



## GEOTECHNICAL MEMORANDUM

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Island West Coast Developments Ltd.  
2214 McCullough Road  
Nanaimo, BC  
V9S 4M8

File: E2188.01  
Date: April 28, 2023

**ATTENTION:** Robert Armeneau

**PROJECT:** Addition to Duncan Hyundai Dealership  
2801 Roberts Road, Duncan, BC

**SUBJECT:** Flood Construction Level

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### 1.0 INTRODUCTION

- a. As requested, Lewkowich Engineering Associates Ltd. (LEA) has determined a safe and suitable Flood Construction Level (FCL) based on available floodplain mapping for the proposed development. This memorandum provides a summary of our findings and recommendations to support a Flood Management Bylaw exemption.
- b. As shown on the attached Site Plan, the proposed development consists of an addition to the existing Hyundai dealership building, including a show room addition off the eastern corner of the building, and a service room addition off the southwestern corner. We understand the proposed addition is greater than 25% of the original building footprint. The floor elevation of the existing dealership building is reported to be 9.77m geodetic.

### 2.0 FLOODPLAIN MAPPING

- a. The subject property, 2801 Roberts Road, Duncan, BC, is located within the Cowichan River watershed. The watershed drains an area of approximately 940 km<sup>2</sup> from near its headwaters at Cowichan Lake to the estuary at Cowichan Bay in the Salish Sea. Major tributaries include Somenos Creek and the Koksilah River.
- b. The property is located between the Cowichan and Koksilah Rivers, at approximate distances of 1,000m and 850m from their Present Natural Boundaries (PNB), respectively. Cowichan Bay (ocean) is located greater than 3.0 km to the east-southeast.
- c. There have been historical accounts of flooding on the Lower Cowichan-Koksilah floodplain. The most severe floods typically occur from November to March as a result of heavy rain and rain-on-snow events. Severe flood damage has been further aggravated by extreme high ocean levels and debris jams.

Backwater controlled flooding can also occur on tributaries such as Somenos Creek where water levels in the Cowichan River control levels upstream. There have also been reports of stormwater drainage issues related to urban development and other land use changes during seasonally high water levels.

- d. A series of floodplain maps for the Cowichan and Koksilah Rivers near Duncan have been produced, with the original mapping issued by the BC Ministry of Environment in 1981. The most recent floodplain mapping was prepared by Northwest Hydraulics Consultants (NHC), as commissioned by the Cowichan Valley Regional District (CVRD), in February 2021.<sup>1</sup> The floodplain maps represent a 200 year flood condition in the year 2100, incorporating effects of climate change and sea level rise, plus a freeboard of 0.60m. The maps were developed using current guidelines and mapping standards issued by Engineers and Geoscientists British Columbia and Natural Resources Canada.
- e. As per the published mapping, the property is located within the floodplain. The FCL can be determined for a specific development area by interpolating between FCL isolines as shown on the applicable floodplain map. As shown in Figure 2.0 below, the FCL is greatest at the northwest corner of the existing building, where the interpolated FCL is less than 9.75m CGVD2013.

