



**DEVELOPMENT PERMIT NO. 830-266**

OWNERS: Glen Allen Nevokshonoff  
Wendy Lyn Nevokshonoff  
140 Hidden Creek Circle NW  
T3J 6H5  
*As joint tenants*

1. This Lakes 100 m and Riparian Areas Regulation Development Permit is issued subject to compliance with all the Bylaws of the Regional District applicable thereto, except as specifically varied or supplemented by this Permit.
2. This Permit applies only to the lands described below:  
  
Lot 2 Section 30 Township 22 Range 11 and of Section 25 Township 22 Range 12 Wet of the 6th Meridian Kamloops Division Yale District Plan 5519 (PID: 009-782-222), which property is more particularly shown outlined in bold on the Location Map attached hereto as Schedule A.
3. This Permit is issued pursuant to Sections 13.3 and 13.4 of the "Electoral Area F Official Community Plan Bylaw No. 830, as amended," for construction of a new accessory building, as more particularly shown on the Site Plan attached hereto as Schedule B.
4. An amendment to the Permit will be required if development is not in substantial compliance with this Permit.
5. This Permit is issued based on the Hydrogeology Assessment submitted by Kala Geosciences Ltd., dated June 11, 2019, which contains recommendations and/or conditions regarding site development, and which form conditions to the issuance of this permit, attached hereto as Schedule C, which satisfies the requirements of the Lakes 100 m Development Permit Area as set out in Section 13.3 of the Electoral Area F Official Community Plan Bylaw No. 830.
6. This Permit is issued based on the Riparian Areas Assessment submitted by Triton Environmental Consultants Ltd., dated May 2, 2019, which contains recommendations and/or conditions regarding site development, and which form conditions to the issuance of this permit, attached hereto as Schedule D, which satisfies the

requirements of the Riparian Areas Regulation Development Permit Area as set out in Section 13.4 of the Electoral Area F Official Community Plan Bylaw No. 830.

7. It is understood and agreed that the Regional District has made no representation, covenants, warranties, guarantees, promises or agreement (verbal or otherwise) with the developers other than those in the permit.
8. This Permit shall inure to the benefit of and be binding upon the parties hereto and their respective heirs, executors, administrators, successors and assigns.
9. This Permit is NOT a building permit.

AUTHORIZED AND ISSUED BY the Manager of Development Services of the Columbia Shuswap Regional District on the 15 day of AUGUST, 2019.

