November 17, 2026 Project 1358015

Squamish Lillooet Regional District
1350 Aster St.
Pemberton, BC

Attention: Omar Butt, General Manager of Infrastructure and Environmental Services

McCullock Creek Emergency Assessment

1.0 INTRODUCTION

At approximately 9:40 pm on November 11, 2026, a debris flow occurred on an unnamed creek, locally referred to as McCullock Creek[1], crossing the In-SHUCK-ch forest service road (FSR) and inundating multiple private properties of Lillooet Lake Estates (LLE) and Heather Jean Properties (HJP).

The Squamish Lillooet Regional District (SLRD) retained BGC Engineering Inc. (BGC) to conduct an emergency assessment to:

1. Identify immediate public safety concerns due to the recent debris flow.
2. Identify hazard conditions that warrant restrictions around work in the area and in the near term (before next rainfall event).
3. Recommend recovery activities to address the changed stream conditions resulting from the recent debris flow.

The scope of work, defined during correspondence with SLRD between November 11 and 13, 2026, is to:

- Complete a one-day site visit to collect observations of the debris-flow impacts and ongoing debris-flow hazards.
- Document observations, findings, and recommendations for immediate risk management.
- Provide recommendations for long-term actions for risk management.

BGC understands that SLRD will use the findings of this assessment to inform emergency response and decisions regarding immediate mitigation needs. SLRD requested BGC provide recommendations for restrictions around work activities in the affected area with the understanding that the Ministry of Forests (MoF) planned to complete emergency work to reopen the In-Shuck-Ch FSR.

[1] The BC Freshwater Atlas indicates McCullock Creek is the watershed immediately to the north of the subject creek. In this report, the name McCullock is used for the subject creek for consistency with local usage.

This work was carried out under the emergency response service agreement between SLRD and BGC dated September 16, 2026.

2.0 BACKGROUND

McCullock Creek drains steep, rugged terrain on the south-facing flank of Duffey Peak (El. ~2,100 m) into Lillooet Lake (Figure 1). Its alluvial fan coalesces with the Catiline Creek fan to the east, which has a long history of damaging debris flows for which debris-flow mitigation is currently under construction. While Catiline Creek has been the subject of multiple debris-flow hazard and risk assessments, BGC is unaware of similar studies for McCullock Creek. BGC (January 22, 2015) and Piteau (1989) have previously identified the debris-flow hazard potential on this creek, with BGC[2] (January 22, 2015) noting landforms on upper bedrock slopes adjacent to the basin that indicate deep-seated bedrock instability.

A Community Emergency Plan was prepared for Lillooet Lake Estates & Heather Jean Properties in 2018, which provides evacuation alert trigger points for debris-flow hazards. It states:

"An evacuation alert trigger points [is when] rainfall event forecast of 25-45 mm or more in less than 24 hours (plus snow melt), or cumulative rainfall of 40 mm or more over 5 days with additional continued rain forecasted. "

Along with the LLE and HJP, the combined alluvial fans are crossed by the In-SHUCK-ch FSR and BC Hydro transmission infrastructure. Upstream of the community, an intake structure on McCullock Creek supplies domestic water and a micro-hydro facility, servicing some residences within LLE and HJP.

Initiated prior to the November 11 event, work is underway constructing a debris-flow conveyance channel and training berms for Catiline Creek. Coast Mountain Excavations Ltd. (CME) is the prime contractor for the Catiline Creek work, and is operating an onsite rain gauge for construction safety. CME reported 70 mm of rain at the Catiline Creek rain gauge between 12:00 am on November 11 and 10:00 am on November 12, 2026.

SLRD issued an Evacuation Alert for LLE and HJP within SLRD Electoral Area C on November 12, 2026. The MoF maintenance contractor (Lizzy Bay Logging Ltd.) restored access on the In-SHUCK-ch FSR through the community on November 13, 2026.

[2] BGC refers to this creek as "Unnamed".

3.0 FIELD OBSERVATIONS

On November 12, 2026, Andrew Mitchell, Ph.D., P.Eng., and Michael Shynkaryk, P.Eng., of BGC completed a ground-based site visit to McCullock Creek, including a drone flight. The following summarizes observations from this site visit, with references to figures attached.

Areas Affected:

- The FSR was impassable due to a debris-flow deposit about 100 m wide and up to 2 m thick (Figure 3).
- Water was flowing outside of the pre-event channel through several properties (Figure 4). Marker tape identifying buried electrical lines was seen between Lots 51 and 52, indicated on Figure 4.
- The debris flow affected several properties downstream of the FSR, inundating vehicles and buildings (residences and outbuildings) with water and debris. The coarser, bouldery debris was primarily found in the new flow path (Figure 5), with the other deposition areas to the east of the new channel primarily consisting of finer debris (Figure 6).

Observed Impacts:

- Sediment had accumulated behind or around permanent residences, and most of the debris-flow damage is to lighter auxiliary structures (e.g., sheds, carports) (Figures 5 and 7).
- Several interior roads within the community were impassable due to water flow and debris deposition.
- The debris flow damaged the small dam upstream of the FSR, undermining the downstream side of the concrete structure (Figure 8).
- Woody debris, boulders, and sediment deposited by the debris flow remain loose in the channel upstream of the FSR (Figure 9).

Observed response actions (by residents):

- BGC observed residents performing emergency measures to protect building foundations, such as diverting flowing water. Some residents reported they are continuing to occupy their residences full time, while some have vacated for the short term.

A rockfall was noted on the FSR at approximately km 2 (Figure 10). This is outside of the assessment area, however, it is a hazard for road users, and could have implications to access and egress to the HJP and LLE.

4.0 FINDINGS AND RECOMMENDATIONS

4.1 Current Hazard and Public Safety

BGC observed uncontrolled water flowing through the affected properties during the November 12, 2026, site visit. While this is not an immediate life-safety concern at flow levels observed during the field visit, it can cause damage to properties. The observation of marker tape indicating buried electrical infrastructure is an indication that buried infrastructure in the area

could be damaged as a result of erosion from these uncontrolled flows, and should be assessed prior to services being restored.

Impacts to the FSR at this location could affect safe access and egress to the HJP and LLE area, as well as other residences along the FSR. Access and egress could also be affected by flows through the community.

Additional rainfall could trigger another debris flow, including remobilization of deposits from the November 11 event. With the exposed soil and loose debris in the channel, and the damaged weir structure at the water intake, the hazard is elevated relative to the pre-event condition. Future debris flows could cause additional impacts to the area already affected, or flow avulsions could cause impacts to new areas of the community. The In-SHUCK-ch FSR is a location where avulsions are very likely in the event of a debris flow as the McCullock Creek channel is not well-incised where it enters the LLE and HJP area. As the FSR is the responsibility of MoF, coordination with MoF will be required to address the current hazard.

4.2 Restrictions Around Work Activities

On November 13, 2026, BGC provided recommendations for weather-related work restrictions to the SLRD via email, which the SLRD shared with MoF. BGC recommends that the rainfall and tactical evacuation trigger points from the Community Emergency Plan should be used as work shutdown criteria for additional work required ahead of the Evacuation Alert being lifted. Given the recent debris-flow activity on the McCullock Creek fan, BGC recommends the trigger to stop work and evacuate the area should be on the lower end of the rainfall threshold in the Community Emergency Plan (forecasted rainfall of 25 mm in 24 hours). Any parties working on or adjacent to the creek during emergency construction activities should closely monitor weather and creek conditions. Equipment operators should be reminded of safety risks and stop work procedures associated with operating equipment on a debris-flow fan. Any work completed should be considered temporary in nature.

