Before an Independent Hearings Panel Appointed by Waimakariri District Council

under: the Resource Management Act 1991

in the matter of: Submissions and further submissions on the Proposed

Waimakariri District Plan

and: Hearing Stream 12: Rezoning requests (larger scale)

and: Carter Group Property Limited

(Submitter 237)

and: Rolleston Industrial Developments Limited

(Submitter 160)

Statement of evidence of Chris Thompson (Geotech) on behalf of Carter Group Limited and Rolleston Industrial Developments Limited

Dated: 5 March 2024

Reference: J M Appleyard (jo.appleyard@chapmantripp.com)

LMN Forrester (lucy.forrester@chapmantripp.com)



STATEMENT OF EVIDENCE OF CHRIS THOMPSON ON BEHALF OF CARTER GROUP LIMITED AND ROLLESTON INDUSTRIAL DEVELOPMENTS LIMITED

INTRODUCTION

- 1 My full name is Christopher Samuel Thompson.
- I hold a Bachelor of Science (Technology) degree and am a member of Engineering New Zealand and the New Zealand Geotechnical Society. I have over 15 years of geotechnical consulting experience. During this time, I have held positions at Foundation Engineering Consultants (Graduate Geologist and Engineering Geologist), Balfour Beatty Ground Engineering (Contracts Engineer) and Coffey / Tetra Tech Coffey (Engineering Geologist to Associate Engineering Geologist).
- I have undertaken a wide range of geotechnical consulting work in New Zealand, Australia and England, including design and construction monitoring for many subdivisions and developments in the Canterbury region and across New Zealand, and have also worked on large infrastructure projects at Lyttelton Port and Kawarau Falls Bridge in Queenstown. In these projects I have carried out geotechnical hazard assessments for settlement (both liquefaction induced and static) and slope stability, which are both relevant to this project.
- 4 I am familiar with the submitters' request to rezone land bound by Mill Road, Whites Road, Bradleys Road (the Site).
- I was involved in private plan change 31 (*PC31*) to rezone this land under the operative District Plan. I prepared the Geotechnical Assessment that was submitted as part of the PC31 application.

CODE OF CONDUCT

Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 9 of the Environment Court Practice Note 2023. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

My evidence relates to the geotechnical aspects of the Site and existing environment.

SUMMARY OF EVIDENCE

- The submitters engaged Tetra Tech Coffey (NZ) Limited to carry out a geotechnical investigation and assessment of suitability for the proposed Ōhoka Plan Change, near Ōhoka, Canterbury. I am the Project Manager for the geotechnical investigation and design for the Site.
- 9 The site investigations and preliminary liquefaction assessment indicates that the Site is predominantly TC1-like. Other geotechnical hazards (static settlement, erosion, slippage and inundation) are considered low risk with appropriate future engineering design.
- 10 My assessment (attached as **Appendix 1**) has considered the requirements of section 106 of the Resource Management Act 1991 (*RMA*) and in my opinion the site is considered geotechnically suitable for rezoning and future subdivision.
- 11 Further investigations and design will be carried out at the subdivision consent stage which is (or would be) typical for a residential subdivision.

EVIDENCE

- Based on my assessment in **Appendix 1**, the Site is considered geotechnically suitable for rezoning and future subdivision.
- The constraint map showing 'Liquefaction Risk Areas' attached to **Mr Walsh's** evidence highlights the site location relative to a report commissioned by ECan in 2012 (and prepared by GNS Science) that provides a review of liquefaction hazard information in Eastern Canterbury (ref. R12/83). This mapping indicates liquefaction damage is unlikely on the Site which is consistent with the findings from our site investigation which concluded the risk of liquefaction was negligible.
- In Canterbury, liquefaction susceptibility of land is mapped into broad zones where liquefaction is more or less likely due to the general nature of the soils and water table in the area. The development of land in areas where 'Liquefaction damage is possible' requires further investigation and possible mitigation of liquefaction risk which increases costs. Therefore, between a choice of rezoning/developing land where liquefaction damage has been identified as possible or unlikely, it would be preferable to rezone/develop land in areas where it has been shown that 'Liquefaction damage is unlikely' rather than in an area that has been identified as 'Liquefaction damage is possible.

CONCLUSION

From a geotechnical perspective, the proposed development that will be enabled by the rezoning request is considered low risk (TC1-

like for foundation design) due to the dense underlying gravel deposits and the ability to design future structures to cope with the seismic and static settlement demands.

Chris Thompson		

Dated: 5 March 2024

APPENDIX 1



535 Mill Road, Ohoka

Geotechnical Assessment Report

Rolleston Industrial Developments Ltd



Reference: 773-CHCGE288040

535 MILL ROAD, OHOKA

Geotechnical Assessment Report

Report reference number: 773-CHCGE288040

1 June 2021

PREPARED FOR

Rolleston Industrial Developments Ltd ASB House, 166 Cashel Street Christchurch Central

PREPARED BY

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QUALITY INFORMATION

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Revision	Description	Date	Author	Reviewer	Approver
V1	GAR	01/06/21	СТ	KWH	СТ
V0	GAR	26/05/21	СТ	KWH	СТ

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Final	1	PDF	Bruce Van Duyn	01/06/21

EXECUTIVE SUMMARY¹

Rolleston Industrial Developments Ltd has engaged Tetra Tech Coffey (NZ) Limited to carry out a geotechnical investigation and assessment of suitability for the proposed Plan Change and future subdivision of 535 Mill Road in Ohoka, Canterbury. The purpose of this report is to support a Plan Change application for the construction of residential Lots at the site.

The site investigations and preliminary liquefaction assessment indicates that the site is TC1-like. Other geotechnical hazards (erosion, slippage and inundation) are considered low to very low risk with appropriate future engineering design.

Our assessment has considered the items required by Section 106 of the RMA and in our opinion the site is considered geotechnically suitable for Plan Change and future subdivision. Further investigations and design will need to be carried out at the subdivision consent stage.

¹ This executive summary must be read in the context of the full report and the attached limitations.

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APPENDIX A: SITE PLAN

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1. INTRODUCTION

Rolleston Industrial Developments Ltd has engaged Tetra Tech Coffey (NZ) Limited to carry out a geotechnical investigation and assessment of suitability for the proposed Plan Change and future subdivision of 535 Mill Road in Ohoka, Canterbury. The purpose of this report is to support a Plan Change application for the construction of residential Lots at the site.

Our assessment has considered the items required by Section 106 of the RMA and in our opinion the site is considered geotechnically suitable for Plan Change and future subdivision. Further investigations and design will need to be carried out at the subdivision consent stage.

2. SCOPE

A scope of assessment work for the approximately 152 Ha total area of the site was developed and carried out by Tetra Tech Coffey, as outlined below:

- Review of previous geotechnical investigations including previous work on the site and surrounding area.
- Site walkover to assess geotechnical hazards.
- Assessment of the geotechnical hazards at the site per Section 106 of the RMA.
- · Geotechnical analyses and reporting.

Tetra Tech Coffey have considered the following in the preparation of this report:

- Existing geotechnical investigation data available from the New Zealand Geotechnical Database (NZGD) and Environment Canterbury well database.
- Our existing information for the site.
- Project correspondence with the wider Plan Change consultants engaged by Rolleston Industrial Developments Ltd.

Reference has also been made to the MBIE Guidance Part D: Subdivisions, to confirm that the requirements outlined in these documents have been incorporated in this report.

PROPOSED DEVELOPMENT

The proposed Plan Change area comprises five land parcels totalling approximately 152 Ha located to the southwest of Ohoka. The Plan Change area bordered by Bradleys Road, Whites Road, Mill Road, and to the south by rural residential and farmland.

The site is predominantly flat with the Ohoka Stream traversing the northern portion of the site. The site is currently used for farming and appears to have had the land usage for at least 100 years. An historic rail alignment is located near the northern boundary close to the intersection of Bradleys and Mill Roads.

4. SITE INVESTIGATION

The location of the geotechnical investigations carried out on the site to develop the ground models are provided in Figure 1 (in Appendix A) and are summarised below. Investigation logs are presented in Appendix B.

Tetra Tech Coffey 1

Report reference number: 773-CHCGE288040

Date: 1 June 2021

Table 1: 535 Mill Road investigation data

Reference	Depth of test (metres below ground level)	Termination criteria	Reference	Depth of test (metres below ground level)	Termination criteria
TP1	1.7	Target depth	TP18	1.2	Target depth
TP2	1.9	Target depth	TP19	1.4	Target depth
TP3	2.0	Target depth	TP20	1.4	Target depth
TP4	0.6	Target depth	TP21	1.6	Target depth
TP5	1.0	Target depth	TP22	1.4	Target depth
TP6	1.6	Target depth	BH1	16.5	Target depth
TP7	1.6	Target depth	BW24/0297	18.0	Target depth
TP8	1.7	Target depth	M35/0300	114.0	Target depth
TP9	1.8	Target depth	BW24/0520	11.2	Target depth
TP10	1.4	Target depth	M35/0595	9.8	Target depth
TP11	1.2	Target depth	M35/4428	20.3	Target depth
TP12	1.6	Target depth	M35/4795	13.0	Target depth
TP13	1.25	Target depth	M35/5609	18.8	Target depth
TP14	1.5	Target depth	M35/6483	20.0	Target depth
TP15	1.5	Target depth	M35/6688	18.0	Target depth
TP16	1.7	Target depth	M35/6773	24.0	Target depth
TP17	1.0	Target depth	M35/10517	23.2	Target depth

BH1 was drilled (in 2011) under the supervision of Coffey for a Vodafone tower located on the site and the ECan well logs have been sourced from https://www.ecan.govt.nz/data/well-search/.

SITE PERFORMANCE 5.

5.1 **GROUND MOTION**

The site is not in an area mapped for ground damage effects as part of the Canterbury Earthquake Sequence response. A report commissioned by ECan² mapped the site as being in an area where 'damaging liquefaction is unlikely'. An extract from the ECan report is shown in Figure 1 below with the site location indicated.

2

Tetra Tech Coffey Date: 1 June 2021

² ECan (2012), Review of liquefaction hazard information in Eastern Canterbury, including Christchurch City, and parts of Selwyn, Waimakariri and Hurunui Districts, ref. R12/83

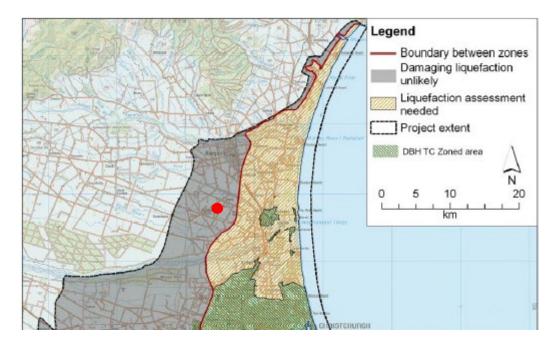


Figure 1: Extract from ECan liquefaction report (site location marked with red dot)

6. GROUND MODEL

6.1 GEOLOGY

The geological map³ of the area indicates that the site is underlain by "Brownish-grey river alluvium (Q2a)."