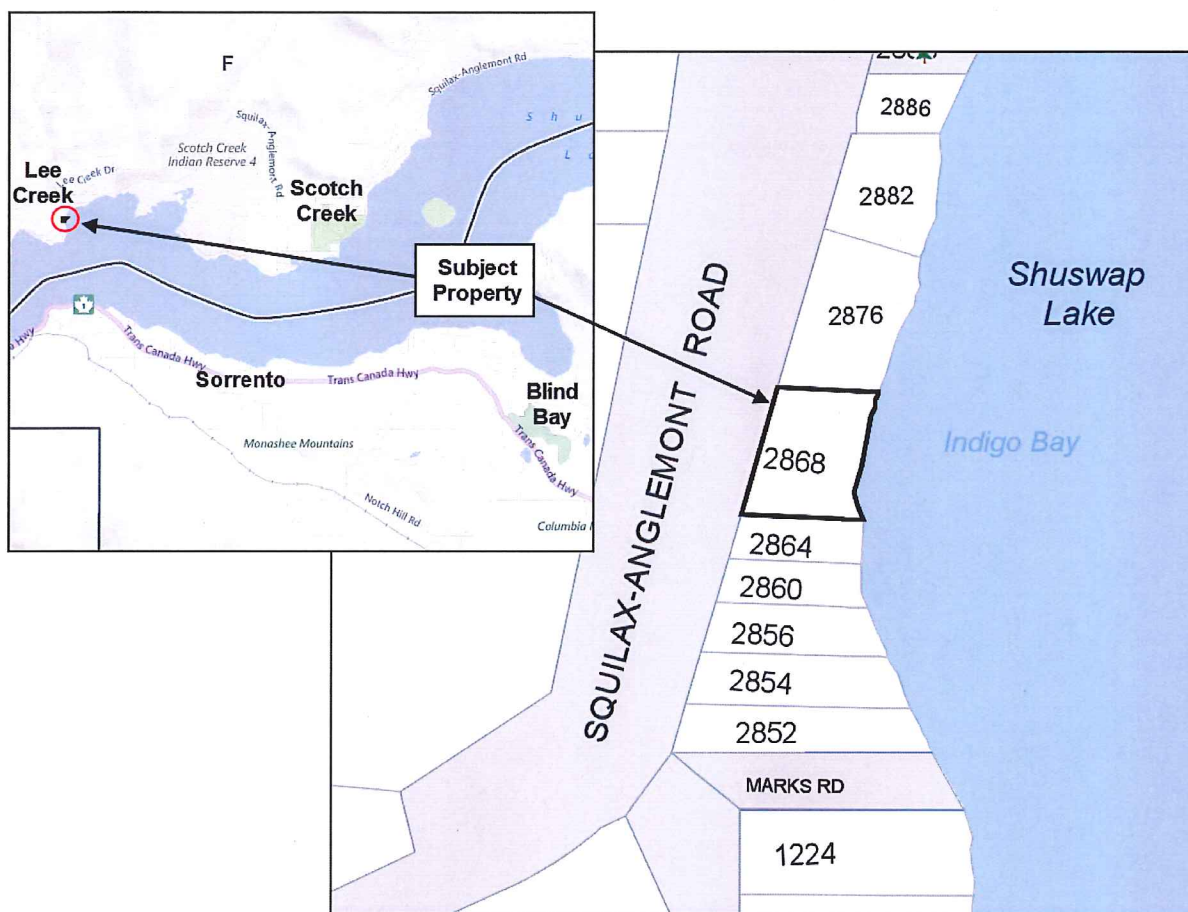


Gerald Christie  
Manager, Development Services

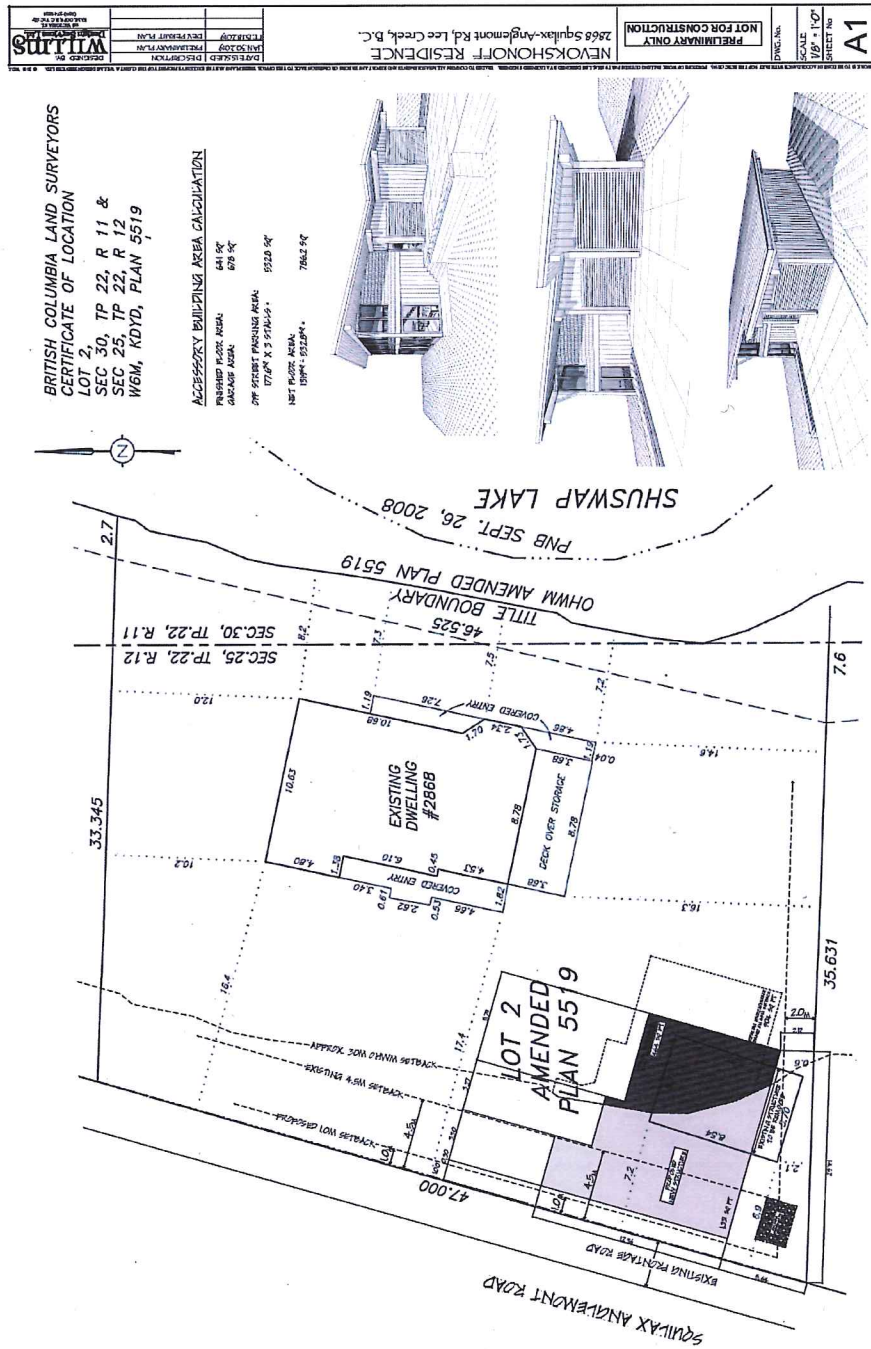
**PLEASE NOTE:**

- 1) Pursuant to Section 504 of the *Local Government Act*, if the development of the subject property authorized by this permit is not substantially commenced within two years after the issuance of this permit, the permit automatically lapses.
- 2) This Permit addresses Local Government regulations only. Further permits or authorizations may be required from Provincial and Federal governments. It is the owner's responsibility to call Front Counter BC at 1-877-855-3222 regarding this project.

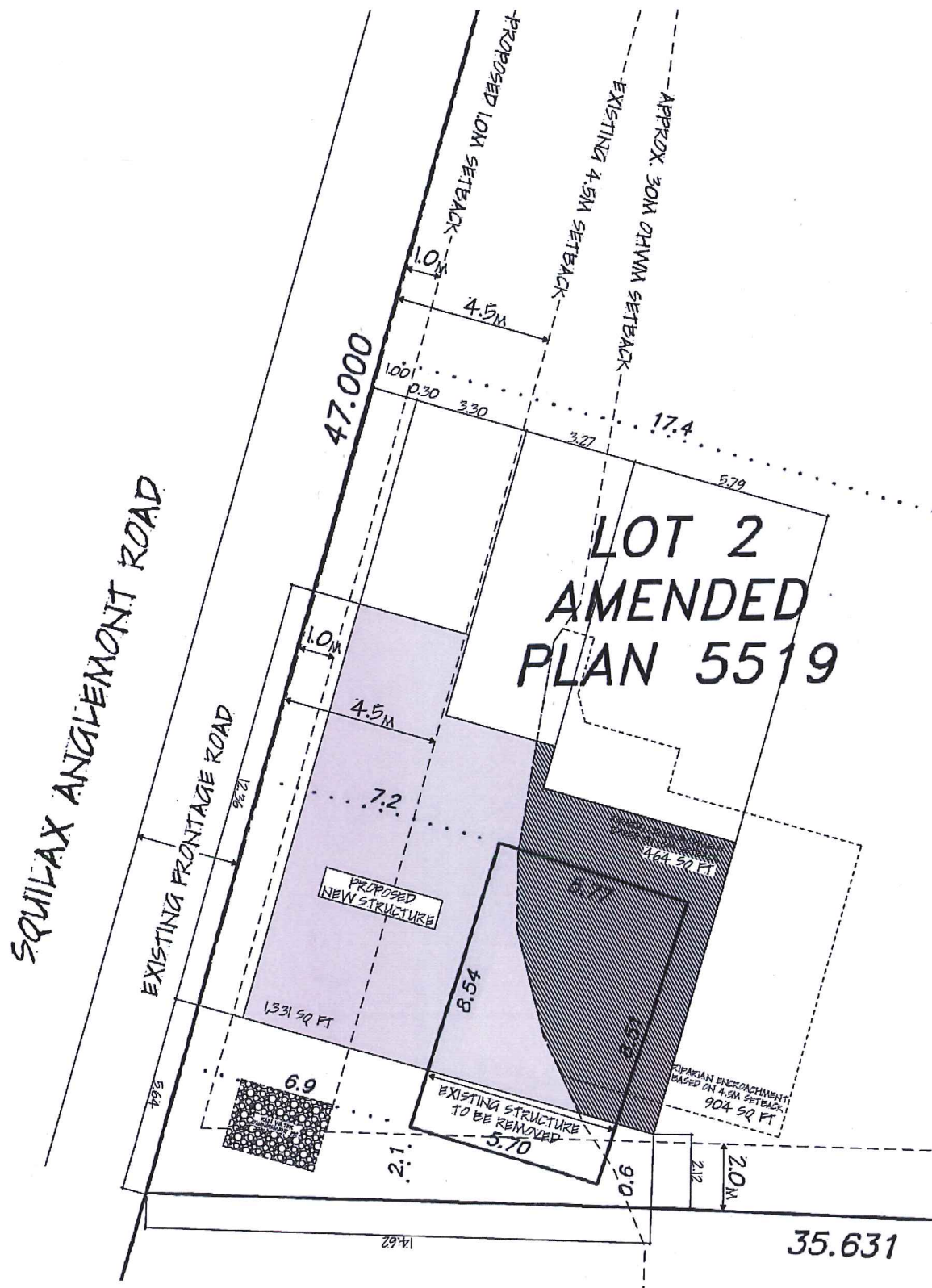
# **Schedule A** Location Map



## Schedule B Site Plan







## Schedule C

### Hydrogeology Assessment

DP830-266  
PL20190000097



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Groundwater • Wastewater • Environmental

