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Geotechnical Interpretive Report

12 Lower Shotover Road, Lake Hayes Estate, Queenstown

Submitted to:
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1 Introduction

ENGEO Ltd was requested by Simplicity Living Limited to complete a geotechnical investigation of the property at 12 Lower Shotover Road, Lake Hayes Estate, (herein referred to as 'the site'). The purpose of the assessment was to provide geotechnical support for Simplicity Living Limited's Resource Consent applications for a new mixed use residential and commercial development, as well as to inform early stages of structural and civil engineering design.

ENGEO's scope has included: geotechnical investigation including collection of soil samples for laboratory index testing, site-specific infiltration testing, review of published relevant information comprising historical geotechnical investigations and infiltration testing, preparation of an engineering geological model, interpretation of geotechnical parameters for foundation and retaining design, assessment of geohazards and preparation of a report suitable for resource consent. This work has been carried out in accordance with our signed agreement (ENGEO, 2025).

Based on existing information and the intended development, key geotechnical uncertainties include depth to contact of loess and glaciofluvial soils, geotechnical parameters and soil strength, material suitability for reuse as fill, and extent of uncertified fill.

2 Site Description

The site comprises medium density residential and commercial precinct zoned land, legally described as Lot 3 DP 606744. The site is located on relatively flat topography, directly north of Lower Shotover Road at its intersection with State Highway 6 (SH6), south of Slope Hill and is currently occupied primarily by pastoral land. A gravel accessway runs through the centre of the site approximately north-northwest, connecting Lower Shotover Road to residential properties north of the site. The site is bordered by paddocks and low-density residential developments to the east, west and north (Appendix 1). The site's southern and southern and south-western areas are occupied by grassed earthen berms of approximately 18 degree slope angle, up to approximately 2.5 m height.

3 Proposed Development

We have been provided with preliminary development plans for the site (Brewer Davidson, 2025), which depict an array of three- to seven-storey apartment buildings comprising over 650 units, two carpark buildings, a neighbourhood retail building, areas of neighbourhood open space and associated roading, infrastructure and footpaths across the site.

We have also been provided with the draft earthworks cut / fill plans for the site (Mackenzie & Co., 2026), which depict cuts and fills to create level building platforms across the development site of up to approximately 3.5 m and 1.5 m, respectively. Greater magnitudes of cut are generally concentrated around levelling of existing earthen berms. We understand the northern parcel of the property is proposed to be 'reserve land', within which infilling of an existing gully is proposed. Gully infill up to approximately 4.0 m is proposed to achieve gently sloping ground. At present, no retaining is noted as being required although we understand that specific evaluation of final cut slopes to enable construction of a roading intersection with Lower Shotover Road is anticipated to be required by Queenstown Lakes District Council (QLDC) (based on email communication with Simplicity Living on 1 November 2025).

We understand design of stormwater systems has not yet been undertaken, but that the project team is aiming to pursue soakage into the existing ground, if able.

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4 Desktop Study

4.1 Geology and Geomorphology

The site is located in the Wakatipu Basin, a feature formed predominantly by glacial advances and retreats, with the last event being approximately 10,000 – 20,000 years ago (Barrell, 2011). Glaciers scoured the flanks of the ranges and the sides and tops of isolated hills. Glaciations have left till, outwash and lake sediments over ice-scoured bedrock. The post-glacial period has been dominated by erosion of schist bedrock and glacial sediments, with deposition of alluvial sands, silts and gravels by local watercourses. Subsequent to this, wind-blown, fine-grained loess sediments have been deposited atop the surface in variable thickness.

The subject site is geologically mapped at 1:250,000 scale as being underlain by predominantly gravels and sands derived from Holocene river and fan deposits (Turnbull, 2000) sourced from alluvial fan and fluvial environments. The basement bedrock in this area is mapped as undifferentiated pelitic and psammitic Schist and Greenschist sequences (Turnbull, 2000). Within the site boundary, bedrock is anticipated to be overlain by a significant thickness of glacial sediments and is at a depth not relevant to this study. Schist bedrock is mapped within Slope Hill, directly north of the site.

4.2 Seismicity

No active fault traces are mapped within the site or in this vicinity. The known active faults in the area include the Northwest Cardrona and West Wakatipu Faults. The Cardrona Fault is a reverse fault located approximately 13 km east of the site which as an estimated recurrence interval of 5,000 to 10,000 years. The West Wakatipu Fault is located approximately 27 km southwest of the site and has an indicated recurrence interval of 10,000 to 20,000 years (Barrell, 2019a). While these are the closest known faults to the site, the Alpine Fault is expected to be the greatest seismic hazard to the region (Mackey, 2015).

The Alpine Fault is an oblique strike-slip fault and is located approximately 85 km to the northwest of the site. The fault has an estimated recurrence interval of < 2,000 years, with four documented earthquakes occurring in the past 900 years.

4.3 Historical Aerial Photography Review

ENGEO reviewed select aerial photographs provided by Retrolens, Google Earth Pro and publicly available historical aerial photographs on the QLDC webmaps from 1956, 1983, 1984, 1988, 2001, 2004, 2006, 2009, 2010, 2011, 2012, 2015, 2016, 2024 and 2025. These photographs were reviewed to help assess changes to landform. Pre-2006 photographs appear to show the site as an undeveloped grassed paddock, with the gravel accessway present and Lower Shotover Road and SH6 within the southern part of the site. Between 2006 and 2013, Lower Shotover Road was realigned to its present location and intersection with SH6, and the earthen bunds within the southern site area were formed. An area of what appears to be ponded water is apparent directly north of the earthen bunds. Between 2013 and 2015, a roundabout is constructed at the intersection of Lower Shotover Road and SH6, which include associated earthworks and what appear to be minor modifications to earthen bunds in the south-eastern site area. From 2016 to present day, the site appears to be broadly unchanged.

4.4 Existing Services

ENGEO has reviewed the mapped utility services detailed by QLDC, as well as requested applicable utility plans noted following an enquiry to ‘Beforeudig’.

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A high voltage power line is noted as running directly adjacent to the central accessway on-site, otherwise no utility pipes have been observed on presently available plans as running through the site.

4.1 ORC Well Data

ENGEO has reviewed the Otago Regional Council (ORC) well database. ORC Wells F41/0284 and F41/0134 are located approximately 110 m and 1 km from site, respectively and have logged static groundwater levels at 50.1 m and 39.57 m depth, respectively.

5 Third-Party Data

5.1 Geohazards

ENGEO has reviewed the geohazards that are mapped and catalogued in both the Queenstown Lakes District Council (QLDC) and Otago Regional Council (ORC) hazard databases. The pertinent information is summarised as follows:

- The majority of the site is mapped with a liquefaction susceptibility domain as 'B1' which is defined as 'low to moderate likelihood of liquefaction-susceptible materials…. In MBIE (2017) terms, liquefaction damage is possible… but there is geotechnical evidence for the presence of liquefaction-susceptible materials at least in some locations in the subsurface' (Barrell, 2019b).
- Under the QLDC Hazard Mapping GIS portal, the south-eastern portion of the site is mapped as having a liquefaction susceptibility of *'LIC 2 (p) Possibly moderate risk',* while the western part of the site is mapped with a liquefaction susceptibility of *'LIC 1 – Nil to Low risk'* (T+T, 2013).
- Both the ORC Natural Hazards and QLDC Hazard Mapping GIS portals map the site as outside alluvial fan and slope hazard zones.

5.2 Historical Geotechnical Investigations

Several geotechnical investigations have been undertaken within the site and the wider Ladies Mile development by Geosolve, Insight, Tonkin + Taylor and Geotago. Investigation results include 26 test pits (TP), 12 'soakage pits' (i.e. TP which included infiltration testing), six dynamic cone penetrometer (DCP) tests, and four hand augers (HA) progressed to depths up to 4.3 m below ground level (bgl).

TPs, DCPs and HAs from investigations across the Ladies Mile development generally encountered topsoil from surface to between 0.2 and 0.4 m depth underlain by interpreted Loess deposits of firm to stiff sandy silts and loose to medium dense silty sands to between 0.5 and 1.9 m depth. Interpreted loess deposits were further underlain by interpreted as 'Deltaic' or 'Holocene Fan' deposits, logged as loose to medium dense sands and gravels with variable silt content to the maximum investigation depth of 4.3 m.

Falling head soakage testing has been carried out by Geosolve and Geotago in 12 test pits across the wider Ladies Mile development, with testing targeting both Loess and underlying sands and gravels. Unfactored infiltration rates within Loess was presented as 20 mm/hr. Unfactored infiltration testing within sands as ranges between 30 to 500 mm/hr. Unfactored infiltration rates within the gravels ranges between 700 to 14,000 mm/hr.

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6 ENGEO Site Investigations

6.1 Geotechnical Drilling and Test Pitting

ENGEO has completed geotechnical site investigations in November 2025 and February 2026. The investigation scope comprised the following:

- Site walkover to observe and map geomorphological and geological features of interest.
- Drill 16 hand auger boreholes (HA) to depths ranging from 0.7 m to 4.3 m bgl, all terminating at practical refusal on hard ground. Dynamic cone penetrometer (DCP) and / or handheld shear vane testing was carried out within each HA.
- Excavate two hand dug test pits (TP) to depths up to 0.5 m.
- Collect grab samples for laboratory testing.
- Excavation of nine machine excavated test pits (TP) to depths up to 4.0 m.
- Infiltration testing within seven TPs to inform soakage device design.

Investigations were carried out by and ENGEO Engineering Geologist and logged in accordance with the New Zealand Geotechnical Society (NZGS) field-description of soil and rock guidelines. A site investigation plan map is included in Appendix 1.

6.2 Laboratory Testing

Samples for six Particle Size Distributions (PSDs), two NZ Standard Compaction Curves (CC), and two California Bearing Ratio (CBR) were collected for the purpose of index testing, assessing the suitability of site won fill for earthworks, and suitability of the *in situ* material as roading subgrade. Soil samples for PSDs were taken from SL-ENG25-HA12 and HA16. Soil samples for NZ Standard Compaction Curve and CBR tests were taken from SL-ENG25-TP01 and TP02.

- PSD testing was completed via the wet-sieving method in accordance with NZS 4402:1986 Test 2.8.1.
- NZ Standard Compaction testing was completed in accordance with NZS 4402: 1986 Test 4.1.1.
- California Bearing Ratio testing was completed in accordance with NZS 4402:1986 Test 6.1.1.

Testing was completed by GeoCivil, Cromwell, which is an IANZ accredited testing laboratory. Table 1 below summarises the sample locations laboratory tests and sample depth of the samples from each.

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Table 1: Laboratory Sample Locations, Depths, and Completed Tests

Sample Locations	Tests	Sample Depths
SL-ENG25-HA12	PSDs	0.9 and 1.4 m bgl
SL-ENG25-HA16	PSDs	0.6 and 2.4 m bgl
SL-ENG25-TP01	CC and CBR	0.5 m bgl
SL-ENG25-TP02	CC and CBR	0.5 m bgl

Lab testing results are discussed in Section 7.2.

6.3 Infiltration Testing

Infiltration testing was carried out in general accordance with the constant head and falling head test methodologies outlined in Auckland Council's GD07 guideline, Appendix A1.3, 1.4 & A1.6, as specified in the QLDC Land Development and Subdivision Code of Practice (LDSCP) 2025.

Test pits were excavated within 10-20 m of the locations noted by McKenzie & Co as proposed for soakage devices. The test pit depth targeted coarse grained alluvium material underlying finer soils at site, as they were expected to have higher soakage potential. Test pits were logged by an Engineering Geologist in the field as per NZGS Soil and Rock Guidelines, included in Appendix 3.

The constant head method was preferred given the relatively high infiltration rates observed within the material, however, in one hole (SP07), silt infilled the test pit from the fine grained material above and the test was abandoned. Testing within the vicinity of Soakhole 1 was excluded due to landowner restrictions at the time of testing.

Two test pits were excavated within the vicinity of Soakhole 5 which did not encounter gravel Alluvium within 3 metres depth (SP05A & SP05B). This area is a local topographical high, and the proposed earthworks plan (MCC, 2026) involve excavation of approximately 3 metres depth within this area. In order to target infiltration testing within the geological unit where soakage is proposed, we excavated a further pit (SP05C) approximately 20 m downslope of Soakhole 5, where gravel Alluvium was encountered. Infiltration testing was carried out in SP05C. Investigation logs for all test pits are presented in Appendix 2. Infiltration test results are presented in Section 9.5 with recommendations in Section 10.3.

7 Site Investigation Results

7.1 Subsurface Materials

The typical ground profile comprised topsoil overlying loess and localised uncontrolled fill, underlain by alluvium of unknown thickness.

Topsoil consisted of organic silt with minor sand, 0 to 0.4 m thick. Uncontrolled fill, mainly encountered in berms, comprised gravelly sand with variable silt and was medium dense to very dense. Loess, 0.5 – 1.9 m thick, consisted of silt with variable sand content, ranging from firm to stiff in silt-rich zones and loose in sand-rich zones. The underlying alluvium consisted of fine- to coarse-grained sand with variable silt and discontinuous gravel layers, with densities ranging from loose to very dense.

Subsurface soils encountered during geotechnical investigations were broadly consistent with those previously observed on-site (Section 5.2) and published mapping.

7.2 Laboratory Results

PSD tests were completed in the uncontrolled fill, loess and fine-grained alluvium, whilst CBR and CC tests were completed in the Loess.

PSD testing indicates that the uncontrolled fill was a silty SAND with some gravel, the loess was a silty SAND with no or trace fine gravel, and the alluvium was SAND with some silt. The silt, sand, and gravel content ranges from the PSDs for each material are summarized in Table 2 below. Please refer to Table 1 for the sample depths.

Table 2: Silt, Sand and Gravel Contents of Tested Materials

Material	Location	Silt Content	Sand Content	Gravel Content
Uncontrolled Fill	SL-ENG25-HA12	30%	50%	20%
Loess	SL-ENG25-HA12 & 16	31 to 42%	58 to 67%	0 to 1%
Fine-Grained Alluvium	SL-ENG25-HA16	19%	81%	0%

NZ Standard Compaction Curve testing indicated the Loess has a maximum dry density of 1.72 t/m³ with an optimum water content ranging between 16 and 17%, and a CBR ranging between 2 and 5%.

Full lab testing results are provided in Appendix 4.

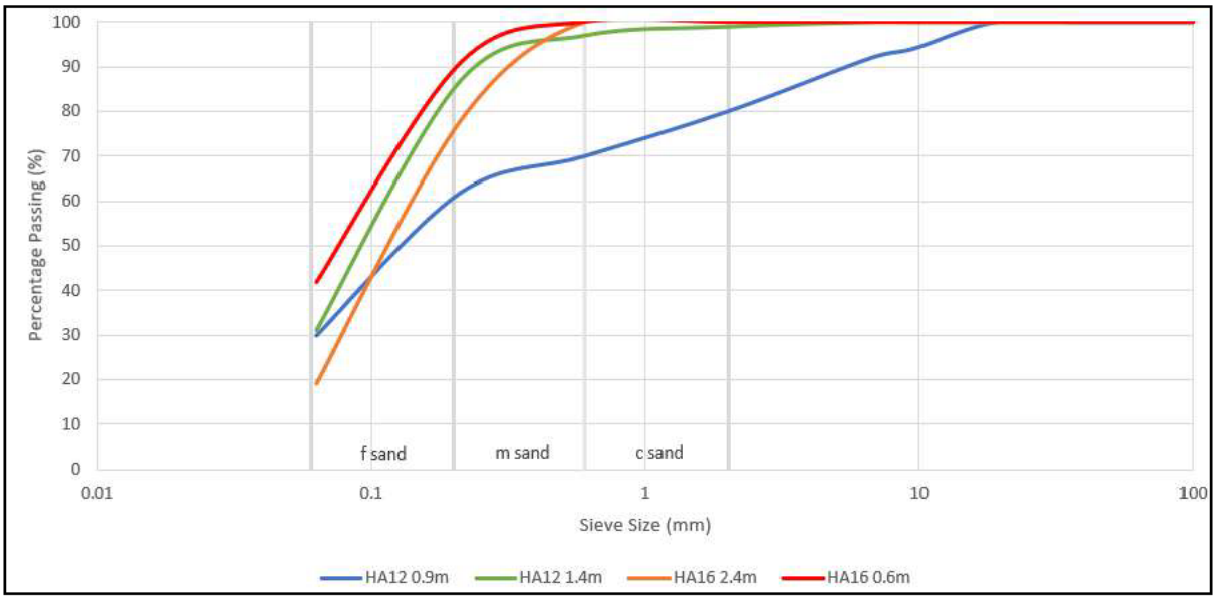

Figure 1: Summary of PSD data

8 Engineering Geological Model

8.1 Generalised Geological Profile

ENGEO have differentiated the subsurface profile encountered during investigations based on both the geological and engineering properties of the materials. These are summarised in Table 3.

Table 3: Summary of Engineering Geological Units

Geological Unit	Typical Depth (m bgl)	Typical Material Description	Strength / Consistency
Topsoil	0 – 0.4	Organic SILT with some fine sand and trace rootlets	Soft to firm
Uncontrolled Fill	0 – 0.9	Gravelly fine to coarse SAND with variable silt	Medium dense to very dense
Loess	0 – 1.0	SILT with minor sand and silty fine SAND	Soft to firm Loose to medium dense
Fine-grained Alluvium	1.0 – 2.2	Silty fine to medium SAND	Loose to medium dense
Coarse-grained Alluvium	1.0+[1]	SAND with minor gravel, increasing gravel quantity with depth	Loose to dense

1. Glaciofluvial material was encountered to the base of investigations within the site and interpreted from logs within the site vicinity. Schist bedrock is interpreted as underlying the Glaciofluvial soils at significant depth (i.e. greater than 60 m), and thus is considered at depths irrelevant to the proposed development.

A brief summary of the unit characteristics are as follows:

Topsoil / Uncontrolled Fill

A combination of topsoil and uncontrolled fill was observed to mantle the site. Uncontrolled fill was observed primarily within the earthen berms located along the site's southern and south-western boundary. These were encountered as gravelly sands with variable silt content, medium dense to very dense and may comprise reworked alluvial soils. Within discrete areas of the central and northern site area (SL_ENG25_HA04 and SL_ENG25_HA11), topsoil was encountered up to 0.9 m depth.

Loess

Loess was observed to mantle the site and is between 0.6 – 1.2 m thick. Loess was encountered as silts with variable fine to medium sand content or silty sand. Typical handheld shear vane results within silts indicate firm to stiff consistency, while DCP test results within sands are indicative of loose density.

Fine-grained Alluvium

A fine-grained Alluvium unit was observed beneath the Loess. The apparent contact between these two units is difficult to distinguish, however it is associated with a lesser silt fraction and a predominantly grey colour. This material is typically logged as a silty fine to medium sand. DCP tests with the unit are indicative of loose to medium density.

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Coarse-grained Alluvium

Coarse-grained Alluvium was found to underlie the fine-grained Alluvium in investigations across the site. The base of this unit was not observed in site investigations and its thickness remains uncertain. This material was typically encountered as a fine to coarse sands and gravels and is distinctly different to those finer grained materials above.

Laboratory results are included in Appendix 4, and site figures interpreting material thicknesses are presented in Appendix 1.

8.2 Groundwater

Groundwater was not encountered within ENGEO nor historical geotechnical site investigations within the site and the wider Ladies Mile Development. ORC well data within the vicinity of site indicates regional groundwater levels between 39 – 51 m depth below the site.

