FVRD Electoral Areas A and B Geohazard Mapping Project

Prepared by BGC Engineering Inc. for:

Fraser Valley Regional District

June 18, 2025

Project 0409009

Pioneering responsible solutions to complex earth science challenges

June 18, 2025 Project 0409009

Fraser Valley Regional District
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Attention: Katelyn Hipwell, Manager of Planning

FVRD Electoral Area A and B - Geohazard Mapping Project

Please find the report attached. We appreciate the opportunity to collaborate with you on this challenging and interesting project.

Should you have any questions, please do not hesitate to contact the undersigned.

Yours sincerely,

BGC Engineering Inc.
per:

Carie-Ann Hancock, P.Geo., M.Sc.
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SUMMARY

This report provides updated geohazard mapping (alluvial fans and landslides) for 361 selected properties within Fraser Valley Regional District's (FVRD) Electoral Areas A and B in the Fraser Canyon. Based on newly available lidar data in the Fraser Canyon, BGC Engineering Inc. (BGC) mapped 53 alluvial fans and 73 landslides within the following study areas:

- Canyon Alpine (Electoral Area A)
- North Bend (Electoral Area A)
- Boston Bar (Electoral Area A)
- Spuzzum (Electoral Area B)
- Yale (Electoral Area B)
- Dogwood Valley (Electoral Area B).

The geohazard extents were interpreted from lidar data and can be used for planning purposes to identify potentially hazardous areas subject to FVRD's Hazard Acceptability Thresholds (FVRD, October 2020). This report is not intended to provide individual property owners a geotechnical assessment that may be required by FVRD as part of permitting processes as it is of insufficient detail for that purpose. The mapping was limited to the 361 properties provided to BGC by FVRD. Additional geohazards exist in the remainder of Electoral Areas A and B that were not mapped by BGC.

Based on the presence of geohazards in densely populated areas, BGC recommends that FVRD consider detailed geohazard assessments at the following locations:

- Hallisey Creek
- Emory Creek
- Stulkawhits Creek
- The unnamed creek 600 m north of Stulkawhits Creek
- The landslide complex in Boston Bar.

FVRD's Hazard Acceptability Thresholds inform policy on development approvals for properties within geohazard areas. Within this policy, acceptability thresholds may indicate that property-specific geohazard assessments are required prior to development of properties in study areas mapped as part of this project. These assessments would be subject to Engineers and Geoscientists of BC Landslide and Flood assessment guidelines (EGBC, August 28, 2018; March 1, 2023).

If a property-specific geohazard assessment is required prior to development at sites mapped as part of this study, Qualified Professionals conducting property-specific assessments should consider:

- The mapping extents provided herein represent the credible extent (based on geomorphic evidence of a hazard and/or the empirical runout model) of alluvial fan, rockfall, and debris slide hazards. Source areas for previous catastrophic landslide hazards (e.g., rockslides) were mapped; runout extents of these hazards were not assessed.

- Local site conditions (terrain, geology, groundwater) should be evaluated by Qualified Professionals to evaluate the likelihood of the described geohazards reaching the extents shown in the geohazard mapping.

TABLE OF REVISIONS

Date	Revision	Remarks
April 4, 2025	Draft	Issued to FVRD for review
June 18, 2025	Final	Additional properties added to study list, mapping adjustments

CREDITS AND ACKNOWLEDGEMENTS

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GLOSSARY

This report refers to the following key definitions:

Term	Definition
Alluvial fan (fan)	A low, outspread, relatively flat to gently sloping mass of loose rock material or sediment, shaped like an open fan or a segment of a cone, deposited by a stream at the place where it issues from a narrow mountain valley, where a constriction in a valley abruptly ceases, or where the gradient of a stream suddenly decreases (Bates & Jackson, 1995).
Asset	Anything of value, including both human-made and natural properties.
Avulsion	Lateral displacement of a stream from its main channel into a new course across its fan or floodplain. An “avulsion channel” is a channel that is being activated during channel avulsions (Oxford University Press, 2008).
Bank erosion	Erosion and removal of material along the banks of a creek or river resulting in either a shift in the river position, or an increase in the river width.
Clear-water floods	Riverine and lake flooding resulting from inundation due to an excess of clear-water discharge in a watercourse or body of water such that land outside the natural or artificial banks which is not normally under water is submerged. While called “clear-water floods”, such floods still transport sediment. This term merely serves to differentiate from other flood forms such as debris flows or debris floods.
Consequence	In relation to risk analysis, the outcome or result of a geohazard occurring. Consequence is a product of vulnerability and a measure of the elements at risk.
Debris flood	A flood during which the entire bed, possibly barring the very largest clasts, mobilizes for at least a few minutes and over a length scale of at least ten times the channel width, though commonly much farther (Church & Jakob, 2020).
Debris flow	Very rapid to extremely rapid surging flow of saturated sediment and debris, originating in steep channels. Debris flows entrain material and water from the flow path and deposit material on fans (Hungr et al., 2014).
Exposure	The situation of people, or infrastructure in an area that may be affected by geohazards (UNDRR, n.d.).
Floodplain	The part of the river valley that is made up of unconsolidated river-borne sediment, and periodically flooded (Oxford University Press, 2008).
Geohazard	Geophysical process that is the source of potential harm, or that represents a situation with a potential for causing harm.

Landslide	Mass movement of rock, debris or earth.
Lidar	A remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to Earth. These light pulses, combined with other data recorded by the airborne system, generate precise, three-dimensional information about the shape of the Earth and its surface characteristics (NOAA, n.d.).
Risk	The likelihood that a geohazard will cause injury or economic damage.
Steep creek	A stream with a gradient exceeding 3° (5% gradient) where debris flows and debris floods are possible (Church & Jakob, 2020). The term ‘steep creek processes’ is used in this report as a collective term for debris flows and debris floods.

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1.0 INTRODUCTION

The Fraser Valley Regional District (FVRD) Electoral Areas A and B are within the Fraser Canyon between Boston Bar and Hope, British Columbia (BC). These electoral areas are subject to numerous geohazards, including clear-water floods, debris floods, debris flows, landslides, earthquakes, wildfires, and snow avalanches (BGC, August 19, 2023). There have been numerous geohazards in recorded history in these electoral areas, including fatal landslides in 1935, 1950, 1958, and 1971 (Septer, 2007; Blais-Stevens, 2020). More recently, atmospheric rivers in January 2020 and November 2021 resulted in extensive geohazards that affected and damaged FVRD properties and infrastructure (highways, roads, railways) (Brideau et al., 2025; Hancock & Wlodarcyzk, 2025).

FVRD, previously known as the Regional District of Fraser-Cheam, developed geohazard maps for the Fraser Canyon in the 1980s and 1990s (e.g., Thurber Consultants Ltd., May 25, 1989). Since that time, comprehensive lidar data was collected along the Fraser Canyon in the Fall 2023 (Government of Canada, n.d.). To comply with BC best practices for geohazard assessments (Engineers and Geoscientists of BC, 2023), FVRD desired to update the available geohazard mapping in the Fraser Canyon with the lidar data and engaged BGC Engineering Inc. (BGC) to provide this service. BGC understands that FVRD intends to provide this new mapping on their FVRD Web Map, which can be accessed publicly for FVRD property owners to find planning information such as zoning and official community plan (OCP) designations, flood and geohazard maps, lot size, development permit areas, and more.

1.1 Scope of Work

BGC was retained by the FVRD to complete geohazard mapping for select properties within Electoral Areas A and B (Figure 1-1, BGC, September 3, 2024) in the following locations:

- Canyon Alpine (Electoral Area A)
- North Bend (Electoral Area A)
- Boston Bar (Electoral Area A)
- Spuzzum (Electoral Area B)
- Yale (Electoral Area B)
- Dogwood Valley (Electoral Area B).

These locations are collectively referred to as the “study areas” in the remainder of the text. The mapping was limited to the 361 properties within the study areas provided to BGC by FVRD. The properties within these study areas mapped as part of this project are listed in Appendix A.

As described in BGC’s proposal (September 3, 2024), BGC completed the following tasks:

- Geomorphic mapping of geohazard areas, as described below
- Review of available geomorphic mapping (e.g., FVRD reports, air photos, and historical records)
- Evaluation of geohazard type[2] based on terrain characteristics and field observations.

[2] Geohazard types were classified using FVRD’s Hazard Acceptability Threshold categories (FVRD, October 2020).

As directed by FVRD, geohazard mapping was limited to:

- Steep creek (debris flow and debris flood) alluvial fans
- Landslides – small-scale localised land slip (source and deposition areas)
- Landslides – catastrophic (source areas only)
- Rockfalls – source and deposition areas.

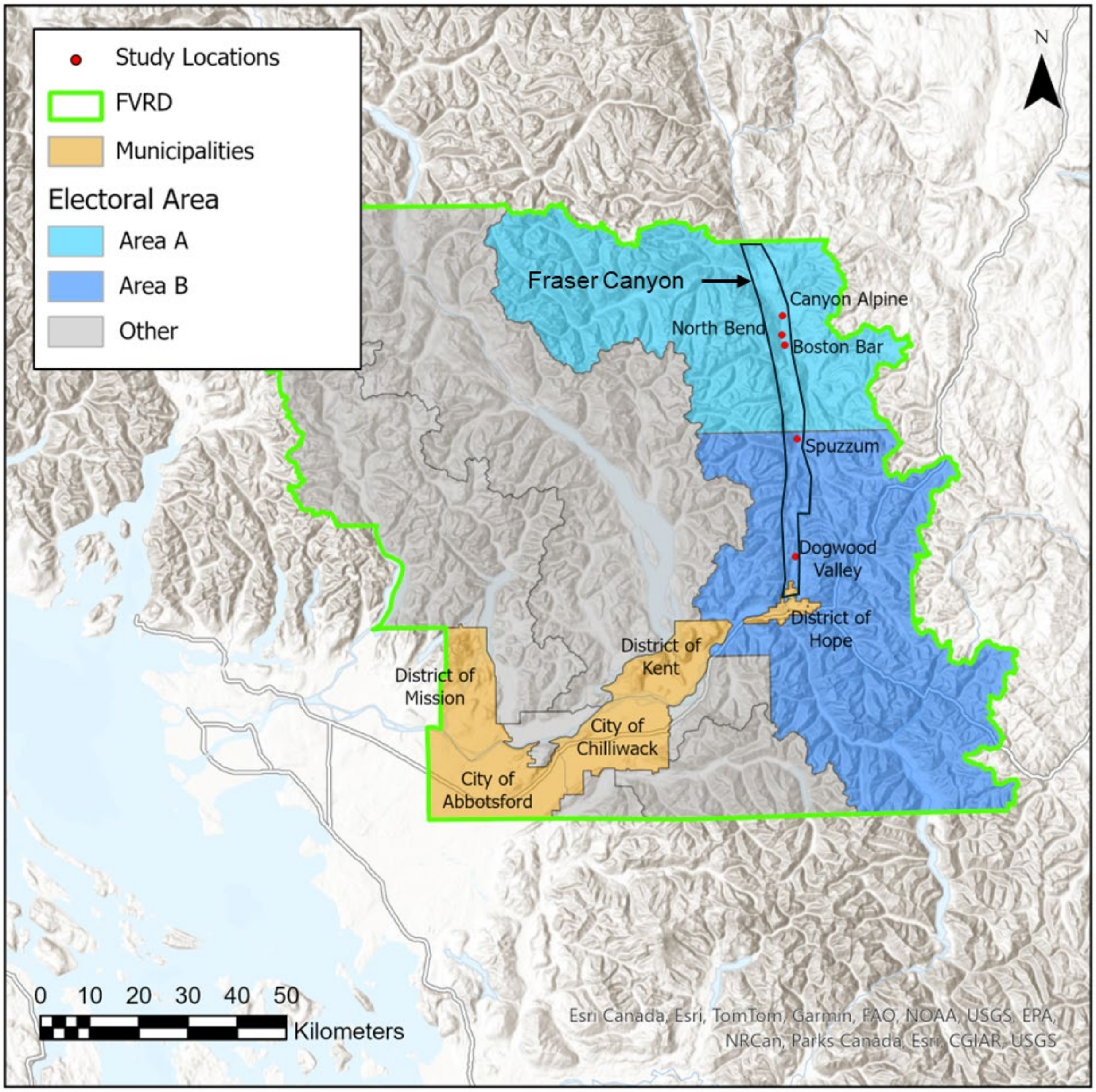


Figure 1-1 Study area locations in FVRD's Electoral Areas A and B (area boundaries from BC Data Catalogue).

This project was carried out under the terms of the agreement for services between BGC and FVRD signed November 5, 2024.

1.2 Appropriate Use of this Report

BGC understands that FVRD is concerned about geohazards that may affect FVRD properties in Electoral Areas A and B. BGC has mapped alluvial fans and landslides at selected properties in Electoral Areas A and B, as identified by FVRD (Appendix A). Additional geohazards exist in the remainder of Electoral Areas A and B that were not mapped by BGC. The mapped geohazard extents were interpreted from lidar data and can be used for planning purposes to identify potentially hazardous areas subject to FVRD's Hazard Acceptability Thresholds (FVRD, October 2020). This report is not intended to provide individual property owners a geotechnical assessment that may be required by FVRD as part of permitting processes as it is of insufficient detail for that purpose. BGC did not assess the likelihood or magnitude of geohazard processes as part of this scope of work. Further work would be required to provide recommendations for risk reduction measures for these geohazards.

2.0 STUDY AREA

2.1 Overview

The study areas are within the lower Fraser Canyon between Hope and Boston Bar, BC. The Fraser Canyon is a steep canyon landform that divides the Cascade Mountains and Coast Mountains physiographic areas in southwestern BC. The Fraser Canyon is an expression of the complex geologic history of this area, including mountain uplifting and faulting, multiple periods of glaciation, and on-going erosion along the Fraser River. The geologic processes have created a canyon that is a vital corridor that moves water, people, and goods between the Lower Mainland, the Interior of BC, and the rest of Canada.

Within the study areas, tributaries to the Fraser River include Anderson River, Scuzzy Creek, Spuzzum Creek, Emory Creek, and Stulkawhits Creek. The Fraser River and its tributaries move large amounts of sediment from landslide and weathering processes in upslope watersheds.

Bedrock controls topographic features within the Fraser Canyon and influences slope stability (Piteau, 1977). The Fraser River follows the Fraser Fault Zone, which is a zone of weaker rock that separates the granitic rocks on the west side of the canyon from interbedded volcanic and sedimentary rocks on the east side of the canyon (Piteau, 1977; Cui et al., 2019). Near the Dogwood Valley, Yale, and Spuzzum study areas, the bedrock is primarily Cretaceous aged metamorphic rock with intrusive igneous rocks (Cui et al., 2019). In the Boston Bar, North Bend, and Canyon Alpine study areas, the bedrock changes to Jurassic aged sedimentary rocks of the Bridge River and Lawdner Group, and the Cretaceous-aged Jackass Mountain Group and Pasayten Group. These sedimentary layers include argillite, shales, claystones and siltstones (Cui et al., 2019). As described in Section 4.0, bedrock influences some of the observed geohazards in study area.

Surficial deposits sourced from glaciers and landslides overlie the bedrock and line the valley bottom within the study areas. Examples of how these different deposits can influence the geohazard sources, and areas free from geohazards in the Fraser Canyon include:

- Glacial deposits can be sources for landslides (e.g., glacially derived landslides along Speyum Creek were triggered by the November 2021 atmospheric river; Hancock & Wlodarcyzk, 2025)
- Developed areas are typically located in areas where surficial deposits have deposited and formed flatter areas compared to the adjacent steep bedrock-controlled slopes (e.g., North Bend and Boston Bar are situated on fluvial terraces of the Fraser River)
- Steep slopes are common below terraces due to the post-glacial erosion of the Fraser River (e.g., steep slopes below North Bend and Canyon Alpine)
- Developed areas are commonly located on alluvial fans at the base of tributary watersheds (e.g., Emory Creek in Dogwood Valley).

Vegetation along the Fraser Canyon slopes consists primarily of Interior Douglas-fir, and Coastal Western Hemlock trees, and Engelmann Spruce-Subalpine Fir

(BC Data Catalogue, 2024). Forest disturbances within the Fraser Canyon include logging (and associated resource roads), wildfires, and pest infestations. These disturbances can influence geohazards, including more frequently occurring landslides and larger floods (Winkler et al., 2010; Hancock & Wlodarcyzk, 2025). Selected examples of forest disturbances in the study areas include:

- Approximately 30% of Emory Creek, and 32% of Hallisey Creek have been historically logged (BC Data Catalogue, April 5; 2024)
- The 2023 Kookipi Creek wildfire burned the lower part of the Nahalatch River watershed (north of North Bend); this wildfire scar produced post-wildfire debris flows and debris floods in August 2024
- Debris avalanches emanating from resource road failures are observed upstream of Dogwood Valley on Stulkawhits Creek (Brideau et al., 2025).

2.2 Elements at Risk

The Fraser Valley Regional District is situated within the unceded traditional territories of the Stó:lō, Nlaka'pamux, and St'at'imc Peoples. BGC recognizes the contributions of Indigenous peoples and the traditional knowledge of the landscape since time immemorial.