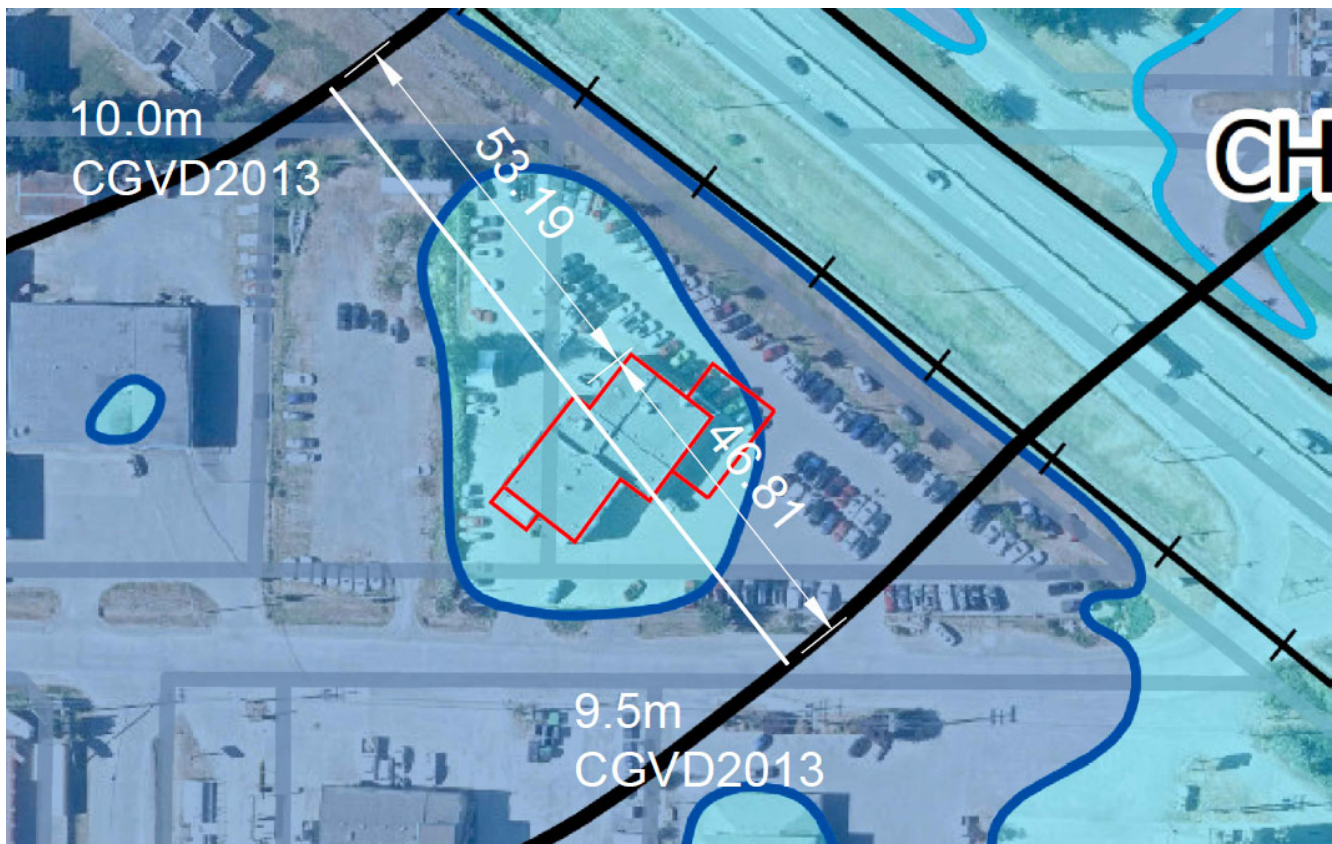


Figure 2.0: Location of proposed development (red outline) with respect to FCL isolines (black lines) as per 2021 floodplain mapping.<sup>2</sup>

### 3.0 VERTICAL DATUM

- a. There are currently two vertical datums being used in Canada, the older CGVD of 1928 (CGVD28), and the newer CGVD of 2013 (CGVD2013). While most local surveyors are still using the older CGVD28, the new floodplain mapping is in terms of CGVD2013. Conversion between CGVD28 and CGVD2013 was completed for this specific site using the on-line GPS-H software by Natural Resources Canada.
- b. The conversion is calculated as follows:  $CGVD28 = CGVD2013 - 0.174m$
- c. The building designer and construction contractor should be aware of the reference vertical datum to ensure the correct FCL is being used for the project.

### 4.0 FLOOD CONSTRUCTION LEVEL

- a. As per the published CVRD floodplain mapping, we recommend a minimum FCL of 9.75m CGVD2013 for the proposed development.
- a. The recommended FCL applies to any Habitable Area; defined as any room or space within a building or structure which can be used for human occupancy, commercial sales, or the storage of goods, possessions, or equipment (including furnaces) which would be subject to damage if flooded.
- a. The FCL establishes the minimum elevation of the underside of a wooden floor system or top of concrete slab for any Habitable Area. During construction, all footing and floor elevations shall be confirmed by qualified survey personnel to ensure the finished floor grade is at or above the recommended minimum FCL geodetic elevation.
- b. Provided any construction within the Property satisfies the recommended FCL, we do not anticipate any damage to structures as a result of floodwater. However, anything constructed or stored below the recommended FCL, such as crawlspaces, basements, or storage rooms, could be subject to damage from flooding. Following best construction practices, areas below the FCL should not be used for the installation of furnaces, major electrical switchgear, or other fixed equipment susceptible to damage by floodwater.

### 5.0 WATERCOURSE SETBACK

- a. The property is located approximately 1,000m from the PNB of Cowichan River and 850m from the PNB of Koksilah River. Considering the significant separation between these watercourses, the property will not be affected by watercourse erosion.

## 6.0 CLOSURE

- a. Provided the recommendations in this memorandum are followed, the proposed development is considered safe from watercourse flood damage, considering a 200 year return period flood and accounting for climate change and sea level rise to the year 2100.
- b. Lewkowich Engineering Associates Ltd. appreciates the opportunity to be of service on this project. If you have any comments, or if we can be of further assistance, please contact us at your convenience.