4.3 Recommended Recovery Activities

For the purpose of this assessment, “recovery” is defined as the actions needed to reduce the debris-flow risk in the affected area to a comparable state to what it was prior to the November 11, 2026 event (i.e., the baseline risk).

As noted in Section 2, there has not been a debris-flow risk assessment completed for McCullock Creek. Baseline risk has not been estimated or evaluated against risk tolerance criteria[3], and such assessment is not part of the current scope of work.

Recommended recovery activities are outlined below, listed in order of priority, and approximately laid out on Figure 11.

[3] The SLRD has not formally adopted risk tolerance criteria. Previous risk assessments at Catiline Creek have compared risk against criteria adopted by other jurisdictions, including the District of North Vancouver and District of Squamish.

Item 1: Reroute flows from the November 11 event avulsion path back to the existing armoured channel through the community. This will help address erosion hazards from uncontrolled surface water flows, and facilitate clean up efforts within the LLE and HJP areas.

Item 2: Protect the culvert inlet where it crosses the In-SHUCK-ch FSR with a trash rack to reduce the likelihood of it being blocked by debris or sediment. Creating sediment storage capacity upstream of the road is also recommended, including excavating a retention basin and using the excavated material to construct temporary training berms on the BC Hydro right-of-way. This will require coordination with BC Hydro for work on or in close proximity to their right-of-way, and additional engineering support for the sediment storage details and arrangement.

Item 3: Assess the damaged small dam on McCullock Creek. If the damage in irreparable, the infrastructure should be removed. In removing the damaged infrastructure, the stream could be redirected to its original flow path here as well, and debris could be removed from the channel to reduce the potential material volumes that could be mobilized in future events.

These items do not address damages that may have occurred to individual lots. Lot owners may wish to complete repairs or other work on their property. These activities should undertaken in coordination with the SLRD to prevent risk transfer to adjacent lots or other stakeholders.

4.4 Long-Term Risk Management

There is insufficient information to assess the risks posed by debris flows to residences and infrastructure on the McCullock Creek fan.

BGC recommends the SLRD explore funding mechanisms for debris-flow hazard, risk, and mitigation studies on McCullock Creek. Previous baseline hazard and risk assessment at Catiline Creek provide an analog for the assessment approach, range of level of effort, and deliverables. Given that McCullock and Catiline Creek fans coalesce (overlap), Cataline Creek and McCullock Creek hazard mapping should be reviewed together once both are completed.

Given the avulsion potential for future debris flows where McCullock Creek crosses the FSR, long-term risk management options should be developed with MoF, as increasing the capacity and/or robustness of the creek crossing will be important for risk management.

5.0 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:



[redacted]

Andrew Mitchell, Ph.D., P.Eng.
Senior Geotechnical Engineer

[redacted]

Michael Shynkaryk, B.A.Sc., P.Eng.
Geological Engineer

Reviewed by:

Kris Holm, M.Sc., P.Geo
Principal Geoscientist

GMF/KH/ab

EGBC Permit to Practice, BGC Engineering Inc. 1000944

Attachment(s): Limitations
References
Figures

LIMITATIONS

BGC Engineering Inc. ("BGC") prepared this document[4] for the exclusive use of Squamish Lillooet Regional District (the "Client"). This document is only intended for the Client's use for the specific purpose or project identified herein. This document may not be used for any other purpose, modified, or published (either on the Internet, through open-source artificial intelligence (AI) tools, or through any other form of print or electronic media) without BGC's express written consent. BGC is not liable for any loss, injury, or damages arising from any unapproved use or unauthorized modification of this document.

No third party may use or rely on this document unless BGC provides express written consent. Any use or reliance which a third party makes of this document is the responsibility of the third party and is at such third party's own risk. BGC accepts no responsibility for damages, if any, suffered by any third parties as a result of their use of this document.

This document contains BGC's professional opinions on the specific issues identified herein, based on the information available to BGC when BGC prepared this document. While preparing this document, BGC relied on information BGC received from the Client or other sources. Unless otherwise stated in this document, BGC did not independently verify such information, and BGC assumed that such information is accurate, complete, and reliable. BGC is not responsible for any deficiency, misstatement, or inaccuracy in this document due to errors or omissions in information provided by the Client or third parties.

This document may include or rely upon estimates, forecasts, or modeling analyses (e.g., results or outputs of numerical modeling) that are based on available data. Such estimates, forecasts, or modeling analyses do not provide definitive or certain results. The Client is solely responsible for deciding what action (if any) to take based on any estimates, forecasts, or modeling analyses.

BGC prepared this document in accordance with generally accepted practices for similar services in the applicable jurisdiction. BGC makes no warranty (either express or implied) related to this document. BGC is not responsible for any independent conclusions, interpretations, extrapolations, or decisions made by the Client or any third party based on this document. The record copy of this document in BGC's files takes precedence over any other copy or reproduction of this document.

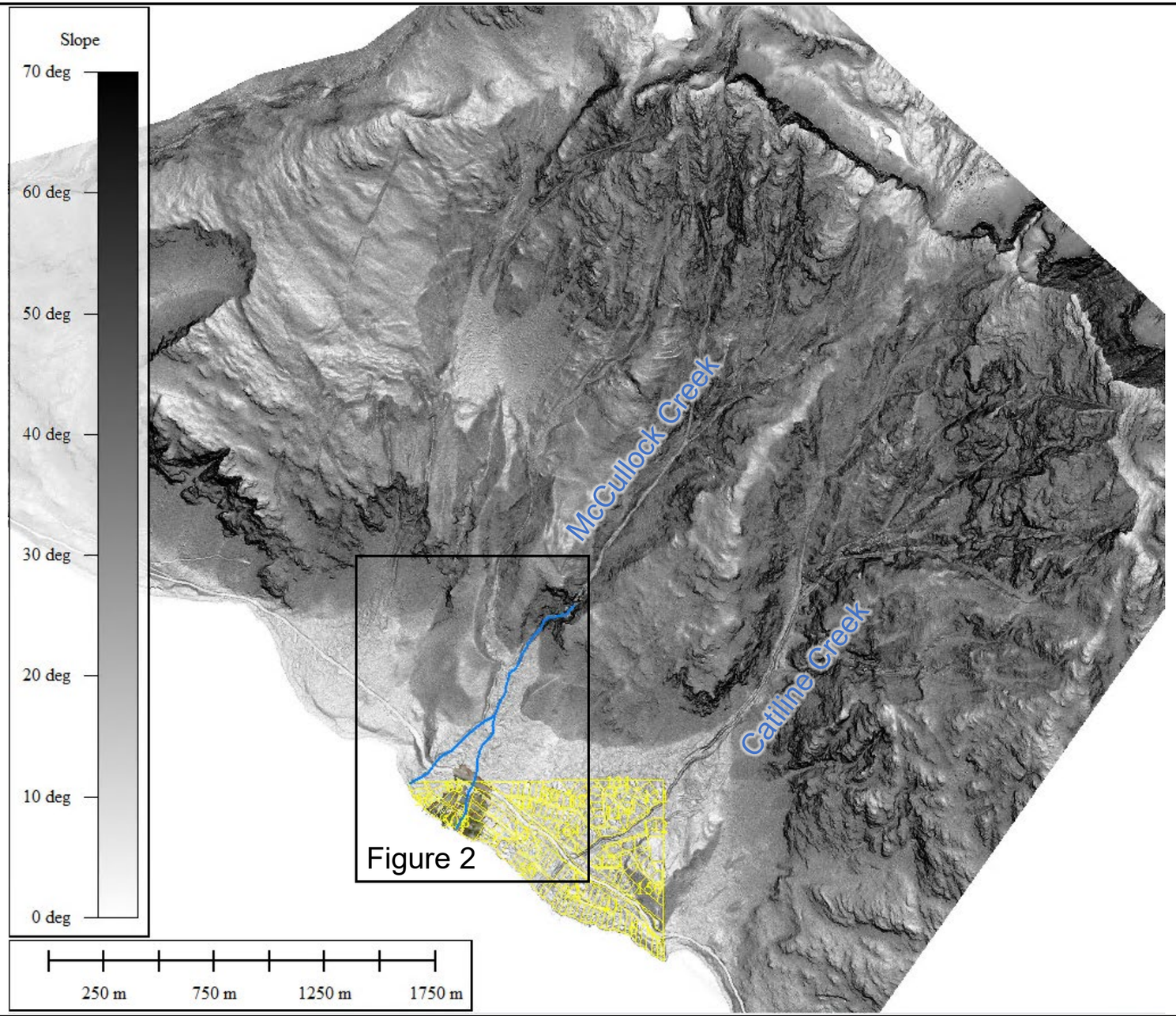
[4] References in these Limitations to the "document" include the document to which these Limitations are attached, any content contained in this document, and any content referenced in this document but located in one of BGC's proprietary software applications (e.g., Cambio).