FVRD Electoral Area A has a population of 495 people and 287 private dwellings as of 2021 (Statistics Canada, 2023). FVRD Electoral Area B has a population of 869 people and 598 private dwellings as of 2021 (Statistics Canada, 2023). These population and private dwelling estimates do not correspond to the total population or total dwellings considered in this study, as the Electoral Areas are larger than this study area. This study assessed a subset of 361 private parcels in both Electoral Areas.

Additional infrastructure is co-located in the Fraser Canyon and within the FVRD, including the Trans-Canada Highway (Highway 1), Canadian National Railway (CN), and Canadian Pacific Kansas City Railway (CPKC). BGC did not assess geohazard exposure for these elements at risk in this report.

2.3 Climate and Precipitation

The climate in the Fraser Canyon is variable from south to north and generally becomes drier towards Lytton. This rainfall gradient coincides with the observed vegetation changes, as Coastal Hemlock species transition to Interior Douglas fir. There are limited climate stations in the study areas, and the nearest available climate normal stations are at Hope and Lytton, BC. At the Hope station, average annual rainfall between 1971 and 2000 rainfall was 2008.4 mm, while at Lytton, the average annual rainfall during the same time period was 432.4 mm (Government of Canada, n.d. a; n.d. b). Climate normals are not reported at these same stations between 1991 and 2020. The available Hope and Lytton climate normals are summarized in Figure 2-1.

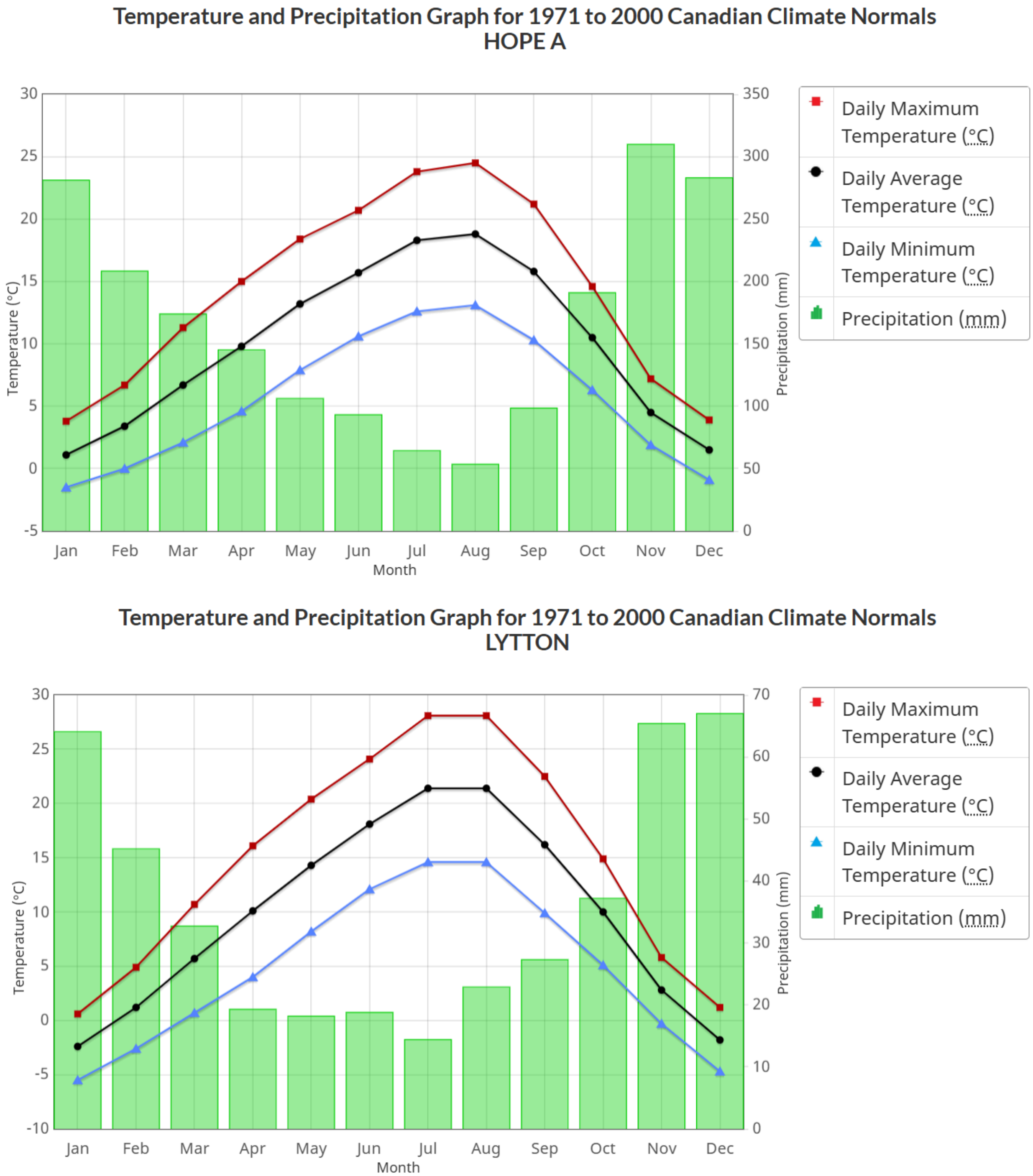


Figure 2-1 Climate normal for Hope (top) and Lytton BC (bottom) between 1971 and 2000. Note that the precipitation and temperature scales are different between the two locations.

Geohazards typically are triggered during heavy rainfall or freeze-thaw cycles in the Fraser Canyon. Older studies (e.g., Piteau, 1977; Peckover & Kerr, 1977) described that most geohazards occurred during the fall and winter months (defined as October to March). Data from recent events (Section 3.2) highlight that these historical studies are generally accurate with regards to triggering mechanisms. In summary, common triggering processes in the Fraser Canyon include:

- Flooding, debris flows, debris floods, and debris slides are typically triggered by heavy rainfall during fall and winter months (e.g., widespread events in January 2020 and November 2021)
- Rockfall commonly occurs during freeze thaw cycles (e.g., rockfall at Yale in January 2011, March 2017, and December 2019)
- Less commonly, intense thunderstorms can trigger debris flows, particularly after a wildfire (e.g., August 2024 events in the Nahalatch River watershed).

3.0 METHODS

BGC's general approach to identifying geohazards in the study areas is summarized by the following steps, which are described in the subsections below:

- Compilation of available report and lidar data
- Development of a geohazard event inventory of recorded geohazards
- Creation of geomorphic maps of alluvial fans and landslides for the study areas
- Completion of field work in November 2024 to assess site conditions at the mapped geohazards and verify the interpreted geohazard process types
- Attribution of geohazards polygons with a primary geohazard process type and additional geohazard processes, where applicable.

3.1 Data Compilation

FVRD maintains a web map of geohazard extents and previous geohazard reports in the study area, which are linked to property locations.

BGC's Hazard Report (October 19, 2023) reviewed existing hazard assessments and floodplain bylaws in FVRD Electoral Areas. These hazards included both geohazards (clearwater floods, steep creeks, landslides, seismic, snow avalanches, and wildfires) and non-natural hazards (transportation, industrial, infrastructure, health, and societal). Where available, the locations of the hazards were compiled for this study.

BGC reviewed publicly available regional and overview geohazard reports prepared for the FVRD. FVRD indicated that limited geohazard mapping currently exists within the study areas and, where they exist, most of the reports were developed before the availability of lidar data in the Fraser Canyon. Selected property-specific geohazard reports[3] were reviewed to incorporate understanding of recent geohazard events and processes (e.g., Statlu, 2022). A summary of reviewed reports is provided in Appendix B.

Publicly available lidar was acquired for the study area in Fall 2023 (Government of Canada, n.d. c). Additional provincial lidar data is also available in selected locations of the Fraser Canyon (LidarBC, n.d.), although it was not used to delineate geohazards for this study. BGC developed lidar digital elevation models (DEMs) to use for the geomorphic mapping and attribution.

3.2 Previous Geohazards in the Study Areas

For the purposes of identifying potential geohazards in study areas, BGC compiled recorded geohazard events within or adjacent to study areas in the Fraser Canyon. BGC reviewed the following datasets to develop a recorded event inventory:

- Records of geohazard events from media[4] (Septer, 2007)

[3] Due to the high number of available reports in the study area, BGC did not review each property-specific geohazard assessment and instead selected overview reports, or reports associated with reported geohazard events.

[4] BGC searched the following key words to catalogue geohazard events: Boothroyd, North Bend, Dogwood Valley, Squeah, Spuzzum, Yale, Boston Bar.

- Database of fatal landslides in Canada (Blais-Stevens, 2020)
- Preliminary Canadian Landslide Inventory (Brideau et al., 2025)
- Geohazards from the November 2021 atmospheric river (Hancock & Wlodarcyzk, 2025).
- Geohazards from previous FVRD reports (see Appendix B).

The event inventory is summarized in Appendix C. This event inventory is not exhaustive and is biased towards larger events that impacted the Trans Canada Highway and/or the railways. Smaller events, that still can pose life-safety risks and damages, are likely underreported. The spatial locations of recorded events, particularly those from Septer (2007), are approximate.

3.3 Geomorphic Mapping

BGC mapped geohazards within the 361 parcel boundaries identified by FVRD for mapping, as well as areas upslope of parcel boundaries with the potential to reach occupied areas in the parcels. Geohazard mapping was limited to:

- Steep creek (debris flow, debris flood, flood, and paleofans) - alluvial fans
- Landslides – small-scale localised land slip (source and deposition areas)
- Landslides – catastrophic (source areas only)
- Rockfalls – source and deposition areas.

The methods used to map these geohazards are described below.

Alluvial Fans

The boundaries of alluvial fans (e.g., Figure 3-2) define the steep creek geohazard areas. Alluvial fans represent the potential extents of future geohazards under similar geologic and triggering conditions. Future geohazards may impact only a portion of the mapped alluvial fan.

Alluvial fan extents were manually delineated in ESRI ArcGISPro based on a review of previous mapping, and from contours and hillshade images built from the available lidar DEMs. Where possible, conjoined alluvial fans were split into distinct polygons based on guidance provided in Lau (2017). Watersheds upstream of each mapped fan were assessed to identify geohazard processes and to attribute the alluvial fans (Section 3.4) but were not mapped.

Landslides Including Rockfall

The extents of landslides (e.g., Figure 3-2) represent the source area and deposit of historical small-scale localised land slips and rockfall geohazards events. Landslides were manually delineated in an ESRI ArcGISPro based on a review of previous mapping, and from contours and hillshade images built from the available lidar DEMs. Where possible, landslide extents were drawn to encompass areas of similar geohazard types and to minimize overlapping hazards. For example, rockfall-prone slopes were mapped separately from debris slide-prone slopes. In some cases, multiple geohazards were identified in a single geohazard area, and as such BGC lumped these areas together and has provided attributes that identify these sites (Section 3.4).

For selected hazards (small-scale localised land slip and rockfall), BGC used empirical relief-length runout models, often colloquially called “H-over-L”, “H/L” or “shadow angles”, to estimate the potential runout extents of rockfall[5] and debris-slide hazards:

- For rockfall hazard extents, a shadow angle of 27.5 degrees was measured from the top of the talus slope to the ground surface (Evans & Hungr, 1993).
- For debris-slide hazards, a shadow angle of 26.5 degrees was measured from the source location. This shadow angle was selected based on a H/L ratio of 0.5, which approximates the 50th percentile runout from past events in similar conditions with volumes of 1,000 to 10,000 m^3 for British Columbia (Brideau et al., 2021).

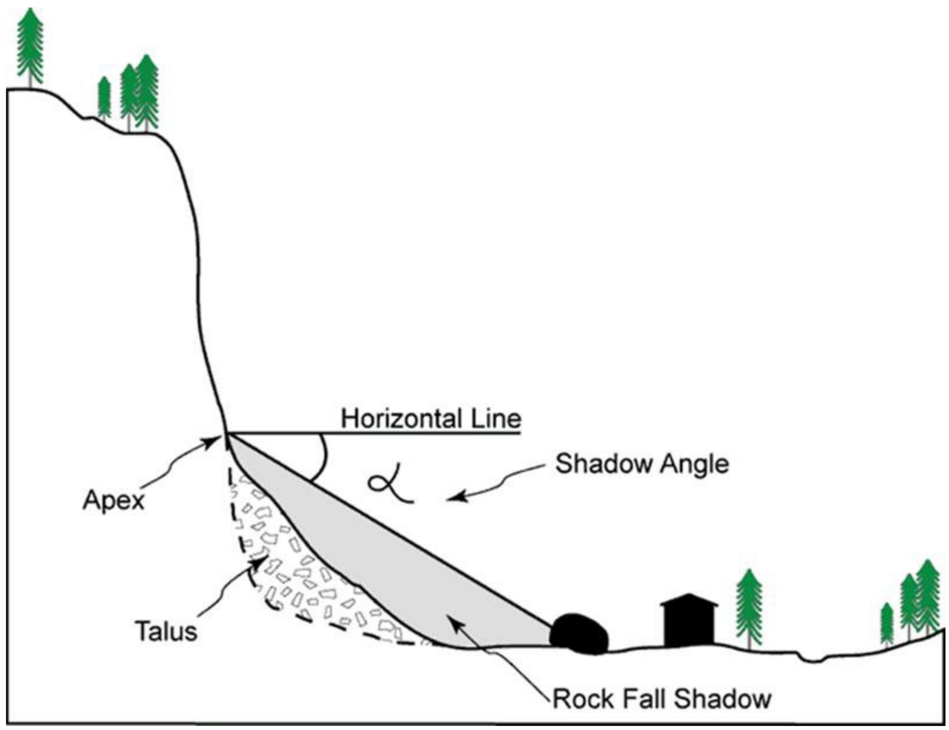


Figure 3-1 Example shadow angle for rockfall originating form the top of talus of the rockfall deposit (Wieczorek et al., 1998).

BGC checked the runout lengths at 43 locations and adjusted mapping extents as needed based on site-specific geomorphic evidence. In places where geomorphic evidence, such as deposits of historical landslides, demonstrated longer runout than the empirical model, the mapping was extended to the limit of the historical deposit. In places where empirical runout suggested longer runout than the geomorphic evidence, the mapping was maintained at the limit of the empirical runout.

[5] Rock slide extents were not estimated for this project.

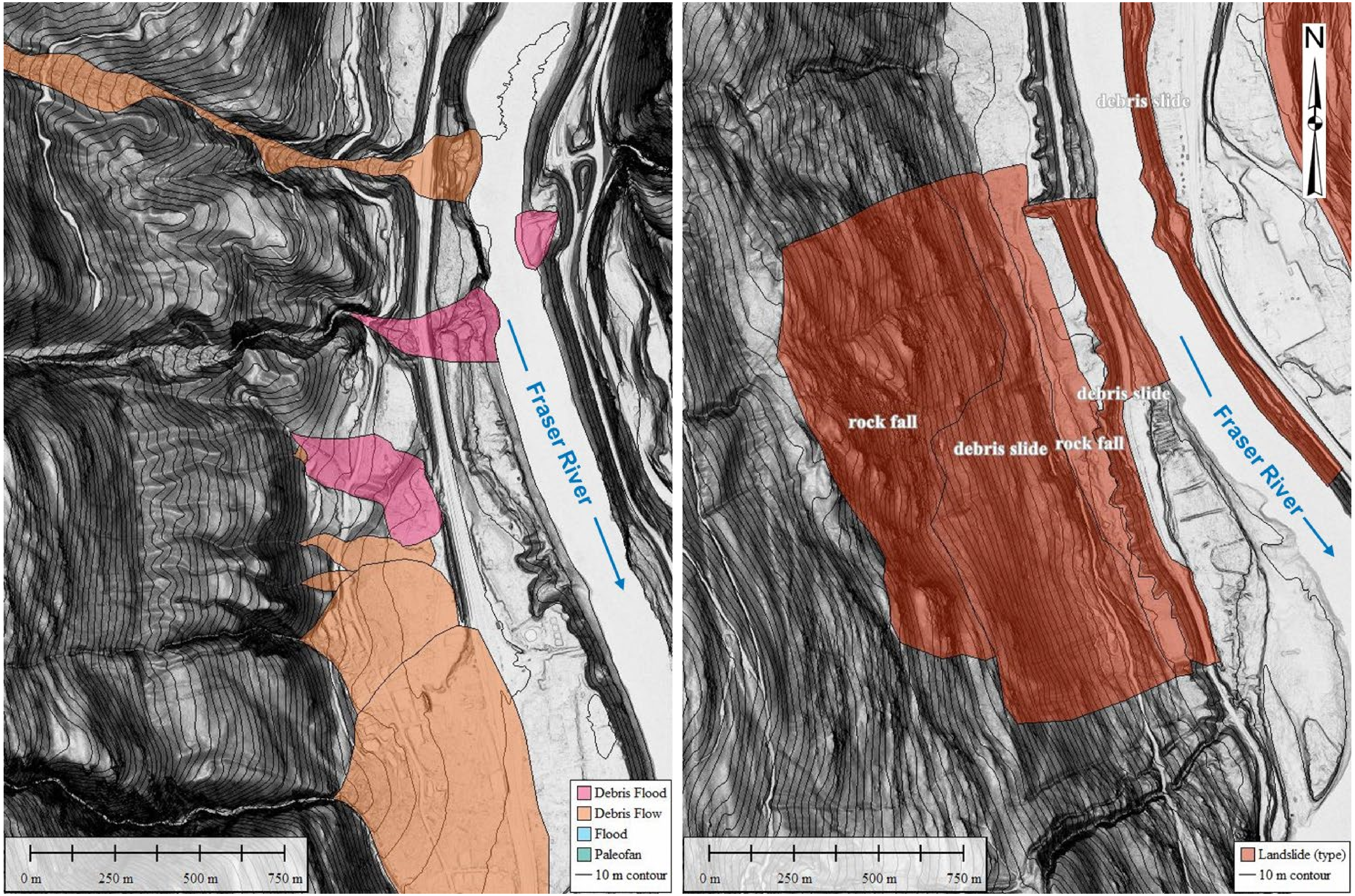


Figure 3-2 Example mapping for alluvial fans (left image) and landslide (right image) in the North Bend study area. Lidar from FHIMP (Government of Canada, n.d.) and dated Fall 2023 with 10-meter contours shown.

