## Moore, Jeffrey TRAN:EX

From: Lee, Steven SE TRAN:EX

Sent: November 26, 2020 1:18 PM

To: Moore, Jeffrey TRAN:EX

Subject: FW: FW: Referral for MOTI #2019-05895 Subdivision @ 49096 Chilliwack Lake Road

Attachments: 19-164 GA18-1288-01 GHA Rpt Rev2 2020-06-10 49096 Chilliwack Lk Rd-sealed.pdf; 19-164 MoTI

Confirmation of Geotech Report.pdf; 19-164 MOE Crossing Notification Acceptance.pdf; 19-164 SD 2019-05895.pdf; 19-164 2020-1044 2020-10-28 Site Plan Rev C for Septic-03 SEPTIC KEY PLAN -

SIGNED.pdf

Hi Jeff,

FYI below.

Also, I chatted with Kevin and he mentioned that if the access road (8.5m width) is going to be owned by strata, we can accommodate lesser width of the road, granted they show the accommodation plans for utilities + emergency services.

So my next course of action was to ask Dylan if the access road is going to be owned by the strata or the province. If province, I will send him the BC Standard to TAC for our road specifications. If he says strata, then I will ask him for full drawings on how they are planning to accommodate utilities + emergency vehicle access (which needs to be signed-off by fire chief).

Is there anything else that you think I should be asking/thinking about? Please kindly advise.

Regards,

## Steven Lee

Assistant Developmen Services Officer (SA-07) Lower Mainland District | South Coast Region Ministry of Transportation and Infrastructure 310 - 1500 Woolridge Street | Coquitlam | BC | V3K 0B8 45890 Victoria Avenue | Chilliwack | BC | V2P 2T1

E-mail: <a href="mailto:steven.se.lee@gov.bc.ca">steven.se.lee@gov.bc.ca</a> | Office: <a href="mailto:+1-236-468-1911">+1-236-468-1911</a> | Cell: <a href="mailto:778-988-6295">778-988-6295</a>

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From: Dylan Anderson

Sent: November 26, 2020 11:59 AM

**To:** Lee, Steven SE TRAN:EX **Cc:** Outofthebox Engineering

Subject: Re: FW: Referral for MOTI #2019-05895 Subdivision @ 49096 Chilliwack Lake Road

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Steven,

Thank you for the call this morning.

Based on our conversation, while it is understood that the AO needs to take a closer look at the site before issuing the PRL, you will be sending me the specifications required for the road design so that we can address as needed as soon as possible.

The FVRD notes in their April 1, 2020 letter that the following items need to be addressed before they will support the subdivision:

- 1. Geo-hazard report (Report and acceptance email attached)
- 2. RAR report (attached as drive link file too large; needs slight amendment to lot count)
- 3. Septic Suitability Report (design and Fraser Health acceptance attached)
- 4. Lot 7 access review (approvals from the Province are attached)

The above noted 4 items are attached.

- 5. Fire Apparatus Servicing review Road Access Width
- 6. Road Access Width

For these above items, please send the appropriate road design specifications. I have included our civil engineer in this email so he can address as needed. Collin please advise what specifications you used to design the cul-de-sac.

If anyone has any questions, please let me know.

Regards,

Dylan

## Dylan V. Anderson BA, MUP

DEVELOPMENT PLANNER / PROJECT MANAGER

c: 604.556.6623

o: 604.393.7815

e: dylan@otgdevelopments.com



Unit 520 - 45715 Hocking Ave Chilliwack, BC, V2P 6Z6 www.otgdevelopments.com

Although OTG is expected to remain open throughout the COVID-19 crisis, social isolation measures are reducing efficiency and interrupting workflow. Consequently, some projects may experience delays. Please do not hesitate to contact us if you have any concerns, and we will take measures to ensure all critical deadlines are met.

Additionally, please know that most Municipal Halls and Regional Offices are remaining open in some capacity. We are all working together to keep your projects going.

Be safe and healthy.

**Sent:** November 26, 2020 8:32 AM

To: 'Dylan Anderson' < <a href="mailto:dylan@otgdevelopments.com">dylan@otgdevelopments.com</a>>

Cc: McGowan, Kevin TRAN:EX < Kevin.McGowan@gov.bc.ca >

On Thu, Nov 26, 2020 at 9:48 AM Lee, Steven SE TRAN:EX < Steven.SE.Lee@gov.bc.ca > wrote:  Hey Dylan,
I got pulled into a meeting – I'll give you a call @ 10:45 AM, instead.
Thank you.
Regards,
Steven Lee
Assistant Developmen Services Officer (SA-07)
Lower Mainland District   South Coast Region
Ministry of Transportation and Infrastructure
310 - 1500 Woolridge Street   Coquitlam   BC   V3K oB8
45890 Victoria Avenue   Chilliwack   BC   V2P 2T1
E-mail: <u>steven.se.lee@gov.bc.ca</u>   Office: <u>+1-236-468-1911</u>   Cell: <u>778-988-6295</u>
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From: Lee Steven SF TRAN:FX

3

Subject: RE: FW: Referral for MOTI #2019-05895 Subdivision @ 49096 Chilliwack Lake Road

Hi Dylan,
Thanks for your prompt reply – I will give you a call @ 10:15 AM today.
Thank you.
Regards,

## Steven Lee

Assistant Developmen Services Officer (SA-07)

Lower Mainland District | South Coast Region

Ministry of Transportation and Infrastructure

310 - 1500 Woolridge Street | Coquitlam | BC | V3K oB8

45890 Victoria Avenue | Chilliwack | BC | V2P 2T1

E-mail: <u>steven.se.lee@gov.bc.ca</u> | Office: <u>+1-236-468-1911</u> | Cell: <u>778-988-6295</u>

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From: Dylan Anderson < <a href="mailto:dylan@otgdevelopments.com">dylan@otgdevelopments.com</a>>

Sent: November 26, 2020 8:30 AM

**To:** Lee, Steven SE TRAN:EX < Steven.SE.Lee@gov.bc.ca > **Cc:** McGowan, Kevin TRAN:EX < Kevin.McGowan@gov.bc.ca >

Subject: Re: FW: Referral for MOTI #2019-05895 Subdivision @ 49096 Chilliwack Lake Road

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Steven SE, Lee@igov, oc. ca

I reviewed the two files with the PAO yesterday: 2020-00310 and 2019-05895.

I was hoping to arrange a quick phone call with you (15 mins) to go over the files and discuss next steps. Please let me know your availability for today.

Thank you.

## Steven Lee

Assistant Developmen Services Officer (SA-07)

Lower Mainland District | South Coast Region

Ministry of Transportation and Infrastructure

310 - 1500 Woolridge Street | Coquitlam | BC | V3K oB8

45890 Victoria Avenue | Chilliwack | BC | V2P 2T1

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From: Lee, Steven SE TRAN:EX Sent: November 24, 2020 8:14 AM

To: 'Dylan Anderson' < <a href="mailto:dylan@otgdevelopments.com">dylan@otgdevelopments.com</a>>

Cc: McGowan, Kevin TRAN:EX < <a href="mailto:Kevin.McGowan@gov.bc.ca">Kevin.McGowan@gov.bc.ca</a>; Neill, Mike D TRAN:EX < <a href="mailto:Mike.Neill@gov.bc.ca">Mike.Neill@gov.bc.ca</a>

Subject: RE: FW: Referral for MOTI #2019-05895 Subdivision @ 49096 Chilliwack Lake Road

Hi Dylan,

Along with 2020-00310, I will also be reviewing this file with the PAO tomorrow. Hoping to respond by end of this week. Thank you for your patience.

Regards,
Steven Lee
Assistant Developmen Services Officer (SA-07)
Lower Mainland District   South Coast Region
Ministry of Transportation and Infrastructure
310 - 1500 Woolridge Street   Coquitlam   BC   V3K oB8
45890 Victoria Avenue   Chilliwack   BC   V2P 2T1
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From: Dylan Anderson <a href="mailto:dylan@otgdevelopments.com">dylan@otgdevelopments.com</a> Sent: November 23, 2020 12:47 PM  To: Lee, Steven SE TRAN:EX < <a href="mailto:steven.SE.Lee@gov.bc.ca">Steven.SE.Lee@gov.bc.ca</a> Cc: McGowan, Kevin TRAN:EX < <a href="mailto:kevin.McGowan@gov.bc.ca">kevin.McGowan@gov.bc.ca</a> Subject: Re: FW: Referral for MOTI #2019-05895 Subdivision @ 49096 Chilliwack Lake Road
[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.
Hi Stephen,
Just following up on this. This owner has been at this for a long time now and is eager to get a PRL. Please advise when it will be ready.
Thanks,

Dylan

## Dylan V. Anderson BA, MUP

DEVELOPMENT PLANNER / PROJECT MANAGER
c: 604.556.6623
o: 604.393.7815
e: dylan@otgdevelopments.com
x
Unit 520 - 45715 Hocking Ave Chilliwack, BC, V2P 6Z6 www.otgdevelopments.com
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Additionally, please know that most Municipal Halls and Regional Offices are remaining open in some capacity. We are all working together to keep your projects going.
Be safe and healthy.
On Wed, Nov 18, 2020 at 8:29 AM Dylan Anderson < <a href="mailto:dylan@otgdevelopments.com">dylan@otgdevelopments.com</a> > wrote:  Hi Stephen,
If you know the answer at this time, please advise as to when we might be able to expect a PRL for this project. The client has been at this for quite some time and asks me daily for this information.
Many thanks,
Dylan

## Dylan V. Anderson BA, MUP

DEVELOPMENT PLANNER / PROJECT MANAGER
c: 604.556.6623
o: 604.393.7815
e: dylan@otgdevelopments.com
Unit 520 - 45715 Hocking Ave Chilliwack, BC, V2P 6Z6 www.otgdevelopments.com
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Additionally, please know that most Municipal Halls and Regional Offices are remaining open in some capacity. We are all working together to keep your projects going.
Be safe and healthy.
On Mon, Nov 16, 2020 at 1:07 PM Neill, Mike D TRAN:EX < Mike.Neill@gov.bc.ca > wrote:
Steven can you update the subdivision file.
Andrea this is for your information.
Mike
From: Dylan Anderson < <a href="mailto:dylan@otgdevelopments.com">dylan@otgdevelopments.com</a> > Sent: November 16, 2020 11:28 AM

To: Neill, Mike D TRAN:EX < > Subject: Fwd: Referral for MOTI #2019-05895 Subdivision @ 49096 Chilliwack Lake Road
This email came from an external source. Only open attachments or links that
you are expecting from a known sender.
Hi Mike,
I understand that Jon is away for now. Please make sure this gets to the proper party and I will reach out to them for updates on the PRL accordingly.
Many thanks,
Dylan
Dylan V. Anderson BA, MUP
DEVELOPMENT PLANNER / PROJECT MANAGER
c: 604.556.6623
o: 604.393.7815
e: <u>dylan@otgdevelopments.com</u>

Unit 520 - 45715 Hocking Ave Chilliwack, BC, V2P 6Z6 www.otgdevelopments.com

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Additionally, please know that most Municipal Halls and Regional Offices are remaining open in some capacity. We are all working together to keep your projects going.

Forwarded message From: Choquette, Blair [FH] < Blair.Choquette@fraserhealth.ca > Date: Sun, Nov 15, 2020 at 3:37 PM Subject: Referral for MOTI #2019-05895 Subdivision @ 49096 Chilliwack Lake Road To: Crump, Jon TRAN:EX < Jon.Crump@gov.bc.ca > Cc: Dylan Anderson < dylan@otgdevelopments.com >
Hi Jon
Please see the attached letter for our comments on the above noted subdivision application referral.
If you have any questions or require further clarification, please call or email.
Regards
Blair
Blair Choquette Health Protection Manager Environmental Health Services Fraser Health 400 2777 Gladwin Rd, Abbotsford, BC V2T 4V1

Be safe and healthy.

Tel: (604) 870-7921 Fax: (604) 852-1558 e-mail: <u>blair.choquette@fraserhealth.ca</u>

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## 180320 CHWK Lk Rd RAR.pdf

#### ATTACHMENT: 19-164 GA18-1288-01 GHA Rpt Rev2 2020-06-10 49096 Chilliwack Lk Rd-sealed.pdf



#### **GeoWest Engineering Ltd.**

200 · 34425 McConnell Road, Abbotsford, BC V2S 7P1 www.geowestengineering.com info@geowestengineering.com | 604·852·9088

June 10, 2020

GeoWest File: GA18-1288-01

Mr. Gilles Brouillette 46096 Chilliwack Lake Road Chilliwack, BC V4Z 1A6

Via Email: \$.22

Dear Sir:

Project: Proposed Seven Lot Single-Family Residential Subdivision

46096 Chilliwack Lake Road, Chilliwack, BC

Subject: Geohazard Site Assessment Report – Revision 2

## 1. INTRODUCTION

GeoWest Engineering Ltd. (GeoWest) has prepared this revised geohazard site assessment report for the proposed subdivision of 49096 Chilliwack Lake Road in Chilliwack, BC into seven single-family residential lots. This revised report was prepared in response to the comments from the Ministry of Transportation and Infrastructure (MoTI) on the GeoWest geohazard report for the site dated November 12, 2019 (Revision 1). The MoTI comments were provided to GeoWest by OTG Developments in an e-mail dated January 8, 2020. This revised report supersedes the GeoWest geohazard site assessment report dated November 12, 2019.

Attached to this report is the GeoWest Memorandum dated March 23, 2020 with recommendations for protective berms for the existing single-family residence and the mobile home, which will remain on the western portion of the site. The protective berms have been constructed at the time of preparation of this revised report.

