

GEOTECHNICAL ASSESSMENT, REV.1

To
Bydand Properties Ltd.
Unit 17 – 351 Church Street
Comox, BC V9M 2C1

From
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Geotechnical Engineer

Re
Geotechnical Assessment –
721 Lazo Road
Comox, BC – Proposed Subdivision

Date
December 12, 2025

1. Introduction

McElhanney Ltd. (McElhanney) was retained by Bydand Properties Ltd. (the Client) to conduct a geotechnical assessment of the property located at 721 Lazo Road in the Town of Comox (The Site). The legal description for this site is: PARCEL B (DD 20772N) OF DISTRICT LOT 191, COMOX DISTRICT.

1.1. BACKGROUND

The upland portion of the subject property, covering 1.48-hectares, is proposed to be dedicated for park use and conservation of the natural environment. The remaining 0.81 hectares of land adjacent to the Strait of Georgia will be subdivided into bare land strata lots. Proposed use of these lots will be single-family dwelling with or without a secondary suite. Lots will be serviced by municipal water supplied from Hutton Road, onsite sanitary disposal, onsite storm water management, and onsite underground wiring.

The comments and discussion pertaining to the geotechnical assessment are provided in this report.

Authorization to proceed with the review was provided by the Client, via signed client agreement on December 12, 2022. This report is subject to the Statement of Limitations – Geotechnical Services (**Appendix A**).

The geotechnical assessment results and recommendations for the development are reported herein. No biological, archaeological, or environmental reviews were completed as part of this assessment.

The author of this report is appropriately knowledgeable to provide this geotechnical report and is a member in good standing with Engineers & Geoscientists British Columbia (EGBC).

McElhanney

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This Flood Assessment Report is provided in conjunction with the following:

- Site Servicing Report, dated December 12, 2025, by McElhanney
- Flood Assessment Report, dated March 6, 2025, by McElhanney
- Environmental Assessment, Dated December 2, 2025, by Pacificus Biological Services, [REDACTED] RPBio.

These reports have been reviewed by the author of this geotechnical assessment report.

1.2. SCOPE OF WORK

McElhanney has completed this geotechnical assessment in general accordance with the proposal dated December 12, 2022. In conducting the geotechnical investigation and submitting this report, McElhanney has:

- Completed a desktop review of available data including surficial geology and seismic hazard;
- Completed index testing of soil samples collected during the field investigation;
- Performed liquefaction screening for soils encountered during the geotechnical investigation;
- Performed slope stability analyses; and,
- Provided geotechnical recommendations in accordance with EGBC Professional Practice Guidelines and the pre-application Development Approval Information Notice from the Town of Comox.

1.3. DESKTOP REVIEW

The following resources are referenced in this report:

- Canadian Foundation Engineering Manual, 5th Ed., 2023, (CFEM, 2023), Canadian Geotechnical Society.
- Engineers and Geoscientists of British Columbia, 2022. Professional Practice Guidelines. Natural Hazards. Landslide Assessments in British Columbia. Version 4.0.
- Well data sourced from: <https://apps.nrs.gov.bc.ca/gwells> accessed on December 14, 2023. Well tags: 12017, 12580, 41433, 21304
- Aquifer #407 fact sheet sourced from: <https://apps.nrs.gov.bc.ca/gwells/aquifers/407> January 9, 2024



- ██████████ 1985. Stability of Natural Deposits During Earthquakes, Proceedings of 11th International Conference on Soil Mechanics and Foundation Engineering, A.A. Balkema Publishers, Rotterdam, Netherlands.
- BC Building Code 2024.

2. Project and Site Description

The Site is approximately rectangular in shape and covers an area of 280 m by 110 m in plan, bounded by Lazo Road and the waterfront of the Strait of Georgia. The property lies roughly 3.5 km south of the Comox Valley Airport. The topography of the Site, beginning from Lazo Road to the waterfront is relatively flat, with a peak in elevation near the middle of the parcel, before dipping at 20° towards the Strait of Georgia to the east. This slope gradually flattens to approximately 10° as it approaches the foreshore. Detailed topography is shown on **Figure B-01** in **Appendix B**.

Surficial geology mapping for the Comox region (Geological Survey of Canada Map 32-1960) indicates that the area contains soil units **8b**, as described below:

- **Shore, deltaic, and fluvial deposits**, comprising gravel, sand, silt, clay, and peat; dune sand.

Soil conditions described in the report generally correspond with available surficial geology mapping, apart from sand fill.

The lot was previously developed with two single family homes, a driveway, parking area, landscaped lawn and vegetation, as well as a small shed and greenhouse. The remainder of the property is occupied by environmentally protected Garry Oak, Douglas Fir, Bald Eagle, and Upland Forest habitats.

3. Field Assessment and Laboratory Testing

The geotechnical field investigation was carried out by McElhanney from November 30 to December 1, 2023, and comprised seven test pits advanced with an excavator, to depths reaching up to 4 m. Dynamic Cone Penetration Tests (DCPT) were completed by McElhanney staff in selected areas using a Triggs Wildcat Penetrometer. Test pit and DCPT locations are depicted on Drawing B-01 in Appendix B, locations were recorded using handheld GPS.

Test pits were logged and sampled by McElhanney staff during the investigation. Soil samples were collected, sealed, and shipped to McElhanney's local materials testing laboratory. Test pits were backfilled with excavated soil and bucket compacted in lifts. Detailed borehole logs are included in **Appendix C**.



3.1. SUBSURFACE CONDITIONS

In general, the encountered subsurface geologic conditions at the site were consistent with the published geological map information. The subsurface conditions encountered are summarised below in **Table 3-1**.

Table 3-1: Inferred Geotechnical Units.

SOIL UNIT	OBSERVED THICKNESS (m)	DESCRIPTION
Topsoil	0.1 - 0.2	Organic topsoil, black, fibrous
Poorly Graded Sand	2.0 - 3.5+	SAND (SP), fine sand, poorly graded, trace gravel, loose to compact, moist [dune sand]
Sandy Gravel	1.3 - 2.1+	GRAVEL (GW), sandy, medium to coarse sand, sub-rounded, well graded, compact, moist to wet [alluvial deposit]

The site subsurface comprises mainly sand, with a gravel component that increased with depth in the test holes. These deposits are inferred to have been placed by either wind or wave action following the last glaciation. The sand deposits generally increased in density with depth based on the DCPT tests, but were typically poorly compacted in shallower horizons.

3.2. GROUNDWATER

Groundwater was encountered in TP23-04 at 3.6m depth, which was excavated during high tide. Groundwater was not encountered in any of the other test pits. Groundwater levels adjacent to the foreshore may fluctuate with tides and seasonal changes.

Pask permeameter testing was completed in TP23-05 within the well graded sand deposit at a depth of 1.2 m. Field saturated hydraulic conductivities (K_{fs}) were in the order of 1×10^{-3} cm/s for both tests.

3.3. LABORATORY TESTING

Detailed laboratory testing results are included in **Appendix D** and are displayed graphically on the borehole logs, **Table 3-2** displays a summary of the results. Geotechnical laboratory testing included the following:

- Grain size analyses (ASTM C136 & C117)
- Moisture content (ASTM D2217)



Table 3-2: Summary of Laboratory Test Results

Test Pit No.	Sample No.	Depth (m)	Moisture Content (%)	Grain Size Distribution (%)		
				Fines	Sand	Gravel
TP23-01	G2	1.00	4.4	0.4	99.6	0.0
TP23-02	G1	0.30	2.2	-	-	-
TP23-02	G2	1.45	5.5	-	-	-
TP23-03	G2	2.40	6.3	1.3	98.7	0.0
TP23-04	G3	3.60	4.3	1.3	44.6	55.0
TP23-05	G1	0.90	1.8	-	-	-
TP23-05	G2	1.30	3.7	-	-	-
TP23-05	G3	3.60	13.8	-	-	-
TP23-06	G3	3.60	3.6	0.3	74.0	25.6
TP23-07	G1	1.00	6.2	2.4	78.7	18.9
TP23-07	G2	2.20	6.4	0.8	99.2	0.0

4. Seismic Hazard & Site Class

According to the BC Building Code (2024) seismic site classification considers averaged properties in the top 30 m of the soil subgrade. Soil properties for each site class are summarized in **Figure 4-1** below (Table 4.1.8.4.B, BCBC, 2024). Equivalent SPT blow counts fall within the lower end of the blow count range for Site Class 'D'. The average blow count profile for depths up to 30m is expected to be at least within the mid range for Site Class 'D' as the soil is expected to increase in density with depth.



Table 4.1.8.4.-B
Site Classes, S, for Site Designation X_s
 Forming Part of Sentence 4.1.8.4.(3)

Site Class, S	Ground Profile	Ground Profile Characteristics		
		Average Shear Wave Velocity in Top 30 m, V_{s30} , in m/s (1)	Average Standard Penetration Resistance in Top 30 m, \bar{N}_{60} , in Blows per 0.3 m	Average Undrained Shear Strength in Top 30 m, \bar{s}_u , in kPa
A	Hard rock (2)	$V_{s30} > 1\,500$	n/a	n/a
B	Rock (2)	$760 < V_{s30} \leq 1\,500$	n/a	n/a
C	Very dense soil and soft rock	$360 < V_{s30} \leq 760$	$\bar{N}_{60} > 50$	$\bar{s}_u > 100$
D	Stiff soil	$180 < V_{s30} \leq 360$	$15 < \bar{N}_{60} \leq 50$	$50 < \bar{s}_u \leq 100$
E	Soft soil	$140 < V_{s30} \leq 180$	$10 < \bar{N}_{60} \leq 15$	$40 < \bar{s}_u \leq 50$
		Any ground profile other than Site Class F that contains more than 3 m of soil with all the following characteristics: <ul style="list-style-type: none"> • plasticity index, $PI > 20$, • moisture content, $w \geq 40\%$, and • undrained shear strength, $s_u < 25$ kPa 		
F	Other soils (3)	$V_{s30} \leq 140$	$\bar{N}_{60} \leq 10$	$\bar{s}_u \leq 40$
		Any ground profile that contains <ul style="list-style-type: none"> • liquefiable soil, quick and highly sensitive clay, collapsible weakly cemented soil, or other soil susceptible to failure or collapse under seismic loading, • more than 3 m of peat and/or highly organic clay, • more than 8 m of highly plastic soil (with $PI > 75$), or • more than 30 m of soft to medium-stiff clay 		

Notes to Table 4.1.8.4.-B:

(1) See Note A-4.1.8.4.(2) and (3).

(2) Site designations X_A and X_B , corresponding to Site Classes A and B, are not to be used in cases where the ground profile contains more than 3 m of softer materials between rock and the underside of footing or mat foundations. The appropriate site designation for such cases is $X_{7.60}$.

(3) Site-specific geotechnical evaluation is required.

Figure 4-1: Seismic Site Classification (Table 4.1.8.4.B, BCBC 2024)

A summary of site specific seismic hazard values obtained from the Natural Resources Canada online 2020 National Building Code of Canada Seismic Hazard Tool, is shown in **Table 4-1**.

Table 4-1: Summary of Seismic Data for the Site

2020 NATIONAL BUILDING CODE OF CANADA GROUND MOTIONS				
PROBABILITY OF EXCEEDANCE IN 50 YEARS	$S_a(0.5)^3$	$S_a(1.0)$	$S_a(2.0)$	PGA(g)
2%	1.19	0.897	0.619	0.416
5%	0.784	0.569	0.359	0.288
10%	0.532	0.367	0.209	0.207



5. Liquefaction Analysis and Discussion

Liquefaction typically occurs when rapid loading is applied to saturated, cohesionless soils, causing pore pressures to increase and effective stresses to decrease. This results in a near complete loss of soil strength during seismic shaking. Observed soils comprised primarily well drained, loose to compact, finer grained sand that could be susceptible to liquefaction if saturated. However, groundwater was only observed in one test pit at 3.6m depth (TP23-04) sited near the foreshore, during a high tide.

5.1. METHOD AND ASSUMPTIONS

Liquefaction screening for each test hole was completed by McElhanney per Seed's method using LiquefyPro software (Civiltech Software, version 5.10). DCPT blow count data was applied to calculate the liquefaction potential of different layers on the site. Analysis assumptions comprised the following:

1. An earthquake magnitude of 7.3.
2. Soil unit weights ranging from 16 to 18 kN/m³ for sand and 19 kN/m³ for compact sandy gravel.
3. Upper sand horizons are well drained. Groundwater depths roughly corresponded with Higher High Water Large Tides
4. Peak ground accelerations for the 2% and 10% in 50 year events, were applied per the NBCC 2020 seismic hazard calculation for this site, considering a seismic site class D.

5.2. LIQUEFACTION SCREENING RESULTS & DISCUSSION

Liquefaction screening results indicate that the loose to compact sand within proposed building footprint areas may be susceptible to liquefaction and seismically induced settlement greater than 50mm *if the soil subgrade is saturated*.

In the unlikely case that the subsurface soil profile is completely saturated, PGAs for a 2% in 50 year event (0.416g) would trigger significant liquefaction. PGAs for a more likely 10% in 50 year event (0.207g), may still trigger minor, localized areas of liquefaction in saturated portions of the sand deposit. Ground damage from the predicted liquefaction would be negligible due to the unliquefied surface crust thickness between the structures and the partially liquefied deposits. (See **Figure 5-1** below.)



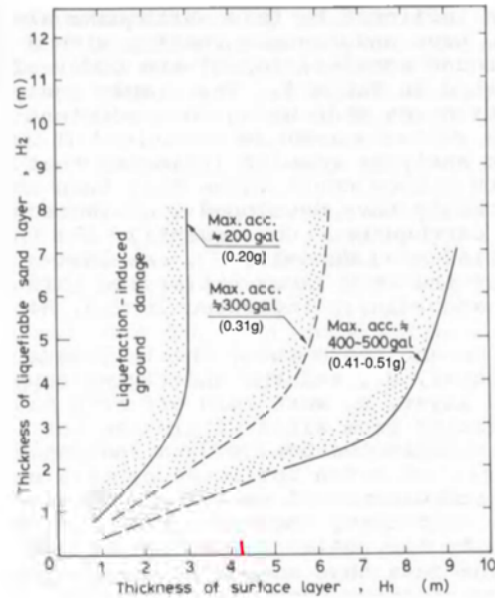


Figure 5-1: Proposed boundary curves for site identification of liquefaction induced damage (Ishihara, 1985)

Groundwater seepage was not observed in any test holes except for TP23-04, during the field investigation. The lower soil units of sandy gravel, and gravel and sand, may become saturated at greater depths due to ocean tides. Generally, the site subsurface appeared to be very well drained and soil saturation not extensive enough to create conditions conducive to significant soil liquefaction. Consequently, liquefaction induced damage to infrastructure is considered to be unlikely if the recommendations in this report are appropriately implemented.

6. Slope Stability

During the investigation two slopes were identified that may influence development of the property. Profiles of those slopes were obtained from the topographic survey performed by Bazett Land Surveying Inc. for the subject property. The cross section locations for the slope stability analysis can be seen in plan view on **Figure B-01** in **Appendix B** labelled Cross Section A and Cross Section B.