3.4 Geohazard Attribution

Alluvial Fans

BGC assigned each alluvial fan a “dominant” geohazard type (debris flow, debris flood, or clear-water flood). The dominant geohazard process was assigned following published guidance (Wilford et al., 2004; de Haas et al., 2024) and interpretations from previous reports (e.g., Thurber, 2018). The term “dominant” refers to the process type that primarily controls hazards on the alluvial fan, either due to the frequency of events or potential damages associated with the geohazard. Recognizing that there is a continuum between clear-water floods and debris flows, BGC notes the following assumptions:

- Fans classified as subject to debris flows may also be subject to floods and debris floods at lower return periods (e.g., debris flows may transition to watery afterflows in the lower runout zone and after the main debris surge)
- Fans classified as subject to debris floods may be subject to clear-water floods, but generally not to debris flows.
- Fans classified as subject to clear-water flood are dominated by clear-water floods.

In some cases, remotely sensed (lidar and air photo) or field observations indicated that the stream may be subject to mixed processes (e.g., the alluvial fan may be subject to debris-flow and debris-flood processes). In this case, the watershed was assigned the more conservative classification (i.e., debris flow is a more conservative rating than debris flood and flood, and debris flood is the more conservative rating than flood.). Where this was observed, BGC has also provided an attribute flagging “mixed” geohazard process types.

The term “paleofan” was used to describe portions of fans interpreted as no longer active (under present climate and geomorphic/geological setting) and entirely removed from active channel processes as well as avulsions due to deep channel incision (Kellerhals & Church, 1990). BGC mapped one paleofan in the study area (Figure 3-3).

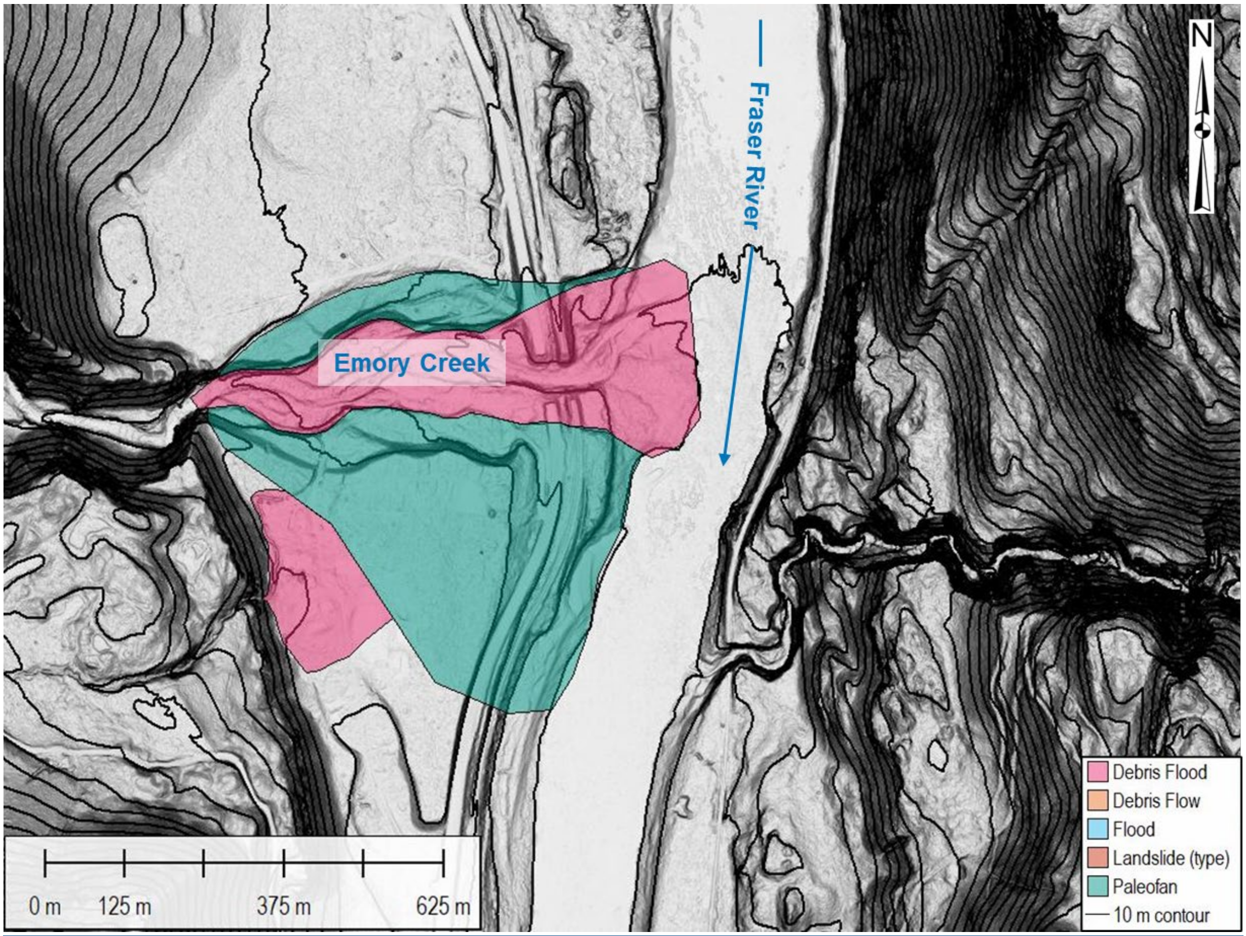


Figure 3-3 Example of a paleofan flanking the active Emory Creek alluvial fan in Dogwood Valley. Lidar from FHIMP (Government of Canada, n.d.) and dated Fall 2023 with 10-meter contours shown.

Landslides including Rockfall

Landslide were assigned one of the following geomorphic process types, following guidance and definitions from Howes and Kenk (1997) and Hungr et al. (2014):

- Earthflow
- Rockfall
- Rock slide
- Rock slope deformation
- Earth slide.

BGC also included a terrain mapping label attribute (per Howes & Kenk, 1997), which can be used to understand the dominant and additional geohazard processes in the polygon:

- Fs – slow landslides in surficial material
- Fe – earth flows
- Rb – rockfall
- Rs – rapid soil slide (debris slide)
- Rr – rock slide/rock avalanche

- Rd – debris flow.

3.5 Field Verification

Fieldwork for this project was undertaken by Carie-Ann Hancock, M.Sc., P.Geo., and Caleb Ring, M.Sc., of BGC from November 13 to 14, 2024. During the fieldwork, BGC visited approximately 110 properties to document, verify, and revise the interpreted hazard and mapping extents as needed. Due to time and weather constraints, BGC did not visit every property with a mapped geohazard and prioritized areas with perceived frequently occurring geohazards that could affect properties, and newly mapped geohazards. Weather at the time of the fieldwork prevented BGC from flying uncrewed aerial vehicle (UAV) surveys; as such observations were limited to on-ground surveys. Select field photos are included in Appendix D.

3.6 Mapping and Attribution Limitations

The accuracy of each geohazard's boundary depends, in part, on the resolution of the available terrain data. Lidar DEMs provide one meter or better resolution. Mapped geohazard boundaries, even where lidar coverage is available, are approximate. The minimum geohazard area that was mapped with the available information is about 0.2 km^2. Local variations in terrain conditions over areas of 0.1 to 0.3 km^2, or over distances of less than about 200 m, may not be visible.

While the presence of an alluvial fan or landslide deposit indicates past geohazard occurrence, the lack of a fan or landslide deposit does not necessarily rule out the potential for future geohazard occurrence. As such, the geohazard inventory completed in this study should not be considered exhaustive.

BGC does not rule out the potential for steep creek or landslide geohazards to extend beyond the limit of the mapped geohazard extents. For example, the fan boundary approximates the extent of sediment deposition since the beginning of fan formation[6]. Geohazards can potentially extend beyond the fan boundary due to localized flooding, where the fan is truncated by a lake or river, in young landscapes where fans are actively forming (e.g., recently deglaciated areas) or where large landslides (e.g., rock avalanches) trigger steep creek events larger than any that have previously occurred.

The extents of landslides should be considered preliminary, particularly where multiple hazard types overlap (rock fall, debris slide, and rock slide), or rockfall runs out onto sloped areas. Future site investigations or geohazard runout modelling could alter the extents of the geohazards mapped by BGC. Landslide retrogression or runout could progress to unmapped areas.

[6] Most of the alluvial fans mapped in this study represent the accumulation of sediment since the last glacial period (approximately 11,000 years before present).

BGC did not specifically consider watershed disturbance (wildfires, logging, and road construction), climate change (increased rainfall and/or snowmelt), and cascading hazards (landslide or constructed dam outburst floods) that may affect the geohazard processes.

As directed by FVRD, BGC did not specifically map areas subject to inundation by flood waters, or mountain stream erosion/avulsion, as defined by FVRD (October 2020).; alluvial fans may contain these geohazards.

4.0 RESULTS

A total of 53 alluvial fans and 73 landslides were mapped within and immediately adjacent to the study areas. Shapefiles for the geohazard mapping will be provided to FVRD as geospatial datasets to integrate with the FVRD Web Map.

Subsections below provide a summary of the results within each study area. Where possible, reported previous events (Appendix C) are integrated into the study area descriptions.

4.1 Canyon Alpine (Electoral Area A)

Previous reports have identified rockfall and debris-flow hazards in the Canyon Alpine study area (e.g., Thurber, January 12, 1989a; May 25, 1989). BGC confirmed the presence of the previously identified geohazards in the study area, along with newly identified debris slide and earthflow geohazards.

Due to Canyon Alpine's proximity to Boston Bar and Boothroyd, limited information (e.g., Septer, 2007) exists to understand if there have been historical geohazard events in Canyon Alpine itself, as this study area is typically lumped with these two communities.

In summary, the Canyon Alpine study area contains the following geohazards (Figure 4-1):

- Alluvial fans subject to debris flows
- Rockfall from mountainous slopes above the developed area (Photo D-1, Photo D-2)
- Earth/soil slides on the west bank of the Fraser River
- An earth flow sourced in the mountainous slopes in the southern part of the community.

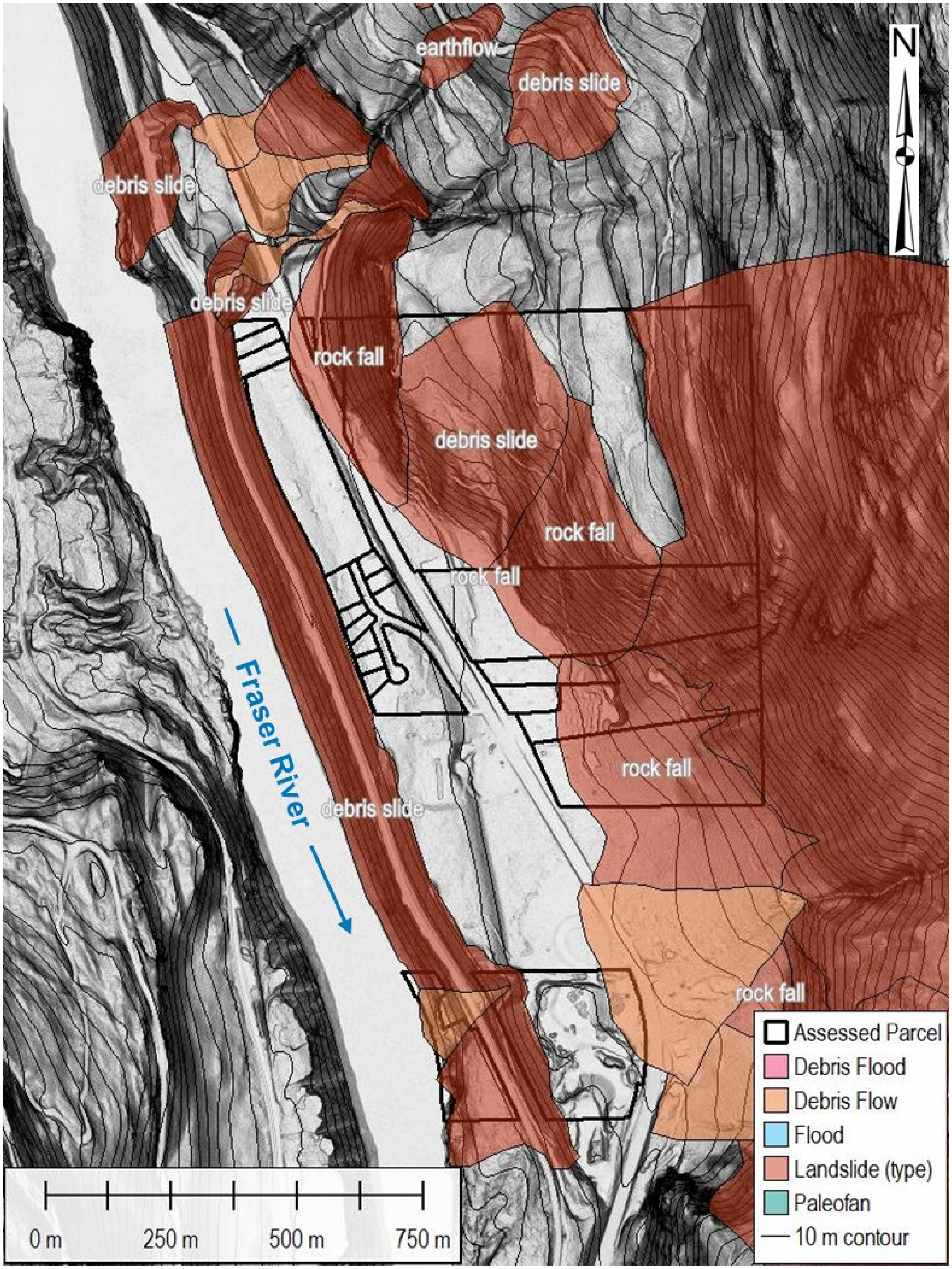


Figure 4-1 **Mapped geohazards in the Canyon Alpine study area. Lidar from FHIMP (Government of Canada, n.d.) and dated Fall 2023 with 10-meter contours shown.**

4.2 North Bend (Electoral Area A)

Previous reports have identified rockfall, debris-slide, and debris-flow hazards in the North Bend study area (e.g., Thurber, January 12, 1989b; October 30, 1987; May 25, 1989; December 10, 1992). BGC confirmed the presence of the previously identified geohazards in the study area, along with newly identified debris-slide and earthflow geohazards.

The alluvial fans and creeks (Brunswick Creek, Hallecks Creek, Hallisey Creek, and other unnamed creeks) in the North Bend study area have previously experienced debris flows and debris floods (Thurber, February 2, 2018; Hancock & Wlodarczyk, 2025). BGC spoke with residents of several parcels that confirmed widespread flooding and debris-flow events during the November 2021 atmospheric river. Residents along North Bend Crescent Road described how during the November 2021 atmospheric river, Hallisey Creek avulsed and travelled south down the road (Photos D-4 and D-5). Additional events occurred on Hallecks Creek in 1989 and 1990 (Thurber, December 10, 1992) and in 2007 (KWL, January 8, 2008). The extents of Hallecks Creek, Hallisey Creek, and an unnamed creek (north of Hallisey) were previously delineated by Thurber (February 2, 2018) and integrated into this study. Given the recent geohazard events, Hallisey Creek would benefit from hydraulic modelling to evaluate geohazard extents.

BGC observed evidence of debris-slide and rockfall activity along the steeper slopes in the southern half of North Bend (shown on right panel of Figure 4-2). BGC noted the presence of a continuous line of bouldery deposits within parcels in the southern half of North Bend (e.g., Photo D-6). The origin of these boulder deposits could not be deduced based on the field data; they could represent rockfall deposits at the base of the slope upslope of Green Ranch Road, or they could be deposits of a kame terrace deposited along the margin of the glacier that once occupied the Fraser Canyon. Due to the uncertainty of the origin of this feature, BGC has conservatively mapped this as a rockfall deposit. Further work at this site would be necessary to confirm the origin of this landform.

