

Newlines ADU

Attention: Gabriel Viel-Cotes, Co-Founder
Gabriel.viel.cotes@newlinesadu.com

**RE: Geotechnical Assessment
Single-Family Dwelling
37 Bracken Parkway, Squamish, BC**

Dear Gabriel Viel-Cotes,

1.0 INTRODUCTION

In accordance with your recent authorization in reference to Kontur's Proposal K-261429-PP, Kontur Geotechnical Consultants Inc. ("Kontur") has completed this *Geotechnical Assessment* for the above-referenced project. The purposes of this study were to characterize the site from a geotechnical point-of-view and to provide geotechnical comments and recommendations with respect to the installation of a modular home.

This letter which summarizes the findings of the *Geotechnical Assessment*, has been prepared in accordance with standard and widely accepted geotechnical engineering principles and practices for similar projects in this region. This report does not address any archaeological, environmental, or other engineering considerations related to the project.

Review and use of this letter should be completed in accordance with the attached *Interpretation and Use of Study and Report* document. It is included as an integral part of this report and should be read in conjunction with all parts of this report.

2.0 PROJECT DESCRIPTION

Based on discussions with New Lines ADU, it is understood that the project generally consists of replacing an existing mobile home with a 1,000 sq. ft. modular home.

It is understood that the client intends to use helical piles to support the proposed building.

The subject property is located within a zone identified as a Secondary Floodway, and within Zone C5 of the Cheekeye Fan Debris Flow Hazard, as per the Squamish Integrated Flood Hazard Management Plan. As such, preparation of a geologic hazard assessment report and determination of an appropriate Flood Construction Level (FCL) is required for the proposed development. These items are addressed under separate cover in Kontur's *Geologic Hazard Assessment*.

3.0 METHODOLOGY

The following sources of information were referenced as part of this study:

- Geotechnical exploration completed on June 18, 2026;



- Surficial Geology Map titled *“Surficial Geology and Landslide Inventory of the Middle Sea to Sky Corridor”* open file 5323 prepared by the Geological Survey of Canada;
- Report titled *“Integrated Flood Hazard Management Plan”* (IFHMP) prepared by Kerr Wood Leidal (KWL), dated October, 2017;
- Available information obtained from District of Squamish online web-mapping Application; and,
- Kontur’s nearby and relevant experience in the area.

On June 18, 2026, geotechnical exploration consisting of two test pits, designated TP26-01 and TP26-02, were advanced to 2.2m and 3.5m depth, respectively. The test pits were completed using an excavator equipped with a smooth-edged bucket. Approximate locations of the test pits are shown in the attached *Test Hole Location Plan*.

4.0 SITE DESCRIPTION

4.1 General

The subject property covers an approximate area of about 720sq.m located about 8km north of downtown Squamish. The property is rectangular in shape, with plan dimensions of about 36m (aligned east-west) by 20m (aligned north-south). The property is bordered to the north, south and west by neighbouring single-family residential lots, and to the east by Bracken Parkway.

Existing development within the subject property generally consists of a single-level mobile home and a garden shed.

4.2 Surface Conditions

Topography within the subject property generally consists of flat-lying ground. Vegetation generally consists of well-maintained grass cover covering the northern and western portions of the property, with remaining exterior areas consisting of asphalt surfacing.

4.3 Subsurface Conditions

Interpretation of subsurface soil and groundwater conditions at the site are based on published surficial geology maps of the area, Kontur’s nearby and relevant experience, and the site reconnaissance/test pits completed as part of this study.

“Surficial Geology and Landslide Inventory of the Middle Sea to Sky Corridor” open file 5323 prepared by the Geological Survey of Canada, the site is underlain by Floodplain Sediments typically comprising sand and silt, commonly including organics underlain, in many places, by gravel. In general, the surficial geology maps of the area and nearby information/experience, are generally consistent with the findings of the geotechnical exploration program completed by Kontur as described in this report.



