report. This reconnaissance report uses the framework of LMH 69 but does not follow it where detailed assessment procedures are described.

**Land Management Handbook 69 Post Wildfire Natural Hazards Risk Analysis in British Columbia 2015**  
<https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh69.htm>

Additional guidance is provided in the MOF SOG for PWNHRA and the 2014 FLNRO Landslide Risk Management Procedure.

Other professional guidance standards that may be used for the preparation of reconnaissance reports are listed below. These guidelines have similar report content to this reconnaissance assessment, but are for different purposes, have different levels of appropriate effort, and do not recognize the potential emergency nature of this reconnaissance assessment. These guidelines include:

**EGBC Guidelines for TSA in the Forest Sector 2010**  
<https://www.egbc.ca/getmedia/684901d7-779e-41dc-8225-05b024beae4f/APEGBC-Guidelines-for-Terrain-Stability-Assessments.pdf.aspx>

**EGBC Guidelines for Legislated Landslide Assessments 2010**  
<https://www.egbc.ca/getmedia/5d8f3362-7ba7-4cf4-a5b6-e8252b2ed76c/APEGBC-Guidelines-for-Legislated-Landslide-Assessments.pdf.aspx>

**Legislated Flood Assessments in a Changing Climate in BC 2018**  
<https://www.egbc.ca/getmedia/f5c2d7e9-26ad-4cb3-b528-940b3aaa9069/Legislated-Flood-Assessments-in-BC.pdf>

**Watershed Assessment and management of hydrologic and geomorphic risk in the Forest Sector**  
<https://www.egbc.ca/app/Practice-Resources/Individual-Practice/Guidelines-Advisories/Document/01525AMW2ATQA5BSODHJAKBAGZDYTRL6FJ/Watershed%20Assessment%20a>

## [nd%20Management%20of%20Hydrologic%20and%20Geomorphic%20Risk%20in%20the%20Forest%20Sect](#)

Other standards may also apply, depending on the professional qualifications of the writer.

### **Statement of Limitations**

Reconnaissance PWNH Level 2 assessments are typically done in constrained timelines where personnel, resources, data collection, and analysis methods are limited. Post-wildfire hydrogeomorphic hazards in BC are not well understood and therefore hazard and risk assessments are estimates only. While probabilities ranges are given in Tables A1 and A2, the state of the science in BC does not allow for precise assessments, particularly near the borders of classes. Numeric probabilities ranges do not imply precision.

Identification of elements at risk relies on BC government data layers, satellite imagery, and perhaps an overview flight. BCWS and the MOF district office may provide additional information. No further confirmation of elements at risk was conducted.

Comments, conclusions, and suggestions contained in this reconnaissance assessment reflect my experience and judgement considering the information available to me at the time that this report was prepared and are considered appropriate for the reconnaissance nature of the review. The review has been carried out in accordance with generally accepted professional practices. This assessment and its contents are intended for the sole use of post-wildfire hazard management by provincial agencies, First Nation governments and local governments. I do not accept any responsibility for the accuracy of any of the data, the interpretation, or the conclusions contained or referenced in the report when the report is used or relied on for any other purpose than specified. Any such unauthorized use of this report is at the sole risk of the user.