In summary, the North Bend study area contains the following geohazards (Figure 4-2):

- Alluvial fans subject to debris flows and debris floods (Photo D-4, Photo D-5)
- Rockfall from mountainous slopes above the developed area (Photo D-6).
- Soil slides from the slopes above the parcels (Photo D-3, D-7).

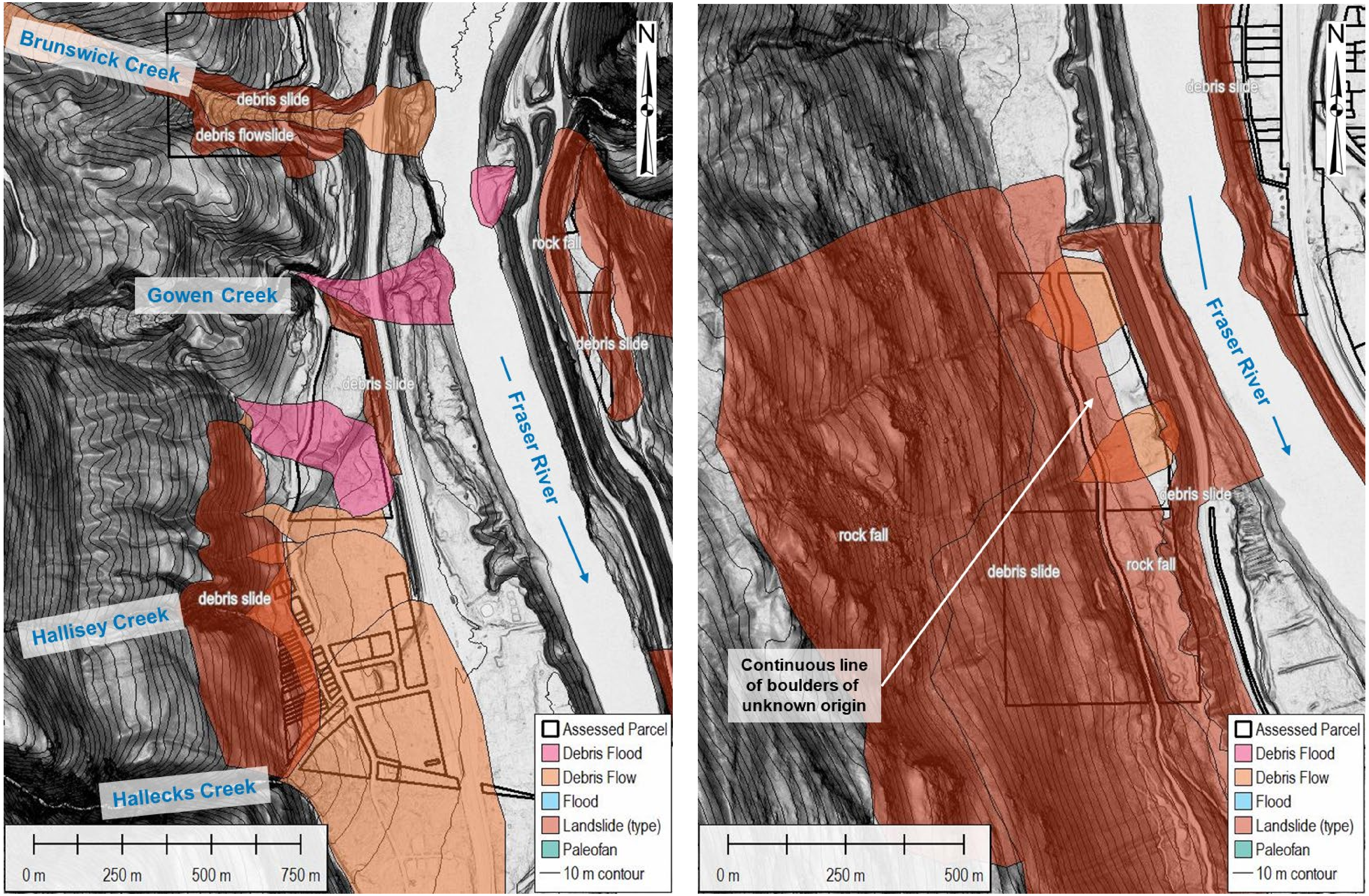


Figure 4-2 Mapped geohazards in the North Bend study area. Panels show mapped geohazards in the northern and southern half of study area, respectively. There are unmapped alluvial fans and landslides (outside of property boundaries provided by FVRD) within both images. Lidar from FHIMP (Government of Canada, n.d.) and dated Fall 2023 with 10-meter contours shown.

4.3 Boston Bar (Electoral Area A)

In Boston Bar, previous reports have identified rockfall, earthflow, rock slide, and potential rock creep[7] geohazards above the developed part of the community (Thurber, January 12, 1989c; October 25, 1990). These reports also hinted at the potential presence of a larger rock slope movement that may explain the presence of these geohazards, but this interpretation was ultimately ruled out of the original geohazard maps of the study area (Thurber, January 12, 1989c; October 4, 1990; Savigny, 1992; Savigny and Clague, 1992).

Based on the newly available lidar data, BGC interpreted that the mountainside above Boston Bar is a large (approximately 3 km wide) landslide complex of unknown age or current activity state (BGC, September 10, 2024). The landslide complex morphology indicates that there are potential rockfall, rock-slide, and earth-flow geohazards within this complex. During field work, BGC observed that the landslide complex is comprised of interbedded slaty metamorphic (argillite) and more competent metamorphosed volcanic rock. Based on the preliminary interpretation of the geomorphology of this site, BGC considers this to be a potentially "catastrophic" landslide[8] for FVRD planning policies. The polygon is classified with a "rockslide" geohazard process, which is the most conservative geohazard type for the observed geomorphologies.

BGC did not specifically map smaller rockfall areas below the large rock slide, however, additional geohazards may originate from the same slope. This includes debris-flow hazards, as well as areas susceptible to debris slides and rockfall.

During field verification in Boston Bar and in support of understanding the large landslide complex, BGC observed active rockfall areas above several parcels that included temporary housing measures, such as a mobile home/RV park (47750 Poplar Road; PIDs 009-536-221, 009-536-264, 009-536-281, 009-501-819, 009-501-843). Based on previous reports, these parcels appear to be within an inactivate quarry. Within this quarry area, previous reports reference a debris slide or rock slide that destroyed a trailer home (Thurber, January 4, 1990), as well as a potential unreported landslide (Thurber, October 25, 1990). Photos D-8 and D-9 show rockfall observations at these parcels.

In summary, the Boston Bar study area contains the following geohazards (Figure 4-3):

- Alluvial fans subject to debris flows
- Rockfall from mountainous slopes above the developed area (Photo D-8, D-9)
- Earth flows on the upper slopes
- Earth/soil slides on the west bank of the Fraser River

[7] Rock creep is the imperceptibly slow, steady, and downward movement of a bedrock slope.

[8] FVRD's Hazard Acceptability Thresholds define catastrophic landslides as "massive landslides [that] pose a destructive and life-threatening risk to those living below the slide area". This definition does not differentiate between catastrophic landslides that could result in life safety threats from a rapid landslide, or a slow-moving catastrophic landslide that could result in extensive building damage but would unlikely result in life safety threats.

- A large landslide complex that encompasses nearly the entire slope above the study area.

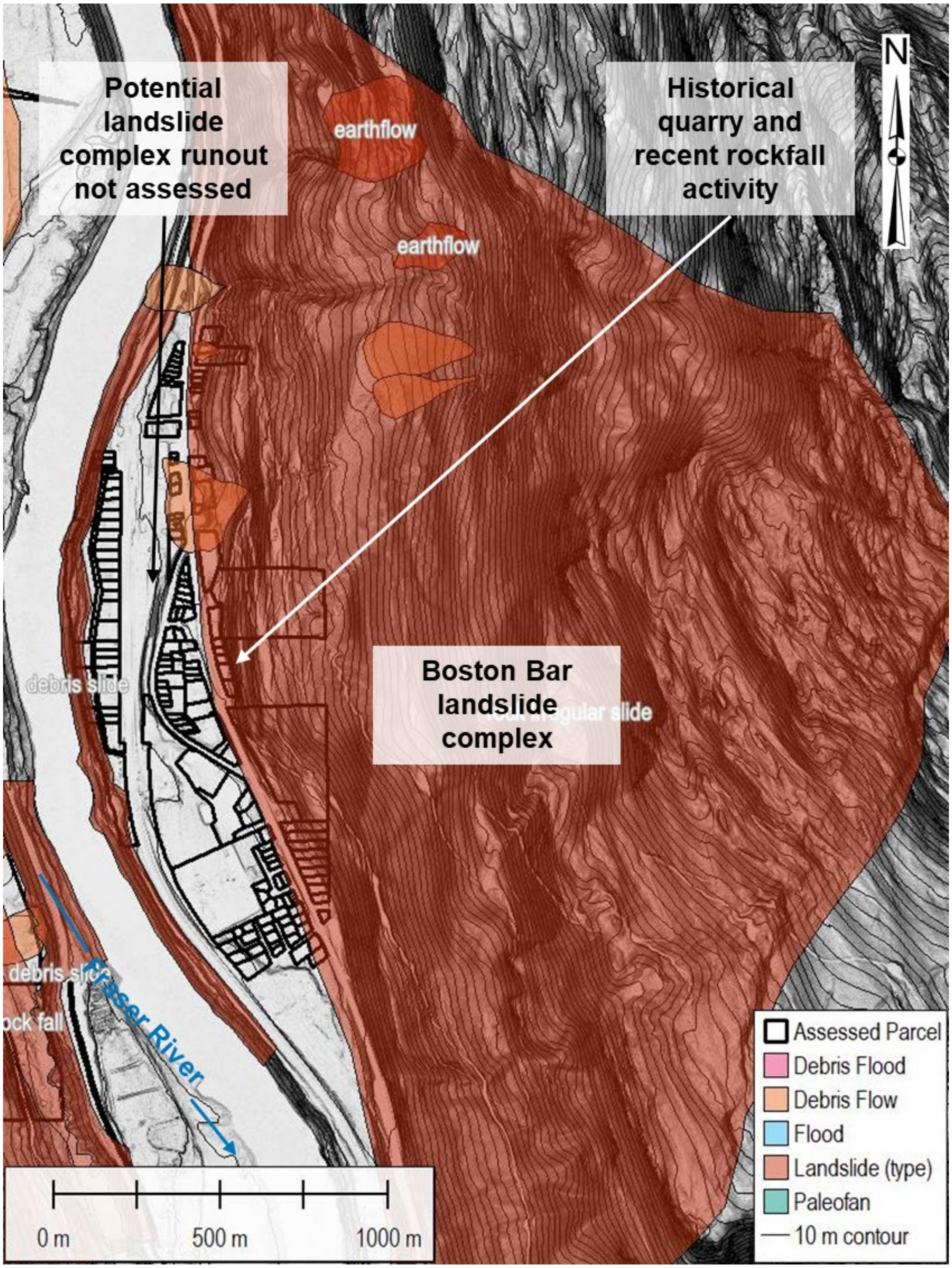


Figure 4-3 Mapped geohazards in the Boston Bar study area. Lidar from FHIMP (Government of Canada, n.d.) and dated Fall 2023 with 10-meter contours shown.

4.4 Spuzzum (Electoral Area B)

Previous reports have identified rockfall and debris-flow hazards in the Spuzzum study area (e.g., Thurber, May 25, 1989). Creeks and alluvial fans in the Spuzzum study area have recorded debris-flow and debris-flood events that occurred during the November 2021 atmospheric river (Hancock & Wlodarczyk, 2025) that were observed during field work as part of this scope.

BGC noted the presence of hummocky boulders on a terrace at 38230 Spuzzum Road (PID 004-854-098) (Photo D-10). Based on their relative position to the Fraser River, and lack of rockslide headscarps upslope of the deposit, BGC interpreted that these boulders are sourced from a glacial outburst flood along the Fraser River approximately 11,000 years ago (Clague et al., 2021).

In summary, the Spuzzum study area contains the following geohazards (Figure 4-4):

- Alluvial fans subject to debris flows and debris floods (Photo D-11)
- Rockfall from mountainous slopes above the developed area, particularly near the Sailor Bar and Saddle Rock Tunnels (e.g., Photo D-12)
- Earth flows on the fluvial terrace slopes
- Earth/soil slides on the west bank of the Fraser River on terraces above the developed area.

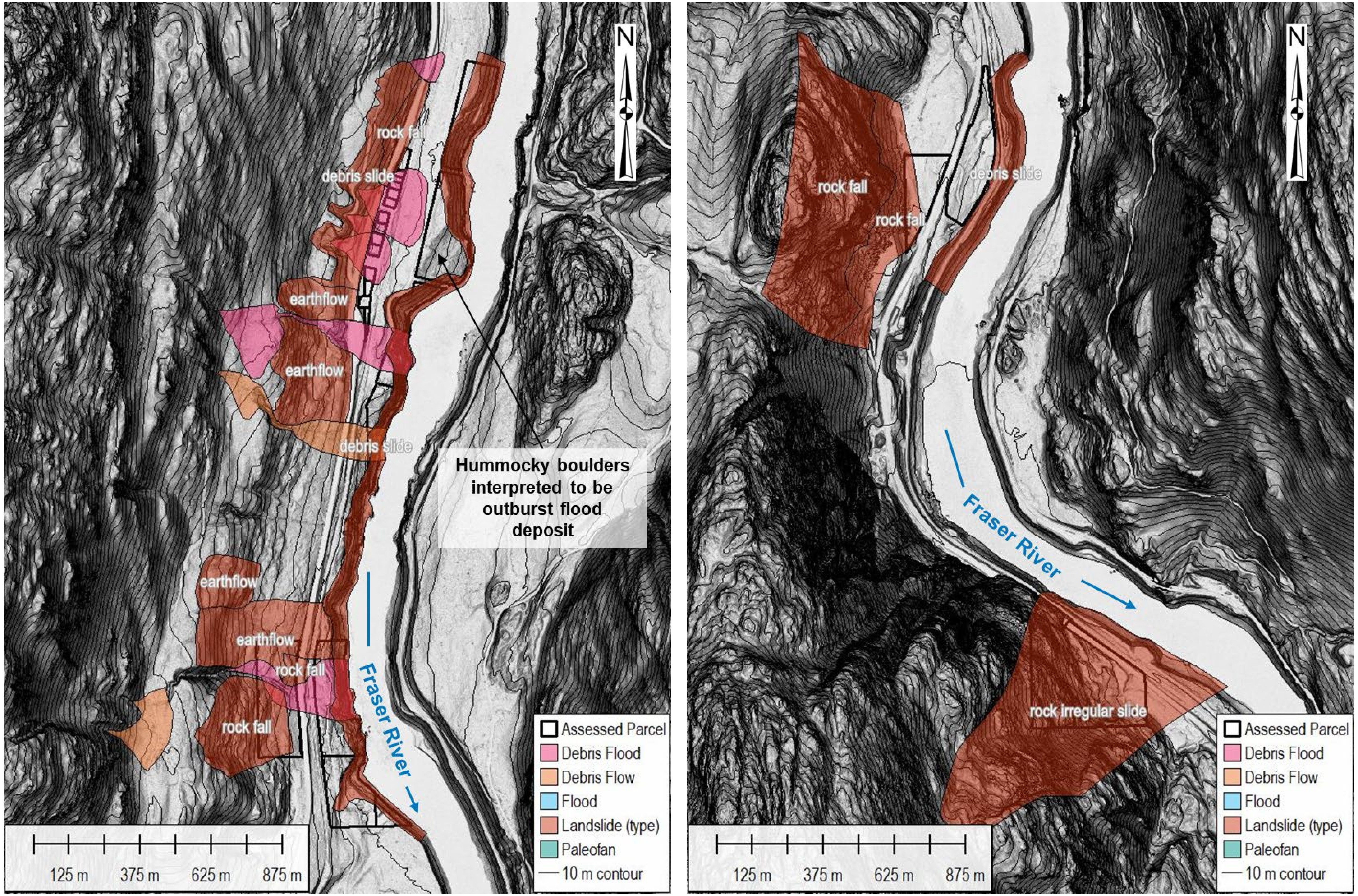


Figure 4-4 Mapped geohazards in the Spuzzum study area. Left panel contains hazards mapped north of Spuzzum Creek, and right panel contains hazards mapped near Sailor Bar Tunnel. Additional mapped parcels near Saddle Rock Tunnel are not shown in this figure. Lidar from FHIMP (Government of Canada, n.d.) and dated Fall 2023 with 10-meter contours shown.

4.5 Spuzzum to Dogwood Valley (Electoral Area B)

Selected parcels were mapped south of Yale between Spuzzum and Dogwood Valley. Previous reports have identified rockfall, rock-slide, and debris-flow hazards in this study area (e.g., Thurber, May 25, 1989). Due to its relatively close proximity to Yale, no specific events have been historically reported in this study area. BGC observed deposits of debris flows from the November 2021 atmospheric river at Highway 1 (Hancock & Wlodarcyzk, 2025).