Respectfully Yours,

**Lewkowich Engineering Associates Ltd.**



Jeff Scott, P.Eng.  
Geotechnical Engineer

April 28, 2023

Chris Hudec, M.A.Sc., P.Eng.  
Senior Project Engineer

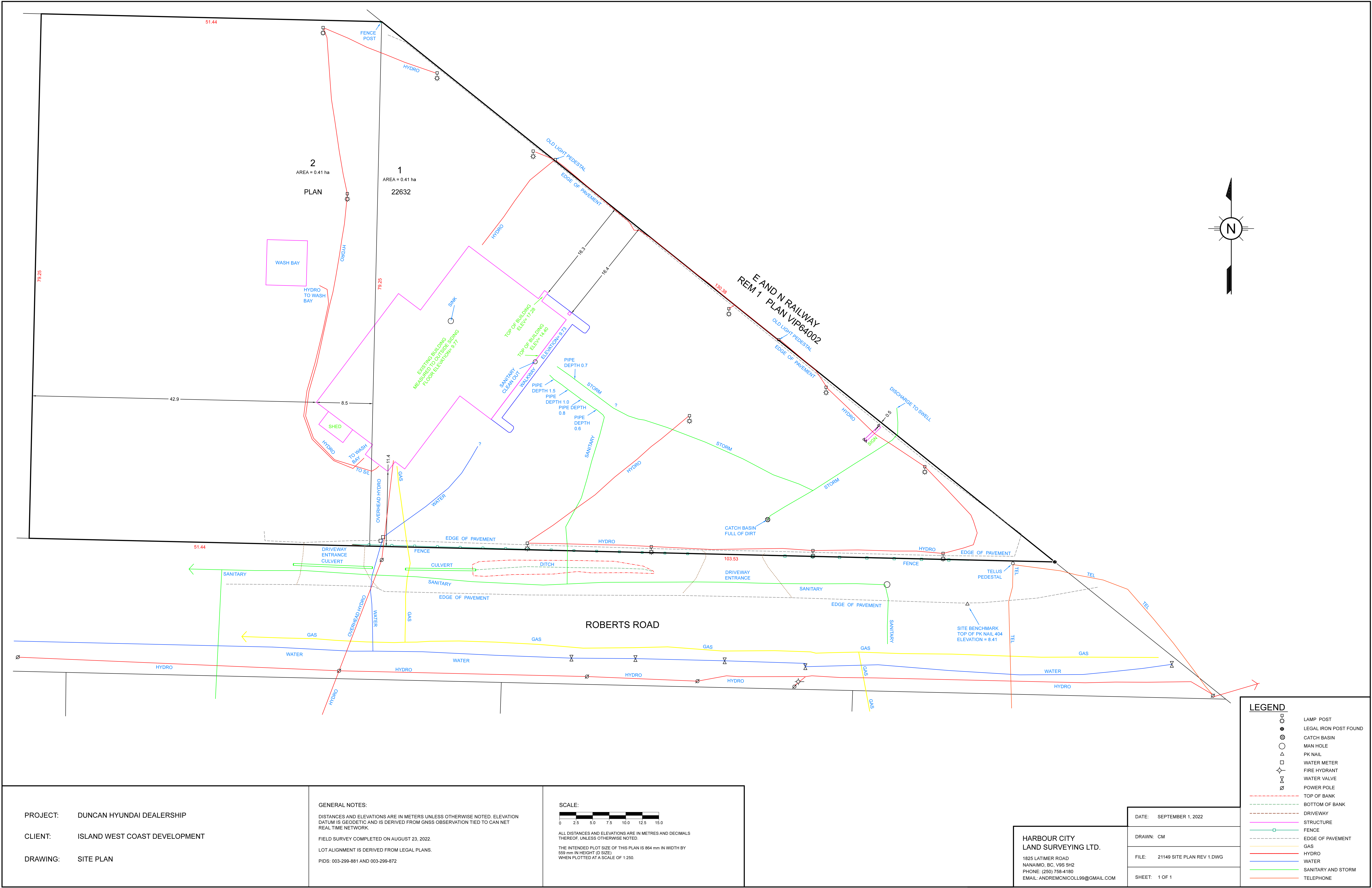
## 7.0 ATTACHMENTS

1. Harbour City Land Surveying Ltd., Duncan Hyundai Dealership, Site Plan, dated September 1, 2022.
2. Allan Lowe Architect Inc., Duncan Hyundai Showroom Addition, Site Plan, Proj No. 21.713, Sheet A1.0, dated January 25, 2023.
3. EGBC, Appendix I: Flood Assurance Statement.
4. CVRD, Natural Hazards Assurance Statement.