REFERENCES

BGC Engineering Inc. (2015, January 22). Catiline Creek Debris-flow Hazard and Risk Assessment [Report]. Prepared for Squamish-Lillooet Regional District.

Piteau Associates (1989). Geotechnical Assessments – Heather Jean Estates [Letter]. Prepared for Squamish-Lillooet Regional District.

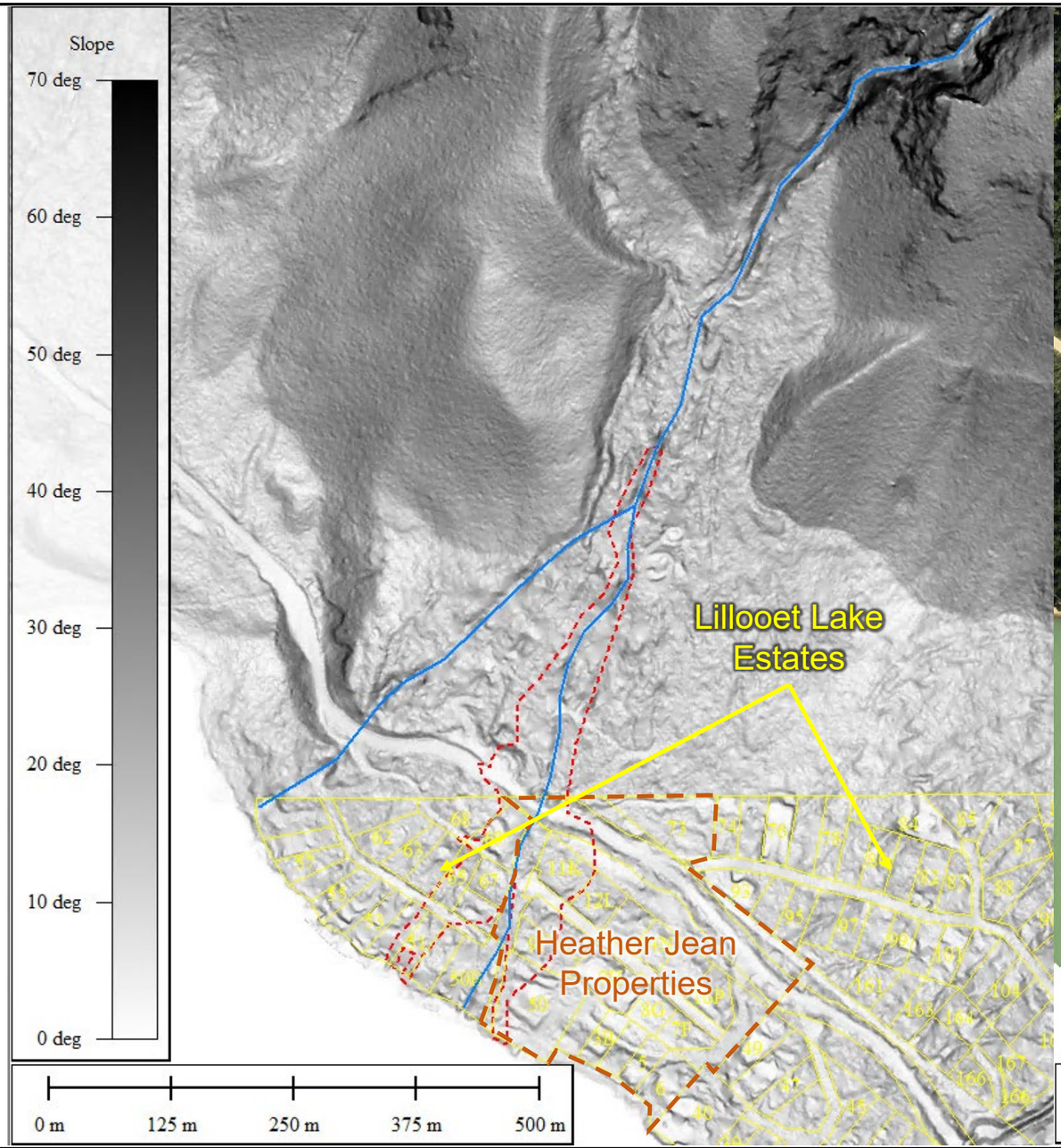
FIGURES

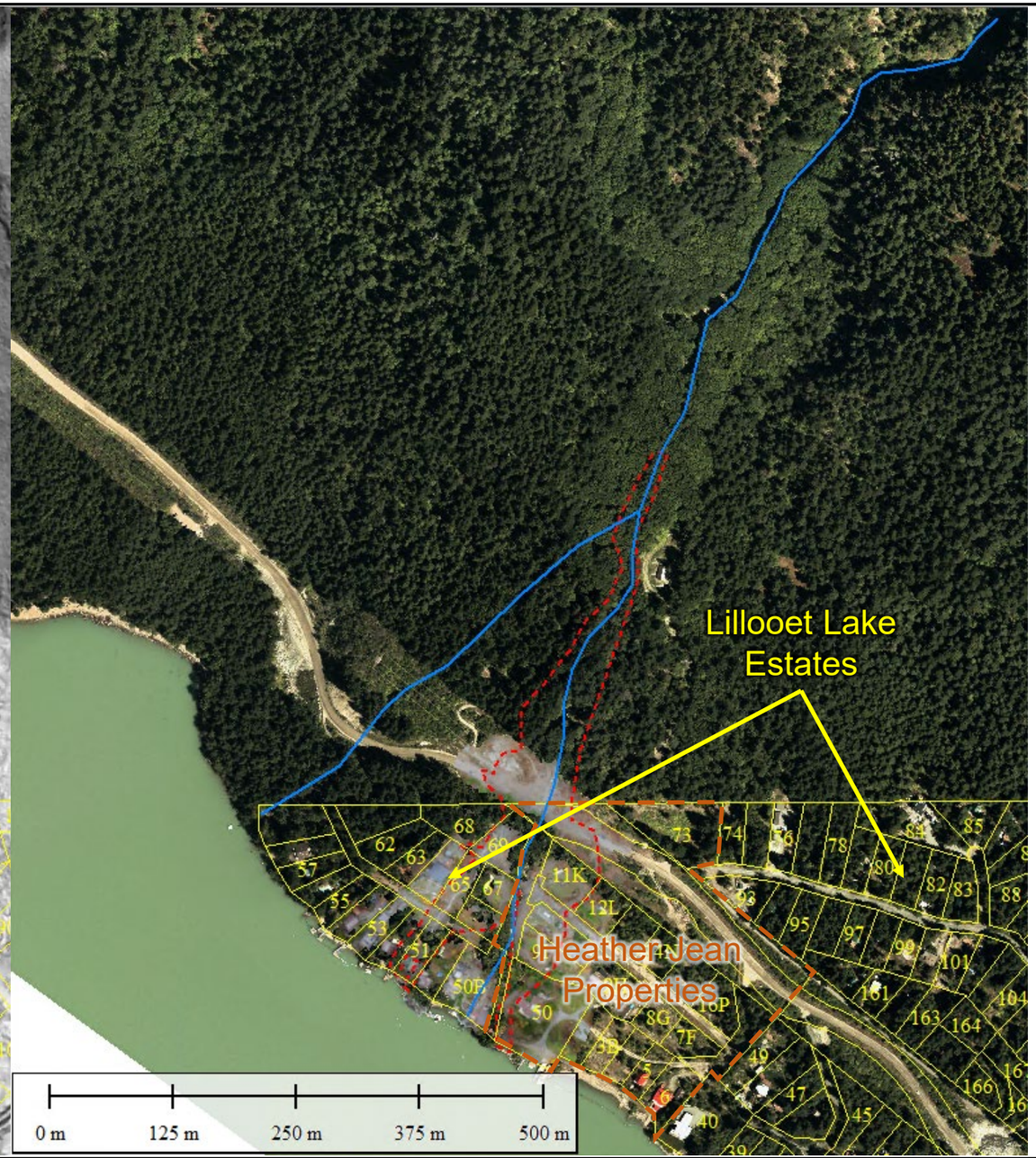


NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Topographic data obtained by McElhanney Consulting Services Ltd., dated 2014.

PREPARED BY:	FIGURE TITLE:		
AM	OVERVIEW		
CHECKED BY:	CLIENT:		
KH	SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
AM	AS SHOWN	1358015	1





NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Topographic and orthophoto data obtained by McElhanney Consulting Services Ltd., dated 2014.

PREPARED BY:	FIGURE TITLE:		
AM	MCCULLOCK CREEK FAN		
CHECKED BY:	CLIENT:		
KH	SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
AM	AS SHOWN	1358015	2

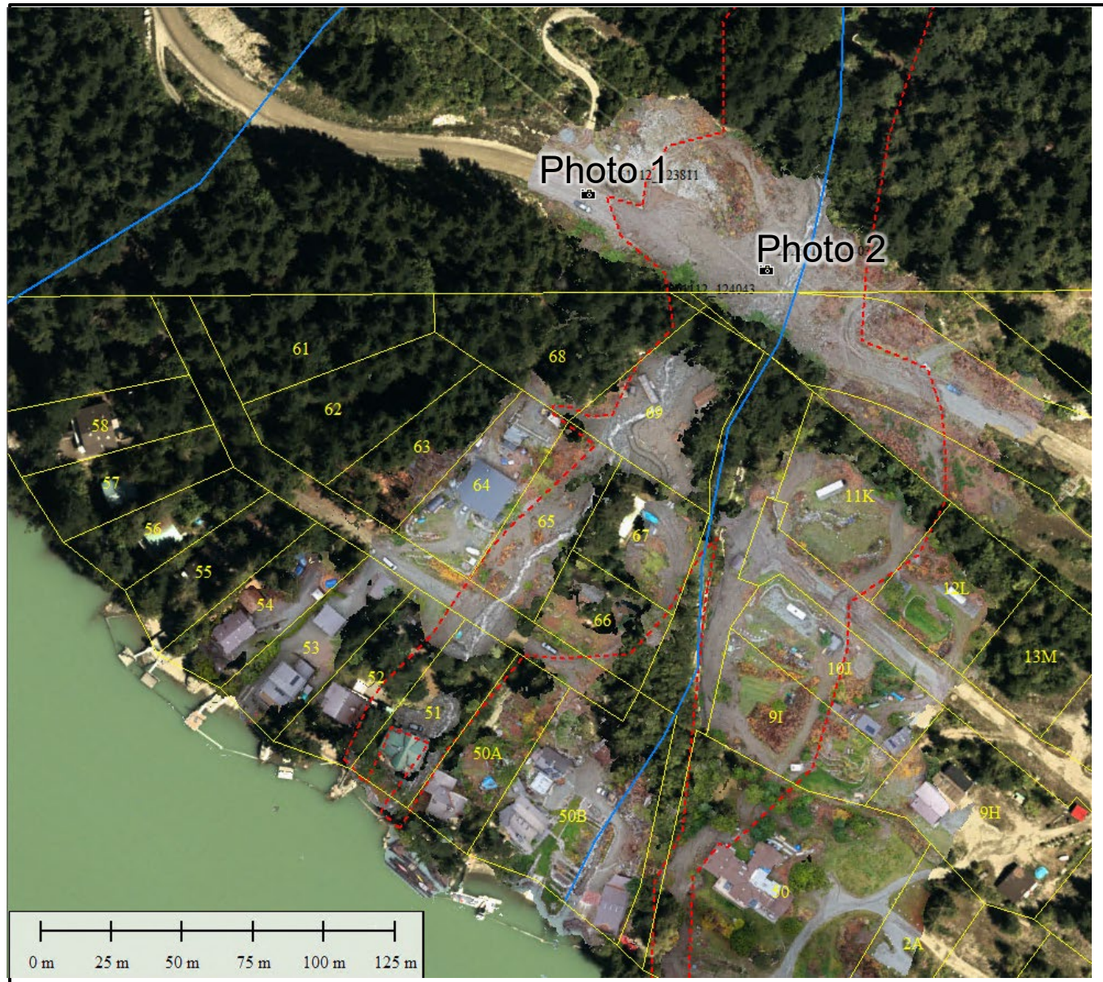






Photo 1: In-SHUCK-ch FSR blockage
Photo 2: Looking upstream on McCullock Creek from the recent deposit.

NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Aerial imagery is a composite of an orthopoto obtained by McElhanney Consulting Services Ltd., dated 2014, and orthorectified drone imagery collected by BGC on November 12, 2026.