The site location and site plan are shown on the attached Figures 1 and 2, respectively. Authorization to proceed with the preparation of this revised report was received from Mr. Gilles Brouillette (the Client) via e-mail on May 28, 2020.

The purpose of this assessment was to:

- Identify the nature and frequency of potential geohazards that could affect the areas of existing residences and proposed development; and
- Determine "safe" building areas on each lot and provide recommendations for geohazard avoidance and mitigative measures for the existing house and mobile home, the proposed single-family residences, and the proposed workshop, as required.



The geohazard assessment was conducted in general conformance with the guidelines presented in the following documents:

- 1. "Hazard Acceptability Thresholds for Development Approvals by Local Government", revised November 1993, by Dr. Peter Cave (1993 Cave Paper)
- 2. BC Land Title Act, Section 86
- 3. "Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC", prepared by APEGBC (now EGBC).

#### 2. SITE DESCRIPTION AND PROPOSED CONSTRUCTION

The subject site is located on the south side of Chilliwack Lake Road, approximately 300 m west of Bell Acres Road, in Chilliwack, British Columbia. The site is bounded by single-family and rural residential properties to the south and west. Chilliwack Lake Road borders the north and east sides of the site. The Chilliwack River is located approximately 300 m south of the site. North to northeast of the site there is a steep slope with a wide terrace extending between Mount Thom to the west and Elk Mountain to the east. Figure 3 illustrates the topography in the immediate site vicinity.

The site is irregular in shape and encompasses an area of approximately 2 hectares, according to the parcel information found on iMapBC. A BC Ministry of Transportation and Infrastructure (MOTI) Right-of-Way occupies a portion of the northwest corner of the site.

The site slopes gently down to the south with elevations ranging from approximately El. 98 m in the northwest corner of the site to El. 94 m along the south property line. At the time of our field work, the western portion of the site was occupied by a single-family house, a mobile home, a large shed/shop, and several small temporary sheds. The eastern portion of the site was vacant and vegetated mostly with brush and grass.

There were two watercourses that drain through the site, Bell Brook and Larry Brook, that originate on the sloping area to the north of the site. Bell Brook flows through the western portion of the site between the residential properties and the shop. Larry Brook runs through the vacant grass field in the eastern portion of the site. The confluence of these two brooks occurs 80 m south of the site, where it flows westward into the Chilliwack River. A berm extended parallel to the south side of Chilliwack Lake Road from the existing driveway east of Bell Brook to approximately 10 m east of Larry Brook, as shown on Figure 2.

The existing house and mobile home will be located on the proposed Lots 1 and 2, respectively, to the west of Bell Brook (see Figure 2). The existing shop will be demolished. It is understood that the entrance to the garage in the northeast corner of the house will be closed with a new wall that will be aligned with the north wall of the house. Lots 3, 4, 5, and 6 will occupy the central portion of the site between Bell Brook and Larry Brook. Lot 7 will occupy the eastern portion of the site, on the east side of Larry Brook. Access to Lots 1 and 2 will remain on the west side of the Bell Brook channel. Access to Lots 3 to 7 will be provided from a cul-de-sac connecting to Chilliwack Lake Road. Crossing of the Larry Brook channel will be required to access Lot 7.

A workshop is proposed to be constructed adjacent to the existing modular home on the proposed Lot 2. According to the preliminary information from the Client, the proposed workshop will be a single-storey



structure with a footprint of approximately 6 m by 9 m. The entrance to the workshop will be on the east side of the structure.

#### METHODOLOGY

GeoWest conducted the following tasks for this assessment:

- 1. Review of the Geological Survey of Canada surficial geology map and the guideline documents listed in Section 1 of this report.
- 2. Review of Fraser Valley Regional District (FVRD) on-line geohazard mapping.
- 3. Review of previous reports provided by FVRD and the Client.
- 4. Review of stereo pairs of historical aerial photographs obtained from the Geographic Information Centre (GIC) of the University of British Columbia (UBC) and historical aerial photographs available on the City of Chilliwack webmap.
- 5. A site reconnaissance conducted by GeoWest geotechnical and geological staff on October 24, 2018 and October 31, 2018. The subject site and the immediate vicinity were reviewed on October 24, 2018. The reconnaissance on October 31 included a traverse of the upper reaches of the Bell Brook and Larry Brook gullies, review of soil exposures, and evidence of previous landslides and debris flows in the creek channels. Slope angles were measured from the horizontal using a hand-held clinometer. Site conditions were documented with photographs attached in Appendix A of this report.
- 6. Analysis and preparation of this report.

## 4. FINDINGS

## 4.1 Surficial Geology Map

According to the Geological Survey of Canada Surficial Geology Map (Map 1487A, Chilliwack), the site is underlain by Quaternary Postglacial slope deposits composed of landslide rubble, gravel, and minor sand up to 10 m thick. Outwash gravel and sand up to 10+ m thick are mapped between Chilliwack Lake Road and the steep slope to the north.

Sumas Drift comprised of sandy loamy till and sub-stratified drift, and Sumas and Pre-Sumas proglacial and fluvial gravel and sand, are mapped on the steep slope to the north of the site.

#### 4.2 FVRD On-Line Geohazard Mapping

According to the FVRD on-line mapping, the majority of the site is located on the Bell Brook and Larry Brook alluvial fans. Alluvial fans are geologic hazard areas formed by a succession of debris flow events and consist of sediment transported from steep up-slope gully headwall and sidewall areas. The streams that form the fans meander across them over time unless trained and maintained within a particular alignment by way of dredging, constructing berms and dikes, etc.



The reviewed mapping indicates that the site is outside of the Chilliwack River flood plain. The FVRD geohazard mapping is illustrated on Figure 4.

#### 4.3 Review of Previous Reports

The following is the summary of reviewed reports and relevant findings received from FVRD:

- A report titled "Geotechnical Reconnaissance for Preliminary Hazard Assessment for Proposed Subdivision" for Chilliwack Lake Road, Chilliwack, BC, prepared October 13, 1983 by Golder Associates (FVRD reference number: 10-29-01-200) included the area of the subject site. The following summarizes the findings and recommendations provided in the report:
  - The slopes above the site are susceptible to creek debris flows, slump, creep, and shallow slope failures resulting in fan deposition at the foot of the slopes.
  - The areas most at risk to natural hazards were those within a 50 m setback from the toe of the escarpment slope.
  - There should be a non-development area around the watercourses to encourage natural development of debris fans; this area is not suitable to residential structures with basements. The report also recommended that all roads should be developed above existing grade.
- 2) A staff memo titled "Chilliwack Lake Road" for 49091, 49096, 49101, 49110, and 49141 Chilliwack Lake Road, Chilliwack, BC, prepared March 6, 1986 by the Regional District of Fraser-Cheam Planning Department (FVRD reference number: 10-12-53-400) discussed a debris slide in Bell Brook that occurred on February 25, 1986. The slide debris extended into 49096 Chilliwack Lake Road (the subject site), covering the field in fine silts and sediments and damaging the properties north of the road.
- 3) A geotechnical assessment report titled "Slope Stability in the Chilliwack Valley" for the Chilliwack River Valley, prepared June 30, 1988 by Thurber Consultants Ltd. (File number: 14-50-7) covered an area of roughly 20 km² of the Chilliwack River Valley, including the subject site. The following summarizes the conclusions and recommendations provided in the report:
  - Applicable Hazards: Flooding, debris flood, channel erosion, seepage erosion, debris flow, and earth sliding. Massive landslides are not likely to occur.
  - There is a high potential for slope instability and resultant debris floods and flows in the area.
  - Recommendations: Earth fill or rock fill dykes that are 2 to 3 m high should be built to constrain debris deposition. The report also recommended construction of debris barriers with storage basins.
- 4) A report titled "Proposed Storage Building" for 49091 Chilliwack Lake Road, Chilliwack, BC, prepared May 31, 1988 by Thurber Consultants Ltd. (File number: 19-641-0) addressed the property at 49091 Chilliwack Lake Road, located approximately 15 m north of the western portion of the subject site. The report recommended construction of a berm to deflect potential debris flows and debris floods from Bell Brook and away from the property. This was recommended to protect the storage building from



minor flooding and debris flows; however, they anticipated that damage would occur for more extreme incidents with a return period on the order of 50 years or greater.

- 5) A geotechnical report titled "Bell Brook Area Chilliwack River Valley Geotechnical Assessment" for the Chilliwack River Valley, prepared October 7, 1997 by Thurber Consultants Ltd. (FVRD reference number: 6785-20-370) assessed the hazards associated with Bell Brook and Larry Brook. The following are the conclusions and recommendations that were provided:
  - Two debris flows occurred in 1997 which were the result of intense rainfall that fell on snow in the upper basin. Organic-rich clays, silts, sands, gravels, cobbles, and boulders up to 0.7 m in size were deposited along the channel and fan. The property at 49101 Chilliwack Lake Road (15 m north of the subject site) was damaged to the point that it was uninhabitable. It was noted that there have been four debris flows in Bell Brook in the last 10 years.
  - The following factors were outlined as contributing to slope instability in Bell Brook and Larry Brook:
     Bell Brook gully slopes have been over-steepened due to landslides, the landowner above the
     headwalls of the two brooks has built a system of unstable logging roads, and there is high
     groundwater pressure on the gully slopes.
  - The geology of these two gullies was described as having a lower 35 m thick layer of glacial lake silt and clay deposits, a middle 105 m thick layer of interbedded thick sand beds and thin silt-clay, and an upper sand and gravel layer up to 30 m thick.
  - The residential property at 49096 Chilliwack Lake Road (the subject site) was estimated as high risk
    for debris flow and debris flood hazards. Deposition of mud and muddy water have been a
    continuous problem for the property at 49096 Chilliwack Lake Road.
  - The report recommended that the property at 49101 Chilliwack Lake Road should not be used for residential purposes. The report also recommended that the property at 49096 Chilliwack Lake Road (the subject site) should have a dyke along Bell Brook and Larry Brook creek channels and the driveway should be raised to match the dyke.
- 6) A report titled "Revision to Proposed House Foundation" for 49096 Chilliwack Lake Road, Chilliwack, BC (the subject site), prepared June 7, 2002 by Thurber Consultants Ltd. (File number: 19-3737-0) provided the following recommendations for construction of the mobile home:
  - The mobile home should be set on a foundation that is at least 1 m above existing grade.
  - A 1 m high flood protection berm with a ditch that runs along the south side of Chilliwack Lake Road should be constructed. This was justified by evidence of historic and potentially damaging debris flows that have occurred in Bell Brook and Larry Brook north of the road and the resultant debris floods that crossed the road and onto the site.
- 7) A geotechnical hazards site assessment report titled "Proposed Multi-Lot Subdivision, 49096 Chilliwack Lake Road, FVRD, BC" prepared February 8, 2018 by WSP Canada Inc. (File: 171-05545-01) summarized the results of the assessment and provided recommendations for geohazard avoidance and mitigative measures for the subject site. The report concluded that the "land may be used safely for the use intended" in the safe building areas identified by setbacks from the toe of slope to the north and from



the natural boundaries of Bell Brook and Larry Brook. The report also provided the following recommendations:

- The underside of the lowest floor of proposed residences should be not less than 1.5 m above the natural boundaries of two brooks.
- The top of the concrete foundation walls of proposed residences should be constructed at least 1 m above the finished grade.
- The driveway to the existing house and mobile home should be raised and sloped down towards Bell Brook to mitigate the debris flood hazard.
- The Bell Brook debris flow runout analysis indicated that the runoff would terminate about 200 m upstream of 49096 Chilliwack Lake Road.
- The Larry Brook debris flow runout analysis indicated that the runoff would terminate about 50 m downstream from the toe of the slope. This would be within the 50 m geotechnical setback zone.

#### 4.4 Aerial Photographs

Aerial photographs indicated the existing single-family residence on site was constructed between 1986 and 1993. Between 1999 and 2004, another residential dwelling (likely the mobile home) was added to the site. The berm that is located along the south side of Chilliwack Lake Road appears to have been built between 2006 and 2009, according to the aerial photographs on the City of Chilliwack Webmap.

Multiple slope failures, generally about 20 m wide, were observed in the Bell Brook gully in the years 1968, 1973, 1983, 1986, and 1999. Evidence of debris flows and debris floods in the Bell Brook gully were observed in the aerial photographs for the years 1963, 1968, 1986, and 1999. The 1963 and 1986 debris floods appeared to have deposited material on the subject site, possibly extending to the south side of the site.

In Larry Brook, five relatively small slope failures were observed occurring on the side slopes of the gully in the years 1940, 1954, 1968, 1979, and 1999. In 1940, the failure appears to have occurred approximately 100 m north of Chilliwack Lake Road with the runout extending onto the subject site. An approximately 200 m wide slope failure was observed in the 1968 aerial photograph at the headwall of Larry Brook gully. A possible debris flood associated with this event was observed on the subject site extending to approximately 75 m south of Chilliwack Lake Road.

No evidence of avulsion of the Bell Brook and Larry Brook channels within the site was noted on the reviewed aerial photographs. However, in the 1954 aerial photograph, the Larry Brook channel appeared to be braided on the subject site. Between 1963 and 1973 there was a possible pond at the south end of the site on Larry Brook. In the 1940 City of Chilliwack aerial photograph, there was possible flooding from the Chilliwack River in the low-lying areas on the east portion of the site.