In a previous report for parcels 004-164-881, 004-164-890, and 004-164-903, Thurber described that no geotechnical hazards are present apart from Gordon Creek (Thurber, September 2, 1987). However, BGC identified and mapped a potential debris-slide hazard intersecting these parcels.

Large, deep-seated post-glacial rock-slide and rock-fall deposits have been identified on either side of Fraser River near Yale (Savigny, 1992; Cordilleran Geoscience, March 9, 2010) that are north of the extents shown in Figure 4-5. Yale was not specifically mapped for this study.

In summary, these parcels are subject to (Figure 4-5):

- Alluvial fans subject to debris flows and debris floods (Photo D-13, D-14, D-15, D-16)
- Rockfall and rock slides from mountainous slopes
- Earth/soil slides above the parcels and along the banks of the Fraser River.

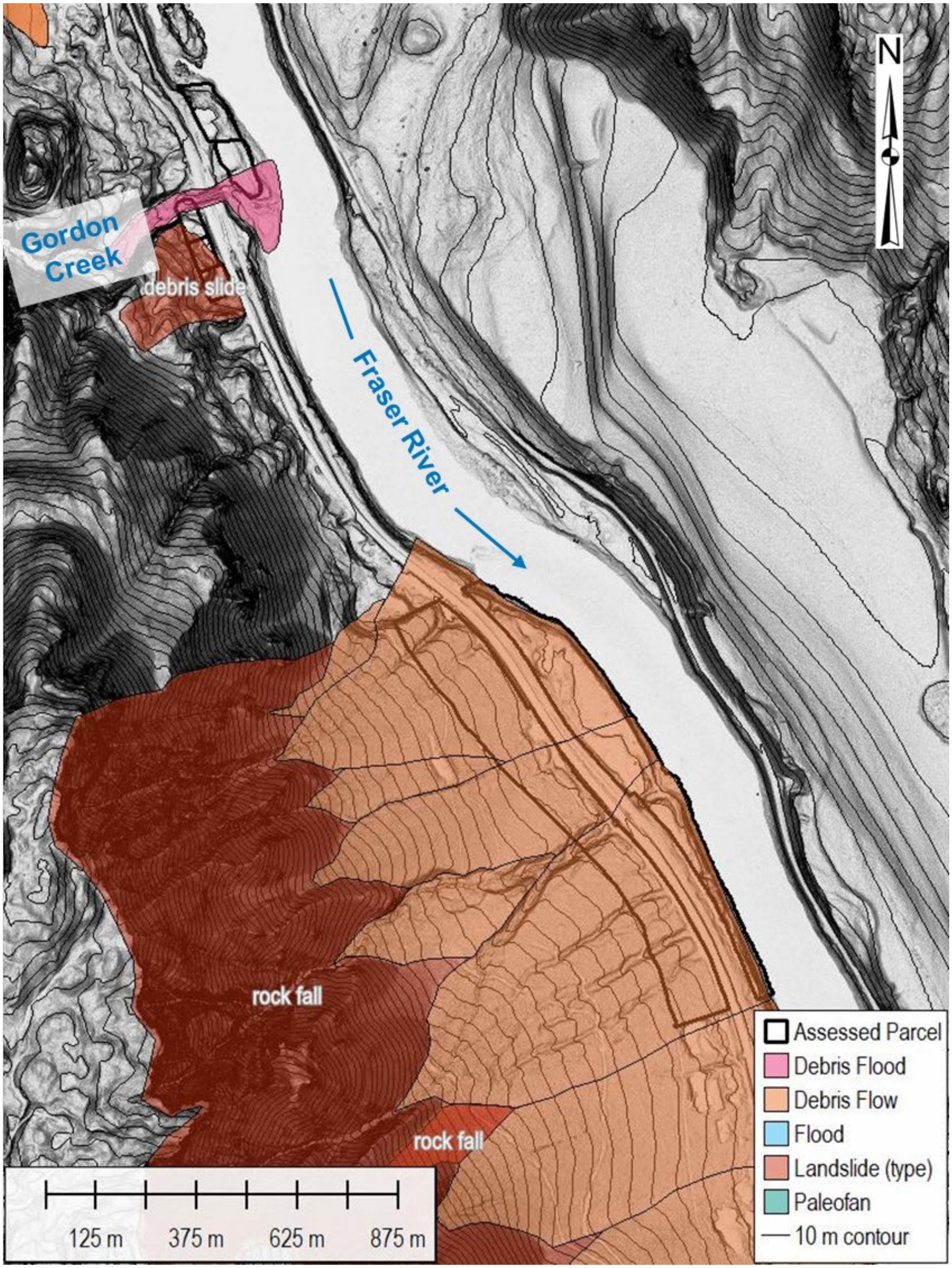


Figure 4-5 Mapped geohazards south of Yale and north of Dogwood Valley. Lidar from FHIMP (Government of Canada, n.d.) and dated Fall 2023 with 10-meter contours shown.

4.6 Dogwood Valley (Electoral Area B)

Previous reports have identified rockfall, rock-slide, debris-slide, debris-flow, and debris-flood hazards in the Dogwood Valley study area (e.g., Thurber, September 22, 1987). Numerous geotechnical studies have been conducted at the individual parcel level in Dogwood Valley. BGC confirmed the presence of the previously identified geohazards in the study area, along with newly mapped debris-flow, debris-slide, rock-slide and earthflow geohazards. Many parts of Dogwood Valley are located at the toe of steep forested slopes, which may be susceptible to rapid surficial landslides. Selected parts of this study area are described below.

Emory Creek is subject to debris-flood geohazards, with rarer debris flows, and potential landslide dam outburst floods due to active landslide processes upstream of the alluvial fan. At 65443 Emory Creek Road (PID 010-419-705), three cabins are within the active floodplain of Emory Creek, including the footings of two cabins (Photos D-17 through D-20).

Between Emory Creek and Stulkawhits Creek, properties are at the base of slopes subject to debris-flow, rockfall, debris-slide, and rock-slide hazards, which were previously described in overview studies (Thurber, September 22, 1987; January 4, 1990). Angular boulder deposits were observed at river level below properties along Yurkin Road[9]; these boulders are interpreted by BGC to be a deposit of an undated rockslide sourced from the escarpment above Dogwood Valley. Debris flows and debris floods from unnamed channels affected homes along Baker Road in January 2020 and November 2021 (Statlu, February 11, 2020; January 9, 2023). At 27111 Baker Road (PID 007-878-087), the house is at the base of a steep slope and water and sediment flooded the house during these events (Photos D-28 though D-31). BGC mapped a new alluvial fan at an unnamed creek approximately 600 m north of Stulkawhits Creek that is potentially subject to debris floods and debris flows. The extents of this alluvial fan were mapped to encompass the potentially active portions of the fan; this site would benefit from hydraulic modelling to evaluate geohazard extents and reduce the area subject to detailed assessments under FVRD' Hazard Acceptability Thresholds.

Stulkwahits Creek is subject to debris-flood and debris-flow hazards. The extents of this alluvial fan were mapped to encompass the potentially active portions of the fan; this site would benefit from hydraulic modelling to further refine geohazard extents and assess risk to existing development. BGC observed a recreational vehicle and deck parked at the top of the left bank (Photo D-31); at the resolution of this assessment, it is unclear if this building is within the debris-flood and bank erosion hazard area.

In summary, the Dogwood Valley study area contains the following geohazards (Figure 4-6):

- Alluvial fans subject to debris flows and debris floods (Photos D-17, D-18, D-19, D-20, D-21, D-22, D-26, D-32, D-33)
- Rockfall and rock slides from mountainous slopes above the developed area (Photos D-23, D-24, D-25, D-27)

[9] Personal communication, Drew Brayshaw, May 29, 2025.

- Earth flows and soil slides form the slopes above the developed area (Photos D-28, D-29, D-30, D-31).

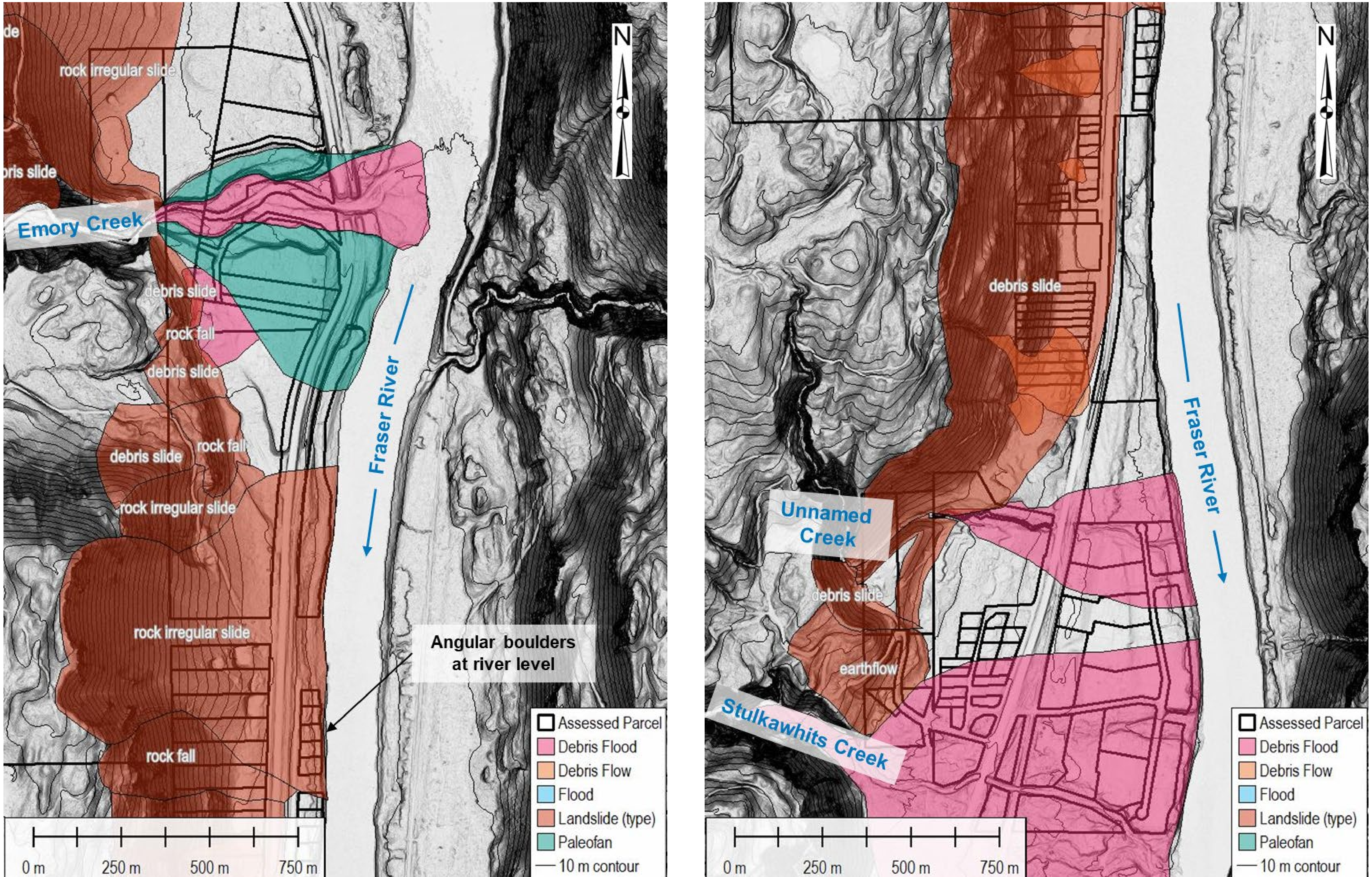


Figure 4-6 Mapped geohazards in the Dogwood Valley study area. Left panel shows mapped geohazards in the northern half of Dogwood Valley, right panel shows mapped geohazards in the southern half of Dogwood Valley.

5.0 RECOMMENDATIONS AND APPLICATIONS OF THIS REPORT

As outlined in Section 1.2, FVRD may use this report and shapefiles for planning purposes under FVRD's Hazard Acceptability Thresholds guidelines (FVRD, October 2020).

In consideration of the Appropriate Use of this Report, BGC has included recommendations for the FVRD and Qualified Professionals that may assist in geohazard risk management and policy development, risk-reduction measures, and individual property assessments.

5.1 Recommendations for FVRD

BGC observed several temporary housing structures (e.g., recreational vehicles, trailers, and cabins) within mapped geohazard extents. Temporary housing structures can experience higher damages from geohazards compared to permanent buildings, due to their relatively lightweight materials, which are not typically designed to withstand impacts from fast flowing water and/or rocks. BGC recommends the FVRD consider the structure type, and increased vulnerability of the observed temporary structures, when assessing properties in hazard areas.

The FVRD may consider detailed assessments including hydraulic and/or debris-flow runout modelling for select creeks and alluvial fans to refine mapping extents and evaluate geohazard risks for existing properties. Detailed assessments may also reduce the area subject to detailed assessments under FVRD' Hazard Acceptability Thresholds. Such assessments would also inform future development in the hazard areas. Based on the perceived level of hazard, and level of development in hazard areas, BGC considers the following creeks in the study areas may benefit from detailed assessments including hydraulic and/or debris flow runout model:

- Hallisey Creek
- Emory Creek
- Stulkawhits Creek
- The unnamed creek 600 m north of Stulkawhits Creek.

BGC issued a technical memo related to the Boston Bar landslide complex to the FVRD on September 10, 2024. BGC considers that this is a potentially "catastrophic" landslide, per FVRD's Hazard Acceptability Thresholds guidance. BGC recommends that FVRD further assess this site and acknowledges that the FVRD has received grant funding to support detailed assessment of this landform.

The cabins with footings in the channel along Emory Creek (65443 Emory Creek Road; PID 010-419-705) are in a high hazard area with potential geohazard risks that warrant further assessment. Consistent with previous Thurber and Statlu reports, BGC considers the location of the home at 27111 Baker Road (PID 007-878-087) to be in a high hazard area with potential life-safety risks that warrants further assessment.

BGC is aware of previous terrain stability mapping in the Yale area completed by Cordilleran Geoscience (2010) without the benefit of lidar. BGC encourages FVRD to consider remapping the Yale area with the lidar data.

As this scope was limited to delineation of geohazard extents based on geomorphic evidence (alluvial fans and landslide landforms) and empirical runout models for rockfall and debris-slide hazards, further work could be done by FVRD to sub-delineate the landforms based on the estimated likelihood of geohazard inundation. This work would benefit many properties and may also reduce the area subject to detailed assessments under FVRD' Hazard Acceptability Thresholds. Such assessments would also inform future development in the hazard areas.

5.2 Recommendations for Qualified Professionals

FVRD's Hazard Acceptability Thresholds manages development approvals for properties within geohazard areas. Property-specific geohazard assessments may be required prior to development for properties within study areas mapped as part of this study and are subject to Engineers and Geoscientists of BC Landslide and Flood assessment guidelines (EGBC, August 28, 2018; March 1, 2023).

If a property-specific geohazard assessment is required by FVRD at sites mapped as part of this study, Qualified Professionals conducting property-specific assessments prior to development should consider:

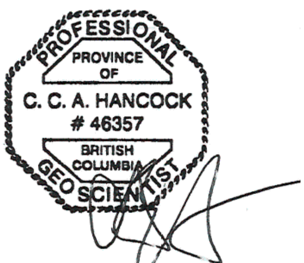
- The mapping extents provided herein represent the credible extent (based on geomorphic evidence of a hazard and/or the empirical runout model) of alluvial fan, rockfall, and debris slide hazards. Source areas for previous catastrophic landslide hazards (e.g., rockslides) were mapped; runout extents of these hazards were not assessed.
- Local site conditions (terrain, geology, groundwater) should be evaluated by Qualified Professionals to evaluate the likelihood of the described geohazards reaching the extents shown in the geohazard mapping.

6.0 CLOSURE

We trust the above satisfies your requirements. Should you have any questions or comments, please do not hesitate to contact us.

