OUT OF THE BOX ENGINEERING
0772308 BC LTD

2019-0912
July 12, 2019

Fraser Valley Regional District
Planning Department
45950 Cheam Avenue, Chilliwack, BC

Reference: **Flood Level Adjustment – Proposed Residence - 155 First Avenue, Cultus Lake BC**

As requested, this writer has researched information in regard to setting a flood level for the above-named property. The researched information is noted below:

- A comprehensive research and report have not been done for establishing the 200-year flood level for Cultus Lake.
- Several reports refer to a 1994 Ministry of Environment memo indicating the natural boundary of Cultus Lake being at an elevation 45m (high water).
- The Fraser Valley Regional District and Cultus Lake Park Board have both adopted an elevation of 46.5m as the required MBE/FCL – which represents 1.5m above the natural boundary level.
- The outlet of Cultus Lake is level controlled so that maximum usable water space is available in the summer months and then lowered during the winter months.
- The outlet is lower than the aforementioned 45m with a typical freeboard for most flood management situations of 0.6m (2 feet).

The plans provided show a FCL of 45.5m. Based on the above information, this writer has no objection to setting the flood level to 45.5m which represents 0.5m above the high water elevation, and recommends that the approving authority accept the lowered flood level. The plans also show a lower basement elevation within a water-proofed structure. A lowered MBE will be provided by others based on their flood-proofing design. The primary need for the lowering of the flood level is for design by others versus buoyancy of the basement.

This writer has no issue with the client and his agents using the 45.5m elevation for their further design (re buoyancy) of the basement of the proposed residence. Please note, however, that the undersigned does not warranty versus flooding the below-grade flood-proofing that is being designed by others for this property.

If there are any questions regarding this report, please do not hesitate to contact the undersigned.

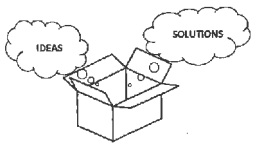
Regards,

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. S. JOHNSON
28938
7/12/19

Collin S. Johnson, P.Eng.
Attached (Sched B and Geo Hazard Assurance Statement)

CC Doug Williams

F.V.R.D. BLDG. DEPT
JUL 1 ∩ 2019
F.V.R.D. BLDG. DEPT
JUL 1 8 2019



Collin Johnson, P.Eng
Box 274 Agassiz PO, Agassiz, BC V0M 1A0
604-819-9809/johnsonscollin@gmail.com

Geo-Hazard Assurance Statement
for Development Approvals

A. Project Information

Date: July 12, 2019 FVRD File No.: Dev Variance Permit 2019-17

Property Information

Project Name & Description: Proposed Residence (Gwyllyn Goddard)

Legal Description: Lot 155 Land District 36 LEASE CULTUS LAKE PARK

Site Address: 155 First Avenue, Cultus Lake BC PID: Area-Jurisdiction-Roll: 15-733-070

Client Information

Name: Doug Willams

Role: ☐ Property Owner ☑ Developer ☐ Other

Client Address: 383 Alder Street Cultus Lake BC

Qualified Professional Information

Name: Collin S Johnson

APEGBC Designation: ☑ P.Eng. ☐ P. Geo. ☐ Eng.L ☐ Geo.L

Company Name: Out of the Box Engineering (0772308 BC Ltd)

Mailing Address: PO Box 274 Agassiz PO, Agassiz BC V0M 1A0

Email Address: ootbe2013@gmail.com Phone #: 604-819-9809

Geo-Hazard Report Reference

Title: Flood Level Adjustment - 155 First Ave Cultus Lake Date: July 12, 2019

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.

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 *Local Government Act* (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 statement as appropriate>

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 prepared pursuant to the following APEGBC Guidelines *(check one or both as applicable)*.

☑ APEGBC Flood Guidelines

☐ APEGBC Landslide Guidelines

If the Report is **not** prepared pursuant to either of the APEGBC Guidelines, please explain.