6.2 GROUNDWATER

Based on the geotechnical investigations carried out on site, groundwater was encountered between 0.9m and 1.5mbgl. We consider these groundwater levels to be relatively consistent and representative of the general area.

6.3 SUBSURFACE PROFILE

A summary of the ground model for the site is provided below:

Table 2: 535 Mill Road ground profile

Description	Strength/ consistency	Thickness (m)	Depth to top of layer (mbgl)
Silt (topsoil)	N/A	0.25 to 0.35	0.0
Clayey Silt	Stiff to hard	0.5 to 1.2	0.25 to 0.35
Sandy Gravel, with minor silt lenses	Dense to very dense	>30	0.6 to 1.5

Fill was encountered along the alignment of the historic railway line, typically this comprised a sandy gravel and was up to 0.3m thick.

Tetra Tech Coffey Report reference number: 773-CHCGE288040 Date: 1 June 2021

³ Forsyth, P.J.; Barrell, D.J.A.; Jongens, R. (compilers) 2008: Geology of the Christchurch area: scale 1:250,000. Lower Hutt: GNS Science. Institute of Geological & Nuclear Sciences 1:250,000 geological map 16. 67 p. + 1 folded map

6.4 SITE SUB-SOIL CLASS

In accordance with NZS1170.5, Section 3.1.3, a subsoil classification of "Class D – Deep or soft soil sites" can be assumed for the site.

GEOTECHNICAL HAZARD ASSESSMENT

7.1 EROSION

The site has relatively flat topography and is bounded by newly developed residential areas as well as grassed paddock land. Provided appropriate stormwater systems are installed as part of the development, there will be few viable sources of erosion at this site.

7.2 FALLING DEBRIS

As there are no slopes or exposed hills or rock faces surrounding the site, there are no sources of falling debris at the site, or for the surrounding area.

7.3 SUBSIDENCE

7.3.1 Liquefaction induced settlement

Saturated, loose, uniform fine grained alluvial soils are subject to seismic (liquefaction-induced) settlement during a significant earthquake. Liquefaction typically affects saturated, loose granular soils ranging from sandy silts to sands, but seismic shaking can also result in strength losses in fine-grained, cohesive soils. Liquefaction does not occur in dense, well-graded alluvial gravel soils that are present at this site.

Due to the dense nature of the gravel encountered, liquefaction risk is considered to be negligible for this project.

7.3.2 Static settlement

Settlement is a crucial factor that can cause structure serviceability issues. Static load-induced settlement typically occurs in low-lying areas underlain by soft, compressible soils as a result of increased overburden loads. As the site is underlain by stiff to hard clayey silts and then dense river gravels, static settlement is not deemed a hazard for the site provided any earthworks are carried out to the relevant standards.

7.4 SLIPPAGE

We have not observed any sources of land instability on the site and due to the flat site topography, we consider the risk of slope failure to be very low. The appropriate design of batter slopes near waterways will mitigate this risk further.

7.5 INUNDATION

In relation to stormwater inundation, we recommend that drainage design and management at the site be addressed by specialist consultants as it is beyond the scope of this report. We expect that with appropriate stormwater and flood control systems, the risk of inundation will be low.

Tetra Tech Coffey Report reference number: 773-CHCGE288040

Date: 1 June 2021

8. CONCLUSIONS

We consider that the site is suitable for development subject to further investigation and design at the subdivision consent stage. Based on the mapped geology and on-site testing carried out to date, the site is considered TC1-like.

Additional geotechnical investigation will be required to refine the ground model and address any geotechnical risks for the proposed Lots once a subdivision plan has been further developed.

9. LIMITATIONS

This report has been prepared solely for the use of our client, Rolleston Industrial Developments Ltd, their professional advisers and Waimakariri District Council (WDC) in relation to the specific project described herein. No liability is accepted in respect of its use for any other purpose or by any other person or entity.

It is recommended that all other parties seek professional geotechnical advice to satisfy themselves as to its on-going suitability for their intended use.

As subsurface information has been obtained from discrete investigation locations, which by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site which have not been disclosed by the investigation and which have not been taken into account in the report. If variations in the subsoils occur from those described or assumed to exist, then the matter should be referred to us immediately.

Please also refer to the enclosed Important Information about Your Tetra Tech Coffey Report.

10. CLOSURE

If you have queries or require further clarification regarding aspects of this report, please contact the undersigned.

For and on behalf of Tetra Tech Coffey

Prepared by

Chris Thompson

BSc (Tech)

Associate Engineering Geologist

Reviewed by

Kah-Weng Ho BE(Civil) CMEngNZ Senior Principal

Tetra Tech Coffey Report reference number: 773-CHCGE288040

Date: 1 June 2021



IMPORTANT INFORMATION ABOUT YOUR TETRA TECH COFFEY REPORT

As a client of Tetra Tech Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Tetra Tech Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Tetra Tech Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Tetra Tech Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Tetra Tech Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Tetra Tech Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Tetra Tech Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Tetra Tech Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Tetra Tech Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Tetra Tech Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Tetra Tech Coffey to work with other project design professionals who are affected by the report. Have Tetra Tech Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Tetra Tech Coffey for information relating to geoenvironmental issues.

Rely on Tetra Tech Coffey for additional assistance

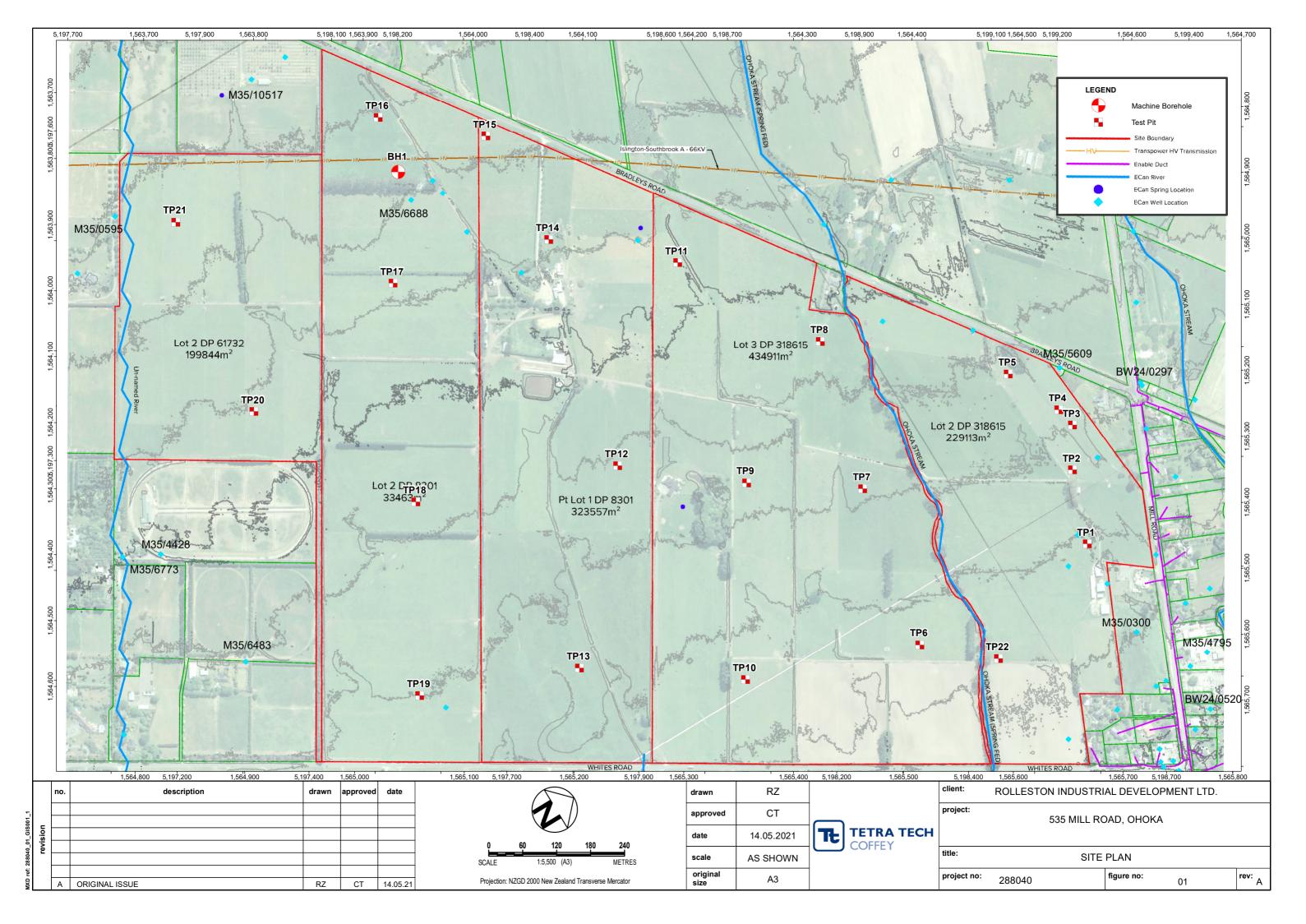
Tetra Tech Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Tetra Tech Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Tetra Tech Coffey to other parties but are included to identify where Tetra Tech Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Tetra Tech Coffey closely and do not hesitate to ask any questions you may have.

APPENDIX A: SITE PLAN

Tetra Tech Coffey Report reference number: 773-CHCGE288040 Date: 1 June 2021



APPENDIX B: INVESTIGATION DATA

Tetra Tech Coffey Report reference number: 773-CHCGE288040

Date: 1 June 2021



TP01 sheet: 1 of 1

Borehole ID.

project no.