## 8.0 REFERENCES

1. Northwest Hydraulics Consultants Ltd., Updated Cowichan-Koksilah River Flood Mapping Project Final Report, Ref No. 3004940, dated February 17, 2021.
2. Northwest Hydraulics Consultants Ltd., 200 Year Flood with Year 2100 Climate Change Scenario Floodplain Map Sheet 4 of 7, Job No. 3004940, dated February 17, 2021.
3. Engineers and Geoscientists of British Columbia, Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC, Version 2.1, dated August 28, 2018.
4. BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Flood Hazard Area Land Use Management Guidelines, amended January 1, 2018.
5. Cowichan Valley Regional District, Bylaw No. 4381 - Cowichan/Koksilah Rivers Flood Management Bylaw, adopted February 9, 2022.





PROJECT: DUNCAN HYUNDAI DEALERSHIP

CLIENT: ISLAND WEST COAST DEVELOPMENT

DRAWING: SITE PLAN

GENERAL NOTES:

DISTANCES AND ELEVATIONS ARE IN METERS UNLESS OTHERWISE NOTED. ELEVATION DATUM IS GEODETIC AND IS DERIVED FROM GNSS OBSERVATION TIED TO CAN NET REAL TIME NETWORK.

FIELD SURVEY COMPLETED ON AUGUST 23, 2022.

LOT ALIGNMENT IS DERIVED FROM LEGAL PLANS.

PIDS: 003-299-881 AND 003-299-872

SCALE:

0 2.5 5.0 7.5 10.0 12.5 15.0

ALL DISTANCES AND ELEVATIONS ARE IN METERS AND DECIMALS THEREOF, UNLESS OTHERWISE NOTED.

THE INTENDED PLOT SIZE OF THIS PLAN IS 864 mm IN WIDTH BY 559 mm IN HEIGHT (D SIZE) WHEN PLOTTED AT A SCALE OF 1:250.

HARBOUR CITY  
LAND SURVEYING LTD.

1825 LATIMER ROAD  
NANAIMO, BC, V9S 5H2  
PHONE: (250) 758-4180  
EMAIL: ANDREMCNICOLL99@GMAIL.COM

DATE: SEPTEMBER 1, 2022

DRAWN: CM

FILE: 21149 SITE PLAN REV 1.DWG

SHEET: 1 OF 1

- LEGEND**
- LAMP POST
  - LEGAL IRON POST FOUND
  - CATCH BASIN
  - MAN HOLE
  - PK NAIL
  - WATER METER
  - FIRE HYDRANT
  - WATER VALVE
  - POWER POLE
  - TOP OF BANK
  - BOTTOM OF BANK
  - DRIVEWAY
  - STRUCTURE
  - FENCE
  - EDGE OF PAVEMENT
  - GAS
  - HYDRO
  - WATER
  - SANITARY AND STORM
  - TELEPHONE



ESQUIMALT AND NANAIMO RAILWAY

RETAINING WALL AND PLANTER

EXISTING BUILDING

SERVICE ADDITION

SHOWROOM ADDITION

ROBERTS ROAD

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**Revised**  
02/07/2023 11:34:50 AM

5	REVIEW	25 JAN '23
4	BP COORDINATION	13 SEP '22
3	BP COORDINATION	08 JUL '22
2	DEVELOPMENT PERMIT	13 APR '22
1	REVIEW	17 FEB '22
No.	Issued / Revisions	Date

118 - 21 Erie St. t 250.360.2888  
Victoria, British Columbia

2801 ROBERTS RD.  
DUNCAN, BC

project no.: 21.713

# A1.0

**ROBERTS ROAD**



## FLOOD ASSURANCE STATEMENT

Note: This statement is to be read and completed in conjunction with the current Engineers and Geoscientists BC *Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC* ("the guidelines") and is to be provided for flood assessments for the purposes of the *Land Title Act*, Community Charter, or the *Local Government Act*. Defined terms are capitalized; see the Defined Terms section of the guidelines for definitions.

To: The Approving Authority

Date: April 28, 2023 - LEA File E2188

Cowichan Valley Regional District

175 Ingram Street, Duncan, BC V9L 1N8

Jurisdiction and address

With reference to (CHECK ONE):

- ☐ *Land Title Act* (Section 86) – Subdivision Approval
- ☐ *Local Government Act* (Part 14, Division 7) – Development Permit
- ☐ Community Charter (Section 56) – Building Permit
- ☐ *Local Government Act* (Section 524) – Flood Plain Bylaw Variance
- ☒ *Local Government Act* (Section 524) – Flood Plain Bylaw Exemption

For the following property ("the Property"):

LOT 1, SECTION 12, RANGE 7, QUAMICHAN DISTRICT, PLAN 22632 ; 2801 Roberts Road, Duncan, BC

Legal description and civic address of the Property

The undersigned hereby gives assurance that he/she is a Qualified Professional and is a Professional Engineer or Professional Geoscientist who fulfils the education, training, and experience requirements as outlined in the guidelines.

