

Appendix 2: Geotechnical Report

RYZUK GEOTECHNICAL
Engineering & Materials Testing

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October 12, 2018
File No: 8-9108-1



Attn: [Redacted]

Re: Proposed Bare Land Strata Subdivision – Geotechnical Assessment
590 Seedtree Road – East Sooke, B.C.

As requested, we have completed a geotechnical assessment of the referenced site with regard to the proposed bare land strata subdivision and associated building locations for future single-family residences. The approximate subdivision layout for the site is as outlined on the attached J.E. Anderson & Associates concept bare land strata plan, issued for discussion, which you had provided to us. Our assessment included a review of past projects in the area, aerial/topographical photos/maps, and a site reconnaissance. According to Bylaw 3353 of the Official Community Plan for East Sooke Section 4.10.4, the site is located within the Development Permit Area – Steep Slope Hazard, as outlined on Map3a. Therefore, a review of the site by a geotechnical engineer is required. Our observations relating to the geohazard potential at the bare land strata, with focus on the driveway and proposed building sites, and our associated recommendations are summarized below. Our work has been carried out in accordance with, and is subject to, the attached Terms of Engagement.

The site is bounded to the east and west by similarly sized residential properties with varying levels of development, to the north by a largely undeveloped area, and to the south by Seedtree Road. Currently, the site is developed in the southwest corner with a single-family residence and a relatively steeply inclined switchback gravel driveway along the east property line. Site topography is bedrock controlled and rises moderately to steeply to the north with an overall slope of some approximately 40%. The slope can be as steep as 2 Horizontal to 1 Vertical (2H:1V), or 50%, in the initial 60 m rise before flattening briefly between 180 m and 194 m elevation. Locally, the exposed bedrock surface can be as steep as vertical. Overall site relief was is on the order of 110 m.

We understand that the proposed development will be a bare land strata with four lots, as indicated in the attached J.E. Anderson Plan. As part of site preparation, the driveway will be regraded and partially relocated to create a more favorable incline. This work is anticipated to involve blasting and filling to achieve the final design grade, as well as installation of any recommended mitigative rockfall catchment measures. The current site development in the southeast corner that includes a single-family residence will become Lot 1, while the remainder of the property will be subdivided into three additional lots and a common property area for the driveway. The proposed building sites on Lots 2-4 are located in the naturally flatter bench area, as noted above, and are anticipated to require minimal additional preparation.

We attended the referenced site on September 20, 2018, to visually assess the existing geotechnical conditions. As part of the process, we walked the existing driveway, the path of the proposed new driveway realignment, and the indicated building sites (as well as other potential sites on Lots 2-4). The

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existing driveway was created by rock blasting and filling (using the blast rock). The resulting conditions are local rock cuts that are about 3 m to 4 m in height, as well as fill slopes about 2 m to 3 m in height. Observed soil overtop bedrock, visible in the noted cuts, was generally a veneer of topsoil overtop dense silty clayey sand and gravel (glacial till). The site was generally well vegetated with a mix of deciduous and coniferous trees with interspersed brush and bramble.

Rockfall hazards were identified during our site visit in three notable locations:

1. Above the driveway switchback on the southern end of the proposed Lot 3 above a blasted rock cut. The slope above has indications of ongoing small rockfall events (i.e. fragmented boulders and cobbles along the slope and leaning against trees).
2. To the north west of the proposed building site on Lot 4, there was a large boulder with evident fracture planes and a minimally supported overhang as part of a rock outcrop. Such appeared to be directed to fall south or southeast, possibly impacting the driveway if it does not become arrested on the existing vegetation.
3. Indications of rockfall activity upslope and to the rear of the site (i.e. fragmented boulders and cobbles along the slope and leaning against trees) were observed on Lot 2. Such generally appeared to be directed to the southwest.

In all the above cases, larger detached boulders or fractured rock masses may mobilize during an earthquake event (or after years of weathering and mechanical destabilization, such as from erosion or the freeze/thaw cycle). The blasted rock faces themselves were generally intact/fractured-in-place, but future rock cuts should be reassessed following blasting to determine if any additional mitigative measures are required.