The letter report was prepared to provide justification to lower the FCL for the proposed residence

D. Background Information

Qualified Professionals **must** confirm and check that each item is included in the Report.

☐ 1. Property location map — 8.5 x 11 size DEVELOPER PROVIDED BUILDING PLANS WHICH INCLUDED SITE PLAN. NOT INCLUDED IN MY REPORT

☐ 2. Development proposal site plan — 8.5 x 11 size. *If a subdivision, show the parent parcel and all lots to be created, including any remainder.*

☑ 3. Description of the proposed development project (including building use) to the extent this is known at the 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

REPORT PROVIDED WAS SHORT ONE SUPPORTING LOGGING ROAD

- [x] 4. Relevant information pertaining to the Property and pertinent potential hazards from appropriate background 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.
- [x] 7. Description 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.

_____

- [x] 9. Review 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. Notation of any visibly apparent natural hazards or other hazards identified in background reports, which are not identified and addressed in this Report. If yes, provide details in Section H: Geo-Hazard Summary Table.
  - ○ Yes
  - ○ No
- [ ] 12. Does the report rely on one or more supporting reports, each of which is independently reviewed, signed and sealed. If yes, provide details in Section H: Geo-Hazard Summary Table.
  - ○ Yes
  - ○ No
- [ ] 13. For subdivision 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

☑ 14. In considering the above-noted potential hazards that may affect the property, I have:

REVIEWED SOILS & SITE AND NOARBY AND RISK IF WATER TABLE RISES

- ☐ reviewed and characterized the potential hazard(s)
- ☐ estimated the potential frequency and magnitude of the potential hazard(s)
- ☐ relied on supporting reports as noted above
- ☐ relied on a pre-existing assessment of hazard frequency and magnitude
- ☐ considered the potential effects of climate change in the context identified in the Report
- ☐ considered the potential effects of changed future conditions (upstream watershed changes, forestry activity, land use changes, sea level rise, etc.) in the context identified in the Report

☐ 15. This Assurance Statement pertains to all geo-hazards that are assessed in the Report and any supporting reports, and accurately reflects the contents of those documents.

☐ 16. The FVRD has adopted "Hazard Acceptability Thresholds for Development Approvals by Local Government", which provides a specific level of hazard or risk tolerance. I have included a Hazard Summary Table which:

- ☐ lists all the potential hazards addressed by the Report and any supporting reports
- ☐ provides an annual return frequency and acceptability threshold classification for the unmitigated condition
- ☐ proposes mitigative measures to appropriately reduce the geo-hazard risk
- ☐ provides an annual return frequency and acceptability threshold classification for the mitigated condition

☐ 17. The Report describes the potential transfer of natural hazard risk to other properties or infrastructure as a result of the proposed project (including any proposed *mitigation works*) and

- ☐ considered the potential for transfer of natural hazard risk
- ☐ concludes that there is no significant transfer of natural hazard risk
- ☐ identifies the potential transfer of natural hazard risk and proposes measures to offset such transfer of risk

Mitigation and Design Recommendations (if recommended)

The Report contains the following items: REPORT NOTES DESIGN REQUIRED BY OTHERS FOR WATER TIGHT STRUCTURE BELOW GRADE

- ☐ 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.

E 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. JUST PROVIDED SHORT REPORT SUPPORTING LOWERING OF FCL
- ☑ 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 Professional (QP)

Prepared by: (QP of Record)

Name Collin Johnson

Designation ☑ P.Eng. ☐ P. Geo. ☐ Eng.L ☐ Geo.L

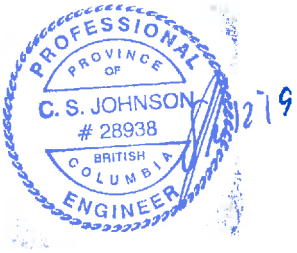
Reviewed by:

Name _____

Designation ☐ P.Eng. ☐ P. Geo.