PREPARED BY: AM	FIGURE TITLE: DEBRIS FLOW IMPACTS - FSR		
CHECKED BY: KH	CLIENT: SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY: AM	SCALE: AS SHOWN	PROJECT NO: 1358015	FIGURE NO: 3

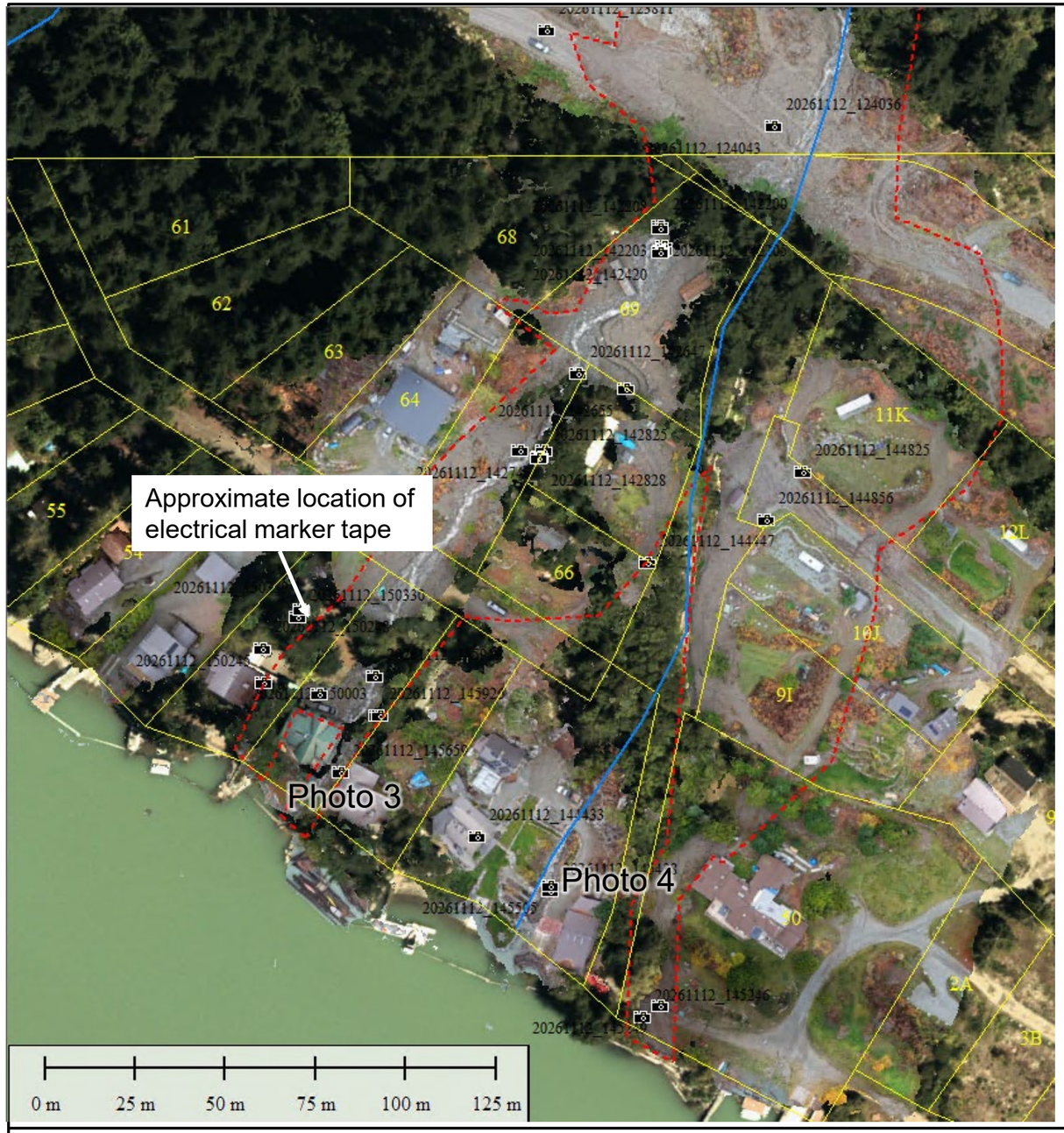






Photo 3: Water flowing down new drainage path entering Lot 69 from the FSR, and flowing through Lots 65 and 51 (pictured)
Photo 4: Previous flow path with no flow observed.

NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Aerial imagery is a composite of an orthopoto obtained by McElhanney Consulting Services Ltd., dated 2014, and orthorectified drone imagery collected by BGC on November 12, 2026.

PREPARED BY:	FIGURE TITLE:		
AM	DEBRIS FLOW IMPACTS – SURFACE WATER		
CHECKED BY:	CLIENT:		
KH	SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
AM	AS SHOWN	1358015	4

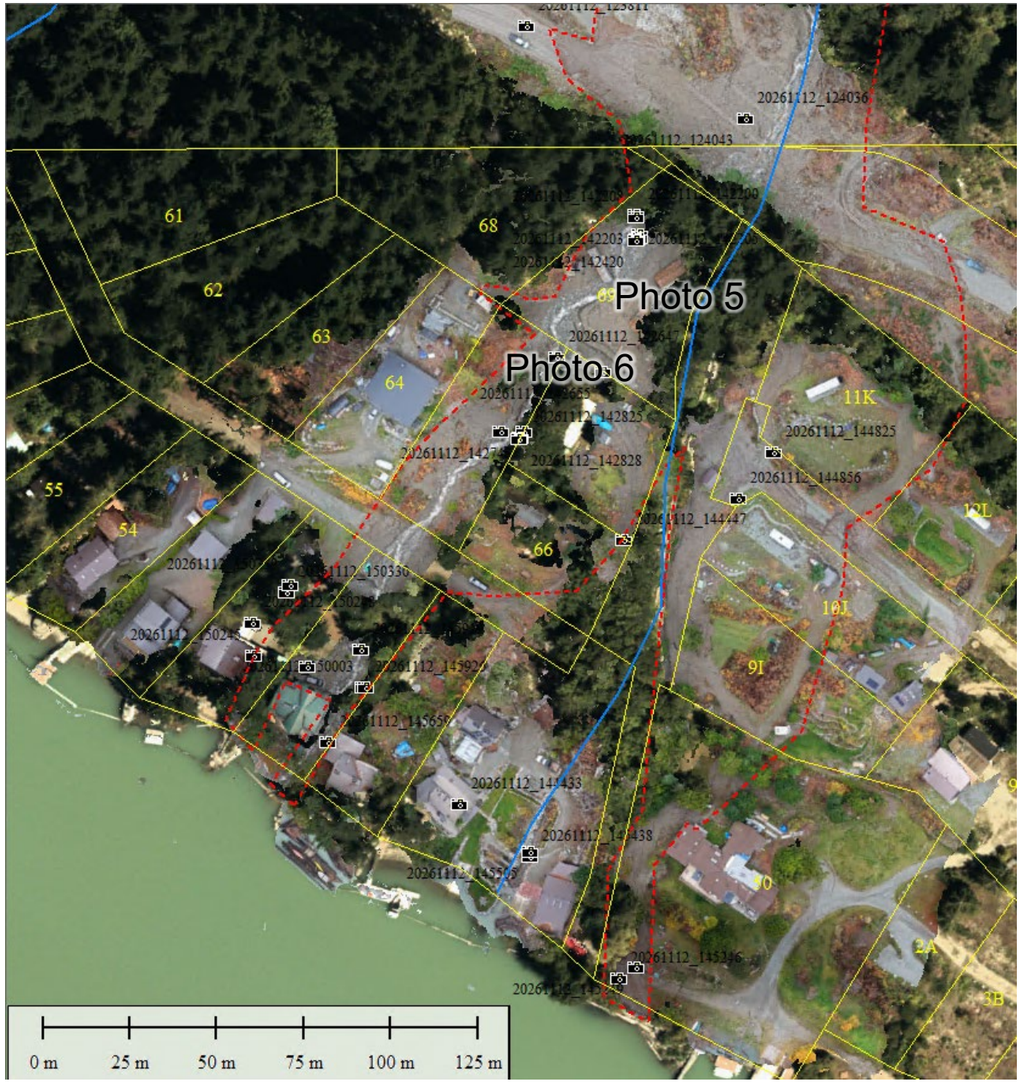






Photo 5: Damage to a storage shed in Lot 69.
Photo 6: Deposition around a parked vehicle in Lot 67.

NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Aerial imagery is a composite of an orthopoto obtained by McElhanney Consulting Services Ltd., dated 2014, and orthorectified drone imagery collected by BGC on November 12, 2026.

PREPARED BY:	FIGURE TITLE:		
AM	DEBRIS FLOW IMPACTS – SEDIMENT DEPOSITION		
CHECKED BY:	CLIENT:		
KH	SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
AM	AS SHOWN	1358015	5

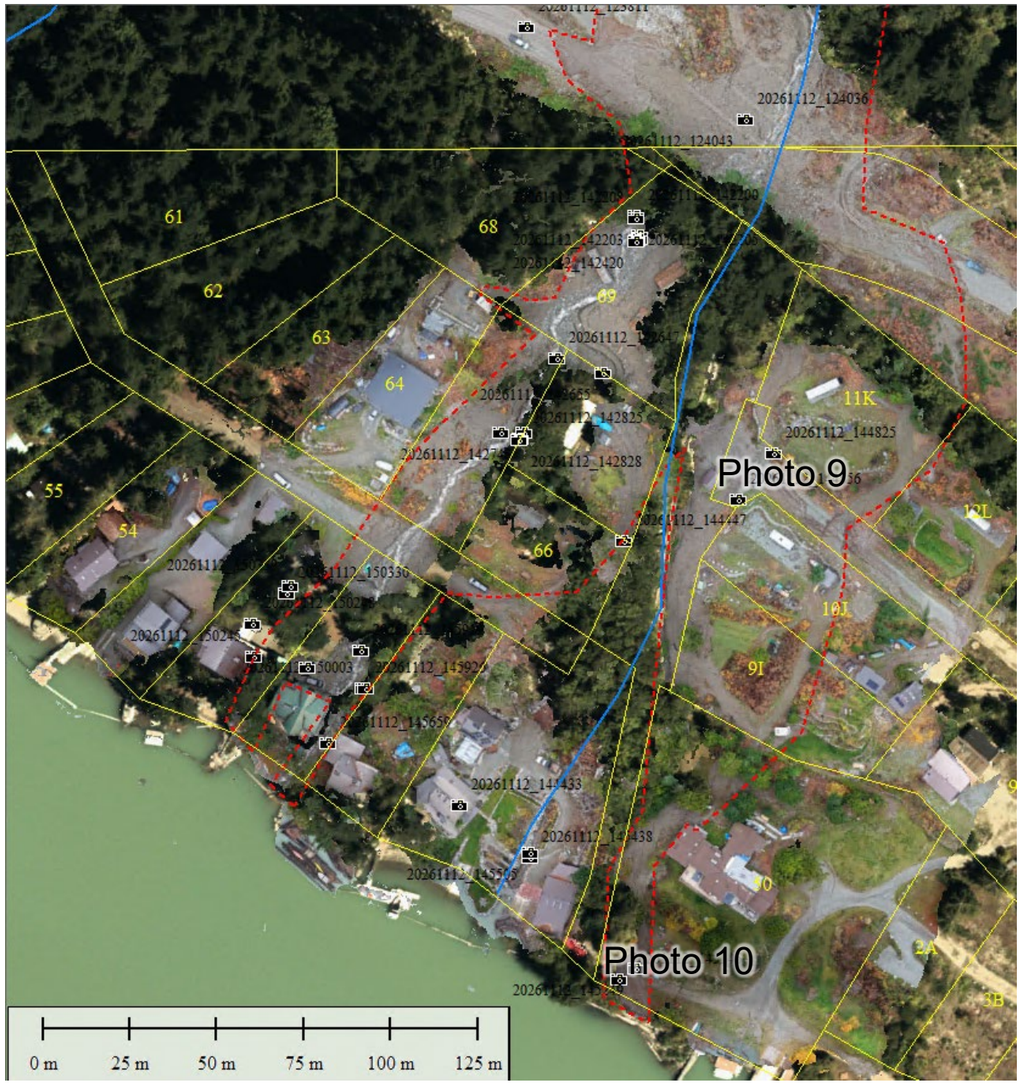






Photo 7: Fine material deposited on the western edge of Lot 10J
Photo 8: Deposition at the edge of Lillooet Lake on Lot 50.

NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Aerial imagery is a composite of an orthopoto obtained by McElhanney Consulting Services Ltd., dated 2014, and orthorectified drone imagery collected by BGC on November 12, 2026.

PREPARED BY:	FIGURE TITLE:		
AM	DEBRIS FLOW IMPACTS – SEDIMENT DEPOSITION		
CHECKED BY:	CLIENT:		
KH	SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
AM	AS SHOWN	1358015	6