I have signed, sealed, and dated, and thereby certified, the attached Flood Assessment Report on the Property in accordance with the guidelines. That report and this statement must be read in conjunction with each other. In preparing that Flood Assessment Report I have:

[CHECK TO THE LEFT OF APPLICABLE ITEMS]

- ☐ 1. Consulted with representatives of the following government organizations:  
\_\_\_\_\_
- ☒ 2. Collected and reviewed appropriate background information
- ☒ 3. Reviewed the Proposed Development on the Property
- ☐ 4. Investigated the presence of Covenants on the Property, and reported any relevant information
- ☐ 5. Conducted field work on and, if required, beyond the Property
- ☐ 6. Reported on the results of the field work on and, if required, beyond the Property
- ☒ 7. Considered any changed conditions on and, if required, beyond the Property
- 8. For a Flood Hazard analysis I have:
  - ☒ 8.1 Reviewed and characterized, if appropriate, Flood Hazard that may affect the Property
  - ☒ 8.2 Estimated the Flood Hazard on the Property
  - ☒ 8.3 Considered (if appropriate) the effects of climate change and land use change
  - ☒ 8.4 Relied on a previous Flood Hazard Assessment (FHA) by others
  - ☐ 8.5 Identified any potential hazards that are not addressed by the Flood Assessment Report
- 9. For a Flood Risk analysis I have:
  - ☐ 9.1 Estimated the Flood Risk on the Property
  - ☐ 9.2 Identified existing and anticipated future Elements at Risk on and, if required, beyond the Property
  - ☐ 9.3 Estimated the Consequences to those Elements at Risk

## FLOOD ASSURANCE STATEMENT

10. In order to mitigate the estimated Flood Hazard for the Property, the following approach is taken:
- ☐ 10.1 A standard-based approach
  - ☐ 10.2 A Risk-based approach
  - ☒ 10.3 The approach outlined in the guidelines, Appendix F: Flood Assessment Considerations for Development Approvals
  - ☐ 10.4 No mitigation is required because the completed flood assessment determined that the site is not subject to a Flood Hazard
11. Where the Approving Authority has adopted a specific level of Flood Hazard or Flood Risk tolerance, I have:
- ☐ 11.1 Made a finding on the level of Flood Hazard or Flood Risk on the Property
  - ☐ 11.2 Compared the level of Flood Hazard or Flood Risk tolerance adopted by the Approving Authority with my findings
  - ☐ 11.3 Made recommendations to reduce the Flood Hazard or Flood Risk on the Property
12. Where the Approving Authority has not adopted a level of Flood Hazard or Flood Risk tolerance, I have:
- ☒ 12.1 Described the method of Flood Hazard analysis or Flood Risk analysis used
  - ☒ 12.2 Referred to an appropriate and identified provincial or national guideline for level of Flood Hazard or Flood Risk
  - ☒ 12.3 Made a finding on the level of Flood Hazard or Flood Risk tolerance on the Property
  - ☒ 12.4 Compared the guidelines with the findings of my flood assessment
  - ☒ 12.5 Made recommendations to reduce the Flood Hazard or Flood Risk
- ☒ 13. Considered the potential for transfer of Flood Risk and the potential impacts to adjacent properties
- ☒ 14. Reported on the requirements for implementation of the mitigation recommendations, including the need for subsequent professional certifications and future inspections.

Based on my comparison between:

[CHECK ONE]

- ☐ The findings from the flood assessment and the adopted level of Flood Hazard or Flood Risk tolerance (item 11.2 above)
- ☒ The findings from the flood assessment and the appropriate and identified provincial or national guideline for level of Flood Hazard or Flood Risk tolerance (item 12.4 above)

I hereby give my assurance that, based on the conditions contained in the attached Flood Assessment Report:

- ☐ For subdivision approval, as required by the *Land Title Act* (Section 86), "that the land may be used safely for the use intended":
- [CHECK ONE]
- ☐ With one or more recommended registered Covenants.
  - ☐ Without any registered Covenant.
- ☐ For a development permit, as required by the *Local Government Act* (Part 14, Division 7), my Flood Assessment Report will "assist the local government in determining what conditions or requirements it will impose under subsection (2) of this section [Section 491 (4)]".
- ☐ For a building permit, as required by the *Community Charter* (Section 56), "the land may be used safely for the use intended":
- [CHECK ONE]
- ☐ With one or more recommended registered Covenants.
  - ☐ Without any registered Covenant.
- ☐ For flood plain bylaw variance, as required by the *Flood Hazard Area Land Use Management Guidelines* and the *Amendment Section 3.5 and 3.6* associated with the *Local Government Act* (Section 524), "the development may occur safely".
- ☒ For flood plain bylaw exemption, as required by the *Local Government Act* (Section 524), "the land may be used safely for the use intended".