DS Received: June 11, 2019

Date: June 11, 2019  
File: R19058

Glen Nevokshonoff  
2868 Squilax Anglemont Road  
Lee Creek, BC  
VOE 1M4

Via Email: [Glen Nevokshonoff \(gnevokshonoff@gmail.com\)](mailto:gnevokshonoff@gmail.com)

Attn: Glen Nevokshonoff  
Property Owner

Re: **CSRD NORTH SHUSWAP OCP - DP BYLAW 830**  
**HYDROGEOLOGICAL ASSESSMENT**  
**2868 SQUILAX ANGLEMONT ROAD, LEE CREEK, BC**  
**LOT 2, SEC 30, TWP 22, RGE 11 & OF SEC 25, TWP 22, RGE 12**  
**W6M, KDYD, PL KAP5519, PID: 009-782-222**  
**REPORT OF FINDINGS**

#### 1.0 INTRODUCTION AND BACKGROUND

Kala Geosciences Ltd. ("Kala") was retained by Mr. Glen Nevokshonoff (the "Client") to undertake a hydrogeological assessment pertinent to a proposed residential development (the "Services") located at 2868 Squilax Anglemont Road, Lee Creek, BC, legally described as Lot 2, Section (Sec) 30, Township (Twp) 22, Range (Rge) 11 and of Sec 25, Twp 22, Rge 12, Plan (Pl) KAP5519, West of the 6th Meridian (W6M), Kamloops Division of Yale District (KDYD), Parcel Identifier (PID): 009-782-222 (the "Subject Property"). The area of the lot is approximately 0.17 hectares (ha). A Subject Property location diagram is shown in Figure 1.<sup>1</sup>

The Client proposes to replace the existing garage with a new garage having an area of 63.0 m<sup>2</sup> (678 ft<sup>2</sup>), and an off-street parking space. The footprint of the proposed development is approximately 123.7 m<sup>2</sup> (1,331 ft<sup>2</sup>) (Figure 2).<sup>2</sup> It is Kala's understanding that the setback distance to a provincial public highway (Squilax-Anglemont Road) will be reduced to 1 m, which has been approved by BC Ministry of Transportation and Infrastructure via Permit 2019-00931.

1314 McGill Road • Kamloops • British Columbia • Canada • V2C 6N6  
Tel: (250) 372-9194 Fax: (250) 372-9398 Email: [info@kalageo.com](mailto:info@kalageo.com) Web: [kalageo.com](http://kalageo.com)

R19058 – Hydrogeological Assessment - CSRD North Shuswap OCP Bylaw No. 830  
 2868 Squilax-Anglemont Road, Lee Creek, BC  
 Lot 2, Sec 30, Twp 22, Rge 11 and of Sec 25, Twp 22,  
 Rge 12, PI KAP5519, W6M, KDYD, PID: 009-782-222  
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Columbia Shuswap Regional District (CSRD) Official Community Plan (OCP) Bylaw No. 830 pertinent to the Electoral Area 'F' indicates a hydrogeological assessment is required prior to issuance of a development permit for:<sup>3</sup>

- a) any residential, commercial or industrial development which exceeds the following:
  - (i) Removal, alteration, disruption or destruction of vegetation involving more than 30% of the parcel area; or
  - (ii) Construction or erection of buildings and structures (including decks, stairs, and balconies), and non-structural impervious surfaces (e.g. paved driveway) with a sum total footprint (measured from the outermost portion of the buildings or structures) in excess of 450 m<sup>2</sup> (4,843.76 ft<sup>2</sup>) or for parcels 0.10 ha (0.25 ac) or smaller, a combined site coverage totaling 30%;
- b) Installation, alteration, or replacement of (or a portion of) a sewerage system.

Where a development proposal involves multiple buildings, structures or phases, calculation of the size of the development shall include the entire build-out of the development.

The hydrogeological assessment shall be used to determine the conditions of the Development Permit and shall include:<sup>3</sup>

- a) Site map showing area of investigation, including existing and proposed: buildings, structures, septic tank and field locations, drinking water sources and natural features;
- b) Existing vegetation and any proposed vegetation removal;
- c) Assessment of hydrogeology, including soil types, drainage characteristics, seepage zones, springs and seasonally saturated areas, groundwater depth, flow direction and pathways, and shallow bedrock;
- d) The suitability for site soils to accept stormwater infiltration and post-development landscape irrigation;
- e) Potential impacts to Shuswap Lake; and
- f) Recommendations and mitigative measures.

Historical and proposed vegetation removal is over 30% of parcel area at the Subject Property, which triggers this hydrogeological study.

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## 2.0 FINDINGS

Kala references the findings of the hydrogeological assessment to CSRD Development Permit Area (DPA) Bylaw 830.<sup>3</sup>

### 2.1 Subject Property Plan and Fieldwork

A site plan showing all requested items is attached as Figure 2. The proposed building footprint is greater than 353 m above sea level (ASL), higher than the 1:200 year flood elevation of 351 m pertinent to Shuswap Lake at the Subject Property.

The Subject Property is accessed from Squilax-Anglemont Road. The site relief varies from 348.7 m at the eastern property line to 361 m at the western property line. The Subject Property slopes from west to east at an average of 30%.

Kala personnel supervised the advancement of two (2) exploratory auger holes and carried out two (2) permeameter tests in the western section of the Subject Property, near the location of the proposed structure, on May 15, 2019. According to the drilling, subsurface soils comprised sand (fine to coarse), some silt, little gravel (sub-angular), trace clay, compact, damp, from 0.5 m to 1.5 m. Bedrock was not encountered within 1.5 m of ground surface at the two (2) auger holes. Groundwater was not intercepted at the two (2) auger holes to the investigation depths of 1.5 m. Permeameter tests suggest a saturated hydraulic conductivity of 210 to 500 mm/d for the soil below 0.5 m of ground surface. Test pit (auger hole) locations are provided in Figure 2. Subject Property photographs are shown within Figure 3.

### 2.2 Existing Vegetation and Proposed Vegetation Removal

The Subject Property was previously developed, and contains a three (3) bedroom, four (4) bathroom home. The existing garage will be demolished and replaced with a new garage and off-street parking space. The Subject Property is partially covered with Douglas fir, hemlock and larch. Historical and proposed vegetation removal is over 30% of parcel area at the Subject Property, although the Subject Property was landscaped/revegetated.

### 2.3 Hydrogeology and Subsurface Conditions

The Subject Property is situated at the foot of Adams Plateau. Bedrock depth would be greater than 17 m based on the well log for a well having well tag number (WTN) of 56330, which was completed in October 1986 within the Subject Property.<sup>4</sup> The static water level (SWL) was 8.5 m below ground surface (mbgs) in October 1986. The unconsolidated surficial deposits comprised sand and gravel. Groundwater at the Subject Property is recharged by lateral flow from the northerly hills. Groundwater flows easterly towards Shuswap Lake (local base level). The groundwater depth is greater than 8 m within the southwest quadrant of the Subject Property. The shallow, unconsolidated deposits are dominated by colluvium, having a saturated conductivity of 210 to 500 mm/d.