Yours sincerely,

BGC Engineering Inc.
per:



2025-06-18

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CAH/BW/LH/ajb/th

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APPENDIX A
PROPERTIES IN STUDY

A-1 LIST OF PROPERTIES IN STUDY

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area A	001-487-515	48755 North Bend Cres	North Bend
Area A	001-547-381	50530 Trans Canada Hwy	Canyon Alpine
Area A	001-550-519	50490 Trans Canada Hwy	Canyon Alpine
Area A	001-552-775	47430 Trans Canada Hwy	Boston Bar
Area A	001-706-659	48060 Larch Rd	Boston Bar
Area A	001-734-407	48835 North Bend Cres	North Bend
Area A	001-762-842	48813 Chaumox Rd	North Bend
Area A	001-762-915	48885 North Bend Cres	North Bend
Area A	001-862-138	47506 Sumac Dr	Boston Bar
Area A	001-863-461	65003 North Bend Post Office Rd	North Bend
Area A	001-950-274	64922 North Bend Post Office Rd	North Bend
Area A	002-009-081	50865 Trans Canada Hwy	Canyon Alpine
Area A	002-019-990	65330 Pine Close	Boston Bar
Area A	002-090-619	48783 Chaumox Rd	North Bend
Area A	002-357-879	49006 Highline Rd	North Bend
Area A	002-635-119	50875 Trans Canada Hwy	Canyon Alpine
Area A	002-689-162	48165 Trans Canada Hwy	Boston Bar
Area A	002-690-519	48240 Cottonwood Rd	Boston Bar
Area A	002-693-887	48270 Cottonwood Rd	Boston Bar
Area A	002-694-085	48280 Cottonwood Rd	Boston Bar
Area A	002-694-158	48180 Cottonwood Rd	Boston Bar
Area A	002-751-712	47410 Trans Canada Hwy	Boston Bar
Area A	002-884-062	65012 North Bend Post Office Rd	North Bend
Area A	003-063-551	50450 Trans Canada Hwy	Canyon Alpine
Area A	003-225-798	47995 Hemlock Rd	Boston Bar
Area A	003-318-273	49200 Trans Canada Hwy	Canyon Alpine
Area A	003-318-354	49300 Trans Canada Hwy	Canyon Alpine

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area A	003-326-322	47975 Hemlock Rd	Boston Bar
Area A	003-326-349	47955 Hemlock Rd	Boston Bar
Area A	003-347-419	47341 Gibson Rd	Boston Bar
Area A	003-540-065	50627 Slanzi Rd	Canyon Alpine
Area A	003-540-090	50585 Slanzi Rd	Canyon Alpine
Area A	003-720-845	47403 Macneal Rd	Boston Bar
Area A	003-928-837	47516 Sumac Dr	Boston Bar
Area A	003-972-551	47486 Sumac Dr	Boston Bar
Area A	003-972-585	47496 Sumac Dr	Boston Bar
Area A	004-012-127	47818 Old Boston Bar Rd	Boston Bar
Area A	004-017-463	48811 North Bend Cres	North Bend
Area A	004-152-361	50615 Slanzi Rd	Canyon Alpine
Area A	004-152-379	50605 Slanzi Rd	Canyon Alpine
Area A	004-152-387	50595 Slanzi Rd	Canyon Alpine
Area A	004-204-981	47762 Old Boston Bar Rd	Boston Bar
Area A	004-271-394	48210 Cottonwood Rd	Boston Bar
Area A	004-314-735	48867 Chaumox Rd	North Bend
Area A	004-314-751	48867 Chaumox Rd	North Bend
Area A	004-352-360	48891 North Bend Cres	North Bend
Area A	004-352-378	48106 North Bend Cres	North Bend
Area A	004-601-688	48080 Trans Canada Hwy	Boston Bar
Area A	004-652-185	50873 Ainslie Rd	Canyon Alpine
Area A	004-754-328	48045 Trans Canada Hwy	Boston Bar
Area A	004-760-956	50610 Trans Canada Hwy	Canyon Alpine
Area A	004-760-964	50580 Trans Canada Hwy	Canyon Alpine
Area A	004-791-622	47436 Sumac Dr	Boston Bar
Area A	004-941-829	47425 Sumac Dr	Boston Bar
Area A	004-941-845	47435 Sumac Dr	Boston Bar

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area A	004-941-861	47445 Sumac Dr	Boston Bar
Area A	004-941-888	47455 Sumac Dr	Boston Bar
Area A	004-941-900	47465 Sumac Dr	Boston Bar
Area A	004-941-926	47475 Sumac Dr	Boston Bar
Area A	004-941-942	47426 Sumac Dr	Boston Bar
Area A	006-053-637	47777 Maple Rd	Boston Bar
Area A	006-134-165	48083 Riverside Rd	Boston Bar
Area A	006-162-002	47663 Old Boston Bar Rd	Boston Bar
Area A	006-162-037	47632 Old Boston Bar Rd	Boston Bar
Area A	006-162-045	47623 Old Boston Bar Rd	Boston Bar
Area A	006-396-097	47744 Old Boston Bar Rd	Boston Bar
Area A	006-746-012	47765 Alder Rd	Boston Bar
Area A	007-047-584	47600 Poplar Rd	Boston Bar
Area A	007-546-327	47415 Sumac Dr	Boston Bar
Area A	007-714-181	48801 North Bend Cres	North Bend
Area A	007-714-271	North Bend Cres	North Bend
Area A	008-164-363	47663 Old Boston Bar Rd	Boston Bar
Area A	008-544-727	48030 Larch Rd	Boston Bar
Area A	008-924-210	48904 North Bend Cres	North Bend
Area A	009-198-377	50885 Trans Canada Hwy	Canyon Alpine
Area A	009-500-251	48000 Larch Rd	Boston Bar
Area A	009-501-819	47750 Poplar Rd	Boston Bar
Area A	009-501-843	Lot 12 Poplar Road	Boston Bar
Area A	009-520-066	47914 Old Boston Bar Rd	Boston Bar
Area A	009-520-074	47894 Old Boston Bar Rd	Boston Bar
Area A	009-520-082	47884 Old Boston Bar Rd	Boston Bar
Area A	009-520-091	47864 Old Boston Bar Rd	Boston Bar
Area A	009-520-104	47864 Old Boston Bar Rd	Boston Bar

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area A	009-520-112	47854 Old Boston Bar Rd	Boston Bar
Area A	009-520-121	47844 Old Boston Bar Rd	Boston Bar
Area A	009-520-139	65321 Pine Close	Boston Bar
Area A	009-520-155	65331 Pine Close	Boston Bar
Area A	009-520-198	47830 Poplar Rd	Boston Bar
Area A	009-525-190	47624 Old Boston Bar Rd	Boston Bar
Area A	009-525-211	47535 Trans Canada Hwy	Boston Bar
Area A	009-525-220	47405 Sumac Dr	Boston Bar
Area A	009-525-238	47395 Sumac Dr	Boston Bar
Area A	009-525-521	48025 Trans Canada Hwy	Boston Bar
Area A	009-536-060	47715 Alder Rd	Boston Bar
Area A	009-536-094	47725 Alder Rd	Boston Bar
Area A	009-536-116	47755 Alder Rd	Boston Bar
Area A	009-536-124	47775 Alder Rd	Boston Bar
Area A	009-536-191	47795 Alder Rd	Boston Bar
Area A	009-536-221	Lot 8 Poplar Road	Boston Bar
Area A	009-536-264	Lot 9 Poplar Road	Boston Bar
Area A	009-536-281	Lot 10 Poplar Road	Boston Bar
Area A	009-632-891	47754 Old Boston Bar Rd	Boston Bar
Area A	009-735-631	48140 Trans Canada Hwy	Boston Bar
Area A	009-783-989	47808 Old Boston Bar Rd	Boston Bar
Area A	009-784-021	47794 Old Boston Bar Rd	Boston Bar
Area A	009-784-055	47784 Old Boston Bar Rd	Boston Bar
Area A	009-784-080	47774 Old Boston Bar Rd	Boston Bar
Area A	009-784-128	47654 Old Boston Bar Rd	Boston Bar
Area A	009-784-179	47624 Old Boston Bar Rd	Boston Bar
Area A	010-012-958	47530 Fairley Rd	Boston Bar
Area A	010-013-016	47520 Fairley Rd	Boston Bar

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area A	010-052-160	47734 Old Boston Bar Rd	Boston Bar
Area A	010-052-224	47714 Old Boston Bar Rd	Boston Bar
Area A	010-052-267	47724 Old Boston Bar Rd	Boston Bar
Area A	010-052-305	47704 Old Boston Bar Rd	Boston Bar
Area A	010-052-348	47694 Old Boston Bar Rd	Boston Bar
Area A	010-052-381	47684 Old Boston Bar Rd	Boston Bar
Area A	010-079-751	47311 Gibson Rd	Boston Bar
Area A	010-086-382	47930 Trans Canada Hwy	Boston Bar
Area A	010-185-593	47404 Macneal Rd	Boston Bar
Area A	010-185-615	47394 Macneal Rd	Boston Bar
Area A	010-185-631	47370 Gibson Rd	Boston Bar
Area A	010-185-666	47384 Macneal Rd	Boston Bar
Area A	010-185-674	47360 Gibson Rd	Boston Bar
Area A	010-185-739	47322 Gibson Rd	Boston Bar
Area A	010-185-763	47350 Gibson Rd	Boston Bar
Area A	010-185-844	47302 Gibson Rd	Boston Bar
Area A	010-185-861	47361 Gibson Rd	Boston Bar
Area A	010-185-909	47369 Adamski Rd	Boston Bar
Area A	010-185-968	47390 Adamski Rd	Boston Bar
Area A	010-185-976	47381 Gibson Rd	Boston Bar
Area A	010-185-984	47371 Gibson Rd	Boston Bar
Area A	010-185-992	47389 Adamski Rd	Boston Bar
Area A	010-186-182	47379 Adamski Rd	Boston Bar
Area A	010-207-821	47285 Aspen Rd	Boston Bar
Area A	010-382-747	47510 Fairley Rd	Boston Bar
Area A	010-382-755	47490 Fairley Rd	Boston Bar
Area A	010-382-763	47480 Fairley Rd	Boston Bar
Area A	010-382-771	47470 Trans Canada Hwy	Boston Bar

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area A	010-382-780	47460 Trans Canada Hwy	Boston Bar
Area A	010-382-798	47450 Trans Canada Hwy	Boston Bar
Area A	010-475-028	47994 Riverside Road	Boston Bar
Area A	010-475-052	47994 Riverside Road	Boston Bar
Area A	010-587-225	48200 Cottonwood Rd	Boston Bar
Area A	010-587-241	48165 Trans Canada Hwy	Boston Bar
Area A	010-587-276	48215 Trans Canada Hwy	Boston Bar
Area A	010-587-306	48215 Trans Canada Hwy	Boston Bar
Area A	010-587-322	48225 Trans Canada Hwy	Boston Bar
Area A	010-587-349	48235 Trans Canada Hwy	Boston Bar
Area A	010-587-373	48245 Trans Canada Hwy	Boston Bar
Area A	010-665-978	47994 Riverside Road	Boston Bar
Area A	010-665-994	47994 Riverside Road	Boston Bar
Area A	010-666-001	47994 Riverside Road	Boston Bar
Area A	010-666-036	47994 Riverside Road	Boston Bar
Area A	010-666-044	47994 Riverside Road	Boston Bar
Area A	010-666-061	47994 Riverside Road	Boston Bar
Area A	010-666-109	47994 Riverside Road	Boston Bar
Area A	010-731-571	48846 Highline Rd	North Bend
Area A	011-158-255	48075 Trans Canada Hwy	Boston Bar
Area A	011-158-280	48075 Trans Canada Hwy	Boston Bar
Area A	011-271-744	47994 Riverside Road	Boston Bar
Area A	011-271-761	47994 Riverside Road	Boston Bar
Area A	011-271-787	47994 Riverside Road	Boston Bar
Area A	011-271-809	47994 Riverside Road	Boston Bar
Area A	011-271-825	47994 Riverside Road	Boston Bar
Area A	011-271-841	47994 Riverside Road	Boston Bar
Area A	011-271-884	47994 Riverside Road	Boston Bar

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area A	011-271-906	47994 Riverside Road	Boston Bar
Area A	011-271-922	47994 Riverside Road	Boston Bar
Area A	011-272-015	47994 Riverside Road	Boston Bar
Area A	011-272-040	47994 Riverside Road	Boston Bar
Area A	011-272-066	47994 Riverside Road	Boston Bar
Area A	011-272-261	47994 Riverside Road	Boston Bar
Area A	011-355-450	48093 Riverside Rd	Boston Bar
Area A	011-355-492	48073 Riverside Rd	Boston Bar
Area A	011-355-557	48064 Riverside Rd	Boston Bar
Area A	011-355-581	48054 Riverside Rd	Boston Bar
Area A	011-355-611	48034 Riverside Rd	Boston Bar
Area A	011-465-913	48795 North Bend Cres	North Bend
Area A	011-617-136	48704 North Bend Cres	North Bend
Area A	011-617-144	48773 Chaumox Rd	North Bend
Area A	011-617-161	48793 Chaumox Rd	North Bend
Area A	011-617-187	48803 Chaumox Rd	North Bend
Area A	011-617-268	48833 Chaumox Rd	North Bend
Area A	011-617-314	48853 Chaumox Rd	North Bend
Area A	011-617-349	48745 North Bend Cres	North Bend
Area A	011-617-365	48761 North Bend Cres	North Bend
Area A	011-617-381	48765 North Bend Cres	North Bend
Area A	011-617-420	48785 North Bend Cres	North Bend
Area A	011-617-594	48815 North Bend Cres	North Bend
Area A	011-617-616	48815 North Bend Cres	North Bend
Area A	011-617-641	48825 North Bend Cres	North Bend
Area A	011-617-705	48841 North Bend Cres	North Bend
Area A	011-704-152	48745 North Bend Cres	North Bend
Area A	014-630-036	48735 North Bend Cres	North Bend

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area A	014-631-270	48632 1St Ave	North Bend
Area A	014-632-331	Chaumox Rd	North Bend
Area A	014-633-191	50690 Trans Canada Hwy	Canyon Alpine
Area A	014-633-345		Canyon Alpine
Area A	014-749-521	47220 Green Ranch Rd	North Bend
Area A	014-750-660	47000 Green Ranch Rd	North Bend
Area A	014-752-409	48130 Trans Canada Hwy	Boston Bar
Area A	014-752-417	48115 Trans Canada Hwy	Boston Bar
Area A	014-757-133	47945 Hemlock Rd	Boston Bar
Area A	014-757-214	47844 Ash Road	Boston Bar
Area A	014-927-586	48834 Chaumox Rd	North Bend
Area A	014-928-183	64980 North Bend Station Rd	North Bend
Area A	015-503-844	48723 Chaumox Rd	North Bend
Area A	017-816-769	47585 Old Boston Bar Rd	Boston Bar
Area A	017-816-777	47555 Trans Canada Hwy	Boston Bar
Area A	018-530-214	50628 Slanzi Rd	Canyon Alpine
Area A	018-530-231	50624 Slanzi Rd	Canyon Alpine
Area A	018-530-257	50620 Slanzi Rd	Canyon Alpine
Area A	023-231-891	48255 Trans Canada Hwy	Boston Bar
Area A	023-270-098	64915 North Bend Station Road	North Bend
Area A	023-673-371	50625 Slanzi Rd	Canyon Alpine
Area A	023-673-389	50621 Slanzi Rd	Canyon Alpine
Area A	024-898-651	50705 Trans Canada Hwy	Canyon Alpine
Area A	024-921-025		North Bend
Area A	024-976-458	48781 North Bend Cres	North Bend
Area A	026-421-348	47301 Gibson Rd	Boston Bar
Area A	031-695-663	48827 Chaumox Rd	North Bend
Area B	001-491-873	27313 Dogwood Valley Rd	Dogwood Valley

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area B	001-519-859	26565 Stulkawhits Rd	Dogwood Valley
Area B	001-559-982	36110 Trans Canada Hwy	Spuzzum
Area B	001-562-991	36255 Trans Canada Hwy	Spuzzum
Area B	001-711-288	29605 Trans Canada Hwy	Spuzzum
Area B	001-757-571	26833 Dogwood Valley Rd	Dogwood Valley
Area B	001-897-659	65176 Nickel Mine Rd	Dogwood Valley
Area B	001-974-122	27533 Dogwood Valley Rd	Dogwood Valley
Area B	002-102-820	38081 Front St	Spuzzum
Area B	002-405-351	38241 Front St	Spuzzum
Area B	002-778-831	27183 Dogwood Valley Rd	Dogwood Valley
Area B	002-884-208	65061 Nickel Mine Rd	Dogwood Valley
Area B	003-092-291	65103 Nickel Mine Rd	Dogwood Valley
Area B	003-931-986	27103 Dogwood Valley Rd	Dogwood Valley
Area B	004-164-881	30295 Trans Canada Hwy	Spuzzum to Dogwood Valley
Area B	004-164-890	30295 Trans Canada Hwy	Spuzzum to Dogwood Valley
Area B	004-164-903	30235 Trans Canada Hwy	Spuzzum to Dogwood Valley
Area B	004-333-993	38191 Front St	Spuzzum
Area B	004-334-001	38171 Front St	Spuzzum
Area B	004-334-043	38250 First St	Spuzzum
Area B	004-334-086	Lot 2 First Street	Spuzzum
Area B	004-370-503	65457 Norton Road	Dogwood Valley
Area B	004-387-368	65128 Nickel Mine Rd	Dogwood Valley
Area B	004-448-669	65100 Nickel Mine Rd	Dogwood Valley
Area B	004-714-636	30370 Trans Canada Hwy	Spuzzum to Dogwood Valley
Area B	004-789-849	26913 Dogwood Valley Rd	Dogwood Valley
Area B	004-832-027	27062 Baker Rd	Dogwood Valley
Area B	004-837-789	26621 Mountain Valley Way	Dogwood Valley
Area B	004-837-801	26571 Mountain Valley Way	Dogwood Valley