Conditions encountered within the test pits are summarized in Table 1 below:

Table 1: Test pit excavations

Test Pit ID	Depth (m)		Description
	From	To	
TP26-01	0.0	0.1	(TOPSOIL) ORGANIC SANDY SILT, dark brown-black, moist (loose), surficial grass
	0.1	0.4	SILT, some sand and organics, dark brown, w>PL (Soft)
	0.4	0.8	SILT, some sand to sandy, trace to some organics, brown-grey, w=PL (soft to firm), sand is fine grained, organics consist of rootlets, sand is fine grained - 0.6m: Moisture = 48.4%
	0.8	1.4	SILTY SAND, grey, wet (very loose), sand is fine grained, some brown blotches - 0.9m: Seepage and ongoing sidewall collapse below about 0.9m - 1.1m: Moisture = 41.7%
	1.4	1.8	SAND, some silt and organics, grey, wet (loose), sand is fine grained, organics consist of occasional wood pieces up to 50mm diameter and 300mm length.
	1.8	2.2	GRAVELLY SAND, brown-grey, wet (compact), maximum fragment size of about 100mm - 2.2m: Limit of exploration due to ongoing test pit sidewall collapse
TP26-02	0.0	0.1	(TOPSOIL) ORGANIC SANDY SILT, dark brown-black, moist (loose), surficial grass
	0.1	0.3	(FILL) SILTY SAND, trace organics, brown, moist (loose)
	0.3	0.9	(FILL) GRAVELLY SAND, some cobbles, trace silt, pale brown, moist (compact), maximum fragment size of about 200mm, cobbles are sub-rounded to sub-angular
	0.9	1.3	SILTY SAND, trace to some organics, grey, moist (loose to compact), some silt in areas, sand is fine grained, organics consist of rootlets, roots and decomposed organic clumps - 1.2m: Moisture = 27.2% - 1.3m: Seepage observed from sidewalls



	1.3	1.7	SILT, some sand to sandy, brown-grey, w<PL (firm), trace to some organics/rootlets - 1.5m: Moisture = 41.3%
	1.7	3.3	SILTY SAND, grey, wet (loose), some silt in areas, sand is fine grained
	3.3	3.5	(Inferred description based on machine feedback and mixed/saturated spoils) GRAVELLY SAND, compact, maximum fragment size of about 150mm

Groundwater seepage was encountered between 0.9 to 1.3m depth during test pit excavation. Fluctuations in groundwater conditions should be anticipated at this site which may be influenced by periods of prolonged and/or intense rainfall, rapid snowmelt, and/or nearby land uses.

4.4 Subsurface Variability

It is important to note that the subsurface conditions described above and encountered in each test pit are representative of the specific conditions in the immediate vicinity of each test pit. Extrapolation and interpretation of the subsurface profile is formulated based on an assumed horizontal continuity of subsurface conditions across the site. Therefore, the conditions or units described above are generalized and based on the available test pit information only. Variation in stratigraphic conditions should always be expected.

5.0 COMMENTS AND RECOMMENDATIONS

5.1 General

Based on Kontur's understanding of the project, information, and findings described above, the following geotechnical comments and recommendations are provided with respect to the installation of a modular home. It is understood that the client intends to use helical piles to support the proposed building.

It is Kontur's opinion that the significant geotechnical considerations for the project may be related to installation of helical piles with respect to cobbles within subsurface soils.

Subsurface conditions are generally anticipated to consists of shallow topsoil underlain soft of firm silts and very loose to loose sands up to between 1.8 to 3.3m depth, underlain by compact gravelly sand to at least 3.5m depth. Fill soils consisting of gravelly sand, some cobbles was encountered locally within TP26-02 up to about 0.9m depth.

Foundations and other geotechnical aspects of the project should be designed and constructed in accordance with the most recent BC Building Code and the recommendations described in the following sections.

5.2 Special Considerations – Installation of Helical Piles

Fill soils locally encountered within TP26-02 up to 0.9m depth consisted of compact gravelly sand, some cobbles with fragment sizes up to about 200mm. Maximum fragment sizes about 150mm were observed



within the natural gravelly sands encountered below 1.8 and 3.3m depth within TP26-01 and 02 (respectively).

It is considered possible that installation of helical piles may be difficult due to the presence of the above-noted coarse fragments. Removal of larger fragments within the shallow fill layer may be required to facilitate pile advancement. The contractor would need to select the installation for the actual subsurface conditions.