9 Geotechnical Assessment

9.1 Site Soil Class

For the purposes of structural design, a site soil classification of 'Class D – Deep or Soft Soil Site' as per NZS 1170.5:2004 or the most conservative of 'Site Class IV – VI' as per TS1170.5.2025 are considered appropriate for the majority of site based on geotechnical investigations and our understanding of the geological setting. Given the presence of bedrock outcrops on Slope Hill directly north of the site, there is the potential for depths to bedrock within this area to be within the threshold of 'Class C – Shallow Soil Site'. Structures within the northern site area may need to evaluate design for both Class C and D and adopt the more conservative design input. Should further clarity be required at detailed design, further intrusive investigations may be required.

Simplicity may elect to complete further geotechnical and/or geophysical investigation to better understand the Class D to C boundary or to refine the site class estimate using TS1170. Should this be required, we will need to directly measure the shear wave velocity in the upper 30 m to develop a Vs30.

9.2 Geotechnical Parameters for Design

ENGEO have interpreted geotechnical parameters for use in design based on the available information. These are summarised in Table 4.

Table 4: Geotechnical Design Parameters

Geological Unit	Geotechnical Units	Unit Weight (kN/m^3)	Mohr-Coulomb Parameters		Young's Modulus E (MPa)
			C' (kPa)	Φ (°)	
Loess	Fine-Grained Material	17	2	30[1]	15[2]
Fine-grained alluvium					
Coarse -grained alluvium	Coarse-Grained Materials	18	0	35	25[2]
Structural Fill[4]		18	0	37[4]	30[2]

[1] Based on Bowles (1997) Table 2.6 for silt or silty sand.

[2] Based on Look (2014) Table 11.7 for stiff silt (Loess), loose to medium dense sand (Glaciofluvial), and medium dense to dense sand (Structural Fill).

[3] Based on Look (2014) Table 5.11 – for a loose to medium dense gravel.

[4] Based on Look (2014) Table 5.11 – for medium dense to dense sand. Assumes fill to comprise site-won alluvium or imported granular hardfill compacted in general accordance with NZS 4431:2022.

The geotechnical design parameters summarised above are based on our current understanding of the inferred geological units. These should be re-evaluated based on future data should this become available or during construction should observations differ from those made herein.

9.3 Seismic Hazards

Potential seismic hazards resulting from nearby moderate to major earthquakes can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking, ground lurching, regional subsidence or uplift, soil liquefaction, lateral spreading, and landslides.

The following sections present a discussion of seismic hazards as they apply to the site.

9.3.1 Ground Rupture

As cited in Section 4.2, the site is located approximately 13 km from the nearest mapped active fault. At this distance, fault related ground rupture and ground lurching are considered unlikely.

However, given the tectonic setting, regional subsidence may be experienced following a large earthquake on faults in the area. In seismically active areas there is always a risk that unmapped active faults may be present, particularly when the faults may have a low recurrence interval and may be buried under younger alluvial sediments.

9.3.2 Ground Shaking

Ground shaking and subsequent effects on structures, infrastructure and engineering systems can be extensive and affect large areas. The intensity, frequency and duration of ground shaking drives the effect of earthquake loading on structures, while the severity of ground shaking drives the level of ground deformation.

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In geotechnical assessments, amplitude, frequency and duration of shaking are the main factors considered.

As depicted on the conceptual plans (Brewer Davidson, 2025), we understand the potential site development includes Importance Level 2 (IL2) structures.

The design peak ground accelerations (PGA) for the site under both ultimate limit state (ULS) and serviceability limit state (SLS) design load cases have been taken from MBIE/NSGS Module 1 (2021):

- a_{max} = 0.41 g has been adopted for ULS.
- a_{max} = 0.10 g has been adopted for SLS.

The recommended earthquake magnitude (M) for Queenstown is 6.5.

9.3.3 Liquefaction and Lateral Spreading

Given the depth to groundwater beneath the site is in excess of 30 metres, liquefaction and lateral spreading are not considered a risk to the development.

9.4 Slope Stability

From our desktop study and site observations, we consider that slope instability is unlikely to be a significant hazard at the site for future development given the site is relatively flat and that proposed earthworks involve removal of earthen berms in the southern and south-western site area.

We understand cut slopes of less than 2 m height and maximum slope angles of 15 degrees are proposed within the vicinity of the existing road on-site (MCC, 2025). These cuts are anticipated to expose interpreted loess and glaciofluvial soils. Given the shallow angle and limited height, we consider the risk of slope instability for these cut slopes to be low. Further evaluation of the material exposed in these cuts should occur during construction to confirm these assumptions.

The Bulk Earthworks Model (MCC, 2026) includes a proposal to in-fill a topographical gully on the north-eastern corner of the site. We understand this will be filled with topsoil materials stripped from the site during earthworks. From a geotechnical perspective, the preliminary slope stability analysis using SLIDE® documented in Appendix 5 demonstrates suitable factors of safety and displacements under ULS conditions (1:500 year seismic events). However, this proposal will require detailed civil engineering design (by a suitably qualified and chartered civil engineer) to assess the hydrologic conditions of the gully and any long-term drainage requirements as well as preparing a suitable earthworks specification.

9.5 On-Site Soakage

The soakage rate (Sr) of the tested materials was estimated based on the minimum rate of infiltration at each location, using the method outlined in Appendix B1.1 of Auckland Council's GD07 guideline. As testing was completed in test pits rather than boreholes, as specified in GD07, the equivalent radius formula was used to provide a representative input diameter into the soakage calculation.

A factor of safety for testing uncertainty F(u) of 1.5 was applied to the infiltration rate, in accordance Quality Level 3 with conditions outlined in GD07 B.4.0 Table 6. A factor of safety for consequence of failure F(c) is to be determined by the soakage designer.

Test results are summarised in Table 2 (Infiltration Test Results Summary), with a copy of calculations also attached in Appendix 5.

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Table 5: Infiltration Test Results Summary

Test ID	Test Method	Test Depth (m bgl) (*max*)	Unfactored Infiltration Rate (L/hr/m^2)	Uncertainty factor (Fu)	Consequence factor F(c)[2]	Total factor F(total)[2]	Factored Infiltration Rate[2] (L/hr/m^2)
SL-ENG26-SP01	*not tested*[1]						
SL-ENG26-SP02	Constant Head	2.5	890	1.5	1.0	1.5	600
SL-ENG26-SP03		3.1	540	1.5	1.0	1.5	360
SL-ENG26-SP04		3.0	580	1.5	1.0	1.5	390
SL-ENG26-SP05C		3.7	400	1.5	1.0	1.5	260
SL-ENG26-SP06		3.0	500	1.5	1.0	1.5	330
SL-ENG26-SP08	Constant Head	2.6	550	1.5	1.0	1.5	370

Notes

1. Not tested due to land access restrictions.
2. A factor of safety for consequence of failure F(c) of 1.0 has been shown for purposes of demonstrating calculation of F(total) only. The actual F(c) to be determined by the soakage designer, and F(total) to be calculated accordingly.

Recommendations

9.6 Foundations

Based on site investigations results, we consider that the site is suitable for shallow strip and pad foundations bearing upon the *in situ* Loess and Alluvium. Generally higher bearing capacities are available in the coarse-grained Alluvium, which may carry implications for foundation designs. Consideration for the thickness of fine-grained soils, building loads and proposed earthworks cuts and fills should be made for each building by the Structural Engineer. We suggest reference to our isopach map detailing the interpreted upper contact with coarse-grained Alluvium (Appendix 1), with an acknowledgement of geological uncertainty given the Alluvium units will be undulating by nature of its depositional environment. Geological uncertainty will increase with distance from investigation data points.

Indicative minimum bearing capacities for typical foundation geometries founded in fine-grained soils and coarse-grained Alluvium are presented in Table 6.

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Table 6: Foundation Bearing Capacities

Footing Type and Geometry	Fine-Grained Bearing Capacity (kPa GUBC[1])	Coarse-Grained Bearing Capacity (kPa GUBC[1])
Strip Footing[2]: 0.5 m wide x 0.5 m deep	200	250
Strip Footing[2]: 0.5 m wide x 1.0 m deep	250	300
Pad Footing: 0.5 m square x 0.5 m deep	250	300
Pad Footing: 1.0 m square x 1.0 m deep	300	400
Pad Footing: 1.5 m square x 1.0 m deep	350	500
Pad Footing: 2.0 m square x 1.0 m deep	400	550

[1]GUBC – Geotechnical Ultimate Bearing Capacity.

[2]Assumes 10 m length strip footing.

We recommend that the following strength reduction factors are applied to these unfactored GUBC:

- SLS – 0.33
- ULS – 0.5

Consolidation settlement potential beneath shallow foundations may need to be further evaluated at detailed design stage. If foundation systems are sensitive to displacements, additional site investigations may need to be carried out, which could include Cone Penetration Testing and Dilatometer Testing.

9.7 Earthworks

9.7.1 Site Preparation

The site is vegetated in shrubs, bushes and trees which may have significant root structures. Stripped surfaces should be free of any roots greater than 20 mm in diameter, along with root clusters and areas where more than 5% of the soil is occupied by roots. All stripped surfaces should be observed by a suitably qualified geo-professional.

All topsoil and uncontrolled fill (where encountered) shall be over-excavated from beneath the building platform to expose the *in situ* soils.

Topsoil should be stripped from all cut and fill areas with stripping operations being planned to extend well beyond cut and fill lines to avoid peripheral fill contamination. Stockpiles of topsoil and unsuitable materials should be sited well clear of the works on suitable areas of natural ground.

9.7.2 Material Suitability

Site-won Alluvium and Loess can be reused as engineered fill on-site, but careful considerations should be made for the difficulties involved with reuse of each. In general, Alluvium will be easier to work with than Loess soils, but both are possibly given the below commentary is considered.

Loess on-site comprises moderately to highly sensitive sandy silts and poorly graded silty sands. Placing Loess as engineered fill will require careful moisture control as the material has a significant degree of sensitivity to above optimum moisture contents and can become quickly difficult to place as fill or require lengthy drying periods. This will likely only be possibly during peak summer months of dry weather, and consideration could be made for the use of lime or cement stabilisation of soils to aid in placement of fill at optimum moisture contents.

Alluvium within anticipated cuts on-site (i.e. within 2 metres of existing ground level) have generally been encountered as poorly graded sands. Placement of poorly graded, granular soils as engineered fill requires careful moisture control to maintain sufficient moisture content, as the permeable nature of the fill can result in rapid drying of soils to below optimum moisture content and inhibit adequate compaction being achieved.

9.7.3 Stability of Cut and Fill Slopes

Cut batters within engineered fill or stiff / moderately dense Loess and Alluvium may recline at up to 1V:4H (14°). Provided that fill slopes are constructed upon approved subgrade soils, we consider that fill batters no steeper than 1V:3H (18°) may be constructed on-site without creating instability issues.

9.8 Soakage Recommendations

Plans provided by McKenzie & Co, dated 12 February 2026 show 8 separate soakage holes across the site. Investigations and testing identified coarse-grained alluvium material is present between 2 to 4 m bgl across the site, except for soakage hole 1. Site specific testing completed in the alluvium has demonstrated unfactored soakage rates between 400 to 890 L/hr/m^2.

On that basis, we recommend that soakage to ground devices can be designed based on the following:

- An unfactored soakage rate of 500 L/hr/m^2 for the coarse-grained alluvium unit at the site. We note this has not been factored for the consequence of failure (in accordance with GD07), and this should be done so by the designer.
- Soakage devices should be designed to avoid or account for migration of fine-grained soils into the coarse-grained Alluvium.
- The designer should take account of the variable depth to the coarse-grained Alluvium observed across the site. We note these materials were encountered between 2.2. m bgl (below ground level) to 3.7 m bgl – around the 363 mRL mark (+/- 1m) – see test pit logs for more details. As bulk earthworks are proposed for the site, changes in finished ground level should be taken into account.

If a soakage device is proposed for 'Soakhole 1', then a test pit and soakage test shall be carried out prior to design. Whilst SP07 reported low soakage rates, we consider this test to have been affected from the fine grained materials collapsing from above. The recommendations above apply to 'Soakhole 7' given (1) the soakage test is unreliable as fine-grained material collapse affected the test, and (2) coarse grained materials are logged in this location. We note the risk of fine-grained material collapse should be considered across the site by the civil designer.

9.9 Earthworks Specification and Compaction Control

A site specific earthworks specification including compaction control criteria should be prepared for the site, prior to engaging with a contractor to complete the subdivision earthworks. The specification should be prepared when the subdivision earthworks concept is finalised, including details of fill embankments, retaining walls, and geotechnical remediation measures including keyways and subsoil drainage.

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9.10 Pavement Subgrade CBR

Based on our Scala penetrometer and Laboratory testing (Appendix 2 and 4, respectively), it is anticipated the underlying native Loess and Alluvium subgrade may be suitable for standard road design and utility trenches. Based on Scala penetrometer testing in the upper 1 m of the site surface, the penetration resistance was typically 2 to 4 blows per 100 mm. Laboratory testing on a remoulded sample of the loess indicated a CBR range of 2 to 5%.

An inferred preliminary CBR design value of approximately 4% may be adopted for preliminary design.

The above CBR values are preliminary only. Specific *in situ* and laboratory testing of the exposed subgrade is recommended following earthworks and prior to finalising pavement designs, including the use of *in situ* and soaked CBR testing and falling weight deflectometer. Where localised uncontrolled fill is encountered, it will be necessary to remove this fill and replace it with engineered fill. Additional subgrade improvement requirements may be necessary to achieve council requirements. This may include undercut and replacements, and / or the use of triaxial geogrid.

9.11 Surface Water Management

During construction, appropriate measures shall be undertaken to control and treat stormwater runoff, with silt and erosion controls complying with local body guidelines for erosion and sediment control. This is particularly relevant for the site due to the proximity to a stormwater receptor, being the stream and reserve to the north. Surface cut-off drains or appropriate stormwater flow paths should be maintained outside of the proposed development area, both during and following construction. These drains and impervious surfaces will divert water away from any buildings and minimise possible movement in sensitive soils during and post construction.

Stormwater from paved areas shall be taken in a piped system and disposed of into an approved stormwater system. Uncontrolled discharge onto land or uncontrolled disposal via in-ground systems must be avoided.

All service trenches should be capped with low permeability materials, so that excavations do not become points of entry for surface runoff.

As per Section 9.4 above, long term drainage and design of the in-filling of the local gully at the northeast of the site should be carried out by a suitably qualified and chartered civil engineer. We have assessed the proposal as being suitable from a high-level geotechnical perspective. During design, the necessary vesting and maintenance requirements should be considered by the designer and Council.

10 Safety in Design

Safety in Design aims to identify, address and minimise or eliminate health and safety risks where it is reasonably practicable to do so.

The construction methodology should consider safe and stable access to the site for workers, specifically during earthworks and installation of foundations The key safety considerations during construction will likely relate to falling from height and the instability of temporary cuts. ENGEO, ideally with the assistance of a suitably experienced Contractor can provide safety in design advice as part of the detailed design stages.

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11 Sustainability

We encourage you to consider sustainability when assessing the options available for your project. Where suitable for the project, we recommend prioritising the use of sustainable building materials (such as timber in favour of concrete or steel), locally sourced (materials readily available to Contractors as opposed to materials requiring import), and installed in an environmentally friendly way (e.g., reduced carbon emissions and minimal contamination). If you would like to discuss these options further, ENGEO staff are available to offer suggestions.

12 Geohazard Assessment

We consider that the proposed development of the site will not accelerate hazards such as erosion, falling debris, subsidence, or inundation (by soil) assuming that the recommendations in this report are followed. Therefore, with respect to Section 106 of the Resource Management Act (RMA), we see no geotechnical reason for the consenting authority to refuse subdivision consent.

In addition, our assessment as detailed above, is summarised in Table 7 in accordance with the National Policy Statement for Natural Hazards 2025:

Table 7: Hazard Summary as per NPSNH

Hazard	Likelihood	Consequence	Risk	Mitigation	Risk After Mitigation
Flooding	- N/A by others			Civil Engineer Design for Subdivision – for hydrogeological assessment from slopes above site, stormwater networks and soakage to ground.	
Landslips (landslides, rockfall, debris flow etc[1])	Rare	Minor	Low	Civil Designed Topsoil in-fill[2]	Low
Coastal erosion	Very rare	Negligible	Low	-	-
Coastal inundation	Very rare	Negligible	Low	-	-
Active Faults[3]	Very rare	Moderate	Low	-	-
Liquefaction	Very rare	Negligible	Low	-	-
Tsunami (seiche)	Very rare	Negligible	Low	-	-

Notes

1. Definition assumed in accordance with NZGS Slope Stability Guidance, Unit 1.
2. As per Section 9.4 and Section 10.6 above.
3. Assumed to be hazards from local active faults,
4. As above, Section 9.3.3.
5. Seiche very rare given site height 50 m above lake and river levels.

13 Future Work

The following has not been carried out within the scope of this report but will need to be considered as the project progresses.

- Additional investigations may be required to support detailed design and Building Consent (if applicable) once the development proposal is further advanced. These could include site-specific soakage testing and / or deep investigation testing if deep foundations are required.
- The client should consider further investigation in order to inform the site soil class (as per Section 9.1 above).
- ENGEO should be given the opportunity to review the foundation design drawings prior to submitting for Building Consent and foundation excavations in order to confirm that the recommendations presented in this report have been interpreted as intended.
- ENGEO should be given every opportunity to attend a pre-start meeting on-site prior to works commencing and then to observe site works, including site stripping and rock cut progression to confirm works are carried out in accordance with the recommendations of this report and that ground conditions are as assumed.
- Upon successful completion of the works ENGEO can provide a Producer Statement – Construction Review (PS4).

14 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Simplicity Living Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on s 9(2)(a) if you require any further information.

Report prepared by

Grant Caldwell
Engineering Geologist

Zoe Martin
Geotechnical Engineer

Report reviewed by

Neil Charters, CMEngNZ (CPEng)
Principal Geotechnical Engineer

15 References

Brewer Davidson Limited (2025). Ladies Mile Development. P3290, dated 21.10.2025.

Cochran, U. A., Clark, K. J., Howarth, J. D., Biasi, G. P., Langridge, R. M., Villamor, P., ... & Vandergoes, M. J. (2017). A plate boundary earthquake record from a wetland adjacent to the Alpine fault in New Zealand refines hazard estimates. *Earth and Planetary Science Letters*, *464*, 175-188.

ENGEO Limited (2025). Proposal for Geotechnical Consultation – 12 Lower Shotover Road, Lake Hayes Estate, Queenstown. P30002.000.001_01, dated 31.10.2025.

Insight Engineering (2023). Re: Geotechnical Assessment for Proposed Residential Building Platform. P23009 dated 09.08.2023, revision 1.

Geosolve (2021). Preliminary Stormwater Soakage Testing – Ladies Mile Masterplan Area, Queenstown. P200353.01 dated 10.05.2021.

Geosolve (2022). Soakage Assessment – Flints Park and Flints Park West, Queenstown. P190162.01 dated 27.01.2022.

Geosolve (2023). Geotechnical Assessment – 489 Ladies Mile, Queenstown. P230270 dated 25.05.2023, revision 1.

Geosolve (2023). Soakage Feasibility Desktop Review – 14 Lower Shotover Road, Ladies Mile, Queenstown. P230569 dated 15.08.2023.

Geosolve (2023). Preliminary Geotechnical Assessment – Ladies Mile Water Reservoir. P230569 dated 13.10.2023.

Geotago (2024). Soakage Testing – Lot 2, 14 Lower Shotover Road. PGL24-227 dated 20.11.2024.

Mackenzie & Co. Limited (2025). Ladies Mile Development. P4163, dated 10.10.2025, revision A.