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## 2.4 Subject Property Suitability

For a 5-year storm event, the 24-hour precipitation is 33.5 mm based on "Short Duration Rainfall Intensity-Duration-Frequency Data" from the Salmon Arm Station, which is the closest station to Lee Creek, BC, calculated by Environment Canada.<sup>5</sup>

The onsite soil is sand, some silt, little gravel, trace clay and has a conductivity of 210 to 500 mm/d, which is significantly greater than the precipitation intensity of 33.5 mm/d during a 5-year storm event. Little to no surface runoff would be expected within the Subject Property under a 5-year storm event and normal conditions.

As the footprint of the proposed development is 123.7 m<sup>2</sup>, the approximate water that would need to be managed from the proposed development during 24 hours of a 5-year storm event is:

$$123.7 \text{ m}^2 \times \{[(33.5 \text{ mm}/24 \text{ h}) / (1000 \text{ mm}/\text{m})] \times 24 \text{ h}\} = 4.1 \text{ m}^3$$

*Where 33.5 mm/24 h is the rainfall of a 24-hour period during a 5-year storm.*

Of the 4.1 m<sup>3</sup> of runoff, approximately 2.1 m<sup>3</sup> is from the proposed garage and 2.0 m<sup>3</sup> is from the proposed off-street parking area.

The onsite soil has a vertical permeability of 210-500 mm/d, and little to no surface runoff would be expected within the Subject Property under a 5-year storm event as long as the stormwater from impervious surfaces associated with the proposed development is properly managed. Kala recommends that two (2) downspouts be used to deliver the runoff generated at the proposed garage to two (2) infiltration pits. Each infiltration pit should have a radius of 0.6 m and a depth of 1.2 m. The two (2) downspouts should each be connected to an infiltration pit using a slotted PVC pipe. A square rain water disbursement pit having a dimension of 2 m by 2 m horizontally and a depth of 1 m should be completed to intercept the runoff generated at the off-street parking area. The runoff generated at the off-street parking area should be collected using a basin, and then delivered to the rain water disbursement pit using a 101 mm diameter perforated PVC pipe wrapped with geotextile. The infiltration pits and rain water disbursement pit should be filled with sand or gravel. Subsurface soils at the Subject Property will assimilate anticipated stormwater loading rates.

Overland flow into Shuswap Lake will be minimal if the stormwater is managed as described above or similar. Therefore, the proposed development will have a negligible impact on Shuswap Lake. The Subject Property is suitable for post-development landscape irrigation.

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### 3.0 CONCLUSIONS AND RECOMMENDATIONS


Based on the scope of services described herein, the following conclusions and recommendations are provided for Client, owner and regulatory consideration:

- a) The Subject Property was previously developed and contains a three (3) bedroom, four (4) bathroom home. The proposed new garage and off-street parking area will be constructed at the location of the existing garage. Vegetation removal will be minimal;
- b) Kala estimates that the stormwater quantity generated from the proposed development during 24 hours of a 5-year storm event is a maximum of 4.1 m<sup>3</sup>;
- c) The Subject Property is suitable to accept stormwater infiltration and post-development landscape irrigation;
- d) Stormwater discharge from the proposed development will unlikely have any detrimental impact on Shuswap Lake if addressed in a controlled and managed manner;
- e) Eaves troughs should discharge to collective subsurface pits filled with sand or gravel;
- f) Concrete or asphalt parking surfaces should drain away to a rain water disbursement pit; and
- g) Overland flow into Shuswap Lake will be minimal from the Subject Property if the recommendations of this report are followed in conjunction with best management practices for site development.


### 4.0 CLOSURE

Please find attached a detailed description of the terms, limitations and constraints applicable to Kala's involvement within this project and the uses of this report. If you have any questions or concerns please contact our office at your convenience.

Sincerely;  
 Kala Geosciences Ltd.

Per:   
 Paul J. Blackett, P.Tech., ROWP, CESA  
 Project Manager



Per:   
 Yanfeng Yin, Ph.D., P. Geoscientist  
 Senior Hydrogeologist



Distribution: 1 Digital Copy – Glen Nevokshonoff, Property Owner  
 1 Digital Copy – CSRD, Planning Department  
 1 Digital Copy – Kala Geosciences Ltd.

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## REFERENCES

Kala acknowledges the following documents and references in the preparation of this report:

1. Columbia Shuswap Regional District Interactive Mapping.
2. Willms Design Service Ltd., 2019, January 30. NEVOKSHONOFF RESIDENCE. 2868 Squilax-Anglemont Rd, Lee Creek, B.C
3. Columbia Shuswap Regional District. (2009, June 29). Electoral Area 'F' Official Community Plan Bylaw No. 830.
4. BC Ministry of Environment & Climate Change Strategy, Water Resource Atlas.
5. Environment Canada. *National Climate Data and Information Archive, IDF files*. Retrieved from [http://www.climate.weatheroffice.gc.ca/prods\\_servs/index\\_e.html](http://www.climate.weatheroffice.gc.ca/prods_servs/index_e.html)

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**Standard of Care**

This study and report has been prepared in accordance with generally accepted hydrogeological and environmental practices. Where possible and applicable Kala has referenced and undertaken authorized commissions in accordance with governing regulatory guidelines. No other warranty, expressed or implied, is provided.

**Reporting**

This report has been prepared for the specific site, design objective, development and purpose that was described to Kala by the Client and summarized in the report of findings. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the report are only valid to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Kala, unless Kala was specifically requested by the Client to review and revise the report in light of such alteration or variation. Recommendations from Kala to the Client pertinent to additional and follow up site inspections are mandatory.

**Preliminary Site Investigations & Environmental Site Assessments**

This section pertains to the completion of Kala reports pertinent to Preliminary Site Investigations (PSIs), Detailed Site Investigations (DSIs), and Environmental Site Assessments (ESAs) as defined by the BC Ministry of Environmental Contaminated Sites Regulation, and Environmental Site Assessments (ESA) as defined by CSA Standard Z768-01 (R2012) - Phase I Environmental Site Assessment

This report authorizes the use of this Kala report by the Client as named herein, its solicitors, lenders, engineers and consultants to the same extent as the Client, and confirms that the Client can rely on this report for financial purposes. This report may be relied upon by the supporting financial institutions and related solicitors, lenders, engineers and consultants to the same extent as the original Client. Reporting is confidential and intended to provide the Client with a baseline assessment of environmental conditions within and adjacent to the subject property as previously defined. Reporting is based on data, information and materials collected during the performance of a (PSI)/(ESA). A PSI or ESA is based solely on site conditions of the subject property during the time of the site visits as described in this report. In evaluating a site Kala relies in good faith on historical information provided by individuals and agencies noted within the report. Kala does not warrant any property, explicitly or implicitly. Although every effort is made to verify the authenticity of pertinent information, Kala assumes no responsibility for any deficiency, misstatement or inaccuracy contained within a report as a result of omissions, misrepresentation or fraudulent acts of the individuals or parties interviewed. Kala generally deems a Stage 1 or 2 PSI, or a Phase 1 or 2 ESA to be valid for a particular site for no more than 5 years from the published date of issue. Unless specifically stated otherwise, the applicability and reliability of the findings, recommendations, suggestions or opinions expressed in the report are only valid to the extent that there has been no material alteration to or variation from any of the information provided to Kala. If new information about the environmental conditions at the site is found, the information should be provided to Kala so that it can be reviewed and revisions to the conclusions and/or recommendations can be made, if warranted.