The Report has received appropriate technical review which is consistent with both the APEGBC Professional Practice Guidelines, and APGBC Quality Management Guidelines. The name of the reviewer is noted in the Report and below.

Professional Seal, Signature and Date:



☑ I am a Qualified Professional as defined in the APEGBC Guidelines, and I fulfill the education, training and experience requirements as outlined in the APEGBC Guidelines

☑ I have signed, sealed, dated and thereby certify, this Assurance Statement and the attached report.

H. Geo-Hazard Summary Table

N/A

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

Geo-Hazard Type #1	Geo-Hazard Type #2
Annual Return Frequency (Unmitigated)	Annual Return Frequency (Unmitigated)
Acceptability Threshold Classification ☐	Acceptability Threshold Classification ☐
MITIGATION (if necessary)	
Proposed Mitigation Measures Yes ◯ No ◯	Proposed Mitigation Measures Yes ◯ No ◯
Annual Return Frequency (Mitigated)	Annual Return Frequency (Mitigated)
Acceptability Threshold Classification ☐	Acceptability Threshold Classification ☐
Comments	Comments
SUPPORTING REPORT	
Was this report prepared by others? Yes ◯ No ◯	Was this report prepared by others? Yes ◯ No ◯
If yes, list report name, date and author.	If yes, list report name, date and author.

Geo-Hazard Type #3	Geo-Hazard Type #4
Annual Return Frequency (Unmitigated)	Annual Return Frequency (Unmitigated)
Acceptability Threshold Classification ☐	Acceptability Threshold Classification ☐
MITIGATION (if necessary)	
Proposed Mitigation Measures Yes ◯ No ◯	Proposed Mitigation Measures Yes ◯ No ◯
Annual Return Frequency (Mitigated)	Annual Return Frequency (Mitigated)
Acceptability Threshold Classification ☐	Acceptability Threshold Classification ☐
Comments	Comments
SUPPORTING REPORT	
Was this report prepared by others? Yes ◯ No ◯	Was this report prepared by others? Yes ◯ No ◯
If yes, list report name, date and author.	If yes, list report name, date and author.

Indicate which hazards were **NOT** reviewed:

- ☐ Chilliwack River Valley Erosion or Avulsion
- ☐ Debris Flow and Debris Torrent
- ☐ Debris Flood
- ☐ Fraser River & tributaries flooding
- ☐ Mountain Stream Erosion or Avulsion
- ☐ Major Catastrophic Landslide
- ☐ Seismic Effects/Liquefaction
- ☐ Rockfall - Small Scale Detachment
- ☐ Slope Stability
- ☐ Small Scale Localized Landslide
- ☐ Snow Avalanche
- ☐ Tsunami

Hazard Acceptability Thresholds Classification, as per Hazard Acceptability Thresholds for Development Approvals by Local Government dated November 1993 by Dr. Peter Cave.

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.

Additional Comments N/A

SCHEDULE B

Forming Part of Subsection 2.2.7., Division C of the British Columbia Building Code

Building Permit Number
(for *authority having jurisdiction's* use)

ASSURANCE OF PROFESSIONAL DESIGN AND COMMITMENT FOR FIELD REVIEW

Notes: (i) This letter must be submitted prior to the commencement of construction activities of the components identified below. A separate letter must be submitted by each *registered professional of record*.
(ii) This letter is endorsed by: Architectural Institute of BC, Association of Professional Engineers and Geoscientists of the Province of BC, Building Officials' Association of BC, and Union of BC Municipalities.
(iii) In this letter the words in italics have the same meaning as in the British Columbia Building Code.

To: The *authority having jurisdiction*

Cultus Lake - Fraser Valley Regional District
Name of Jurisdiction (Print)

Re: Proposed Home
Name of Project (Print)

155 First Avenue Cultus Lake BC
Address of Project (Print)

The undersigned hereby gives assurance that the design of the

(Initial those of the items listed below that apply to this *registered professional of record*. All the disciplines will not necessarily be employed on every project.)