Although both sections were initially evaluated to inform subdivision design concepts, the remainder of the slope stability discussions in this report will focus on the slope at Cross Section A as the proposed site grading will remove the steep slope conditions at Cross Section B.

6.1. ANALYSIS METHOD AND PROPERTIES

DCPT data and test pit data in the vicinity of the cross sections was used to develop a geological model of the subsurface. Slope stability was evaluated under static and seismic conditions using Slope/W software (Geostudio 2021.4). Morgenstern-Price's limit equilibrium method was applied to determine factors of safety against deeper seated slope failures. Potential slope failures were modelled as rotational slip surfaces. Soil



parameters were then selected for the materials encountered during the investigation. **Table 6-1** shows the material properties applied to slope models.

Table 6-1: Material Properties for Slope Modelling Exercise

INFERRED UNIT	Friction Angle (°)	COHESION (kPa)	UNIT WEIGHT (kN/m ³)
Alluvial Gravel	35	0	21
Compact Sand	33	0	19
Loose Sand	32	0	18
Very Loose Sand	30	0	18

For the Seismic condition, a peak ground acceleration of 0.416 g applied (see **Table 4-1**). According to the EGBC Professional Practice Guidelines, slope displacements of 15cm or less are considered tolerable. A k_{15} seismic coefficient may be applied to slope stability models to approximate horizontal seismic loads that would trigger a displacement of 15 cm or less. **Equation 1** was used to approximate the k_{15} applied to the seismic model, per EGBC Landslide Assessment Guidelines (Section E.2).

$$k_{15} = (0.006 + 0.038 M) \times S(0.5) - 0.026 \tag{1}$$

$$k_{15} = (0.006 + 0.038 \times 7) \times 1.26 - 0.026$$

$$k_{15} = 0.317$$

Where M is the moment of magnitude of the modal earthquake; and S(0.5) is the spectral response acceleration for a degraded period of 0.5 s. A value of 7 was used for the moment of magnitude and 1.26 for S(0.5), as obtained from Natural Resources Canada 2020 NBCC Seismic Hazard Tool.

Ground water was modelled based on data obtained from the Aquifer #407 fact sheet stating that that the shallowest water level depth measurement for the aquifer was at 3.75 m depth. Groundwater was not encountered in during the test pit investigation except for TP23-04 where groundwater was measured at 3.60 m depth near the shore at high tide.

6.1.1. Design Criteria

In the absence of a Town of Comox natural hazard risk tolerance policy, the slope stability model was based on the recommendations of the Landslide Assessments in British Columbia guideline publication by EGBC, which is summarized below in **Table 6-2**.

Table 6-2: Design Basis Criteria Minimum Factor of Safety.[1]

DESIGN OPTION	Static Factor of Safety	Seismic (2% in 50 years & k_{15}) Factor of Safety
Slope	1.5	1.0



Notes: ^[1] Design parameters were obtained from Engineers and Geoscientists of British Columbia. (2022). Landslide Assessments in British Columbia. Version 4.0.

6.1.2. Slope Stability Modelling Results

Table 6-3 summarizes the results of the slope stability modelling exercise. Modeling results can be found in **Appendix G** of this report.

Table 6-3: Slope Modelling Results

Model	Peak Ground Acceleration (g)	Lowest Factor of Safety
	Cross Section A	
Static	0	1.6
Seismic (2% in 50 years)	0.42	0.6
Seismic (k_{15})	0.314	0.8

The factors of safety below 1.0 in the seismic analysis tabled above indicate that slope movement during the major seismic event may occur.

6.2. POTENTIAL SLOPE FAILURE MODES

Software analysis may not capture more complex or nuanced failures but serves to provide an approximate indication of stability. Potential failures that may occur on this slope include:

- **Minor sloughing** is a smaller scale failure that may occur on the crest, mid slope, or toe regions of a slope. For the purposes of this report, minor surficial sloughing may be defined as sliding vegetation cover or exposed surficial soils with up to 1m thickness of underlying soil. These failures may occur in over steepened areas, or where erosion gullies are formed from hydraulic point loads from surface or subsurface water flow.
- **Rotational Failures** occur where a sloped mass of soil rotates and slumps along a deeper seated slip surface. This type of failure is typically seen in larger, sloped deposits of loose soil. Smaller scale and localized rotational failures may also occur where loose materials are dumped on the slope or where the slope is subjected to additional loading.

6.3. SLOPE FAILURE TRIGGERS

Factors that may affect slope stability at this site include the following:

- **Surface Water Run Off** – Surface flows may erode upper soil horizons on the slope face resulting in preferential flow paths, over-steepened areas, and loss of vegetation.
- **Groundwater Conditions** - Pore pressures can have significant impact on slope stability by decreasing effective stress and softening soils. Seepage from the exposed slope face was not directly observed during the site visits.



- **Slope Toe Erosion** - Without protection, recession of the slope toe can also significantly reduce the slope safety factors over time. Removal of material at the toe of a slope may cause local oversteepening that also destabilizes upslope materials.
- **Slope Disturbance** – This may take the form of utility excavations into the slope, dumping of material onto the slope, modifying slope topography, and cutting trees or removing vegetation.
- **Seismic Loading** - Significant levels of seismic shaking may lower the factor of safety and/or trigger slope failures.

6.4. SETBACK DISTANCES FROM SLOPE

We understand that the slope modeled by Section A will not be developed near the crest of the slope. Therefore, the primary concern will be the impact of debris runout downslope resulting from slope failure. The distance that debris may travel after being mobilized by some form of slope failure is governed by variables that are difficult to accurately determine, as well as triggering scenarios that may not be accurately predicted with the absence of historical data. Localized topography, the soil composition of slopes, varying soil moisture regimes, and modifications to surface conditions, are among a number of factors that play a role in the potential volume, speed, and run out distance of debris.

Several geometric methods for run-out distance analysis were applied to very roughly estimate building setbacks from the toe of the slope represented by Section A. The following resources were used as a guide in estimating run out distances and establishing building setbacks:

- [REDACTED] 'Travel distance angle for "rapid" landslides in constructed and natural slopes', *Canadian Geotechnical, Volume 40, pg. 1123-1141, 2003.*
- [REDACTED] 'Estimating landslide motion mechanism, travel distance and velocity', 2005.

Table 6-4 summarizes estimated building setback distances from the slope crest and slope toe (Section A). Scenarios consider seismic and static conditions along Cross Section A. These setbacks distances are based on estimated run out distances as well as the Engineer's experience with similar slope failure mechanisms. Slope models included in **Appendix G** define the crest of the slope for cross sections.



Table 3-4: Recommended Slope Setback Distances from Slope Crest and Toe

	Static	Seismic (2% in 50 yrs)	Seismic (K ₁₅)
	Cross Section A		
Setback Upland from Slope Crest	2 m	7 m	4 m
Setback Downslope from Slope Toe	~5 m	10 m	--

7. Conclusions and Recommendations

7.1. GENERAL

The land identified as LOT 9, SECTION 3, COMOX DISTRICT, PLAN 30319, EXCEPT PART IN PLAN VIP72997 is considered geotechnically safe for the proposed development in accordance with Section 56 of the Community Charter (defined for the purpose of this report as single family residential strata subdivision), if the recommendations presented herein were followed.

7.2. CONDITIONS FOR DEVELOPMENT

The final proposed development designs should be reviewed by a qualified geotechnical engineer.

7.3. SLOPE STABILITY RECOMMENDATIONS

The potential for loss of structures or trees proximal to the top of bank, due to slope failure increases as the distance to the crest diminishes by surficial weathering, erosion, and other shallow slope instability events. Structures proximal to the base of slopes could also be at risk from impact of earth movement from slope failures. Measures and precautions to minimize the potential for slope instability are as follows:

1. Habitable structures should not be sited within 7m of a steep slope crest or within 10m of a steep slope toe, where steep slopes are greater than 3m in height.
2. Storm water should be controlled by closed, non-perforated piping or ditching that is adequately protected from erosion. This includes runoff from roadways, roof areas, and patios, walkways and any other hardscapes that could increase flows towards a slope. This recommendation is intended to minimize as much as practicable the surface water flows upland from slopes.
3. Vegetation should be restored and maintained within 10m of the top of bank and on slope faces, as an erosion control measure. From a geotechnical perspective, tree removal at the slope crest,



or on the slope within three metres (as measured vertically) of the crest may be permitted, since these trees could represent a surcharge load to the slope that may initiate slope instability. However, stumps shall be left in place, and vegetation planting (which may consist of low ground cover vegetation) should be undertaken as soon as practicable.

4. Additional fill or any surcharging loads within 15m of the top of bank and dumping of fill material, garden waste or other debris on slopes should be prohibited without further geotechnical advice from a geotechnical engineer. In addition, any grading work beyond the top of bank should achieve no net increase in ground level. Grading should be done in a manner that does not allow concentrated overland flow towards the slope face.
5. Installation of ponds or swimming pools, in-ground lawn irrigation systems is strongly discouraged on this site. Stormwater outfalls and exfiltration facilities should be designed and installed under the guidance of a geotechnical engineer experienced in liquefaction screening and slope stability evaluation.

7.4. FOUNDATIONS

Soil conditions at the subject site are considered suitable for the construction of cast in place, raft slab foundations founded on compact, undisturbed, naturally deposited sand, or engineered fill bearing on the former, if recommendations in this report are implemented as intended. Raft slab foundations are recommended to accommodate the potential effects of the predicted limited seismic soil liquefaction described in Section 5.

McElhanney should be given the opportunity to review the final development plan, which could affect these recommendations. Foundation subgrades must be reviewed and approved by a qualified geotechnical engineer during construction phase.

We recommend the following to mitigate settlement and liquefaction induced damage, per life safety criteria:

1. Buildings with living space must be supported by raft slab foundations.
2. Building designs should be symmetrical in plan to mitigate differential settlement.
3. Foundations must not include individual structural elements such as pad footings to support liveable space. Spread footings may be used to support light ancillary structures (such as decks or roof overhangs) if they are structurally connected to the primary foundation by continuous ties in not less than two directions.
4. Building foundations and/or Engineered fill for the proposed buildings should be founded on undisturbed, unfrozen, inorganic subgrade, in compact or better condition, free from unsuitable fill and organic soil and loose/soft or wet soils including weathered till. All subgrades should be



reviewed and approved by qualified geotechnical personnel prior to engineered fill placement or foundation construction.

5. Building subgrades must be prepared as follows:
 - a. Topsoil/organic overburden and any fill should be stripped within the proposed foundation footprints.
 - b. Building foundation footprints must be excavated to depths of at least 1m, to expose approved, undisturbed, naturally deposited, granular soil.
 - c. The exposed subgrade should then be reviewed and approved by a geotechnical engineer.
 - d. The exposed subgrade should then be compacted with light moisture conditioning, and tested for compaction by field density testing using test strips under review of the geotechnical engineer before any geotextile or fill is placed.
 - e. Following compaction and the engineer's approval, the excavation floor should be overlaid with non woven geotextile (Terrafix 360R or approved equivalent).
 - f. Engineered fill should be then be placed and compacted per Section 7.5, up to the raft slab foundation grade.

For raft slab foundations footings, suitable bearing capacities are provided in **Table 7-1**.

Table 7-1: Summary of Recommended Limit State Bearing Capacities

SUBGRADE SOILS	FACTORED ULTIMATE LIMIT STATE (Kpa)	SERVICEABILITY LIMIT STATE (kPA)	SOIL FRICTION ANGLE (°)	UNIT WEIGHT (KN/m ³)
ENGINEERED FILL	75	50	33	20
COMPACT NATURALLY DEPOSITED SAND	75	50	30	18

Notes:

1. Canadian Foundation Engineering Manual, 5th Edition, 2023, Canadian Geotechnical Society, Bitech Publishing Ltd., Richmond, BC.
2. Based on structural tolerance to differential settlement of 19 mm or less across column spacing for typical wood-framed construction.

7.5. ENGINEERED FILL

Engineered fill should be used if needed to raise grades, as the design requires, that will support building foundations, slab on grade or pavement structures. The following are recommendations for engineered fill:



1. Qualified geotechnical personnel should approve the exposed subgrade prior to placement of engineered fill, to confirm that unsuitable materials have been removed.
2. Engineered fill placement and compaction should be observed and approved by qualified geotechnical personnel. This would include approval of the proposed fill materials and performing a suitable program for compaction testing.
3. Engineered fill should consist of inorganic, 75mm minus well-graded sands and gravels (pit run) or crushed rock, unless otherwise advised. If engineered fill placement is to be carried out in the wet season or during inclement weather, free draining materials with a fines content (passing the #200 sieve) of less than 5% should be used.
4. For a confined condition, the bottom of excavation should extend beyond the footing edge for a distance of at least the thickness of the Engineered fill below the footing and not less than 0.7m.
5. If engineered fill is not confined within an excavation and will form a free slope (embankment), additional geotechnical recommendations will be required.
6. Engineered fill should be compacted to a minimum of 95% Modified Proctor Maximum Dry Density (MPMDD ASTM D1557) and placed at approximately the optimum moisture content in any areas that will support buildings, slabs, roads, or pavement.
7. Engineered fills should be compacted using vibratory compaction equipment and placed in lift thicknesses appropriate for the size and type of compaction equipment used. A general guideline for maximum lift thickness as measured loose is:
 - a. 100 mm for light hand equipment,
 - b. 150 mm for small walk-behind rollers or plate tampers,
 - c. 300 mm for large ride-on rollers or heavy (>500 kg) vibratory plate compactors, rubber-tired backhoe mounted hoe-pacs, or track-excavator mounted hoe-pacs.

8. Roadways and Pavements

Based on the assumption of light-to-medium weight vehicle usage for the proposed development we recommend the pavement structure for the roads and parking areas as part of the proposed development as summarized below in **Table 8-1**.



Table 8-1: Recommended Pavement Structure

MATERIAL	PAVEMENT STRUCTURE THICKNESS
HOT MIX ASPHALT (HMA)	50
GRANULAR BASE (19MM CRUSH GRAVEL)	100
GRANULAR BASE SUBBASE (75MM MINUS SGB)	250 (min)

Some over-excavation and replacement with structural fill to design subgrade may be required where fill or very loose sand is encountered in the stripped road subgrade. Contact the geotechnical engineer during excavation of the vehicle access and parking areas for additional recommendations, as required.

Consideration should be given to increasing the asphalt thickness to 65mm in areas of heavy vehicle traffic, such as garbage trucks.

For the purposes of design and construction, the following additional recommendations for site road and parking areas are provided below.

1. The subgrade should be crowned at a minimum 2% cross fall to promote drainage;
2. New base coarse and sub-base aggregates should conform to the Master Municipal Construction Documents (MMCD) Association, Platinum Edition (2009), or equivalent as approved by the geotechnical engineer; and,
3. Granular base coarse and sub-base gravels should be compacted to at least 95% MPMDD. All fill placement and compaction operations should be observed by a geotechnical engineer or their representative.

Prior to placement of road structure gravels, the subgrade should be shaped to provide drainage away from the road centerline. Road and parking area subgrades should be proof-rolled with a fully loaded dump truck prior to placement of sub-base and base materials and any areas showing excessive visible deflection should be repaired.

9. Trenching, Backfilling and Restoration

Beyond the building envelopes, it is anticipated that the proposed utility trench excavations will range from 0.5 to 2.0 m depth below existing ground surface.