5.3 Design Considerations

5.3.1 Seismic Considerations

The British Columbia Building Code (BCBC) provides guidelines and parameters for seismic design. The 2024 BCBC is the current standard. Therefore, the following seismic design recommendations are developed based on the applicable building code at the time of preparation of this report, that being the 2024 BCBC which uses seismic hazard calculations based on the 2020 National Building Code of Canada.

Based on the 2024 BCBC, the design earthquake corresponds to a 2% probability of exceedance in 50 years which is equivalent to a 1 in 2475-year return period. The Natural Resources Canada website provides interpolated site-specific hazard values and indicates a Peak Ground Acceleration of 0.38g for the subject property.

TABLE A -Spectral Acceleration Values

Sa (0.2)	Sa (0.5)	Sa (1.0)	Sa (2.0)	Sa (5.0)	Sa (10.0)	PGA	PGV
0.84g	0.93g	0.73g	0.48g	0.16g	0.061g	0.38g	0.68m/s

The granular deposits (sands, silty sands and gravelly sands), where situated below the established groundwater level, may have the potential to liquefy under the 2024BCBC design earthquake. The soft portion of the silt deposits may have a potential for cyclic softening during the design earthquake. As a result, this site is classified as *Site Class F – Other Soil*. However, the 2024 BCBC states that for structures on liquefiable soils that have a fundamental lateral period, T_a , of 0.5 seconds or less, the site designation, the corresponding spectral accelerations, and the Peak Ground Acceleration (PGA) values may be determined by assuming the soils are not liquefiable or prone to cyclic softening. On this basis, if it is determined that the proposed structures have fundamental periods of vibrations equal to or less than 0.5 seconds, then the Site Class and corresponding values for PGA and spectral accelerations may be determined based on *Site Class E – Soft Soil*.

5.3.2 Foundation Design

It is understood that the client anticipates support for the proposed building with the use of helical piles.

It is understood that pile design will be provided by others.



Conventional strip and pad footings founded on a minimum 0.6m thick pad of engineered fill placed thereon are also considered suitable to support the proposed additions, however, removal of compressible soils (above gravels) or preloading may be required. Kontur can provide additional recommendations regarding design/constructability considerations for strip/pad footings if required.

Schedule A2 of the IFHMP indicates a simplified design velocity of 0.81 to 2.8 m/s during the design flood event. As such, backfill surrounding proposed foundations must be protected from scour and erosion (refer to attached Schedule F - *Standard Erosion and Scour Protection Details*). Scour protection for deep foundations (helical piles) would require the upper helix to be at least 2m below finished grade.

6.0 FIELD REVIEW

To sign-off on the work, Kontur must be provided the opportunity to review final project designs (not including pile design) or drawings from a geotechnical point-of-view. In addition, Kontur must be provided the opportunity to complete the necessary field reviews during the construction stage of the project. Additional field review would be required if helical piles cannot be installed below 2m depth, or if strip/pad footings are required.

Kontur requires at least forty-eight (48) to seventy-two (72) hours of advanced notice to visit the site when the work is ready for review.

7.0 CLOSURE

The comments and recommendations presented in this letter are based on the referenced information and Kontur's understanding of the project as described herein. If site conditions or project parameters differ from those described in this report, Kontur should be notified promptly to review geotechnical aspects of the project and provide additional or modified comments and recommendations, as deemed appropriate. Contractors should make their own assessments of subsurface conditions at this site and select the construction means and methods that are most appropriate for encountered site conditions.

The subject property is considered 'safe' for the intended purpose, that being the construction of an auxiliary dwelling unit. The term safe specifically refers to the ability of the sub surface soils to support the proposed building within typically tolerable settlement for such buildings, and global slope stability being adequate for static and seismic conditions.

This letter has been prepared for the exclusive use of Newlines ADU / Newlines Contracting and/or their designated agents or consultants for the intended purpose described herein. The district of Squamish may use the information for development and/or building permit purposes. Any use of the information contained in this report for other than its intended purpose or by any other party must first be verified in writing by Kontur. Kontur does not accept any responsibility or damages because of any other party relying on or using the information, interpretations, opinions, comments, and/or recommendations that are contained in this report.