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Appendix 1:

Figures

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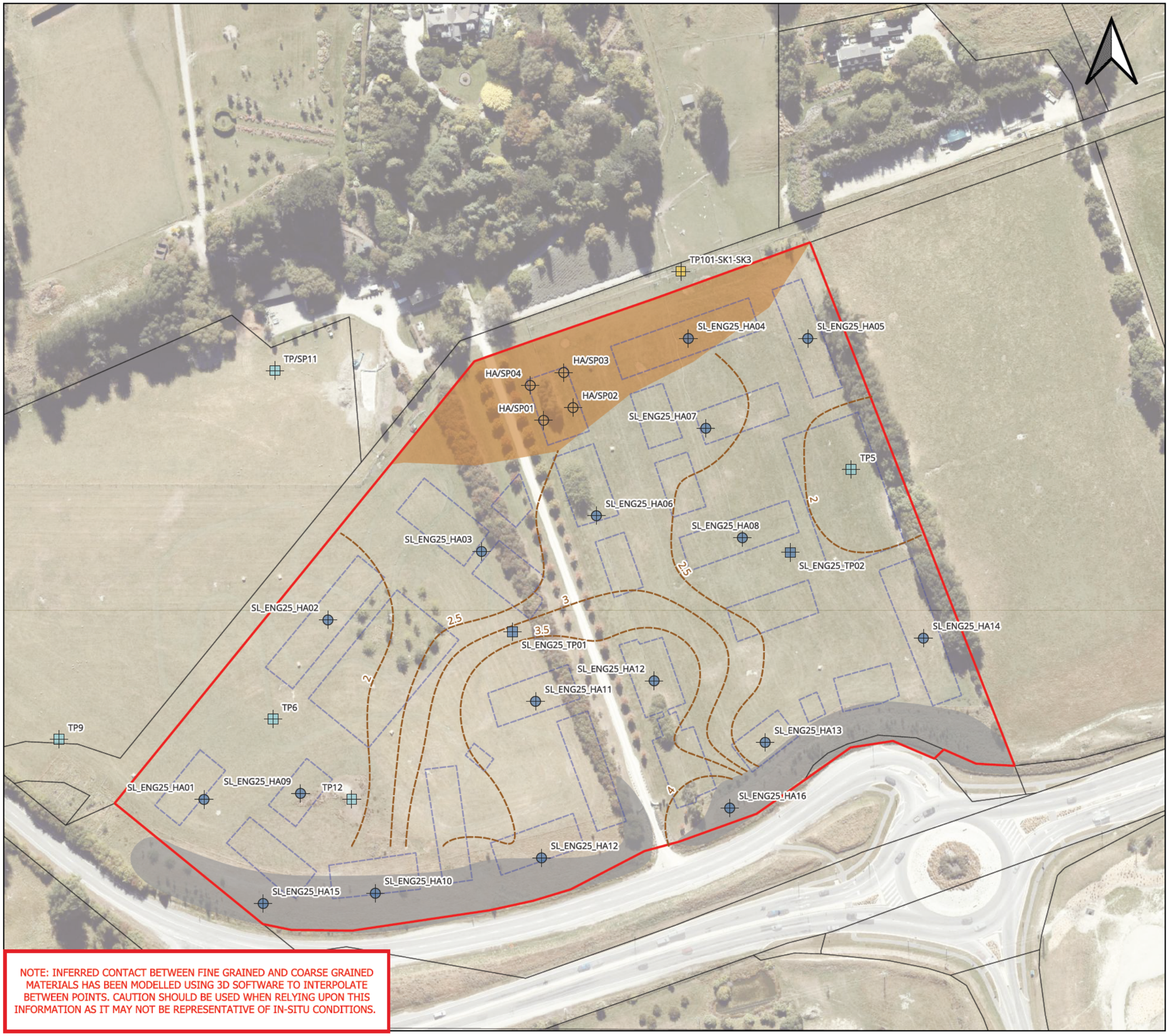

NOTE: INFERRED CONTACT BETWEEN FINE GRAINED AND COARSE GRAINED MATERIALS HAS BEEN MODELLED USING 3D SOFTWARE TO INTERPOLATE BETWEEN POINTS. CAUTION SHOULD BE USED WHEN RELYING UPON THIS INFORMATION AS IT MAY NOT BE REPRESENTATIVE OF IN-SITU CONDITIONS.

LEGEND

- Site Boundary
- Existing Contours (1m, QLDC LiDAR)
- Property Boundaries (LINZ)
- Master Plan Building Outlines (Approx. for reference only)
- Geological Contact Contours - between fine and coarse grained materials (from existing ground level, m)
- Thicker fine grained materials (approx.)
- Earthbunds (from roading)

Geotechnical Investigations

- ENGEO (2025) - Hand Augers
- ENGEO (2025) - Hand Dug Test Pit
- Geosolve (2022) - Test Pits
- Geotago (2025) - Test Pits
- Insight (2023) - Hand Augers

Notes:
1) Master Plan building locations based on the plan provided by Simplicity / Brewer Davidson, datd 21/10/2025 (ref: 3290).
2) Depth to underside of fine grained materials is inferred only, and includes any topsoil horizon above. Contours are shown as metres below existing ground level, based ont the investigations shown on the plan.
3) Investigations by others include: Geotago Site Visit Record, Dated 20 November 2024 (GL24-227), Insight Geotechnical Assessment dated 9 August 2023, ref 23009, Rev 1, Geosolve Flink Park Soakage Assessment 2022.

0 25 50 m

Projection: NZTM 2000NZGD2000 / Mount Nicholas 2000

Client: Simplicity Living Ltd		
Title: Site Investigation Plan		Appendix No. 1 Size: A3 Figure 1
Project: 12 Lower Shotover Road	Drawn: BH/GC	
Date: 12/03/2026	Checked: NC	
Proj No: 30002	Scale: 1500 @ A3	Version: 1.0

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LEGEND

- Soakage Testing Locations (ENGEO, 2026)
- Proposed Soakholes (from McKenzie)
- Site Boundary
- Property Boundaries (LINZ)
- Existing Contours (1m, QLDC LiDAR)

Notes:
1) Soakhole locations based on plans provided by McKenzie (4163 - Simplicity Living - Soakpit locations and final surface contours 260212)
2) Existing contours based on 2021 QLDC LINZ LiDAR.

0 25 50 m

Projection: NZTM 2000NZGD2000 / Mount Nicholas 2000

Client: Simplicity Living Ltd		
Title: Soakage Testing Plan		Appendix No. 1 Size: A3 Figure 2
Project: 12 Lower Shotover Road	Drawn: BH/GC	
Date: 10/03/2026	Checked: NC	
Proj No: 30002	Scale: 1500 @ A3	Version: 1.0

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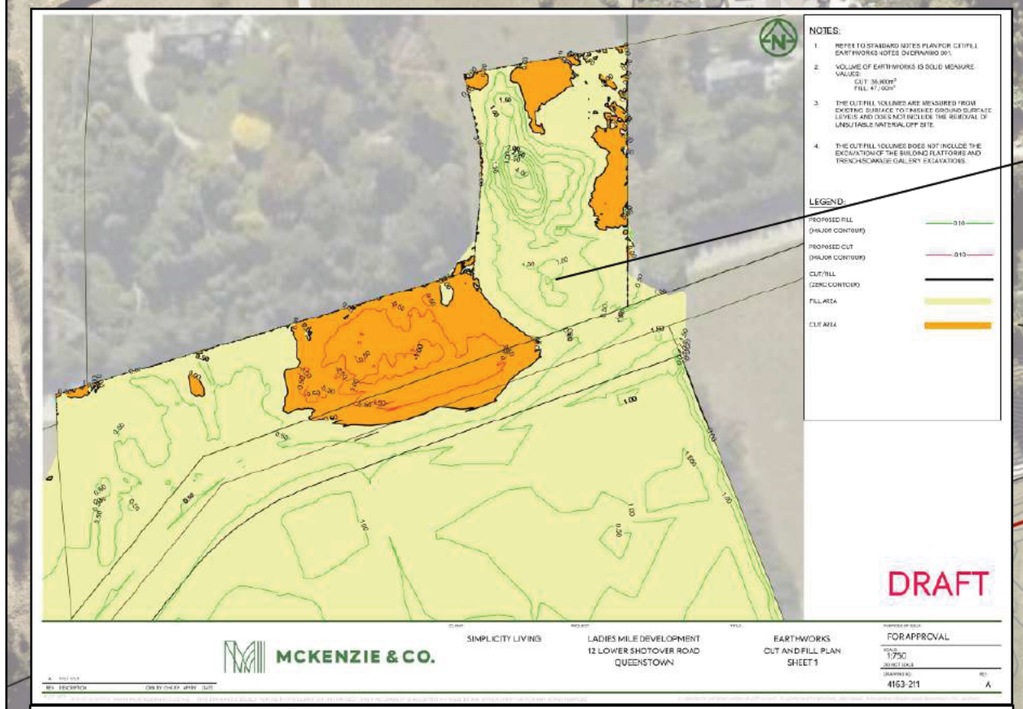


Extract from proposed BEM Plans (McKeznie) - showing shaded cut and fill associated with the model. Fill shown in pale green, cut shown in orange.

LEGEND

- Property Boundaries (LINZ)
- Site Boundary
- Cross Section Line - Limit Equilibrium Anaylsis
- Proposed Bulk Earthworks Contours (from McKenzie)

Geomorphic Features

- Gully edge
- Gully axis
- Toe of slope (concave break of slope)

Notes:
1) Porposed Bulk Earthworks Model from McKenzie & Co (4163-Simplicty Living-Finshed surface contours 3d-260212.dwg)

0 25 50 m

ENGEO

Projection: NZTM 2000NZGD2000 / Mount Nicholas 2000

Client: Simplicity Living Ltd		
Title: Proposed Bulk Earthworks and Topsoil in-fill area		Appendix No. 1 Size: A3 Figure 3
Project: 12 Lower Shotover Road	Drawn: BH/GC	
Date: 10/03/2026	Checked: NC	
Proj No: 30002	Scale: 1500 @ A3	Version: 1.0

Appendix 2:

Third Party Data

Key

TP1 = Test Pit/Soakge Pit Area

Scale 1:2500

0 30 60 90 120 150 (m)

CADFILE: Sketch 1.dwr	DRAWN	ELH	01/2022
SCALE (AT A3 SIZE): AS SHOWN	DRAFTING CHECKED	MDP	01/2022
PROJECT No: 1920162.01	APPROVED	RWW	01/2022

GEOSOLVE
ENGINEERING CONSULTANTS

Mark Tylden
Soakage Assessment
Flints Park and Flints Park West, Queenstown
Site Investigation Plan

File No: APPENDIX A, FIGURE 1

REV: 1

GEOSOLVE
ENGINEERING CONSULTANTS

TEST PIT LOG

EXCAVATION NUMBER: **TP 1**

PROJECT:	Flints Park and Flints Park West, Queenstown			JOB NUMBER:	190162.01
LOCATION:	See Site Plan	INCLINATION:	Vertical		

EASTING:		EQUIPMENT:	5.4T excavator	OPERATOR:	Client Provided
NORTHING:		COORD. SYSTEM:	Aerial Photography	COMPANY:	
ELEVATION:		EXCAV. DATUM:	Existing ground level	HOLE STARTED:	16/12/2021
METHOD:	Aerial Photography	ACCURACY:	5 m +-	HOLE FINISHED:	16/12/2021

Soil / Rock Type	Description	Graphic Log	Depth (m)	Groundwater / Seepage	Scala Penetrometer (Blows per 100mm) 0 5 10 15
TOPSOIL	Organic SILT; brown. Dry to moist. 0m – 0.4m		0.0 – 0.4		
LOESS	SILT with some sand; light grey brown to light grey, massive. Greasy. Firm to very stiff; moist; sand, fine. A trace of rootlets.		0.4 – 1.1		
DELTAIC GRAVEL	Sandy fine to coarse GRAVEL with a trace of silt; grey brown, bedded. Loose to medium dense; moist; sand, fine to coarse; gravel, subrounded. 1.1m – 1.5m		1.1 – 1.5		
DELTAIC GRAVEL	Sandy fine to coarse GRAVEL; grey, bedded. Medium dense; moist to wet; sand, fine to coarse; gravel, subrounded. 1.5m – 3.8m		1.5 – 3.8	NO SEEPAGE	

Total Excavation Depth = 3.8 m

COMMENT:		LOGGED BY:	ELH
		CHECKED DATE:	27/01/2022
		SHEET:	1 of 1

GEOSOLVE
ENGINEERING CONSULTANTS

TEST PIT LOG

EXCAVATION NUMBER:
TP 4

PROJECT:	Flints Park and Flints Park West, Queenstown			JOB NUMBER:	190162.01
LOCATION:	See Site Plan	INCLINATION:	Vertical		

EASTING:		EQUIPMENT:	5.4T excavator	OPERATOR:	Client Provided
NORTHING:		COORD. SYSTEM:	Aerial Photography	COMPANY:	
ELEVATION:		EXCAV. DATUM:	Existing ground level	HOLE STARTED:	16/12/2021
METHOD:	Aerial Photography	ACCURACY:	5 m +-	HOLE FINISHED:	16/12/2021

Soil / Rock Type	Description	Graphic Log	Depth (m)	Groundwater / Seepage	Scala Penetrometer (Blows per 100mm) 0 5 10 15
TOPSOIL	Organic SILT with some sand; brown. Moist; sand, fine. A trace of rootlets. 0m – 0.4m		0.0 – 0.4		
LOESS	SILT with some sand to sandy SILT; brown grey, massive. Firm to very stiff; moist; sand, fine. A trace of rootlets. 0.4m – 1.3m		0.4 – 1.3		
DELTAIC GRAVEL	Sandy fine to coarse GRAVEL with a trace of cobbles; grey brown to brown grey, bedded. Loose to medium dense; moist to wet; sand, fine to coarse; gravel, subrounded to subangular. 1.3m – 3.8m		1.3 – 3.8	NO SEEPAGE	

Total Excavation Depth = 3.8 m

COMMENT:		LOGGED BY:	ELH
		CHECKED DATE:	27/01/2022
		SHEET:	1 of 1

GEOSOLVE
ENGINEERING CONSULTANTS

TEST PIT LOG

EXCAVATION NUMBER:
TP 5

PROJECT:	Flints Park and Flints Park West, Queenstown			JOB NUMBER:	190162.01
LOCATION:	See Site Plan	INCLINATION:	Vertical		

EASTING:		EQUIPMENT:	5.4T excavator	OPERATOR:	Client Provided
NORTHING:		COORD. SYSTEM:	Aerial Photography	COMPANY:	
ELEVATION:		EXCAV. DATUM:	Existing ground level	HOLE STARTED:	16/12/2021
METHOD:	Aerial Photography	ACCURACY:	5 m +-	HOLE FINISHED:	16/12/2021

Soil / Rock Type	Description		Graphic Log	Depth (m)	Groundwater / Seepage	Scala Penetrometer (Blows per 100mm) 0 5 10 15
TOPSOIL	Organic SILT with a trace of sand; brown. Moist.	0m		0.0		
		0.4m		0.4		
LOESS	SILT with some sand; grey brown, massive. Firm to very stiff; moist; sand, fine.			0.5		
		1m		1.0		
DELTAIC SAND	Silty fine SAND; grey, massive. Loose to medium dense; moist.			1.1		
		1.4m		1.4		
DELTAIC SAND	Gravelly fine to medium SAND; orange brown grey. Loose to medium dense; moist to wet; gravel, fine to medium, subangular to subrounded.			1.5		
		1.7m		1.7		
DELTAIC GRAVEL	Sandy fine to coarse GRAVEL; brown grey to grey. Medium dense; moist to wet; sand, fine to coarse; gravel, predominantly fine to medium, becoming coarse, subangular to subrounded.			2.0		
				2.5		
				3.0		
				3.5	NO SEEPAGE	
		3.8m		3.8		

Total Excavation Depth = 3.8 m

COMMENT:	Pit walls stood well during excavation.	LOGGED BY:	ELH
		CHECKED DATE:	27/01/2022
		SHEET:	1 of 1

GEOSOLVE
ENGINEERING CONSULTANTS

TEST PIT LOG

EXCAVATION NUMBER: **TP 6**

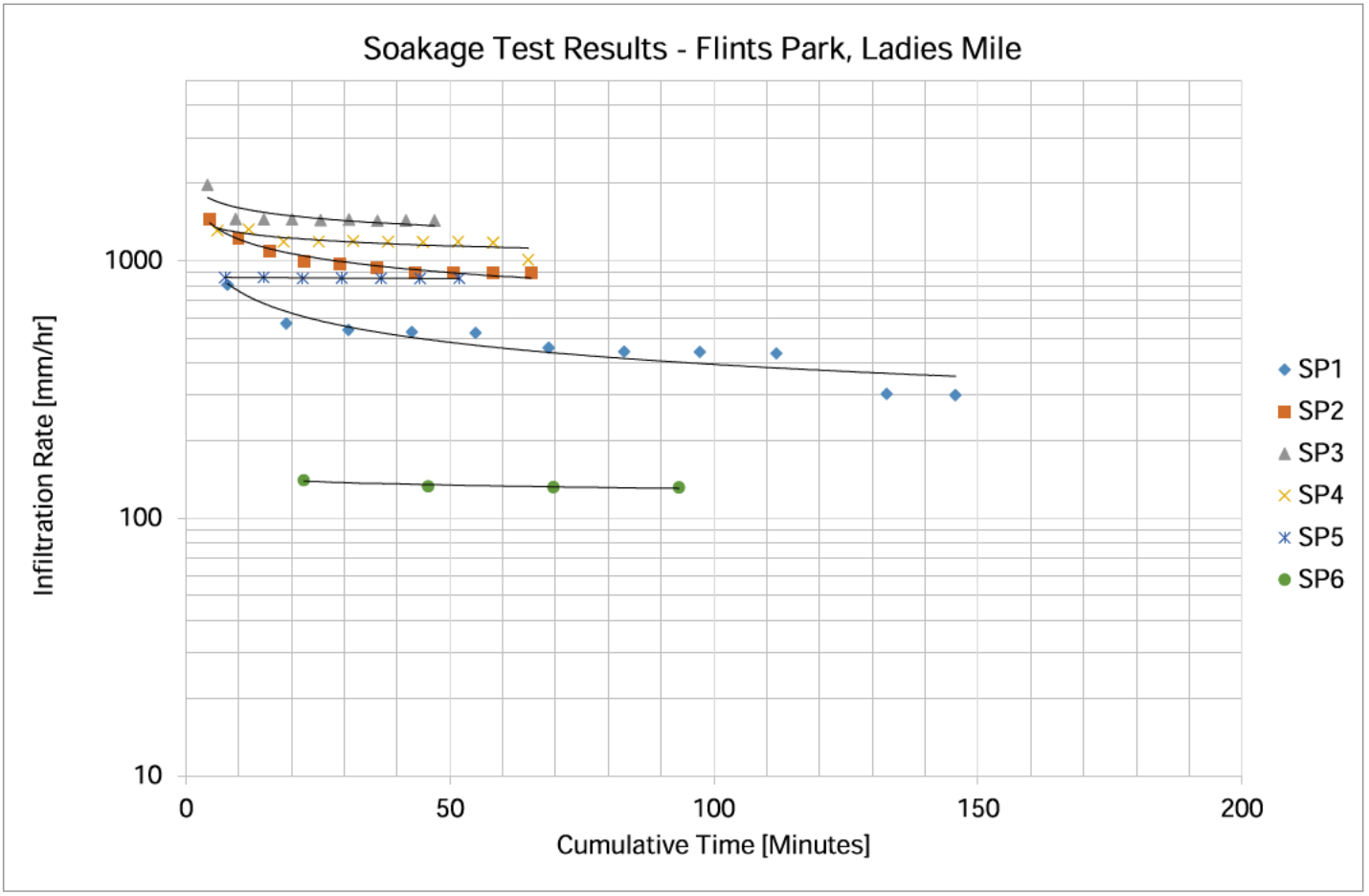
PROJECT:	Flints Park and Flints Park West, Queenstown			JOB NUMBER:	190162.01
LOCATION:	See Site Plan	INCLINATION:	Vertical		