773-CHCGE288040

Rolleston Industrial Developments Limited client: date started: 05 May 2021

05 May 2021 principal: date completed:

project: 535 Mill Road logged by: B. Chau

Ohoka, Christchurch 7676 C. Thompson location: checked by:

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\vdash					moun	ted			drilling fluid: Swamp Bucket		hole dia	meter :		vane id.: 1508
dr	illir	ng info	rmati	on			mate	rial sub						I
method &	upport	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕ remoulded • peak (kPa) 0500000000000000000000000000000000000	DCP (blows/ 100 mm)	
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project:

principal: -

Engineering Log - Excavation

Rolleston Industrial Developments Limited

sheet: 1 of 1

Borehole ID.

project no. **773-CHCGE288040**

TP02

date started: 05 May 2021

date completed: 05 May 2021

535 Mill Road logged by: B. Chau

	•		moun	ited			surface elevation: Not Specified drilling fluid: Swamp Bucket		•		ntal: 9	90°	DCP id.: vane id.: 1508
ing inf	ormati	on			mate	rial sub	estance						
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				1.0—		GW	Sandy GRAVEL: medium to coarse grained, grey-brown.	W	_		 		
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535 Mill Road

client:

project:

principal: -

Engineering Log - Excavation

Rolleston Industrial Developments Limited

TP03 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no.

date started: 05 May 2021

05 May 2021 date completed:

logged by: B. Chau

		Not Spe : Hitach	cified i 14t, Track	mour			070	surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fr	om hori		tal:	90°	DCP id.: vane id.: 1508
drill	ing in	nformat	ion			mate	rial sub	estance							
method & support	1 2 penetration		samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	Vane shea ⊕ remoul ⊚ peal (kPa)	ir Ided k	(blo 100	CP ows/ mm)	structure and additional observations
					- -		ML GP	SILT: low plasticity, brown. Sandy GRAVEL: brown-grey.	D					 	FILL
			VS 150/ 40 kPa		0.5 —		ML ML	Clayey SILT: medium plasticity, grey with orange mottling. Clayey SILT: low to medium plasticity,		VSt				 	QUATERNARY ALLUVIUM
					- -			grey-brown with orange mottling.	W - S	_					
		 	VS 120/ 21 kPa		1.0									 	
	 				1.5	0.00	GW	Sandy GRAVEL: medium to coarse grained, grey-brown, with trace of cobbles.	S					 	
_	 				- 2.0 -	0 0 0		Excavation TP03 terminated at 2.0 m Target depth			 	1	Π	 	
					2.5—										
		 - - - -			3.0 —									 	
		 - - - -			3.5—								 	 	
					-	-						Î I I			
meth AD AS HA W	auge auge hand	er drilling er screwi d auger hbore		M i	port mud casing etration	1	nil istance	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa)	base moistu	ed on AS	symbol cription 3 1726:20			\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	
* e.g. B T	bit sl AD/7 blan TC b	k bit oit	suffix	wat	10-leve	Oct-12 watel on date ter inflow	l ater shown	N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	M mo W we S sa Wp pla	oist) 	rian in



TP04 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no. Rolleston Industrial Developments Limited client: date started: 05 May 2021

05 May 2021 principal: date completed:

project: 535 Mill Road logged by: B. Chau

osition drill mod		•	ified 14t, Track	moun	ted			surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fro	om horizor meter :	ntal: 90°	DCP id.: vane id.: 1508	
drilling	g info	mati	on			material substance								
method & support	1 2 penetration 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear eremoulded epeak (kPa)	DCP (blows/ 100 mm)		
		Not Encountered	VS 203/ 53 kPa		- - - 0.5		GP GW ML	SILTY GRAVEL: medium to coarse grained, pale brown, with trace of cobbles. SILTY GRAVEL: medium to coarse grained, pale brown. Clayey SILT: low to medium plasticity, grey-brown with orange mottling.	M	VSt - H			QUATERNARY ALLUVIUN	
•					1.0 —			Excavation TP04 terminated at 0.6 m Target depth						
methoc AD a AS a HA h W v	disauger dauger shand auger shand auwashbo	crewin uger re	g*	pen wate	etration N m er 10-0 leve water	ı	iter shown	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal	moistu D dr M m W w S sa Wp pl	ed on AS re condi y oist	1726:2017 tion		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense	



principal: -

Engineering Log - Excavation

Rolleston Industrial Developments Limited

TP05 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no.

date started: 05 May 2021

05 May 2021 date completed:

project: 535 Mill Road logged by: B. Chau

	ion: No	ot Spe	cified		criur			surface elevation: Not Specified		angle fro	om horizo	•	DCP id.: -
			14t, Track	moun	ited	4.		drilling fluid: Swamp Bucket	r	nole dia	meter :		vane id.: 1508
method &	benetration	/ater	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear eremoulded e peak (kPa)		structure and additional observations
			VS 81/ 33 kPa				ML ML	SILT: low plasticity, pale brown. Clayey SILT: medium plasticity, grey-brown with orange mottling.	D	St	⊕ ⊚	1111	TOPSOIL QUATERNARY ALLUVIUM
<u>, y</u>		-			- - - 1.0 - - -		ML	SILTY GRAVEL: medium to coarse grained, grey with orange staining. Excavation TP05 terminated at 1.0 m Target depth		D			DCP 1.0 - 1.1m: Refusal
					1.5 —								
					2.5 —								
					3.0 —								
meti AD AS HA W	nod auger auger hand washt	drilling screwing	ng*	M r C c pen	etration	ı	l ater	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone	moistu D dr M m W we S sa	re condi	symbol & cription	,	consistency / relative density //S very soft S soft = firm St stiff //St very stiff H hard Fb friable //L very loose L loose
e.g. B T V	AD/T blank TC bit V bit			<u> </u>	wat	er inflow er outflow		VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing		astic limit uid limit	t		MD medium dense D dense //D very dense



Engineering Log - Excavation

Rolleston Industrial Developments Limited

TP06 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no.

date started: 05 May 2021

principal: -05 May 2021 date completed:

project: 535 Mill Road B. Chau logged by:

Ohoka, Christchurch 7676 C. Thompson location. checked by:

locati	ion:	On	oka, Ch	rıst	chur	ch 7	676			С	hecked I	by:	C. Thompson		
positio	n: No	ot Spec	cified					surface elevation: Not Specified	a	angle fro	om horizor	DCP id.: -			
drill m	odel: ŀ	Hitachi	14t, Track	mour	ited	_		drilling fluid: Swamp Bucket	h	nole dia	meter:		vane id.: 1508		
drilli	ng info	ormati	on			mate	erial sub	stance							
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear e remoulded e peak (kPa)	DCP (blows/ 100 mm)			
- 9					-		ML	SILT : low plasticity, brown, with trace of rootlets.	D	0.2		111	TOPSOIL		
		Not Encountered	VS 156/ 42 kPa		0.5		ML	Clayey SILT: medium plasticity, pale grey with orange mottling.	M	VSt			-		
					1.0 — - - - 1.5 —		GW	Sandy GRAVEL: medium to coarse grained, grey-brown with orange staining.		D			DCP 0.8 - 0.9m: Refusal		
		_			1.5	<u>،</u> ،		Excavation TP06 terminated at 1.6 m							
					2.0 — - - - - 2.5 — -			Target depth							
					3.0										
					3.5										
metho AD AS HA W	auger auger hand a washb		ng*	M in C of pen	etration	no res rangin ✓ refusa		samples & field tests B	moistu D dr M mo W we	re condi	1726:2017		Consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose		
e.g. B T V	AD/T blank TC bit V bit	bit	JULIA		leve	Oct-12 wa el on date er inflow er outflov	shown	Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	W wet S saturated Wp plastic limit WI liquid limit				L loose MD medium dense D dense VD very dense		



Engineering Log - Excavation

Rolleston Industrial Developments Limited

sheet: 1 of 1

Borehole ID.

project no. **773-CHCGE288040**

TP07

date started: 05 May 2021

principal: - date completed: 05 May 2021

project: 535 Mill Road logged by: B. Chau

ositior drill mo		•	cified 14t, Track	mour	ited			surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fro	m horizon neter :	tal: 90°	DCP id.: vane id.: 1508
drillin	g info	ormati	on			mate	rial sub	stance					
method &	1 2 penetration 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	Vane shear ⊕ remoulded ⊕ peak (kPa) % 00 92 00	DCP (blows/ 100 mm)	
					-		ML	SILT: low plasticity, pale brown, with trace of rootlets.	D				TOPSOIL
			VS UTP		0.5		ML	Clayey SILT: pale grey-brown with orange mottling.	М	VSt - H	 	 	QUATERNARY ALLUVIUN
	$\Box\Box$				-				W				
Z					1.0		GW	Sandy GRAVEL : medium to coarse grained, grey, with trace of cobbles.	S				
	 	-			- - 1.5—								
					2.0	66		Excavation TP07 terminated at 1.6 m Target depth					
					2.5 — - -								
					3.0 —								
					3.5								
method AD &	auger	drilling*		M		N	nil	samples & field tests B bulk disturbed sample	:	il group s soil desci	ription		consistency / relative density VS very soft
HA I	hand a	oore		pen wat	10-0 leve		ater shown	D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N' SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	moistu D dr M m W w S sa Wp pl	re condit	1726:2017 ion		S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense



Engineering Log - Excavation

Rolleston Industrial Developments Limited

sheet: 1 of 1

Borehole ID.

project no. **773-CHCGE288040**

TP08

date started: 05 May 2021

principal: - date completed: 05 May 2021

project: 535 Mill Road logged by: B. Chau

drill mo	odel:		14t, Track	moun	ited	1		surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fro	om horizonta meter :	il: 90°	DCP id.: - vane id.: 1508
×ŏ	inf benetration	ormat	samples & field tests		(m)			material description SOIL NAME: plasticity or particle characteristic,	e no	consistency / relative density		DCP (blows/ 00 mm)	structure and additional observations
support	2 pene	water		RL (m)	depth (m)	graphic log	soil group symbol	colour, secondary and minor components	moisture condition	consisterelative	(kPa) (kPa)	14086	
					-		ML	SILT: low plasticity, brown.	M				TOPSOIL
			VS 75/ 30 kPa		0.5		ML	Clayey SILT: medium plasticity, grey with orange mottling.		St - VS			QUATERNARY ALLUVIUM
z		Not Encou	VS 165/ 33 kPa		1.0-	•			W S				
					- - - 1.5		GW	Sandy GRAVEL: medium to coarse grained, grey-brown, with trace of cobbles.		D		### 	DCP: 1.0 - 1.1m: Refusal
•					2.0 —	00		Excavation TP08 terminated at 1.7 m Target depth					
					2.5—								
					3.0 —								
					3.5								
AS HA	auger auger	drilling screwi auger bore		M r C c	etration	ı	nil stance g to	samples & field tests B	base moistu D di	soil desc ed on AS ure condi	symbol & ription 1726:2017	(\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
e.g. AD/T B blank bit			10-0 leve	Oct-12 wa el on date er inflow er outflow	shown	N' SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	W w S sa Wp pl	et aturated lastic limit quid limit		L N	/L very loose		



Engineering Log - Excavation

Rolleston Industrial Developments Limited

TP09 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no.

date started: 05 May 2021

05 May 2021 principal: date completed:

project: 535 Mill Road logged by: B. Chau

drill m		litachi	14t, Track	moun	ited			surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fro	m horizoi meter :	ntal: 90°	DCP id.: vane id.: 1508
method & support	benetration benetration		samples & field tests	-	(m) ı	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic,	ture	consistency / relative density	vane shear ⊕ remoulded • peak	DCP (blows/	
supp	3 2 -	water		RL (m)	depth (m)	graph	Soil g symt	colour, secondary and minor components SILT: low plasticity, brown.	M moisture condition	consi	(kPa) 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 120 00 00 00 00 00 00 00 00 00 00 00 00 0		
			VS 114/ 31 kPa		0.5		ML	Clayey SILT: medium plasticity, pale grey-brown with orange staining.	IVI	St - VSf			QUATERNARY ALLUVIUN
 			VS 141/ 42 kPa		1.0 —				W	_			
•		-			1.5 — - -	0 0 0	GW	Sandy GRAVEL: medium to coarse grained, grey.	S		. 		
					2.0 — - -			Excavation TP09 terminated at 1.8 m Target depth					
					2.5—								
					3.0 —								
					3.5—								
AD AS HA W	S auger screwing* C casing A hand auger washbore bit shown by suffix g. AD/T C casing penetration water 10-Oct-level on		no res rangin refusa Oct-12 wa	nter	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered NC SPT with solid cone	moistu D dr M m W w S sa	soil desc ed on AS are condit y oist	1726:2017		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose			
B T V	B blank bit TC bit				er inflow er outflow	1	VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing		juid limit			MD medium dense D dense VD very dense	



TP10 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no.