# FLOOD ASSURANCE STATEMENT

I certify that I am a Qualified Professional as defined below.

April 28, 2023

Date

Jeff Scott, P.Eng.

Prepared by

Reviewed by

Jeff Scott, P.Eng.

Name (print)

Name (print)

Jeff Scott

Signature

Signature

1900 Boxwood Road

Address

Nanaimo, BC V9S 5Y2

250-756-0355

Telephone

jscott@lewkowich.com

Email



(Affix PROFESSIONAL SEAL here)

If the Qualified Professional is a member of a firm, complete the following:

I am a member of the firm Lewkowich Engineering Associates Ltd.  
and I sign this letter on behalf of the firm. (Name of firm)

# Geohazard Assurance Statement

For Development Approvals and Building Permits

Please complete this form in its entirety. If fields are left blank or responses are inconsistent, the form will be returned.

## A. Project Information

Date April 28, 2023 CVRD File No. \_\_\_\_\_

### Property Information

Project Name & Description Duncan Hyundai Dealership Addition

Legal Description LOT 1, SECTION 12, RANGE 7, QUAMICHAN DISTRICT, PLAN 22632

Site Address 2801 Roberts Road, Duncan, BC PID 003-299-872

### Client Information

Name Island West Coast Developments Ltd.

Role (check on or more) ☐ Property Owner ☒ Developer ☐ Other \_\_\_\_\_

Client Address 2214 McCullough Road, Nanaimo, BC V9S 4M8

### Qualified Professional

Name Jeff Scott, P.Eng.

EGBC Designation(s) ☒ P.Eng. ☐ P. Geo. ☐ Eng.L. ☐ Geo.L.

Firm Name<sup>1</sup> Lewkowich Engineering Associates Ltd.

Email Address geotech@lewkowich.com

Phone Number(s) 250-756-0355

Mailing Address 1900 Boxwood Road, Nanaimo, BC V9S 5Y2

### Geophysical Hazard Risk Assessment Report Reference (the Report)

Title LEA File E2188.01 - Flood Construction Level Date April 28, 2023

1. The Qualified Professional is a representative of the firm, and submits this Assurance Statement on behalf of the firm.



## Geohazard Assurance Statement

For Development Approvals and Building Permits

### B. Assurance

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

<input type="checkbox"/> <b>Development Permit:</b>	The Report will “assist the local government in determining what conditions or requirements under [Section 920] subsection (7.1) it will impose in the permit”, as required by the Local Government Act (Sections 488 and 489).
<input type="checkbox"/> <b>Building Permit:</b> <input type="checkbox"/> Community Charter <input type="checkbox"/> Seismic Slope	“The land may be used safely for the use intended” , as required by the Community Charter (Section 56),  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
<input checked="" type="checkbox"/> <b>Floodplain Management Bylaw Exemption:</b>	“The land may be used safely for the use intended”, as required by the Local Government Act (Section 524).
<input type="checkbox"/> <b>Subdivision</b>	The land may be used safely for the use intended”, as required by the Land Title Act (Section 86).
<input type="checkbox"/> <b>Other:</b> (e.g. Zoning Bylaw Amendment Official Community Plan Amendment Temporary Use Permit, etc.)	Insert statement as appropriate:

### C. EGBC Professional Practice Guidelines

The Report and this Assurance Statement were completed in accordance with the current version of one or both of the following Professional Practice Guidelines issued by the Engineers and Geoscientists of BC (EGBC):

- 2018 Legislated Flood Assessments in a Changing Climate in BC, and
- 2010 Legislated Landslide Assessments for Proposed Residential Development in British Columbia” (“EGBC Landslide Guidelines”).

These two documents are collectively referred to as the “EGBC Guidelines”. The italicized words in this Assurance Statement are defined in the EGBC Guidelines.

The Report has been prepared pursuant to the following EGBC Guidelines (check one or both as applicable).