In the adjacent gullies to the west and east of Bell Brook and Larry Brook, slope failures were observed in the years 1940 and 1954. In the 1940 aerial photograph, there is evidence of a large arcuate failure and resulting landslide at the top of a gully approximately 1.5 km northeast of the site. The scarp of this failure was approximately 400 m wide. The resulting debris flows extended to the toe of slope, just north of the Chilliwack



River. This unvegetated scarp surface can still be seen on the aerial photos on the City of Chilliwack Webmap dating to 2016. In 1954, a failure, approximately 100 m wide, occurred in the gully west of Bell Brook. The resulting debris flow travelled downstream and deposited in an alluvial fan to the north of Chilliwack Lake Road. The subject site did not appear to be affected by either of these slope failures and debris flows.

Details of the reviewed photographs are provided in Table 1.

Table 1
Summary of Reviewed GIC UBC Aerial Photographs

		<del> </del>
Photo ID	Year	Scale (approx.)
BC209: 57-58	1940	1:20,000
BC1684: 66-68 and BC1684: 76-78	1954	1:10,000
BC5065: 229-227 and BC5065: 209-210	1963	1:10,000
BC7057: 149-148 and BC7057: 209-210	1968	1:20,000
BCC88: 21-23	1973	1:20,000
BC79005: 164-166	1979	1:10,000
BC83013: 117-119	1983	1:20,000
BCC453: 20-22	1986	1:10,000
BCB93026: 130-131	1993	1:20,000
SRS6064: 246-247	1999	1:30,000
SRS6912: 161-163 and SRS6912: 171-172	2004	1:20,000

#### 4.5 Site Reconnaissance Observations

The following provides a summary of our site observations.

#### The Site and Immediate Vicinity

- The site is inclined at less than 5 degrees from Chilliwack Lake Road down to the southeast. The central and eastern portions of the site are illustrated in Photo 1.
- The existing house in the northwest portion of the site is a two-storey, single-family home with a floor elevation at approximately 0.4 m above the existing grade (Photo 2). The garage is at grade.
- A mobile home located on the southwest portion of the site is illustrated on Photo 3. The mobile
  home was constructed on an approximately 0.6 to 0.7 m high concrete foundation wall. Like the
  house, the garage was at grade.
- The existing berm built along the north property line on the south side of Chilliwack Lake Road
  extends from east of the driveway to the east side of Larry Brook. The berm was estimated to be
  approximately 1.2 to 1.5 m in height and 3 m in width. The berm was heavily vegetated with trees
  and blackberry bushes at the time of our field work. No details about the berm construction were
  available to GeoWest at the time of preparation of this report.
- Two 1.2 m diameter corrugated steel pipe (CSP) culverts convey Bell Brook under Chilliwack Lake
   Road into the northwest corner of the site. The culverts are shown in Photo 4. The creek channel



upstream from the road has been armoured with rip rap ranging in diameter from 0.3 to 0.9 m. The culvert inlets were generally free of debris except for some wood and leaf debris surrounding the west culvert.

- On the south side of the road, Bell Brook's channel was estimated as 3 m deep and 2.5 m wide at the base with side slopes inclined at about 35 to 40 degrees, shown in Photo 5. The creek bedload immediately downstream of the culverts contained rounded cobbles, some boulders, and gravel and sand. The channel side slopes just to the south of Chilliwack Lake Road appeared recently regraded with exposed gravel and cobbles on the slope surface. A small, dyke-like feature less than 0.5 m high extends between the north portion of existing driveway and Bell Brook.
- In the south portion of the site, the Bell Brook channel was about 3 to 4 m wide along the top and the depth was 0.5 to 1 m. The side slopes were vegetated and inclined at 25 to 30 degrees, as shown in Photo 6. The creek bedload was mostly sand and gravel.
- Larry Brook enters the northeast corner of the site through a 0.6 m diameter CSP culvert crossing Chilliwack Lake Road, shown in Photo 7. The culvert inlet on the north side of Chilliwack Lake Road was partially blocked by branches and leaf debris. The culvert outlet was suspected to have collapsed as it could not be seen.
- About 20 m north of Chilliwack Lake Road, Larry Brook appeared to be re-directed to the southeast through an existing 0.6 m diameter 3.5 m long CSP culvert. The creek channel upstream from the culvert was roughly 1 m wide and 1.5 m deep and heavily vegetated. The side slopes were steeply inclined, with bedload containing cobbles and boulders.
- Within the site, the Larry Brook channel side slopes were vegetated with grass. The channel was about 0.5 to 1 m wide and 0.5 m deep. The creek bedload comprised mostly sand. Larry Brook channel is shown in Photo 8. A 0.6 m diameter culvert providing a crossing of the channel was located in the centre of the site (Photo 9).

#### **Bell Brook**

- The channel gradient in the upper reaches of Bell Brook was approximately 30 to 35 degrees. The
  brook was dry in the upper reaches at the time of our site reconnaissance. Cobbles, boulders and
  wood debris were present in the channel, as shown in Photo 10. The gully sidewall slopes were
  inclined at about 35 to 40 degrees and were densely vegetated by coniferous and deciduous trees.
- Multiple scarps were present on both sides of the gully, indicating unstable slopes. The exposed soil was comprised mostly of sand and gravel, which corresponds to the surficial geology described in the Thurber 1997 report.
- The channel gradient decreased to about 10 to 15 degrees at approximately El. 200 m where deposition of logs, cobbles and boulders from previous upstream debris flow events was present. In this area, the gully was about 15 to 20 m wide at the base with braided channels and flowing water. On the west side of this depositional area, the slopes were over-steepened with recent failure scarps. To the east, there appeared to be a previous failure as evidenced by a runout, roughly 2 m wide and 1.5 m deep.



• A near vertical scarp was observed on the east side of the gully. The exposed soil comprised interbedded sands and silts, as shown in Photo 11.

#### **Larry Brook**

- The headwall of the Larry Brook gully is an arcuate shaped, vegetated, possible old scarp. The slope inclination along the top of the headwall ranged from about 35 to 40 degrees, as shown in Photo 12. Near the toe of the headwall the side slopes are less steep, inclined at about 25 to 35 degrees.
- An old possible logging road was encountered on the ridge between Bell Brook and Larry Brook at approximate El. 260 m. Two slope failures were observed above and below the logging road, as shown in Photo 13 and 14. The upslope failure was approximately 5 to 6 m high and 20 m wide, with exposed soil comprised mostly of sand. The downslope failure was approximately 1 m high and 10 m wide, with exposed sand.
- The headwall of the gully transitions into a wide, densely vegetated area inclined at 10 degrees at approximate El. 220 m. Flowing water was observed in the braided channels in this area. The soil between the channels was soft and wet. We did not observe evidence of recent large-scale slope failures on or below the headwall.
- Multiple trees with curved and thickened trunk-bases were observed on the east side slope of the gully, indicating possible slope creep (Photo 15).

During our traverse of the Larry Brook gully, a loud noise of falling trees and soil movement was heard from the direction of Bell Brook. It was inferred that it was likely a slope failure on the gully's steep side slopes.

#### GEOHAZARDS

The 1993 Cave Paper referenced in Section 1 lists the following geohazards that should be considered in determining the suitability of a site for proposed residential developments:

- Inundation by flood waters;
- Mountain stream erosion and avulsion;
- Debris flows and debris torrents;
- Debris floods:
- Small-scale localized landslides;
- Snow avalanche;
- Rockfall; and
- Massive, catastrophic landslides.

It is our opinion that the site is not subject to the following geohazards:

Inundation by flood waters; the site is not located within a mapped flood hazard area.



- Small-scale landslides include slumps and debris avalanches from unstable slopes. The slopes between
  the gullies to the north of Chilliwack Lake Road across from the site represent a small-scale landslide
  hazard to the immediate area. However, the small-scale landslide hazard is not a consideration for the
  subject site due to its significant setback from these sloped areas.
- Snow avalanche and rockfall are not a consideration due to the site's moderate climate and an absence of bedrock outcrops upslope from the site.
- Review of aerial photographs did not indicate the evidence of previous catastrophic landslides in the site vicinity. The reviewed previous reports discussing geohazard in the Chilliwack River Valley did not indicate the presence of historic large-scale catastrophic landslides. Examples of large-scale slides include the Hope Slide that occurred in 1965, and the Cheam Slide that occurred 5000 to 6000 years ago in Popkum. The large arcuate-shaped scarp at the head wall of Larry Brook gully is inferred to have developed over a long period of time due to the granular nature of soil which is not susceptible to deep-seated catastrophic movements.

Debris flows, debris floods and mountain stream avulsion are related processes that occur on alluvial fans as a result of up-slope debris flow initiation in the steep gully systems that drain onto the alluvial fans. It is our opinion that the primary geohazards on site are debris floods and mountain stream avulsion from the Bell Brook and Larry Brook watercourses.

Avulsion hazard should also be considered in the event of blockage of the existing culverts below Chilliwack Lake Road and downstream channels by debris material or due to the streams realigning upstream between Chilliwack Lake Road and the apex of the fans. This may result in uncontrolled and unpredictable flow of water across the relatively flat site.

Hazard avoidance (setbacks) and construction of hazard mitigative measures are required to provide 'safe building areas' on each Lot. The setbacks and mitigative measures discussed in Section 7 are intended to reduce the risk of loss of life or injury and minimize the damage to existing and future residences on site and to the proposed workshop. Property damage, damage to roads, landscaping and non-residential structures, such as sheds, pools, etc., can still occur in 'safe' building areas.

The current and future property owners should be provided a copy of this report and should acknowledge and accept the inherent risks associated with living on an alluvial fan. The current and future property owners should be responsible for maintenance of protective berm, scour pads, watercourse channels on their properties and timely removal of any debris flood material from their properties to maintain the horizontal and vertical setbacks recommended in this report.

Table 2 provides the estimated frequency of geohazards discussed above in 'safe building areas' illustrated on Figure 5.



Table 2.
Estimation of Annual Return Frequencies for Safe Building Sites

Estimation of Annual Return Frequencies for Safe Building Sites								
Type of Geohazard		Estimated Annual R	Approval Rating for a Subdivision					
		Existing	Proposed	Existing	Proposed			
Inundation by flood wat	ers	<1:200	<1:200	1	1			
Mountain stream erosio	on and avulsion	1:100-1:200	1:200-1:500	5	4			
Debris flows and debris	torrents	1:500 -1:10,000	1:500 -1:10,000	1	1			
Debris floods		1:50-1:200	1:200-1:500	5	4			
Small-scale localized lar	ndslides <1:10,000 <1:10,000 1 1							
Snow avalanche		<1:10,000	<1:10,000	1	1			
Massive, catastrophic la	andslides <1:10,000 <1:10,000 1 1							
Rockfall	<1:10,000 <1:10,000 1							
Approval Rating		Approval Response						
1	Approval with	out conditions relating	to hazards					
2	1	Approval, without siting conditions or protective works conditions, but with a covenant including "save harmless" conditions						
3		Approval, but with siting requirements to avoid the hazard, or with requirements for protective works to mitigate the hazard						
4	Approval as (3)	Approval as (3) above, but with a covenant including "save harmless" conditions as well as siting conditions, protective works, or both						
5	Not approvable							

The estimated annual return frequencies provided in Table 2 were established based on observed site conditions, results of desktop study, our engineering judgement, and using the information available when this report was prepared. Annual return frequencies can be subject to change should the volume of water flow in Bell Brook and/or Larry Brook increase due to logging activities on the slope above the site. Development on the bench above the steep slope can result in changes in the regime of surficial water and increased volumes/velocities in the creek gullies. Climate change could also contribute to changes in the estimated geohazard frequencies.

#### 6. MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE SITE STABILITY GUIDELINES

There is no province-wide legislated acceptability of landslide hazard for proposed residential subdivisions in BC. The MOTI provides the following guidance as a minimum standard for determination if a site can be used "safely for the use intended":

- 1 in 475 years (10% in 50 years) probability of occurrence for landslides;
- 1 in 200 years probability of occurrence for flooding;
- 1 in 10,000 years probability of occurrence for catastrophic landslides.



The BC Land Title Act, Section 86, states that an Approving Officer (which in this case may include the MOTI) can refuse a subdivision if the land is expected to be subject to flooding, erosion, land slip or avalanche. These lands can only be approved for subdivision with the assurance of a professional engineer or geoscientist experienced in geotechnical engineering that the site can be used "safely for the use intended".

#### 7. CONCLUSIONS AND RECOMMENDATIONS

The acceptability of a proposed development is dependent on the type of hazard, degree of hazard (expressed as the estimated annual return frequency in Table 2), and type of development being considered. Using the 1993 Cave Paper and MOTI stability criteria introduced above as guidelines for assessing the acceptability and the above annual return frequencies, GeoWest considers the building sites illustrated on Figure 5 "safe for the use intended", but with a covenant including "save harmless" conditions as well as siting conditions and protective works to mitigate the hazards associated with being constructed on an alluvial fan. The statement "safely for the use intended" is defined herein in general accordance with acceptable annual return frequencies defined in the 1993 Cave Report and the APEGBC Legislated Landslide Assessment Guidelines. An FVRD Geo-Hazard Assurance Statement for Development Approvals is attached to this report as Appendix B.