Based on observed subsurface conditions, trench excavations will encounter loose-to-compact sand fill material sand and naturally deposited sand with some gravel. Excavation in these materials should be possible with conventional mechanical excavation equipment. Unsupported excavation sidewalls may slump to angles as low as 20°, in dry sand.

Trench excavation surfaces should be monitored for potential ground movements encountered during or after completion of trench excavation activities resulting from unconfined trench wall conditions including, but not limited to, changed soil or porewater pressure conditions, soil raveling, caving, loss of ground, groundwater seepage ingress, dewatering activities and / or construction equipment vibration.

It is assumed that utility trench excavations will be carried out for single pipe installations comprising in the order of about 50 to 300mm diameter PVC or HDPE plastic pipes. All utility trenches, specifically trench stability and safety procedures, shall conform to WorkSafe BC Regulations.

Depending on the time of year or duration temporary excavations are maintained open, surface water or groundwater seepage from the underlying fills and naturally deposited soils may collect in the trench excavations. Based on results of the investigation, the seepage is unlikely but if it is encountered the groundwater collected from utility trench excavations should be discharged according to local governing agency requirements.

In the event contaminated groundwater is encountered at this site, provision should be made to collect contaminated water in an approved surface containment facility, such as temporary above-ground storage tanks or mobile vacuum tanker truck equipment for environmental assessment and approval prior to disposal.

9.1.1. Service Trench Backfill Materials

All service trench backfill materials, including granular fill, common fill derived from approved onsite soil, and imported granular fill, placement methods and compaction requirements should as a minimum conform to the backfill specifications as defined by MMCD, unless otherwise advised.

Granular backfill materials should be placed in loose lifts not exceeding 300mm thickness, unless otherwise noted, and all granular fills should be moisture conditioned, if required, prior to compaction. Water should be added or removed, if required, to adjust the in-situ moisture content to within 2% of the optimum moisture content, as determined by the Proctor density – moisture relationship. All lifts shall be uniformly compacted using vibratory compaction equipment, such as a smooth drum vibratory roller or vibratory hoe-pack, to the following in-situ density:

- **Approved Trench Backfill:** Including pit run gravel fill and rock fill materials should be compacted to 95% of the MPMDD, as determined by ASTM Test Method D1557, unless otherwise advised by the Geotechnical Engineer.



- **Approved Granular Backfill Materials:** Acquired from existing trench excavations and placed in non-critical landscape areas such as adjacent road fill areas should be compacted to at least 90% of the MPMDD, unless otherwise advised by the Geotechnical Engineer.
- **Pipe Bedding:** Granular pipe bedding should only be lightly compacted to achieve a tight fit without voids around piping within the confines of the placement area.

Existing sand may be used to partially backfill trenches. However, all backfill materials should be submitted for prequalification testing prior to construction. Grain size analysis and moisture-density relationship (Proctor) laboratory testing should be completed. It is recommended the construction program consider monitoring the backfill material properties according to a Quality Assurance and Quality Control (QA/QC) testing program. McElhanney can provide further QA/QC details, including material testing procedures and test frequency, if desired.

10. Acknowledgements

Notwithstanding any other statement in this report, this report may be relied upon by the Town of Comox in considering:

- A zoning amendment application to rezone the subject property from R3.3 Single-Family Large Lot as regulated by the Comox Zoning Bylaw 1850 to a new zone facilitating the proposed development of 6 bare land strata lots and parkland dedication.
- An application for a development permit under sections 491(4) and (5) of the Local Government Act for lands within Town of Comox Development Permit Areas (DPA): DPA#9 Upland Environmental with Older Forest ESA, DPA#10 Bald Eagle Nesting Sites/Perching Trees, and DPA#12 Garry Oak Habitat,
- A development variance permit application to vary Town of Comox Subdivision and Development Servicing Bylaw, 1261 section 12.1 to not require storm drainage works designed, constructed and installed in accordance with Schedule C and section 14.1 to not require sanitary sewage collection designed and constructed in accordance with Schedule C; and to permit the servicing of the subject property by on-site liquid waste disposal as opposed to connection to the municipal sanitary sewer system and issuance of relevant building permit.
- A subdivision application under Section 86(1)(d) of the Land Title Act.
- If different or changed subsurface conditions are encountered during future assessment and/or construction than those conditions reported herein, the Geotechnical Engineer should carry out a field review and provide an additional geotechnical assessment of the encountered conditions. Additional geotechnical recommendations may be required as a result of additional field review.



To the best of the Author's knowledge the conditions of this report do not conflict with:

- Any Environmental Management Plan conditions required in the REVISED June 24, 2021 Pacificus Biological Services assessment report; and
- Any development servicing conditions specified in the Engineering Servicing Report (draft), dated January 9, 2025, by McElhanney; and
- Any Flood Assessment report conditions required in the Flood Assessment Report, dated March 6, 2025, by McElhanney

11. Geotechnical Quality Assurance

The BC Building Code requires that a geotechnical engineer be retained to provide Geotechnical Assurance services for the construction of most industrial and commercial installations and certain residential developments. Geotechnical Assurance services include review of the geotechnical components of the plans and supporting documents, and responsibility for field reviews of these components during construction.

Prior to final design submission, it is recommended further geotechnical review of the founding conditions should be carried out to confirm that the geotechnical recommendations are sufficient and / or have been applied according to the design intent.

If different or changed subsurface conditions are encountered during future assessment and / or construction than those conditions reported herein, the Geotechnical Engineer should carry out a field review and provide additional geotechnical assessment of the encountered conditions. Additional geotechnical recommendations may be required as a result of additional field review.

It is recommended that the following items are reviewed by a geotechnical engineer during construction:

- Verification of site preparation and surface stripping;
- Verification of bearing conditions prior to engineered fill or concrete placement;
- Verification of fill materials and fill placement; and
- Compaction testing of engineered fill.

Field reviews should be carried out by a qualified geotechnical engineer or their designated representative. McElhanney can provide material testing services during construction such as laboratory material gradation, compaction density and concrete testing if desired by the successful construction contractor.



12. Closure

The attached Statement of Limitations for Geotechnical Services is provided in **Appendix A** applies to this report and is hereby incorporated herein.

We trust this geotechnical assessment information is sufficient for your present needs. Should you have any questions or require additional information, please do not hesitate to contact us.

Submitted by,

Johannes Fischer, P.Eng.
McElhanney Ltd.



Reviewed by:

Richard Simpson, P.Eng.
McElhanney Ltd.

I certify this to be a report prepared by

Johannes Fischer, P.Eng.

Appendices:

- A. Statement of Limitations – Geotechnical Services
- B. McElhanney Site Plans
- C. Test Hole Logs
- D. Town of Comox Schedule 3
- E. Field Testing Results
- F. Laboratory Testing Results
- G. Slope Stability Modelling Results
- H. Landslide Assessment Assurance Statement

Date	Status	Revision	Author
December 12, 2025	FINAL	1	J. Fischer
March 6, 2025	FINAL	0	J. Fischer



APPENDIX A

Statement of Limitations



Statement of Limitations – Geotechnical Services

Use of this Report. This report was prepared by McElhanney Ltd. ("McElhanney") for the particular site, design objective, development and purpose (the "Project") described in this report and for the exclusive use of the client identified in this report (the "Client"). The data, interpretations and recommendations pertain to the Project and are not applicable to any other project or site location and this report may not be reproduced, used or relied upon, in whole or in part, by a party other than the Client and Building Authority, without the prior written consent of McElhanney. The Client may provide copies of this report to its affiliates, contractors, subcontractors and regulatory authorities for use in relation to and in connection with the Project provided that any reliance, unauthorized use, and/or decisions made based on the information contained within this report are at the sole risk of such parties. McElhanney will not be responsible for the use of this report on projects other than the Project, where this report or the contents hereof have been modified without McElhanney's consent, to the extent that the content is in the nature of an opinion, and if the report is preliminary or draft. This is a technical report and is not a legal representation or interpretation of laws, rules, regulations, or policies of governmental agencies. The professional services retained for this Project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in this report. In particular, environmental conditions such as surface and subsurface contamination are outside the scope of this report.

Standard of Care and Disclaimer of Warranties. This study and report have been prepared in accordance with generally accepted engineering and scientific judgments, principles and practices. McElhanney expressly disclaims any and all warranties in connection with this report including, without limitation, any warranty that this report and the associated site review work has uncovered all potential geotechnical liabilities associated with the subject property.

Effect of Changes. All evaluations and conclusions stated in this report are based on facts, observations, site-specific details, legislation and regulations as they existed at the time of the site assessment. Some conditions are subject to change over time and the Client recognizes that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site may substantially alter such evaluations and conclusions. Construction activities can significantly alter soil, rock and other geologic conditions on the site. McElhanney should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein upon any of the following events: a) any changes (or possible changes) as to the site, purpose, or development plans upon which this report was based, b) any changes to applicable laws subsequent to the issuance of the report, c) new information is discovered in the future during site excavations, construction, building demolition or other activities, or d) additional subsurface assessments or testing conducted by others.

Subsurface Risks. Soil, rock and groundwater data were collected in general accordance with the standards and methods described in the document. The classification and identification of soils, rocks and geologic formations was based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Interpretations of groundwater levels and flow direction are based on water level observations at selected test hole locations and are expected to fluctuate. Observations at test holes indicate the approximate subsurface conditions at those locations only. Subsurface conditions between test holes were based, by necessity, on judgement and assumptions of what exists between the actual locations sampled, and may vary significantly from actual site conditions and all persons making use of this report should be aware of, and accept, this risk. Even a comprehensive sampling and testing program, implemented in accordance with appropriate equipment by experienced personnel, may fail to detect all or certain conditions.

Information from Client and Third Parties. McElhanney has relied in good faith on information provided by the Client and third parties noted in this report and has assumed such information to be accurate, complete, reliable, non-fringing, and fit for the intended purpose without independent verification. McElhanney accepts no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions or errors in information provided by third parties or for omissions, misstatements or fraudulent acts of persons interviewed.

Underground Utilities and Damages. In the performance of the services, McElhanney has taken reasonable precautions to avoid damage or injury to subterranean structures or utilities. Subsurface sampling may result in unavoidable contamination of certain subsurface areas not known to be previously contaminated such as, but not limited to, a geologic formation, the groundwater or other hydrous body. McElhanney will adhere to an appropriate standard of care during the conduct of any subsurface sampling.

Independent Judgments. McElhanney will not be responsible for the independent conclusions, interpretations, interpolations and/or decisions of the Client, or others, who may come into possession of this report, or any part thereof. This restriction of liability includes decisions made to purchase, finance or sell land or with respect to public offerings for the sale of securities.

Construction. The subsurface information contained in this report were obtained for the owner's information and design. The extent and detail of assessments necessary to determine all relevant conditions that may affect construction costs would normally be greater than the assessments carried out for this report. Accordingly, a contingency fund to allow for the possibility of variations of subsurface conditions should be included in the construction budget to cover costs associated with modifications of the design and construction procedures resulting from conditions that vary from the assumptions in this report. If during construction, subsurface conditions are found to be other than those described in this report, McElhanney is to be notified and may alter or modify the geotechnical report recommendations. If McElhanney is not retained to provide services during construction, then McElhanney is not responsible for confirming or recording that subsurface conditions do not materially differ from those interpreted conditions contained in this report or for confirming or recording that construction activities have not adversely affected subsurface conditions or the recommendations contained in this report.

APPENDIX B

Site Plans



Drawing No: **SK-02**
 Project Number: 2211-4748-00
 Rev: 01

BYDAND PROPERTIES LTD.
 721 LAZO ROAD, COMOX, BC
 SLOPE SETBACKS

1111 River Road
 Courtenay, BC
 Canada V9J 3K6
 T 250 338 5665



721 LAZO ROAD
 BUILDING SETBACK FROM TOP OF BANK
 10m BUILDING SETBACK FROM SLOPE
 SLOPE TOE
 10m BUILDING SETBACK FROM SLOPE
 SLOPE TOE

NOTE: SLOPES WITHIN THIS BOUNDARY WILL LIKELY BE REGRADED TO SHALLOWER SLOPE ANGLES. THEREFORE THE SLOPE SETBACKS MAY NOT APPLY TO FINAL GRADING DESIGN.

NO.	DATE	DESCRIPTION	BY	CHECKED	APPROVED
1	2022-02-25	ISSUED FOR REFERENCE	JT	JF	RS
2	2022-03-14	ISSUED FOR DISCUSSION	JT	LD	JF
3					
4					
5					
6					
7					
8					
9					
10					

ORIGINAL 3MG SIZE ANS B (11" x 17")

APPENDIX C

Test Hole Logs

CLIENT: Bydand Properties Ltd.	PROJECT: 721 Lazo Road	TEST PIT No. TP23-01
CONTRACTOR: Tippin Point Excavating	CO-ORDS N/E: 5505338.62 364427.17	PROJECT No. 2211-47748-00
METHOD: Excavator/Kubota KX57	LOCATION: Comox, BC	ELEVATION: 6.00 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	▲ N Value				REMARKS
					● Moisture Content (%)	I Plastic/Liquid Limit (%)	□ Fines Content (%)	◆ DCPT Blows	
					20	40	60	80	
	0.40		SAND (SW), fine to coarse sand, some fine gravel, trace fines, well graded, angular, compact, brown, moist [fill]	G 1					
	5.60		SAND (SP), fine sand, poorly graded, compact, light brown, moist [natural]	G 2					M: 4.4% Gravel: 0.0% Sand: 99.6% Fines: 0.4%
	1.60		Terminated at 1.60 m. Test pit cave in. Backfilled with excavated soil bucket compacted in lifts.						
1	5								
2	4								
3	3								
4	2								

	LOGGED BY: L. Dykeman	START DATE: December 01, 2023
	REVIEWED BY: J. Fischer	COMPLETION DATE: December 01, 2023
	COMPLETION DEPTH: 1.60 m	Sheet 1 of 1

CLIENT: Bydand Properties Ltd.	PROJECT: 721 Lazo Road	TEST PIT No. TP23-02
CONTRACTOR: Tippin Point Excavating	CO-ORDS N/E: 5505291.23 364440.92	PROJECT No. 2211-47748-00
METHOD: Excavator/Kubota KX57	LOCATION: Comox, BC	ELEVATION: 5.50 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	<ul style="list-style-type: none"> ▲ N Value ● Moisture Content (%) I Plastic/Liquid Limit (%) □ Fines Content (%) ◆ DCPT Blows 				REMARKS
					20	40	60	80	
	5.50		0.10 Topsoil, organic 5.40						
			SAND (SP), fine sand, trace fines, poorly graded, compact to loose, light brown, moist, rootlets to 0.9m [natural]	G 1	●				M: 2.2%
			0.90 SAND (SP), fine sand, trace fines, poorly graded, compact, black, moist 4.60	G 2	●				
			1.20 SAND (SP), fine sand, trace fines, poorly graded, compact, light brown, rusty, moist 4.30	G 3	●				M: 5.5%
			- At 2.4m, becomes light grey to light brown	G 4					
			3.60 Terminated at 3.60 m. Maximum excavator reach. 1.90	G 5					