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The conclusions presented in this report were based, in part, on visual observations of the site and structures. Our conclusions cannot be and are not extended to include those portions of the site or structures which were not reasonably available, in Kala's opinion, for direct observation. The environmental conditions at the site were assessed within the limitations set forth here within. A review of compliance by past owners or occupants of the site with any applicable local, provincial or federal by-laws, orders-in-council, legislative enactments and regulations was not performed. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances or different quantities of substances tested for, may be present on site and may be revealed to be different if other testing not provided for in our contract is completed. Because of the limitations referred to above, different environmental conditions from those stated in Kala's report may exist. Should such different conditions be encountered, Kala must be notified in order that it may determine if modifications to the conclusions in the report are necessary. Provided that the report is still reliable, and less than 12 months old, Kala will issue a third-party reliance letter to such parties that the Client identifies in writing, upon payment of the current fee for such letters. All third parties relying on Kala's report by such reliance agree to be bound by our proposal and Kala's standard reliance letter. Kala's standard reliance letter indicates that in no event shall Kala be liable for any damages, howsoever arising, relating to third-party use of Kala's report.

#### **Groundwater Potential Evaluations and Proof of Sufficient Water Investigations**

Groundwater potential evaluations are based on a review of maps, databases and published documents available at the time of the assessment, and a site reconnaissance. The conclusions provided by Kala do not preclude the existence of other aquifers from those identified. A groundwater supply investigation involving test wells and evaluation techniques is required to verify the presence or absence of suspected aquifers. If additional information or assessment findings arise which may alter the conclusions and/or recommendations of this report Kala would be pleased to review and append our report where required.

Proof of water assessments are based on pumping test information provided by others and interpreted by Kala unless otherwise noted. Groundwater sourced from fractured bedrock aquifers is dependent on the density and aperture of randomly and structurally oriented fractures and joints. Kala cannot warranty the long term viability of domestic water wells completed within fractured bedrock. Water well maintenance is required on a regular basis to sustain long term yields.

Kala proof of water evaluations are valid for the time of year and site conditions noted. The impacts of neighboring water wells on the pumping well or the later alteration of site conditions to include additional water wells has not been determined. While every effort is made to establish a recommended pumping rate for a subject water well based on the data provided, the Client or well owner is responsible for monitoring long term well water to verify an aquifers response to pumping and maintain the well such that well bore deterioration does not impact well performance.

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Kala recommends the construction, development and use of drilled wells over and above excavated wells where ever possible. Dug wells generally comprise shallow culvert style excavations which are directly under the influence of surface water owing to depth and proximity to surface water recharge. Dug wells, unlike deeper drilled wells, are more sensitive to fluctuations in total available drawdown which impacts the quantity of water available. Seasonal fluctuations in water level especially during drought periods can have pronounced impact on dug wells. Dug wells are not developed to a silt and sand free condition as deeper drilled wells completed in unconsolidated formations are; rather, dug wells rely on the filtering capacity of the surrounding envelope of drain rock to improve water quality. Both the quality and quantity of water sourced from dug wells is more sensitive to surface and local watershed changes.

#### **Report Use**

The information and opinions expressed in the report, or any document forming part of the report, are for the sole benefit of the Client. The Client and approved users or agents may not give, lend, sell or otherwise make available the report or any portion thereof, or any copy of the report or portion thereof, to any other party without the permission of Kala. No other party may use or rely upon the report in whole or in part without the written consent of Kala. Any use of the report, or any portion of the report, by a third party are the sole responsibility of such third party. Kala is not responsible for damages suffered by any third party resulting from unauthorized use of the report.

#### **Third Party Report Use**

The information provided within this report is for the exclusive use of the Client/owner and their authorized users and agents. Third party use of this report or any reliance or decisions made on the subject information herein, is at the sole risk of the third party. Kala has no obligation, contractual or otherwise to any third persons or parties, using or relying on this information for any reason and therefore accepts no responsibility for damages incurred by a third party as a result of actions taken or decisions made on the basis of the subject information.

#### **Complete Report**

The report is not intended to stand alone without reference to the instructions given to Kala by the Client, communications between Kala and the Client, and to any other reports prepared by Kala for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations, and opinions expressed in the report, reference must be made to the whole of the report. Kala cannot be responsible for use by any party of portions of the report without reference to the whole report.

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**Interpretation of the Report**

(a) *Nature and Exactness of Soil Description:* Classification and identification of soils, rocks and geologic units have been based upon commonly accepted methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from these systems have been used they are specifically mentioned. Classification and identification of the type and condition of soils, rocks and geologic units are judgmental in nature. Accordingly, Kala cannot warrant or guarantee the exactness of the description of insitu ground conditions set forth in the report.

(b) *Logs of Test Holes, Pits, Trenches etc.:* The test hole logs are a record of information obtained from field observations and laboratory testing of selected samples as well as an interpretation of the likely subsurface stratigraphy at the test hole sites. In some instances normal sampling procedures do not recover a complete sample. Soil, rock or geologic zones have been interpreted from the available data. The change from one zone to another, indicated on the logs as a distinct line, may be transitional. The same limitations apply to test pit and other logs.

(c) *Stratigraphic and Geologic Sections:* The stratigraphic and geologic sections indicated on drawings contained in this report are interpreted from logs of test holes, test pits or other available information. Stratigraphy is inferred only at the locations of the test holes or pits to the extent indicated by items (a) and (b) above. The actual geology and stratigraphy, particularly between these locations, may vary considerably from that shown on the drawings. Since natural variations in geologic conditions are inherent and a function of the historic site environment, Kala does not represent or warrant that the conditions illustrated are exact and the user of the report should recognize that variations may exist.

(d) *Groundwater Conditions:* Groundwater conditions shown on logs of test holes and test pits, and/or given within the text of this report, record the observed conditions at the time of their measurement. Groundwater conditions may vary between test hole and test pit locations and can be affected by annual, seasonal and special meteorological conditions, or by tidal conditions for sites near the seas. Groundwater conditions can also be altered by construction activities. These types of variations need to be considered in design and construction.

**Samples**

Kala normally disposes of all unused soil, rock, and sediment or water samples after 90 days of completing the testing program for which the samples were obtained. Further storage or transfer of samples can be made at the owner's expense upon written request.

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**Alternate Report Format**

When Kala submits both electronic file and hard copies of reports, drawings and other documents and deliverables, the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by Kala 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 version archived by Kala shall be deemed to be the overall original for the project.

The Client agrees that both electronic file and hard copy versions shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Kala. The Client warrants that Kala's report will be used only and exactly as submitted by Kala.

