APPENDIX Q: GEOTECHNICAL ASSESSMENT

374 & 376 Springs Road, Halswell, Christchurch

Geotechnical Assessment Report

for: Puna Property Holdings Limited & Foddercube Products (Nth. Canty.) Limited.



Job No: 67592#CHGE

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Prepared by	
	Daniel Pickering
	BAppSci (Envi), BSc(Hons) (Geology) Geotechnical Engineer
Reviewer(s)	
	Scott McHardy
	BEng (Hons), CPEng, CMEngNZ, IntPE(NZ) Senior Geotechnical Engineer

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0	2/12/2025	Final	Daniel Pickering	Scott McHardy
1	23/07/2026	Updated client details	Kristen Fry	Scott McHardy

Reference: 374 & 376 Springs Road, Halswell, Christchurch Geotechnical Assessment Report.

A report prepared for Puna Property Holdings Limited & Foddercube Products (Nth. Canty.) Limited. by Babbage Consultants. July 2026.

TABLE OF CONTENTS

Document Approval and Revision History i
Table of Contents ii
1 Introduction 1
2 Site Description 1
2.1 Location 1
2.2 Land Categorisation 2
3 Background Information 2
3.1 Geological and Hydrogeological Setting 2
3.2 Geographical Setting 2
4 Geotechnical Investigation 3
4.1 Methodology 3
4.2 Investigation Findings 3
4.3 Design Soil Profile and Soil Parameters 4
5 Hazard Assessment 5
5.1 Flood Risk 5
5.2 Active Faults 5
5.3 Liquefaction Potential 5
6 Discussion and Recommendations 6
6.1 Bearing Capacity 6
6.2 Static Settlement 6
6.3 Foundations Considerations 6
6.4 Earthworks 7
6.5 External Paved Areas 7
6.6 General Considerations 8
6.7 Further Geotechnical Testing 8
Applicability and Limitations 9
References 1

List of Appendices

Appendix A Site Location Plan
Appendix B Geotechnical Investigation Plan
Appendix C Geotechnical Investigation Logs

1 INTRODUCTION

Babbage Consultants Limited (Babbage) has been engaged by Puna Property Holdings Limited & Foddercube Products (Nth. Canty.) Limited ("the client") to undertake a geotechnical assessment of a site across three adjacent lots 374 and 376 Springs Road, Halswell (Secs 4,6 SO 550060). There are no preliminary plans for the proposed building locations and therefore a general investigation was undertaken to provide reasonable coverage of the site.

This report is based on the scope of works summarised in Table 1.

Table 1 - Scope of geotechnical investigation and assessment

Desktop study of public and provided information	• Information available on the New Zealand Geotechnical Database (NZGD) • GNS Science Active Fault Database • Institute of Geological and Nuclear Sciences (GNS) Geological Maps (QMAP) • Christchurch City Council (CCC) records, reports, maps and other information
Site-specific fieldwork investigation	• Site specific investigations comprising hand auger and test pits with Scala penetrometer testing
Geotechnical assessment	• Assessment of the variation of ground conditions beneath the site and description of soil types encountered • An assessment of ground related natural hazards • Any relevant geotechnical hazards and foundation design considerations • Selection of geotechnical parameters for the purposes of foundation design • Discussion and recommendations regarding foundations, soil bearing capacities, and site subsoil class

2 SITE DESCRIPTION

2.1 Location

A site location plan is included in Appendix A, and has a total area of approximately 12.45 hectares.

The site comprises a largely open paddock with a garden centre and nursery to the south-west and is accessed off Springs Road. Historical imagery from Canterbury Maps indicates the site was undeveloped, being large open fields since 1940, with the removal of a shelter belt that crossed the site by 1964. The garden centre along Springs road was progressively developed since 1994 though to 2010 and has remained fairly consistent since.

There are no minor or major waterways within 1.0 km of the site, however an open drain is noted along Springs Road.

2.2 Land Categorisation

The area in which the property is located is designated as “Rural and unmapped” and does not therefore have an MBIE Technical Category for the purposes of foundation selection for residential properties.

The Liquefaction Vulnerability Map available on Canterbury Maps classifies the site as being in an area where ‘Liquefaction Damage is Unlikely’.

3 BACKGROUND INFORMATION

3.1 Geological and Hydrogeological Setting

The GNS 1:250,000 Geological Map of New Zealand QMAP describes the natural deposits as geological unit Q1, “Holocene river deposits” comprising, “Modern river floodplain/low-level degradation terrace. Unweathered, variably sorted gravel/sand/silt/clay”.

Babbage has previously undertaken an investigation on a property to the north during a previous stage of the project in August 2024. This investigation found topsoil overlying layers of firm to stiff silt and medium dense sand, with dense to very dense sandy gravels encountered between 0.8 m and 1.5 m depth.

The nearest geotechnical investigation data available on the New Zealand Geotechnical Database (NZGD) is a series of hand augers located to the south-east, associated with a roading upgrade. Investigation NZGD:ID 150450 encountered topsoil to 0.2 m, overlaying interbedded silt and sandy silt to 2.85 m, where the test encountered refusal on assumed gravel.

The nearest Environment Canterbury Well record, located at the southern end of property, along Marshes Road (M36/4471) shows sand to a depth of 3.5 m, with sandy gravels to at least 21.0 m depth. An initial groundwater depth was encountered at 6.80 m below ground level. Borehole M36/7336 is a well located 280 m west of the site, and has a recent recorded groundwater depth of 8.92 m.