McElhanney

LOGGED BY: L. Dykeman	START DATE: December 01, 2023
REVIEWED BY: J. Fischer	COMPLETION DATE: December 01, 2023
COMPLETION DEPTH: 3.60 m	Sheet 1 of 1

CLIENT: Bydand Properties Ltd.	PROJECT: 721 Lazo Road	TEST PIT No. TP23-03
CONTRACTOR: Tippin Point Excavating	CO-ORDS N/E: 5505288.33 364440.03	PROJECT No. 2211-47748-00
METHOD: Excavator/Kubota KX57	LOCATION: Comox, BC	ELEVATION: 5.00 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	▲ N Value				REMARKS
					Moisture Content (%)	Plastic/Liquid Limit (%)	Fines Content (%)	DCPT Blows	
					20	40	60	80	
	0.15		Topsoil						
	4.85		SAND (SP), fine sand, trace fines, poorly graded, compact, light brown, moist						
1	4			G 1					
2	3		- At 2.4m, becomes light grey to light brown	G 2	●				M 6.3% Gravel: 0.0% Sand: 98.7% Fines: 1.3%
3	2			G 3					
	3.70		Terminated at 3.70 m. Maximum excavator reach.						
4	1								

	LOGGED BY: L. Dykeman	START DATE: December 01, 2023
	REVIEWED BY: J. Fischer	COMPLETION DATE: December 01, 2023
	COMPLETION DEPTH: 3.70 m	Sheet 1 of 1

CLIENT: Bydand Properties Ltd.	PROJECT: 721 Lazo Road	TEST PIT No. TP23-04
CONTRACTOR: Tippin Point Excavating	CO-ORDS N/E: 5505292.54 364461.02	PROJECT No. 2211-47748-00
METHOD: Excavator/Kubota KX57	LOCATION: Comox, BC	ELEVATION: 4.00 m

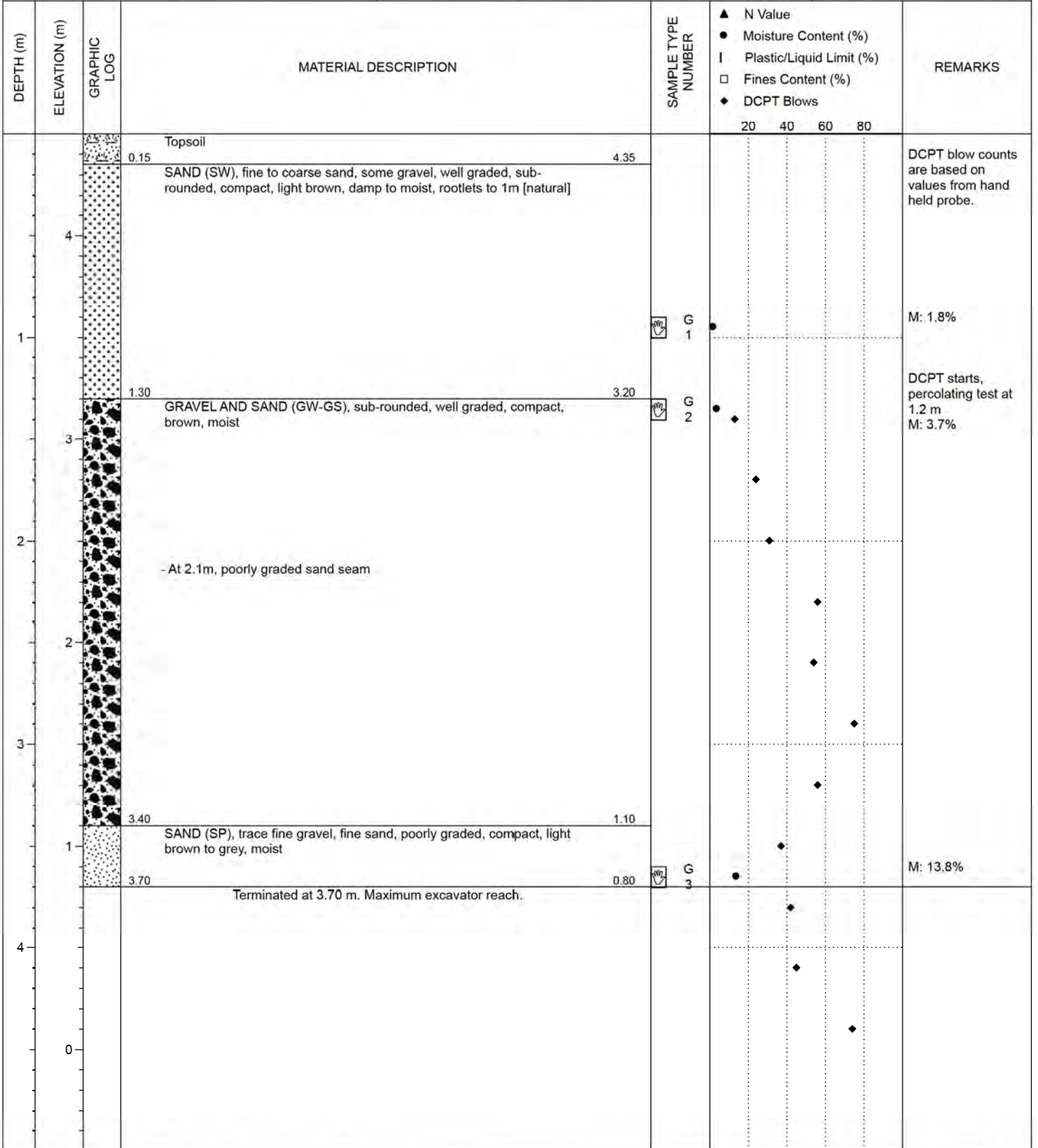
DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	WATER	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	▲ N Value				REMARKS
						● Moisture Content (%)	I Plastic/Liquid Limit (%)	□ Fines Content (%)	◆ DCPT Blows	
						20	40	60	80	
	0.15			Topsoil						
	3.85			SAND (SP), fine sand, trace to some fine rounded gravel, trace fines, poorly graded, compact to loose, light brown, rootlets [natural]	G 1					
	2.20			GRAVEL (GW), sandy, medium to coarse sand, sub-rounded, well graded, compact, dark brown to grey, wet	G 2					
	1.80									
	3.70			Terminated at 3.70 m. Maximum excavator reach. Moderate groundwater seepage observed at 3.6 m.	G 3					M 4.3% Gravel: 55.0% Sand: 44.6% Fines: 1.3%
	0.30									




McElhanney








LOGGED BY: L. Dykeman	START DATE: December 01, 2023
REVIEWED BY: J. Fischer	COMPLETION DATE: December 01, 2023
COMPLETION DEPTH: 3.70 m	Sheet 1 of 1

CLIENT: Bydand Properties Ltd.	PROJECT: 721 Lazo Road	TEST PIT No. TP23-05
CONTRACTOR: Tippin Point Excavating	CO-ORDS N/E: 5505293.12 364474.75	PROJECT No. 2211-47748-00
METHOD: Excavator/Kubota KX57	LOCATION: Comox, BC	ELEVATION: 4.50 m



 McElhanney	LOGGED BY: L. Dykeman	START DATE: December 01, 2023
	REVIEWED BY: J. Fischer	COMPLETION DATE: December 01, 2023
	COMPLETION DEPTH: 3.70 m	Sheet 1 of 1

CLIENT: Bydand Properties Ltd.	PROJECT: 721 Lazo Road	TEST PIT No. TP23-06
CONTRACTOR: Tippin Point Excavating	CO-ORDS N/E: 5505272.84 364440.32	PROJECT No. 2211-47748-00
METHOD: Excavator/Kubota KX57	LOCATION: Comox, BC	ELEVATION: 4.90 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	▲ N Value				REMARKS
					Moisture Content (%)	Plastic/Liquid Limit (%)	Fines Content (%)	DCPT Blows	
					20	40	60	80	
	4.75		Topsoil						
	0.15		SAND (SP), fine sand, poorly graded, loose to compact, light brown, moist [natural]						
1	4		- At 1m, becomes compact and rootless stop	G 1					
2	3								
	2.40		GRAVEL (GW), sandy, well graded, sub-rounded, compact, brown, moist	G 2					
	2.50								
3	2		GRAVEL AND SAND (GW-SW), medium to coarse sand, well graded, brown, sub-rounded, moist						
	2.70								
	2.20								
	3.70		Terminated at 3.70 m. Maximum excavator reach.	G 3					M: 3.6% Gravel: 25.6% Sand: 74.0% Fines: 0.3%
	1.20								
4	1								
	0								



McElhanney

LOGGED BY: L. Dykeman	START DATE: December 01, 2023
REVIEWED BY: J. Fischer	COMPLETION DATE: December 01, 2023
COMPLETION DEPTH: 3.70 m	Sheet 1 of 1

CLIENT: Bydand Properties Ltd.	PROJECT: 721 Lazo Road	TEST PIT No. TP23-07
CONTRACTOR: Tippin Point Excavating	CO-ORDS N/E: 5505345.50 364367.32	PROJECT No. 2211-47748-00
METHOD: Excavator/Kubota KX57	LOCATION: Comox, BC	ELEVATION: 14.00 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	<ul style="list-style-type: none"> ▲ N Value ● Moisture Content (%) I Plastic/Liquid Limit (%) □ Fines Content (%) ◆ DCPT Blows 				REMARKS	
					20	40	60	80		
	13.85		Topsoil							
	13.85		SAND (SP), fine sand, trace gravel, poorly graded, compact, light to dark brown, rusty staining, moist, roots to 2m [fill]	G 1						DCPT blow counts are based on values from hand held probe.
1	13									M: 6.2% Gravel: 18.9% Sand: 78.7% Fines: 2.4%
	11.90		Organic soil, black	G 2						M: 6.4% Gravel: 0.0% Sand: 99.2% Fines: 0.8%
	11.70		SAND (SP), fine sand, poorly graded, compact, light brown to orangey brown, moist [natural]							
2	12									
	10.40		Terminated at 3.60 m. Maximum excavator reach. Backfilled with excavated soil, bucket compacted in lifts.	G 3						
3	11									
4	10									




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LOGGED BY: L. Dykeman	START DATE: December 01, 2023
REVIEWED BY: J. Fischer	COMPLETION DATE: December 01, 2023
COMPLETION DEPTH: 3.60 m	Sheet 1 of 2

CLIENT: Bydand Properties Ltd.	PROJECT: 721 Lazo Road	TEST PIT No. TP23-07
CONTRACTOR: Tippin Point Excavating	CO-ORDS N/E: 5505345.50 364367.32	PROJECT No. 2211-47748-00
METHOD: Excavator/Kubota KX57	LOCATION: Comox, BC	ELEVATION: 14.00 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	<ul style="list-style-type: none"> ▲ N Value ● Moisture Content (%) I Plastic/Liquid Limit (%) □ Fines Content (%) ◆ DCPT Blows 				REMARKS
					20	40	60	80	
6	8				◆				
7	7				◆				
8	6				◆				
9	5				◆				

 McElhanney	LOGGED BY: L. Dykeman	START DATE: December 01, 2023
	REVIEWED BY: J. Fischer	COMPLETION DATE: December 01, 2023
	COMPLETION DEPTH: 3.60 m	Sheet 2 of 2

APPENDIX D

Town of Comox – Schedule C

SCHEDULE 3

For completion by the Engineer of Record: A check to the left of the following items indicates the information was considered in the preparation of this report. Strike-out or mark the item "NA" if it is not applicable to the proposed development

- Background Information-** includes a review of all available background information and previous geotechnical reports, not limited to reports only on file in the Town of Comox database
 - The engineer should contact the Comox Planning Department to request copies of any Geotechnical Reports on file at the Town that may be applicable to the subject property.
- potential geotechnical hazards** (e.g. land slip, debris flows, alluvial fan areas, debris torrents, mud flows, rock falls; geotechnical failure; flooding; mud flows; erosion; subsidence or avalanche.)
- Impact outside the construction zone** – an analysis of the slope stability of the site should be included, including those portions of the site not directly impacted by construction. Special consideration should be given to identify areas considered sensitive to disturbance of soil stability including through changes in vegetation or alterations in surface flows of water, as well as potential impact on adjacent properties.
- Bearing Capacity of Soil** – provide a clear assessment of the bearing capacity of the soil for the support of the building and other structures including retaining walls.
- Structural Consideration of the Soil including Slope Stability and Seismic Loading** – provide a clear assessment of the stability of slopes supporting or loading against the building and the design of geotechnical aspects of the interaction between ground and building.
- Excavations** – provide clear assessment of hazards associated with the removal of ground for the purpose of constructing a building or structure. The report should address stability of cut slopes, the location and extent of excavated cuts, the potential impact on adjacent properties, temporary dewatering including pumping and measures to prevent deposit of sediment or soil on adjacent properties, streets or services.
- Backfill and Fill** – provide a clear assessment of backfill against and affecting building and retaining walls. Consideration should include the impact of fill on slope stability and impacts on neighbouring properties.
- Compaction** – where required, provide a clear assessment of compaction of engineered fill, permanent underpinning and the Geotechnical aspects of deep foundations.
- Design**-provide design of shoring and underpinning systems as may be required.
- Dewatering**
- Permanent Dewatering** – provide clear assessment of the installation of drainage systems to maintain groundwater at design levels and pressure. This review should include:
 - pumping, drainage and cut off of ground water;
 - pumping, perimeter and under-slab drainage to maintain the building free of surface run-off, ground seepage and precipitation; and
 - the assessment of impact on neighbouring properties.