BGC Engineering

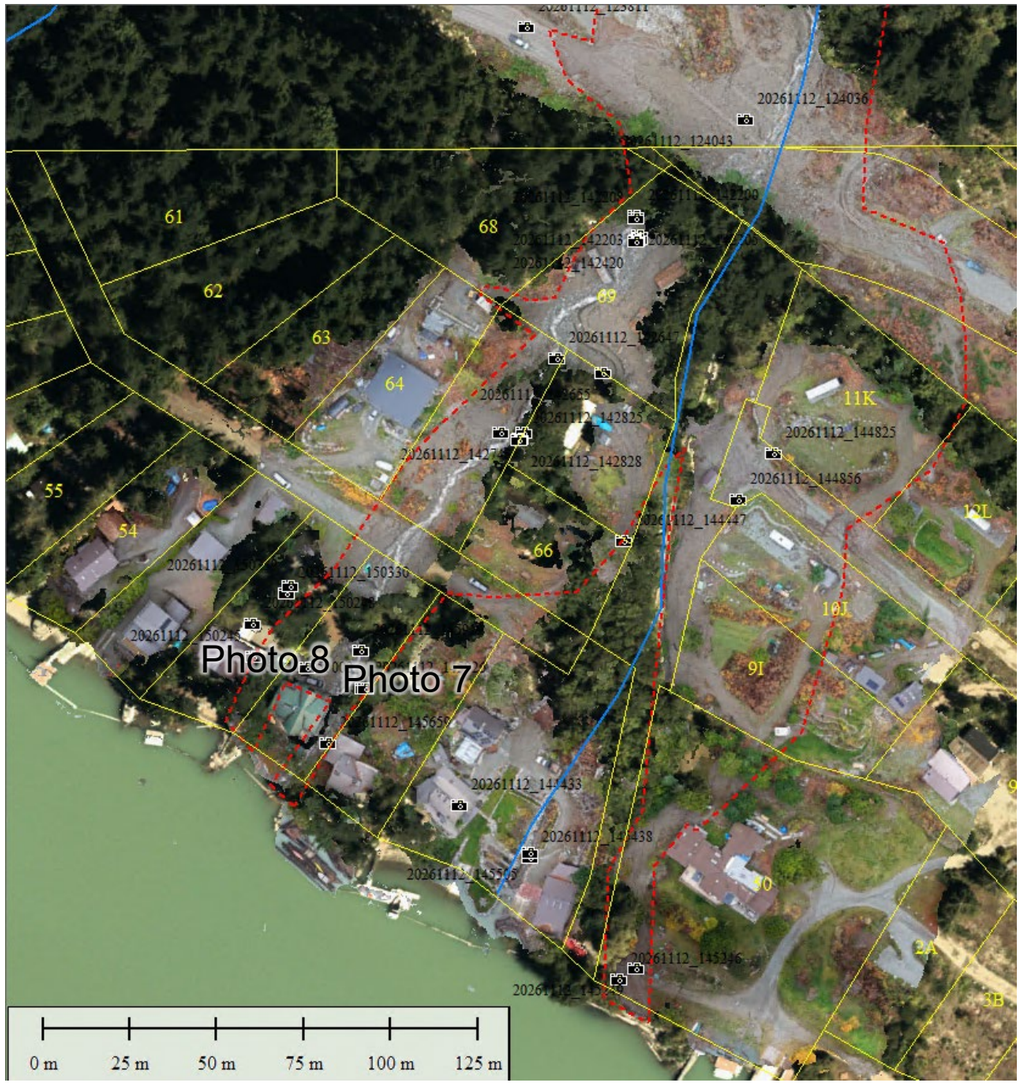






Photo 9: Deposition on the upslope side of Lot 51.
Photo 10: Deposition around buildings on Lot 52.

NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Aerial imagery is a composite of an orthopoto obtained by McElhanney Consulting Services Ltd., dated 2014, and orthorectified drone imagery collected by BGC on November 12, 2026.

PREPARED BY:	FIGURE TITLE:		
AM	DEBRIS FLOW IMPACTS – SEDIMENT DEPOSITION		
CHECKED BY:	CLIENT:		
KH	SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
AM	AS SHOWN	1358015	7

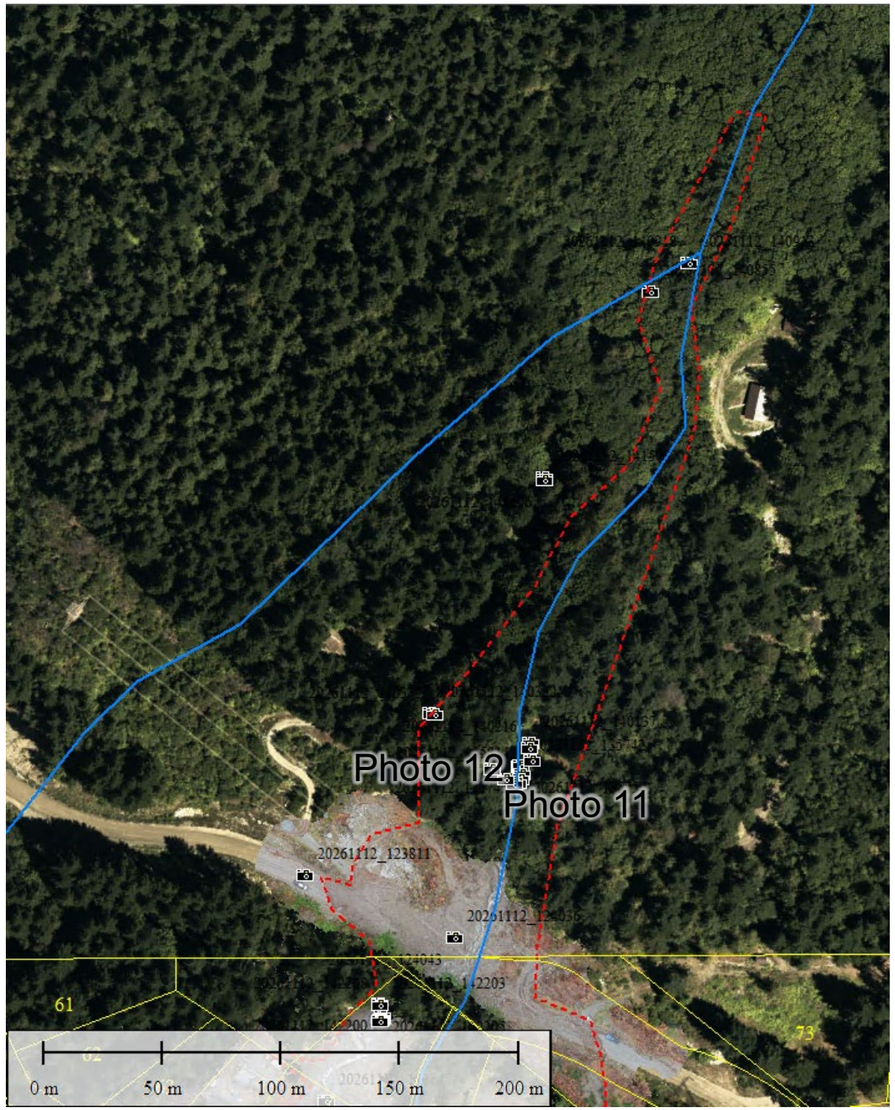






Photo 11: Undermined and outflanked dam structure.
Photo 12: Outbuilding adjacent to dam which was not significantly damaged.

NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Aerial imagery is a composite of an orthopoto obtained by McElhanney Consulting Services Ltd., dated 2014, and orthorectified drone imagery collected by BGC on November 12, 2026.

PREPARED BY:	FIGURE TITLE:		
AM	DEBRIS FLOW IMPACTS – SMALL DAM		
CHECKED BY:	CLIENT:		
KH	SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
AM	AS SHOWN	1358015	8