3.2 Geographical Setting

Black Maps, 1856 are historical maps of the area, these maps indicate that the site location and surrounding area at that time was “Herbaceous (fern/grass/herbs)” but predominantly grass. There does not appear to be (or have been) geographical features onsite or features nearby that would pose a geotechnical constraint.

4 GEOTECHNICAL INVESTIGATION

4.1 Methodology

A site walkover and geotechnical investigation was undertaken on 5th – 7th November 2025. The fieldwork comprised 22 hand augers and 3 excavated test pits, generally with accompanying Scala penetrometer tests. All the investigation locations were logged by an experienced Engineering Geologist from Babbage Consultants.

The investigation locations were selected to provide good general coverage of the site, with target depths of hand augers ranging between 1.0 m and 3.0 m. The test pits were taken to depths of between 1.0 m and 2.0 m bgl.

The approximate location of the exploratory holes is shown on the Geotechnical Investigation Plan included in Appendix B.

4.2 Investigation Findings

Ground conditions were found to be relatively consistent across the site, with the exception of HA07 which encountered shallow gravel at 0. 7 m depth.

The investigation found topsoil/gravel fill that was generally 0.3 m thick, but up 0.45 m in localised areas, which overlays interbedded firm silt and loose to medium dense sand to at least 3.0 m bgl. While the gravel was generally not encountered during the investigation, based on nearby NZGD records and historical well logs medium dense to dense gravel is anticipated at approximately 3.5 m depth and extend to some depth beneath the site (at least 20 m and likely considerably more).

Testing within the garden centre (HA23, HA24, and HA25) encountered gravel fill over buried topsoil to depths between 0.30 and 0.45 m.

Saturated soils were encountered at five locations between 2.7 m and 2.9 m and was absent in the remainder of the testing. It is unknown if the saturated soils are associated with a low permeability layer or the ground water. Groundwater monitoring within ECAN wells suggest long-term groundwater depth of approximately 9 m below ground level.

The ground conditions identified from the investigations are summarised in Table 2 below.

Table 2: Summary of encountered ground conditions

Soil Type	Approximate Depth to Base of Stratum (m)												
	HA01	**HA02**	**HA03**	**HA04**	**HA05**	**HA06**	**HA07**	**HA08**	**HA09**	**HA10**	**HA11**	**HA12**	**HA13**
Topsoil/fill	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.25	0.2
Interbedded sand and silt mixtures	0.8^	3.0*	3.0*	3.0*	1.0*	3.0*	1.0*	3.0*	3.0*	3.0*	1.0*	3.0*	1.0*
Saturated soil	-	-	-	-	-	2.7	-	-	-	2.9	-	-	-
	HA14	**HA15**	**HA16**	**HA17**	**HA18**	**HA19**	**HA20**	**HA21 (TP)**	**HA22 (TP)**	**HA23 (TP)**	**HA24**	**HA25**	
Topsoil/fill	0.2	0.2	0.3	0.25	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.45	
Interbedded sand and silt mixtures	3.0*	3.0*	3.0*	3.0*	1.0*	3.0*	3.0*	1.0*	2.0*	1.0*	3.0*	1.0*	
Saturated soil	-	-	-	2.8	--	2.8	2.9	-	-	-	-	-	-

^ Refusal on assumed gravel

*Target depth

A detailed description of the soil profiles encountered at the test locations can be found in the investigation logs in Appendix C. The descriptive terms used are in general accordance with the NZ Geotechnical Society's "Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes" December 2005.

4.3 Design Soil Profile and Soil Parameters

A summary of the soil profile and their design parameters are presented in Table 3.

Table 3 - Generalised soil profile and estimated parameters

Soil Unit	Description	Depth to the base of the stratum (m)	Unit Weight, γ, (kN/m³)	Internal Friction Angle, ϕ′, (°)	Effective Cohesion c′ (kPa)	Undrained shear strength (kPa)	Elastic Modulus, E (MPa)
1	Topsoil	0.3	16.0	-	-	-	-
2	Interbedded Silt firm, or loose sand	3.5	16.5	28	2	40	5
8	Sandy gravel, medium dense to dense	>20	19.0	38	0	-	20

5 HAZARD ASSESSMENT

5.1 Flood Risk

The Christchurch City Council (CCC) Floor Level Viewer bases floor level information on the most recent assessment of flood modelling results. The site does not currently lie within the District Plan Flood Management Area; however, flooding extents for 10-year return period and above are present within the site, particularly across the north-west and south-east corners of the site.

As the Floor Level Viewer indicates that predicted flood levels for 1 in 10-year, 1 in 50-year, and 1 in 200-year events have not been assessed, it is recommended that CCC be contacted to obtain the necessary guidance prior to building consent application.

5.2 Active Faults

Based on the GNS Active Fault Database, there are no nearby faults affecting the site. The nearest active fault is the Greendale Fault, located 12km to the northwest and the site is not within the Greendale Fault avoidance zone.

5.3 Liquefaction Potential

Canterbury Maps presents information about the liquefaction susceptibility in eastern Canterbury. This information has been drawn from many sources following the Canterbury Earthquake Sequence (CES) and then gathered together in one place for ease of access.

The Vulnerability Map tool shows how liquefaction vulnerability varies across Christchurch as well as describing the likelihood and severity of ground damage, and the reliability of the known ground conditions. The site is mapped within an area where “Liquefaction damage is unlikely”.

The shallow soil profile consists of silt and sand overlying sandy gravels which are anticipated to be present from 3.5 m (based on the nearby machine borehole and NZGD testing). The sandy gravel is not considered to be liquefiable as this soil type is generally too dense to liquefy.