APPENDIX E

Field Testing Data

WILDCAT DYNAMIC CONE LOG

McElhanney Ltd.
1211 Ryan Road
Courtenay, BC V9N 3R6

PROJECT NUMBER: 2211-47748-00
DATE STARTED: 12-01-2023
DATE COMPLETED: 12-01-2023

HOLE #: DCPT23-01
CREW: XXXXXXXXXX
PROJECT: 721 Lazo Road Development
ADDRESS: 721 Lazo Road
LOCATION: Comox BC

SURFACE ELEVATION: _____
WATER ON COMPLETION: _____
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm ²	GRAPH OF CONE RESISTANCE				N'	TESTED CONSISTENCY	
			0	50	100	150		NON-COHESIVE	COHESIVE
-	1	4.4	•				1	VERY LOOSE	VERY SOFT
-	2	8.9	••				2	VERY LOOSE	SOFT
- 1 ft	2	8.9	••				2	VERY LOOSE	SOFT
-	3	13.3	•••				3	VERY LOOSE	SOFT
-	3	13.3	•••				3	VERY LOOSE	SOFT
- 2 ft	4	17.8	••••				5	LOOSE	MEDIUM STIFF
-	4	17.8	••••				5	LOOSE	MEDIUM STIFF
-	5	22.2	•••••				6	LOOSE	MEDIUM STIFF
- 3 ft	6	26.6	••••••				7	LOOSE	MEDIUM STIFF
- 1 m	7	31.1	•••••••				8	LOOSE	MEDIUM STIFF
-	7	27.0	••••••				7	LOOSE	MEDIUM STIFF
- 4 ft	7	27.0	••••••				7	LOOSE	MEDIUM STIFF
-	7	27.0	••••••				7	LOOSE	MEDIUM STIFF
-	9	34.7	•••••••				9	LOOSE	STIFF
- 5 ft	9	34.7	•••••••				9	LOOSE	STIFF
-	9	34.7	•••••••				9	LOOSE	STIFF
-	9	34.7	•••••••				9	LOOSE	STIFF
- 6 ft	10	38.6	••••••••				11	MEDIUM DENSE	STIFF
-	15	57.9	••••••••••				16	MEDIUM DENSE	VERY STIFF
- 2 m	5	19.3	••••				5	LOOSE	MEDIUM STIFF
- 7 ft	10	34.2	••••••				9	LOOSE	STIFF
-	10	34.2	••••••				9	LOOSE	STIFF
-	5	17.1	••••				4	VERY LOOSE	SOFT
- 8 ft	5	17.1	••••				4	VERY LOOSE	SOFT
-	7	23.9	•••••				6	LOOSE	MEDIUM STIFF
-	9	30.8	••••••				8	LOOSE	MEDIUM STIFF
- 9 ft	9	30.8	••••••				8	LOOSE	MEDIUM STIFF
-	9	30.8	••••~				8	LOOSE	MEDIUM STIFF
-	9	30.8	••••~				8	LOOSE	MEDIUM STIFF
- 3 m	10 ft	30.8	••••~				8	LOOSE	MEDIUM STIFF
-	9	27.5	••••~				7	LOOSE	MEDIUM STIFF
-	9	27.5	••••~				7	LOOSE	MEDIUM STIFF
-	9	27.5	••••~				7	LOOSE	MEDIUM STIFF
- 11 ft	10	30.6	••••~				8	LOOSE	MEDIUM STIFF
-	11	33.7	••••~				9	LOOSE	STIFF
-	12	36.7	••••~				10	LOOSE	STIFF
- 12 ft	12	36.7	••••~				10	LOOSE	STIFF
-	13	39.8	••••~				11	MEDIUM DENSE	STIFF
-	13	39.8	••••~				11	MEDIUM DENSE	STIFF
- 4 m	13 ft	55.1	••••~				15	MEDIUM DENSE	STIFF

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm ²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY	
					NON-COHESIVE	COHESIVE
-	11	30.5	.....	8	LOOSE	MEDIUM STIFF
-	17	47.1	.....	13	MEDIUM DENSE	STIFF
- 14 ft	16	44.3	.....	12	MEDIUM DENSE	STIFF
-	17	47.1	.....	13	MEDIUM DENSE	STIFF
-	21	58.2	.....	16	MEDIUM DENSE	VERY STIFF
- 15 ft	23	63.7	.....	18	MEDIUM DENSE	VERY STIFF
-	20	55.4	.....	15	MEDIUM DENSE	STIFF
-	25	69.3	.....	19	MEDIUM DENSE	VERY STIFF
- 16 ft	16	44.3	.....	12	MEDIUM DENSE	STIFF
- 5 m	16	44.3	.....	12	MEDIUM DENSE	STIFF
-	16	40.6	.....	11	MEDIUM DENSE	STIFF
- 17 ft	20	50.8	.....	14	MEDIUM DENSE	STIFF
-	24	61.0	.....	17	MEDIUM DENSE	VERY STIFF
-	27	68.6	.....	19	MEDIUM DENSE	VERY STIFF
- 18 ft	29	73.7	.....	21	MEDIUM DENSE	VERY STIFF
-	30	76.2	.....	21	MEDIUM DENSE	VERY STIFF
-	27	68.6	.....	19	MEDIUM DENSE	VERY STIFF
- 19 ft	25	63.5	.....	18	MEDIUM DENSE	VERY STIFF
-	29	73.7	.....	21	MEDIUM DENSE	VERY STIFF
- 6 m	24	61.0	.....	17	MEDIUM DENSE	VERY STIFF
- 20 ft	26	60.6	.....	17	MEDIUM DENSE	VERY STIFF
-	30	69.9	.....	19	MEDIUM DENSE	VERY STIFF
-	34	79.2	.....	22	MEDIUM DENSE	VERY STIFF
- 21 ft	33	76.9	.....	21	MEDIUM DENSE	VERY STIFF
-						
-						
- 22 ft						
-						
- 7 m	23 ft					
-						
-	24 ft					
-						
-	25 ft					
-						
-	26 ft					
- 8 m						
-	27 ft					
-						
-	28 ft					
-						
-	29 ft					
- 9 m						

WILDCAT DYNAMIC CONE LOG

McElhanney Ltd.
1211 Ryan Road
Courtenay, BC V9N 3R6

PROJECT NUMBER: 2211-47748-00
DATE STARTED: 12-01-2023
DATE COMPLETED: 12-01-2023

HOLE #: DCPT23-03

CREW: XXXXXXXXXX

PROJECT: 721 Lazo Road Development

ADDRESS: 721 Lazo Road

LOCATION: Comox BC

SURFACE ELEVATION: _____
WATER ON COMPLETION: _____
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm ²	GRAPH OF CONE RESISTANCE				N'	TESTED CONSISTENCY	
			0	50	100	150		NON-COHESIVE	COHESIVE
-	1	4.4	•				1	VERY LOOSE	VERY SOFT
-	2	8.9	••				2	VERY LOOSE	SOFT
- 1 ft	2	8.9	••				2	VERY LOOSE	SOFT
-	3	13.3	•••				3	VERY LOOSE	SOFT
-	4	17.8	••••				5	LOOSE	MEDIUM STIFF
- 2 ft	7	31.1	••••••				8	LOOSE	MEDIUM STIFF
-	8	35.5	••••••				10	LOOSE	STIFF
-	10	44.4	•••••••				12	MEDIUM DENSE	STIFF
- 3 ft	10	44.4	•••••••				12	MEDIUM DENSE	STIFF
- 1 m	5	22.2	••••				6	LOOSE	MEDIUM STIFF
-	6	23.2	••••				6	LOOSE	MEDIUM STIFF
- 4 ft	6	23.2	••••				6	LOOSE	MEDIUM STIFF
-	8	30.9	•••••				8	LOOSE	MEDIUM STIFF
-	8	30.9	•••••				8	LOOSE	MEDIUM STIFF
- 5 ft	9	34.7	••••••				9	LOOSE	STIFF
-	10	38.6	•••••••				11	MEDIUM DENSE	STIFF
-	11	42.5	•••••••				12	MEDIUM DENSE	STIFF
- 6 ft	14	54.0	••••••••				15	MEDIUM DENSE	STIFF
-	13	50.2	••••••••				14	MEDIUM DENSE	STIFF
- 2 m	12	46.3	••••••••				13	MEDIUM DENSE	STIFF
- 7 ft	13	44.5	••••••••				12	MEDIUM DENSE	STIFF
-	13	44.5	••~•••••				12	MEDIUM DENSE	STIFF
-	13	44.5	••~•••••				12	MEDIUM DENSE	STIFF
- 8 ft	16	54.7	••••••••				15	MEDIUM DENSE	STIFF
-	17	58.1	••~•••••				16	MEDIUM DENSE	VERY STIFF
-	19	65.0	••~••••••				18	MEDIUM DENSE	VERY STIFF
- 9 ft	19	65.0	••~••••••				18	MEDIUM DENSE	VERY STIFF
-	18	61.6	••~•••••				17	MEDIUM DENSE	VERY STIFF
-	17	58.1	••~•••••				16	MEDIUM DENSE	VERY STIFF
- 3 m	10 ft	61.6	••~•••••				17	MEDIUM DENSE	VERY STIFF
-	18	55.1	••~•••••				15	MEDIUM DENSE	STIFF
-	16	49.0	••~•••••				13	MEDIUM DENSE	STIFF
-	17	52.0	••~•••••				14	MEDIUM DENSE	STIFF
- 11 ft	15	45.9	••~•••••				13	MEDIUM DENSE	STIFF
-	19	58.1	••~•••••				16	MEDIUM DENSE	VERY STIFF
-	20	61.2	••~•••••				17	MEDIUM DENSE	VERY STIFF
- 12 ft	21	64.3	••~•••••				18	MEDIUM DENSE	VERY STIFF
-	20	61.2	••~•••••				17	MEDIUM DENSE	VERY STIFF
-	22	67.3	••~••••••				19	MEDIUM DENSE	VERY STIFF
- 4 m	13 ft	61.2	••~•••••				17	MEDIUM DENSE	VERY STIFF

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm ²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY	
					NON-COHESIVE	COHESIVE
-	22	60.9	.....	17	MEDIUM DENSE	VERY STIFF
-	30	83.1	.....	23	MEDIUM DENSE	VERY STIFF
- 14 ft	36	99.7	.....	25+	MEDIUM DENSE	VERY STIFF
-	40	110.8	.....	25+	DENSE	HARD
-	43	119.1	.....	25+	DENSE	HARD
- 15 ft	44	121.9	.....	25+	DENSE	HARD
-	41	113.6	.....	25+	DENSE	HARD
-	36	99.7	.....	25+	MEDIUM DENSE	VERY STIFF
- 16 ft	34	94.2	.....	25+	MEDIUM DENSE	VERY STIFF
- 5 m	42	116.3	.....	25+	DENSE	HARD
-	42	106.7	.....	25+	MEDIUM DENSE	VERY STIFF
- 17 ft	44	111.8	.....	25+	DENSE	HARD
-	50	127.0	.....	25+	DENSE	HARD
-	50	127.0	.....	25+	DENSE	HARD
- 18 ft						
-						
- 19 ft						
- 6 m						
- 20 ft						
-						
- 21 ft						
-						
- 22 ft						
-						
- 7 m 23 ft						
-						
- 24 ft						
-						
- 25 ft						
-						
- 26 ft						
- 8 m						
-						
- 27 ft						
-						
- 28 ft						
-						
- 29 ft						
- 9 m						

WILDCAT DYNAMIC CONE LOG

McElhanney Ltd.
1211 Ryan Road
Courtenay, BC V9N 3R6

PROJECT NUMBER: 2211-47748-00
DATE STARTED: 12-01-2023
DATE COMPLETED: 12-01-2023

HOLE #: TP/DCPT23-05
CREW: [REDACTED]
PROJECT: 721 Lazo Road Development
ADDRESS: 721 Lazo Road
LOCATION: Comox BC

SURFACE ELEVATION: _____
WATER ON COMPLETION: _____
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm ²	GRAPH OF CONE RESISTANCE				N'	TESTED CONSISTENCY	
			0	50	100	150		NON-COHESIVE	COHESIVE
-	0	0.0					0	VERY LOOSE	VERY SOFT
-	0	0.0					0	VERY LOOSE	VERY SOFT
- 1 ft	0	0.0					0	VERY LOOSE	VERY SOFT
-	0	0.0					0	VERY LOOSE	VERY SOFT
-	0	0.0					0	VERY LOOSE	VERY SOFT
- 2 ft	0	0.0					0	VERY LOOSE	VERY SOFT
-	0	0.0					0	VERY LOOSE	VERY SOFT
-	0	0.0					0	VERY LOOSE	VERY SOFT
- 3 ft	0	0.0					0	VERY LOOSE	VERY SOFT
- 1 m	0	0.0					0	VERY LOOSE	VERY SOFT
-	0	0.0					0	VERY LOOSE	VERY SOFT
- 4 ft	0	0.0					0	VERY LOOSE	VERY SOFT
-	1	3.9	•				1	VERY LOOSE	VERY SOFT
-	6	23.2	•••••				6	LOOSE	MEDIUM STIFF
- 5 ft	6	23.2	•••••				6	LOOSE	MEDIUM STIFF
-	8	30.9	••••••				8	LOOSE	MEDIUM STIFF
-	8	30.9	••••••				8	LOOSE	MEDIUM STIFF
- 6 ft	8	30.9	••••••				8	LOOSE	MEDIUM STIFF
-	10	38.6	••••••••				11	MEDIUM DENSE	STIFF
- 2 m	10	38.6	••••••••				11	MEDIUM DENSE	STIFF
- 7 ft	11	37.6	••••••••				10	LOOSE	STIFF
-	17	58.1	••••••••••				16	MEDIUM DENSE	VERY STIFF
-	20	68.4	••••••••••••				19	MEDIUM DENSE	VERY STIFF
- 8 ft	19	65.0	••••••••••••				18	MEDIUM DENSE	VERY STIFF
-	16	54.7	••••••••••				15	MEDIUM DENSE	STIFF
-	18	61.6	••••••••••				17	MEDIUM DENSE	VERY STIFF
- 9 ft	20	68.4	••••~••••••••				19	MEDIUM DENSE	VERY STIFF
-	28	95.8	••••••••••••••••				25+	MEDIUM DENSE	VERY STIFF
-	26	88.9	••••~••••••••••				25	MEDIUM DENSE	VERY STIFF
- 3 m	10 ft	21	71.8	••••~••••••••••			20	MEDIUM DENSE	VERY STIFF
-	16	49.0	••••~••••••••				13	MEDIUM DENSE	STIFF
-	23	70.4	••••~••••~••••••				20	MEDIUM DENSE	VERY STIFF
-	17	52.0	••••~••••~••••				14	MEDIUM DENSE	STIFF
- 11 ft	16	49.0	••••~••••~••••				13	MEDIUM DENSE	STIFF
-	10	30.6	••••~••••				8	LOOSE	MEDIUM STIFF
-	11	33.7	••••~••••				9	LOOSE	STIFF
- 12 ft	10	30.6	••••~••••				8	LOOSE	MEDIUM STIFF
-	9	27.5	••••~••••				7	LOOSE	MEDIUM STIFF
-	10	30.6	••••~••••				8	LOOSE	MEDIUM STIFF
- 4 m	13 ft	13	39.8	••••~••••			11	MEDIUM DENSE	STIFF

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm ²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY	
					NON-COHESIVE	COHESIVE
-	15	41.6	.....	11	MEDIUM DENSE	STIFF
-	17	47.1	.....	13	MEDIUM DENSE	STIFF
- 14 ft	22	60.9	.....	17	MEDIUM DENSE	VERY STIFF
-	27	74.8	.....	21	MEDIUM DENSE	VERY STIFF
-	25	69.3	.....	19	MEDIUM DENSE	VERY STIFF
- 15 ft	29	80.3	.....	22	MEDIUM DENSE	VERY STIFF
-	36	99.7	.....	25+	MEDIUM DENSE	VERY STIFF
-	42	116.3	.....	25+	DENSE	HARD
- 16 ft	60	166.2	.....	25+	DENSE	HARD
- 5 m	50	138.5	25+	DENSE	HARD
-						
-						
- 17 ft						
-						
-						
- 18 ft						
-						
-						
- 19 ft						
-						
- 6 m						
-						
- 20 ft						
-						
-						
- 21 ft						
-						
-						
- 22 ft						
-						
- 7 m						
-						
- 23 ft						
-						
-						
- 24 ft						
-						
-						
- 25 ft						
-						
-						
- 26 ft						
- 8 m						
-						
- 27 ft						
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-						
- 28 ft						
-						
-						
- 29 ft						
-						
- 9 m						

WILDCAT DYNAMIC CONE LOG

McElhanney Ltd.
1211 Ryan Road
Courtenay, BC V9N 3R6

PROJECT NUMBER: 2211-47748-00
DATE STARTED: 12-01-2023
DATE COMPLETED: 12-01-2023

HOLE #: TP/DCPT23-07
CREW: [REDACTED]
PROJECT: 721 Lazo Road Development
ADDRESS: 721 Lazo Road
LOCATION: Comox BC