The Client recognizes and agrees that electronic files submitted by Kala have been prepared and submitted using specific software and hardware systems. Kala makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

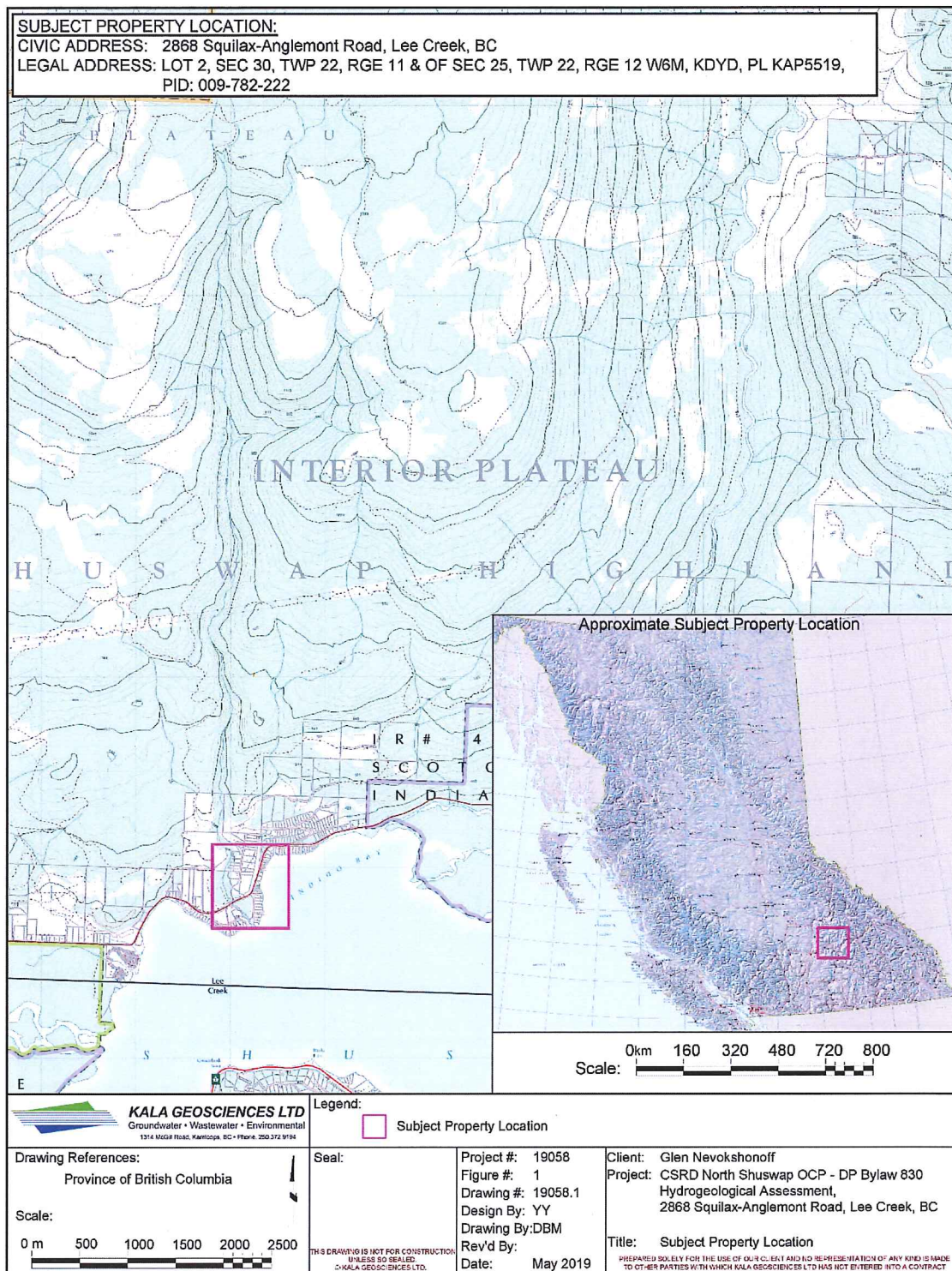
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**LIST OF FIGURES**

- Figure 1: Subject Property Location  
Figure 2: Subject Property Layout and Test Pit Locations  
Figure 3: Subject Property Photographs







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 1314 McColl Road, North Vancouver, BC • Phone: 253.3723.94

Scale: 0 m 3 6 9 12 15

PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO  
 REFERENCE TO OR FOR ANY OTHER PURPOSES WHICH  
 KALA GEOSCIENCES LTD HAS NOT INTENDED TO BE CONTROLLED

**Legend:**





- Permeameter Test Location
- ⊗ Borehole Location
- Subject Property Line

Project #: 19033  
 Figure: 2  
 Drawing #: 19058.2  
 Design By: YY  
 Drawing By: DBM  
 Rev'd By: May 2019  
 Date:

Seal:

THIS DRAWING IS NOT FOR  
 CONSTRUCTION  
 © KALA GEOSCIENCES LTD

Client: Glen Navokshonoff  
 Project: CSRD North Shuswap OCP - DP Bylaw 830  
 Hydrogeological Assessment,  
 2868 Squilax-Anglemont Road, Lee Creek, BC  
 Title: Subject Property Layout  
 Drawing Ref: Bing Aerial Imaging

		
P1: Front of Subject Property	P2: Proposed shop location	P3: Borehole and auguring for permeameter test
		
P4: Permeameter test	P5: Borehole and permeameter locations	P6: Material from borehole
<div><div><div><div>KALA GEOSCIENCES LTD</div><div>Geotechnical • Watermark • Environmental 311 Westwood Avenue, Suite 201, Burnaby, BC V5C 2H1</div></div></div><div>THIS DRAWING IS NOT FOR CONSTRUCTION UNLESS SO NOTED.</div></div>		
<div><div>Project #: 19058 Figure #: 3 Drawing #: 19058.3 Design By: YY</div><div>Drawing By: DBM Revd By: Date: June 2019</div><div>Client: Glen Nevelstonoff Project: CSRD North Shuswap OCP - DP Bylaw E30 Hydrogeological Assessment, 2888 Squilax-Argonaut Road, Lee Creek, BC Title: Subject Property Photographs</div><div>Scale Not Applicable:</div><div>Seal:</div></div>		
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## Schedule D

### Riparian Areas Assessment

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

**Riparian Areas Regulation: Assessment Report**Date **May 3, 2019****I. Primary QEP Information**

First Name	Bill	Middle Name	
Last Name	Rublee		
Designation	R.P. Bio	Company:	Triton Environmental Consultants Ltd.
Registration #	573	Email	<a href="mailto:brublee@triton-env.com">brublee@triton-env.com</a>
Address	1326 McGill Road		
City	Kamloops	Postal/Zip	V2C 6N6
Prov/state	B.C.	Country	Canada
		Phone #	250-851-0023

**II. Secondary QEP Information (use Form 2 for other QEPs)**

First Name	N/A	Middle Name	
Last Name			
Designation			
Registration #		Email	
Address			
City		Postal/Zip	Phone #
Prov/state		Country	

**III. Developer Information**

First Name	Kyle	
Last Name	Wilms	
Company	Wilms Design Inc	
Phone #	250-320-4401	Email <a href="mailto:kyle.wilms@telus.net">kyle.wilms@telus.net</a>
Address	118 Victoria St.	
City	Kamloops	Postal/Zip V2C 1Z7
Prov/state	BC	Country Canada

**IV. Development Information**

Development Type	Accessory Building		
Area of Development (ha)	0.0012	Riparian Length (m)	46
Lot Area (ha)	0.17	Nature of Development	Re-development
Proposed Start Date	June 1, 2019	Proposed End Date	May 1, 2020

**V. Location of Proposed Development**

Street Address (or nearest town)	2868 Squilax Anglemont Road		
Local Government	CSRD	City	Scotch Creek
Stream Name	Shuswap Lake		
Legal Description (PID)	009-782-222	Region	Central Interior Region
Stream/River Type	Lake	DFO Area	BC Interior
Watershed Code	128		
Latitude	50	54	34
Longitude	119	31	40

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## FORM 1

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**Section 1. Description of Fisheries Resources Values and Description of the Development proposal****Fisheries Resource Values**

Shuswap Lake (WSC: 128) and its tributaries, part of the Thompson River Watershed, is an important fish-bearing waterbody which supports many species of fish, including anadromous Salmon.