	ARCHITECTURAL
	STRUCTURAL
	MECHANICAL
	PLUMBING
	FIRE SUPPRESSION SYSTEMS
	ELECTRICAL
7.1	GEOTECHNICAL — temporary
8.1	GEOTECHNICAL — permanent

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. S. JOHNSON
28938

(Professional's Seal and Signature)

July 12, 2019
Date

components of the plans and supporting documents prepared by this *registered professional of record* in support of the application for the *building* permit as outlined below substantially comply with the British Columbia Building Code and other applicable enactments respecting safety except for construction safety aspects.

The undersigned hereby undertakes to be responsible for *field reviews* of the above referenced components during construction, as indicated on the "SUMMARY OF DESIGN AND FIELD REVIEW REQUIREMENTS" below.

F.V.R.D. BLDG. DEPT
JUL 18 2019

CRP's Initials

Schedule B - *Continued*

Building Permit Number
(for *authority having jurisdiction's* use)

155 First Avenue Cultus Lake BC
Project Address

Geotech (7.1, 8.1)
Discipline

The undersigned also undertakes to notify the *authority having jurisdiction* in writing as soon as possible if the undersigned's contract for *field review* is terminated at any time during construction.

I certify that I am a *registered professional* as defined in the British Columbia Building Code.

Collin Johnson P.Eng.
Registered Professional of Record's Name (Print)

Box 274 Agassiz PO
Address (Print)

Agassiz, BC V0M 1A0
Address (Print) (continued)

604-819-9809
Phone Number

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. S. JOHNSON
28938
(Professional's Seal and Signature)

July 12, 2019
Date

(If the *Registered Professional of Record* is a member of a firm, complete the following.)

I am a member of the firm Out Of The Box Engineering (DBA 0772308 BC LTD)
and I sign this letter on behalf of the firm. (Print name of firm)

Note: The above letter must be signed by a *registered professional of record,* who is a *registered professional.* The British Columbia Building Code defines a *registered professional* to mean

(a) a person who is registered or licensed to practise as an architect under the Architects Act, or
(b) a person who is registered or licensed to practise as a professional engineer under the Engineers and Geoscientists Act.

CRP's Initials

Schedule B - *Continued*

Building Permit Number
(for *authority having jurisdiction's* use)

155 First Avenue Cultus Lake BC
Project Address

Geotech (7.1, 8.1)
Discipline

SUMMARY OF DESIGN AND FIELD REVIEW REQUIREMENTS

(Initial applicable discipline below and cross out and initial only those items not applicable to the project.)

ARCHITECTURAL

1.1 Fire resisting assemblies
1.2 *Fire separations* and their continuity
1.3 *Closures*, including tightness and operation
1.4 Egress systems, including *access to exit* within *suites* and *floor areas*
1.5 Performance and physical safety features (guardrails, handrails, etc.)
1.6 Structural capacity of architectural components, including anchorage and seismic restraint
1.7 Sound control
1.8 Landscaping, screening and site grading
1.9 Provisions for firefighting access
1.10 *Access* requirements for *persons with disabilities*
1.11 Elevating devices
1.12 Functional testing of architecturally related fire emergency systems and devices
1.13 Development Permit and conditions therein
1.14 Interior signage, including acceptable materials, dimensions and locations
1.15 Review of all applicable shop drawings
1.16 Interior and exterior finishes
1.17 Dampproofing and/or waterproofing of walls and slabs below *grade*
1.18 Roofing and flashings
1.19 Wall cladding systems
1.20 Condensation control and cavity ventilation
1.21 Exterior glazing
1.22 Integration of building envelope components
1.23 Environmental separation requirements (Part 5)
1.24 Building envelope, Part 10 – ASHRAE, NECB or Energy Step Code requirements
1.25 Building envelope, testing, confirmation or both as per Part 10 requirements

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. S. JOHNSON
28938

(Professional's Seal and Signature)