SURFACE ELEVATION: _____
WATER ON COMPLETION: _____
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm ²	GRAPH OF CONE RESISTANCE				N'	TESTED CONSISTENCY	
			0	50	100	150		NON-COHESIVE	COHESIVE
-	10	44.4	.....				12	MEDIUM DENSE	STIFF
-	14	62.2	.....				17	MEDIUM DENSE	VERY STIFF
-	16	71.0	.....				20	MEDIUM DENSE	VERY STIFF
-	14	62.2	.....				17	MEDIUM DENSE	VERY STIFF
-	10	44.4	.....				12	MEDIUM DENSE	STIFF
-	7	31.1	.....				8	LOOSE	MEDIUM STIFF
-	7	31.1	.....				8	LOOSE	MEDIUM STIFF
-	5	22.2	.....				6	LOOSE	MEDIUM STIFF
-	4	17.8	.....				5	LOOSE	MEDIUM STIFF
-	3	13.3	...				3	VERY LOOSE	SOFT
-	4	15.4	.....				4	VERY LOOSE	SOFT
-	6	23.2	.....				6	LOOSE	MEDIUM STIFF
-	7	27.0	.....				7	LOOSE	MEDIUM STIFF
-	9	34.7	.....				9	LOOSE	STIFF
-	8	30.9	.....				8	LOOSE	MEDIUM STIFF
-	9	34.7	.....				9	LOOSE	STIFF
-	10	38.6	.....				11	MEDIUM DENSE	STIFF
-	10	38.6	.....				11	MEDIUM DENSE	STIFF
-	9	34.7	.....				9	LOOSE	STIFF
-	6	23.2	.....				6	LOOSE	MEDIUM STIFF
-	6	20.5	.....				5	LOOSE	MEDIUM STIFF
-	7	23.9	.....				6	LOOSE	MEDIUM STIFF
-	10	34.2	.....				9	LOOSE	STIFF
-	10	34.2	.....				9	LOOSE	STIFF
-	10	34.2	.....				9	LOOSE	STIFF
-	13	44.5	.....				12	MEDIUM DENSE	STIFF
-	17	58.1	.....				16	MEDIUM DENSE	VERY STIFF
-	17	58.1	.....				16	MEDIUM DENSE	VERY STIFF
-	16	54.7	.....				15	MEDIUM DENSE	STIFF
-	15	51.3	.....				14	MEDIUM DENSE	STIFF
-	18	55.1	.....				15	MEDIUM DENSE	STIFF
-	18	55.1	.....				15	MEDIUM DENSE	STIFF
-	17	52.0	.....				14	MEDIUM DENSE	STIFF
-	19	58.1	.....				16	MEDIUM DENSE	VERY STIFF
-	18	55.1	.....				15	MEDIUM DENSE	STIFF
-	18	55.1	.....				15	MEDIUM DENSE	STIFF
-	17	52.0	.....				14	MEDIUM DENSE	STIFF
-	16	49.0	.....				13	MEDIUM DENSE	STIFF
-	13	39.8	.....				11	MEDIUM DENSE	STIFF
-	13	39.8	.....				11	MEDIUM DENSE	STIFF

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm ²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY	
					NON-COHESIVE	COHESIVE
-	13	36.0	.....	10	LOOSE	STIFF
-	15	41.6	.....	11	MEDIUM DENSE	STIFF
- 14 ft	14	38.8	.....	11	MEDIUM DENSE	STIFF
-	14	38.8	.....	11	MEDIUM DENSE	STIFF
-	12	33.2	.....	9	LOOSE	STIFF
- 15 ft	12	33.2	.....	9	LOOSE	STIFF
-	14	38.8	.....	11	MEDIUM DENSE	STIFF
-	15	41.6	.....	11	MEDIUM DENSE	STIFF
- 16 ft	14	38.8	.....	11	MEDIUM DENSE	STIFF
- 5 m	14	38.8	.....	11	MEDIUM DENSE	STIFF
-	14	35.6	.....	10	LOOSE	STIFF
- 17 ft	11	27.9	.....	7	LOOSE	MEDIUM STIFF
-	14	35.6	.....	10	LOOSE	STIFF
-	12	30.5	.....	8	LOOSE	MEDIUM STIFF
- 18 ft	12	30.5	.....	8	LOOSE	MEDIUM STIFF
-	10	25.4	.....	7	LOOSE	MEDIUM STIFF
-	12	30.5	.....	8	LOOSE	MEDIUM STIFF
- 19 ft	13	33.0	.....	9	LOOSE	STIFF
-	11	27.9	.....	7	LOOSE	MEDIUM STIFF
- 6 m	12	30.5	.....	8	LOOSE	MEDIUM STIFF
- 20 ft	9	21.0	.....	5	LOOSE	MEDIUM STIFF
-	14	32.6	.....	9	LOOSE	STIFF
-						
- 21 ft						
-						
- 22 ft						
-						
- 7 m 23 ft						
-						
- 24 ft						
-						
- 25 ft						
-						
- 26 ft						
- 8 m						
- 27 ft						
-						
- 28 ft						
-						
- 29 ft						
- 9 m						



ph: 250.338.5495 fax: 250.338.7700

Client: **Bydand Properties Ltd**
CC:

Project No: 2211-47748
Project: 721 Lazo Rd
Location: 721 Lazo Rd, Comox, BC
Test Date: 01-Dec-23
Tech: Cole Gent

Test No.	Location	K _{fs}			Depth (m)	Soil Type
		(cm/sec)	(cm/min)	(cm/day)		
1	TP23-05	0.003756	0.225363	324.52	1.2	SAND (SW), fine to coarse, some gravel, well graded sub rounded, compact, light brown,
2	TP23-05	0.008764	0.525847	757.22	1.2	SAND (SW), fine to coarse, some gravel, well graded sub rounded, compact, light brown,
3						
4						
5						
6						
7						
8						
9						
10						

Notes:

CALCULATION SUMMARY FOR DETERMINING K_{fs}

K_{fs} Field Saturated Hydraulic Conductivity (cm/sec, cm/min, cm/day)
a Augered Test Hole Radius (cm)
H Height of Air Inlet Hole from Bottom of Test Hole (cm)
C Shape Factor (Constant determined from graph)
α* Soil Type (cm⁻¹) - see 'Soil Structure and Texture Chart'
X Cross-Sectional Area of Permeameter Reservoir (cm²)
r Constant Rate of Fall of Water in Permeameter Reservoir (cm/min)

α*	0.36	Coarse sands/highly structured soils
	0.12	Most Structured soils and med-fine sands
	0.04	Unstructured fine textured soils
	0.01	Compacted clays

APPENDIX F

Laboratory Testing



PROJECT NO. 2211-47748
CLIENT Bydand Properties Ltd.
CC

TO Bydand Properties Ltd.

ATTN :

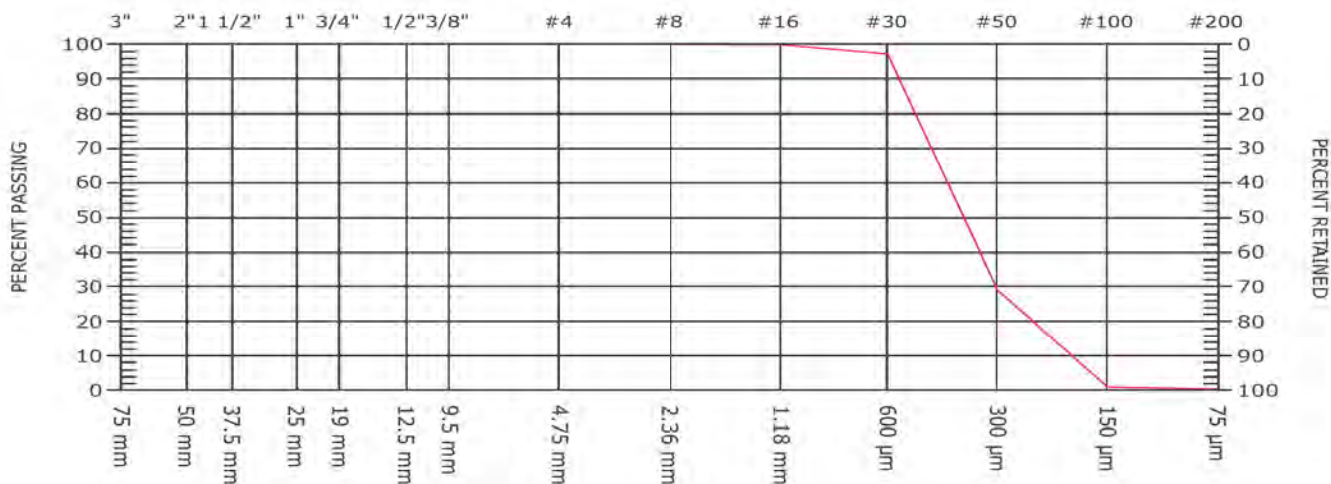
PROJECT 721 Lazo Road Development
Lead Consultant

CONTRACTOR

SIEVE TEST NO. 1 DATE TESTED 11-Dec-2023 DATE SAMPLED 01-Dec-2023 DATE RECEIVED 01-Dec-2023

SUPPLIER TP23-01
SOURCE G2; 1.0 - 1.1m
SPECIFICATION
MATERIAL TYPE SAND, trace silt

SAMPLED BY
TESTED BY
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS	SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm			No. 4	4.75 mm	100.0	
2"	50 mm			No. 8	2.36 mm	100.0	
1 1/2"	37.5 mm			No. 16	1.18 mm	99.9	
1"	25 mm			No. 30	600 µm	97.2	
3/4"	19 mm			No. 50	300 µm	29.1	
1/2"	12.5 mm			No. 100	150 µm	1.0	
3/8"	9.5 mm			No. 200	75 µm	0.4	

MOISTURE CONTENT: 4.4%

COMMENTS

Lab ID# 23-792A



PROJECT NO. 2211-47748

CLIENT Bydand Properties Ltd.

CC

TO

Bydand Properties Ltd.

ATTN : [REDACTED]

PROJECT 721 Lazo Road Development
Lead Consultant

CONTRACTOR

SIEVE TEST NO. 2

DATE TESTED 11-Dec-2023

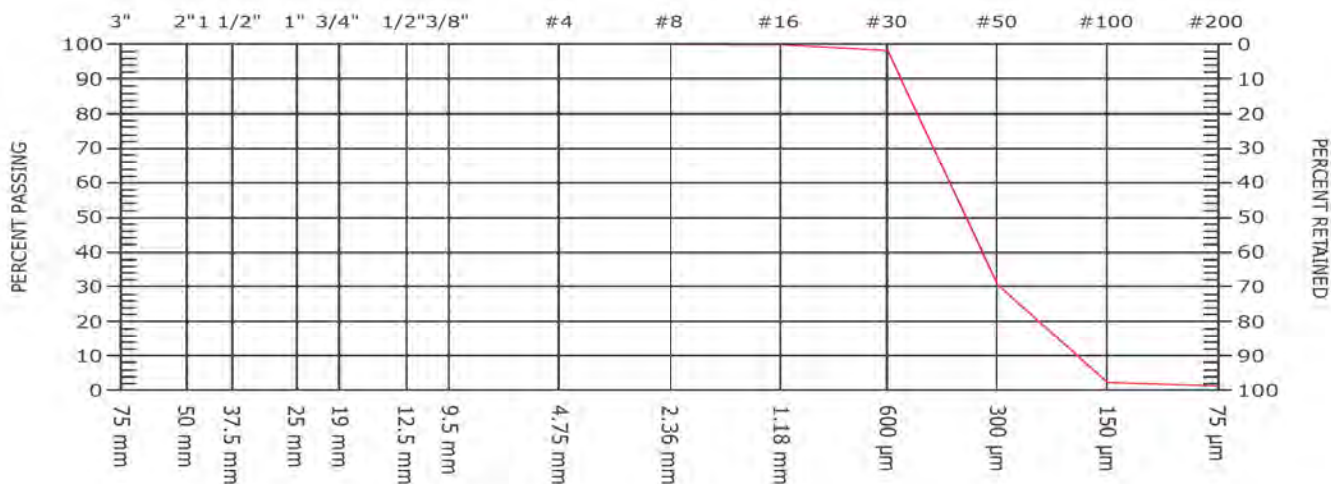
DATE SAMPLED 01-Dec-2023

DATE RECEIVED 01-Dec-2023

SUPPLIER TP23-03
SOURCE G2; 2.4 - 2.5m

SAMPLED BY [REDACTED]
TESTED BY [REDACTED]
TEST METHOD WASHED

SPECIFICATION
MATERIAL TYPE SAND, trace Silt



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS	SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
3"	75 mm		No. 4	4.75 mm	
2"	50 mm		No. 8	2.36 mm	100.0
1 1/2"	37.5 mm		No. 16	1.18 mm	99.9
1"	25 mm		No. 30	600 µm	98.2
3/4"	19 mm		No. 50	300 µm	30.7
1/2"	12.5 mm		No. 100	150 µm	2.3
3/8"	9.5 mm		No. 200	75 µm	1.3

MOISTURE CONTENT: 6.3%

COMMENTS

Lab ID# 23-793B



PROJECT NO. 2211-47748

CLIENT Bydand Properties Ltd.

CC

TO

Bydand Properties Ltd.

ATTN :

PROJECT 721 Lazo Road Development
Lead Consultant

CONTRACTOR

SIEVE TEST NO. 3

DATE TESTED 11-Dec-2023

DATE SAMPLED 01-Dec-2023

DATE RECEIVED 01-Dec-2023

SUPPLIER TP23-04

SOURCE G3; 3.6 - 3.7m

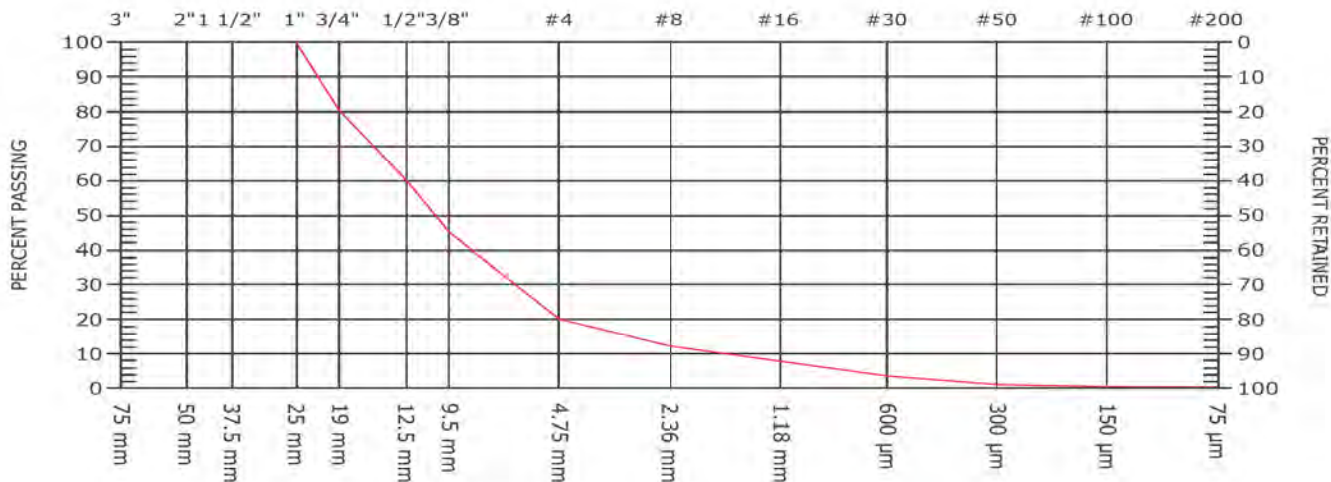
SPECIFICATION

MATERIAL TYPE GRAVEL, some Sand

SAMPLED BY

TESTED BY

TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS	SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm			No. 4	4.75 mm	20.1	
2"	50 mm			No. 8	2.36 mm	12.3	
1 1/2"	37.5 mm			No. 16	1.18 mm	7.9	
1"	25 mm	100.0		No. 30	600 µm	3.6	
3/4"	19 mm	80.4		No. 50	300 µm	1.1	
1/2"	12.5 mm	60.3		No. 100	150 µm	0.5	
3/8"	9.5 mm	45.1		No. 200	75 µm	0.4	

MOISTURE CONTENT: 4.3%

COMMENTS

Lab ID# 23-794C



PROJECT NO. 2211-47748

CLIENT Bydand Properties Ltd.

