

MINISTRY OF FORESTS: POST-WILDFIRE NATURAL HAZARD RISK ANALYSIS
HOWSER RIDGE 3 - 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. It is not a detailed risk analysis and further work may alter the conclusions. Please read the appendix of this report for important limitations. Contact the author for more information.

FIRE NUMBER: N71144 Howser Ridge 3	FIRE YEAR: 2024	DATE OF REPORT: January 13, 2025
AUTHOR: Sarah Crookshanks, P.Geo., Ministry of Forests		
REPORT PREPARED FOR: Southeast Fire Centre, District Manager		
FIRE SIZE, LOCATION, AND LAND OWNERSHIP: 606 ha on provincially managed public land ~11 km north Meadow Creek		
VALUES AT RISK 1. Private residence (14940 Highway 31) 2. Highway 31		
SUMMARY OF TERRAIN CONDITIONS AND THE EFFECTS OF THE FIRE The Howser Ridge 3 fire was discovered on July 18, 2024, and burned 606 ha on Howser Ridge, which separates the Lardeau River valley from Duncan Lake. The fire burned both the northeast and southwest aspects of the ridge between 700 m and 1400 m. On the northeast aspect slope, the fire affected numerous small unnamed drainages that flow east into Duncan Lake. These drainages do not have any elements at risk downslope. On the southwest aspect slopes, the fire burned a face unit with no defined channels visible on aerial imagery or base mapping. Highway 31 and one parcel of private land are located downslope of the fire along this aspect. Aerial reconnaissance was completed on August 7, 2024, and no field work was undertaken given the low risks outlined below. The vegetation burn severity map is shown in Figure 1. The northeast aspect burned mostly at high burn severity, whereas the southwest face burned mostly at moderate and low burn severity, with only patches of high burn severity. Of the 238 ha that burned along the southwest face, 53% is moderate burn severity, 29% is low burn severity and 18% is high burn severity. Potential post-wildfire natural hazards include flooding, debris floods, debris flows, landslides, and rockfall. Over the first few years after a fire, hazardous events such as debris floods and flows are typically triggered by short-duration, high intensity (i.e. convective) rainfall threatening elements located on alluvial fans near valley bottom. Debris flows and floods can also occur during spring runoff because of rapid snowmelt in burned areas, or less frequently during fall rain events. Due to changes in snow accumulation and melt processes, elevated flows during spring freshet or summer low flow periods may persist for many years until the forest canopy closure recovers.		
SUMMARY OF POST-FIRE HAZARD AND RISK 1. Hazard = $P(H)$, the probability of occurrence of a hazardous event 2. Probability of spatial impact, $P(S:H)$, the probability of a hazard reaching or affecting an element at risk 3. Partial Risk, the probability of a hazard occurring and affecting an element at risk = $P(H) \times P(S:H)$ 4: Location with the highest risk rating given; at other locations the risk may be lower Overland flooding impacting private residence or Highway 31 Hazard $P(H)$¹ = Low Probability of spatial impact $P(S:H)$² = Low Partial Risk^{3,4} = Very Low The vegetation burn severity on the southwest-aspect face above the private residence is mostly low and moderate, with one patch of high burn severity near the ridge top. Given the patchwork nature of the burn severity and moderating influence of potential needlecast and remaining surface cover, the likelihood of generating overland flow is rated as low. The private residence is located ~200 m away from where the		

ridge flattens out at the valley bottom, and the highway is 400 m farther. Therefore, the likelihood of any overland flooding impacting the residence or highway is rated as low.

FURTHER ACTIONS

No further actions recommended at this time.

SIGNATURE, SEAL, FIRM PRACTICE

S. Crookshanks
January 13, 2025

Sarah Crookshanks, P. Geo.