Shuswap Lake contains the following fish species. (Province of BC, 2019):

Common Name	Scientific Name	Common Name	Scientific Name
Rainbow Trout	<i>Oncorhynchus mykiss</i>	Carp	<i>Cyprinus carpio</i>
Burbot	<i>Lota lota</i>	Dace	<i>Rhinichthys spp.</i>
Kokanee	<i>Oncorhynchus nerka</i>	Lake Chub	<i>Couesius plumbeus</i>
Sockeye Salmon	<i>Oncorhynchus nerka</i>	Lake Trout	<i>Salvelinus namaycush</i>
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	Lake Whitefish	
Pink Salmon	<i>Oncorhynchus gorbuscha</i>	Northern Pikeminnow	<i>Ptychocheilus oregonensis</i>
Sculpin	<i>Cottus</i>	Largescale Sucker	<i>Catostomus macrocheilus</i>
Coho	<i>Oncorhynchus kisutch</i>	Leopard Dace	<i>Rhinichthys falcatus</i>

Shuswap is a large lake (approximately 31,000 ha) with a maximum depth of 162 m. The area has a high annual runoff and the theoretical flushing rate of the basin is 2.2 years. The average conductivity ranges from 55-114 umho/cm<sup>2</sup> and the morphoedaphic index (conductivity divided by depth in meters) is 1.4 (Williams 1989). The measurements of conductivity and morphoedaphic index indicate that Shuswap Lake is classified as an oligotrophic lake, one with generally low nutrient values. The dominant nutrient pathways in large lakes are tied into the inputs from tributary streams and other surface runoff, the airshed and sunlight. Nutrients enter the lake from these pathways and are taken by living organisms at the bottom of the food chain (plants, algae and phytoplankton). The nutrient inputs eventually make their way up the food chain as zooplankton and invertebrates consume the plant/algae/phytoplankton organisms and eventually become available as food sources for fish. Tributary streams can also be a direct source of zooplankton and insects that contribute to the food chain in the lake.

The littoral or shoreline zone of the lake is important for rearing of many fish species and is of particular importance to juvenile salmon. Salmon spawn in tributaries that enter into the lake in the fall (trout spawn in the spring) and eggs incubate throughout the winter. In the spring, fry descend the rivers and take up position along the shoreline and start feeding. As the fry grow they migrate along the shore to distribute throughout the basin. As they become larger and better swimmers they can forage in greater water depths.



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Sockeye fry migrate off shore after several weeks to begin rearing in the deeper waters out in the lake. As temperatures increase in the summer, chinook fry move further offshore into deeper cooler water but maintain their affiliation with the lake margins (Russell et. al, 1981). Fish will sometimes move into shallower water at night and return to cooler deeper water during daylight hours. Lake Trout spawn in the fall in shoal areas associated with lakeshores. Some lake Trout spawning occurs along the north shore of the main arm of Shuswap Lake. Lake Trout spawning occurs in coarse cobble and boulder substrate. Use by salmonids would be dependent on water temperatures inside the basin. It is possible that young of the year salmon could rear in the area in May and early June but would likely move out into the lake when temperatures rise. Generally temperatures in excess of 16°C will cause rearing juvenile chinook to move off shore in Shuswap Lake to deeper water habitats (Russell et. al, 1981).

**References:**

Province of BC, 2019. Habitat Wizard. Accessed January 2017

Russell, L.R., Graham, C.C., Sewid, A.G., and Archibald, D.M. 1981. Distribution of juvenile Chinook, coho, and sockeye salmon in Shuswap Lake – 1978 – 1979—biophysical Inventory of Littoral Areas of Shuswap Lake 1978. Fisheries and Oceans Canada, Fish. Mar. Serv. Man. Rept. No. 1479.

Williams, I.V., 1989. Studies of the lacustrine biology of the sockeye salmon (*O. nerka*) in the Shuswap System. Int. Pac. Salmon Fish. Comm. Bull. No. XXIV.

**Site Conditions – Riparian Area**

The site is a well vegetated lot on the north shore of Shuswap Lake. There is currently an existing house located within the 15 metre SPEA, and an accessory building located partially within the 30 m Riparian Assessment Area. A small grassed area is present between the existing house and an old retaining wall that delineates the High Water Mark at the property. The lot is well vegetated with fir and cedar trees as well as alders fruit trees and shrubs. (Photos 1-4)

A low to moderate gradient sand and gravel beach is present in front of the property.

**Development Proposal**

It is proposed to remove the existing accessory building. The new building will sit on the site of the old one and will extend to the back side primarily on an existing concrete pad. A patio will be built in front of the new building and will cover what is currently grass. All of the works will be located outside of the 15 m SPEA.

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**Section 2. Results of Detailed Riparian Assessment**

Refer to Chapter 3 of Assessment Methodology

Date: May 2, 2019

Description of Water bodies involved (number, type)

1 - Lake

Stream

Wetland

Lake

Ditch

Number of reaches

Reach #

**Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)**

	Channel Width(m)	Gradient (%)
starting point		
reedman		
downstream		
Total: minus high /low mean		
	R/P	C/P S/P
Channel Type		

I, Bill Rublee, hereby certify that:

a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;

b) I am qualified to carry out this part of the assessment of the development proposal made by the developer KYLE WILLMS;

c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation.

**Site Potential Vegetation Type (SPVT)**

	Yes	No
SPVT Polygons		X

Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes

I, Bill Rublee, hereby certify that:

a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;

b) I am qualified to carry out this part of the assessment of the development proposal made by the developer KYLE WILLMS;

c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation.

Polygon No: LC SH TR

SPVT Type LC SH TR X

Method employed if other than TR

**Zone of Sensitivity (ZOS) and resultant SPEA**

Segment	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons
No:		
LWD, Bank and Channel Stability ZOS (m)	15	

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Litter fall and insect drop ZOS (m)	15					
Shade ZOS (m) max	0	South bank	Yes		No	X
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)					
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report	
SPEA maximum	15	(For ditch use table3-7)				
I, <u>Bill Rublee</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer KYLE WILLIAMS; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation.						