Saturated soil was encountered as shallow as 2.8 m, with competent gravel soils anticipated from 3.5 m depth extending to at least 20m depth (and likely deeper). Consequently, the risk of liquefaction at the site is considered to be low.

There was no evidence of liquefaction at the site from aerial and satellite imagery or site visit data (Canterbury Maps) following the September 2010 and February 2011 earthquakes [the two largest at this location in the Canterbury Earthquake Sequence (CES)].

6 DISCUSSION AND RECOMMENDATIONS

6.1 Bearing Capacity

The shallow soils comprise topsoil that range in thickness between 0.3 m and 0.45 m, with firm silt below. Considering the above, the natural non-organic soils below the topsoil/fill is anticipated to achieve a geotechnical ultimate bearing capacity (GUBC) of 200 kPa.

Should localised organic soil, buried topsoil, non-engineered fill or soft soils (below the anticipated GUBC) be identified below the building platform, localised over-excavation and reinstatement with engineered fill may be required.

A strength reduction factor of 0.5 shall be applied to the above GUBC value in combination with imposed factored static loads, and a strength reduction factor of 0.8 for seismic overstrength load combinations.

6.2 Static Settlement

Given the generally firm nature of the natural non-organic soils immediately below the topsoil/fill, and provided that future structures are designed using the above geotechnical ultimate bearing capacities and on an approved bearing strata, the risk of significant static settlement is considered low. However, it is recommended that further assessment of static settlement is undertaken if the ground is raised by more than 400 mm.

6.3 Foundations Considerations

Geotechnical assessment indicates that the site is underlain by natural soils comprising topsoil over sandy silts and silty sands. The medium dense to dense sandy gravel was only encountered at one location (HA07) at 0.7 m depth and is anticipated to be at a depth of 3.5 m bgl across the remainder of the site.

Conventional strip and pad footings can be used for proposed buildings, founded within the natural sand and silt encountered beneath the topsoil/fill, which was generally 0.3 m thick, and up to 0.45 m (bgl).

As the nature of the development is yet to be determined (at the time of writing), the following is a generic assessment for the purposes of preliminary evaluation.

It is recommended that:

- A geotechnical ultimate bearing capacity (GUBC) be assumed as 200kPa for strip footings and isolated pad footings that are founded within the natural soils.
- In general, a ground bearing slab can be adopted and placed on the natural material beneath the topsoil with a minimum thickness of 150 mm of compacted hardfill beneath it; the actual thickness will depend on the finished floor levels of individual buildings, and the depth of topsoil strip.

- Specific geotechnical design parameters for slab designs (modulus of subgrade reaction) can only be determined once the nature of the development has been determined, and the specific load bearing requirements are known.
- Strength reduction factors of 0.5 for factored static loads and 0.8 for seismic overload cases should be applied to the recommended GUBC for pad and strip foundations.
- While the risk of static and liquefaction induced settlement is considered low, future buildings should be designed to accommodate static settlements up to 25 mm over a 6 m horizontal span.

6.4 Earthworks

Following the topsoil stripping (up to 400 mm) and prior to any filling and the slab construction, there should be:

- Proof rolling of the exposed subgrade;
- Inspection of the formation by a suitably qualified geotechnical specialist; and
- Replacement of any unsuitable or soft material with compacted hardfill or AP65.

Where future development of the site requires general filling, this should be compacted hardfill or AP65. The fill should be compacted in layers not exceeding 200mm thickness and compacted to 95% of the laboratory maximum dry density provided by the supplier. Compaction verification should be undertaken using calibrated Nuclear Density Meters (NDM).

6.5 External Paved Areas

The external areas around the site may be concrete or asphalt hardstanding with sub-base thicknesses, material type, and compaction requirements based on the specific designs and final design levels. All deleterious soil layers should be stripped from the hardstanding areas where high storage and traffic loads are to be expected with the exposed formation providing a maximum design CBR value of 4%.

It is recommended that the exposed formation be proof rolled and any localised soft or otherwise unsuitable materials be removed and replaced with compacted AP65. Elsewhere, where concrete or asphalt hardstanding is to be provided for light traffic and car park purposes, the depth of site strip will be determined either by the topsoil removal requirement or by the specific sub-base design whichever is thicker.

6.6 General Considerations

A site subsoil Class D (deep or soft soil) in accordance with NZS 1170.5:2004 should be adopted for design purposes at this location.

Finished floor level requirements will need to be checked for the proposed development as this may affect foundation embedment, and volumes of filling required to form the building platform to the design elevation.

Once each building within the proposed development has been designed, Babbage should review the structural drawings, including foundation sizes, embedment, and imposed loads to ensure all foundation types are compliant with the recommendations provided.

If excavations are to be left open prior to concrete pouring, these should be covered to protect the natural formation from rainfall induced softening.

At the time of construction an appropriate level of monitoring by a geotechnical specialist shall be undertaken to confirm that the encountered founding soils are consistent with those encountered during the geotechnical investigation.

6.7 Further Geotechnical Testing

Whilst the ground conditions across the site have been found to be relatively consistent, the spatial distribution of the testing locations does not rule out isolated areas where the ground conditions may vary from those identified.

It is recommended that once the site layout and development requirements have been established, the findings of this report be re-assessed for building specific relevance and if necessary, further geotechnical investigations undertaken. This may also be required for Building Consent purposes.

As indicated above further development specific percolation testing may be required.