Ministry of Forests

Permit to Practice #1003022



ATTACHMENTS

See attached map and Appendix

Reviewed by: Gareth Wells, P. Geo

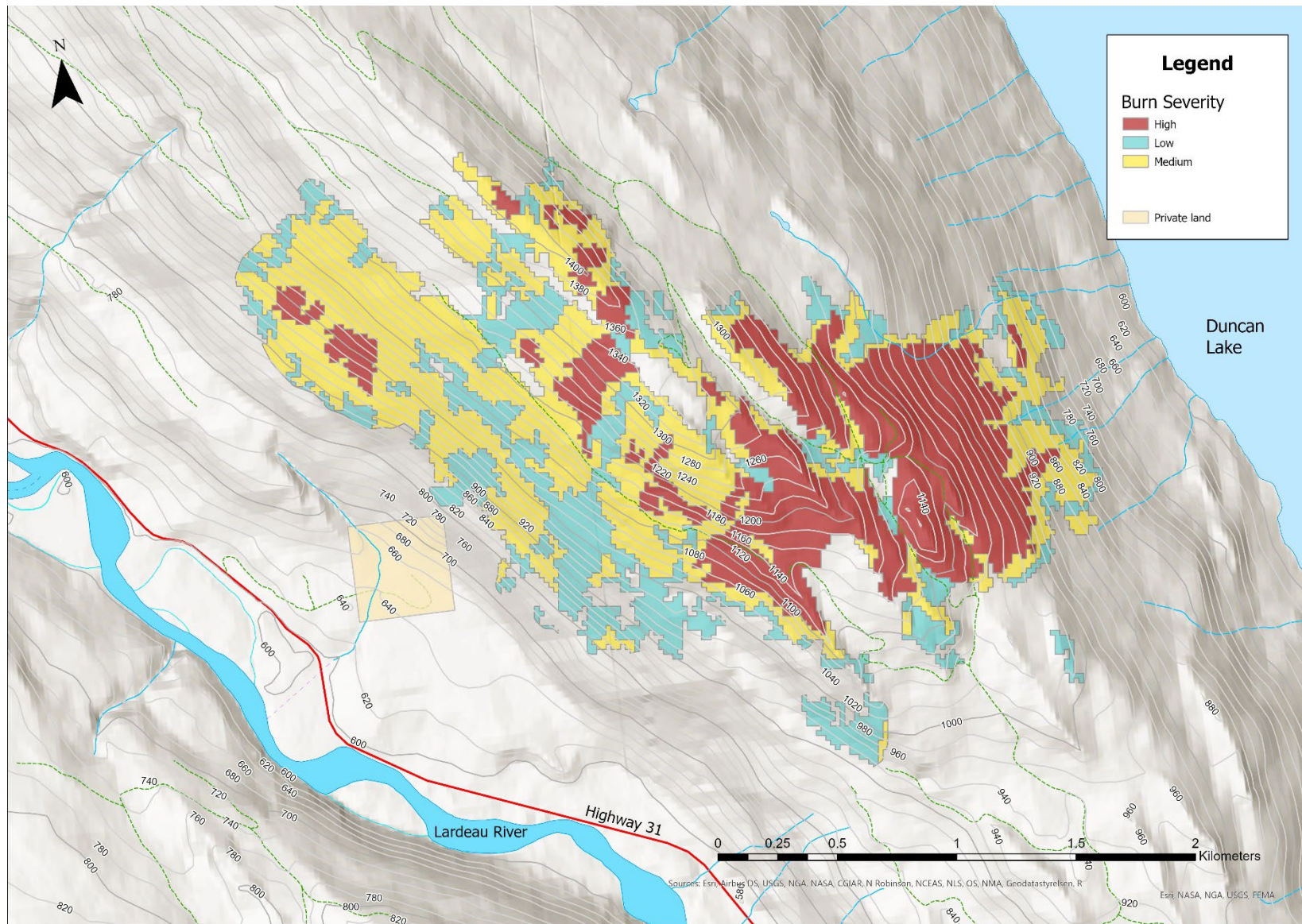


Figure 1 Burn severity map of the Howser Ridge 3 fire showing estimated classes derived from Sentinel-2 imagery (prefire: July 7, 2024, post-fire: August 26, 2024).



Figure 2. Aerial overview of the Howser Ridge 3 fire and private property downslope.

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.

Post-wildfire hazard rating	Description	Annual Probability Range
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.

Likelihood of spatial impact	Description	Probability range
H	It is probable that the event will impact the element at risk.	>0.5
M	It is possible that the event will impact the element at risk.	0.5 - 0.1
L	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%20and%20Management%20of%20Hydrologic%20and%20Geomorphic%20Risk%20in%20the%20Forest%20Sector>

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.