EASTING:		EQUIPMENT:	5.4T excavator	OPERATOR:	Client Provided
NORTHING:		COORD. SYSTEM:	Aerial Photography	COMPANY:	
ELEVATION:		EXCAV. DATUM:	Existing ground level	HOLE STARTED:	16/12/2021
METHOD:	Aerial Photography	ACCURACY:	5 m +-	HOLE FINISHED:	16/12/2021

Soil / Rock Type	Description	Graphic Log	Depth (m)	Groundwater / Seepage	Scala Penetrometer (Blows per 100mm) 0 5 10 15
TOPSOIL	Organic SILT with minor sand; brown, massive. Moist; sand, fine. 0m – 0.3m		0.0 – 0.3		
LOESS	Sandy SILT; light tan brown, massive. Firm to very stiff; moist; sand, fine. 0.95m		0.4 – 0.9		
DELTAIC SAND	Silty fine to medium SAND; grey, massive. Loose to medium dense; moist. 1.5m		1.0 – 1.4		
DELTAIC SAND	Fine to medium SAND with minor silt and gravel; orange brown, bedded. Loose to medium dense; moist; gravel, fine to medium, subangular to subrounded.		1.5 – 1.6		
DELTAIC GRAVEL	Sandy fine to coarse GRAVEL; grey, bedded. Medium dense; moist to wet; sand, fine to coarse; gravel, subangular to subrounded. 1.65m – 3.65m		1.7 – 3.6	NO SEEPAGE	

Total Excavation Depth = 3.65 m

COMMENT:		LOGGED BY:	ELH
		CHECKED DATE:	27/01/2022
		SHEET:	1 of 1


Soakage Test Results - Flints Park, Ladies Mile
Infiltration Rate [mm/hr]
1000
100
10
0
50
100
150
200
Cumulative Time [Minutes]
SP1
SP2
SP3
SP4
SP5
SP6

geotago
Engineering Geology & Geotechnics

KARL JAMESON

14 LOWER SHOTOVER ROAD, QUEENSTOWN

SOAKAGE LOCATION PLAN

SCALE:	SIN REF #:
NTS	SIN01
REF:	DATE:
GL24-227 DRW001	26 NOVEMBER 2024

Test Pit Falling Head Log

Project:	14 Lower Shotover Road			
Site Location:	Queenstown			
Test Number:	TP101-SK1		Test Date:	20/11/2024
Calcs By	TJG		Test Time:	11:00:00am
Test Pit size:	Width	0.75	Presoak Time	NA
	Length	2.3	Operator	James Fleming
	Depth	2.7	Company	Southern Lakes Bobcats

geotago
Engineering Geology & Geotechnics

Test Pit Log

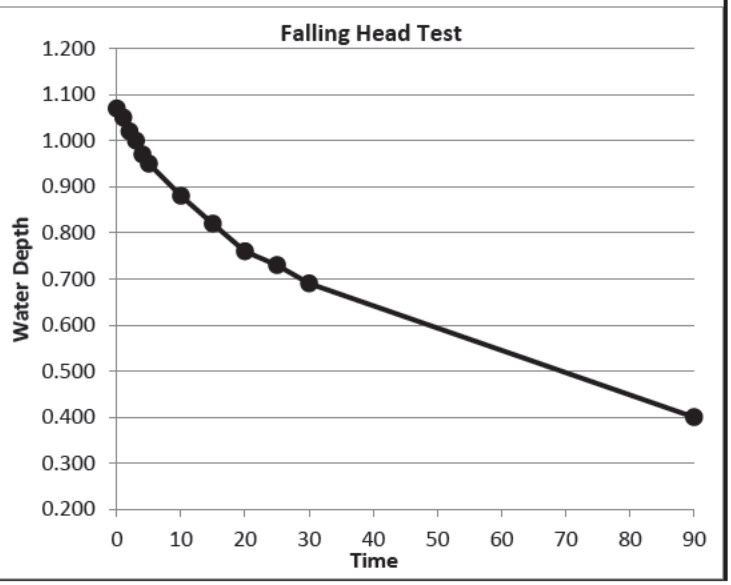
DEPTH (m)	Geological Unit	SOIL / ROCK CLASSIFICATION, PARTICLE SIZE CHARACTERISTICS,PLASTICITY, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	Legend	Sample	Water Level
0.4	Topsoil	Silty SAND: dark brown, moist, fine sand, organics and rootlets throughout		Not Sampled	Not Encountered
0.8	Holocene Fan Deposits	Sandy SILT: grey-brown, moist, fine sand, soft to firm.			
1.2					
1.6					
2.0					
2.4		Silty SAND: brown, dry-moist, fine sand, loose to medium dense.			
2.8		2.7m: Target Depth Achieved.			
3.2					

Soakage Rate	964.55	mm/hr	16.08	L/min/m2	Based on E1 using basal area soakage only
	23.15	m/day			

Soakage Testing

Time (min)	Water Level	Soakage Rate (mm/hr)	Soakage Rate (L/m2/min)
0	1.070	-	-
1	1.050	1200	20
2	1.020	1800	30
3	1.000	1200	20
4	0.970	1800	30
5	0.950	1200	20
10	0.880	840	14
15	0.82	720	12
20	0.76	720	12
25	0.73	360	6
30	0.69	480	8
90	0.4	290	4.833333333

Graph



Test Pit Falling Head Log

Project:	14 Lower Shotover Road			
Site Location:	Queenstown			
Test Number:	TP101-SK2		Test Date:	20/11/2024
Calcs By	TJG		Test Time:	2:00:00pm
Test Pit size:	Width	0.75	Presoak Time	NA
	Length	2.3	Operator	James Fleming
	Depth	2.7	Company	Southern Lakes Bobcats

geotago
Engineering Geology & Geotechnics

Test Pit Log

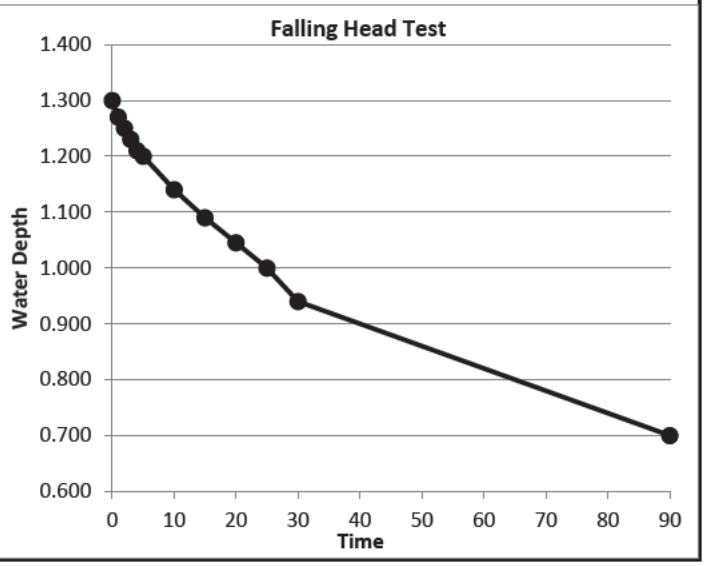
DEPTH (m)	Geological Unit	SOIL / ROCK CLASSIFICATION, PARTICLE SIZE CHARACTERISTICS,PLASTICITY, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	Legend	Sample	Water Level
0.4	Topsoil	Silty SAND: dark brown, moist, fine sand, organics and rootlets throughout		Not Sampled	Not Encountered
0.8	Holocene Fan Deposits	Sandy SILT: grey-brown, moist, fine sand, soft to firm.			
1.2					
1.6					
2.0					
2.4		Silty SAND: brown, dry-moist, fine sand, loose to medium dense.			
2.8		2.7m: Target Depth Achieved.			
3.2					

Soakage Rate	850.91	mm/hr	14.18	L/min/m2	Based on E1 using basal area soakage only
	20.42	m/day			

Soakage Testing

Time (min)	Water Level	Soakage Rate (mm/hr)	Soakage Rate (L/m2/min)
0	1.300	-	-
1	1.270	1800	30
2	1.250	1200	20
3	1.230	1200	20
4	1.210	1200	20
5	1.200	600	10
10	1.140	720	12
15	1.09	600	10
20	1.045	540	9
25	1	540	9
30	0.94	720	12
90	0.7	240	4

Graph



Test Pit Falling Head Log

Project:	14 Lower Shotover Road			
Site Location:	Queenstown			
Test Number:	TP101-SK3		Test Date:	20/11/2024
Calcs By	TJG		Test Time:	4:00:00pm
Test Pit size:	Width	0.75	Presoak Time	NA
	Length	2.3	Operator	James Fleming
	Depth	2.7	Company	Southern Lakes Bobcats

geotago
Engineering Geology & Geotechnics

Test Pit Log

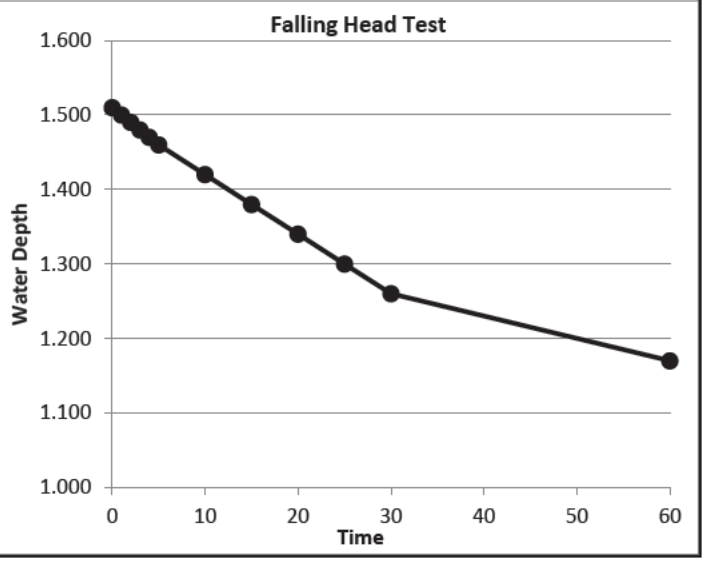
DEPTH (m)	Geological Unit	SOIL / ROCK CLASSIFICATION, PARTICLE SIZE CHARACTERISTICS,PLASTICITY, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	Legend	Sample	Water Level
0.4	Topsoil	Silty SAND: dark brown, moist, fine sand, organics and rootlets throughout		Not Sampled	Not Encountered
0.8	Holocene Fan Deposits	Sandy SILT: grey-brown, moist, fine sand, soft to firm.			
1.2					
1.6					
2.0					
2.4		Silty SAND: brown, dry-moist, fine sand, loose to medium dense.			
2.8		2.7m: Target Depth Achieved.			
3.2					

Soakage Rate	507.27	mm/hr	8.45	L/min/m2	Based on E1 using basal area soakage only
	12.17	m/day			

Soakage Testing

Time (min)	Water Level	Soakage Rate (mm/hr)	Soakage Rate (L/m2/min)
0	1.510	-	-
1	1.500	600	10
2	1.490	600	10
3	1.480	600	10
4	1.470	600	10
5	1.460	600	10
10	1.420	480	8
15	1.38	480	8
20	1.34	480	8
25	1.3	480	8
30	1.26	480	8
60	1.17	180	3

Graph



Amalgamation Conditions

- That Lot 1 hereon & Section 107 Block III Shotover Survey District be held on one Record of Title

- That Lots 2, 3 & 4 hereon be held on one Record of Title

Lot 2 DP 339864

Lot 1 DP 398999

Lot 5 DP 398999

Lot 2 DP 418751

Lot 5 DP 463532

Areas A, B & C DP 398999 right of way, right to convey water, electricity, gas, telecommunications and computer media and a right to drain water and sewage (EI 8777688.4)

Marked D DP 398999 Right of way, a right to convey water, electricity, gas, telecommunications and computer media and a right to drain water and sewage (EI 7777688.3) Right to convey electricity and a right of way (EI 8869074.2)

Areas M, N & O DP 418751 Right to convey water (EI 8970568.1)

Centreline A to B on Diagram T 462350.1 Right to convey water

Marked L DP 391412 Right to convey water (EC 5121931.4) Right to convey water (EC 754597.2) Right to convey water (EC 8869074.2) Right to convey water (EI 8970568.1)

Marked A, B, C & D DP 302775 Right to convey water (EI 6064446.2)

Pool House

Lot 1 5.17 Ha (Title 1)

Accessory building

District Plan ONF Line

Ex vehicle crossing

Ex hardfill to be cleaned off & new gravel placed for access to Springbank

Marked R DP 391412 Right (In gross - A.I.C. Ltd) to convey water (EI 6299455.2)

Dwelling

Sec 107 Blk III Shotover SD (Title 1)

Animal shelter

Lot 1 DP 22874

Lot 5 DP 438514

Accessory building & Residential Flat

Proposed Ladys Mile Master Plan Urban Limit

Marked A DP 405803 Right (In gross - Aurora) to convey and transform electricity (EI 8026761.3)

Grove

Accessory building

Septic Tank

Disposal field

10.0 28.3 10.0 28.3 A 800m² Building area

Sec 9 SO 485598

Area A on DP 391412 (now Area I DP 438514) Subject to a right of way, to convey water, electricity, gas, telecommunications and computer media and to drain water and sewage (EI 7620262.12)

Springbank

Lot 2 2.45 Ha (Title 2)

Legal Road Unformed

Lot 3 6.14 Ha (Title 2)

35mm ID gas pipe

Marked H SO 485598 Right of way - In favour of Sec 107 over Sec 8 (proposed Lot 3) (T 462350.1) Right (In gross - Aurora) to convey electricity (EI 8026761.4)

Existing sewer & water connections

Water Tank with pressure pump

Lower Shotover Road

Lot 4 292m² (Title 2)

Marked X SO 485598 Right (In gross - AIC Ltd) to convey water (T 884459)

Connection to existing bore

S.H. 6

Legend:

Ex Appurtenant Easement

Ex Subject Easement to be retained

Lot 201 DP 391412 Subject to Consent Notice 7620262.11

Lots 1 to 4 being Subdivision of Lots 3 & 4 DP 438514 and Sec 8 SO 485598 and Lot 201 DP 391412 Scheme Plan

Rev.	Date	Revision Details
0	28-10-21	For discussion
1	8-11-21	Alter Lot 1/2 bdy, shift driveway
2	8-11-21	Add Consent notice area
3	26-11-21	Remove contours
4	5-07-22	Add building area
5	15-11-22	Shift Bldg platform, add water services

Surveyed

Drawn HRW

Designed

N

Scale 1:2000 @ A3

Project # - 21056

Client - M Henry

SOUTHERN HORIZONS
SURVEYING & RESOURCE MANAGEMENT
Gore • Ph: 027 468 2596 • hamish@southernhorizons.co.nz

NOTE:
- All dimensions shown are in metres unless otherwise shown
- If this plan is being used as part of sale and purchase agreement then it is done so on the basis that it is preliminary only, final dimensions and areas may vary on final survey
- Any aerial images shown are sourced from LINZ Data Service unless otherwise stated

Plan # 01

Datum Mt Nicholas 2000

C:\Projects\21056 - Subdivision - 14 Lower Shotover Road - M Henry\12d 21056 14 Lower Shotover Rd Hnery Tue Nov 15 12:00:12 2022

Document Set ID: 7717164
Version: 1, Version Date: 10/08/2023

GEO CIVIL
TEST RIGHT • BUILD RIGHT

AUGERHOLE LOG

11E Pinot Noir Drive,
Cromwell
M: 0276565231
E: info@geocivi.co.nz

Lab Job No: 8602-007 **Borehole No.:** 01 **Sheet:** 1 of 1

Client: Insight Engineering **Hole Depth:** 3.00 m

Job: Geotechnical Investigation **Coordinates:** **Date:** 23/02/23

Report No.: OTA8602-007-R001 **Location:** 14 Lower Shotover Road **Ground Level:** 0

Client Ref. No.: -

Unit	Geological Interpretation (In accordance with NZGS 2005)	USC	Depth (m)	Water	Relative Density	Scala Penetrometer (NZS4402: 1986 Test 6.5.2 - Procedure 2, blows / 100mm)	Values	Vane Shear Strength (kPa) (Tested in accordance with NZGS Aug 2001)	Samples
	SILT with trace rootlets; light brown, loose, dry, poorly graded	ML	0.0	Groundwater Not Encountered	-	5 10 15	2		
	SILT; light greysh brown, loose, dry, poorly graded	ML					2 3 3		
	SILT; light greysh brown, loose, dry to moist, poorly graded	ML	0.5				3 4 4		
	SILT with minor sand; light greyish brown, medium dense, dry to moist, poorly graded; sands are fine	ML	1.0				5 4 5 5 5 5 4		
	Silty SAND; light greyish brown, medium dense, dry, poorly graded; sands are fine	ML	1.5				4 5 7 7		
	SILT with minor sand; light greyish brown, dense, moist, poorly graded; sands are fine	ML	2.0				6 5 6 6 9 7 5 4 6 8 9		
	EOB, Target Depth		3.0						

Remarks

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test

Note: Scala Penetrometer interpretation is not endorsed

Water

- Standing Water Level
- Out flow
- In flow

Investigation Type

- [ ] Hand Auger
- [x] Hand Auger + Scala (DCP)

Contractor:	Equipment:	Recorded By:	Checked By:	Approved Signatory:
Geocivil	Hand auger, scala	F.B	F.B	Joe Vincent
		Recorded Date: 23/02/2023	Checked Date: 23/02/2023	

Produced with Core-GS

Printed: 10/08/2023 8:58:58 am

Document Set ID: 7717164
Version: 1, Version Date: 10/08/2023

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AUGERHOLE LOG

11E Pinot Noir Drive,
Cromwell
M: 0276565231
E: info@geocivi.co.nz

Lab Job No: 8602-007 **Borehole No.:** 02 **Sheet:** 1 of 1

Client: Insight Engineering **Hole Depth:** 3.00 m

Job: Geotechnical Investigation **Coordinates:** **Date:** 23/02/23

Report No.: OTA8602-007-R001 **Location:** 14 Lower Shotover Road **Ground Level:** 0

Client Ref. No.: -

Unit	Geological Interpretation (In accordance with NZGS 2005)	USC	Depth (m)	Relative Density	Scala Penetrometer (NZS4402: 1986 Test 6.5.2 - Procedure 2, blows / 100mm)	Values	Vane Shear Strength (kPa) (Tested in accordance with NZGS Aug 2001)	Samples
	SILT with trace rootlets; light brown, medium dense, dry, poorly graded	ML	0.0	-		3 4 3 5 3		
	SILT; light greyish brown, medium dense, dry to moist, poorly graded	ML	0.5 – 1.5	-		3 3 4 3 3 4 4 5 4 5 5 5		
	Silty SAND; light greyish brown, medium dense, dry to moist, poorly graded; sands are fine	SM	2.0	MD		6 6		
	SILT; light greyish brown, medium dense, moist, poorly graded	ML	2.0 – 2.5	-		6 6 6 6 6 6		
	Silty SAND; light greyish brown, medium dense, moist, poorly graded; sands are fine	SM	2.5	MD		6 7		
	SILT with minor sand; light greyish brown, medium dense, moist, poorly graded; sands are fine	ML	2.5 – 3.0	-		9		
	EOB, Target Depth		3.0					

Groundwater Not Encountered

Remarks

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test

Note: Scala Penetrometer interpretation is not endorsed

Water

- Standing Water Level
- Out flow
- In flow

Investigation Type

- [ ] Hand Auger
- [x] Hand Auger + Scala (DCP)

Contractor:	Equipment:	Recorded By:	Checked By:	Approved Signatory:
Geocivil	Hand auger, scala	F.B	F.B	Joe Vincent
		Recorded Date: 23/02/2023	Checked Date: 23/02/2023	