APPLICABILITY AND LIMITATIONS

Restrictions of Intended Purpose

This report has been prepared solely for the benefit of Puna Property Holdings Limited & Foddercube Products (Nth. Canty.) Limited. as our client with respect to the brief. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such party's sole risk. Babbage accepts no responsibility or liability for the consequences of this report being used for any purpose or project other than that for which it was commissioned, or by any party with whom an agreement has not been executed.

Legal Interpretation

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards and should not be construed as legal opinions. Where opinions or judgements are to be relied on, they should be independently verified with appropriate legal advice.

Maps and Images

All maps, plans, and figures included in this report are indicative only and are not to be used or interpreted as engineering drafts and should not be scaled. They are provided for the purposes of this report only and may not be used for construction purposes or any other purpose for which they are not intended. Sources for map and plan compositions may include LINZ Data and Map Services and local council GIS services. For further details regarding any maps, plans or figures in this report, please contact Babbage Consultants Limited.

Reliability of Investigation

Where Babbage have undertaken site specific geotechnical investigations, the recommendations and opinions in this report are based on the data derived from the exploratory holes or tests undertaken specifically for those investigations as described herein.

The nature and continuity of subsoil conditions away from such exploratory holes or tests are inferred and it must be appreciated that actual conditions could vary considerably from those assumed and which have not therefore been taken into account in this report.

The comments made regarding groundwater conditions are based on observations made at the time the field work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, seismic and weather-related effects.

Where planned and undertaken by Babbage, the scope of the investigation was selected on the basis of specific requirements of the Client and may be inappropriate to another form of development, scheme or other requirement.

During excavation and construction, the site should be examined by a Geotechnical Engineer or Engineering Geologist competent to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. It is possible that the nature of the exposed subsoils may require further investigation and the modification of the design based upon this report.

If during construction or excavation subsoil conditions are found to vary from those described in this report it is essential that Babbage are contacted as any such variations may affect the design parameters and recommendations provided.

Reliability of Third-Party Data and Information

Where factual information has been provided to Babbage by the Client including reports, documents, drawings, photographs, and/or geotechnical investigations undertaken by third parties, and on the basis of which Babbage has been requested to provide recommendations and opinions, Babbage does not accept any liability whatsoever for the consequences of any errors or omissions in the information supplied, and has accepted such information in good faith as being reasonably representative of the conditions at the site.

As a user of Data extracted from the New Zealand Geotechnical Database (NZGD) Babbage (the User) is required to advise the Client of the following:

> *The User provides or uses Data from the NZGD and the Data was uploaded into that database without charge and strictly on the basis that any use is at the User's sole risk; no warranty or representation whatsoever (including as to its accuracy, adequacy, completeness, or fitness for any purpose) is provided in connection with the Data; and neither the Data Provider, the Owner or any other Person providing Data to the NZGD accepts any liability (including in negligence) in relation to it; and where any Data includes any other disclaimer or requirement relating to its use, the User will not use that Data unless it accepts or agrees to that disclaimer or requirement.*

Babbage does not accept any liability whatsoever for the Data extracted from the NZGD, and the opinions and recommendations provided by Babbage as a result of the use of this Data are given in good faith and are accepted by the Client on this basis.

REFERENCES

- Ministry of Business Innovation and Employment (MBIE) Guidance: Repairing and rebuilding houses affected by the Canterbury earthquakes, Version 3, December 2012.
- MBIE. (2021, November). Module 3: Identification, assessment and mitigation of liquefaction hazards.
- MBIE. (2025, July 28). Acceptable Solutions and Verification Methods B1/VM2 (Geotechnical design of foundations) 2nd edition. Retrieved from Building Performance: https://www.building.govt.nz/assets/Uploads/building-code-compliance/b-stability/b1-structure/asvm/b1-structure-vm2-second-edition.pdf
- New Zealand Standard (NZS) 1170.5:2004. Structural design actions - Part 5: Earthquake actions - New Zealand. Standards New Zealand. 2004.
- GNS Science. (2020, December). Surface Traces of Onshore Active Faults at a Scale of 1:250,000.

Appendix A

Site Location Plan



Legend

Site Boundary

0 100 m 200 m

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Produced by **Datanest.earth**

Title: Site Location Plan		
Client: Tuatara Structures		Size: A4
Project: Geotechnical Investigation	Drawn: -	Figure: -
Date: Invalid date	Checked: -	
Proj No: 67592	Scale: 1:7000	Version: -

Appendix B

Geotechnical Investigation Plan



Legend

- Testing Location (Shallow)
- Testing Location (Deep)
- Site Boundary

0 25 m 50 m

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Produced by **Datanest.earth**

Title: Investigation Plan		
Client: Tuatara Structures		Size: A4
Project: Geotechnical Investigation	Drawn: -	Figure: -
Date: 13-11-2025	Checked: -	
Proj No: 67592	Scale: 1:2500	Version: -

Appendix C

Geotechnical Investigation Logs

Babbage

128 Montreal Street, Sydenham, Christchurch

Phone:

Geotechnical Log - Hand Auger

HA01

UTM	: 59G	Drill Rig	:	Job Number	: 67592
Latitude	: -43.56584	Driller Supplier	:	Client	: Tuatara Structures
Longitude	: 172.51915	Logged By	: DP	Project	: Geotechnical Investigation
Ground Elevation	: Not Surveyed	Reviewed By	: DP	Location	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 0.7 m BGL	Date	: 05/11/2025	Loc Comment	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1, 0.2, 0.3	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
0.3m - 0.7m: SILT with some fine to medium sand; light yellow. firm; moist; low plasticity.		0.4, 0.5, 0.6				0.5	
Terminate 0.7 m Practical refusal was reached at 0.7 m. Refusal on assumed gravel							



Depth: 0 m - 0.0 - 0.7 m

Borehole No: HA02

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 06/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.2m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1					
0.2m - 0.7m: Silty fine SAND; light yellow. loose; moist.		0.2 – 0.7					
0.7m - 1.5m: with trace silt, sand is fine to medium.		0.7 – 1.5					
1.5m - 2m: becoming silty fine to medium sand.		1.5 – 2.0					
2m - 2.5m: SILT; light yellow. firm; wet; low plasticity.		2.0 – 2.5					
2.5m - 2.9m: fine to medium SAND; light orange. medium dense; wet.		2.5 – 2.9					
2.9m - 3m: becoming dense.		2.9					
HA02 Terminate at 3 m (Target depth was reached at 3 m.)							