Kontur trusts that the information described above meets your current requirements. If you should have any concerns or questions, please do not hesitate to contact the undersigned.

Sincerely,

Kontur Geotechnical Consultants Inc.
EGBC Permit to Practice #1000925

Per:

Peter Knott EIT
Geotechnical Engineer-In-Training

Per:



Evan Sykes P.Eng 2026-07-09
Principal | Geotechnical Engineer

Attachments: Interpretation and Use of Study and Report
Photographs
Test Pit Location Plan
2020 National Building Code Seismic Hazard Calculation



INTERPRETATION AND USE OF STUDY AND REPORT DOCUMENT

1.0 STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering consulting practices in this area. No other warranty, expressed or implied, is made. Engineering studies and reports do not include environmental engineering or consulting.

2.0 COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3.0 BASIS OF THE REPORT

The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document are only valid to the extent that there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4.0 USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT. WE WILL CONSENT TO ANY REASONABLE REQUEST BY THE CLIENT TO APPROVE THE USE OF THIS REPORT BY OTHER PARTIES AS "APPROVED USERS". The contents of the Report remain our copyright property and we authorise only the Client and Approved Users to make copies of the Report only in such quantities as are reasonably necessary for the use of the Report by those parties. The Client and Approved Users may not give, lend, sell or otherwise make the Report, or any portion thereof, available to any party without our written permission. Any use which a third party makes of the Report, or any portion of the Report, are the sole responsibility of such third parties. We accept no responsibility for damages suffered by any third party resulting from unauthorised use of the Report.

5.0 INTERPRETATION OF THE REPORT

Nature and Exactness of Descriptions: Classification and identification of soils, rocks, geological units, contaminant materials, building envelopment assessments, and engineering estimates have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature and even comprehensive sampling and testing programs, implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations, or building envelope descriptions, utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarising such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and all persons making use of such documents or records should be aware of, and accept, this risk. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

Reliance on Provided information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the report as a result of misstatements, omissions, misrepresentations or fraudulent acts of persons providing information.

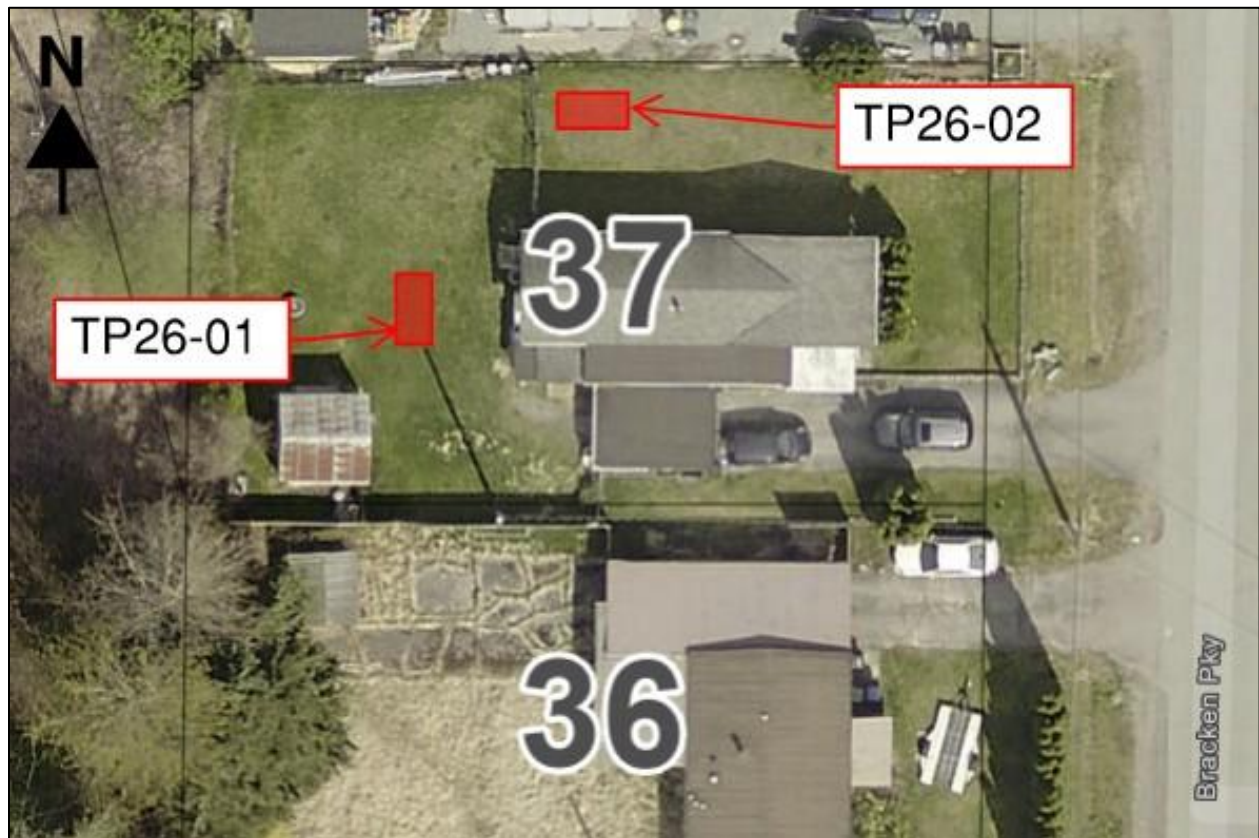
To avoid misunderstandings, KONTUR should be retained to work with the other design professionals to explain relevant engineering findings and to review their plans, drawings, and specifications relative to engineering issues pertaining to consulting services provided by KONTUR. Further, KONTUR should be retained to provide field reviews during the construction, consistent with building codes guidelines and generally accepted practices. Where applicable, the field services recommended for the project are the minimum necessary to ascertain that the Contractor's work is being carried out in general conformity with KONTUR's recommendations. Any reduction from the level of services normally recommended will result in KONTUR providing qualified opinions regarding adequacy of the work.