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AUGERHOLE LOG

11E Pinot Noir Drive,
Cromwell
M: 0276565231
E: info@geocivi.co.nz

Lab Job No: 8602-007 **Borehole No.:** 03 **Sheet:** 1 of 1

Client: Insight Engineering **Hole Depth:** 3.00 m

Job: Geotechnical Investigation **Coordinates:** **Date:** 23/02/23

Report No.: OTA8602-007-R001 **Location:** 14 Lower Shotover Road **Ground Level:** 0

Client Ref. No.: -

Unit	Geological Interpretation (In accordance with NZGS 2005)	USC	Depth (m)	Water	Relative Density	Scala Penetrometer (NZS4402: 1986 Test 6.5.2 - Procedure 2, blows / 100mm)	Values	Vane Shear Strength (kPa) (Tested in accordance with NZGS Aug 2001)	Samples
	SILT with trace rootlets; light brown, medium dense, dry, poorly graded	ML	0.0	Groundwater Not Encountered	-		4		
	SILT with trace gravels; light brown, medium dense, dry, poorly graded; gravels are fine to medium, highly weathered, rounded to sub-rounded, weak	ML					4		
	SILT; light brown, medium dense, dry, poorly graded	ML	0.5				4 5 8 7 5 5 5 4		
	SILT with trace gravels; dark greyish brown, medium dense, dry to moist, poorly graded; gravels are fine to medium, highly weathered, rounded to sub-rounded, weak	ML	1.0				4 5 4 4 5 5 6 6 6 5 6 6 6 6 9 10 9		
	Silt with trace sands; light greyish brown, medium dense, dry to moist, poorly graded; sands are fine	ML	1.5 2.0 2.5						
	EOB, Target Depth		3.0						

Remarks

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test

Note: Scala Penetrometer interpretation is not endorsed

Water

- ▼ Standing Water Level
- ◁ Out flow
- ▷ In flow

Investigation Type

- ☐ Hand Auger
- ☑ Hand Auger + Scala (DCP)

Contractor:	Equipment:	Recorded By:	Checked By:	Approved Signatory:
Geocivil	Hand auger, scala	F.B	F.B	Joe Vincent
		Recorded Date: 23/02/2023	Checked Date: 23/02/2023	

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Version: 1, Version Date: 10/08/2023

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AUGERHOLE LOG

11E Pinot Noir Drive,
Cromwell
M: 0276565231
E: info@geocivi.co.nz

Lab Job No: 8602-007 **Borehole No.:** 04 **Sheet:** 1 of 1

Client: Insight Engineering **Hole Depth:** 3.00 m

Job: Geotechnical Investigation **Coordinates:** **Date:** 23/02/23

Report No.: OTA8602-007-R001 **Location:** 14 Lower Shotover Road **Ground Level:** 0

Client Ref. No.: -

Unit	Geological Interpretation (In accordance with NZGS 2005)	USC	Depth (m)	Relative Density	Scala Penetrometer (NZS4402: 1986 Test 6.5.2 - Procedure 2, blows / 100mm)	Values
	SILT with minor sands and trace rootlets; light brown, medium dense, dry, poorly graded; sands are fine to course	ML	0.0			3
	SILT with minor sands; light brown, medium dense, dry, poorly graded; sands are fine to course	ML	0.5			4 5 6 6 7
	SILT with minor sands and minor gravels; light brown, medium dense, dry to moist, poorly graded; gravels are fine to medium, moderately to highly weathered; rounded to sub-rounded, moderately strong to weak; sands are fine	ML	1.0	-		6 6 5 3 5 5 4
	SILT with trace sand; dark greyish brown, medium dense, moist, poorly graded; sands are fine	ML	1.5			4 4 3 4 5 7
	SAND with trace silt; light brown, medium dense, dry, poorly graded; sands are fine	SM	2.0	MD D MD D MD		6 7 8 8 7 5 5 6 8 6
	SILT with minor sand; light brown, medium dense, moist, poorly graded; sands are fine	ML	2.5	-		6
	EOB, Target depth		3.0			

Groundwater Not Encountered

Vane Shear Strength (kPa) — Tested in accordance with NZGS Aug 2001

Samples

Remarks

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test

Note: Scala Penetrometer interpretation is not endorsed

Water

- Standing Water Level
- Out flow
- In flow

Investigation Type

- [ ] Hand Auger
- [x] Hand Auger + Scala (DCP)

Contractor:	Equipment:	Recorded By:	Checked By:	Approved Signatory:
Geocivil	Hand auger, scala	F.B	F.B	Joe Vincent
		Recorded Date: 23/02/2023	Checked Date: 23/02/2023	

Produced with Core-GS

Document Set ID: 7717164
Version: 1, Version Date: 10/08/2023

Appendix 3:

ENGEO Logs

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA01

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814703.9
(NZ MT YORK2000) N: 429203.7
Elevation (mRL): 365.1
Elevation Datum: NZMt Nic 2000

Maximum Depth: 1.8 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

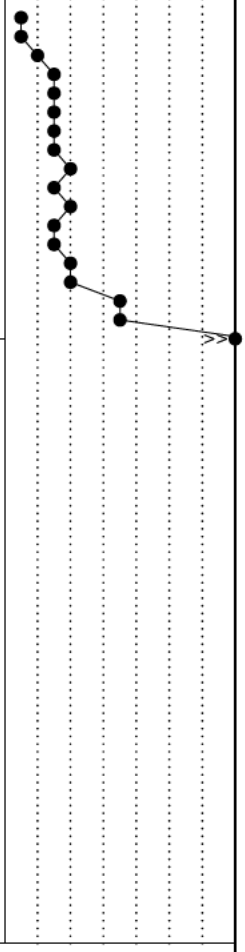
Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable)	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
365	TS		SILT with some fine sand and trace rootlets, brown. Low plasticity; (TOPSOIL).					S-F		SV@0.3m 166/62
	LOESS		SILT with trace sand, grey brown. Low plasticity; moist; firm to stiff; sand, fine (LOESS).	0.5			M	St-Vst		SV@0.6m 171/56
364				1.0						SV@0.9m 75/32
	ALLUVIUM		Fine to coarse SAND with minor silt, grey brown. Poorly graded; moist; loose (ALLUVIUM).	1.5				MD		
			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; moist; dense to very dense; gravel, subrounded to subangular (ALLUVIUM)					VD		

Depth of Excavation: 1.8 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer

Blows per 100mm

2 4 6 8 10 12



Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA02

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814779
(NZ MT YORK2000) N: 429255.6
Elevation (mRL): 365.9
Elevation Datum: NZMt Nic 2000

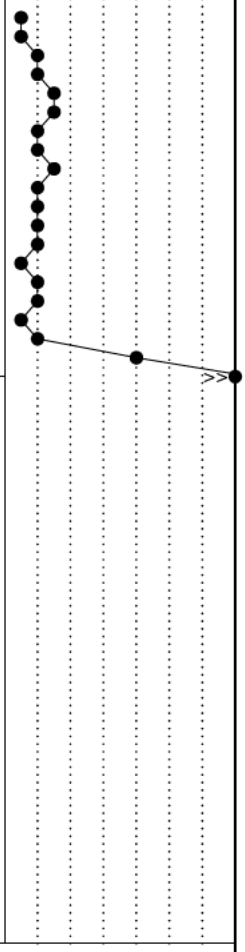
Maximum Depth: 2 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
	TS		SILT with some fine sand and trace rootlets, brown. Low plasticity; (TOPSOIL).					S-F		SV@0.3m 168/55
	LOESS		SILT with some sand, grey brown.Low plasticity; Firm to stiff; moist; (LOESS).	0.5				St-Vst		SV@0.6m 159/53
365	ALLUVIUM		Medium to coarse SAND, grey brown. Poorly graded; loose to medium dense; (ALLUVIUM).	1.0			M	L-MD		SV@0.9m 81/50
364			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM)	1.5						
			Depth of Excavation: 2 m Termination Condition: Practical refusal	2.0				VD		

Dynamic Cone Penetrometer

Blows per 100mm

2 4 6 8 10 12



Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA03

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814807.8
(NZ MT YORK2000) N: 429320
Elevation (mRL): 365.9
Elevation Datum: NZMt Nic 2000

Maximum Depth: 2.4 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
	TS		SILT with some fine sand and trace rootlets, brown. Low plasticity; (TOPSOIL).					S-F		SV@0.3m 165/50
365	LOESS		SILT with some sand, grey brown.Low plasticity; moist; (LOESS).	0.5			M	Vst-H		SV@0.6m 200+ SV@0.9m 135/35
364	ALLUVIUM		Medium to coarse SAND, grey brown. Poorly graded; dense; (ALLUVIUM).	1.5				L-MD		
			fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense;gravel, subrounded to subangular (ALLUVIUM)	2.0				VD		

Depth of Excavation: 2.4 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12

Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA04

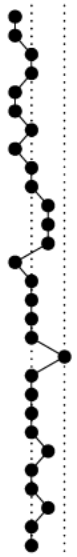
Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814896.9
(NZ MT YORK2000) N: 429406.6
Elevation (mRL): 366.4
Elevation Datum: NZMt Nic 2000

Maximum Depth: 3.7 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
366	TS		SILT with some fine sand and trace rootlets and SILT with some sand reworked, brown. Low plasticity; (TOPSOIL / FILL).	0.5				S-F		SV@0.6m 90/30
	LOESS		Silty fine SAND, light brown. Poorly graded; loose; moist (LOESS).	1.0				L		SV@0.9m 135/32
365				1.5						
	ALLUVIUM		Fine to coarse SAND with trace silt, brown. Poorly graded; loose; (ALLUVIUM).	2.0			M			
364			@ 2.6 m becomes with some silt.	2.5				L-MD		
				3.0						
363			Medium to coarse SAND, brown; poorly graded; loose to medium dense (ALLUVIUM).					L-MD		
			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM).	3.5				MD-VD		
			Depth of Excavation: 3.7 m Termination Condition: Practical refusal							

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12



Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA05

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814896.9
(NZ MT YORK2000) N: 429456.7
Elevation (mRL): 365.7
Elevation Datum: NZMt Nic 2000

Maximum Depth: 2.6 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
	TS		SILT with some fine sand and trace rootlets and SILT with some sand reworked, brown. Low plasticity; (TOPSOIL).					S-F		SV@0.3m 134/46
365	LOESS		Silty fine SAND, light brown. Poorly graded; loose; moist (LOESS)	0.5				L		SV@0.6m 105/41
	ALLUVIUM		Medium to coarse SAND with some silt, grey brown. Poorly graded; dense; (ALLUVIUM).	1.0			M			
364				1.5				L		
				2.0						
			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM).	2.5				MD-VD		
			Depth of Excavation: 2.6 m Termination Condition: Practical refusal							

Dynamic Cone Penetrometer

Blows per 100mm

2 4 6 8 10 12

Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA06

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814822.7
(NZ MT YORK2000) N: 429368.1
Elevation (mRL): 366.0
Elevation Datum: NZMt Nic 2000

Maximum Depth: 3.2 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier–Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
	TS		SILT with some fine sand and trace rootlets and SILT with some sand reworked, brown. Low plasticity; (TOPSOIL).					S-F		SV@0.3m 171/47
	LOESS		Silty fine SAND, light brown. Poorly graded; loose; moist (LOESS).	0.5				L		SV@0.6m 200+
365			Medium to coarse SAND with some silt, grey brown. Poorly graded; dense; (ALLUVIUM).	1.0						SV@0.9m 87/32
	ALLUVIUM			1.5			M	L-MD		
364				2.0						
				2.5				MD-D		
363			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM).	3.0				D-VD		

Depth of Excavation: 3.2 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12

Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA07

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814859.4
(NZ MT YORK2000) N: 429414
Elevation (mRL): 365.7
Elevation Datum: NZMt Nic 2000

Maximum Depth: 2.8 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
	TS		SILT with some fine sand and trace rootlets and SILT with some sand reworked, brown. Low plasticity; (TOPSOIL).					S-F		SV@0.3m 154/40
365	LOESS		Silty fine SAND, light brown. Poorly graded; loose; moist (LOESS).	0.5				L		SV@0.6m 132/34
	ALLUVIUM		Medium to coarse SAND with trace silt, grey brown. Poorly graded; dense; (ALLUVIUM).	1.0			M			
364				1.5				L-MD		
			@ 2.2 m becomes with some silt	2.0						
363			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM)	2.5				VD		

Depth of Excavation: 2.8 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12

Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA08

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

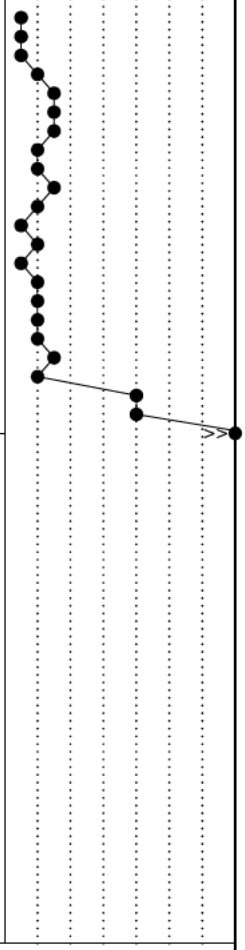
Coordinates E: 814813.5
(NZ MT YORK2000) N: 429429.3
Elevation (mRL): 365.0
Elevation Datum: NZMt Nic 2000

Maximum Depth: 2.3 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
	TS		SILT with some fine sand and trace rootlets and SILT with some sand reworked, brown. Low plasticity; (TOPSOIL).					S-F		SV@0.3m 149/31
	LOESS		Silty fine SAND, light brown. Poorly graded; loose; moist (LOESS)	0.5						SV@0.6m 134/32
364				1.0			M	L		SV@0.9m 86/34
				1.5						
363	ALLUVIUM		Fine to medium SAND with some silt, grey brown. Poorly graded; dense; (ALLUVIUM).	2.0				L-D		
			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM).					VD		

Depth of Excavation: 2.3 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12



Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA09

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814679.458
(NZ MT YORK2000) N: 429345.1
Elevation (mRL): 367.2
Elevation Datum: NZMt Nic 2000

Maximum Depth: 1.9 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
367	TS		SILT with some rootlets, light brown; Low plasticity (TOPSOIL).					F-St		
	LOESS		SILT with trace sand, light brown; Low plasticity (LOESS).	0.5				St		
			SILT with trace sand, grey; Low plasticity (LOESS).	1.0			M	St		
366	ALLUVIUM		Fine to medium SAND with trace gravel and trace silt, grey brown; Poorly graded (ALLUVIUM).	1.5				D-VD		
			Fine to coarse gravelly SAND with trace silt, gravel, grey brown; Well graded; dense to very dense; gravel, sub rounded to subangular (ALLUVIUM).					VD		
			Depth of Excavation: 1.9 m Termination Condition: Practical refusal							

Dynamic Cone Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA10

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814664.6
(NZ MT YORK2000) N: 429275.5
Elevation (mRL): 367.3
Elevation Datum: NZMt Nic 2000

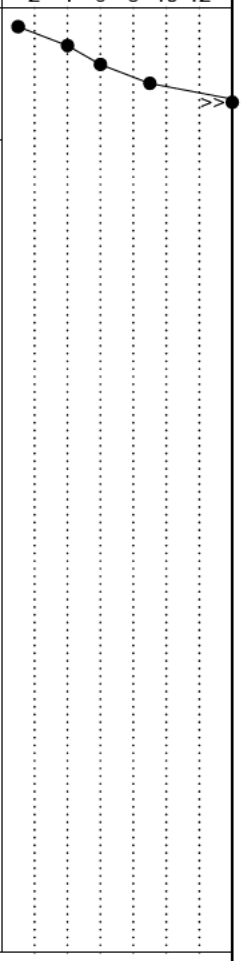
Maximum Depth: 0.7 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
367	TS		Sandy SILT with trace rootlets, brown. Low plasticity; (TOPSOIL)S				M	S-St		
	FILL		Gravelly fine to coarse SAND with minor silt, light brown. Well graded; very dense; gravel, fine to medium (BUND FILL).	0.5				VD		
			Depth of Excavation: 0.7 m Termination Condition: Practical refusal							

Dynamic Cone Penetrometer

Blows per 100mm

2 4 6 8 10 12



Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA11

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814745
(NZ MT YORK2000) N: 429342.6
Elevation (mRL): 367.4
Elevation Datum: NZMt Nic 2000

Maximum Depth: 4 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
367	TOPSOIL		SILT with some fine sand and trace rootlets AND reworked SILT with some sand , brown. Low plasticity; (TOPSOIL / FILL).	0.5				S-St		SV@0.3m 60/15 SV@0.6m 46/18 SV@0.9m 70/32
366	ALLUVIUM		Medium to coarse SAND, grey brown. Poorly graded; dense; (ALLUVIUM).	1.0 1.5 2.0			M	L-MD		
365				2.5 3.0						
364			fine to coarse SAND with some gravel and trace silt, grey brown. Well graded; dense to very dense; Gravel, subrounded to subangular (ALLUVIUM).	3.5 4.0				VD		

Depth of Excavation: 4 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12

Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA12

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

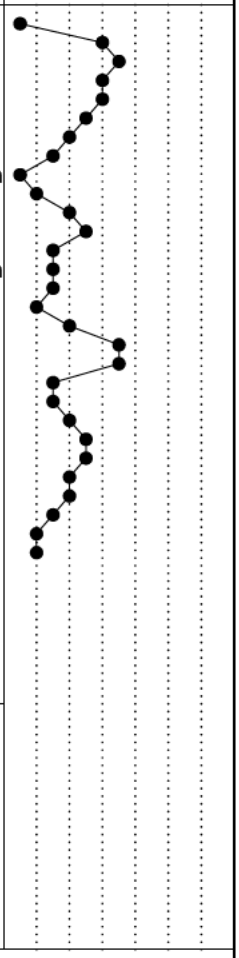
Coordinates E: 814679.5
(NZ MT YORK2000) N: 429345.1
Elevation (mRL): 367.2
Elevation Datum: NZMt Nic 2000

Maximum Depth: 3.7 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
367	TS		Sandy SILT with trace rootlets, brown. Low plasticity; (TOPSOIL).	0.0				S-F		
	BUND FILL		Gravelly fine to coarse SAND with minor silt, light brown. Well graded; very dense; gravel, fine to medium (BUND FILL).	0.5				MD		
366	LOESS		Silty fine to coarse SAND with trace fine gravel , light brown. Poorly graded; loose; moist (LOESS).	1.0				L-MD		PSD @ 0.9 m
	ALLUVIUM		Fine to coarse SAND with minor silt and trace gravel, light grey / brown. Well graded; loose; grave, fine to medium, subrounded (ALLUVIUM).	1.5			M	L-MD		PSD @ 1.4 m
365			Fine to coarse SAND with trace silt, brown. Poorly graded; loose; (ALLUVIUM).	2.5				L-MD		
364			fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM).	3.5				VD		

Depth of Excavation: 3.7 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12



Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA13

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814727.8
(NZ MT YORK2000) N: 429438.8
Elevation (mRL): 365.5
Elevation Datum: NZMt Nic 2000

Maximum Depth: 2.5 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable)	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
365	TS		SILT with some fine sand and trace rootlets and SILT with some sand reworked, brown. Low plasticity; (TOPSOIL).	0.0				S-F		SV@0.3m 131/41
	LOESS		Silty fine SAND, light brown. Poorly graded; loose; moist (LOESS).	0.5				L		SV@0.6m 75/34
	ALLUVIUM		Fine to coarse SAND with some silt, grey brown. Poorly graded; dense; (ALLUVIUM).	1.0			M	L		
364				1.5						
				2.0				L-D		
363			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense;gravel, subrounded to subangular (ALLUVIUM).	2.5				VD		