July 12, 2019
Date

STRUCTURAL

2.1 Structural capacity of structural components of the *building*, including anchorage and seismic restraint
2.2 Structural aspects of *deep foundations*
2.3 Review of all applicable shop drawings
2.4 Structural aspects of unbonded post-tensioned concrete design and construction

MECHANICAL

3.1 HVAC systems and devices, including high *building* requirements where applicable
3.2 *Fire dampers* at required *fire separations*
3.3 Continuity of *fire separations* at HVAC penetrations
3.4 Functional testing of mechanically related fire emergency systems and devices
3.5 Maintenance manuals for mechanical systems
3.6 Structural capacity of mechanical components, including anchorage and seismic restraint
3.7 Review of all applicable shop drawings
3.8 Mechanical systems, Part 10 – ASHRAE, NECB or Energy Step Code requirements
3.9 Mechanical systems, testing, confirmation or both as per Part 10 requirements

CRP's Initials

Schedule B - *Continued*

Building Permit Number
(for *authority having jurisdiction's* use)

155 First Avenue Cultus Lake BC
Project Address

Geotech (7.1, 8.1)
Discipline

PLUMBING

4.1 Roof *drainage systems*
4.2 Site and foundation *drainage systems*
4.3 *Plumbing systems* and devices
4.4 Continuity of *fire separations* at plumbing penetrations
4.5 Functional testing of plumbing related fire emergency systems and devices
4.6 Maintenance manuals for *plumbing systems*
4.7 Structural capacity of plumbing components, including anchorage and seismic restraint
4.8 Review of all applicable shop drawings
4.9 Plumbing systems, Part 10 – ASHRAE, NECB or Energy Step Code requirements
4.10 Plumbing systems, testing, confirmation or both as per Part 10 requirements

FIRE SUPPRESSION SYSTEMS

5.1 Suppression system classification for type of *occupancy*
5.2 Design coverage, including concealed or special areas
5.3 Compatibility and location of electrical supervision, ancillary alarm and control devices
5.4 Evaluation of the capacity of city (municipal) water supply versus system demands and domestic demand, including pumping devices where necessary
5.5 Qualification of welder, quality of welds and material
5.6 Review of all applicable shop drawings
5.7 Acceptance testing for "Contractor's Material and Test Certificate" as per NFPA Standards
5.8 Maintenance program and manual for suppression systems
5.9 Structural capacity of sprinkler components, including anchorage and seismic restraint
5.10 For partial systems — confirm sprinklers are installed in all areas where required
5.11 Fire Department connections and hydrant locations
5.12 Fire hose standpipes
5.13 Freeze protection measures for fire suppression systems
5.14 Functional testing of fire suppression systems and devices

ELECTRICAL

6.1 Electrical systems and devices, including high building requirements where applicable
6.2 Continuity of *fire separations* at electrical penetrations
6.3 Functional testing of electrical related fire emergency systems and devices
6.4 Electrical systems and devices maintenance manuals
6.5 Structural capacity of electrical components, including anchorage and seismic restraint
6.6 Clearances from *buildings* of all electrical utility equipment
6.7 Fire protection of wiring for emergency systems
6.8 Review of all applicable shop drawings
6.9 Electrical systems, Part 10 – ASHRAE, NECB or Energy Step Code requirements
6.10 Electrical systems, testing, confirmation or both as per Part 10 requirements

GEOTECHNICAL — Temporary

7.1 *Excavation*
7.2 Shoring
7.3 Underpinning
7.4 Temporary construction dewatering

GEOTECHNICAL — Permanent

8.1 Bearing capacity of the *soil*
8.2 Geotechnical aspects of deep *foundations*
8.3 Compaction of engineered fill
8.4 Structural considerations of *soil*, including slope stability and seismic loading
8.5 Backfill
8.6 Permanent dewatering
8.7 Permanent underpinning

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. S. JOHNSON
28938
12/19

(Professional's Seal and Signature)

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Date

CRP's Initials