Depth: 0.0 m - 3.0m

Borehole No: HA03

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 06/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1 – 0.3	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
0.3m - 0.7m: Sandy SILT; light yellow. firm; moist; low plasticity; sand, fine.		0.4 – 0.7					
0.7m - 2m: Silty fine to medium SAND; light yellow. loose; moist.		0.8 – 2.0					
2m - 2.2m: SILT; light yellow. firm; wet; low plasticity.		2.1 – 2.2					
2.2m - 2.5m: fine to medium SAND; light yellow. loose to medium dense; moist.		2.3 – 2.5					
2.5m - 3m: SILT; light yellow. firm to stiff; moist; low plasticity.		2.6 – 2.9					
HA03 Terminate at 3 m (Target depth was reached at 3 m.)							



Depth: 0.0 m - 3.0 m

Babbage

128 Montreal Street, Sydenham, Christchurch

Phone:

Geotechnical Log - Hand Auger

HA04

Coordinate System	: EPSG:2193	Drill Rig	:	Job Number	: 67592
Easting (m)	: 0.00	Driller Supplier	:	Client	: Tuatara Structures
Northing (m)	: 0.00	Logged By	: DP	Project	: Geotechnical Investigation
Ground Elevation	: Not Surveyed	Reviewed By	: DP	Location	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m BGL	Date	: 06/11/2025	Loc Comment	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1 – 0.3	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
0.3m - 1.2m: SILT with some fine sand; light yellow. firm; moist; low plasticity.		0.4 – 1.2					
1.2m - 2.5m: fine to medium SAND; light yellow. loose to medium dense; dry.		1.3 – 2.5					
2.5m - 3m: becoming silty fine to medium sand wet.		2.6 – 2.9					
Terminate 3 m Target depth was reached at 3 m.							



Depth: 0.0 m - 3.0 m

Borehole No: HA05

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 1 m	**Date**	: 06/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1					
0.3m - 0.7m: Silty fine SAND; light yellow. loose; dry.		0.2					
0.7m - 1m: becoming silty fine sand.		0.3					
		0.4					
		0.5				0.5	
		0.6					
		0.7					
		0.8					
		0.9					
		1.0					
HA05 Terminate at 1 m (Target depth was reached at 1 m.)							



Depth: 0.0 m - 1.0 m

Borehole No: HA06

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: Alex Baldwin	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	:	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 06/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; dry; low plasticity. [TOPSOIL]		0.1 – 0.2					
0.3m - 0.8m: SILT with some fine sand; light yellow. firm; dry; low plasticity.		0.3 – 0.8					
0.8m - 1.6m: Silty fine to medium SAND; light yellow. loose to medium dense; wet.		0.8 – 1.6					
1.6m - 2m: SILT; light yellow. firm to stiff; wet; low plasticity.		1.6 – 2.0					
2m - 2.5m: fine to medium SAND; light yellow. loose to medium dense; wet.		2.0 – 2.5					
2.5m - 2.7m: SILT; light yellow. firm; wet; low plasticity.		2.5 – 2.7					
2.7m - 3m: becoming saturated.		2.7 – 2.9					
HA06 Terminate at 3 m (Target depth was reached at 3 m.)							



Depth: 0.0 m - 3.0 m

Babbage

128 Montreal Street, Sydenham, Christchurch

Phone:

Geotechnical Log - Hand Auger

HA07

Coordinate System	: EPSG:2193	Drill Rig	:	Job Number	: 67592
Easting (m)	: 0.00	Driller Supplier	:	Client	: Tuatara Structures
Northing (m)	: 0.00	Logged By	: DP	Project	: Geotechnical Investigation
Ground Elevation	: Not Surveyed	Reviewed By	: DP	Location	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 1 m BGL	Date	: 06/11/2025	Loc Comment	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; dry; low plasticity. [TOPSOIL]		0.1 0.2 0.3	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
0.3m - 1m: Sandy SILT; light yellow. firm; moist; low plasticity; sand, fine.		0.4 0.5 0.6 0.7 0.8 0.9 1.0				0.5	
Terminate 1 m Target depth.							



Depth: 0.0 m - 1.0 m

Borehole No: HA08

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 06/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1 – 0.3					
0.3m - 0.6m: Sandy SILT; light yellow. firm; moist; low plasticity; sand, fine to medium.		0.4 – 0.6					
0.6m - 0.9m: fine to medium SAND with some silt; light yellow. loose; moist.		0.7 – 0.9					
0.9m - 1.2m: becoming wet.		1.0 – 1.2					
1.2m - 1.8m: Sandy SILT; light yellow firm; wet; low plasticity; sand, fine.		1.3 – 1.8					
1.8m - 2m: fine to medium SAND; light yellow loose; wet.		1.9 – 2.0					
2m - 2.5m: becoming fine to coarse sand.		2.1 – 2.5					
2.5m - 3m: SILT; light yellow. firm; wet; low plasticity.		2.6 – 2.9					
HA08 Terminate at 3 m (Target depth.)							