Depth of Excavation: 2.5 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12

Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA14

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

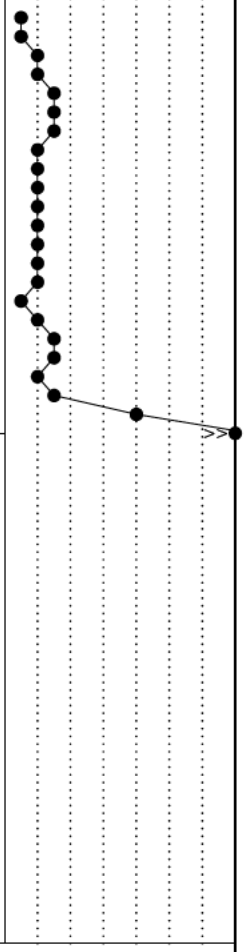
Coordinates E: 814771.4
(NZ MT YORK2000) N: 429505.1
Elevation (mRL): 364.5
Elevation Datum: NZMt Nic 2000

Maximum Depth: 2.3 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
364	LOESS		SILT with some fine sand and trace rootlets and SILT with some sand reworked, brown. Low plasticity; (TOPSOIL).	0.5				S-F		SV@0.3m 87/28
			Silty fine SAND, light brown. Poorly graded; loose; moist (LOESS).					L		SV@0.6m 90/41
	ALLUVIUM		Fine to medium SAND with some silt, grey brown. Poorly graded; dense; (ALLUVIUM).	1.0			M			
363				1.5				L		
				2.0						
			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM).					VD		

Depth of Excavation: 2.3 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12



Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA15

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814660.3
(NZ MT YORK2000) N: 429228.5
Elevation (mRL): 367.8
Elevation Datum: NZMt Nic 2000

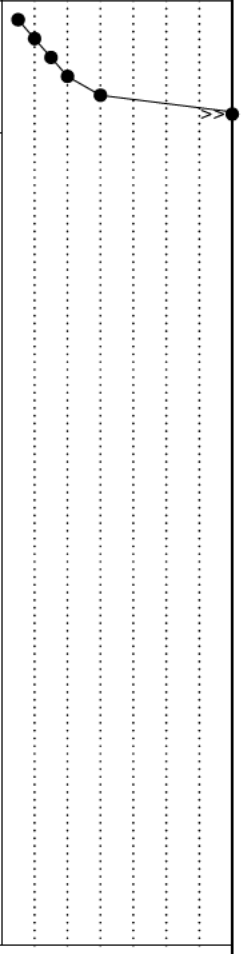
Maximum Depth: 0.7 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
	BUND FILLTS		Sandy SILT with trace rootlets, brown. Low plasticity; (TOPSOIL).				M	S-St		
			Gravelly fine to coarse SAND with minor silt, light brown. Well graded; very dense; gravel, fine to medium (BUND FILL).	0.5				L-VD		
			Depth of Excavation: 0.7 m Termination Condition: Practical refusal							

Dynamic Cone Penetrometer

Blows per 100mm

2 4 6 8 10 12



Photos / Sketches

ENGEO

Test Pit Log

Client: Simplicity Living Limited
Project: Simplicity Living
Location: 12 Lower Shotover Road
Project Number: 30002.000.001

Hole I.D:
SL-ENG25-HA16

Method: Hand Auger
Contractor:
Bucket Size:
Vane Number: 2534

Coordinates E: 814700.3
(NZ MT YORK2000) N: 429424
Elevation (mRL): 367.1
Elevation Datum: NZMt Nic 2000

Maximum Depth: 4.3 m
Survey Method: Leica GPS
Start Date: 17/11/2025
Finish Date: 17/11/2025
Logged By: JJ
Reviewed By: GC

Elevation (mRL)	Geological Unit	Excavatability (relative scale) Easier – Harder	DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity, additional features (grain size, roundness, composition etc. as applicable))	Depth (m BGL)	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density	Sample	Testing / Additional Comments
367	TS		SILT with some fine sand and trace rootlets and SILT with some sand reworked, brown. Low plasticity; (TOPSOIL).	0.0				S-F		
	LOESS		Silty fine to medium SAND, light brown. Poorly graded; loose; moist (LOESS).	0.5				L		PSD @ 0.6 m
366	ALLUVIUM		Fine to coarse SAND with trace silt, brown. Poorly graded; loose; moist (ALLUVIUM).	1.0						
365			@ 2.2 m becomes fine to medium SAND with some silt.	2.0			M	L		PSD @ 2.4 m
364			@ 3.4 m becomes fine to coarse SAND.	3.5						
363			Fine to coarse SAND with some gravel and trace silt, grey brown.Well graded; dense to very dense; gravel, subrounded to subangular (ALLUVIUM).	4.0				VD		

Depth of Excavation: 4.3 m
Termination Condition: Practical refusal

Dynamic Cone Penetrometer
Blows per 100mm
2 4 6 8 10 12

Photos / Sketches

ENGEO TEST PIT LOG 30002 - SIMPLICITY LIVING_V0.GPJ NZ MASTER DATA TEMPLATE.GDT 5/2/26

Appendix 4:

Laboratory Data

Wellington Laboratory
47C Kenepuru Drive,
Porirua
s 9(2)(a)

TEST REPORT

Lab Job No: 8398-121

Your ref.: 30002

Date of Issue: 4/02/2026

Date of Re-Issue: -

Test Report No. WLG8398-121-R001

PROJECT: **Simplicity Living - Scomp, CBR**

CLIENT: ENGEO
24 Rees St, Queenstown 9300

ATTENTION: Grant Caldwell

TEST METHODS: Determination of the Dry density / water content relationship – New Zealand Standard Compaction
NZS 4402: 1986 Test 4.1.1
Determination of the California Bearing Ratio (CBR) (remoulded samples) (Not accredited)
NZS 4402: 1986 Test 6.1.1 (Not accredited)

SAMPLING METHOD Unknown

TEST RESULTS: As per attached sheets

M. Morgan
Laboratory Technician

G. Bromfield
Approved Signatory

All results obtained in accordance with the test methods listed above.

Any material descriptions included in this report are excluded from IANZ endorsement.

Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Test results relate only to the sample tested.

This report shall not be reproduced, except in full, without written approval of the laboratory

Geocivil Laboratory
Northland - Wellington - Christchurch - Otago
P: 09 438 4417
E: info@geocivil.co.nz

Determination of the California Bearing Ratio

NZS 4402:1986 Test 6.1.1

Lab Job No: 8398-121
Client: ENGEO
Project/Site: Simplicity Living

Date Received: 15/12/2025
Date Sampled: 2/12/2025
Sampler: Client

Sampling Method: Sampled by client – Sampling not accredited

Sample Numbers: S001
Tested By: H.DG
Date: 20/01/2026
Checked By: M.M
Date: 22/01/2026

Report No: WLG8398-121-R001
REF: #30002

Sample No	Sample Location / Description	Treatment	Bulk Density	Dry Density (t/m^3)	Water Content		CBR (%)	Penetration (mm)	Swell (%)	Operator	Date tested	% Passing 19mm Sieve
					As Compacted (%)	After Curing(%)						
WLG8398-121-S001	TP01 -silty SAND grey moist	• -1.0% Water Removed by Mass	2.02	1.68	19.9	24.7	**2**	2.5 & 5.0	4.2	H.DG	20/01/2026	100

Geocivil Laboratory
Northland - Wellington - Christchurch - Otago
P: 09 438 4417
E: info@geocivil.co.nz

Note:	1	A surcharge mass of 4kg was used for all samples.
	2	All results obtained in accordance with the compacted test method.
	3	All samples compacted in accordance with NZ Standard Compaction NZS 4402:1986 Test 4.1.1
	4	All samples tested at 97% of known Optimum water content.
	5	Plunger penetration rate was 1 mm/min for all samples.
	6	Samples were soaked for 4 days prior to testing.
	7	Tests performed on material passing 19.0mm test sieve.

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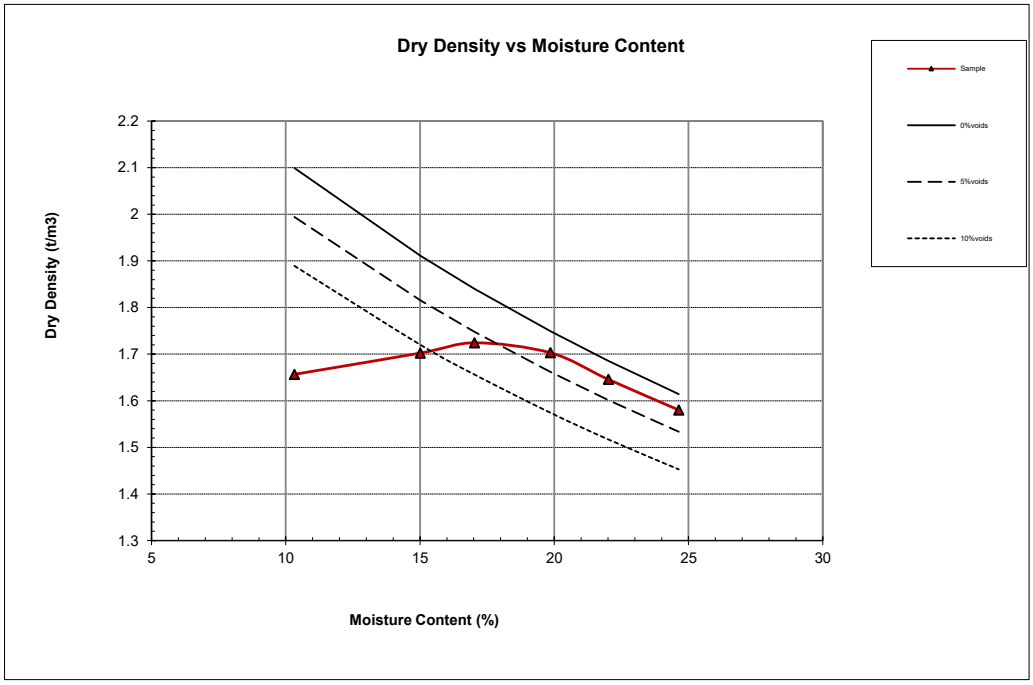
DETERMINATION OF DRY DENSITY/ WATER CONTENT RELATIONSHIP
NEW ZEALAND STANDARD COMPACTION

NZS 4402:1986 Test 4.1.1

Lab Job No:	8398-121	**Sample No.:**	WLG8398-121-S001
Client:	ENGEO	**Tested By:**	H.DG
Project/Site:	Simplicity Living	**Date:**	20/01/2026
Sample Location:	TP01	**Checked By:**	M.M
		Date:	22/01/2026
Date Received:	15/12/2025		
Date Sampled:	2/12/2025	**Report No:**	WLG8398-121-R001
Sampler:	Client	**REF:**	#30002
Sampling Method:	Sampled by client – Sampling not accredited		
Sample Description:	silty SAND, grey moist		

Compaction used: New Zealand Standard Compaction Test performed on:
Whole sample

History: As received Percent retained on specified sieve: 0 %



Test Results			
Water Content (%)	Dry Density (t/m^3)	Shear Vane (kPa)*	
		Peak	Residual
10.3	1.657	-	-
15.0	1.702	-	-
17.0	1.724	-	-
19.9	1.703	-	-
22.0	1.646	-	-
24.6	1.580	-	-

Solid Density (t/m^3)	**2.68**	**Assumed**
Optimum Water Content (%)	**17**	
Max Dry Density (t/m^3)	**1.72**	
Natural Water Content (%)	**20**	

Sample unsuitable for shear vane readings due to sand content

Wellington Laboratory
47C Kenepuru Drive,
Porirua
s 9(2)(a)

TEST REPORT

Lab Job No: 8398-121

Your ref.: 30002

Date of Issue: ########

Date of Re-Issue: -

Test Report No. WLG8398-121-R002

PROJECT: **Simplicity Living - SComp, CBR**

CLIENT: ENGEO
24 Rees St, Queenstown 9300

ATTENTION: Grant Caldwell

TEST METHODS: Determination of the Dry density / water content relationship – New Zealand Standard Compaction
NZS 4402: 1986 Test 4.1.1
Determination of the California Bearing Ratio (CBR) (remoulded samples) (Not accredited)
NZS 4402: 1986 Test 6.1.1 (Not accredited)

SAMPLING METHOD Unknown

TEST RESULTS: As per attached sheets

G. Bromfield
Laboratory Manager

G. Bromfield
Approved Signatory

All results obtained in accordance with the test methods listed above.

Any material descriptions included in this report are excluded from IANZ endorsement.

Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Test results relate only to the sample tested.

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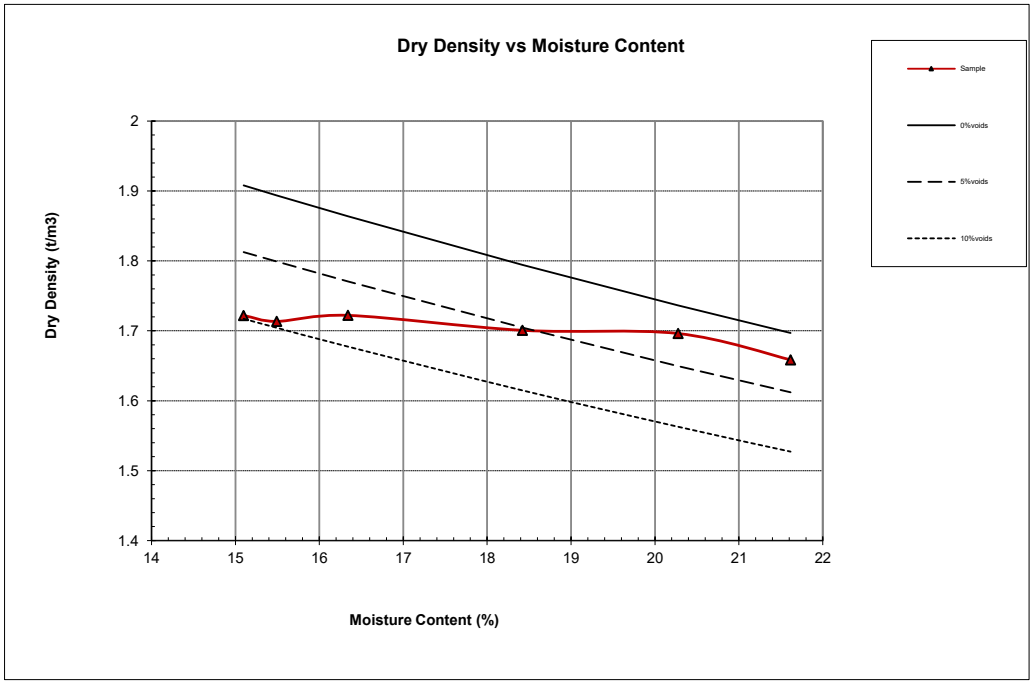
DETERMINATION OF DRY DENSITY/ WATER CONTENT RELATIONSHIP
NEW ZEALAND STANDARD COMPACTION

NZS 4402:1986 Test 4.1.1

Lab Job No:	8398-121	**Sample No.:**	WLG8398-121-S002
Client:	ENGEO	**Tested By:**	H.DG
Project/Site:	Simplicity Living	**Date:**	21/01/2026
Sample Location:	TP02	**Checked By:**	G.B
		Date:	9/02/2026
Date Received:	15/12/2025		
Date Sampled:	2/12/2025	**Report No:**	WLG8398-121-R002
Sampler:	Client	**REF:**	#30002
Sampling Method:	Sampled by client – Sampling not accredited		
Sample Description:	sandy Gravels, grey moist		

Compaction used: New Zealand Standard Compaction Test performed on:
Fraction Passing 19mm test sieve

History: As received Percent retained on specified sieve: 0 %



Test Results			
Water Content (%)	Dry Density (t/m^3)	Shear Vane (kPa)*	
		Peak	Residual
15.1	1.722	-	-
15.5	1.714	-	-
16.3	1.722	-	-
18.4	1.701	-	-
20.3	1.696	-	-
21.6	1.659	-	-

Solid Density (t/m^3)	**2.68**	**Assumed**
Optimum Water Content (%)	**16**	
Max Dry Density (t/m^3)	**1.72**	
Natural Water Content (%)	**20**	

Sample unsuitable for shear vane readings due to sand content

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Determination of the California Bearing Ratio

NZS 4407:2015 Test 3.15

Lab Job No: 8398-121
Client: ENGEO
Project/Site: Simplicity Living

Date Received: 15/12/2025
Date Sampled: 2/12/2025
Sampler: Client

Sampling Method: Sampled by client – Sampling not accredited

Sample Numbers: S002
Tested By: G.B
Date: 5/02/2026
Checked By: G.B
Date: 9/02/2026

Report No: WLG8398-121-R002
REF: #30002

Sample No	Sample Location / Description	Treatment	Bulk Density	Dry Density (t/m³)	Water Content		CBR (%)	Penetration (mm)	Swell (%)	Operator	Date tested	% Passing 19mm Sieve
					As Compacted (%)	After Curing(%)						
WLG8398-121-S002	TP02-sandy Gravels, grey moist	• -3.0% Water Removed by Mass	2.02	1.76	15.6	23.8	5	2.5 & 5.0	-11.0	G.B	5/02/2026	100

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47C Kenepuru Drive,
Porirua
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TEST REPORT

Lab Job No: 8398-121

Your ref.: 30002

Date of Issue: ########

Date of Re-Issue: -

Test Report No. WLG8398-121-R003

PROJECT: **Simplicity Living - PSDs**

CLIENT: ENGEO
24 Rees St, Queenstown 9300

ATTENTION: Grant Caldwell

TEST METHODS: Determination of the particle size distribution-wet sieving method
NZS 4402:1986 Test 2.8.1

SAMPLING METHOD Sampled by client – Sampling not accredited

TEST RESULTS: As per attached sheets

M. Morgan
Laboratory Technician

G. Bromfield
Approved Signatory

All results obtained in accordance with the test methods listed above.

Any material descriptions included in this report are excluded from IANZ endorsement.

Test results relate only to the sample tested.