To mitigate the identified hazards and provide "safe building areas", we provide the following recommendations:

## **New Single-Family Residences**

- A minimum 50 m setback zone from the toe of slope on the north side of the site. The 50 m setback is based on findings of the Golder 1983 report and debris flood runout analysis by WSP provided in their 2018 report.
- 2. No removal of vegetation or ground disturbance (placement and removal of material) should be conducted on site within the 50 m setback area except along the proposed driveway connecting Lots 3 to 7 to Chilliwack Lake Road.
- 3. A minimum 15 m horizontal setback from the natural boundary for Bell Brook and Larry Brook as per the FVRD Bylaw No. 0681, 2005, Section 6.b)(iv).
- 4. The top of the concrete foundation walls/underside of the floor of the lowest habitable space for the proposed residences should be at least 1.5 m above the natural boundary of Bell Brook and Larry Brook (as per the FVRD Bylaw No. 0681, 2005, Section 6.a)(iv)) or at least 1.0 m above the final site grade adjacent to residences, whichever is higher.
- 5. The natural boundary is defined as the visible high watermark in the watercourse channels where the presence and action of the water are so common and usual and so long continued in all ordinary years as to mark upon the soil of the bed of the watercourses a character distinct from that of the banks thereof, in respect to vegetation, as well as in respect to the nature of the soil itself (Land Act, Section 1). The high watermark should be marked on site by a qualified environmental professional.
- 6. Basements and crawl spaces should not be constructed.
- 7. Foundation scour pads should be built on the north, west and east sides of the proposed residences, as illustrated in Figure 6.



- 8. A hydrological assessment of Larry Brook should be conducted for proposed crossing to access Lot 7. The results of the assessment should be provided to a geotechnical engineer for provision of geotechnical recommendations for the crossing.
- 9. Save harmless covenant to be registered against the title of the property, to indemnify the FVRD, the Developer and GeoWest Engineering Ltd. in the event damages to the properties occur.

## **Existing House and Mobile Home**

The protective berm and the ditch recommended by Thurber were not constructed to the north of the existing house and mobile home. The floor elevation of the existing mobile home was estimated to be about 0.7 m above the surrounding grade, i.e. lower than 1 m recommended in the Thurber 2002 report. Consequently, we recommend the following:

- 1. Protective berms a minimum 1.0 m high should be constructed to the north of the existing house and mobile home as shown on Figure 5. The berm alignment is intended to retain and/or deflect debris towards the Bell Brook channel. Typical berm cross-sections are illustrated on Figures 7 and 8.
- 2. The top of the new concrete foundation wall in the northeast corner of the existing house should not be lower than the top of the existing concrete foundation wall on the north side of the house.
- 3. The existing driveway south of the protective berm should be re-graded to slope down towards the Bell Brook channel at a 2.5% gradient (see Figure 5).
- 4. Save harmless covenant to be registered against the title of the property, to indemnify the FVRD, the Developer and GeoWest Engineering Ltd. in the event damages to the properties occur.
- 5. Provided these recommendations are followed, the existing house and the mobile home are considered "safe for the use intended". Any existing covenants for the house and mobile home should be amended, as necessary.

#### **Proposed Workshop**

- 1. The top of the concrete foundation wall on the north, west and south sides of the proposed workshop should be at least 0.6 m above the final site grade.
- 2. The concrete foundation wall on the east side should extend south of the northeast corner a minimum of 0.6 m at a height of 0.6 m above final grade.
- 3. The top of the slab-on-grade should be at least 0.45 m above adjacent site grades. This will require a ramp for access.

#### **Existing Berm Along Chilliwack Lake Road**

It is our professional opinion that the existing berm along the north side of the site should not be relied on for protection of future residences; however, we recommend that the berm remain in place as an added protection measure for the landscaped areas. It is judged that the berm would provide protection in the event of a small-scale landslide or a debris flood event by slowing down and re-directing/storing the debris without significant transfer of the risk to adjacent properties.



The existing berm extends only partially into the proposed Lot 7. Recommendations for protective measures for the future residence on Lot 7 are provided above.

#### Bell Brook Channel on MoTI RoW and Larry Brook Crossing of Chilliwack Lake Road

The exposed side slopes of the Bell Brook channel on the south side of Chilliwack Lake Road are subject to erosion by creek action and surficial water run-off. Although the subject section of the channel is within the MoTI right-of-way, we recommend that consideration be given to armouring the creek banks with appropriately sized rip rap for long-term protection. GeoWest can provide recommendations for erosion protection, if requested.

The culverts conveying Bell Brook and Larry Brook under Chilliwack Lake Road and the downstream channels within the MoTI right-of-way should be reviewed regularly by MoTI personnel. Accumulated sediment in the channel should be removed. We recommend that the culvert conveying Larry Brook under Chilliwack Lake Road be reviewed and replaced if needed prior to any construction on site.

#### Transfer of Geohazards

It is our opinion that the proposed mitigative measures will not significantly transfer the identified geohazards to adjacent properties.

#### **Maintenance of Geohazard Protective Measures**

The property owners are responsible for maintenance of protective measures recommended in this report. Any accumulated sediments on the new lots, including in the Bell Brook and Larry Brook channels, access driveway to Lots 1 and 2, areas of protective berms, or areas around the future houses should be removed by the property owners without delay to maintain the minimum horizontal setbacks and elevations recommended in this report.

## **Climate Change**

Climate change in the form of increased frequency and intensity of heavy precipitation can contribute to changes in the estimated geohazard frequencies. The protective measures recommended in this report are considered suitable for the current site conditions and reasonably expected change in climate conditions over the next 50 years. The property owners may need to retain a qualified geotechnical engineer during the design life of the buildings to review the site conditions and provide recommendations for additional protective measures should the frequencies and intensity of extreme weather events (rain, snow) increase from those reasonable expected at present time.

#### 8. FURTHER GEOTECHNICAL REVIEW

A survey plan should be provided to GeoWest for review prior to construction. The survey plan should include the following:



- File: GA18-1288-01
  - Toe of slope on the north side of Chilliwack Lake Road. The toe of slope is defined as a line where the slope angle is less than 15 degrees from horizontal.
  - A 50 m setback from the toe of the slope on the north side of Chilliwack Lake Road.
  - Natural boundaries of Bell Brook and Larry Brook.
  - 15 m setback from the natural boundaries.
  - Ground elevations along the natural boundaries of Bell Brook and Larry Brook.
  - Final grade elevations and top of concrete foundation wall elevations for proposed residences on Lots 3 to 7.
  - Final grade elevations and top of concrete foundation wall for the proposed workshop on Lot 2.

The setbacks and locations of proposed houses should be marked on site prior to construction. GeoWest should be given the opportunity to review the proposed locations and provide additional recommendations, as required.

A Geotechnical Engineer experienced in terrain assessment should be retained to conduct a supplementary geohazard assessment and provide additional recommendations if any of the following occurs:

- Changes to the proposed subdivision.
- Changes to proposed construction on Lots 1 and 2.
- Deforestation, construction of logging roads, or changes in surficial and/or groundwater regimes occur due to development upslope from the site.

#### CLOSURE

This revised geohazard site assessment report has been prepared by GeoWest Engineering Ltd. exclusively for Mr. Gilles Brouillette and his appointed agents. The Fraser Valley Regional District and BC Ministry of Transportation and Infrastructure may also rely on this report for permit review purposes. The information contained in this report reflects our judgement considering the information provided to us at the time it was prepared.

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The attached Terms of Reference form an integral part of this report.



We trust the information provided herein meets your immediate requirements. If you have any questions or require additional information, please contact the undersigned.

Yours truly,

## GeoWest Engineering Ltd.



**REVIEWED BY:** 

Per: Dejan Jovanovic, P.Eng.

Principal, Senior Geotechnical Engineer

Michael Gutwein, P.Eng. Senior Geotechnical Engineer

DJ/erc

Attachments: Terms of Reference

Figures 1 to 8

Appendix A – Site Photos

Appendix B – FVRD Geo-Hazard Assurance Statement

Appendix C – GeoWest Memo March 23, 2020

cc: Dylan Anderson, OTG Development Concepts



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When GeoWest submits both electronic and hard copy versions of the Instruments of Professional Services, the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding upon GeoWest. The hard copy versions submitted by GeoWest shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancy, the hard copy versions shall govern over the electronic versions; furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed and sealed versions of the Instruments of Professional Services maintained or retained, or both, by GeoWest shall be deemed to be the overall originals for the Project.

The Client agrees that the electronic file and hard copy versions of Instruments of Professional Services shall not, under any circumstances, no matter who owns or uses them, be altered by any party except GeoWest. The Client warrants that the Instruments of Professional Services will be used only and exactly as submitted by GeoWest.

The Client recognizes and agrees that GeoWest prepared and submitted electronic files using specific software or hardware systems, or both. GeoWest makes no representation about the compatibility of these files with the current or future software and hardware systems of the Client, the Approved Users or any other party. The Client further agrees that GeoWest is under no obligation, unless otherwise expressly specified, to provide the Client, the Approved Users and any other party, or any or all of them, with specific software and hardware systems that are compatible with the electronic files submitted by GeoWest. The Client further agrees that should the Client, an Approved User or a third party require GeoWest to provide specific software or hardware systems or both, compatible with electronic files prepared and submitted by GeoWest, for any reason whatsoever included but not restricted to and order from a court, then the Client will pay GeoWest for all reasonable costs related to the provision of the specific software or hardware systems, or both. The Client further agrees to indemnify and hold harmless GeoWest, its officers, directors, employees, agents, representative or sub-consultant, or any or all of them, against any claim or any nature whatsoever brought against GeoWest, whether in contract or in tort, arising or related to the provision or use or any specific software or hardware provided by GeoWest.



**FIGURES** 





LEGEND:

SITE BOUNDARY

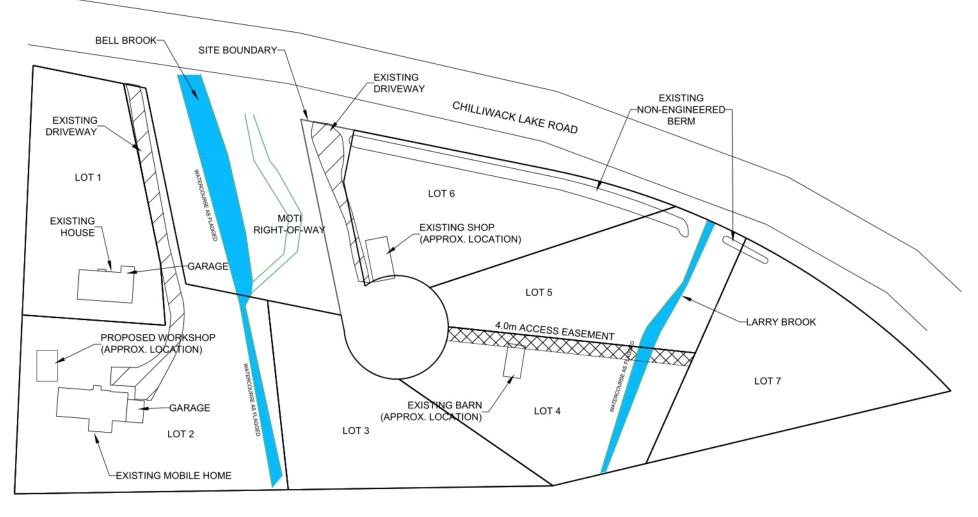
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DWG. NO:  N/A  PROJECT:  PROPOSED SEVEN LOT SINGLE-FAMILY	REVISIONS						
DATE/REV.: PROPOSED SEVEN LOT SINGLE-FAMILY					SITE LOCATION MAP		
DATE/REV.:				N/A			
N/A RESIDENTIAL SUBDIVISION			DATE/REV.: N/A	RESIDENTIAL SUBDIVISION			
This drawing is the sole property of GeoWest Engineering Ltd. and cannot be used or duplicated in any way without the expressed written consent of GeoWest.			Engineering Ltd. and cannot be used or duplicated in any	ADDRESS: 49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC			
01 NOVEMBER 18 Issued for Review TS DJ The general contractor shall verify all dimensions and CLIENT:	01 NOVEMBER 18 Issued for Review	TS	DJ	The general contractor shall verify all dimensions and	CLIENT: CILLES BROLIILLETTE		
REV Date Issue/Revision Description Drawn Check report any discrepancies to GeoWest.	REV Date Issue/Revision Description	Drawn	Check	report any discrepancies to GeoWest.	GILLES BINOUILLETTE		



DESIGN: N/A	FEB 2019
REVIEW: DJ	SCALE: NTS
DRAWN:	FILE NO: GA18-1288-01
FIGURE NO:	

**1** 32 of 70 TRA-2021-1241





REVISION	S				ADAPTED FROM: OTG DEVELOPMENT CONCEPTS 7 LOT SUBDIVISION	SITE PLAN		DESIGN: N/A	FEB 2019
1					16-122, SHEET 1	PROPOSED SEVEN LOT SINGLE-FAMILY	_	DJ	NTS
1					DATE/REV.: SEPT 12, 2018	RESIDENTIAL SUBDIVISION	GeoWest	TS	FILE NO: GA18-1288-01
					This drawing is the sole property of GeoWest Engineering Ltd. and cannot be used or duplicated in any way without the expressed written consent of GeoWest.	ADDRESS: 49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC	ENGINEERING	FIGURE NO:	2
Ô	01 NOVEMBER 18	Issued for Review	TS	DJ	The general contractor shall verify all dimensions and report any discrepancies to GeoWest.	GILLES BROUILLETTE			<b>4</b>
REV	Date	Issue/Revision Description	Drawn	Check	report any discrepancies to Geovest.	3.2223 21.001222112	Page	∃33 of 70 T	RA-2021-1241