Depth: 0.0 m - 3.0 m

Borehole No: HA09

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 10/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; dry; low plasticity. [TOPSOIL]		0.1 – 2.9	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
0.3m - 0.7m: Silty fine SAND; light yellow. loose; moist.							
0.7m - 1.2m: becoming silty fine to medium SAND.							
1.2m - 1.5m: becoming fine to coarse.							
1.5m - 2.5m: Sandy SILT; light yellow. firm; wet; low plasticity; sand, fine.							
2.5m - 3m: sand becomes fine to medium.							
HA09 Terminate at 3 m (Target depth)							



Depth: 0.0 m - 3.0 m

Borehole No: HA10

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 06/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1 – 0.9					
0.3m - 1m: Silty fine to medium SAND; light yellow. loose; moist.		1.0					
1m - 1.8m: becoming fine grained sand.		1.1 – 1.7					
1.8m - 2.5m: SILT; light yellow. firm; wet; low plasticity.		1.8 – 2.4					
2.5m - 2.9m: fine to coarse SAND with some silt; light orange yellow. medium dense; wet.		2.5 – 2.9					
2.9m - 3m: becoming saturated.							
HA10 Terminate at 3 m (Target depth.)							



Depth: 0.0 m - 3.0 m

Borehole No: HA11

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 1 m	**Date**	: 07/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.2m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1					
0.2m - 0.6m: Sandy SILT; light yellow. firm; moist; low plasticity; sand, fine.		0.2 0.3 0.4 0.5				0.5	
0.6m - 1m: fine SAND with some silt; light yellow. loose; moist.		0.6 0.7 0.8 0.9 1.0					
HA11 Terminate at 1 m (Target depth)							



Depth: 0.0 m - 1.0 m

Borehole No: HA12

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 07/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.25m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1					
0.25m - 0.6m: SILT; light yellow. firm; moist; low plasticity.		0.2					
		0.3					
		0.4					
		0.5				0.5	
0.6m - 1.2m: fine SAND; light yellow. loose; moist.		0.6					
		0.7					
		0.8					
		0.9					
		1.0				1.0	
1.2m - 1.8m: becoming silty fine sand.		1.1					
		1.2					
		1.3					
		1.4					
		1.5				1.5	
		1.6					
		1.7					
1.8m - 2.2m: SILT; light yellow. firm to stiff; moist; low plasticity.		1.8					
		1.9					
		2.0				2.0	
		2.1					
2.2m - 3m: fine to medium SAND; light yellow. medium dense; moist.		2.2					
		2.3					
		2.4					
		2.5				2.5	
		2.6					
		2.7					
		2.8					
		2.9					
HA12 Terminate at 3 m (Target depth.)							



Depth: 0.0 m - 3.0 m

Borehole No: HA13

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 1 m	**Date**	: 07/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.2m: Organic SILT; brown. firm; moist; low plasticity. [TOPSOIL]		0.1	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
0.2m - 0.4m: SILT; light yellow. firm; moist; low plasticity.		0.2					
0.4m - 1m: fine SAND; light yellow. loose; moist.		0.3					
		0.4					
		0.5				0.5	
		0.6					
		0.7					
		0.8					
		0.9					
		1.0					
HA13 Terminate at 1 m (Target depth)							



Depth: 0.0 m - 1.0 m

Borehole No: HA14

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 07/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.2m: Organic SILT; brown. firm; moist; low plasticity. [TOPSOIL]		0.1					
0.2m - 0.4m: SILT; light yellow. firm; moist; low plasticity.		0.2					
0.4m - 1.3m: Silty fine SAND; light yellow. loose; moist.		0.3 – 1.3					
1.3m - 1.7m: silt is absent.		1.3 – 1.7					
1.7m - 2.5m: SILT with some fine silt; light yellow. stiff; wet; low plasticity.		1.7 – 2.5					
2.5m - 3m: fine to medium SAND; light yellow orange loose to medium dense; wet.		2.5 – 2.9					
HA14 Terminate at 3 m (Target depth)							



Depth: 0.0 m - 3.0 m

Borehole No: HA15

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 07/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.2m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1					
0.2m - 0.4m: SILT; light yellow firm; moist; low plasticity.		0.2					
0.4m - 3m: Silty fine SAND; light yellow loose; moist.		0.3					
		0.4					
		0.5					
		0.6					
		0.7					
		0.8					
		0.9					
		1.0					
		1.1					
		1.2					
		1.3					
		1.4					
		1.5					
		1.6					
		1.7					
		1.8					
		1.9					
		2.0					
		2.1					
		2.2					
		2.3					
		2.4					
		2.5					
		2.6					
		2.7					
		2.8					
		2.9					
HA15 Terminate at 3 m (Target depth)							



Depth: 0.0 m - 3.0 m

Babbage

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Phone:

Geotechnical Log - Hand Auger

HA16

UTM	: 59G	Drill Rig	:	Job Number	: 67592
Latitude	: -43.56774	Driller Supplier	:	Client	: Tuatara Structures
Longitude	: 172.51864	Logged By	: DP	Project	: Geotechnical Investigation
Ground Elevation	: Not Surveyed	Reviewed By	: DP	Location	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m BGL	Date	: 07/11/2025	Loc Comment	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; dry; low plasticity. [TOPSOIL]		0.1 – 0.3					
0.3m - 1.5m: Silty fine SAND; light yellow. loose; moist.		0.4 – 1.4					
1.5m - 1.7m: SILT; light yellow. firm; moist; low plasticity.		1.5 – 1.7					
1.7m - 2m: Silty fine to medium SAND; loose to medium dense; moist.		1.8 – 2.0					
2m - 2.5m: SILT; light yellow. firm; moist; low plasticity.		2.1 – 2.5					
2.5m - 2.9m: fine SAND with some silt; light yellow. loose to medium dense; wet.		2.6 – 2.9					
2.9m - 3m: SILT; light yellow. firm; wet; low plasticity.							
Terminate 3 m Target depth							



Depth: 0.0 m - 3.0 m

Borehole No: HA17

Coordinate System : EPSG:2193		Driller Rig	:	Job Number	: 67592
Easting	:	Driller Supplier	:	Client	: Tuatara Structures
Northing	:	Logged By	: DP	Project	: Geotechnical Investigation
RL	: Not Surveyed	Reviewed By	: DP	Location	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	Date	: 07/11/2025	Loc Comment	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.25m: Organic SILT; brown. firm; dry; low plasticity. [TOPSOIL]		0.1 – 2.9	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
0.25m - 1m: Sandy SILT; light yellow. firm; moist; low plasticity; sand, fine.							
1m - 1.8m: Silty fine to medium SAND; light yellow. loose; moist.							
1.8m - 2.8m: SILT some sand; light yellow. firm; moist; low plasticity.							
2.8m - 3m: becoming saturated.						▽	
HA17 Terminate at 3 m (Target depth)							



Depth: 0.0 m - 3.0 m

Borehole No: HA18

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 1 m	**Date**	: 07/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; brown. firm; dry; low plasticity. [TOPSOIL]		0.1					
0.3m - 0.7m: Silty fine SAND; light yellow. loose; moist.		0.2					
0.7m - 1m: Becoming silty fine - medium sand, wet.		0.3					
		0.4					
		0.5				0.5	
		0.6					
		0.7					
		0.8					
		0.9					
HA18 Terminate at 1 m (Target depth)		1.0					



Depth: 0.0 m - 1.0 m

Borehole No: HA19

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 07/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; dry; low plasticity. [TOPSOIL]		0.1					
0.3m - 0.3m: Sandy SILT; light yellow. firm; moist; low plasticity		0.2					
0.6m - 1.2m: Silty fine SAND; light yellow. loose to medium dense; moist.		0.3					
1.2m - 1.5m: becoming light grey.		0.4					
1.5m - 2.5m: SILT; light grey. firm; wet; low plasticity.		0.5					
2.5m - 2.8m: fine to medium SAND; light orange. medium dense to dense; moist.		0.6					
2.8m - 3m: becoming saturated.		0.7					
		0.8					
		0.9					
		1.0					
		1.1					
		1.2					
		1.3					
		1.4					
		1.5					
		1.6					
		1.7					
		1.8					
		1.9					
		2.0					
		2.1					
		2.2					
		2.3					
		2.4					
		2.5					
		2.6					
		2.7					
		2.8					
		2.9					
HA19 Terminate at 3 m (Target depth, groundwater encountered at 2.8 m)							



Depth: 0.0 m - 3.0 m

Borehole No: HA20

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m	**Date**	: 07/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.1 0.2 0.3					
0.3m - 0.7m: Sandy SILT; light yellow. firm; moist; low plasticity		0.4 0.5 0.6 0.7					
0.7m - 1.8m: Silty fine SAND; light yellow loose; moist.		0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8					
1.8m - 2.7m: SILT; firm; wet; low plasticity.		1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7					
2.7m - 2.9m: Silty fine to coarse SAND; dense; wet.		2.8 2.9					
2.9m - 3m: becoming saturated.							
HA20 Terminate at 3 m (Target depth, groundwater at 2.9 m)							



Depth: 0.0 m - 3.0 m

Borehole No: HA21 (Test pit)

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 1.1 m	**Date**	: 11/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.4m: fine GRAVEL with some silt and cobbles; light grey loose medium dense; dry. [FILL]		0.1 0.2 0.3 0.4	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
0.4m - 0.6m: Silty fine SAND; light yellow. loose; moist.		0.5 0.6				0.5	
0.6m - 0.8m: SILT; light yellow. stiff; moist; low plasticity.		0.7 0.8					
0.8m - 1.1m: fine SAND; light yellow. loose to medium dense; moist.		0.9 1.0 1.1				1.0	
HA21 (Test pit) Terminate at 1.1 m (Target depth)							



Depth: 0 m - 1.1 m

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Geotechnical Log - Hand Auger

HA22 (Test pit)

Coordinate System	: EPSG:2193	Drill Rig	:	Job Number	: 67592
Easting (m)	: 0.00	Driller Supplier	:	Client	: Tuatara Structures
Northing (m)	: 0.00	Logged By	: DP	Project	: Geotechnical Investigation
Ground Elevation	: Not Surveyed	Reviewed By	: DP	Location	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 2 m BGL	Date	: 08/11/2025	Loc Comment	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.3m: fine GRAVEL with some cobbles; light grey loose medium dense; dry. [FILL]		0.1					
0.3m - 0.6m: Sandy SILT; light yellow. firm; moist; low plasticity; sand, fine.		0.2					
0.6m - 1m: Silty medium to coarse SAND; light yellow. loose to medium dense; moist.		0.3					
1m - 1.6m: with some silt, sand is fine.		0.4					
1.6m - 2m: SILT; light yellow wet; low plasticity.		0.5					
Terminate 2 m Target depth & maximum reach of excavator		0.6					
		0.7					
		0.8					
		0.9					
		1.0					
		1.1					
		1.2					
		1.3					
		1.4					
		1.5					
		1.6					
		1.7					
		1.8					
		1.9					