ACCREDITED IANZ TESTING LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

Determination of fines content of soil

NZS 4402:1986 Test 2.8.1

Lab Job No: 8398-121
Client: ENGEO
Project/Site: Simplicity Living
Sample Location: HA12 0.9m

Date Received: 15/12/2025
Date Sampled: 2/12/2025
Sampler: Client
Sampling Method: Sampled by client – Sampling not accredited
Sample Description Silty SANDS

Test Details: Dry sieving method
History: Oven Dried

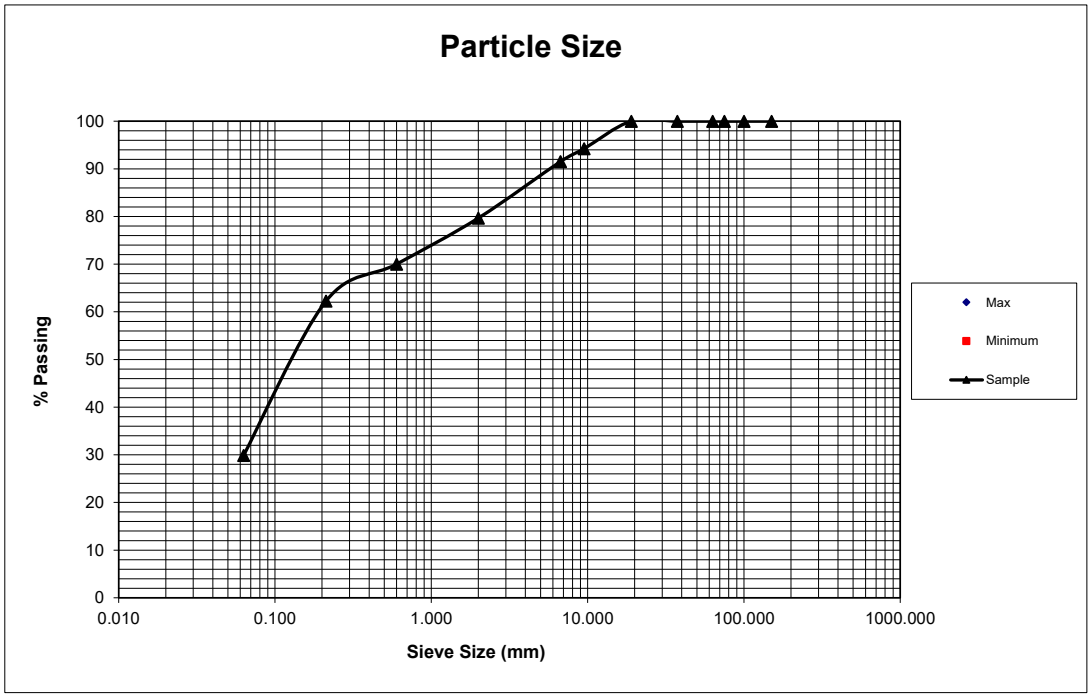
Sample No.: WLG8398-121-S003
Tested By: HDG
Date: 15/01/2026
Checked By: M.M
Date: 22/01/2026

Report No: WLG8398-121-R003
REF: #30002

	% Passing		
Sieve Size	**Max**	**Min**	**Sample**
150	-	-	100
100	-	-	100
75	-	-	100
63	-	-	100
37.5	-	-	100
19.0	-	-	100
9.5	-	-	94
6.7	-	-	92
2	-	-	80
0.6	-	-	70
0.212	-	-	62
0.063	-	-	30

Fraction	% Within Fraction
Cobbles	0
Coarse Gravel	0
Medium Gravel	8
Fine Gravel	12
Coarse Sand	10
Medium Sand	8
Fine Sand	32
Silt/Clay	30

Grading fractions in accordance with NZGS soil classification system



The percentage passing the finest sieve was obtained by difference

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DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

Determination of fines content of soil

NZS 4402:1986 Test 2.8.1

Lab Job No: 8398-121
Client: ENGEO
Project/Site: Simplicity Living
Sample Location: HA12 1.4m

Date Received: 15/12/2025
Date Sampled: 2/12/2025
Sampler: Client
Sampling Method: Sampled by client – Sampling not accredited
Sample Description Silty SANDS

Test Details: Dry sieving method
History: Oven Dried

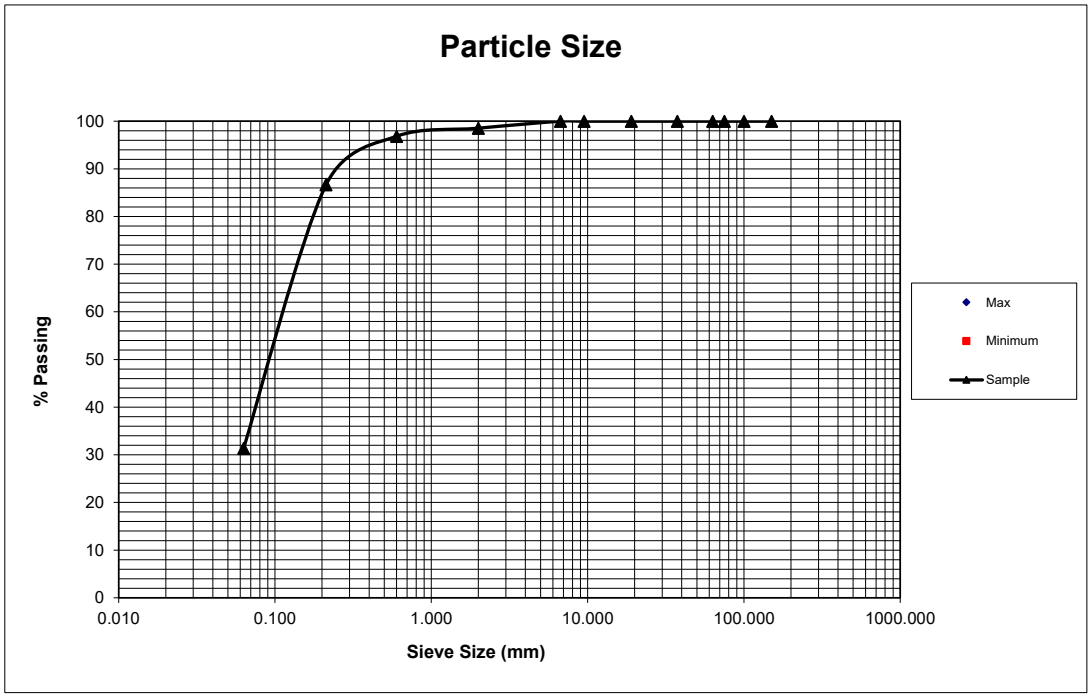
Sample No.: WLG8398-121-S004
Tested By: H.DG
Date: 20/01/2026
Checked By: M.M
Date: 22/01/2026

Report No: WLG8398-121-R003
REF: #30002

	% Passing		
Sieve Size	**Max**	**Min**	**Sample**
150	-	-	100
100	-	-	100
75	-	-	100
63	-	-	100
37.5	-	-	100
19.0	-	-	100
9.5	-	-	100
6.7	-	-	100
2	-	-	99
0.6	-	-	97
0.212	-	-	87
0.063	-	-	31

Fraction	% Within Fraction
Cobbles	0
Coarse Gravel	0
Medium Gravel	0
Fine Gravel	1
Coarse Sand	2
Medium Sand	10
Fine Sand	55
Silt/Clay	31

Grading fractions in accordance with NZGS soil classification system



The percentage passing the finest sieve was obtained by difference

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DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

Determination of fines content of soil

NZS 4402:1986 Test 2.8.1

Lab Job No: 8398-121
Client: ENGEO
Project/Site: Simplicity Living
Sample Location: HA16 0.6m

Date Received: 15/12/2025
Date Sampled: 2/12/2025
Sampler: Client
Sampling Method: Sampled by client – Sampling not accredited
Sample Description Silty SANDS

Test Details: Dry sieving method
History: Oven Dried

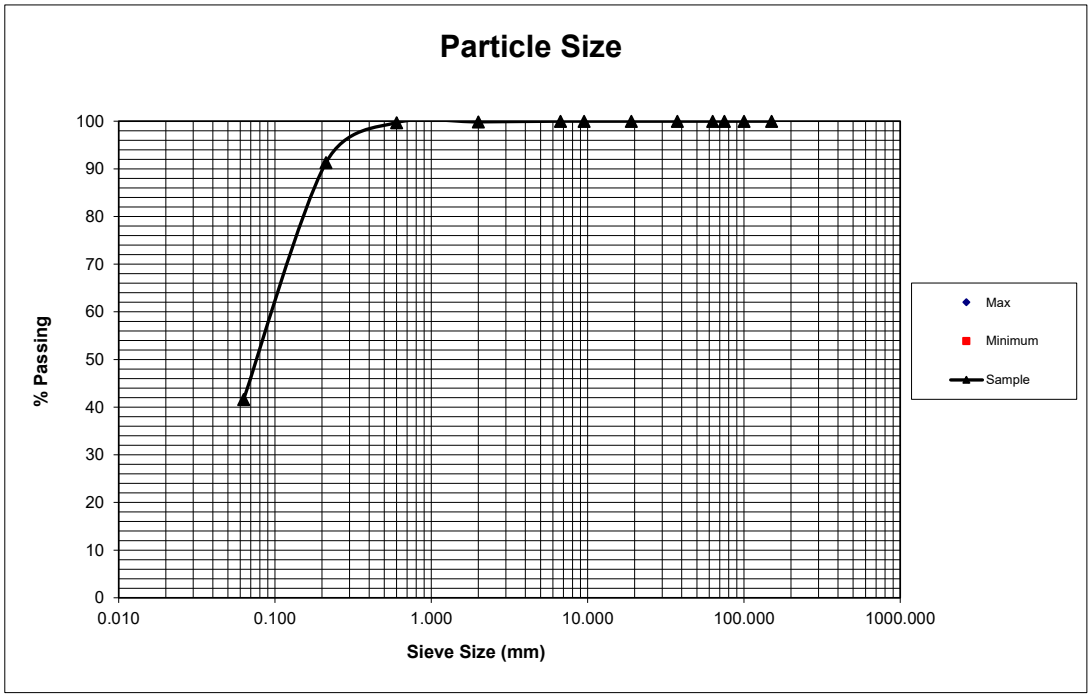
Sample No.: WLG8398-121-S005
Tested By: H.DG
Date: 20/01/2026
Checked By: M.M
Date: 22/01/2026

Report No: WLG8398-121-R003
REF: #30002

	% Passing		
Sieve Size	**Max**	**Min**	**Sample**
150	-	-	100
100	-	-	100
75	-	-	100
63	-	-	100
37.5	-	-	100
19.0	-	-	100
9.5	-	-	100
6.7	-	-	100
2	-	-	100
0.6	-	-	100
0.212	-	-	91
0.063	-	-	42

Fraction	% Within Fraction
Cobbles	0
Coarse Gravel	0
Medium Gravel	0
Fine Gravel	0
Coarse Sand	0
Medium Sand	8
Fine Sand	50
Silt/Clay	42

Grading fractions in accordance with NZGS soil classification system



The percentage passing the finest sieve was obtained by difference

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DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

Determination of fines content of soil

NZS 4402:1986 Test 2.8.1

Lab Job No: 8398-121
Client: ENGEO
Project/Site: Simplicity Living
Sample Location: HA16 2.4m

Date Received: 15/12/2025
Date Sampled: 2/12/2025
Sampler: Client
Sampling Method: Sampled by client – Sampling not accredited
Sample Description Silty SANDS

Test Details: Dry sieving method
History: Oven Dried

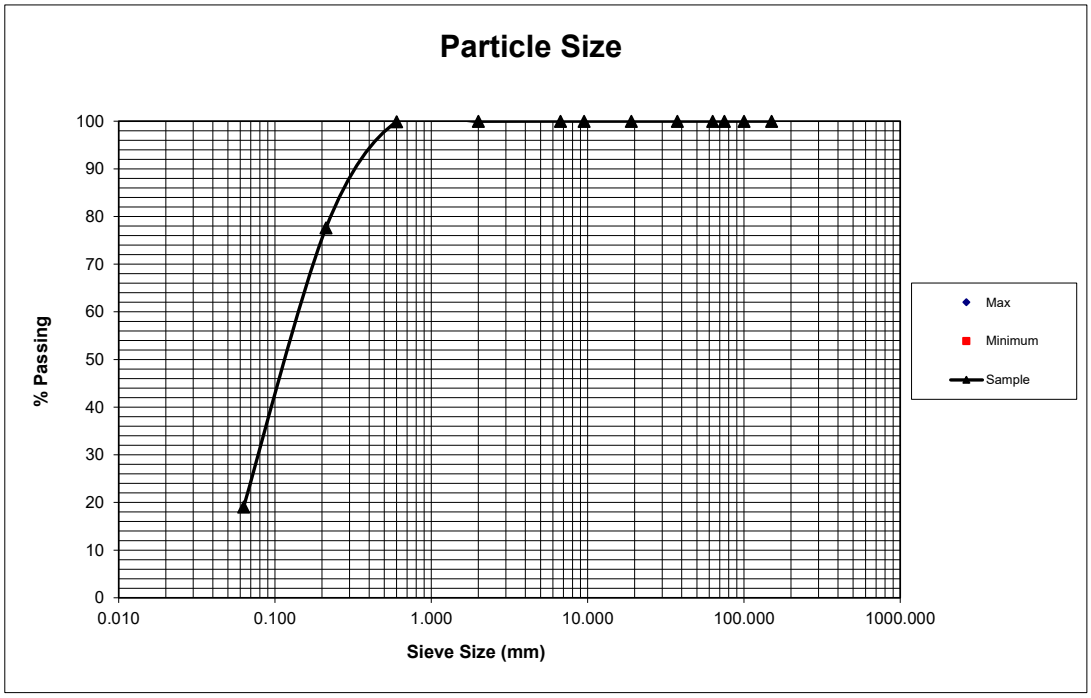
Sample No.: WLG8398-121-S006
Tested By: H.DG
Date: 20/01/2026
Checked By: M.M
Date: 22/01/2026

Report No: WLG8398-121-R003
REF: #30002

	% Passing		
Sieve Size	**Max**	**Min**	**Sample**
150	-	-	100
100	-	-	100
75	-	-	100
63	-	-	100
37.5	-	-	100
19.0	-	-	100
9.5	-	-	100
6.7	-	-	100
2	-	-	100
0.6	-	-	100
0.212	-	-	78
0.063	-	-	19

Fraction	% Within Fraction
Cobbles	0
Coarse Gravel	0
Medium Gravel	0
Fine Gravel	0
Coarse Sand	0
Medium Sand	22
Fine Sand	59
Silt/Clay	19

Grading fractions in accordance with NZGS soil classification system



The percentage passing the finest sieve was obtained by difference

Grading envelope taken from: -

Appendix 5:

Soakage Testing

Appendix B1.1 Worksheet 1: Falling Head (Variable Head) Percolation Test (pg. 1/2)

ENGEO Ltd

24 Rees Street, Queenstown 9300

Project Number: 30002.000.001 Date: 20/02/2026 Time: 12:35:00 PM

Site Address: 12 Lower Shotover Rd

Test Pit #: SL-ENG26-SP07 Test #: 2 of total 2 tests Test by: BH

Position x: Position y: mRL:

Other boreholes within influence distance (test simultaneously):

1. Attach the following (tick once attached)

√	Log of hole showing depth, rock typoe & moisture
√	Graph of Water Level against Time
√	Site Plan Showing location of hole(s)

2. General Information

Depth of Test Pit, **H**: 2.4 m

Equiv Diameter **D** = 2a / sqrt(pi) 0.35 m

Pre-test GW level : - m (bpgl)

Test Pit Dimensions

Width of Base, **W**: 0.7 m

Length of Base, **L**: 1.2 m

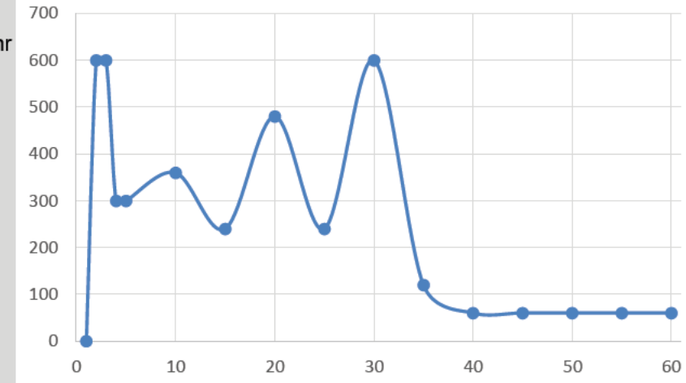
3. Test Log

Minutes	Interval (x; min)	Water depth (m bpgl) Start of interval	Water depth (m bpgl) End of Interval	Level Drop Over interval (y; m)	Interval Gradient (y/x)	mm/hr	Notes
0	0	1.5	1.500	0	0.00		
1	1	1.50	1.500	0.000	0.0000	0	
2	1	1.5	1.510	0.010	0.0100	600	
3	1	1.51	1.520	0.010	0.0100	600	
4	1	1.52	1.53	0.005	0.0050	300	
5	1	1.525	1.53	0.005	0.0050	300	
10	5	1.53	1.56	0.030	0.0060	360	
15	5	1.56	1.58	0.020	0.0040	240	
20	5	1.58	1.62	0.040	0.0080	480	
25	5	1.62	1.64	0.020	0.0040	240	
30	5	1.64	1.69	0.050	0.0100	600	
35	5	1.69	1.7	0.010	0.0020	120	
40	5	1.7	1.705	0.005	0.0010	60	
45	5	1.705	1.71	0.005	0.0010	60	
50	5	1.71	1.715	0.005	0.0010	60	
55	5	1.715	1.72	0.005	0.0010	60	
60	5	1.72	1.725	0.005	0.0010	60	

0.84

Input for Sheet 2 (Doesn't print)		
Time Step:	40	Minutes
Minimum Gradient:	0.0010	x/y (m/min)
WL End Depth:	1.705	m bpgl
WL 2nd last depth:	1.7	m bpgl
Minimum Soakage	60.0	mm/hr

mm/hr



Appendix B1.2 Worksheet 2: Soil Constant Head Percolation Test (pg. 2/2)

ENGEO Ltd
24 Rees Street, Queenstown 9300

Project Number: 30002.000.001 Date: 20/02/2026 Time: 8:56:00 AM
Site Address: 12 Lower Shotover Rd
Borehole #: SL-ENG26-SP06 Test #: 1 of total 1 tests Test by: BH

1. Final capacity of borehole in soil

Capacity of Bore [2] $= p_2 = Flowrate =$ 0.38 L/s

2. Percolation rate

Soakage surface = *soakpit base area + soakpit wall area*
$= (\pi \times D^2) + (H - W) \times \pi \times D$ = 2.72 m^2

Percolation rate $= P(total) = \frac{(p_2 \times 60^2)}{soakage\ surface}$ = 503.53 L/hr/m²

FoS for consequence of failure [3] $= F_{(c)}$ = 1

FoS for testing uncertainty [4] $= F_{(u)}$ = 1.5

Total Factor of Safety $F_{(total)} = F_{(c)} \times F_{(u)}$ = 1.5

Factored Percolation Rate $P_{(factored)} = \frac{P}{F_{(total)}}$ = **335.68 L/hr/m²**

General comments (indications of waterlogging, soil structure, biological pores, etc.):

Name of Test Operator:

Qualification:

Signature

Date:

Notes: [1] m bpgl = metres below present ground level
[2] Measured at the end of test using a 31 L container, once the the water level remained consitent over at least the last three measurements.
[3] See Section B.4.0 Table 5 for factors of safety.
[4] See Section B.4.0 Table 6 for factors of safety.

F(c) (GD07 B.4.0 Table 5 - Doesn't print)
Suggested partial factor of safety (F(c)) for consequences of failure

Device Type	Consequence Level			
	1	2	3	4
Soakpit	1.0	1.5	2.5	5.0
GW Recharge Pit	1.0	1.0	Not Acceptable	Not Acceptable
Rockbore	1.0	1.5	2.5	5.0

Consequence Level 1: The secondary flow path complies with the Stormwater Code of Practice and all of the following apply:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 2: The secondary flow path complies with the Stormwater Code of Practice and one or more of the following applies:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 3: The secondary flow path does not meet the Stormwater Code of Practice but will only cause minor damage to external areas, or non-habitable floor flooding (e.g., surface water on car parking), and one or more of the below points applies:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 4: Any other scenario, including all situations where the secondary flow path is l ikely to cause damage to buildings or structures, or major flooding of roads.

F(u) (GD07 B.4.0 Table 6 - Doesn't print)
Suggested partial factor of safety (F(u)) for uncertainty in input data

Device Type	Quality Level			
	1	2	3	4
Falling Head Test in soil	1.2	1.4	1.8	2.4
Constant Head Test in soil	1.0	1.2	1.5	2.0
Rockbore Test	1.0	1.2	1.5	2.0

Quality Level 1: All of the following apply:
> Test undertaken at the location and depth of the proposed device
> Test undertaken at a time when groundwater is at an annual high. For rock bores, this must be after heavy rain at a time when the rainfall-induced groundwater level peak is likely to be present
> Groundwater monitoring with a duration of over 12 months and measurements taken in winter and summer is available within 100 m of the proposed device. For rockbore tests, this must include monitoring at short intervals (1 hour or less) to identify short-term response to heavy rainfall.

Quality Level 2: All of the following apply:
> Test undertaken at the location and depth of the proposed device
> Test undertaken at a time when groundwater is likely to be at an annual high. For rock bores, this must be after heavy rain at a time when the rainfall-induced groundwater level peak is likely to be present.

Quality Level 3: One of the following apply:
> Test undertaken at the location and depth of the proposed device, but at a time of year when the groundwater may be lower than the seasonal high
> Test undertaken at a time when groundwater is likely to be at an annual high, but not at the exact device location. For this to apply, the test must be in a location where the geological and hydrogeological conditions are expected to be the same as the actual proposed device location, and no more than 10 m (horizontally) and 1 m (vertically) from the actual proposed device location.