Rolleston Industrial Developments Limited client: date started: 05 May 2021

05 May 2021 principal: date completed: project: 535 Mill Road logged by: B. Chau

	cation: Ohoka, Chris sition: Not Specified					CII 1	0/0		checked by:	C. Thompson		
positio	n: No	t Spec	cified					surface elevation: Not Specified	angle from horizontal: 9			
drill mo	odel: F	litachi	14t, Track	mour	nted			drilling fluid: Swamp Bucket	hole diameter :	vane id.: 1508		
drillir	ng info	rmati	on			mate	rial sub	stance				
method & support	2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	modifure condition conditi	ws/ additional observations		
					-	$\left \begin{array}{c} \\ \\ \end{array} \right $	ML	SILT: low plasticity, brown.	M	TOPSOIL		
			VS 90/ 28 kPa		0.5		ML	Clayey SILT: medium plasticity, grey with orange mottling.	St - VSt	QUATERNARY ALLUVIUM		
			VS 132/ 15 kPa		-				W #			
		-			-		GW	Sandy GRAVEL: medium to coarse grained, grey with orange mottling.	S			
	 				1.5 —			Excavation TP10 terminated at 1.4 m Target depth				
					2.0 —							
					2.5—							
					3.0							
					- - 3.5—							
					- - -							
AS HA	auger auger hand a washb	screwir uger		M C	port mud casing etration	ı	nil	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample	soil group symbol & soil description based on AS 1726:2017	consistency / relative density VS very soft S soft F firm St stiff		
e.g. 3	bit sho AD/T blank to		suffix	wat	leve wate	no res rangin refusa Oct-12 was on date er inflow er outflow	ater shown	U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal	moisture condition D dry M moist W wet S saturated Wp plastic limit WI liquid limit	VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense		



ering Log - Excavation project no. 773-CHCGE288040

Borehole ID.

sheet:

TP11

1 of 1

client: Rolleston Industrial Developments Limited date started: 05 May 2021

principal: - date completed: 05 May 2021

project: 535 Mill Road logged by: B. Chau

UCali	cation: Ohoka, Christo				cnur	cn /	6/6		checked by:				C. Thompson	
ositio	n: No	t Spe	cified					surface elevation: Not Specified	6	angle fro	om horizon	ıtal: 90°	DCP id.:	
drill mo	odel: F	litachi	14t, Track	moun	ited			drilling fluid: Swamp Bucket	h	hole dia	meter:		vane id.: 1508	
drillin	ng info	rmati	on			mate	rial sub	estance						
support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear eremoulded e peak (kPa)	2 4 0 0 5 (blows/ DCP		
Ā					-		ML	SILT: low plasticity, brown.	M	0.2			TOPSOIL	
			VS 156/ 39 kPa		0.5		ML	Clayey SILT: medium plasticity, grey-brown with orange mottling.		VSt			QUATERNARY ALLUVIUM	
Z					- -		GW	Sandy GRAVEL: medium to coarse grained, grey with orange staining.	W					
		-			1.0 —	0 0 0			S					
					- 1.5 — -			Excavation TP11 terminated at 1.2 m Target depth						
					2.0 —									
					2.5									
					3.0 —									
					3.5 —								1	
AS HA	auger auger hand a	screwii iuger		M i	port mud casing etration	ı	nil istance g to	samples & field tests B	base	soil desc ed on AS are condi	1726:2017	_	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard	
e.g. B T	washbore penetr bit shown by suffix water			leve wat	✓ refusa Oct-12 was el on date er inflow er outflow	ater shown	N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	M m W we S sa Wp pla	oist	t		Fb friable VL very loose L loose MD medium dense D dense VD very dense		



sheet: 1 of 1

TP12

773-CHCGE288040

Borehole ID.

project no.

client: Rolleston Industrial Developments Limited date started: 05 May 2021

principal: - date completed: 05 May 2021

project: 535 Mill Road logged by: B. Chau

	position: Not Specified drill model: Hitachi 14t, Track mounted							surface elevation: Not Specified	а	ngle fro	m horizor	ıtal: 90°		
Į	drill m	odel: Hi	achi	14t, Track	moun	ted			drilling fluid: Swamp Bucket	h	ole diar	neter :		vane id.: 1508
[drilli	ng infor	mati	on			mate	rial sub	stance					
	method & support	1 2 penetration 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊚ peak (kPa) % 02 02 03	DCP (blows/ 100 mm)	structure and additional observations
						-		ML	SILT: low plasticity, brown.	М				TOPSOIL -
	Z			VS 124/ 43 kPa		- 0.5 — - -		ML	Clayey SILT: medium plasticity, brown-grey with orange staining.		VSt			QUATERNARY ALLUVIUM
24/05/2021 12:06				18 kPa		1.0		GW	Sandy GRAVEL: medium to coarse grained, grey with orange staining.	W		⊕¦		DCP 1.0 - 1.1: Refusal
	• •	111	-			- 1.5 —				S				-
CDF_0_9_07_LIBRARY.GLB revAU Log COF BOREHOLE. NON CORED + DCP CHCGE288040 GINT.GPJ < <drawngfile>></drawngfile>						2.0—			Excavation TP12 terminated at 1.6 m Target depth					- - - - - - - - - - - - - - - - - - -
	methods AS HA W	od auger d auger s hand au washbo bit show AD/T blank bi TC bit V bit	ger re	ng*	pene	etration N M Pr 10-0 Nation		ater shown	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS spilt spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	moistur D dry M mo W we S sa Wp pla	d on AS re condit	1726:2017	\ S S N H F N C	firm St stiff //St very stiff H hard Fb friable //L very loose L loose MD medium dense



Engineering Log - Excavation

sheet: 1 of 1

Borehole ID.

project no. **773-CHCGE288040**

TP13

Rolleston Industrial Developments Limited date started: 05 May 2021

principal: - date completed: 05 May 2021

project: 535 Mill Road logged by: B. Chau

irill mo		itachi	14t, Track	mour	ited			surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fro	m horizon meter :	tal: 90°	DCP id.: vane id.: 1508
arıllir	ig info	rmati	on			mate	rial sub			>-		D02	
support	1 2 penetration 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture	consistency / relative density	vane shear ⊕remoulded ⊚ peak (kPa) 03 05 05	DCP (blows/ 100 mm)	
					-		ML	SILT: low plasticity, brown.	М				TOPSOIL
z		t Encountered	VS UTP		0.5 —		ML	Clayey SILT: low to medium plasticity, grey with orange mottling.		VSt - H	. Vs UтР 	 	QUATERNARY ALLUVIUN
		Not	VS UTP		1.0—		GW	Sandy GRAVEL: medium to coarse grained, grey with orange staining, and trace of cobbles.			 Vs UтР 		
					-	0 0			W				
					1.5 —			Excavation TP13 terminated at 1.25 m Target depth					
					2.0 —								
					2.5—								
	 				3.0								
					3.5—								
			•		- - -							 	
AS HA	auger of auger s hand a washbo	crewir uger		M i	port mud casing etration	l 1⊢ no res	nil istance	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter	base	soil desc	1726:2017		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff
e.g. 3	bit shown by suffix J. AD/T blank bit TC bit V bit				10-0 leve	rangin refusa Oct-12 wa el on date er inflow er outflow	g to I ater shown	HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	D dr M m W we S sa Wp pl	y oist			H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense



project no. **773-CHCGE288040**

TP14

1 of 1

Borehole ID.

sheet:

client: Rolleston Industrial Developments Limited date started: 05 May 2021

principal: - date completed: 05 May 2021

project: 535 Mill Road logged by: B. Chau

	osition: Not Specified ill model: Hitachi 14t, Track mounted Irilling information							surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fro	m horizon neter :	tal: 90°	0° DCP id.: vane id.: 1508	
drilling	j info	mati	on			mate	rial sub	estance					1	
support	2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊕ peak (kPa) % 00 00 00	DCP (blows/ 100 mm)		
A					-		ML ML	SILT: low plasticity, brown. Clayey SILT: low to medium plasticity,	D	VSt - H			TOPSOIL	
		Encountered	VS UTP		0.5		IVIL	grey-brown with orange mottling.		V31 - FI	 vs итР 			
		Not E			- - 1.0		SP	SILTY SAND: medium grained, yellow-brown with orange staining.	W - M	_				
					- - -		GW	Sandy GRAVEL: medium to coarse grained, brown-grey.	J s					
					1.5 - -	المناسبة الم		Excavation TP14 terminated at 1.5 m Target depth						
					2.0 —									
					2.5									
 					3.0									
					3.5—									
					- -									
AS a HA h	l auger d auger s aand au washbo	crewin ıger		M i	port mud casing etration	l 1⊢ no res	nil	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U### undisturbed sample ##mm diameter	base	ed on AS	1726:2017		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff LI boot	
e.g. A 3 b	g. AD/T lev war			rangin refusa Oct-12 wa el on date er inflow er outflow	ater shown	HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	W we S sa Wp pl	oist			H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense			



principal: -

Engineering Log - Excavation

Rolleston Industrial Developments Limited

TP15 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no.