Depth: 0.0 m - 2.0 m

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HA23 (Test pit)

Coordinate System	: EPSG:2193	Drill Rig	:	Job Number	: 67592
Easting (m)	: 0.00	Driller Supplier	:	Client	: Tuatara Structures
Northing (m)	: 0.00	Logged By	: DP	Project	: Geotechnical Investigation
Ground Elevation	: Not Surveyed	Reviewed By	: DP	Location	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 1 m BGL	Date	: 11/11/2025	Loc Comment	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.1m: fine GRAVEL with some silt; light grey loose; wet. [FILL]		0.1					
.1m - 0.3m: Sandy fine to coarse GRAVEL; light grey medium dense; moist; sand, fine to coarse. [FILL]		0.2					
0.3m - 0.4m: Organic SILT; brown. firm; moist; low plasticity. [TOPSOIL]		0.3					
0.4m - 1m: SILT with some fine sand; light yellow. firm; moist; low plasticity.		0.4					
		0.5				0.5	
		0.6					
		0.7					
		0.8					
		0.9					
Terminate 1 m Target depth		1.0					



Depth: 0.0 m - 1.0 m

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Geotechnical Log - Hand Auger

HA24

UTM	: 59G	Drill Rig	:	Job Number	: 67592
Latitude	: -43.56848	Driller Supplier	:	Client	: Tuatara Structures
Longitude	: 172.51912	Logged By	: DP	Project	: Geotechnical Investigation
Ground Elevation	: Not Surveyed	Reviewed By	: DP	Location	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 3 m BGL	Date	: 08/11/2025	Loc Comment	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water	Comments
0m - 0.15m: fine GRAVEL with some silt; light grey loose; wet. [FILL]		0.1					
0.15m - 0.3m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.2					
0.3m - 0.7m: Sandy SILT; light yellow. firm; moist; low plasticity; sand, fine.		0.3					
		0.4					
		0.5					0.5
		0.6					
0.7m - 1.8m: Silty fine SAND; light yellow. loose; moist.		0.7					
		0.8					
		0.9					
		1.0					1.0
		1.1					
		1.2					
		1.3					
		1.4					
		1.5					1.5
		1.6					
		1.7					
		1.8					
1.8m - 2.5m: becoming wet.		1.9					
		2.0					2.0
		2.1					
		2.2					
		2.3					
		2.4					
		2.5					2.5
2.5m - 2.8m: SILT with some fine sand; light yellow. firm; wet; low plasticity.		2.6					
		2.7					
		2.8					
2.8m - 3m: fine to medium SAND; light yellow. saturated.		2.9					
Terminate 3 m Target depth							



Depth: 0.0 m - 3.0 m

Borehole No: HA25

Coordinate System	: EPSG:2193	**Driller Rig**	:	**Job Number**	: 67592
Easting	:	**Driller Supplier**	:	**Client**	: Tuatara Structures
Northing	:	**Logged By**	: DP	**Project**	: Geotechnical Investigation
RL	: Not Surveyed	**Reviewed By**	: DP	**Location**	: 376 Springs Road, Hornby South, Christchurch, New Zealand
Total Depth	: 1 m	**Date**	: 11/11/2025	**Loc Comment**	:

Geological Field Description: Field Description of Soil and Rock: Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZ Geotechnical Society, December 2005)	Legend	Depth (m)	NZS4403:1986 Test 6.5.2 (blows per 100mm)	Samples	Shear Vane: NZGS 2001 Guideline for Hand Held Shear Vane Test (Corrected)	Water: Water	Comments
0m - .1m: fine GRAVEL with some silt; light grey loose; wet. [FILL]		0.1					
.1m - 0.2m: Sandy fine to coarse GRAVEL; light grey medium dense; wet; sand, fine to coarse. [FILL]		0.2					
0.2m - 0.45m: Organic SILT; light brown. firm; moist; low plasticity. [TOPSOIL]		0.3					
		0.4					
0.45m - 1m: SILT; light yellow. firm; moist; low plasticity.		0.5				0.5	
		0.6					
		0.7					
		0.8					
		0.9					
		1.0					
HA25 Terminate at 1 m (Target depth)							



Depth: 0.0 m - 1.0 m

Auckland

Address | Level 4, 68 Beach Road, Auckland 1010

Post | PO Box 2027, Shortland Street, Auckland 1140, New Zealand

Ph | 64 9 379 9980

Fax | +64 9 377 1170

Email | contact-us@babbage.co.nz

Hamilton

Address | Unit 1, 85 Church Road, Pukete, Hamilton 3200

Post | PO Box 20068, Te Rapa, Hamilton 3241, New Zealand

Ph | +64 7 850 7010

Fax | +64 9 377 1170

Email | contact-us@babbage.co.nz

Christchurch

Address | 128 Montreal Street, Sydenham, Christchurch 8023

Post | PO Box 2373, Christchurch 8140, New Zealand

Ph | +64 3 379 2734

Fax | +64 3 379 1642

Email | solutions@babbage.co.nz

Babbage Consultants Australia Pty Ltd – Australia

Address | Suite 4, Level 2, 1 Yarra Street, Geelong,

Victoria 3220, Australia

Ph | +61 3 8539 4805

Email | contact-us@babbage.co.nz

www.babbage.co.nz

www.babbageconsultants.com.au