Quality Level 4: Any other scenario. The designer will still have to demonstrate that the testing is representative of the proposed device location.

Appendix B1.1 Worksheet 1: Falling Head (Variable Head) Percolation Test (pg. 2/2)

ENGEO Ltd
24 Rees Street, Queenstown 9300

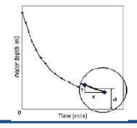
Project Number: 30002.000.001 Date: 20/02/2026 Time: 12:35:00 PM
Site Address: 12 Lower Shotover Rd
Borehole #: SL-ENG26-SP07 Test #: 2 of total 2 tests Test by: BH

1. Minimum Gradient [1]

Minimum Gradient [2] = $\frac{y}{x}$

= 0.0010 m/min

d = 1.71 m



2. Percolation Rate

Percolation Rate [3] = $P_{(total)} = \frac{D \times \text{gradient} \times 1000}{4 \times d}$ = 9.9 L/hr/m²

Soakage Rate [3b] = min. $\frac{\delta \text{ Depth}}{\delta \text{ Time}}$ = 60.0 mm/hr

FoS for consequence of failure [4] = $F_{(c)}$ = 1 Consequence Level: 1

FoS for testing uncertainty [5] = $F_{(u)}$ = 1.5 Quality Level: 3

Total Factor of Safety $F_{(total)} = F_{(c)} \times F_{(u)}$ = 1.5

Factored Percolation Rate $P_{(factored)} = \frac{P_{(total)}}{F_{(total)}}$ = **6.6 L/hr/m2**

Factored soakage Rate $P_{(factored)} = \frac{P_{(total)}}{F_{(total)}}$ = **40.0 mm/hr**

Additional Comments:
No methodology for testing in mechanical excated test pit available from E1/VM1 of the NZBC.
Test methodology taken from the New Zealand Ground Investigation Specification (Auckland Council, 2017; Volume 1, Part 12.11 for testing at the base of a mechanically excavated test pit.
Factors of Safety (FoS) after GD007 (Auckland Council, 2021) and applied equally to calculation methodologies under both GD007 & E1/VM1.

General comments (indications of waterlogging, soil structure, biological pores, etc.):

After test pit / soakage test was completed, it was observed that the gravels had been covered in silt material, likely during filling the pit with water. Inferred that this affected the soakage rate of the test.

Notes: [1] m bpgl = metres below present ground level
[2] lowest gradient is required. This will normally be the last two points. If the rate of change during the test has not stabilised for at least the last three measurements, then the test shall be repeated
[3] d = distance in m between the midpoint of the last two readings and the base of the borehole
[3b] Calcualted in accordance with NZBC E1/VM1
[4] See Section B.4.0 Table 5 for factors of safety.
[5] See Section B.4.0 Table 6 for factors of safety.

F(c) (GD07 B.4.0 Table 5 - Doesn't print)
Suggested partial factor of safety (F(c)) for consequences of failure

Device Type	Consequence Level			
	Consequence Level			
	1	2	3	4
Soakpit	1.0	1.5	2.5	5.0
GW Recharge Pit	1.0	1.0	Not Acceptable	Not Acceptable
Rockbore	1.0	1.5	2.5	5.0

Consequence Level 1: The secondary flow path complies with the Stormwater Code of Practice and all of the following apply:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 2: The secondary flow path complies with the Stormwater Code of Practice and one or more of the following applies:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 3: The secondary flow path does not meet the Stormwater Code of Practice but will only cause minor damage to external areas, or non-habitable floor flooding (e.g., surface water on car parking), and one or more of the below points applies:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 4: Any other scenario, including all situations where the secondary flow path is likely to cause damage to buildings or structures, or major flooding of roads.

F(u) (GD07 B.4.0 Table 6 - Doesn't print)
Suggested partial factor of safety (F(u)) for uncertainty in input data

Device Type	Quality Level			
	Quality Level			
	1	2	3	4
Falling Head Test in soil	1.2	1.4	1.8	2.4
Constant Head Test in soil	1.0	1.2	1.5	2.0
Rockbore Test	1.0	1.2	1.5	2.0

Quality Level 1: All of the following apply:
> Test undertaken at the location and depth of the proposed device
> Test undertaken at a time when groundwater is at an annual high. For rock bores, this must be after heavy rain at a time when the rainfall-induced groundwater level peak is likely to be present
> Groundwater monitoring with a duration of over 12 months and measurements taken in winter and summer is available within 100 m of the proposed device. For rockbore tests, this must include monitoring at short intervals (1 hour or less) to identify short-term response to heavy rainfall.

Quality Level 2: All of the following apply:
> Test undertaken at the location and depth of the proposed device
> Test undertaken at a time when groundwater is likely to be at an annual high. For rock bores, this must be after heavy rain at a time when the rainfall-induced groundwater level peak is likely to be present.

Quality Level 3: One of the following apply:
> Test undertaken at the location and depth of the proposed device, but at a time of year when the groundwater may be lower than the seasonal high
> Test undertaken at a time when groundwater is likely to be at an annual high, but not at the exact device location. For this to apply, the test must be in a location where the geological and hydrogeological conditions are expected to be the same as the actual proposed device location, and no more than 10 m (horizontally) and 1 m (vertically) from the actual proposed device location.

Quality Level 4: Any other scenario. The designer will still have to demonstrate that the testing is representative of the proposed device location.

Appendix B1.2 Worksheet 2: Soil Constant Head Percolation Test (pg. 1/2)

ENGEO Ltd
24 Rees Street, Queenstown 9300

Project Number: 30002.000.001 Date: 20/02/2026 Time: 8:56:00 AM
Site Address: 12 Lower Shotover Rd
Test Pit #: SL-ENG26-SP08 Test #: 1 of total 1 tests Test by: BH
Position x: Position y: mRL:
Other boreholes within influence distance (test simultaneously):

soil moisture drop down
Wet
Moist
Dry

1. Attach the following (tick once attached)

√	Log of hole showing depth, rock type & moisture
√	Site Plan Showing location of hole(s)

2. General Information

Depth of test pit, **H**: 3.0 m
Equivalent Diameter, **D**: 0.8 m
Pre-test GW level : dry m (bpgl)
Water depth during test, **W**: 2.80 m (bpgl)

Vegetation at test site: Grass Field
Soil condition at time of excavation: Moist

Test Pit Dimensions
Width of Base, **W**: 0.7 m
Length of Base, **L**: 0.7 m

Reservoir volume per mm height (**Vmm**):
= π × (D/2)^2 n/a L/mm

3. Test Log (continue test until flow rate is stable to ±10% over three time intervals

Time	Interval (min)	Water Level at interval start (mm)	Change in Level during interval ΔL (mm)	Volume (litres)	Time (s)	Flow rate = V/s (L/s)
8:56:00 AM	0	50				
9:03:00 AM	7	80	30.0			
9:12:00 AM	9	120	40.0			
9:20:00 AM	8	200	80.0			
9:30:00 AM	10	200	0.0			
9:36:00 AM	6	200	0.0			
				31.0	81.0	0.38

10:06:00 am 10:06:00 AM
10:12:00 am 12:06:00 AM
10:20:00 am 12:08:00 AM
10:26:00 am 12:06:00 AM
10:36:00 am 12:10:00 AM
10:46:00 am 12:10:00 AM

We Should have a rate recorded at each time step

Appendix B1.2 Worksheet 2: Soil Constant Head Percolation Test (pg. 2/2)

ENGEO Ltd
24 Rees Street, Queenstown 9300

Project Number: 30002.000.001 Date: 20/02/2026 Time: 8:56:00 AM
Site Address: 12 Lower Shotover Rd
Borehole #: SL-ENG26-SP08 Test #: 1 of total 1 tests Test by: BH

1. Final capacity of borehole in soil

Capacity of Bore [2] = p_2 = *Flowrate* = 0.38 L/s

2. Percolation rate

Soakage surface = *soakpit base area + soakpit wall area*
= $(\pi \times D^2) + (H - W) \times \pi \times D$ = 2.46 m^2

Percolation rate = $P(total) = \frac{(p_2 \times 60^2)}{soakage\ surface}$ = 556.94 L/hr/m²

FoS for consequence of failure [3] = $F_{(c)}$ = 1

FoS for testing uncertainty [4] = $F_{(u)}$ = 1.5

Total Factor of Safety $F_{(total)} = F_{(c)} \times F_{(u)}$ = 1.5

Factored Percolation Rate $P_{(factored)} = \frac{P}{F_{(total)}}$ = **371.29 L/hr/m²**

General comments (indications of waterlogging, soil structure, biological pores, etc.):

Name of Test Operator:

Qualification:

Signature

Date:

Notes: [1] m bpgl = metres below present ground level
[2] Measured at the end of test using a 31 L container, once the the water level remained consitent over at least the last three measurements.
[3] See Section B.4.0 Table 5 for factors of safety.
[4] See Section B.4.0 Table 6 for factors of safety.

F(c) (GD07 B.4.0 Table 5 - Doesn't print)
Suggested partial factor of safety (F(c)) for consequences of failure

Device Type	Consequence Level			
	1	2	3	4
Soakpit	1.0	1.5	2.5	5.0
GW Recharge Pit	1.0	1.0	Not Acceptable	Not Acceptable
Rockbore	1.0	1.5	2.5	5.0

Consequence Level 1: The secondary flow path complies with the Stormwater Code of Practice and all of the following apply:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 2: The secondary flow path complies with the Stormwater Code of Practice and one or more of the following applies:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 3: The secondary flow path does not meet the Stormwater Code of Practice but will only cause minor damage to external areas, or non-habitable floor flooding (e.g., surface water on car parking), and one or more of the below points applies:
> Pre-treatment will be present
> Access for maintenance will be easy, frequency of maintenance will be high, and a maintenance plan will be implemented.

Consequence Level 4: Any other scenario, including all situations where the secondary flow path is likely to cause damage to buildings or structures, or major flooding of roads.

F(u) (GD07 B.4.0 Table 6 - Doesn't print)
Suggested partial factor of safety (F(u)) for uncertainty in input data

Device Type	Quality Level			
	1	2	3	4
Falling Head Test in soil	1.2	1.4	1.8	2.4
Constant Head Test in soil	1.0	1.2	1.5	2.0
Rockbore Test	1.0	1.2	1.5	2.0

Quality Level 1: All of the following apply:
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> Groundwater monitoring with a duration of over 12 months and measurements taken in winter and summer is available within 100 m of the proposed device. For rockbore tests, this must include monitoring at short intervals (1 hour or less) to identify short-term response to heavy rainfall.

Quality Level 2: All of the following apply:
> Test undertaken at the location and depth of the proposed device
> Test undertaken at a time when groundwater is likely to be at an annual high. For rock bores, this must be after heavy rain at a time when the rainfall-induced groundwater level peak is likely to be present.

Quality Level 3: One of the following apply:
> Test undertaken at the location and depth of the proposed device, but at a time of year when the groundwater may be lower than the seasonal high
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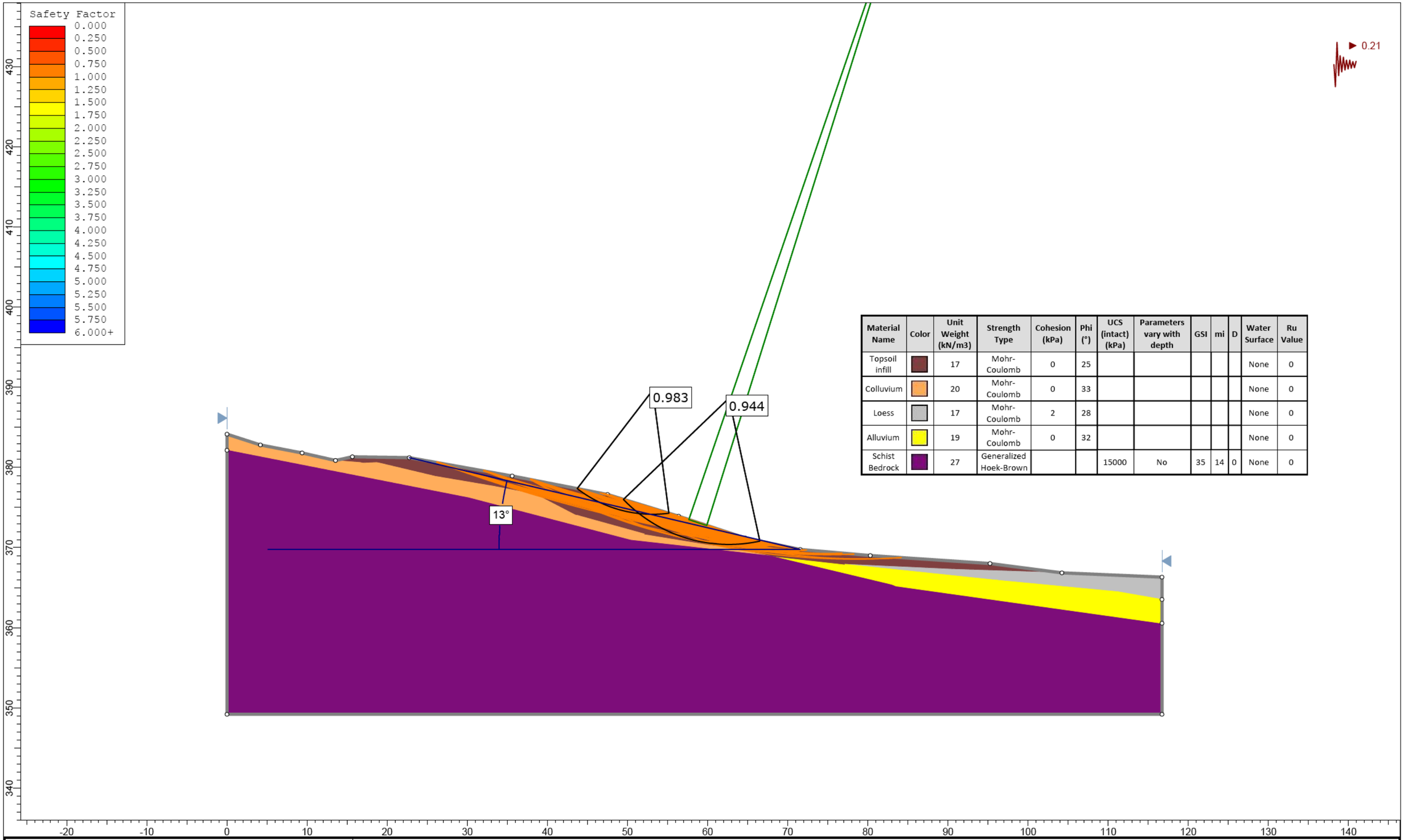
Quality Level 4: Any other scenario. The designer will still have to demonstrate that the testing is representative of the proposed device location.

Appendix 6:

Slide Model



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	UCS (intact) (kPa)	Parameters vary with depth	GSI	mi	D	Water Surface	Ru Value
Topsoil infill		17	Mohr-Coulomb	0	25						None	0
Colluvium		20	Mohr-Coulomb	0	33						None	0
Loess		17	Mohr-Coulomb	2	28						None	0
Alluvium		19	Mohr-Coulomb	0	32						None	0
Schist Bedrock		27	Generalized Hoek-Brown			15000	No	35	14	0	None	0

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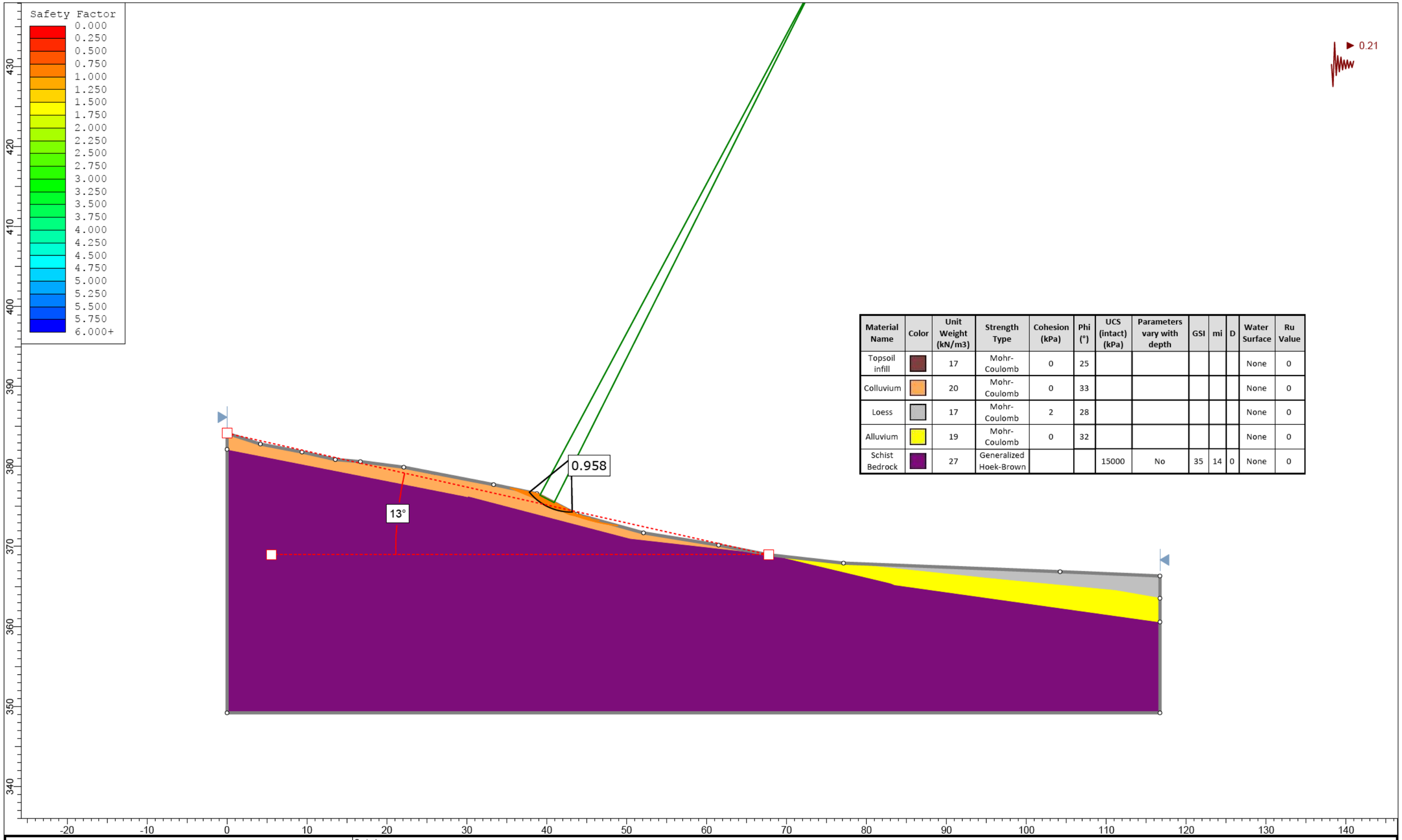
SLIDEINTERPRET 9.038

Project	Post Earthworks Construction - ULS 0.21g
Analysis Description	, Master Scenario
Drawn By	*Client*
Date	9/03/2026, 3:48:14 pm
File Name	Slide_model.slmd



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Colluvium		20	Mohr-Coulomb	0	33						None	0
Loess		17	Mohr-Coulomb	2	28						None	0
Alluvium		19	Mohr-Coulomb	0	32						None	0
Schist Bedrock		27	Generalized Hoek-Brown			15000	No	35	14	0	None	0

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SLIDEINTERPRET 9.038

Project	Pre Earthworks Construction - ULS 0.21g
Analysis Description	, Master Scenario
Drawn By	*Client*
Date	9/03/2026, 3:48:14 pm
File Name	Slide_model.slmd