- ☒ EGBC Flood Guidelines  
☐ EGBC Landslide Guidelines

## 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, *Show the spatial extent of hazard assessment zones.*
- ☒ 2. Development proposal site plan — 8.5 x 11 size. *Show the spatial extent of the study area, the hazard area and locations of mitigative features, where applicable. 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. *Specify ALL that apply.*
  - ☐ residential
  - ☐ industrial
  - ☒ commercial
  - ☐ institutional
  - ☐ other \_\_\_\_\_

If the Report deviates materially from the appropriate EGBC Guidelines, please explain.

Floodplain mapping prepared by a specialist in accordance with current guidelines is available.



## E. Technical Requirements

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

### Report Content

The Report contains the following items:

- ☒ 4. Relevant information pertaining to the Property and pertinent potential hazards from appropriate background sources, including the CVRD online library.
- ☒ 5. Complete listing of previous reports and other relevant information that has been reviewed in preparing the Report, including that from the CVRD online library.
- ☒ 6. Maps, illustrations and diagrams to illustrate areas referred to in the Report.
- ☐ 7. Description of field work conducted on and, if required, beyond the Property.
- ☐ 8. Contact and consultation with the Cowichan Valley Regional District. Provide name and title of contact:  
\_\_\_\_\_
- ☒ 9. Review of relevant CVRD bylaws and other statutory requirements.
- ☐ 10. Restrictive covenants registered against the Property title that pertain to geohazards (if registered, the Report provides relevant information about the covenants).
- ☐ 11. Notation of any visibly apparent geohazards identified in background reports, which are not identified and addressed in the Report.  
☐ Yes   ☐ No  
Comment: \_\_\_\_\_
- ☒ 12. Does the Report rely on one or more Supporting Reports, each of which is independently reviewed, signed and sealed.  
☒ Yes   ☐ No  
If yes, have the supporting reports been reviewed by:  
☒ staff of the Report author's company; or  
☐ a third party?
- ☐ 13. For subdivision approval, the Report addresses geohazards for:
  - ☐ the parent parcel prior to subdivision; and
  - ☐ any lots to be created (including any remainder)
  - ☐ adjacent properties representing a source of hazard, or are relevant to include in assessment of risk transfer with the proposed lot

# Geohazard Assurance Statement

For Development Approvals and Building Permits

## Geohazard Assessment, Risk Acceptability and Risk Transfer

- ☒ 14. In considering the above-noted potential hazards that may affect the property, I have:
- ☒ reviewed and characterized the potential hazard(s);
  - ☐ estimated the potential frequency and magnitude of the potential hazard(s);
  - ☒ relied on Supporting Report(s) 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 geohazards that are assessed in the Report and any Supporting Reports, and accurately reflects the contents of those documents.
- ☒ 16. The CVRD has adopted 'Natural Hazard Life Loss Policy', which provides a specific level of geohazard risk tolerance. I have included a geohazard risk tolerance table in the form presented in Section H, and which:
- ☒ lists all of the potential hazards addressed by the Report and any Supporting Reports;
  - ☐ provides an annualized loss of life frequency and acceptability threshold classification (ALARP/Unacceptable) for the unmitigated condition;
  - ☒ proposes mitigative measures to appropriately reduce the geohazard risk if the quantified geohazard risk exceeds thresholds considered intolerable by the CVRD; and
  - ☒ provides an annualized loss of life frequency and acceptability threshold classification (ALARP/Unacceptable) for the mitigated condition (the residual risk).
- ☐ 17. Following consultation with the CVRD, the Report proposes an alternative approach to risk reduction.
- ☒ 18. The Report describes the potential transfer of geohazard risk to other properties or infrastructure as a result of the proposed project (*including any proposed structural mitigation works*) and:
- ☒ considered the potential for transfer of geohazard risk;
  - ☒ concludes that there is no transfer of geohazard risk;
  - ☐ identifies the potential transfer of geohazard risk and proposes measures to offset such risk transfer.



# Geohazard Assurance Statement

For Development Approvals and Building Permits

## Mitigation and Design Recommendations

The Report contains the following items:

- ☐ 19. Clearly identified building locations which are acceptable according to risk tolerance standards, ancillary structures, and onsite utility services (as applicable, such as a septic field) out of the geohazard area as a preferred development alternative.
- ☐ 20. Implementation steps for the identified mitigation works (in terms of design, construction and approval).
  - ☐ Not Applicable
- ☐ 21. Commentary on the effectiveness of proposed mitigation works in terms of risk reduction and identify residual risks, and identification of any residual risk.
- ☒ 22. Proposed Flood Construction Level (FCL) for future development, including specification of an appropriate technique of achieving the FCL.
- ☐ 23. Proposed watercourse or marine shoreline setback, which is clearly referenced from the natural boundary, top of bank or high tide line.
  - ☐ Not Applicable
- ☐ 24. A reference to proposed operation and maintenance actions that will be necessary in order for the level of safety to be maintained in the future, with indication of who should be responsible for those actions and when.