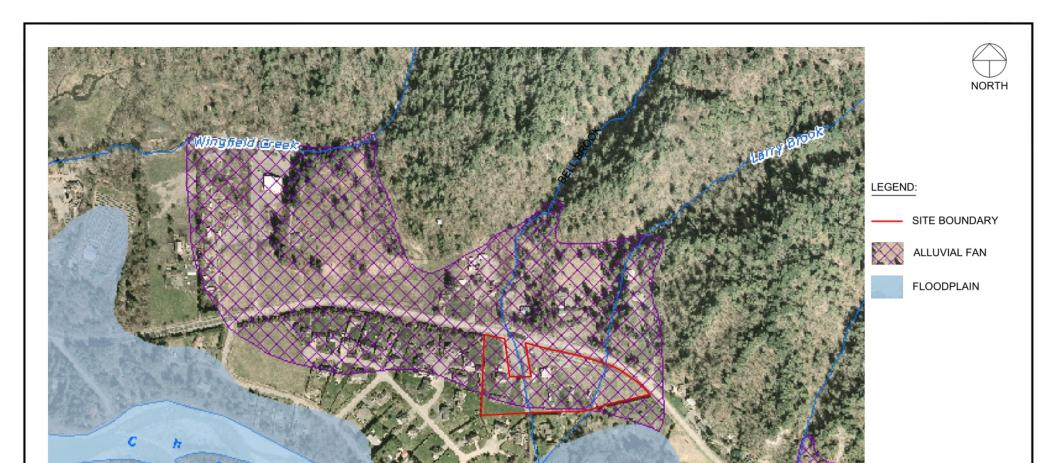


				ADAPTED FROM: CITY OF CHILLIWACK WEB MAP	TOPOGRAPHY		
ı					DWG. NO:		
1			N/A	PROPOSED SEVEN LOT SINGLE-FAMILY	<b>(</b>		
			N/A RESIDENTIAL SUBDIVISION				
			This drawing is the sole property of GeoWest Engineering Ltd. and cannot be used or duplicated in any	ADDRESS: 49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC			
0	01 NOVEMBER 18	Issued for Review	TS	DJ	way without the expressed written consent of GeoWest.  The general contractor shall verify all dimensions and	GILLES BROUILLETTE	
REV	Date	Issue/Revision Description	Drawn	Check	report any discrepancies to GeoWest.	GILLES BROOILLETTE	



DESIGN: N/A	FEB 2019
REVIEW: DJ	SCALE: NTS
TS	FILE NO: GA18-1288-01
FIGURE NO:	_

3 4 of 70 TRA-2021-1

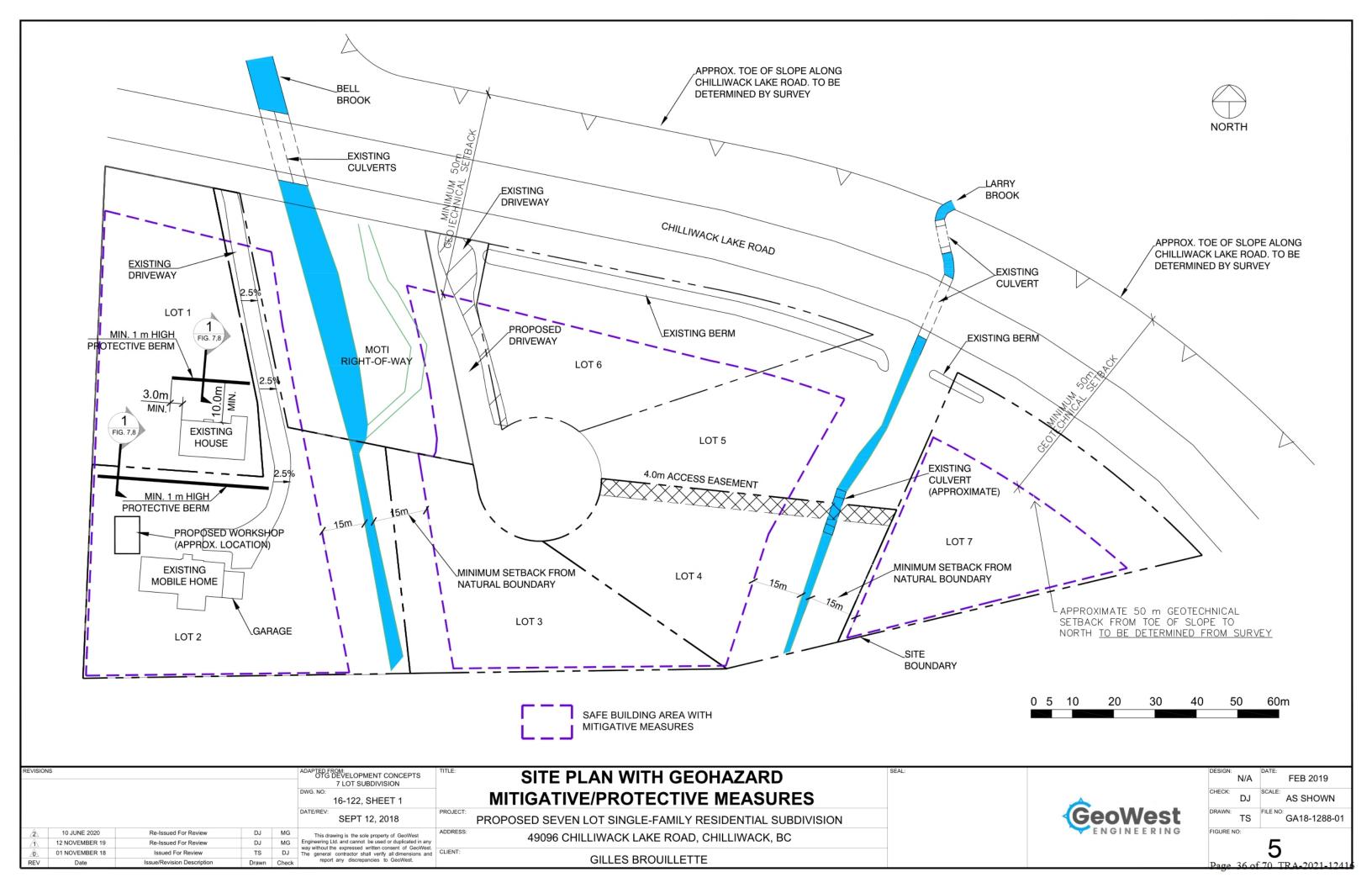


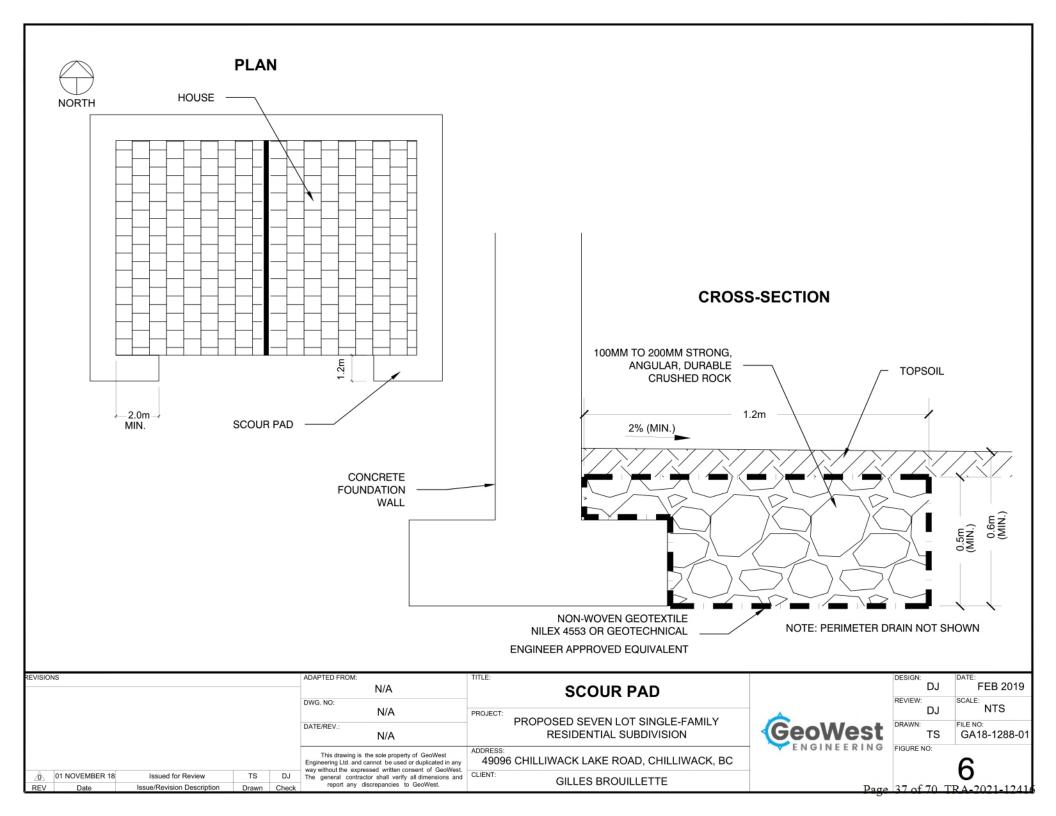
REVISIONS					ADAPTED FROM: FVRD WEB MAP	GEOHAZARD MAP	
l					DWG. NO: N/A	PROJECT:	
l					DATE/REV.:	PROPOSED SEVEN LOT SINGLE-FAMILY	
l					N/A	RESIDENTIAL SUBDIVISION	
		This drawing is the sole property of GeoWest Engineering Ltd. and cannot be used or duplicated in any way without the expressed written consent of GeoWest.	ADDRESS: 49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC				
Ô	01 NOVEMBER 18	Issued for Review	TS	DJ	The general contractor shall verify all dimensions and		
REV	Date	Issue/Revision Description	Drawn	Check	report any discrepancies to GeoWest.		



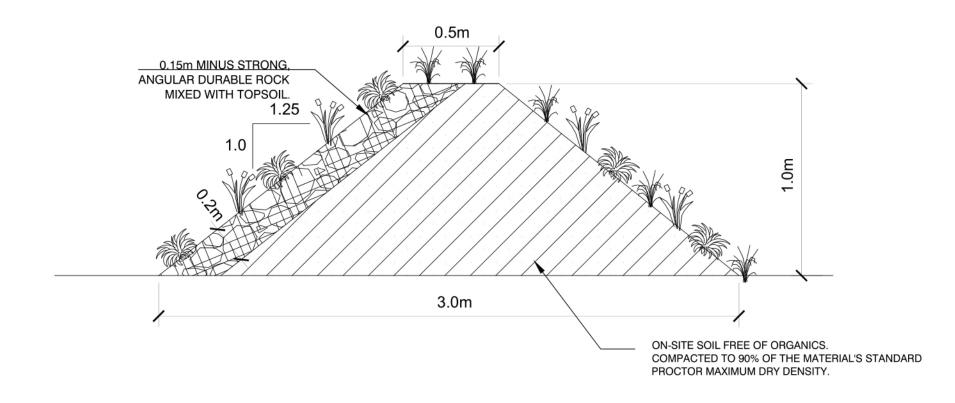
	DESIGN: N/A	FEB 2019
	REVIEW: DJ	SCALE: NTS
	DRAWN:	FILE NO: GA18-1288-01
	FIGURE NO:	_

**4** 5 of 70\_TRA-2021-1241



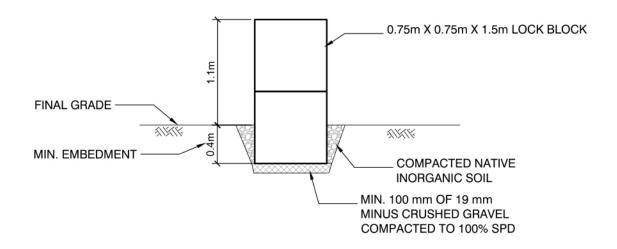






REVISIO	NS				ADAPTED FROM: N/A	PROTECTIVE BERM CROSS-SECTION		DESIGN:	FEB 2019
ı					DWG. NO:	ALTERNATIVE 1 PROJECT:		REVIEW:	SCALE: NTS
ı					N/A				
					DATE/REV.: N/A	PROPOSED SEVEN LOT SINGLE-FAMILY RESIDENTIAL SUBDIVISION	GeoWest	TS	FILE NO: GA18-1288-01
					This drawing is the sole property of GeoWest Engineering Ltd. and cannot be used or duplicated in any way without the expressed written consent of GeoWest.	ADDRESS: 49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC	ENGINEERING	FIGURE NO:	7
<u>Ô</u>	01 NOVEMBER 18	Issued for Review	TS	DJ	The general contractor shall verify all dimensions and report any discrepancies to GeoWest.	GILLES BROUILLETTE	70	20 650 5	TD 4 2021 1241

## PROTECTIVE BERM ALTERNATIVE 2



REVISIONS	S				ADAPTED FROM:	PROTECTIVE BERM CROSS-SECTION ALTERNATIVE 2				
					N/A					
					DWG. NO:	ALILIMATIVE Z				
l					N/A	PROPOSED SEVEN LOT SINGLE-FAMILY				
l					DATE/REV.: N/A	RESIDENTIAL SUBDIVISION				
l					IN/A	TRESIDENTIAL CODDITION				
					This drawing is the sole property of GeoWest	ADDRESS:				
À	10 JUNE 2020	Issued for Review	DJ	MG	Engineering Ltd. and cannot be used or duplicated in any way without the expressed written consent of GeoWest.	49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC				
<u></u> 0 1	12 NOVEMBER 19	Issued for Review	TS	DJ	The general contractor shall verify all dimensions and	GILLES BROUILLETTE				
REV	Date	Issue/Revision Description	Drawn	Check	report any discrepancies to GeoWest.	GILLES BROOKLETTE				



DESIGN:	NOV 2019
REVIEW: MG	SCALE: NTS
DRAWN:	FILE NO: GA18-1288-01
FIGURE NO:	'

Page 39 of 70 TR-2021-12416



APPENDIX A SITE PHOTOS



Photo 1

Central and eastern portions of the subject site, looking east.



Photo 2

Northeast corner of the existing house.



Photo 3

Mobile home, looking southwest.



Inlets of two culverts on Bell Brook.