In all three proposed lots, we confirmed that the indicated building sites were located safely outside of the above identified rockfall hazard areas. Such were also found to be safely located on a reasonable bench or on massive bedrock so as to avoid other possible steep slope geohazards, such as landslide or landslip. The greatest area of impact appeared to be along the driveway from the rockfall zones indicated in 1 and 2 above. Mitigation of the rockfall hazard to the driveway on site can likely be achieved by removing the detached boulders or fractured rock and construction of a flat/reverse inclined rockfall catchment area (such as behind a retaining wall along the driveway).

Subgrade bearing at all three proposed building sites will either consist of dense glacial till, intact/fractured-in-place bedrock, or blast rock fill placed and compacted atop such. We would consider the noted possible subgrades capable of providing stable, long-term support at these locations for the expected one or two-storey single-family residences. However, the sites should be reassessed at time of foundation preparation to confirm the bearing conditions and/or suitability of fill compaction.

We do not anticipate the proposed development will appreciably alter surface or groundwater flow patterns, including from the blasting or placement of new rock fill for the driveway. However, storm water runoff from hard surfaces following development (such as the roofs of the proposed single-family residences) should be conveyed away from any buildings and/or septic areas via tight pipe and disposed of downslope of foundations to limit the washing of fines out of the rock fill.

Given the above, we consider the likelihood of a landslide occurring and affecting the proposed building site or the existing residence to be low, using a seismic hazard probability of 2% exceedance in 50 years. This level of landslide safety was adopted by the Building and Safety Policy Branch of British Columbia as of February 1, 2010. Therefore, as required by Section 56 of the Community Charter, and subject to the

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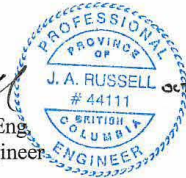
recommendations outlined above, it is our professional opinion that the land may be used safely for the use intended, that being the development as a bare land strata subdivision for future development with single-family residences.

We trust that the above is sufficient for your needs at present. If you have any questions or concerns, or require further assistance, please do not hesitate to contact us. Thank you for this opportunity to have been of service to you.

Yours truly,
Ryzuk Geotechnical



James Russell, M.Sc., P.Eng.
Project Geotechnical Engineer



Oct 12, 2018

Attachments:

Terms of Engagement

J.E. Anderson & Associates Concept Bare Land Strata Plan, IFD

TERMS OF ENGAGEMENT

GENERAL

Ryzuk Geotechnical (the Consultant) shall render the Services, as specified in the agreed Scope of Services, to the Client for this Project in accordance with the following terms of engagement. The Services, and any other associated documents, records or data, shall be carried out and/or prepared in accordance with generally accepted engineering practices in the location where the Services were performed. No other warranty, expressed or implied is made. The Consultant may, at its discretion and at any stage, engage sub-consultants to perform all or any part of the Services.

Ryzuk Geotechnical is a wholly owned subsidiary of C. N. Ryzuk & Associates Ltd.

COMPENSATION

All charges will be payable in Canadian Dollars. Invoices will be due and payable by the Client on receipt of the invoice without hold back. Interest on overdue accounts is 24% per annum.

REPRESENTATIVES

Each party shall designate a representative who is authorized to act on behalf of that party and receive notices under this Agreement.

TERMINATION

Either party may terminate this engagement without cause upon thirty (30) days' notice in writing. On termination by either party under this paragraph, the Client shall forthwith pay to the Consultant its Charges for the Services performed, including all expenses and other charges incurred by the Consultant for this Project.

If either party breaches this engagement, the non-defaulting party may terminate this engagement after giving seven (7) days' notice to remedy the breach. On termination by the Consultant under this paragraph, the Client shall forthwith pay to the Consultant its Charges for the Services performed to the date of termination, including all fees and charges for this Project.

ENVIRONMENTAL

The Consultant's field investigation, laboratory testing and engineering recommendations will not address or evaluate pollution of soil or pollution of groundwater. The Consultant will cooperate with the Client's environmental consultant during the field work phase of the investigation.

PROFESSIONAL RESPONSIBILITY

In performing the Services, the Consultant will provide and exercise the standard of care, skill and diligence required by customarily accepted professional practices and procedures normally provided in the performance of the Services contemplated in this engagement at the time when and the location in which the Services were performed.