date started: 06 May 2021

06 May 2021 date completed:

project: 535 Mill Road logged by: B. Chau

oodi	cation: Onoka, Christo sition: Not Specified					CII 7	0/0		cne	ecked by:	C. Thompson		
ositio	n: No	t Spe	cified					surface elevation: Not Specified	angle from	horizontal: 90°	0° DCP id.:		
drill mo	odel: F	litachi	14t, Track	mour	nted			drilling fluid: Swamp Bucket	hole diame	eter:	vane id.: 1508		
drillir	ng info	ormati	on			mate	rial sub	estance					
method & support	2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components		vane shear (blows/200 peak (kPa) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	n)		
1					-		ML	SILT: low plasticity, brown.	M		TOPSOIL		
Z		Not Encountered	VS 209/ 62 kPa		0.5 —		ML	Clayey SILT: medium plasticity, grey with orange mottling.	VSt - H	⊕ 0 1 1 1 1 1 1 1 1 1	QUATERNARY ALLUVIUM		
					- - -	0 0 0 0 0	GW	Sandy GRAVEL: medium to coarse grained, grey with orange staining, and trace of cobbles.	M S		 		
					1.5 - - - 2.0			Excavation TP15 terminated at 1.5 m Target depth			 		
					2.5						 		
					3.0						 		
					- - -						 		
					3.5 —						 		
AS HA	auger			M i	port mud casing etration	no res	nil istance g to	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS spilt spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa)	soil group syr soil descrip based on AS 17 moisture conditio D dry	mbol & otion '26:2017	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard		
e.g. B T	bit sho AD/T blank TC bit V bit		suffix	wat	leve wate	Tefusa Oct-12 was el on date er inflow er outflow	ater shown	N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	M moist W wet S saturated Wp plastic limit WI liquid limit		Fb friable VL very loose L loose MD medium dense D dense VD very dense		



sheet: 1 of 1

TP16

project no. **773-CHCGE288040**

Borehole ID.

client: Rolleston Industrial Developments Limited date started: 06 May 2021

principal: - date completed: 06 May 2021

project: 535 Mill Road logged by: B. Chau

Ohoka, Christchurch 7676 location: checked by: C. Thompson position: Not Specified surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: Hitachi 14t, Track mounted drilling fluid: Swamp Bucket vane id.: 1508 hole diameter: drilling information material substance consistency / relative density DCP material description structure and penetratio samples & (blows/ 100 mm) additional observations soil group symbol Œ moisture condition field tests method a SOIL NAME: plasticity or particle characteristic, graphic Ξ depth (colour, secondary and minor components (kPa) 02 02 02 02 R ML SILT: low plasticity, brown. М $\Box\Box\Box$ 1111 **3**1111 ML Clayey SILT: low to medium plasticity, pale VSt QUATERNARY ALLUVIUM grey with orange mottling. VS 166/ 67 kPa ÐІ 6 0.5 \perp VS 106/ 60 kPa 11111 1.0 \perp \perp VS 54/ 1111121 kPa W ++++11111Sandy GRAVEL: medium to coarse grained, grey with orange staining, and trace of cobbles. GW 11111 S 11111 11111 Excavation TP16 terminated at 1.7 m GINT.GP. Target depth IIIIII \perp 11111 2.0 \perp \perp 111I + I + I $\perp 1 \perp 1 \perp 1 \perp 1$ $\Box\Box\Box\Box$ \Box +111112.5 1111111111 1111111111 \perp IIII3.0 \perp 11111| | | $\perp 1 \perp 1 \perp 1 \perp 1$ ± 11111 3.5 $\Pi\Pi\Pi$ 11111 IIIIII \perp 11111 \perp IIIIII11111auger drilling* support imples & field tests soil group symbol & consistency / relative density N nil bulk disturbed sample soil description very soft AS auger screwing C casing disturbed sample based on AS 1726:2017 soft hand auger НΑ Ε environmental sample firm penetration W washbore SS split spoon sample St stiff no resistance ranging to refusal undisturbed sample ##mm diameter verv stiff VSt U## moisture condition HP hand penetrometer (kPa) H Fb dry moist wet saturated D M W standard penetration test (SPT) Ν friable SPT - sample recovered very loose bit shown by suffix SPT with solid cone Nc loose e.g. B AD/T level on date showr medium dense VS vane shear; peak/remouded (kPa) Wp plastic limit WI liquid limit MD blank bit vater inflow R refusal D dense TC bit vater outflow НВ VD very dense



sheet: 1 of 1

Borehole ID.

project no. **773-CHCGE288040**

TP17

client: Rolleston Industrial Developments Limited date started: 06 May 2021

principal: - date completed: 06 May 2021

project: 535 Mill Road logged by: B. Chau

position: Not Specified	surface elevation: Not Specified	angle from horizontal: 90°			
drill model: Hitachi 14t, Track mounted	drilling fluid: Swamp Bucket	hole diameter :	vane id.: 1508		
drilling information	material substance				
support support water RL (m) depth (m)	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	nonditune and selection and se			
	ML SILT: low plasticity, brown. ML Clayey SILT: low to medium plasticity, grey with orange mottling.	M	TOPSOIL QUATERNARY ALLUVIUM		
	Sandy GRAVEL: medium to coarse grained, grey with orange staining, and trace of cobbles.				
1.5-	Excavation TP17 terminated at 1.0 m Target depth				
2.0-					
2.5-					
3.0-					
3.5-					
e.g. AD/T	oresistance ranging to hand penetrometer (kPa) Oct-12 water el on date shown experience to the period of the peri	moisture condition D dry M moist W wet S saturated Wp plastic limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense		
e.g. AD/T B blank bit	el on date shown Nc SPT with solid cone	S saturated Wp plastic limit WI liquid limit	L loose		



535 Mill Road

client:

principal: -

project:

Engineering Log - Excavation

Rolleston Industrial Developments Limited

TP18 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no. date started: 06 May 2021

06 May 2021

date completed: logged by: B. Chau

Ohoka Christohurch 7676 ahaakad by C Thompson

	locat	ion:	Oh	oka, Ch	rist	chur	ch 7	676			c	hecked b	oy:	C. Thompson
ſ	positio	on: Not	Spec	cified					surface elevation: Not Specified	a	ingle fro	om horizon	tal: 90°	DCP id.:
	drill m	odel: Hi	tachi	14t, Track	moun	ted			drilling fluid: Swamp Bucket	ŀ	ole dia	meter :		vane id.: 1508
ſ	drilli	ng info	mati	on			mate	rial sub	stance					
	method & support	1 2 penetration 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear eremoulded e peak (kPa)	DCP (blows/ 100 mm)	structure and additional observations
	A A					-		ML	SILT: low plasticity, brown. Clayey SILT: medium plasticity, grey with	M	St			-
			Not Encountered	VS 70/ 34 kPa		0.5 —	•	GW	orange mottling. Sandy GRAVEL: medium to coarse grained,					- - - -
24/05/2021 12:06		 				1.0 -	· 0 . 0	Gvv	grey with orange staining.					-
< <drawingfile>> 24/05/2</drawingfile>						- 1.5 —			Excavation TP18 terminated at 1.2 m Target depth					- - -
HCGE288040 GINT.GPJ <						2.0—								-
-og COF BOREHOLE: NON CORED + DCP CHCGE288040 GINT.GPJ						2.5								-
-1						3.0 —								- - -
9_07_LIBRARY.GLB rev:AU						3.5—								- - -
CDF_0_9		method support		_							 	-		
	meth AD AS HA W	AD auger drilling* AS auger screwing* HA hand auger W washbore M m C ca			mud casing etration		nil istance g to	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT)	base moistui D dry M mo	d on AS re condity pist	1726:2017		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable	
	AS auger screwing* HA hand auger					10-0 leve	Oct-12 wa el on date er inflow er outflow	shown	N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	W we S sa Wp pla		:		VL very loose L loose MD medium dense D dense VD very dense



535 Mill Road

client:

project:

principal: -

Engineering Log - Excavation

Rolleston Industrial Developments Limited

TP19 sheet: 1 of 1

Borehole ID.

773-CHCGE288040 project no.

date started: 06 May 2021

06 May 2021 date completed:

logged by: B. Chau

Ohoka, Christchurch 7676 C. Thompson checked by: location:

100	au	on:	OII	oka, Ch	11151	Ciiui	CII 1	070			CH	ecked I	oy.	C. Thompson
pos	sitio	n: Not	Spec	cified					surface elevation: Not Specified	an	ngle fror	n horizor	ntal: 90°	DCP id.: -
drill	l mo	odel: Hi	tachi	14t, Track	mour	nted			drilling fluid: Swamp Bucket	ho	ole diam	eter :		vane id.: 1508
dr	illir	ng info	mati	on			mate	rial sub	stance					
method &	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture		vane shear ⊕remoulded ⊕ peak (kPa) % 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DCP (blows/ 100 mm)	structure and additional observations
	•					-		ML	SILT: low plasticity, brown.	M	0.2		11 11 11 11 11	TOPSOIL
	 		Not Encountered	VS UTP		0.5 —		ML	Clayey SILT: low to medium plasticity, grey with orange staining.		/St - H	Vs UTP	111	QUATERNARY ALLUVIUM
						- -	0 0 0	GW	Sandy GRAVEL : medium to coarse grained, brown-grey with orange staining.		D			
						1.5 —			Excavation TP19 terminated at 1.4 m Target depth					
						2.0 —								
	2.5				2.5 —									
					3.0 —									
	3.4					3.5 —								
me AD AS HA	AS auger screwing* IA hand auger V washbore C casin penetrat							nil istance g to	samples & field tests B	so	conditi	ption 726:2017		consistency / relative density VS very soft s soft firm St stiff VSt very stiff hard firiable
* e.g B T V	g.	bit show AD/T blank bi TC bit V bit	•	suffix	wat	leve	Oct-12 wa el on date er inflow er outflow	shown	N statistative ferrel attent test (PF1) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	W wet S satu Wp plas) 1 1	//L very loose L loose MD medium dense D dense //D very dense



client:

principal: -

Engineering Log - Excavation

Rolleston Industrial Developments Limited

sheet: 1 of 1

Borehole ID.

project no. **773-CHCGE288040**

TP20

date started: 06 May 2021

date completed: 06 May 2021

project: 535 Mill Road logged by: B. Chau

location: Ohoka, Christchurch 7676 checked by: C. Thompson

	n: Not odel: H	•	cified 14t, Track	mour	nted			surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fr	om horizonta meter :	al: 90°	DCP id.: - vane id.: 1508
drillir	ng info	rmati	on			mate	rial sub	estance		1			T
support	1 2 penetration 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	(kPa)	DCP (blows/ 100 mm)	structure and additional observations
					-		ML	SILT: low plasticity, brown.	М				TOPSOIL
z		Not Encountered	VS 171/ 36 kPa		0.5		ML	Clayey SILT: medium plasticity, brown-grey with orange mottling.		VSt			QUATERNARY ALLUVIUM
			VS 203/ 46 kPa		1.0 — - -	0 0 0 0	GW	Sandy GRAVEL: medium to coarse grained, brown-grey with orange staining.		D			
					1.5 —	-		Excavation TP20 terminated at 1.4 m Target depth					
					2.0 —								
					2.5 —								
					3.0 —								
					3.5 —								
AS HA	auger of auger s hand a washbo	crewir uger		M i	port mud casing etration	1	nil istance g to	samples & field tests B	bas	soil desc ed on AS ure cond	symbol & cription 1726:2017		consistency / relative density volume very soft soft firm st stiff volume very stiff H hard
e.g. З Г	bit shown by suffix AD/T blank bit TC bit V bit		wat	10-leve	Oct-12 was el on date ter inflow ter outflow	ater shown	N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	M m W w S sa Wp pl	oist et aturated astic limi quid limit	t	F \ L !	Fb friable VL very loose loose medium dense dense VD very dense	



client:

Engineering Log - Excavation

Rolleston Industrial Developments Limited project no. 773-CHCGE288040

Borehole ID.

sheet:

TP21

1 of 1

principal: - date completed: 06 May 2021

project: 535 Mill Road logged by: B. Chau

location: Ohoka, Christchurch 7676 checked by: C. Thompson

	del: Hi	tachi	14t, Track	moun	ted			surface elevation: Not Specified drilling fluid: Swamp Bucket		angle fr	om horizor meter :	ntal: 90°	DCP id.: vane id.: 1508
drilling		mati	on			mate	rial sub	stance		_	1		
support	2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊚ peak (kPa) % 00 00 00	100 mm) DCP (blows/	structure and additional observations
Z		Not Encountered	VS 151/ 60 kPa		0.5 —		ML ML GW	Clayey SILT: low to medium plasticity, grey-brown with orange mottling. Sandy GRAVEL: medium to coarse grained, grey-brown with orange staining, and trace of cobbles.	M	VSt			
,					1.5—			Excavation TP21 terminated at 1.6 m Target depth					
method AD a AS a HA h W w * b e.g. A B b T T	 	crewin uger re	g*	pend	etration or of the control of the c	ı	iter shown	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	moistu D dr M m W w S sa Wp pl	soil desc ed on AS are condi y oist	1726:2017	VS	soft firm stiff St very stiff hard friable very loose loose medium dense dense



Engineering Log - Excavation

sheet: 1 of 1
project no. 773-CHCGE288040

TP22

Borehole ID.

client: Rolleston Industrial Developments Limited date started: 06 May 2021

principal: - date completed: 06 May 2021

project: 535 Mill Road logged by: C. Thompson
location: Ohoka, Christchurch 7676 checked by: C. Thompson

lo	ocati	ion:	Oh	oka, Ch	rist	chur	ch 7	676			cl	hecked b	oy:	C. Thompson
р	ositic	n: Not	Spec	ified					surface elevation: Not Specified	á	angle fro	m horizon	tal: 90°	DCP id.: -
d	rill m	odel: Hit	achi	14t, Track	moun	ted			drilling fluid: Swamp Bucket	ŀ	nole diar	neter :		vane id.: 1508
	drilli	ng infor	mati	on			mate	rial sub	stance					
mothod &	support	2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕ remoulded • peak (kPa) 02 00 00	DCP (blows/ 100 mm)	structure and additional observations
•	A					-		ML	SILT: low plasticity, brown. Clayey SILT: medium plasticity, grey with	M	St - VSI			TOPSOIL
24/05/2021 12:06 — E — — — — — — — — — — — — — — — — — —	Z					0.5 —		GW	Sandy GRAVEL: medium to coarse grained, grey-brown with orange staining.	W	D			DCP 1.0 - 1.1m: Refusal
< <drawingfile>> 2</drawingfile>	V					1.5 —	o` .o. i		Excavation TP22 terminated at 1.4 m Target depth				11111	
COF BOREHOLE: NON CORED + DCP CHCGE288040 GINT.GPJ						2.0 —								- - - - -
HOLE: NON CORED + DCF						2.5								- - - - -
Log						3.0 —								- - - - -
CDF_0_9_07_LIBRARY.GLB rev:AU						3.5 — - - -								- - - - - -
1	method AD auger drilling* AS auger screwing* HA hand auger W washbore				pene	nud easing etration	− no resi rangin ⊲ refusal		samples & field tests B	base moistu D dr	ed on AS re condity oist	1726:2017	() () () () ()	consistency / relative density //S very soft S soft = firm St stiff //St very stiff H hard Fb friable //L very loose
1	bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit			suffix		10-0 leve	Oct-12 wa el on date er inflow er outflow	shown	N° SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	S sa Wp pla	et uturated astic limit uid limit		L N	loose MD medium dense



Vodafone NZ

Principal:

Project:

Engineering Log - Machine Borehole

236 Bradleys Road, Ohoka

Sheet 1 of 3

Machine Borehole No. **BH01**

Project No: **GENZCHRI15188**

Date started: **7.7.2011**

Date completed: **7.7.2011**

Logged by: SKK

			orehole	,	os-	v 40	.i*~	nlan							Oh - '	ا ء.	b			ш
	mod		mounting:					plan	asting: 24	74175	im		Slope	· _an°	Check			ce: m	^	Vane No:
				VIR				,	•											vane NU.
			r: mm ormation		D	rilling f	امند	abatanaa	orthing: 57				Bearir			atu		round k mas	e dof	octs
bud	metrod		notes samples, tests, etc		depth metres	log	classification symbol	material Soil - Soil type; colour, structur bedding; plasticity, sensitivity. Siminor components. Rock - Colour, fabric, rocl discontinuities, additional inf	re. Grading; econdary an k type; ormation.	moisture condition	consistency/ density index	weathering alteration	estim stren	ated ngth	25 50 75 vane shear 100 (remoulded 125 /beak) kPa		recovery %	def	ect cing m	defect descriptionumber, type, orientation, roughness, aperture, description (refer to de description explanation particular ge
llosdo					_			TOPSOIL; No core from 0. 0.40m	00 to	М	F		ш>>2	00 > 00	25,52,52,53	11.	+	6,4	7	paraeara: ge
0		_				× × × × × × × × × × × × × × × × × × ×	ML	TOPSOIL; dark grey friable with roots SILT with traces of rootlets brownish grey (mottled), fir plasticity, homogeneous	· ;								73			
oprinigatori riii (aba)			SPT 11,15,21 N*=36		2		SP GW	SAND wity traces of rootlet grey, friable Sandy fine to coarse GRA\ coloured, sub-rounded to reloose to medium dense, homogeneous	/EL; grey	/	D					-	87			
			SPT 50 N*=R		3		GW	Sandy silty fine to coarse of brownish, sub-rounded to relose to medium dense, trasilt Medium to coarse GRAVE colour, sub-rounded to rou	ounded, aces of L; greyish	_	VD	_				-		_		
gaacellaly 180			SPT 37,13 N*=R		4		GW	very loose, bedded Sandy fine to medium GRA greyish, sub-angular to rou loose to medium dense, homogeneous		_							100	_		
(···)			SPT 50 N*=R		6		GP	Sandy fine to medium GR/ greyish, sub-angular to rou loose to medium dense, homogeneous, more sand	nded,							_	100	_		
			SPT 50 N*=R		7 8		GW SP GW	Sandy fine to coarse GRAN greyish, sub-rounded to rou loose to medium dense, homogeneous Medium to coarse SAND; g loose, homogeneous	unded,	-						-	100			
AD OB TT W sup N C var • × »>	o tr w pport n ca ne sh rea pe < pe	uger d pen ba iple tu rashbo il asing ear (k mould ak ak gre	arrel be ore		s b N U	coil desidente d	ation s cription in Field aland G amples undistr undistr disturb SPT - : SPT w bulk sa	Description of Soil and Rock, ieotechnical Society Inc 2005 s, tests urbed sample 50mm diameter urbed sample 63mm diameter ed sample sample recovered ith solid cone	water moistu D M W S	on war par cor ure dr m	date s ter infl tial dri nplete y oist	ow II fluid drill flu		\ S F S \ H L	St :: /St :: //St :: //L :: //D :: //	very soft firm stiff very nard very oose medi dens	soft stiff loose		UW SW MW HW CW RS	Intering unweathered slightly weathered moderately weathered rompletely weathered completely weathered residual soil mass strength extremely weak weak weak moderately strong strong extremely strong extremely strong



Vodafone NZ

Principal:

Engineering Log - Machine Borehole

Machine Borehole No. **BH01**

Sheet 2 of 3

GENZCHRI15188 Project No:

7.7.2011 Date started:

7.7.2011 Date completed:

236 Bradleys Road, Ohoka SKK Project: Logged by: Machine Borehole

ocati			mounting:					plan • (DT)	Easting: 24	7/175	m		Slope:	-Q0°	Checked		: face:		IH Vane	No:
			•	VIK				•	· ·										vane	NO:
	-		r: mm ormation	1	D	rilling f		substance	Northing: 57	75972	3 m		Bearing): -	Dati		Grou Ck r	nass defe	ects	
			Jimatioi	_		_	_	material							. 70	H		nass acr		description
method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Soil - Soil type; colour, struct bedding; plasticity, sensitivity. minor components Rock - Colour, fabric, ro discontinuities, additional ir	ure. Grading; Secondary an s. ck type; nformation.	moisture condition	consistency/ density index	weathering alteration	estima streng		25 50 vane shear 100 (remoulded 125 /peak) kPa 175	recovery %	RQD %	defect spacing mm	number, type, roughness description	orientation, sh s, aperture, infil (refer to defect explanation she gene
			SPT 50 N*=R		- - - 9		GW (cont) GP GW	sub-rounded, loose to me dense, homogeneous (cc Fine GRAVEL; greyish, sub-rounded to rounded, medium dense, laminatec Sandy fine to coarse GRA	edium entinued)	D	VD					100				
			SPT		1 <u>0</u>	\times	GW	greyish, sub-angular to sub-rounded, medium der homogeneous Medium to coarse GRAVI greyish, sub-angular to sub-rounded, very loose, homogeneous Sandy fine to coarse GRA greyish, sub-angular to	EL;	M						80				
			50 N*=R		- 11 -		GW	sub-rounded, medium der homogeneous Sandy fine to coarse GRA greyish, sub-angular to sub-rounded, medium der homogeneous	AVEL;							98				
			SPT 39,11 N*=R		1 <u>2</u>	M	GW	Sandy fine to coarse GRA greyish, sub-rounded to romedium dense, homogen to medium sand	ounded,	-						63				
			SPT 5,19,18 N*=37		13 - - - 14		SP GW	Fine SAND; brownish colon medium dense, lensoidal Sandy fine to coarse GRA greyish colour, sub-rounder, medium dense, homogeneous	AVEL;	- /	D	_				100				
			SPT 50 N*=R		1 <u>5</u>		GW	- minor silt Sandy silty fine to coarse grey, sub-rounded to rour loose. Core collected in a sample	nded, very	W	VD									
OB IT W suppor	au op trip wa	en ba ole tu ashbo	be		b N	oil deso ased or lew Zea otes, s	ription Field land G amples undistr	symbols and n Description of Soil and Rock, leotechnical Society Inc 2005 s, tests urbed sample 50mm diameter	water	on wa pai	date s ter infl tial dri	ow II fluid I		\ F S	S soft firm St stiff /St very	soft		SW SW MW HW CW RS	highly we	eathered ly weathered athered ly weathered oil
c vane s ● re × p »× p	cas she rem pea pea	sing ear (k noulde ik ik gre		00kPa	N) * c s	disturb SPT - : SPT w bulk sa	urbed sample 63mm diameter ed sample sample recovered tith solid cone ample nmental sample	moistu D M W S	dr m w	oist	d		\ L M	loos MD med D den	loos le lium	dense	EW VW W	extremely very weal weak moderate strong very stror extremely	weak k ly strong