CC

TO

Bydand Properties Ltd.

[Redacted]

ATTN : [Redacted]

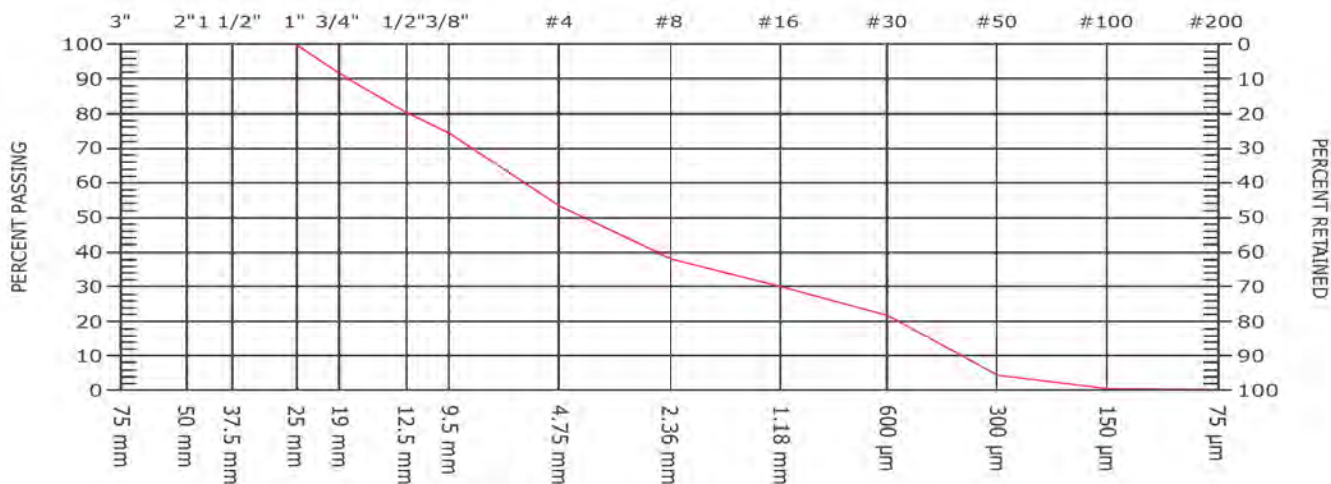
PROJECT 721 Lazo Road Development
Lead Consultant

CONTRACTOR

SIEVE TEST NO. 4 DATE TESTED 11-Dec-2023 DATE SAMPLED 01-Dec-2023 DATE RECEIVED 01-Dec-2023

SUPPLIER TP23-06
SOURCE G3; 3.6 - 3.7m
SPECIFICATION
MATERIAL TYPE GRAVEL & SAND, trace silt

SAMPLED BY [Redacted]
TESTED BY [Redacted]
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS	SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm			No. 4 4.75 mm	53.3	
2" 50 mm			No. 8 2.36 mm	38.2	
1 1/2" 37.5 mm			No. 16 1.18 mm	30.2	
1" 25 mm	100.0		No. 30 600 µm	21.8	
3/4" 19 mm	91.6		No. 50 300 µm	4.4	
1/2" 12.5 mm	80.5		No. 100 150 µm	0.5	
3/8" 9.5 mm	74.4		No. 200 75 µm	0.3	

MOISTURE CONTENT: 3.6%

COMMENTS

Lab ID# 23-795D

PER.



PROJECT NO. 2211-47748
CLIENT Bydand Properties Ltd.
CC

TO
Bydand Properties Ltd.
[Redacted]
[Redacted]
ATTN : [Redacted]

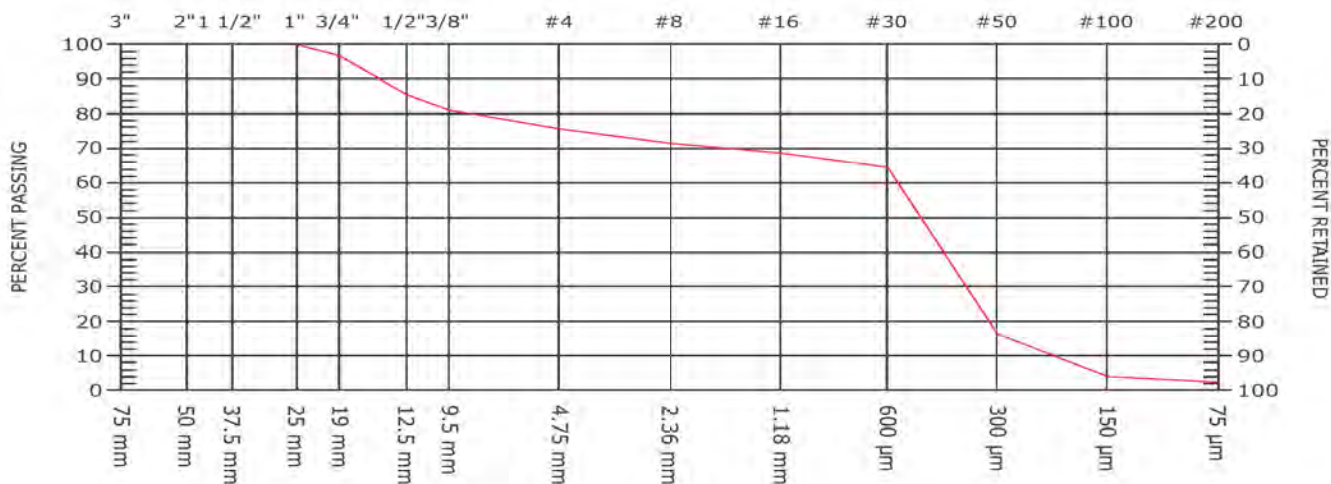
PROJECT 721 Lazo Road Development
Lead Consultant

CONTRACTOR

SIEVE TEST NO. 5 DATE TESTED 11-Dec-2023 DATE SAMPLED 01-Dec-2023 DATE RECEIVED 01-Dec-2023

SUPPLIER TP23-07
SOURCE G1 1.0 - 1.1m
SPECIFICATION
MATERIAL TYPE Gravelly SAND, trace Silt

SAMPLED BY [Redacted]
TESTED BY [Redacted]
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS	SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm			No. 4	4.75 mm	75.7	
2"	50 mm			No. 8	2.36 mm	71.5	
1 1/2"	37.5 mm			No. 16	1.18 mm	68.7	
1"	25 mm	100.0		No. 30	600 µm	64.5	
3/4"	19 mm	96.7		No. 50	300 µm	16.4	
1/2"	12.5 mm	85.7		No. 100	150 µm	4.0	
3/8"	9.5 mm	81.1		No. 200	75 µm	2.4	

MOISTURE CONTENT: 6.2%

COMMENTS

Lab ID# 23-796E

PER.



PROJECT NO. 2211-47748
CLIENT Bydand Properties Ltd.
CC

TO
Bydand Properties Ltd.
[Redacted]
[Redacted]
ATTN : [Redacted]

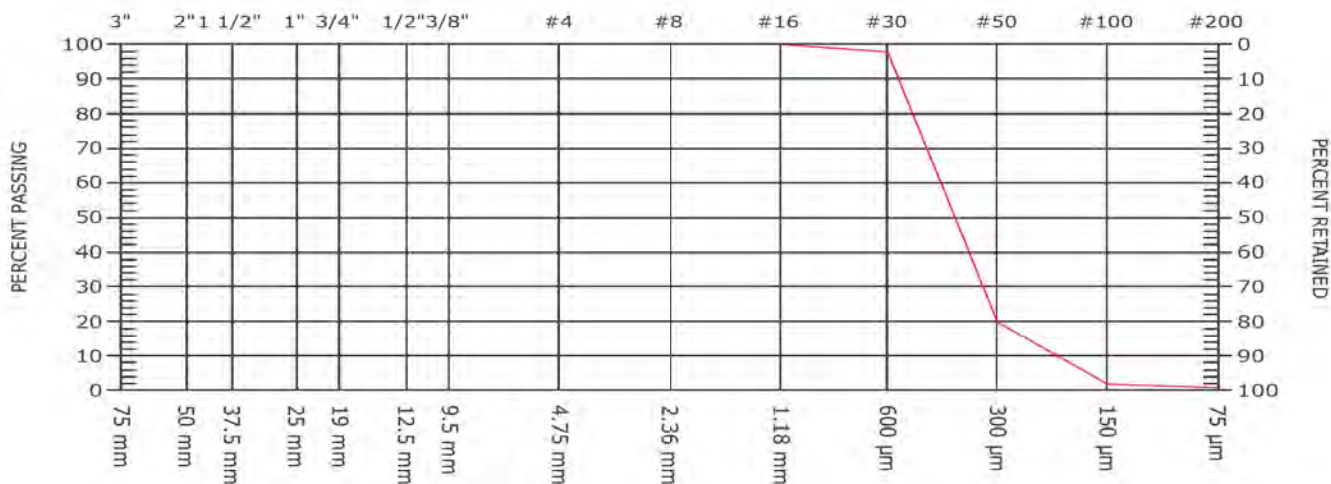
PROJECT 721 Lazo Road Development
Lead Consultant

CONTRACTOR

SIEVE TEST NO. 6 DATE TESTED 11-Dec-2023 DATE SAMPLED 01-Dec-2023 DATE RECEIVED 01-Dec-2023

SUPPLIER TP23-07
SOURCE G2; 2.2 - 2.3m
SPECIFICATION
MATERIAL TYPE SAND

SAMPLED BY [Redacted]
TESTED BY [Redacted]
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS	SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
3"	75 mm		No. 4	4.75 mm	100.0
2"	50 mm		No. 8	2.36 mm	100.0
1 1/2"	37.5 mm		No. 16	1.18 mm	100.0
1"	25 mm		No. 30	600 µm	97.8
3/4"	19 mm		No. 50	300 µm	19.8
1/2"	12.5 mm		No. 100	150 µm	1.8
3/8"	9.5 mm		No. 200	75 µm	0.8

MOISTURE CONTENT: 6.4%

COMMENTS
Lab ID# 23-797F

PER. *Kyp*

Soil Moisture Content

Report



Client: Bydand Properties Ltd.
Project Name: 721 Bydand - Enviro Servicing

Lab ID: 23-787 to 23-791
Project Number: 2211-47748
Report Number: 1
Report Date: 12 - Dec - 2023

Material Type: Native Soil
Source: TP23-02 & TP 23-05
Other: _____

Sample Date: 1 - Dec - 2023
Sampled by: [Redacted]
Test Date: 11 - Dec - 2023
Tested by: [Redacted]

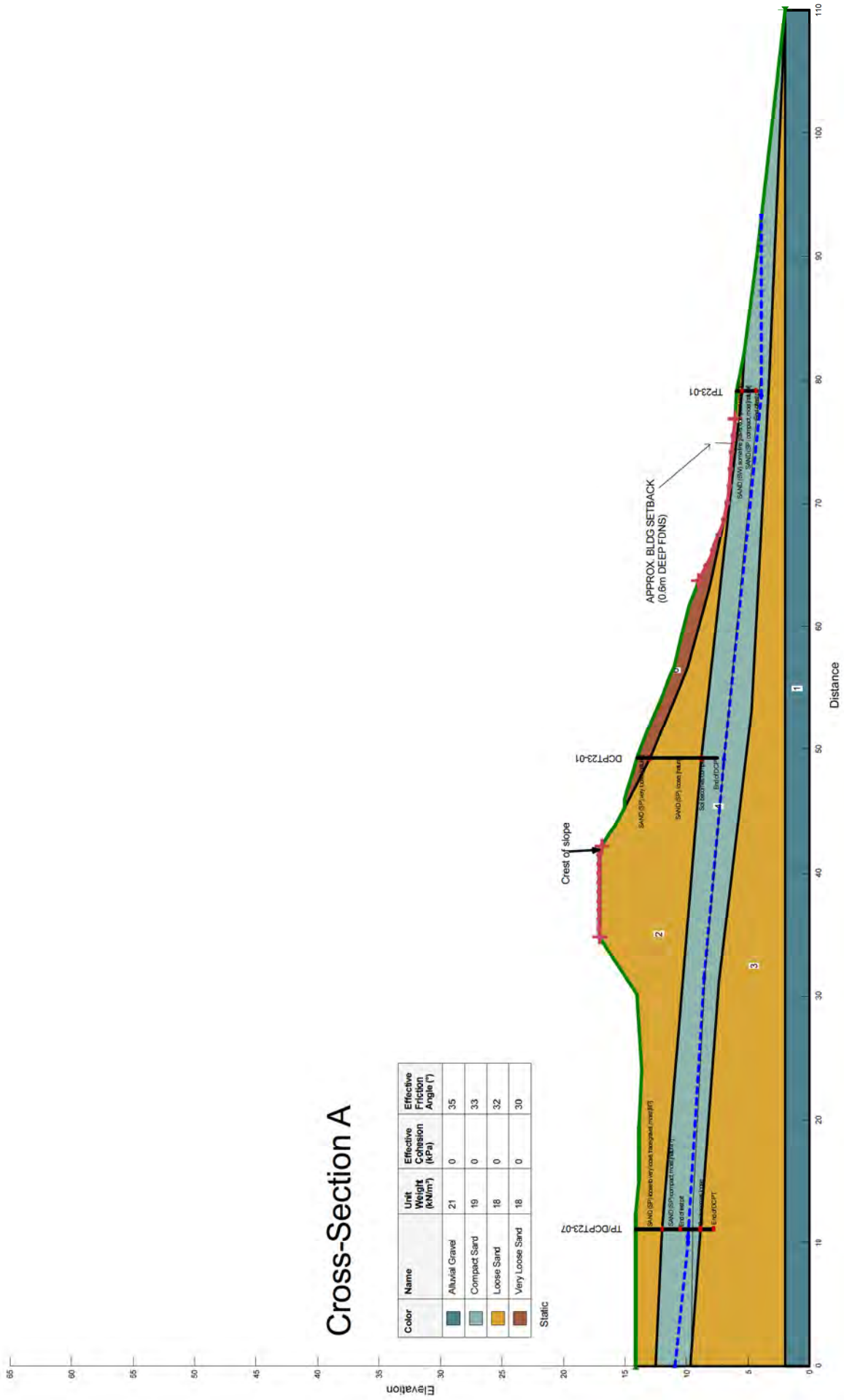
Test Pit Number	Sample Depth (m)	Container Number	Tare (g)	Tare + Wet (g)	Tare + Dry (g)	Moisture (%)
TP23-02 G1	0.3	B-7	232.8	1658.3	1628.2	2.2
TP23-02 G2	1.45	B-3	232.1	1659.9	1585.2	5.5
TP23-05 G1	0.9	B-8	233.5	1920.6	1891.3	1.8
TP23-05 G2	1.3	B-2	234	1667.7	1616.3	3.7
TP23-05 G3	3.6	B-5	232.7	1602.3	1436.2	13.8