6.0 ALTERNATE REPORT FORMAT

When KONTUR submits both electronic file and hard copies of reports, drawings and other documents and deliverables (KONTUR's instruments of professional service), 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 KONTUR 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 KONTUR shall be deemed to be the overall original for the Project.

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

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



Note: Base image extrapolated from District of Squamish online web-mapping application



2025 - 2020 National Building Code of Canada Seismic Hazard Tool

This application provides seismic values for the design of buildings in Canada under Part 4 of the National Building Code of Canada (NBC) 2020 and 2025, as prescribed in Article 1.1.3.1. of Division B of the respective NBC editions.

Seismic Hazard Values

User requested values

Code edition	NBC 2020
Site designation X_E	X_E
Latitude (°)	49.765
Longitude (°)	-123.155

Please select one of the tabs below.

NBC 2020 Additional Values Plots API Background Information

The 5%-damped spectral acceleration ($S_a(T, X)$, where T is the period, in s, and X is the site designation) and peak ground acceleration ($PGA(X)$) values are given in units of acceleration due to gravity (g , 9.81 m/s^2). Peak ground velocity ($PGV(X)$) values are given in m/s. Probability is expressed in terms of percent exceedance in 50 years. Further information on the calculation of seismic hazard is provided under the *Background Information* tab.

The 2%-in-50-year seismic hazard values are provided in accordance with Article 4.1.8.4. of the NBC 2020. The 5%- and 10%-in-50-year values are provided for additional performance checks in accordance with Article 4.1.8.23. of the NBC 2020.

See the *Additional Values* tab for additional seismic hazard values, including values for other site designations, periods, and probabilities not defined in the NBC 2020.

NBC 2020 - 2%/50 years (0.000404 per annum) probability

$S_a(0.2, X_E)$	$S_a(0.5, X_E)$	$S_a(1.0, X_E)$	$S_a(2.0, X_E)$	$S_a(5.0, X_E)$	$S_a(10.0, X_E)$	$PGA(X_E)$	$PGV(X_E)$
0.836	0.931	0.727	0.481	0.164	0.0608	0.382	0.682

The log-log interpolated 2%/50 year $S_a(4.0, X_E)$ value is : **0.2131**

► Tables for 5% and 10% in 50 year values

Download CSV