## Riparian Area Regulation (if applicable)

- ☐ 25. If a Riparian Area Regulation assessment has been completed for the property, and it has been reviewed to identify and avoid conflict with Report recommendations for hazard mitigation.
  - ☐ Yes ☐ No ☐ Uncertain

## Reviewer

- ☒ 26. The Report has received appropriate technical review which is consistent with the EGBC Professional Practice Guidelines, and the name of the reviewer is noted in the Report and below (insert name and professional designation):

Name Chris Hudec, M.A.Sc., P.Eng.

EGBC Designation(s) ☒ P.Eng. ☐ P. Geo. ☐ Eng.L ☐ Geo.L

## F. CVRD Supplemental Requirements

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

- ☒ 27. Permission is granted to the CVRD 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.
- ☒ 28. Methodology used in the Report is described in sufficient detail to facilitate a review of the study by CVRD staff or qualified third party professionals when necessary.
- ☒ 29. This Assurance Statement may be relied upon for permitting purposes for a period of one year after submittal or until major earthworks or drainage diversions take place in the study area, whichever comes first. Beyond that time, CVRD should contact the QP for an updated Assurance Statement if needed.
- ☒ 30. Professional liability insurance coverage of at least \$1 million per claim is carried by the QP.
- ☒ 31. Third party review or supplemental information may be required at the discretion of the CVRD.
- ☐ 32. Permission is granted to the CVRD to include the Report in the online CVRD geohazard report library (as background information, not for other parties to rely on).



## H. Geohazard Summary Table

This geohazard risk assessment covers: (check one or both)

☐ Individual Risk Assessment

☐ Group Risk Assessment



The geohazard report and/or any supporting reports addresses the following hazard types:

RISK TOLERANCE THRESHOLDS															
TYPE	SUPPORTING REPORT (have other reports pertaining to this property been referenced in the development of this assessment?)		NOT RE-VIEWED	Annual Risk of Fatality - Unmitigated								Annual Risk of Fatality - Mitigated		Acceptability Threshold Classification - Mitigated	
	YES	NO		YES	If YES Report: Name, Date & Author	Acceptability Threshold Classification - Unmitigated		Proposed Mitigation Measures		Annual Risk of Fatality - Mitigated	Acceptability Threshold Classification - Mitigated				
						Unacceptable	ALARP	YES	NO		Unacceptable	ALARP			
LANDSLIDE PROCESSES															
Rock Fall	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>			
Rock Slide	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>			
Rock Avalanche	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>			
Debris Flow	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>			
SNOW AVALANCHES															
Dry	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>			
Wet	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>			
FLUVIAL PROCESSES															
Inundation by Floodwaters	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NHC, 2021		not reviewed	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	not reviewed	<input type="checkbox"/>	<input type="checkbox"/>		
Bank Erosion and Scour	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NHC, 2021		not reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not reviewed	<input type="checkbox"/>	<input type="checkbox"/>		
Sediment Deposition	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Surface Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
MARINE PROCESSES															
Coastal Flooding	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Coastal Shoreline Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Tsunami – Earthquake Induced	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Tsunami – Submarine Landslide-Induced	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Tsunami – Subaerial Landslide-Induced	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
EARTHQUAKE															
Ground Shaking	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Ground Rupture	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Liquefaction	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Ridgetop Spreading	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Co-seismic Landslides	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		

## Geohazard Assurance Statement

For Development Approvals and Building Permits

### G. Qualified Professional (QP)

#### Prepared by: (QP of Record)

Name Jeff Scott, P.Eng.

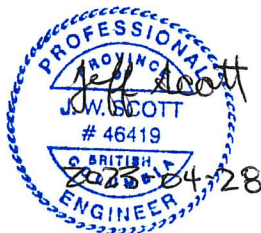
Designation ☒ P.Eng. ☐ P. Geo. ☐ Eng.L ☐ Geo.L

#### Reviewed by:

Name Chris Hudec, M.A.Sc., P.Eng.

Designation ☒ P.Eng. ☐ P. Geo.

#### Professional Seal, Signature and Date:



- ☒ I am a Qualified Professional as defined in the EGBC Guidelines, and I fulfill the education, training and experience requirements as outlined in the EGBC Guidelines
- ☒ I have signed, sealed, dated and thereby certify, this Assurance Statement and the attached report.