**Comments**

The SPEA for this site is 15m.
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## FORM 1

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**Section 3. Site Plan**

## Site Location

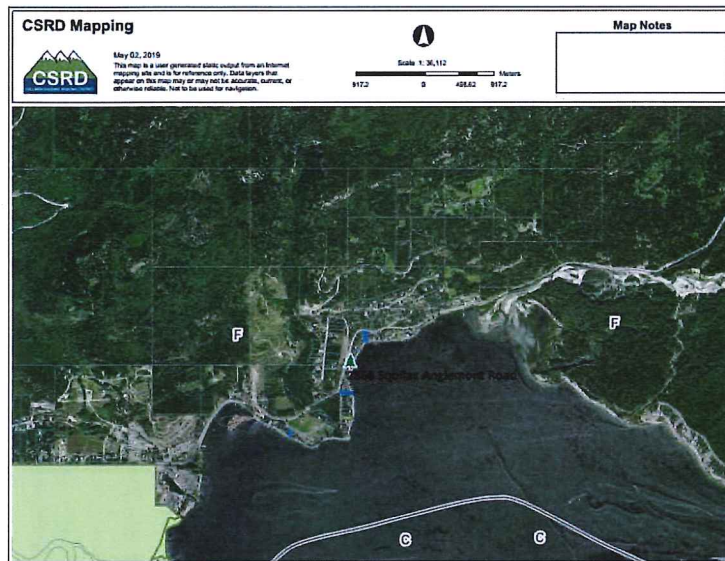


Figure 1 Site Location



Figure 2 Site close up

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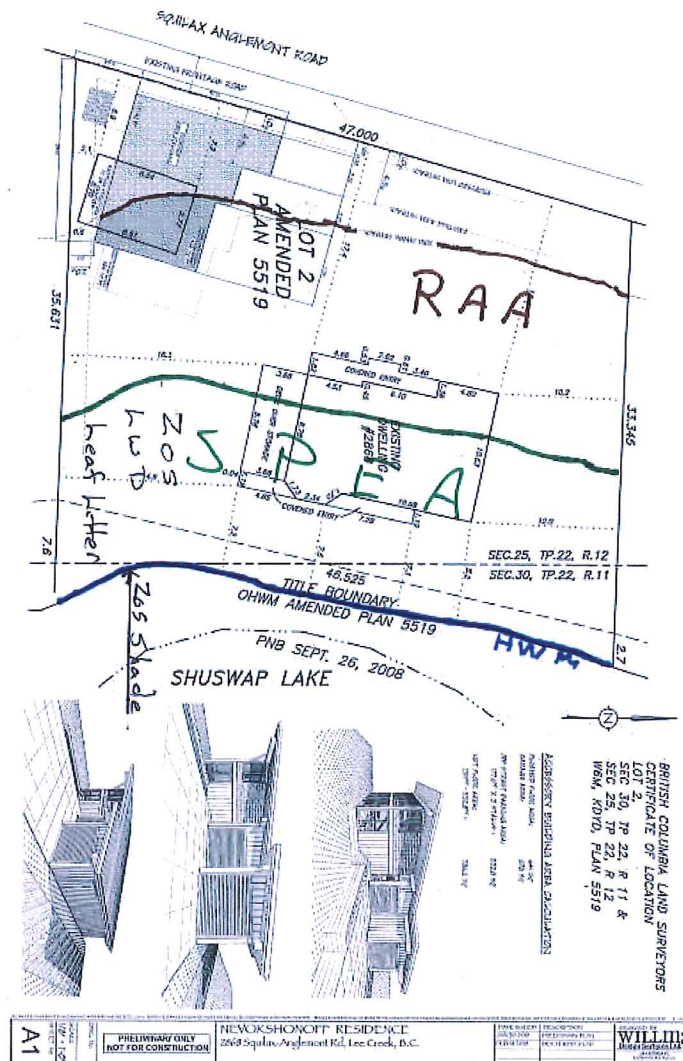


Figure 3 Lot and with design and 15 m. SPEA

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**Section 4. Measures to Protect and Maintain the SPEA**

Please note. I have commented in measures windows that deal with engineering and geotechnical for which I am not a QEP. I am however comfortable in identifying that input from these professional is not required in this case. If there any of these measures required attention these professionals would have been brought in to provide services.

<b>Danger Trees</b>	No decadent trees noted.
I, <u>Bill Rublee</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Kyle Willms</u> ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	
<b>Windthrow</b>	No windfall noted.
I, <u>Bill Rublee</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Kyle Willms</u> ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	
<b>Slope Stability</b>	No slope stability issues identified as the proposed building site is flat.
I, <u>Bill Rublee</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Kyle Willms</u> ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	
<b>Protection of Trees</b>	No trees within the SPEA are at risk with the proposed development.
I, <u>Bill Rublee</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Kyle Willms</u> ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	
<b>Encroachment</b>	There will be no encroachment into the 15m SPEA.
I, <u>Bill Rublee</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Kyle Willms</u> ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	



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<b>Sediment and Erosion Control</b>	There are limited risks associated with sediment and erosion control due to the flat nature of the site. However during construction BMPs (Land Development Guidelines and Provincial A Users Guide to Working Around Water) will be used including silt fencing storing spoil away from the water and tarping spoil piles
I, <u>Bill Rublee</u> , hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Kyle Wilms</u> ; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d. In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	
<b>Stormwater Management</b>	Stormwater will be directed to ground and not towards SPEA or lake.
I, <u>Bill Rublee</u> , hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Kyle Wilms</u> ; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d. In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	
<b>Floodplain Concerns (highly mobile channel)</b>	There are no noted floodplain concerns any work will be in compliance with CSRD floodplain bylaws.
I, <u>Bill Rublee</u> , hereby certify that: a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Kyle Wilms</u> ; c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d. In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	

**Section 5. Environmental Monitoring**

Monitoring during construction activities will be done on an as needed basis to ensure that Best Management Practices are followed to protect against sediment inputs into Shuswap Lake. An initial site visit will correspond with start of activity to ensure that the contractor is aware on the requirements for BMPs and primarily sediment control.

A post project monitoring assessment will be conducted and a report documenting adherence to the Assessment Report SPEA and Measures designed to protect the SPEA will be submitted.

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**Section 6. Photos**



Photo 1. View of existing house and retaining wall delineating HWM, May 2, 2019.



Photo 2. Ancillary building to be replaced May 2, 2019.

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Photo 3. View of vegetation in front of ancillary building May 2, 2019.



Photo 4. Back of ancillary building and concrete pas that will be back of new building, May 2, 2019.



## FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

**Section 7. Professional Opinion****Assessment Report Professional Opinion on the Development Proposal's riparian area.**Date May 2, 2019,  
20191. We, Bill Rublee, R.P. Bio

hereby certify that:

- a) We are qualified environmental professional(s), as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
- b) I am/We are qualified to carry out the assessment of the proposal made by the developer Kyle Willms, which proposal is described in section 3 of this Assessment Report (the "development proposal");
- c) I have/We have carried out an assessment of the development proposal and my/our assessment is set out in this Assessment Report; and
- d) In carrying out my/our assessment of the development proposal, I have/We have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation; AND

2. As qualified environmental professional(s), we hereby provide my/our professional opinion that:

- a) ☐ if the development is implemented as proposed by the development proposal there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area in which the development is proposed, **OR**

(Note: include local government flex letter, DFO Letter of Advice, or description of how DFO local variance protocol is being addressed)

- b) ☒ if the streamside protection and enhancement areas identified in this Assessment Report are protected from the development proposed by the development proposal and the measures identified in this Assessment Report as necessary to protect the integrity of those areas from the effects of the development are implemented by the developer, there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area in which the development is proposed.