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area B	004-837-827	26521 Mountain Valley Way	Dogwood Valley
Area B	004-837-835	65231 Parklane Dr	Dogwood Valley
Area B	004-837-851	26471 Mountain Valley Way	Dogwood Valley
Area B	004-837-886	65341 Parklane Dr	Dogwood Valley
Area B	004-837-908	65232 Parklane Road	Dogwood Valley
Area B	004-837-916	65292 Parklane Dr	Dogwood Valley
Area B	004-837-932	65342 Parklane Dr	Dogwood Valley
Area B	004-837-983	26251 Mountain Valley Way	Dogwood Valley
Area B	004-838-033	26231 Mountain Valley Way	Dogwood Valley
Area B	004-854-080	38440 Spuzzum Rd	Spuzzum
Area B	004-854-098	38230 Spuzzum Rd	Spuzzum
Area B	004-854-101	38028 Spuzzum Rd	Spuzzum
Area B	004-932-358	1-26240 Trans Canada Hwy	Dogwood Valley
Area B	006-167-438	27494 Yurkin Rd	Dogwood Valley
Area B	006-167-446	27474 Yurkin Rd	Dogwood Valley
Area B	006-167-454	27454 Yurkin Rd	Dogwood Valley
Area B	006-167-462	27424 Yurkin Rd	Dogwood Valley
Area B	006-167-471	1-27384 Yurkin Rd	Dogwood Valley
Area B	006-167-519	1-27344 Yurkin Rd	Dogwood Valley
Area B	006-167-527	27314 Yurkin Rd	Dogwood Valley
Area B	006-167-535	27294 Yurkin Rd	Dogwood Valley
Area B	006-167-543	27274 Yurkin Rd	Dogwood Valley
Area B	006-167-551	27254 Yurkin Rd	Dogwood Valley
Area B	006-167-578	1-27234 Yurkin Rd	Dogwood Valley
Area B	006-555-225	65099 Nickel Mine Rd	Dogwood Valley
Area B	006-588-492	38111 Front St	Spuzzum
Area B	006-588-522	38131 Front Street	Spuzzum
Area B	006-729-304	27503 Dogwood Valley Rd	Dogwood Valley

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area B	006-729-312	27473 Dogwood Valley Rd	Dogwood Valley
Area B	006-729-347	27453 Dogwood Valley Rd	Dogwood Valley
Area B	006-729-363	27403 Dogwood Valley Rd	Dogwood Valley
Area B	006-729-380	27383 Dogwood Valley Rd	Dogwood Valley
Area B	006-729-398	27343 Dogwood Valley Rd	Dogwood Valley
Area B	006-729-428	27283 Dogwood Valley Rd	Dogwood Valley
Area B	006-729-452	27253 Dogwood Valley Rd	Dogwood Valley
Area B	006-729-487	27223 Dogwood Valley Rd	Dogwood Valley
Area B	006-920-829	26448 Mountain Valley Way	Dogwood Valley
Area B	007-219-016	27143 Dogwood Valley Rd	Dogwood Valley
Area B	007-877-994	27061 Baker Rd	Dogwood Valley
Area B	007-878-010	27071 Baker Rd	Dogwood Valley
Area B	007-878-028	27081 Baker Rd	Dogwood Valley
Area B	007-878-087	27111 Baker Rd	Dogwood Valley
Area B	008-588-856	27000 Trans Canada Hwy	Dogwood Valley
Area B	008-882-860	38101 Front St	Spuzzum
Area B	009-177-230	27193 Dogwood Valley Rd	Dogwood Valley
Area B	009-177-256	27173 Dogwood Valley Rd	Dogwood Valley
Area B	009-177-353	27153 Dogwood Valley Rd	Dogwood Valley
Area B	009-443-606	26823 Dogwood Valley Rd	Dogwood Valley
Area B	009-443-631	26853 Dogwood Valley Rd	Dogwood Valley
Area B	009-443-657	26873 Dogwood Valley Rd	Dogwood Valley
Area B	009-443-673	26893 Dogwood Valley Rd	Dogwood Valley
Area B	009-443-681	26903 Dogwood Valley Rd	Dogwood Valley
Area B	009-443-703	26933 Dogwood Valley Rd	Dogwood Valley
Area B	009-443-738	26953 Dogwood Valley Rd	Dogwood Valley
Area B	009-443-754	26953 Dogwood Valley Rd	Dogwood Valley
Area B	009-570-292	1-26700 Trans Canada Hwy	Dogwood Valley

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area B	010-230-556	65466 Wotten Rd	Dogwood Valley
Area B	010-354-930	35185 Trans Canada Hwy	Spuzzum
Area B	010-419-152	65283 Emory Creek Rd	Dogwood Valley
Area B	010-419-161	65254 Emory Creek Rd	Dogwood Valley
Area B	010-419-179	65274 Emory Creek Road	Dogwood Valley
Area B	010-419-209	65443 Emory Creek Rd	Dogwood Valley
Area B	010-419-217	65313 Emory Creek Road	Dogwood Valley
Area B	010-419-705	65443 Emory Creek Road	Dogwood Valley
Area B	010-419-748	65356 Wotten Rd	Dogwood Valley
Area B	010-419-764	65407 Norton Rd	Dogwood Valley
Area B	010-419-781	28445 Trans Canada Hwy	Dogwood Valley
Area B	010-919-511	27051 Baker Rd	Dogwood Valley
Area B	011-299-649	64859 Nickel Mine Rd	Dogwood Valley
Area B	012-873-896	38221 Front Street	Spuzzum
Area B	012-873-900	Lot 5 First Street	Spuzzum
Area B	012-873-918	38390 First Street	Spuzzum
Area B	012-873-934	38370 First St	Spuzzum
Area B	013-035-762	65243 Emory Creek Rd	Dogwood Valley
Area B	013-176-048	26578 Mountain Valley Way	Dogwood Valley
Area B	014-439-298	37840 Spuzzum Rd	Spuzzum
Area B	014-442-621	37440 Spuzzum Creek Rd	Spuzzum
Area B	014-454-467	37270 Spuzzum Creek Rd	Spuzzum
Area B	014-454-726	37270 Spuzzum Creek Rd	Spuzzum
Area B	014-771-357	30950 East of River	Spuzzum to Dogwood Valley
Area B	014-903-717	27915 Trans Canada Hwy	Dogwood Valley
Area B	014-904-152	27915 Trans Canada Hwy	Dogwood Valley
Area B	014-904-268	65276 Norton Rd	Dogwood Valley
Area B	014-946-785	30850 East of River	Spuzzum to Dogwood Valley

Electoral Area	PID	Address	Study Area (section 4 of main report)
Area B	014-947-064	30940 East of River	Spuzzum to Dogwood Valley
Area B	015-013-685	65216 Norton Rd	Dogwood Valley
Area B	017-572-614	26378 Mountain Valley Way	Dogwood Valley
Area B	018-929-915	38280 First St	Spuzzum
Area B	024-044-725	26441 Reynolds Rd	Dogwood Valley
Area B	024-044-784	26461 Reynolds Rd	Dogwood Valley
Area B	024-044-792	26481 Reynolds Rd	Dogwood Valley
Area B	024-044-822	26521 Reynolds Rd	Dogwood Valley
Area B	024-044-831	26531 Reynolds Rd	Dogwood Valley
Area B	024-044-849	26541 Reynolds Rd	Dogwood Valley
Area B	024-044-857	26561 Reynolds Rd	Dogwood Valley
Area B	024-044-865	26581 Reynolds Rd	Dogwood Valley
Area B	024-044-873	26582 Reynolds Rd	Dogwood Valley
Area B	024-044-881	26562 Reynolds Rd	Dogwood Valley
Area B	024-044-890	26542 Reynolds Rd	Dogwood Valley
Area B	024-044-903	26522 Reynolds Rd	Dogwood Valley
Area B	024-044-911	26502 Reynolds Rd	Dogwood Valley
Area B	024-044-938	26462 Reynolds Rd	Dogwood Valley
Area B	024-044-946	Lot 18 Nickel Mine Road	Dogwood Valley
Area B	024-044-954	26523 Apostolic Way	Dogwood Valley
Area B	024-044-962	26543 Apostolic Way	Dogwood Valley
Area B	024-044-971	26563 Apostolic Way	Dogwood Valley
Area B	024-044-997	26625 Apostolic Way	Dogwood Valley
Area B	024-292-079		Dogwood Valley
Area B	024-651-320	30420 Trans Canada Hwy	Spuzzum to Dogwood Valley
Area B	029-214-831		Spuzzum

APPENDIX B
REPORT REFERENCES

Table B-1 Reports reviewed by BGC during this project. Reports are organized by Electoral Area, and then by the report number assigned by FVRD.

FVRD Report Number	Electoral Area	General Area	Report
73	A	North Bend	Thurber Consultants Ltd. (1987, October 30). Hallisey Creek Fan, North Bend, B. C. [Report]. Prepared for Regional District of Fraser-Cheam.
101	A	North Bend	Thurber Consultants Ltd. (1989, January 12). North Bend Official Community Plan Slope Hazards Assessment [Report]. Prepared for Regional District of Fraser-Cheam.
104	A	Canyon Alpine	Thurber Consultants Ltd. (1989, January 12). Canyon-Alpine Official Community Plan Slope Hazards Assessment [Report]. Prepared for Regional District of Fraser-Cheam.
118	A	Boston Bar	Thurber Consultants Ltd. (1989, January 12). Boston Bar Official Community Plan Slope Hazards Assessment [Report]. Prepared for Regional District of Fraser-Cheam.
126	A	Boston Bar	Thurber Consultants Ltd. (1990, Ocbtober 4). Boston Bar Slope Stability Assessment [Report]. Prepared for Regional District of Fraser-Cheam.
223	A	North Bend	Thurber Consultants Ltd. (1992, December 10). North Bend Flooding and Debris Flow Study [Report]. Prepared for Regional District of Fraser-Cheam.
279	A	Boston Bar	Thurber Consultants Ltd. (1990, October 25). Rock-slope instability: Boston Bar [Report]. Prepared for Regional District of Fraser-Cheam.
308	A	Canyon Alpine	Cascade Engineering Ltd. (1996, March 19). Geotechnical Report for a Mobile Home on Lot No. 17, Fraser Canyon Trailer Park, Boston Bar, B.C. [Report]. Prepared for Mr. Fred Pfenninger.
454	A	Canyon Alpine	Cascade Engineering Ltd. (2000, February 9). Geotechnical Hazard Assessment for 3x Trailer Pad Lots (Units 43, 44 and 45) at the Fraser Canyon Trailer Park Ltd., 50601 Trans--Canada Highway, Boston Bar, B.C. [Report]. Prepared for Art Warren.
470	A	Canyon Alpine	Golder Associates (2009, September 2). Geotechnical Hazard Review - Lot No 17, Fraser Canyon Mobile Home park [Report]. Prepared for Art Warren.
683	A	North Bend	Kerr Wood Leidal (2008, January 8). Hallecks Creek Debris Flow Field Assessment [Report]. Prepared for Boston Bar First Nation.

FVRD Report Number	Electoral Area	General Area	Report
820	A	North Bend	Thurber Consultants Ltd. (2018, February 2). Debris Flow Hazard Assessment Update and Conceptual Mitigation Options, North Bend, B.C. [Report]. Prepared for Fraser Valley Regional District.
114	A, B	All of Fraser Canyon	Thurber Consultants Ltd. (1989, May 25). Fraser Canyon Study Private Lands Slope Hazard Assessment [Report]. Prepared for Regional District of Fraser-Cheam.
71	B	Yale	Thurber Consultants Ltd. (1987, September 2). Gordon Creek Subdivision, Yale, B.C. [Report]. Prepared for Regional District of Fraser-Cheam.
80	B	Dogwood Valley	Thurber Consultants Ltd. (1987, September 22). Overview of Geological Hazards in the Yale-Dogwood Valley Areas [Report]. Prepared for Regional District of Fraser-Cheam.
116	B	Dogwood Valley - Camp Squeah	Klohn Leonoff (1989, May 9). Slope Stability Assessment - Camp Squeah [Report]. Prepared for Camp Squeah.
127	B	Dogwood Valley – Baker Rd	Thurber Consultants Ltd. (1990, January 4). Baker Road Area, Dogwood Valley Slope Stability Assessment [Report]. Prepared for Regional District of Fraser-Cheam.
137	B	Dogwood Valley – Baker Rd	Thurber Consultants Ltd. (1990, May 7). 007-878-087 - Home Site: Dogwood Valley [Report]. Prepared for Regional District of Fraser-Cheam.
179	B	Dogwood Valley	Thurber Consultants Ltd. (1991, June 7). DL 64, Plan 1779 - South of Yale, B.C. - Geotehnical Hazard Assessment [Report]. Prepared for Mr. Glen Stewart.
251	B	Dogwood Valley - Camp Squeah	Klohn-Crippen (1994, January 13). Geotechnical Review - Temporary Storage Shed [Report]. Prepared for Regional District of Fraser-Cheam.
260	B	Dogwood Valley - Camp Squeah	Klohn-Crippen (1994, April 8). Geotehcnical Assessment - Camp Squeah [Report]. Prepared for Regional District of Fraser-Cheam.
321	B	Dogwood Valley	Thurber Consultants Ltd. (1995, June 13). 27563 Property - Dogwood Valley Terrain Hazard Assessment. [Report]. Prepared for redacted.
406	B	Spuzzum	Thurber Consultants Ltd. (1997, December 15). Proposed Subdivision on Spuzzum I.R. 1 and Adjacent Private Land - Geotechnical Hazard Evaluation [Report]. Prepared for David Nairne and Associates Ltd.

FVRD Report Number	Electoral Area	General Area	Report
563	B	Spuzzum	Horizon Engineering Inc (2004, November 18). Proposed Mobile Home and Storage Building at Rockels' Parcel Remainder 36255 Trans Canada Highway, Spuzzum I.R. #1, BC (2nd Revision) [Report]. Prepared for Mr and Mrs Rockel.
638	B	Dogwood Valley - Camp Squeah	Klohn Crippen Berger (2008, June 4). Camp Squeah Slope Stability Assessment Registration Office Building [Report]. Prepared for Camp Squeah.
677	B	Yale	Cordilleran Geoscience (2010, March 9). Geologic Hazards and Risk Assessment, Yale, BC [Report]. Prepared for Fraser Valley Regional District.
894	B	Dogwood Valley – Baker Rd	Statlu Environmental Consulting (2020, February 11). RE: Geotechnical Hazard Assessment – Dogwood Valley [Report]. Prepared for Fraser Valley Regional District.
989	B	Dogwood Valley – Baker Rd	Statlu Environmental Consulting (2023, January 9). Technical Memorandum RE: 27111 Baker Road, Dogwood Vvalley, 2021 Atmospheric River Follow Up [Report]. Prepared for Fraser Valley Regional District.

APPENDIX C
GEOHAZARD EVENT INVENTORY

Table C-1 Geohazard Event Inventory within the study areas. The events are listed in chronological order.