INSURANCE

Ryzuk Geotechnical is covered by Professional Indemnity Insurance as follows:

1. \$ 2,000,000 each and every claim
2. \$ 4,000,000 aggregate
3. \$ 5,000,000 commercial/general liability coverage

LIMITATION OF LIABILITY

The Consultant shall not be responsible for:

1. the failure of a contractor, retained by the Client, to perform the work required for the Project in accordance with the applicable contract documents;
2. the design of or defects in equipment supplied or provided by the Client for incorporation into the Project;
3. any cross-contamination resulting from subsurface investigations;
4. any Project decisions made by the Client if the decisions were made without the advice of the Consultant or contrary to or inconsistent with the Consultant's advice;
5. any consequential loss, injury or damages suffered by the Client, including but not limited to loss of use, earnings and business interruption;
6. the unauthorized distribution of any confidential document or report prepared by or on behalf of the consultant for the exclusive use of the Client
7. Subsurface structures and utilities

V.1.1

The Consultant will make all reasonable efforts prior to and during subsurface site investigations to minimize the risk of damaging any subsurface utilities/mains. If, in the unlikely event that damage is incurred where utilities were unmarked and/or undetected, the Consultant will not be held responsible for damages to the site or surrounding areas, utilities/mains or drilling equipment or the cost of any repairs.

The total amount of all claims the Client may have against the Consultant or any present or former partner, executive officer, director, stockholder or employee thereof under this engagement, including but not limited to claims for negligence, negligent misrepresentation and breach of contract, shall be strictly limited to the amount of any professional liability insurance the Consultant may have available for such claims.

No claim may be brought against the Consultant in contract or tort more than two (2) years after the date of discovery of such defect.

DOCUMENTS AND REPORTING

All of the documents prepared by the Consultant or on behalf of the Consultant in connection with the Project are instruments of service for the execution of the Project. The Consultant retains the property and copyright in these documents, whether the Project is executed or not. These documents may not be used on any other project without the prior written agreement of the Consultant.

The documents have been prepared specifically for the Project, and are applicable only in the case where there has been no physical alteration to, or deviation from any of the information provided to the Consultant by the Client or agents of the Client. The Client may, in light of such alterations or deviations, request that the Consultant review and revise these documents.

The identification and classification as to the extent, properties or type of soils or other materials at the Project site has been based upon investigation and interpretation consistent with the accepted standard of care in the engineering consulting practice in the location where the Services were performed. Due to the nature of geotechnical engineering, there is an inherent risk that some conditions will not be detected at the Project site, and that actual subsurface conditions may vary considerably from investigation points. The Client must be aware of, and accept this risk, as must any other party making use of any documents prepared by the Consultant regarding the Project.

Any conclusions and recommendations provided within any document prepared by the Consultant for the Client has been based on the investigative information undertaken by the Consultant, and any additional information provided to the Consultant by the Client or agents of the Client. The Consultant accepts no responsibility for any associated deficiency or inaccuracy as the result of a miss-statement or receipt of fraudulent information.

JOBSITE SAFETY AND CONTROL

The Client acknowledges that control of the jobsite lies solely with the Client, his agents or contractors. The presence of the Consultant's personnel on the site does not relieve the Client, his agents or contractors from their responsibilities for site safety. Accordingly, the Client must endeavor to inform the Consultant of all hazardous or otherwise dangerous conditions at the Project site of which the Client is aware.

The client must acknowledge that during the course of a geotechnical investigation, it is possible that a previously unknown hazard may be discovered. In this event, the Client recognizes that such a hazard may result in the necessity to undertake procedures which ensure the safety and protection of personnel and/or the environment. The Client shall be responsible for payment of any additional expenses incurred as a result of such discoveries, and recognizes that under certain circumstances, discovery of hazardous conditions or elements requires that regulatory agencies must be informed. The Client shall not bring about any action or dispute against the Consultant as a result of such notification.

FIELD SERVICES

Where applicable, field services recommended for the Project are the minimum necessary, in the sole discretion of the Consultant, to observe whether the work or a contractor retained by the Client is being carried out in general conformity with the intent of the Services. Any reduction from the level of services recommended will result in the Consultant providing qualified certifications for the work.

DISPUTE RESOLUTION

If requested in writing by either the Client or the Consultant, the Client and the Consultant shall attempt to resolve any dispute between them arising out of or in connection with this Agreement by entering into structured non-binding negotiations with the assistance of a mediator on a without prejudice basis. The mediator shall be appointed by agreement of the parties. If a dispute cannot be settled within a period of thirty (30) calendar days with the mediator, the dispute shall be referred to and finally resolved by arbitration under the rules of the arbitrator appointed by agreement of the parties or by reference to a Judge of the British Columbia Court.

V.1.1