Photo 4



Photo 5

Bell Brook at the south side of Chilliwack Lake Road.



Bell Brook, approximately 70 m south of Chilliwack Lake Road, looking south.

Photo 6

Photo 7 Larry Brook outlet, on the south side Chilliwack Lake Road. Photo 8 Larry Brook channel in the east portion of the site, looking south.

Photo 9

The Larry Brook culvert, located on site, approx. 40 m south of Chilliwack Lake Road.



Photo 10

Bell Brook channel.



Photo 11

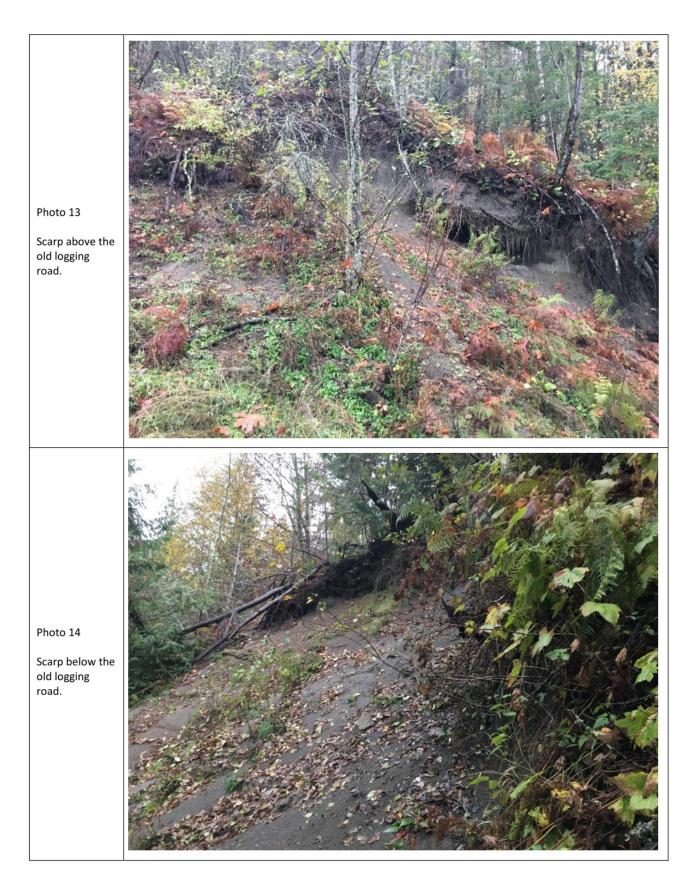
Exposed soil on a scarp in the Bell Brook gully.





Photo 12

The slope at the top of the headwall of Larry Brook.







# APPENDIX B FVRD GEO-HAZARD ASSURANCE STATEMENT

## Geo-Hazard Assurance Statement

Project Information

for Development Approvals

<i>,</i>		, , , , , , , , , , , , , , , , , , , ,	acion				
Date	June 10, 2	2020			FVRD File No.	2019-0	5895
Prope	rty Infori	nation					
Project	: Name & D	Description	Proposed Seven	Lot Single-Family	Residential Subd	ivision	
Legal [	Description	LOT A, D	ISTRICT LOT 5	01, NEW WESTM	INSTER DISTRI	CT, PLAN	N 71101 & DL 575, 765
Site Ad	dress 40	6096 Chilliwac	k Lake Road, Chi	lliwack, BC		PID _	003-224-228
Name Role	Gilles Br	perty Owner	vack Lake Road, (	Develop	er		Other
Qualit	ied Profe	essional Inf	ormation				
Name	Dejan Jo	vanovic					
APEGB	C Designa		P.Eng.	P. Geo.	☐ Eng	.L	Geo.L
	ny Name			l, Abbotsford, BC V	/2C 7D1		
Mailing	g Address				V 25 / P 1		
Email A	Address _	djovanovic@g	eowestengineerin	g.com		Phone	# 604-852-9088
Geo-H	azard Re	port Refere	nce				

GA18-1288-01

June 10, 2020

Personal information on this form is being collected in accordance with Section 27 of the Freedom of Information and Protection of Privacy Act, RSBC 1996 Ch. 165; Part 9, Division 1 [Building Regulation] and Part 14 [Planning and Land Use Management] of the Local Government Act, RSBC 2015 Ch. 1; and Section 56 of the Community Charter, SBC 2003 Ch. 26 and will only be collected, used and disclosed for the purpose of administering geo-technical hazard reviews and assurance statements related to development approvals. Questions? Contact FVRD Privacy Officer at 45950 Cheam Avenue, Chilliwack, BC V2P 1N6; 604-702-5000 or 1-800-528-0061; or FOI@fvrd.ca.



Title



Geohazard Site Assessment Report - Revision 2

### B. Assurance

Based on the contents of this Assurance Statement and the Report, I hereby give assurance that: *(check as applicable)* 

Development Permit	The Report will "assist the local government in determining what conditions or requirements under it will impose in the permit", as required by the <i>Local Government Act</i> (Division 7)				
Building Permit					
Community Charter	"The land may be used safely for the use intended", as required by the Community Charter (Section 56)				
Seismic Slope	The Report addresses the requirements of the BC Building Code 2006, 4.1.8.1.6 (8) and 9.4.4.4 (2), as detailed in the BC Building & Safety Policy Branch Information Bulletin B10-01, Jan 18, 2010				
Floodplain Management Bylaw Exemption	"The land may be used safely for the use intended", as required by the Local Government Act. (Section 524)				
Subdivision	"The land may be used safely for the use intended", as required by the Land Title Act (Section 86).				
Other (e.g. Zoning Bylaw Amendment, Official Community Plan Amendment, Temporary Use Permit, etc.)	<insert appropriate="" as="" statement=""></insert>				

## C. APEGBC Professional Practice Guidelines

The Report and this Assurance Statement should be completed in accordance with the current version of one or both of the following Professional Engineers and Geoscientists of BC (APEGBC).

- Legislated Flood Assessments in a Changing Climate in BC
- Legislated Landslide Assessments for Proposed Residential Development in British Columbia, ("APEGBC Landslide Guidelines").

These two documents are collectively referred to as the "APEGBC Guidelines". The italicized words in this Assurance Statement are defined in the APEGBC Guidelines.

The Report has been prepar	red pursuant to the following	APEGBC Guidelines	(check one or both as applicable).

THE NE	port has been prepared pursuant to the following Ar Labe dula
	APEGBC Flood Guidelines
1	APEGBC Landslide Guidelines





# **Geo-Hazard Assurance Statement** for Development Approvals

If the I	Repo	s <b>not</b> prepared pursuant to either of the APEGBC Guidelines, please explain.
D.	Ba	kground Information
Qualif		essionals <b>must</b> confirm and check that each item is included in the Report.
<b>1</b>	1.	roperty location map — 8.5 x 11 size
	2.	evelopment proposal site plan — $8.5 \times 11$ size. If a subdivision, show the parent parcel and all lots to be reated, including any remainder.
	3.	escription of the proposed development project (including building use) to the extent this is known at ne time of Report preparation.
		residential
		industrial
		commercial
		institutional
		other



# E. Technical Requirements

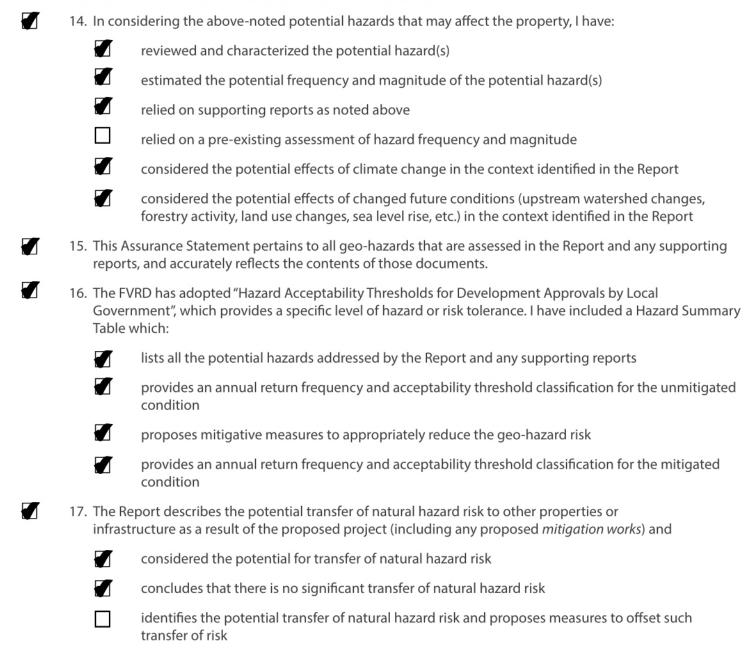
Qualified Professionals **must** review, confirm and check completed items (as applicable).

Report	Content

4.		ant information pertaining to the Property and pertinent potential hazards from appropriate round sources, including the FVRD online library.								
5.		Time limitation or condition statement to describe extent the FVRD may rely on the Assurance Statement and Report for development approvals, and when resubmittal is recommended.								
6.	Maps,	illustrations and diagrams to illustrate areas referred to in the Report.								
7.	Descri	ption of field work conducted on and, if required, beyond the Property.								
8.		Contact and consultation with the Fraser Valley Regional District. Provide name and title of contact. David Bennett, Planner II								
9.	Reviev	v of relevant FVRD bylaws and other statutory requirements.								
10.		Restrictive covenants registered against the Property title that pertain to geo-hazards (if registered, the Report provides relevant information about the covenants).								
11.	11. Notation of any visibly apparent natural hazards or other hazards identified in background repare not identified and addressed in this Report. If yes, provide details in Section H: Geo-Hazard Table.									
	$\circ$	Yes								
	0	No								
12.		the report rely on one or more supporting reports, each of which is independently reviewed, signed caled. If yes, provide details in Section H: Geo-Hazard Summary Table.								
	$\circ$	Yes								
	0	No								
13.	. For su	bdivision approval, the Report addresses natural hazards for:								
		the parent parcel prior to subdivision								
		any lots to be created (including any remainder)								



### Geo-hazard Assessment, Risk Acceptability and Risk Transfer





1

1

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7

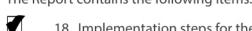
7

1

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### Mitigation and Design Recommendations (if recommended)

The Report contains the following items:



18. Implementation steps for the identified structural mitigation works (in terms of design, construction and approval).

19. Clearly identified safe locations for building(s), ancillary structures, and onsite utility services (as applicable, such as a septic field) out of the natural hazard area as a preferred development alternative.

20. Commentary on the effectiveness of proposed structural mitigation works in terms of ability to reduce the potential hazard impact, and identification of any residual risk that would remain.

21. Proposed Flood Construction Level (FCL) for future development and including specification of an appropriate method of achieving the FCL.

22. Proposed watercourse setback, which is clearly referenced from the natural boundary, top of bank or another suitable basis.

23. Proposed operation and maintenance actions that will be necessary in order for the level of safety to be maintained in the future, with indications of who should be responsible for those actions and when.

### Riparian Area Regulation (if applicable)

24. QP must review RAR assessment report to avoid conflict with Geo-Hazard Report recommendations.

## **FVRD Supplemental Requirements**

The following points are understood by the Qualified Professional when submitting a Report:

25. Permission is granted to the FVRD to use the Report in considering approval of the proposed development on the property, provided that such permission is limited only to the proposed development project for which the Report was prepared.

26. Methodology used in the Report is described in sufficient detail to facilitate a professional review of the study by the FVRD when necessary.

27. Professional liability insurance coverage of at least \$1 million per claim is carried by the QP.

28. Third party review or supplemental information may be required by the FVRD where complex development proposals warrant.

29. Permission is granted to the FVRD to include the Report in the online FVRD geo-hazard report library (as background information, not for other parties to rely).



G.	Qualified	Prof	ession	al (Q	P)						
Prepare	ed by: (QP of Dejan Jovanov		rd)								
Designa	tion		P.Eng.		P. Geo.			Eng.L		Geo.	L
Review	ed by:										
Name	Michael Gutwe	ein									
Designa	tion		P.Eng.		P. Geo.						
											fessional Practic eport and below
Profess	sional Seal, S	Signat	ure and I	Date:							
Jun	e 10, 2020				D. JOVANON # 30153	20000000000000000000000000000000000000					
	l am a Qualifie experience red I have signed,	quireme	ents as ou	tlined i	n the APEGBC	Guidel	ines				





# **Geo-Hazard Assurance Statement** for Development Approvals

#### H. **Geo-Hazard Summary Table**

The geo-hazard report and/or any supporting reports addresses the following hazard types.

Geo-Hazard Type #1		Geo-Hazard Type #2		
Mountain Stream Erosion or Avulsion		Debris Flood		
Annual Return Frequency (Unmitigated)		Annual Return Frequency (Unmitigated)		
1:100-1:200		1:50-1:200		
Acceptability Threshold Classification	5	Acceptability Threshold Classification		5
MITIC	ATION	(if necessary)		
Proposed Mitigation Measures Ye	es O	Proposed Mitigation Measures	Yes	0
No	0		No	0
Annual Return Frequency (Mitigated)		Annual Return Frequency (Mitigated)		
1:200-1:500		1:200-1:500		
Acceptability Threshold Classification	4	Acceptability Threshold Classification		4
Comments		Comments		
SUI	PPORTI	NG REPORT		
Was this report prepared by others? Yes	0	Was this report prepared by others?	Yes	0
No	0		No	0
If yes, list report name, date and author.		If yes, list report name, date and author.		
Geo-Hazard Type #3		Geo-Hazard Type #4		
15 Star (C.) 1000 - 1010 - Cas (C.) 150 Mile		COORD SHEET IS HE HAVE TO LIKE TO		
Annual Return Frequency (Unmitigated)		Annual Return Frequency (Unmitigated)		
Acceptability Threshold Classification		Acceptability Threshold Classification		
	SATION	(if necessary)		
Proposed Mitigation Measures Ye	es O	Proposed Mitigation Measures	Yes	0
No	<u> </u>		No	0
Annual Return Frequency (Mitigated)		Annual Return Frequency (Mitigated)		
Acceptability Threshold Classification		Acceptability Threshold Classification		
Comments		Comments		
SUI	PPORTI	NG REPORT		
Was this report prepared by others?	s	Was this report prepared by others?	Yes	$\circ$
No			No	0
If yes, list report name, date and author.				
The year instruction and a deliver		If yes, list report name, date and author.		
in yes, not report name, date and dather		If yes, list report name, date and author.		