Geohazard Type	Watercourse (If Applicable)	Latitude	Longitude	Location Confidence	Timing	Reference	Description
Debris flow		49.613	-121.412	Low	1896-10-13	Septer, 2007	Between Yale and North Bend
Debris slides		49.818	-121.450	Regional	1896-11-20	Septer, 2007	Between North Bend and Spuzzum
Debris slides		49.690	-121.414	Regional	1909-11-27	Septer, 2007	Several debris slides at Spuzzum
Debris flows and slides		49.813	-121.458	Regional	1909-11-27	Septer, 2007	Several debris slides/flows at China Bar
Debris slide		49.914	-121.451	Low	1921-10-29	Septer, 2007	Debris slides on CNR at Boston Bar
Debris flow		49.556	-121.443	Low	1921-12-12	Septer, 2007	Slide at Yale, unclear location
Debris slide		49.914	-121.450	Low	1927-12-07	Septer, 2007	Debris slide at Boston Bar on CNR
Rock slide		49.701	-121.412	Low	1934-04-23	Septer, 2007	Rock slide damaged Hoodoo bridge on Cariboo Highway north of Spuzzum
Debris flow		49.756	-121.423	Low	1937-02-17	Septer, 2007	10 miles west of North Bend CNR
Debris avalanche		49.883	-121.451	Low	1935	Blais-Stevens; 2020	Fatality
Debris slide		49.890	-121.453	Low	1939-01-04	Septer, 2007	Near North Bend. Unclear mechanisms, may have been debris slide or debris flow
Rock slide	`	49.806	-121.457	Moderate	1947-10-17	Septer, 2007	Rock slide at China Bar
Debris slides and flows		49.607	-121.415	Regional	1949-02-22	Septer, 2007	Several debris slides between Yale and Boston Bar
Debris flood	Gordon Creek	49.548	-121.441	High	1949-11-30	Septer, 2007	Bridge at Gordon Creek washed out
Debris flow		49.686	-121.415	Low	1949-11-30	Septer, 2007	Debris flow west of Alexandria Bridge at Spuzzum
Debris flows		49.720	-121.420	Regional	1949-11-30	Septer, 2007	Several debris flows/slides east of Alexandria bridge
Debris flows and debris slides		49.847	-121.444	Regional	1949-11-30	Septer, 2007	Approximately 30 miles of washed out tracks near North Bend
Debris slide		49.574	-121.403	Regional	1951-01-26	Septer, 2007	Several debris slides/flows in Fraser Canyon near Yale
Debris flow		49.801	-121.459	Moderate	1953-01-12	Septer, 2007	Washout at China Creek
Debris flood		49.563	-121.425	High	1954-11-21	Septer, 2007	Fraser Canyon Highway washout at Yale Creek
Debris slide		49.862	-121.450	Low	1954-11-21	Septer, 2007	Near North Bend
Debris slide		49.668	-121.408	Low	1955-11-04	Septer, 2007	Debris slide 18 miles from Boston Bar
Rock slide		49.946	-121.472	High	1958	Blais-Stevens; 2020	Fatality
Debris slide		49.638	-121.404	High	1961-01-13	Septer, 2007	Rock slide and other landslides reported in near Sailor Bar
Debris slide		49.888	-121.453	Low	1961-01-13	Septer, 2007	Five debris slides near Boston Bar
Debris flow		49.817	-121.434	Moderate	1961-01-15	Septer, 2007	CNR fatality 3.5 miles west of Boston Bar
Debris slide		49.638	-121.406	High	1961-01-17	Septer, 2007	Sailor Bar
Debris slide		49.638	-121.406	Regional	1961-01-17	Septer, 2007	18 debris slides between Yale and North Bend
Debris flows and debris slides		49.639	-121.408	Regional	1961-01-19	Septer, 2007	70 debris flows and debris slides between North Bend and Yale
Debris flood	Stulkawhits Creek	49.474	-121.425	High	1962-11-19	Septer, 2007	CNR derailment
Debris flow		49.474	-121.415	Moderate	1962-11-21	Septer, 2007	Debris flow and debris slides along CPR line

Geohazard Type	Watercourse (If Applicable)	Latitude	Longitude	Location Confidence	Timing	Reference	Description
Debris slide		49.960	-121.495		1971	Blais-Stevens; 2020	
Debris slides		49.619	-121.396	Regional	1972-01-20	Septer, 2007	29-mile of track washed out along an unknown railway
Rock slide		49.819	-121.447	Low	1972-12-25	Septer, 2007	Rock slide derailed westbound CPR train near Boston Bar
Debris slide		49.578	-121.402	Low	1975-02-12	Septer, 2007	Debris slide 3 miles east of Yale
Debris slide		49.765	-121.435	Moderate	1975-02-12	Septer, 2007	Several debris slides/rock slides between China Bar and Hell's Gate.
Debris flood	Stulkawhits Creek	49.475	-121.426	High	1975-12-03	Septer, 2007	
Debris slide and rockfall		49.639	-121.406	Moderate	1975-12-03	Septer, 2007	Multiple rock slides and debris slides
Debris flow		49.586	-121.397	Low	1975-12-04	Septer, 2007	Debris flow near Yale
Rockslide		49.591	-121.404	Moderate	1975-12-04	Septer, 2007	Rock slide covered CN tracks for eight days
Debris flow		49.557	-121.443	Low	1977-11-01	Septer, 2007	Debris flow near Yale covered CP tracks
Rock slide		49.563	-121.409	High	1979-12-04	Septer, 2007	Multiple rock slide events on the same day, north portal of Yale Tunnel
Debris flow	Gordon Creek	49.548	-121.442	High	1980-12-26	Septer, 2007	Debris flow washout
Debris flow		49.557	-121.444	Moderate	1980-12-26	Septer, 2007	Debris flow in Yale
Debris flows		49.561	-121.437	Regional	1980-12-26	Septer, 2007	Debris flows throughout the Fraser Canyon
Debris flows		49.789	-121.446	Regional	1984-08-27	Septer, 2007	Multiple slides in the Boston Bar and Hells Gate area
Debris slide		49.820	-121.444	Low	1986-12-01	Septer, 2007	West of North Bend at unknown location
Debris flow	Hallecks Creek	49.880	-121.457	High	1989	Thurber; 1992, December 10	
Debris slide		49.563	-121.414	Low	1990-11-09	Septer, 2007	Rock slide blocked Highway
Debris slide		49.863	-121.440	Moderate	1990	Thurber; 1990, October 25	Unknown date, 1989-1990.
Debris slide		49.863	-121.440	Moderate	1990	Thurber; 1990, January 4	Unknown date, pre-1990.
Debris flow		49.880	-121.457	Moderate	1990-11-13	Septer, 2007	Destroyed community water supply system
Debris flow		49.628	-121.388	Low	1995-11-29	Septer, 2007	Debris flow 33 km west of Boston Bar. Unclear which side of canyon
Debris flows		49.561	-121.437	Regional	1997-03-19	Septer, 2007	Debris flows between Yale and Boston Bar
Debris slide		49.564	-121.403	Low	2005-10-11	Septer, 2007	Debris slide derailed an eastbound CN train
Debris slide		49.814	-121.450	Low	2005-12-23	Septer, 2007	Rock slide onto CN line near Boston Bar
Debris flow	Hallecks Creek	49.880	-121.457	High	2007-12-03	KWL; January 8, 2008	
Debris flow		49.650	-121.352	High	2020		
Debris flood		49.798	-121.457	High	2021		
Debris flow	Unnamed Creek	49.463	-121.434	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.474	-121.426	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.481	-121.423	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris slide		49.490	-121.423	High	2021-11-15	Statlu, 2023 January 9	Debris slide into garage/shed.
Debris flow		49.493	-121.423	High	2021-11-15X	BGC	

Geohazard Type	Watercourse (If Applicable)	Latitude	Longitude	Location Confidence	Timing	Reference	Description
Debris flood	Unnamed Creek	49.505	-121.413	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Emory Creek	49.509	-121.417	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Flood	Unnamed Creek	49.518	-121.452	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.524	-121.415	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.525	-121.432	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.526	-121.403	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.527	-121.380	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.527	-121.376	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.527	-121.395	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.530	-121.356	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.534	-121.427	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.538	-121.323	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.539	-121.432	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.541	-121.315	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.543	-121.438	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.546	-121.314	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.548	-121.485	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.548	-121.464	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.550	-121.486	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.551	-121.485	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.551	-121.484	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.551	-121.479	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.552	-121.320	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.552	-121.481	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.557	-121.445	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.557	-121.445	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.560	-121.296	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.565	-121.497	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.565	-121.328	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Mary Ann Creek	49.565	-121.423	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.565	-121.489	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.566	-121.332	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.568	-121.336	High	2021-11-15	Hancock and Wlodarczyk (2025)	

Geohazard Type	Watercourse (If Applicable)	Latitude	Longitude	Location Confidence	Timing	Reference	Description
Debris flow		49.569	-121.337	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.570	-121.335	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.572	-121.404	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.574	-121.481	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.574	-121.333	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.578	-121.331	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.579	-121.347	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.579	-121.403	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.581	-121.370	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Siwash Creek	49.581	-121.396	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.584	-121.404	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.589	-121.337	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.595	-121.348	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.596	-121.349	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.597	-121.349	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.598	-121.414	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.599	-121.309	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.599	-121.349	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.600	-121.348	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.601	-121.462	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.601	-121.416	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.601	-121.351	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.603	-121.459	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.603	-121.459	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.604	-121.476	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.604	-121.468	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.604	-121.469	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.605	-121.496	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.606	-121.483	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.606	-121.483	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.606	-121.481	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.607	-121.476	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.608	-121.323	High	2021-11-15	Hancock and Wlodarczyk (2025)	

Geohazard Type	Watercourse (If Applicable)	Latitude	Longitude	Location Confidence	Timing	Reference	Description
Debris flow	Unnamed Creek	49.608	-121.445	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.610	-121.467	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.610	-121.479	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.610	-121.332	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.611	-121.336	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Sawmill Creek	49.613	-121.413	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.613	-121.358	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.614	-121.436	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.616	-121.410	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.617	-121.407	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.619	-121.404	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.639	-121.407	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.640	-121.409	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.642	-121.411	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.664	-121.443	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.673	-121.463	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.674	-121.466	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.674	-121.315	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.674	-121.418	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.675	-121.471	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.677	-121.323	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.680	-121.417	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.683	-121.338	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.684	-121.416	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.687	-121.475	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.687	-121.416	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.688	-121.347	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.696	-121.348	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.706	-121.351	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.707	-121.418	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.711	-121.359	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.711	-121.464	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.712	-121.455	High	2021-11-15	Hancock and Wlodarczyk (2025)	

Geohazard Type	Watercourse (If Applicable)	Latitude	Longitude	Location Confidence	Timing	Reference	Description
Debris flow	Unnamed Creek	49.714	-121.419	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.719	-121.422	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.721	-121.429	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.722	-121.421	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.723	-121.361	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.727	-121.463	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.730	-121.436	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.739	-121.380	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.742	-121.418	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.743	-121.376	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.745	-121.461	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.745	-121.376	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.746	-121.463	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.746	-121.465	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.747	-121.465	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.757	-121.418	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.757	-121.342	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.759	-121.420	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.759	-121.382	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.761	-121.469	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.761	-121.468	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.764	-121.433	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.771	-121.436	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.774	-121.437	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.787	-121.368	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.789	-121.455	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.789	-121.368	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.790	-121.452	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.793	-121.365	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.797	-121.376	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.798	-121.457	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide		49.800	-121.374	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.803	-121.460	High	2021-11-15	Hancock and Wlodarczyk (2025)	

Geohazard Type	Watercourse (If Applicable)	Latitude	Longitude	Location Confidence	Timing	Reference	Description
Debris flow	Unnamed Creek	49.809	-121.461	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Petch Creek	49.815	-121.434	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Earth slide	Unnamed Creek	49.820	-121.446	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.830	-121.478	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.830	-121.385	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.831	-121.477	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.832	-121.479	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.834	-121.486	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.835	-121.494	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Rock slide	Unnamed Creek	49.837	-121.485	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.855	-121.394	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.872	-121.451	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Hallisey Creek	49.884	-121.458	High	2021-11-15	BGC	
Debris flow	Unnamed Creek	49.891	-121.391	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.892	-121.456	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.893	-121.385	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.895	-121.448	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.896	-121.457	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow		49.898	-121.379	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.918	-121.462	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.931	-121.472	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris avalanche	Unnamed Creek	49.937	-121.482	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	Unnamed Creek	49.938	-121.476	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.938	-121.477	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.953	-121.500	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flood	North Ainslie Creek	49.959	-121.449	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.960	-121.505	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.963	-121.509	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.980	-121.538	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.985	-121.551	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris avalanche	Unnamed Creek	49.985	-121.531	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris avalanche	Unnamed Creek	49.986	-121.530	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	49.989	-121.574	High	2021-11-15	Hancock and Wlodarczyk (2025)	

Geohazard Type	Watercourse (If Applicable)	Latitude	Longitude	Location Confidence	Timing	Reference	Description
Debris flow	Unnamed Creek	50.000	-121.599	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Unnamed Creek	50.000	-121.599	High	2021-11-15	Hancock and Wlodarczyk (2025)	
Debris flow	Nahatlatch Creek	49.987	-121.541	Moderate	2024-8-10		Post-wildfire debris flows at Kookipi Creek Fire

APPENDIX D
SELECT FIELD PHOTOS

D-1 PHOTOS FROM CANYON ALPINE

Photo D-1 Looking east at a Canyon Alpine parcel and the hillslope above the mobile homes. This area was mapped with rockfall and debris slides. Photo taken by BGC on November 13, 2024.

Photo D-2 Looking north along the hillslope above the mobile homes at a parcel in Canyon Alpine. This area was mapped with rockfall and debris slides. Photo taken by BGC on November 13, 2024.

D-2 PHOTOS FROM NORTH BEND

Photo D-3 Example debris slide hazard in North Bend. Photo taken by BGC on November 13, 2024.

Photo D-4 Looking west at a debris flood avulsion channel in North Bend along Hallisey Creek that was active during the November 2021 atmospheric river. Photo taken by BGC on November 13, 2024.

Photo D-5 **Looking southeast along N Bend Crescent road in North Bend. Note the sand bags along the road that were presumably placed during the November 2021 atmospheric river. Photo taken by BGC on November 13, 2024.**

Photo D-6 **Looking north at a trailer-sized boulder within a parcel along Green Ranch Road at North Bend. The origin of this and other boulders in the area could not be deduced based on the field data; they could represent rockfall deposits at the base of the slope upslope of Green Ranch Road, or they could be deposits of a kame terrace deposited along the margin of the glacier that once occupied the Fraser Canyon. Photo taken by BGC on November 13, 2024.**

Photo D-7 **Looking northwest at a debris slide area along Green Ranch Road in North Bend. Photo taken by BGC on November 13, 2024.**

D-3 PHOTOS FROM BOSTON BAR

Photo D-8 Looking south along a rockfall source and deposit area in Boston Bar. This site was a historical quarry location. Photo taken by BGC on November 13, 2024.

Photo D-9 **Looking east at a rockfall source and deposit area in Boston Bar. This site was a historical quarry location. Photo taken by BGC on November 13, 2024.**

D-4 PHOTOS FROM SPUZZUM TO DOGWOOD VALLEY

Photo D-10. Looking south at the hummocky boulders on a terrace at 38230 Spuzzum Road (PID 004-854-098). Photo taken by BGC On November 13, 2024.

Photo D-11 **Looking west at a debris flow creek in the Spuzzum area. This creek has a recorded event from the November 2021 atmospheric river. Photo taken by BGC on November 13, 2024.**

Photo D-12 Looking west at a rockfall source and deposit area south of Spuzzum. Photo taken by BGC on November 13, 2024.

Photo D-13 Looking downstream along the left (north) bank of Gordon Creek upstream of the Highway 1 bridge crossing. Photo taken by BGC on November 14, 2024.

Photo D-14 Looking downstream along the left (north) bank of Gordon Creek below the Highway 1 crossing. Photo taken by BGC on November 14, 2024.

Photo D-15 Looking west and upstream at a debris flow channel north of Dogwood Valley that was active during the November 2021 atmospheric river. Photo taken by BGC on November 14, 2024.

Photo D-16 Looking west and upstream at a debris flow channel north of Dogwood Valley that was active during the November 2021 atmospheric river. The deposits may have been previously cleared by an excavator. Photo taken by BGC on November 14, 2024.

D-5 PHOTOS FROM DOGWOOD VALLEY

Photo D-17 Looking upstream along a side channel along the right (south) bank of Emory Creek. BGC observed tires that were embedded along the bank that may be providing bank armouring. Photo taken by BGC on November 14, 2024.

Photo D-18 Looking downstream along the right (south) bank of Emory Creek at a cabin along the active stream channel. Note the sandbags placed along the corner of the house. Photo taken by BGC on November 14, 2024.

Photo D-19 **Looking downstream along the right (south) bank of Emory Creek. Note the cabin footings within the creek. Photo taken by BGC on November 14, 2024.**

Photo D-20 Looking upstream along the left (south) bank of Emory Creek. Note the cabin along the stream channel. Photo taken by BGC on November 14, 2024.

Photo D-21 Looking north across Emory Creek from the right (south) bank. Photo taken by BGC on November 14, 2024.

Photo D-22 **Looking east and downstream along a steep creek in Camp Squeah. Photo taken by BGC on November 14, 2024.**

Photo D-23 Looking south along a debris slide and rockfall prone slope at Camp Squeah. Photo taken by BGC on November 14, 2024.

Photo D-24 Looking upslope at a rockfall runout area in Dogwood Valley. Photo taken by BGC on November 14, 2024.

Photo D-25 Looking south along a debris slide/rockfall prone slope in Dogwood Valley. Photo taken by BGC on November 14, 2024.

Photo D-26 Looking upstream at a debris flow channel in Dogwood Valley. BGC observed evidence of activity in this creek/fan, possibly form the November 2021 atmospheric rivers. Photo taken by BGC on November 14, 2024.

Photo D-27 **Looking upslope from a home on Baker Road. Note the house is built into a slope prone to rockfall and debris slides. Photo taken by BGC on November 14, 2024.**

Photo D-28 Looking north at a debris slide along a roadcut and upslope of a home on Baker Road. Photo taken by BGC on November 14, 2024.

Photo D-29 Looking upslope at a debris slide along a roadcut above a house on Baker Road. Photo taken by BGC on November 14, 2024.

Photo D-30 Looking west at the slope above a home on Baker Road. Note the debris slides along the slope (and above a roadcut). Photo taken by BGC on November 14, 2024.

Photo D-31 Looking west at a home on Baker Road. Note that a debris slide previously deposited into the shed building. Photo taken by BGC on November 14, 2024.

Photo D-32 Looking downstream along the left (north) bank of Stulkawhits Creek upstream of the Highway 1 bridge. Photo taken by BGC on November 14, 2024.

Photo D-33 Looking downstream along an unnamed creek north of Stulkawhits Creek. This creek had a debris flow event during the November 2021 atmospheric river (Hancock & Wlodarczyk, 2025). Photo taken by BGC on November 14, 2024.