Reviewed by: [Signature]
Kerry Barth, AScT

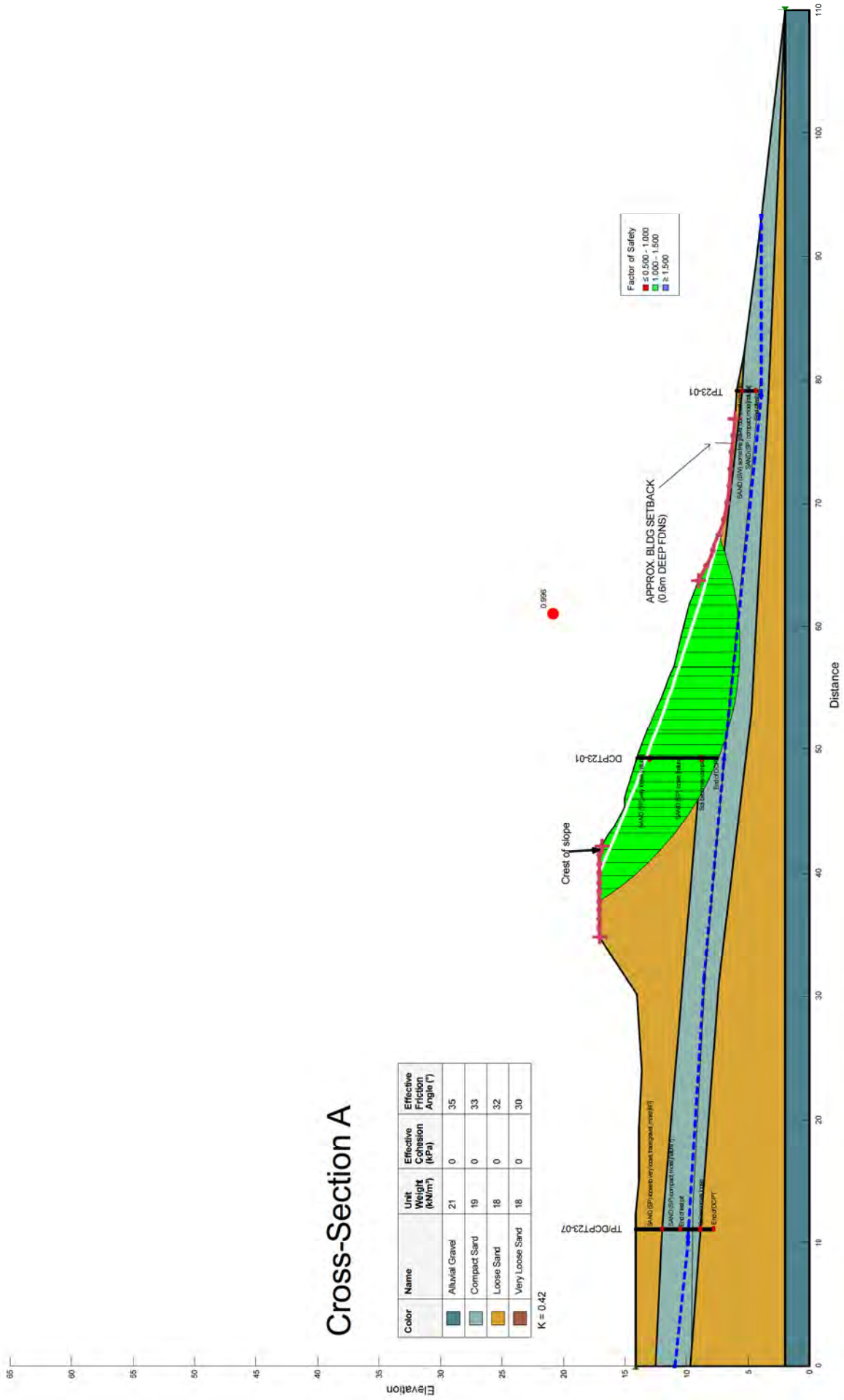
APPENDIX G

Slope Modelling Results

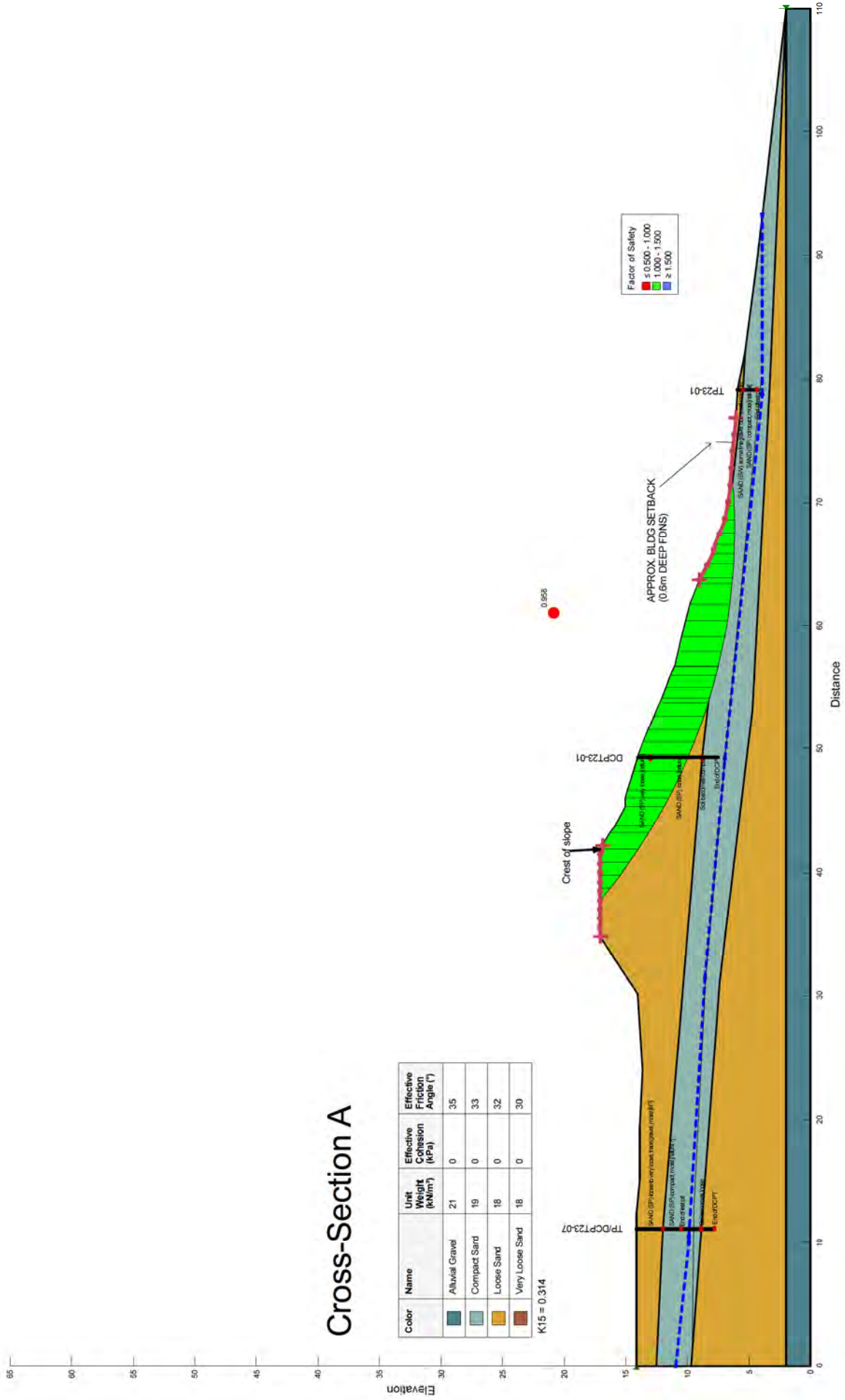
Cross-Section A



Cross-Section A



Cross-Section A



Color	Name	Unit Weight (KN/m ³)	Effective Cohesion (KPa)	Effective Friction Angle (°)
Dark Blue	Alluvial Gravel	21	0	35
Light Blue	Compact Sand	19	0	33
Orange	Loose Sand	18	0	32
Red	Very Loose Sand	18	0	30

K15 = 0.314

APPENDIX H

Landslide Assessment Assurance Statement

LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Notes: This statement is to be read and completed in conjunction with the Engineers and Geoscientists BC *Professional Practice Guidelines – Landslide Assessments in British Columbia* (“the guidelines”) and the current *BC Building Code (BCBC)*, and is to be provided for Landslide Assessments (not floods or flood controls), particularly those produced for the purposes of the *Land Title Act*, *Community Charter*, or *Local Government Act*. Some jurisdictions (e.g., the Fraser Valley Regional District or the Cowichan Valley Regional District) have developed more comprehensive assurance statements in collaboration with Engineers and Geoscientists BC. Where those exist, the Qualified Professional is to fill out the local version only. Defined terms are capitalized; see the Defined Terms section of the guidelines for definitions.

To: The Approving Authority (or Client)

Date: March 6, 2025

Town of Comox

1809 Beaufort Ave, Comox, BC V9M 1R9

Jurisdiction/name and address

With reference to (CHECK ONE):

- A. *Land Title Act* (Section 86) – Subdivision Approval
- B. *Local Government Act* (Sections 919.1 and 920) – Development Permit
- C. *Community Charter* (Section 56) – Building Permit
- D. Non-legislated assessment

For the following property (the “Property”):

1900 Ryan Road, Courtenay, BC

PARCEL B (DD 20772N) OF DISTRICT LOT 191, COMOX DISTRICT

Civic address of the Property

The undersigned hereby gives assurance that they are a Qualified Professional and a professional engineer or professional geoscientist who fulfils the education, training, and experience requirements as outlined in the guidelines.

I have signed, authenticated, and dated, and thereby certified, the attached Landslide Assessment Report on the Property in accordance with the guidelines. That report must be read in conjunction this statement.

In preparing that report I have:

[CHECK TO THE LEFT OF APPLICABLE ITEMS]

- 1. Collected and reviewed appropriate background information
- 2. Reviewed the proposed Residential Development or other development on the Property
- 3. Conducted field work on and, if required, beyond the Property
- 4. Reported on the results of the field work on and, if required, beyond the Property
- 5. Considered any changed conditions on and, if required, beyond the Property
- 6. For a Landslide Hazard analysis or Landslide Risk analysis, I have:
 - 6.1 reviewed and characterized, if appropriate, any Landslide that may affect the Property
 - 6.2 estimated the Landslide Hazard
 - 6.3 identified existing and anticipated future Elements at Risk on and, if required, beyond the Property
 - 6.4 estimated the potential Consequences to those Elements at Risk
- 7. Where the Approving Authority has adopted a Level of Landslide Safety, I have:
 - 7.1 compared the Level of Landslide Safety adopted by the Approving Authority with the findings of my investigation
 - 7.2 made a finding on the Level of Landslide Safety on the Property based on the comparison
 - 7.3 made recommendations to reduce Landslide Hazards and/or Landslide Risks

LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

8. Where the Approving Authority has **not** adopted a Level of Landslide Safety, or where the Landslide Assessment is not produced in response to a legislated requirement, I have:
- 8.1 described the method of Landslide Hazard analysis or Landslide Risk analysis used
 - 8.2 referred to an appropriate and identified provincial, national, or international guideline for Level of Landslide Safety
 - 8.3 compared those guidelines (per item 8.2) with the findings of my investigation
 - 8.4 made a finding on the Level of Landslide Safety on the Property based on the comparison
 - 8.5 made recommendations to reduce Landslide Hazards and/or Landslide Risks
9. Reported on the requirements for future inspections of the Property and recommended who should conduct those inspections

Based on my comparison between:

[CHECK ONE]

- the findings from the investigation and the adopted Level of Landslide Safety (item 7.2 above)
- the appropriate and identified provincial, national, or international guideline for Level of Landslide Safety (item 8.4 above)

Where the Landslide Assessment is not produced in response to a legislated requirement, I hereby give my assurance that, based on the conditions¹ contained in the attached Landslide Assessment Report:

A. SUBDIVISION APPROVAL

- For subdivision approval, as required by the *Land Title Act* (Section 86), "the land may be used safely for the use intended"
[CHECK ONE]
 - with one or more recommended additional registered Covenants
 - without an additional registered Covenant(s)

B. DEVELOPMENT PERMIT

- For a development permit, as required by the *Local Government Act* (Sections 488 and 491), my report will "assist the local government in determining what conditions or requirements it will impose under subsection (2) of [Section 491]"
[CHECK ONE]
 - with one or more recommended additional registered Covenants
 - without an additional registered Covenant(s)

C. BUILDING PERMIT

- For a building permit, as required by the *Community Charter* (Section 56), "the land may be used safely for the use intended"
[CHECK ONE]
 - with one or more recommended additional registered Covenants
 - without any additional registered Covenant(s)

¹ When seismic slope stability assessments are involved, Level of Landslide Safety is considered to be a "life safety" criteria, as described in Commentary JJJ of the *National Building Code of Canada (NBC) 2015*, Structural Commentaries (User's Guide – NBC 2015: part 4 of division B). This states:

"The primary objective of seismic design is to provide an acceptable level of safety for building occupants and the general public as the building responds to strong ground motion; in other words, to minimize loss of life. This implies that, although there will likely be extensive structural and non-structural damage, during the DGM (design ground motion), there is a reasonable degree of confidence that the building will not collapse, nor will its attachments break off and fall on people near the building. This performance level is termed 'extensive damage' because, although the structure may be heavily damaged and may have lost a substantial amount of its initial strength and stiffness, it retains some margin of resistance against collapse."

LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Johannes Fischer, P.Eng.
Name (print)

March 6, 2025
Date

1211 RYAN ROAD, COURTENAY, BC V9N 3R6
Address

250 338 5495
Telephone

JFISCHER@MCELHANNEY.COM
Email



PERMIT TO PRACTICE
McElhanney Ltd.
PERMIT NUMBER: 1003299
Engineers and Geoscientists
of British Columbia

(Affix PROFESSIONAL SEAL and signature here)

The Qualified Professional, as a registrant on the roster of a registrant firm, must complete the following:

I am a member of the firm MCELHANNEY LTD.
(Print name of firm)

with Permit to Practice Number 1003299
(Print permit to practice number)

and I sign this letter on behalf of the firm.