# Geo-Hazard Assurance Statement for Development Approvals

Indi	cate which hazards were <b>NOT</b> reviewed:						
	Chilliwack River Valley Erosion or Avulsion	1	Seismic Effects/Liquefaction				
	Debris Flow and Debris Torrent		Rockfall - Small Scale Detachment				
	Debris Flood		Slope Stability				
	Fraser River & tributaries flooding		Small Scale Localized Landslide				
	Mountain Stream Erosion or Avulsion		Snow Avalanche				
	Major Catastrophic Landslide	1	Tsunami				
	ard Acceptability Thresholds Classification, as per Haza al Government dated November 1993 by Dr. Peter Cave		cceptability Thresholds for Development Approvals by				
1	Approval with conditions relating to hazards.						
2	Approval, without siting conditions or protective works conditions, but with a covenant including "save harmless" conditions.						
3	Approval, but with siting requirements to avoid the hazard, or with requirements for protective works to mitigate the hazard.						
4	Approval as (3) above, but with a covenant including "	save	harmless" conditions as well as siting conditions,				
_	protective works or both.						
5	Not approvable.						

he following reports were relied on in preparation of	this report:
eotechnical Reconnaissance for Preliminary Hazard C, prepared October 13, 1983 by Golder Associates	Assessment for Proposed Subdivision for Chilliwack Lake Road, Chilliwack (FVRD reference number: 10-29-01-200)
roposed Multi-Lot Subdivision, 49096 Chilliwack La 71-05545-01)	ake Road, FVRD, BC, prepared February 8, 2018 by WSP Canada Inc. (File:







# APPENDIX C GEOWEST MEMORANDUM, MARCH 23, 2020





200 · 34425 McConnell Road, Abbotsford, BC V2S 7P1 www.geowestengineering.com info@geowestengineering.com | 604·852·9088

#### MEMORANDUM

Attention:	Gilles Brouillette	Date:	March 23, 2020
cc:		From:	Dejan Jovanovic, P.Eng.
Project:	46096 Chilliwack Lake Road, Chilliwack, BC	File:	GA18-1288-02
		Sent Via:	Email
Subject:	Protective Berms, Future Lots 1 and 2		

As requested, GeoWest Engineering Ltd. (GeoWest) visited the site to review an alternative location for protective berms for two existing residential structures at the above-referenced address. We understand that a proposed protective berm located on future Lot 1 and shared driveway with future Lot 2 recommended in the GeoWest geohazard site assessment report dated November 12, 2019 (GeoWest File: GA18-1288-01 Rev 1) was not approved by the BC Ministry of Transportation and Infrastructure (BCMoTI). We understand that the BCMoTI requested that future Lot 1 and Lot 2 each have their own independent protective berms.

After reviewing the site conditions with you, we recommend that the protective berms be aligned at the locations illustrated on the attached Figure 1. The berms should be constructed using compacted mineral fill armoured with rock as shown on Figure 2. Alternatively, the berms can be constructed using modular concrete Lock-Blocks as illustrated on Figure 3. The existing driveway should be re-graded to provide a cross slope to drain towards the Bell Brook channel at a 2.5% gradient as shown on Figure 1.

Provided that the proposed berm on future Lot 2 is constructed as recommended in this memo, the protective barrier for the existing mobile home garage and raised concrete foundation wall for the future garage, recommended in the above-referenced GeoWest report, are no longer required.

We recommend that you provide this memo to the FVRFD and MoTI for review and comments, before the start of construction. GeoWest is to be given the opportunity to review the construction of protective berms including material used in construction and berm alignments.

We trust that the information provided herein meets your immediate needs. Should you require further assistance, please contact the undersigned.

#### **GeoWest Engineering Ltd.**



**REVIEWED BY:** 

Per: Dejan Jovanovic, P.Eng.
Principal, Senior Geotechnical Engineer

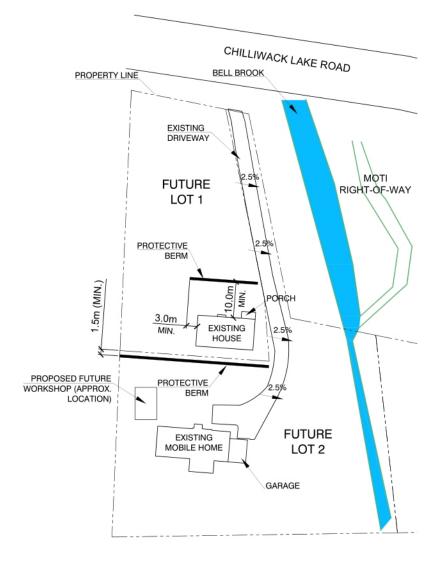
Calum Buchan, P.Eng., P.E., FEC Principal, Senior Geotechnical Engineer

DJ/knh

Attachments: Figures 1 to 3



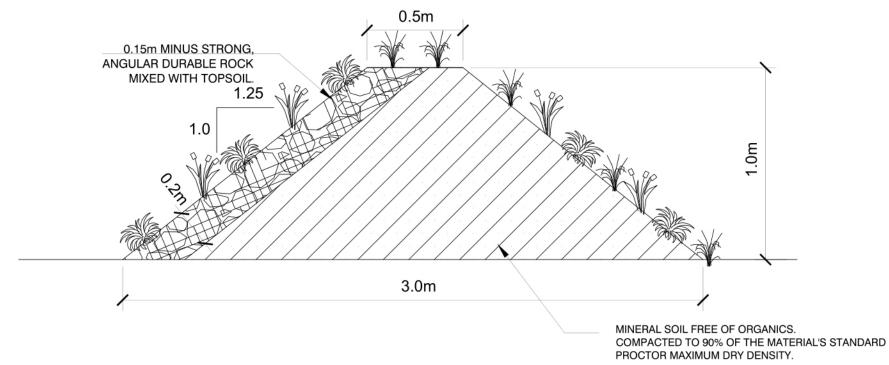






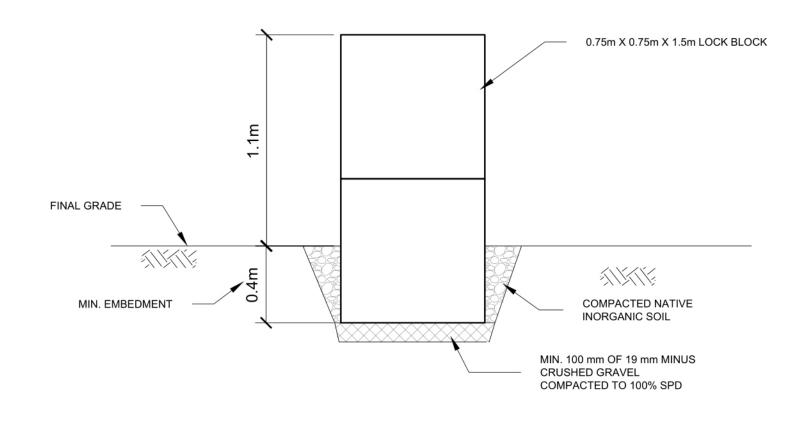
REVISIONS					ADAPTED FROM: OTG DEVELOPMENT CONCEPTS 7 LOT SUBDIVISION	TITLE: SITE PLAN		DESIGN:	MARCH 2020
					DWG. NO: 16-122, SHEET 1	PROJECT:	_	CB	NTS
					DATE/REV.: SEPT 12, 2018	PROTECTIVE BERMS FOR FUTURE LOTS 1 AND 2	GeoWest	DRAWN:	FILE NO: GA18-1288-02
					This drawing is the sole property of GeoWest Engineering Ltd. and cannot be used or duplicated in any way without the expressed written consent of GeoWest.	ADDRESS: 49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC	ENGINEERING	FIGURE NO:	4
REV	Date	Issue/Revision Description	Drawn	Check	The general contractor shall verify all dimensions and report any discrepancies to GeoWest.	GILLES BROUILLETTE	Dogo	61 of 70 T	TD A 2021 12414







REVISION	S			 ADAPTED FROM: N/A	PROTECTIVE BERM		DESIGN:	MARCH 2020
				DWG. NO:	ALTERNATIVE 1 PROJECT:	_	REVIEW: CB	SCALE: NTS
				DATE/REV.: N/A	PROTECTIVE BERMS FOR FUTURE LOTS 1 AND 2	GeoWest	DRAWN:	FILE NO: GA18-1288-02
				This drawing is the sole property of GeoWest Engineering Ltd. and cannot be used or duplicated in any way without the expressed written consent of GeoWest.	ADDRESS: 49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC	ENGINEERING	FIGURE NO:	2
REV	Date	Issue/Revision Description	Drawn	The general contractor shall verify all dimensions and report any discrepancies to GeoWest.	GILLES BROUILLETTE	Daga	62 of 70 T	ED A-2021-12414





REVISIONS	3				ADAPTED FROM: N/A	PROTECTIVE BERM ALTERNATIVE 2		DESIGN:	MARCH 2020
					DWG. NO: N/A	PROJECT:	_	REVIEW: CB	SCALE: NTS
					DATE/REV.: N/A	PROTECTIVE BERMS FOR FUTURE LOTS 1 AND 2	GeoWest	DRAWN:	FILE NO: GA18-1288-02
					This drawing is the sole property of GeoWest Engineering Ltd. and cannot be used or duplicated in any way without the expressed written consent of GeoWest.	ADDRESS: 49096 CHILLIWACK LAKE ROAD, CHILLIWACK, BC	ENGINEERING	FIGURE NO:	3
REV	Date	Issue/Revision Description	Drawn	Check	The general contractor shall verify all dimensions and report any discrepancies to GeoWest.	GILLES BROUILLETTE	D	62 - 670 T	DA 2021 12414

ATTACHMENT: 19-164 MoTI Confirmation of Geotech Report.pdf



Dylan Anderson <dylan@otgdevelopments.com>

# Geotechnical Review for proposed 7 lot subdivision - 46096 Chilliwack Lake Road BC MoTI Files 2017-01691 & 2019-05895

Crump, Jon TRAN:EX <Jon.Crump@gov.bc.ca>
To: Dylan Anderson <dylan@otgdevelopments.com>
Cc: David Bennett <dbennett@fvrd.ca>

Thu, Oct 15, 2020 at 11:43 AM

Dylan,

The Ministry has reviewed the revised report by Geowest Engineering (June 10, 2020 Rev 2). The applicant has addressed the 10 items from the Ministry's June 7, 2019 email.

It is potentially quite a task to capture all of Geowest's requirements into a revised covenant.... and then we will need to check that their lawyer captured all the requirements accurately. There are also previous non-compliances to correct such as item number 9 where Geowest addressed our comments by stating that the existing shop will be demolished. These matters will need to be resolved prior to signing of the covenant by the Approving Officer.

The applicant's lawyer may want to attach the report to a legal document along with noting the restrictions however this approach is difficult to capture the intent because often the report wasn't written in clear terms (lots of "should" and "could" type of wording in Geotech reports). The Ministry would like to continue to be included in this process.

Please have your Geotechnical Engineer review the covenant prior to submission.

Take care,

Jon Crump, Development Services Officer

Ministry of Transportation and Infrastructure, Development Services, Chilliwack Area Office

45890 Victoria Avenue

Chilliwack, BC V2P 2T1

778-704-0029

BC MoTI /Development Services information can be found at: https://posse.th.gov.bc.ca/DAP/

From: Dylan Anderson <dylan@otgdevelopments.com>

Sent: June 30, 2020 10:23 AM

To: Crump, Jon TRAN:EX < Jon.Crump@gov.bc.ca>

Subject: Re: Geotechnical Review for proposed 7 lot subdivision - 46096 Chilliwack Lake Road BC MoTI Files 2017-

01691 & 2019-05895

**CAUTION:** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Jon,

I just wanted to confirm that you received the most recent version of the geotech report and that it was being reviewed.

Please advise once Staff have signed off on the report.

Please also note that the septic information has been submitted and paid at Fraser Health and as such, you should be receiving their referrals soon. If there is anything else you require to provide the PRL, please let me know.

Regards,

Dylan

\*\*\* Please note that I will be away from the office from July 1st - 5th \*\*\*

#### Dylan V. Anderson BA, MUP

DEVELOPMENT PLANNER / PROJECT MANAGER

c: 604.556.6623

o: 604.393.7815

e: dylan@otgdevelopments.com

Unit 520 - 45715 Hocking Ave Chilliwack, BC, V2P 6Z6 www.otgdevelopments.com

Although OTG is expected to remain open throughout the COVID-19 crisis, social isolation measures are reducing efficiency and interrupting workflow. Consequently, some projects may experience delays. Please do not hesitate to contact us if you have any concerns, and we will take measures to ensure all critical deadlines are met.

working together to keep your projects going.

Be safe and healthy.