BGC Engineering

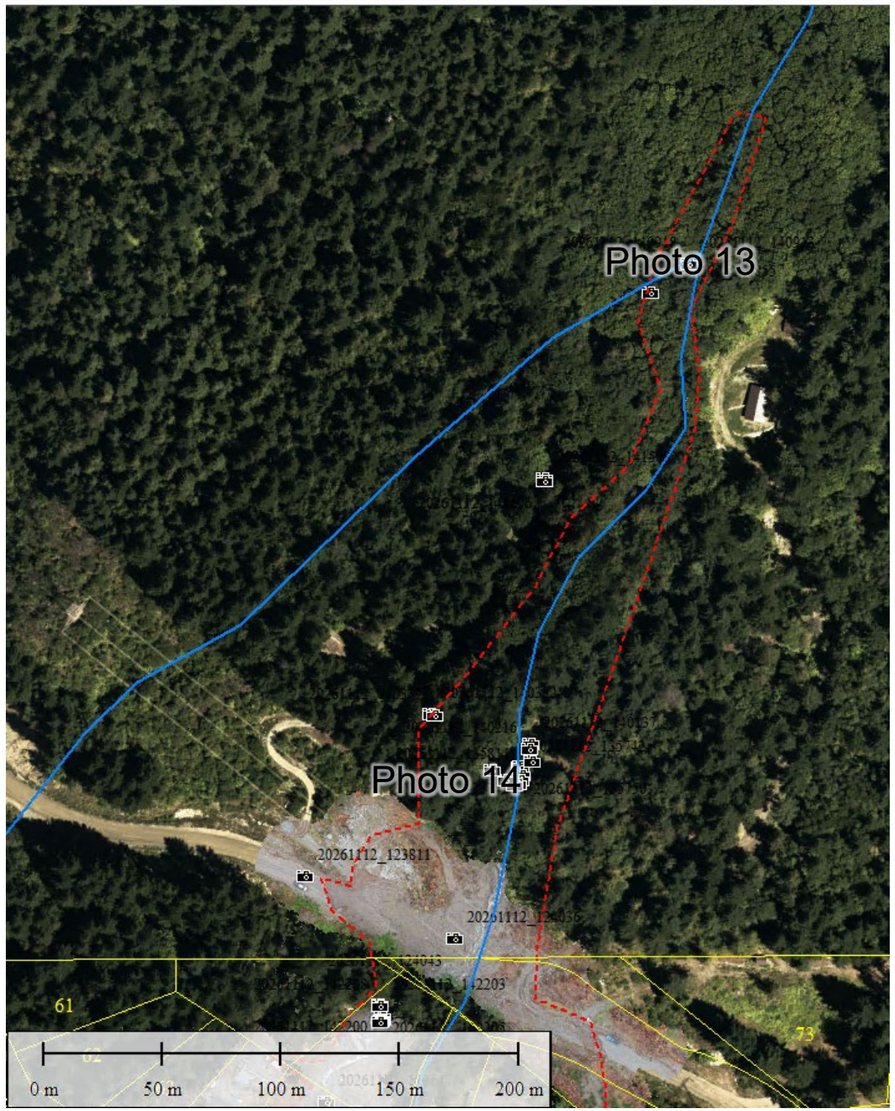






Photo 13: Upstream end of channel observed, with fresh debris exposed.
Photo 14: Directly downstream of intake structure, with large wood and coarse debris.

NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Aerial imagery is a composite of an orthopoto obtained by McElhanney Consulting Services Ltd., dated 2014, and orthorectified drone imagery collected by BGC on November 12, 2026.

PREPARED BY: AM	FIGURE TITLE: DEBRIS FLOW IMPACTS – CHANNEL SCOUR AND DEBRIS		
CHECKED BY: KH	CLIENT: SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY: AM	SCALE: AS SHOWN	PROJECT NO: 1358015	FIGURE NO: 9

BGC Engineering



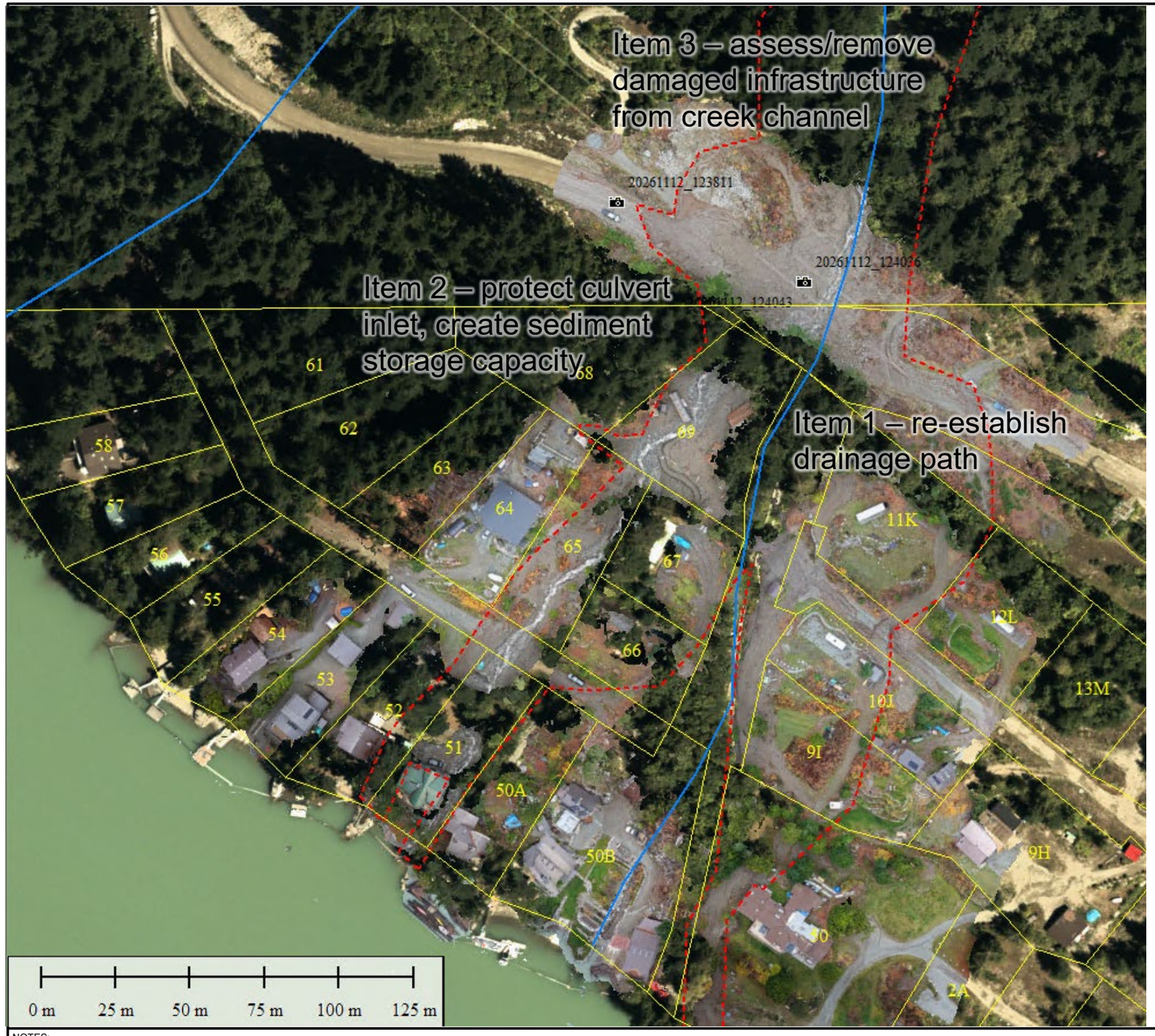


Photo 15: Rockfall on FSR at approximately km 2.

NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.

PREPARED BY: AM	FIGURE TITLE: ROCKFALL IMPACT ON FSR		
CHECKED BY: KH	CLIENT: SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY: AM	SCALE: AS SHOWN	PROJECT NO: 1358015	FIGURE NO: 10



NOTES:

1. This Figure should be read in conjunction with BGC's report title McCullock Creek Emergency Assessment, and dated November 17, 2026.
2. Aerial imagery is a composite of an orthopoto obtained by McElhanney Consulting Services Ltd., dated 2014, and orthorectified drone imagery collected by BGC on November 12, 2026.

PREPARED BY:	FIGURE TITLE:		
AM	RECOMMENDED RECOVERY ACTIVITIES		
CHECKED BY:	CLIENT:		
KH	SQUAMISH-LILLOOET REGIONAL DISTRICT		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
AM	AS SHOWN	1358015	11

BGC Engineering