On Wed, Jun 17, 2020 at 4:40 PM Dylan Anderson <dylan@otgdevelopments.com> wrote:

Good morning Jon,

Please see the attached amended geotechnical engineering report which appears to address MoTI's most recent set of comments. Please advise if this report is acceptable to MoTI.

Thanks.

Dylan

#### Dylan V. Anderson BA, MUP

**DEVELOPMENT PLANNER / PROJECT MANAGER** 

- c: 604.556.6623
- o: 604.393.7815
- e: dylan@otgdevelopments.com

Unit 520 - 45715 Hocking Ave Chilliwack, BC, V2P 6Z6 www.otgdevelopments.com

Although OTG is expected to remain open throughout the COVID-19 crisis, social isolation measures are reducing efficiency and interrupting workflow. Consequently, some projects may experience delays. Please do not hesitate to contact us if you have any concerns, and we will take measures to ensure all critical deadlines are met.

Additionally, please know that most Municipal Halls and Regional Offices are remaining open in some capacity. We are all working together to keep your projects going.

Be safe and healthy.

[Quoted text hidden]

ATTACHMENT: 19-164 MOE Crossing Notification Acceptance.pdf



Dylan Anderson <dylan@otgdevelopments.com>

### Fwd: Notification 100326338 - FCBC Accepted - Critical Habitat

**Remi Masson** <remi@redcedarenvironmental.com>
To: Dylan Anderson <dylan@otgdevelopments.com>

Wed, Sep 9, 2020 at 3:54 PM

FYI.

Rémi Masson, R.P.Bio.

Senior Consultant

Although Redcedar Environmental is expected to remain open throughout the COVID-19 crisis, social isolation measures are reducing efficiency and interrupting workflow. Consequently, some projects may experience delays. Please do not hesitate to contact us if you have any concerns, and we will take measures to ensure all critical deadlines are met.

Redcedar Environmental Consulting Inc. 32141 Sandpiper Place Mission, BC, V2V 2L5



t: (604) 621 9811 e: remi@redcedarenvironmental.com w: redcedarenvironmental.com

----- Forwarded message -----

From: Weymer, Janice M FLNR:EX <Janice.Weymer@gov.bc.ca>

Date: Thu, Sep 3, 2020 at 9:47 AM

Subject: Notification 100326338 - FCBC Accepted - Critical Habitat

To: Remi Masson <remi@redcedarenvironmental.com>

Good morning Remi,

FrontCounter BC (FCBC) has accepted your application, assigned a tracking number, and forwarded it to Resource Management (RM) for their records. Please see updated application attached to this email to reflect both property owners on the application.

Resource Management does not necessarily provide a response to each notification submission. Your receipt of this email is confirmation that your work plan is on record and you need not follow up further with either FCBC or RM.

The tracking number assigned to your application is: 100326338 Date Received: August 21, 2020 Work Window October 5, 2020 to October 31, 2020

Additional considerations for the proposed works;

(a) You are advised that your project may be inspected during and/or post construction. A copy of the application and associated plans/drawings should be available for inspection, upon request, at any location where the changes in and about a stream are being undertaken.

- (b) Care shall be exercised during all phases of the work to prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate or any deleterious substances.
- (c) Please refer to "Standards and Best Practices for Instream Works" http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf for additional guidance on the provincial Standards and Best Practices for any activity or construction within the stream channel that has or may have an impact on the stream.
- \*\*Please Note: Work area is within the critical habitat, Coastal Giant Salamander and for this reason this application has been forwarded to the Fish and Aquatics Team.
- \*\*\*Please Note: Notification applications must be submitted at least 45 days before commencing the change in and about a stream. The proponent must also comply with specified terms and conditions for the proposed change from the Habitat Officer. Please refer to this link for more information:

https://www2.gov.bc.ca/gov/content/environment/air-land-water/water-licensing-rights/water-licences-approvals/apply-for-a-change-approval-or-submit-notification-of-instream-work

Sincerely,



Janice Weymer

Natural Resource Specialist

FrontCounter BC

Ministry of Forests, Lands, Natural Resource Operations and Rural Development

South Coast Natural Resource Region, Chilliwack Forest District

46360 Airport Rd, Chilliwack BC V2P 1A5

NEW\*Phone (778) 704-7105 Fax: (604) 702-5711

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November 15, 2020

Jon Crump
Area Development & Operations Technician
Ministry of Transportation
5890 Victoria Ave
Chilliwack BC V2P 2T1

RE: <u>Proposed Conventional Subdivision Application - File 2019-05985</u> 49096 Chilliwack Lake Rd, Chilliwack, BC

Based on the information provided by Out Of The Box Engineering (0772308 BC LTD), we have no objections to the approval of the above noted subdivision within the scope of the Local Services Act, Subdivision Regulation. This recommendation is based on a Type 1 sand mound sewerage disposal system designed to service a 4 bedroom residence.

Based on the size of the proposed lots we recommended that a suitable instrument be registered on title that serves to protect the primary and reserve sewerage disposal areas (as shown on the attached site plan) and to inform the owner that the soils on the property, within in the sewage disposal areas, (identified on the plan) are not to be disturbed, removed or compacted.

Should you have any questions or require clarification, please contact the undersigned at 604-870-7921.

Yours truly,

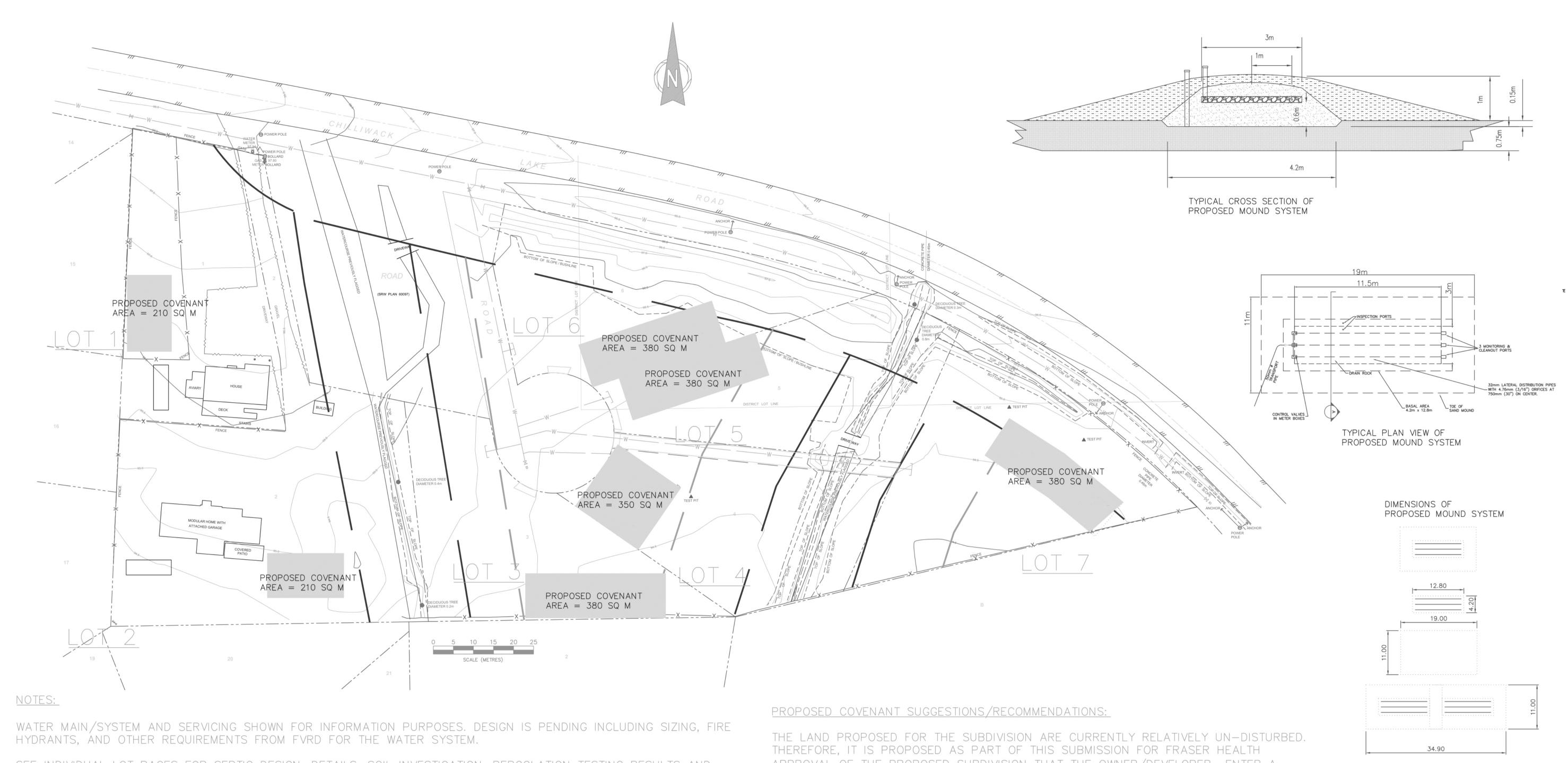
Blair Choquette, CIPHI (C)

Manager, Environmental Health Services

Health Protection Fraser Health

BC/bc

pc: OTG Development Ltd.



SEE INDIVIDUAL LOT PAGES FOR SEPTIC DESIGN, DETAILS, SOIL INVESTIGATION, PERCOLATION TESTING RESULTS AND OTHER INFORMATION PERTINENT TO EACH LOT.

LOTS 1 AND 2 HAVE EXISTING HOMES AND EXISTING SEPTIC FIELDS AND THEREFORE SHARE A DETAIL DESIGN PAGE (PAGE 8A) SHOWING TEST PIT LOCATION AND RESERVE FIELD AREA.

MAXIMUM ONE RESDIENCE PER LOT ALLOWED.

MINIMUM LOT AREA 2000 SQUARE METERS.

THE LAND PROPOSED FOR THE SUBDIVISION ARE CURRENTLY RELATIVELY UN-DISTURBED. THEREFORE, IT IS PROPOSED AS PART OF THIS SUBMISSION FOR FRASER HEALTH APPROVAL OF THE PROPOSED SUBDIVISION THAT THE OWNER/DEVELOPER ENTER A COVENANT ON THE PROPOSED AREAS SHOWN FOR TYPE I SEPTIC DISPOSAL SYSTEM SIZED HERE FOR 4 BEDROOM HOMES. AT THE TIME OF THE BUILDING PERMIT, IT IS RECOMMENDED THAT THE PERMIT ONLY BE ISSUED UPON RECEIPT OF A SUITABLY DESIGNED ON-SITE WASTEWATER DISPOSAL SYSTEM FOR THAT SPECIFIC HOME PLUS A SIMILAR SIZED RESERVE AREA IDENTIFIED ON THE DESIGN PLAN SUBMITTED AT BUILDING PERMIT STAGE. THIS ALLOWS DISCRETION FOR THE ENGINEER OR REGISTERED WASTEWATER PRACTITIONER TO DESIGN A SYSTEM OTHER THAN THE TYPE I SYSTEMS PROPOSED WITHIN THIS SUBDIVISION DESIGN PACKAGE CONFIRMING THAT EACH LOT IS CAPABLE OF ACCOMMODATING A TYPE 1 SEPTIC DISPOSAL SYSTEM FOR A 4 BEDROOM HOME PLUS A RESERVE FIELD AREA. UPON ACCEPTANCE OF THE PROPOSE SITE/BUILDING SPECIFIC DESIGN BY A REGISTERED PROFESSIONAL, THE COVENANT FROM TIME OF SUBDIVISION SHOULD BE RELEASED IN PREFERENCE TO NEW SITE SPECIFIC COVENANT FOR DESIGNED SYSTEM AND RESERVE FIELD.

## DIMENSIONS OF PROPOSED MOUND SYSTEM

FROM TOP TO BOTTOM:

- DISPOSAL AREA PLUS TOE OF MOUND.
   TREATMENT/DISPOSAL AREA MEASURING ~54 SQUARE METERS — BASAL AREA OF MOUND SYSTEM.
- DIMENSIONS TO TOE OF MOUND
   MEASURING ~209 SQUARE METERS.

   DIMENSIONS OF TWO MOUNDS WITH
- DIMENSIONS OF TWO MOUNDS WITH TOES OVERLAPPING MEASURING ~384 SQUARE METERS.

SUGGEST COVENANT AREA AS SHOWN ON PLAN ABOVE — 210 SQ M FOR RESERVE FIELDS FOR LOTS 1 AND 2, AND BETWEEN 350 AND 380 SQ M FOR EACH OF LOTS 3 THROUGH 7.



OUT OF THE BOX ENGINEERING 0772308 BC LTD Box 274 Agassiz PO Agassiz, BC VOM 1A0 ootbe2013@gmail.com 604-819-9809

П					
	С	REVISED AS PER FHA COMMENTS - REISSUED FOR PERMIT	2020-10-15	CSJ	
	В	EXIST. SEPTIC ADDED AND NEW TEST PITS - RE-ISSUED FOR PERMIT	2020-09-20	CSJ	
	Α	ISSUED FOR REVIEW/PERMIT	220-06-11	CSJ	
	NO.	ISSUE / REVISION	YYYY/MM/DD	BY	SE

PROPOSED 7 LOT SUBDIVISION FRASER HEALTH SUBMISSION

49096 CHILLIWACK LAKE ROAD CHILLIWACK, BC

CLIENT	OTG DEVE	I OPMEN		scale 1:500					
	OTO DEVE	.LOI WILIV		DATE	DATE 2020-06-11				
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	SITE PLAN			2020	)-1	044-	03		
PROJ. ENG.	CSJ	DESIGNED	CSJ	DRAWN	CSJ	OF	09	ISSUE/REV.	С