Vodafone NZ

Principal:

Project:

Engineering Log - Machine Borehole

Machine Borehole No. **BH01**

Sheet 3 of 3

Project No: **GENZCHRI15188**

Date started: **7.7.2011**

Date completed: **7.7.2011**

236 Bradleys Road, Ohoka Logged by: SKK

Machine Borehole
Location: Refer to site plan Checked by: NH

	ach cat			orehole	F	Refe	r to	site	plan								(Chec	ckec	by:			NH		
Dri	ll m	ode	el &	mounting:	VTR	9700-	Track	70mr	m (DT)	Easting: 24	74175	m		Slo	pe: -9	90°			R.L.	Surfa	ce:	m		Vane No):
				r: mm		D	rilling			Northing: 5	75972	3 m		Bea	aring:				Dati	um: G	rour	nd			
dı	illi	ng	inf	ormation	1			-	substance											roc	k m	ass de	_		
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification	material Soil - Soil type; colour, struc bedding; plasticity, sensitivity minor componen Rock - Colour, fabric, r discontinuities, additional	cture. Grading; . Secondary ar its. rock type; information.	moisture condition	consistency/ density index	weathering alteration	est st	imate rength	ed n ss	25	75 Vane Shear 100 (remoulded 125 (2012) 150	150 /peak) KPa 175	recovery %	۶ ۶ ا <u>د</u>	defect spacing mm	numbe rou des	r, type, ori ghness, a cription (re iption expl	scription entation, sha perture, infill efer to defect anation shee
						_		GW (cont)			W	VD													
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AE OI TI W	W washbore support notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample						on wat par cor	/1/98 w date s ter inflo rtial dri mplete	hown ow II fluid	loss	s	VS F St VS H	S t St	stenc	very soft firm stiff very hard	stiff	ndex	UW SW MW HW CW RS	/ sliq / mo / hig / co res k mass st	hly weath npletely v idual soil rength	hered veathered ered veathered				
va		she	ar (k	•)			moist D	ure dr	у				VI L	L		very loos	loose e		EW VW W	/ ve	remely work y weak ak	eak
×	remoulded peak Bs bulk sample N* SPT - sample recovered NC SPT with solid cone Bs bulk sample					M W		oist				M D				lium de	nse	MS S		ak derately s ong	strong				
≫ UT	remoulded Nc SPT with s peak peak greater than 200kPa E environme					nmental sample	S	sa	aturate	d			VI	D		very	dense		VS ES	ve	y strong remely st	rong			

Borelog for well BW24/0297

Grid Reference (NZTM): 1576754 mE, 5210602 mN

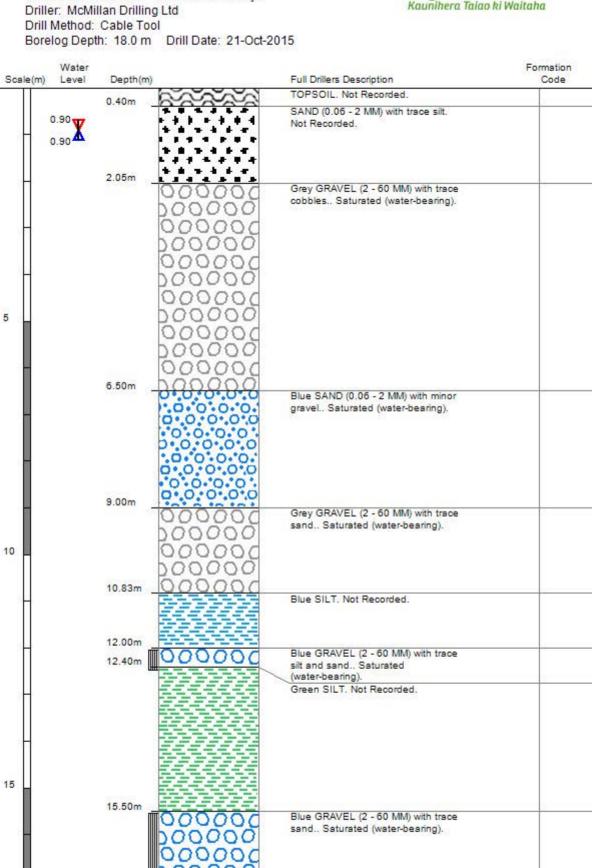
Location Accuracy: 10 - 50m

Ground Level Altitude: m +MSD Accuracy:

17.50m

18.02m





Brown GRAVEL (2 - 60 MM) with some sand.. Not Recorded.

Borelog for well M35/0300 Environment Grid Reference (NZTM): 1565501 mE, 5198781 mN anterbury Location Accuracy: 50 - 300m Regional Council Ground Level Altitude: 23.9 m +MSD Accuracy: < 0.5 m Kaunihera Taiao ki Waitaha Driller: Job Osborne (& Co/Ltd) Drill Method: Unknown Borelog Depth: 114.0 m Drill Date: 07-Dec-1894 Water Formation Scale(m) Level Depth(m) Full Drillers Description Code Topsoil 0.30m 0.30m Topsoi Loose shingle 18.29m 18.29m Loose shingle Hard shingle 24.40m Hard shingle 24.40m Close shingle 59.70m 59.70m Close shingle Hard shingle 70.09m Hard shingle 70.09m Loose shingle 76.19m Loose shingle 76.19m Hard shingle 93.00m 93.00m Hard shingle Loose shingle 97.50m 97.50m Loose shingle Hard shingle

106.70m

106.70m

114.00m

Hard shingle Loose shingle

Borelog for well BW24/0520

Grid Reference (NZTM): 1565685 mE, 5198823 mN



0.20m	Water Scale(m) Level		Full Drillers Description	Formation Code
0.60m		0.20m QQQC	Not Logged GRAVEL (2 - 60 MM). Not Recorded.	
2.40m 2.40m O O O O O O O O O O O O O O O O O O O		0.60m	Not Logged TOPSOIL. Not Recorded.	
2.40m		0=0	MM). Not Recorded.	
5=0=0 0=0=0 0=0=0		2.40m	Not Logged gravelly CLAY. Not Recorded.	
5.00m - S - O -			0 = 0 = 0 = 0 = 0 = 0 = 0 = 0 = 0 = 0 =	

8-	2.4011	000000000000000000000000000000000000000	Not Logged gravelly CLAY. Not Recorded.	
5	5.00m	0-	Not Logged gravelly CLAY, Not Recorded.	
	6.70m	010110110110110110110110110110110110110	Not Logged clayey GRAVEL (2 - 60 MM). Saturated (water-bearing).	

Not Logged clayey GRAVEL (2 - 60 MM), Saturated (water-bearing).

Grou Drille Drill	nd Level er: Clem Method:	ence Drillir Rotary/Pei	m +MSD Accuracy: ng Contractors	Regional Co Kaunihera Taiao ki	
ale(m)	Water Level	Depth(m)		Full Drillers Description	Format
		0.20m	202000	Not Logged GRAVEL (2 - 60 MM). Not Recorded.	
		0.60m		Not Logged TOPSOIL. Not Recorded.	
		8.7		Not Logged clayey GRAVEL (2 - 60 MM). Not Recorded.	
		2.40m	0=0=0	Not Logged gravelly CLAY, Not Recorded.	

8.20m

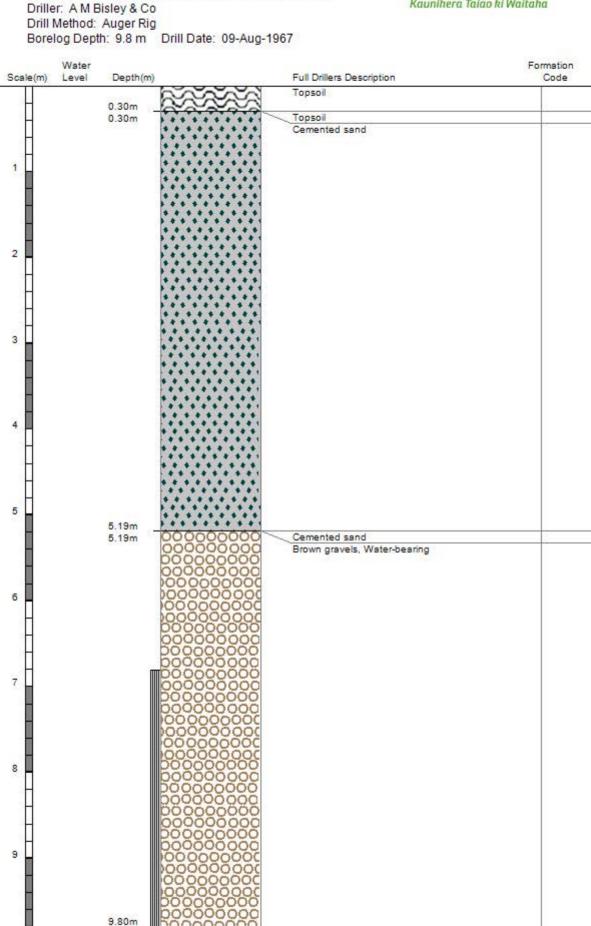
11.22m

Grid Reference (NZTM): 1563949 mE, 5197621 mN

Location Accuracy: 2 - 15m

Ground Level Altitude: 30.8 m +MSD Accuracy: < 0.5 m





Grid Reference (NZTM): 1564502 mE, 5197382 mN

Location Accuracy: 50 - 300m

Ground Level Altitude: 28.1 m +MSD Accuracy: < 0.5 m Driller: A M Bisley & Co

Drill Method: Cable Tool

Borelog Depth: 20.3 m Drill Date:



1.30m	Scale(m)	Water Level	Depth(m)		Full Drillers Description	Formation Code
13.0m			17. (5)(2)	2000	The state of the s	
1.30m				0==0==0==	Topsoil	
1.30m 1.50m	<u> 9</u> 2		4.00	00	Silt and Grey gravel	
1.50m				888888	Silt and Grev gravel	17
1.50m 1.50m				0:0:0::	Yellow clay and gravel	
14.40m 14.40m 15.40m 15.40m 15.40m 19.29m	H		1.50m	0.00	Yellow clay and gravel	3
14.40m 14.40m 15.40m 15.40m 15.40m 16.40m 17.40m 18.40m 19.29m					Medium gr, Brown gravel and sand	
14.40m 14.40m 15.40m 15.40m 15.40m 16.40m 17.40m 18.40m 19.29m				D. O. 10.16		
14.40m 14.40m 15.40m 15.40m 15.40m 16.40m 17.40m 18.40m 19.29m	8			1.0:0:10:		
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14.40m 14.40m 15.40m 15.40m 15.40m 16.40m 17.40m 18.40m 19.29m	1 T			N. O. O.		
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15.40m 16.40m 16				100.00 B	Medium or, Brown gravel and sand	
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15.40m	23367.00		15.40m	[:0::0::0]		
19.29m 19.29m 19.29m 19.29m				000000000	Sandy Grey gravels	
19.29m 19.29m 19.29m 19.29m				000000000	Medium Brown/Grey stained gravel	
19.29m 19.29m 19.29m 19.29m			200	000000000		
19.29m 19.29m 19.29m 19.29m				000000000		
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19.29m Medium Brown/Grey stained gravel Sandy, medium Grey gravels and clay				0000000000		
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19.29m Medium Brown/Grey stained gravel Sandy, medium Grey gravels and clay	- 80		19 29m	0000000000		
Sandy, medium Grey gravels and clay				0.0.0.0	Medium Brown/Grey stained gravel	
20.29m 20.00	20			V	Sandy, medium Grey gravels and clay	
	20		20.29m	1.0:0:0	and the state of t	

Grid Reference (NZTM): 1565596 mE, 5198870 mN

Location Accuracy: 1 - 2m
Ground Level Altitude: 21.1 m +MSD Accuracy: < 0.1 m



Drill Method: Driven Pipe Borelog Depth: 13.0 m Drill Date: 01-Jul-1983					
Wate		n)	Full Drillers Description	Formation Code	
II	0.40	80000	Topsoil		
	0.40m		Blue clay		
1.02	0.80m		Sand and clay	175	
A			Sand and clay		
1.25	1.50m				
		00000000 00000000 00000000 00000000 0000	Bl/Gr gravel		
	4.40m	00000000 00000000 00000000 00000000 0000	Brown stained gravel, Water-bearing		
	5.60m		Brown and gr gravel and sand		
	4.00011	00000000 00000000 00000000 00000000 0000	Med gr gravel, Water-bearing		

13.00m

Borelog for well M35/5609 Environment Grid Reference (NZTM): 1565032 mE, 5198906 mN anterbury Location Accuracy: 2 - 15m Regional Council Ground Level Altitude: 26.4 m +MSD Accuracy: < 0.5 m Kaunihera Taiao ki Waitaha Driller: McMillan Drilling Ltd Drill Method: Cable Tool Borelog Depth: 18.8 m Drill Date: 26-Jan-1989 Formation Water Level Full Drillers Description Code Depth(m) Topsoil 0.30m 0.30m Topsoil Brown silt, Black/Brown small to medium sandy gravels 1.20m 1.20m Brown silt, Black/Brown small to medium sandy gravels Black stained small to medium sandy gravels 3.50m Black stained small to medium sandy 3.50m gravels Medium Brown stained sandy gravels, trace Brown/Yellow clay, wl 2.4 4.19m Medium Brown stained sandy gravels, 4.19m trace Brown/Yellow clay, wl 2.4 Grey/Brown small to medium sandy gravel, odd large stone, Water-bearing, wl 2.4 to end of well 4.80m Grey/Brown small to medium sandy 4.80m gravel, odd large stone. Water-bearing, wl 2.4 to end of well Very sandy Grey/Brown gravels nb 5.40m Very sandy Grey/Brown gravels no Brown and Black stained small to 5.40m medium sandy gravels, Water-bearing

5

9.10m Brown and Black stained small to 9.10m medium sandy gravels, Water-bearing Grey/Brown sandy gravels, trace Brown clay, Water-bearing 9.60m Grey/Brown sandy gravels, trace 9.60m Brown clay, Water-bearing Grey/Brown sandy gravels, Water-bearing

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Grey/Brown sandy gravels,

Grey/Brown sandy gravels, trace Brown clay, Water-bearing

Grey/Brown sandy gravels, trace

Grey/Brown sandy gravels, trace

Grey/Brown sandy gravels, sticky Brown clay, Water-bearing

Grey/Brown sandy gravels, sticky

Grey/Brown sandy gravels, trace Brown clay, Water-bearing Small to medium Brown polished gravels, sandy large lumps, sticky

Small to medium Brown polished

gravels, sandy large lumps, sticky

Grey/Brown small to medium sandy gravels, trace Black stained

Grey/Brown small to medium sandy

gravels, trace Black stained Pea gravels, Grey/Brown and sandy,

Pea gravels, Grey/Brown and sandy,

trace Brown clay, free flowing Small to medium Grey/Brown sandy

Small to medium Grey/Brown sandy

Small to medium Grey/Brown sandy

gravels, trace Brown clay,

gravels, trace Brown clay,

gravels, trace Brown clay, Water-bearing, tighter

Water-bearing

Water-bearing

trace Brown clay, free flowing

Brown clay

Brown clay

Brown clay, Water-bearing Grey/Brown sandy gravels, trace Brown clay, Water-bearing

Brown clay, Water-bearing, very loose

Grey/Brown sandy gravels, trace Brown clay, Water-bearing, very loose

Brown clay, Water-bearing

Water-bearing

10

10.70m

10.70m

11.80m

11.80m

13.20m

13.20m

14.50m

14.50m

15.60m 15.60m

16.10m

16.10m

16.79m

16.79m

17.60m

17.60m

18.00m

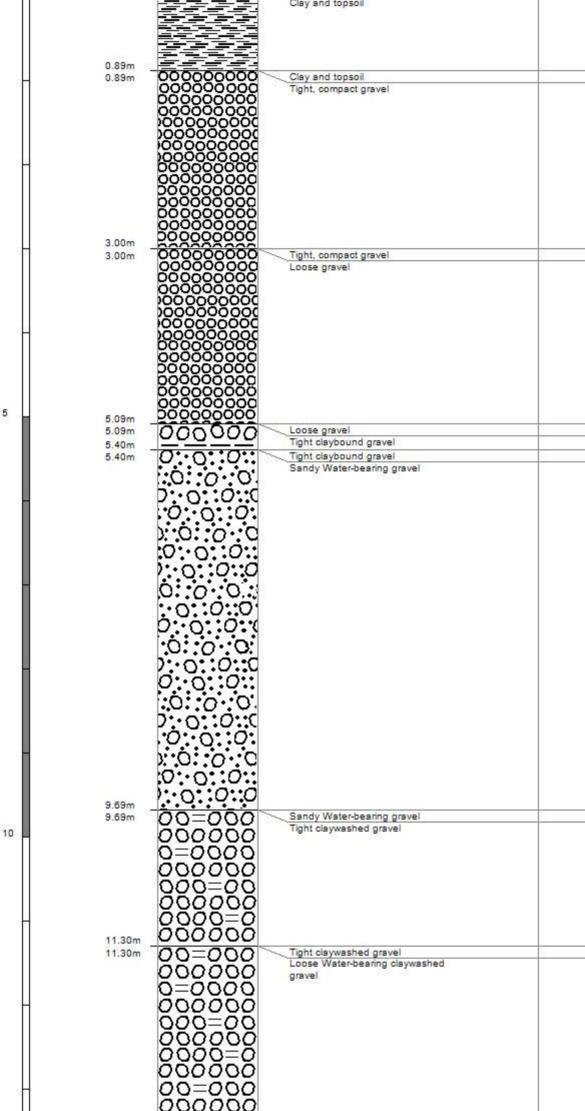
18.00m

18.79m

15

Scale(m)

Borelog for well M35/6483 Environment Grid Reference (NZTM): 1564742 mE, 5197412 mN anterbury Location Accuracy: 50 - 300m Regional Council Ground Level Altitude: 27.1 m +MSD Accuracy: < 0.5 m Kaunihera Taiao ki Waitaha Driller: Clemence Drilling Contractors Drill Method: Cable Tool Borelog Depth: 20.0 m Drill Date: 29-Nov-1990 Water Formation Level Full Drillers Description Code Depth(m) Clay and topsoil 0.89m Clay and topsoil 0.89m Tight, compact gravel 3.00m 3.00m Tight, compact gravel Loose gravel 5.09m 5.09m Loose gravel Tight claybound gravel 5.40m 5.40m Tight claybound gravel Sandy Water-bearing gravel



10 000000 =000C 00000 14.60m 868666 Loose Water-bearing claywashed 14.60m gravel 15 Tight claybound gravel 000000 000000 000000 000000 000000 000000 000000 000000 000000 18.00m Tight claybound gravel 18.00m Good loose Water-bearing gravel

20.00m

Grid Reference (NZTM): 1564192 mE, 5198081 mN

Location Accuracy: 50 - 300m

Ground Level Altitude: 31.0 m +MSD Accuracy: < 0.5 m

18.00m P: 0::0::0

Driller: McMillan Drilling Ltd Drill Method: Cable Tool



		h: 18.0 m	Drill Date: 04-Ma	y-1992	
Scale(m)	Water Level	Depth(m)		Full Drillers Description	Formation Code
TI.		0.40m		Topsoil	
		0.40m		Topsoil	
Ш		5004500 S		Brown clay	
- 11		1.20m _ 1.20m	0.0.0.	Brown clay	
		1.20111	00.0.	Brown sandy gravel and clay	
Щ			.0:0:0		
			0.0.0.		
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Ц		11.80m _	0::0::0::	Brown sandy gravel and clay Brown stained sandy gravel	
			0.00	Brown stained sandy gravel	
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Grid Reference (NZTM): 1564472 mE, 5197322 mN Location Accuracy: 50 - 300m Ground Level Altitude: 28.1 m +MSD Accuracy: < 0.5 m

Environment Canterbury Regional Council

	Water Level	Depth(m)		Full Drillers Description	Formation Code
		0.30m _ 0.30m		Topsoil Topsoil	
		U.30m		Yellow clay	
H		1.00m 1.00m	00=000	Yellow clay	
		111	000000	Heavy claywashed gravel	
			000000		
H			ZŽŽŽŽŽŽ		
			000000		
		0.00	ŎŎŎŎŎŎ		
		3.09m 3.09m	00000000	Heavy claywashed gravel Good loose Water-bearing gravel	
			000000000 000000000 000000000 00000000	Terr 2025 Mater Acquiring Braker	
4			000000000		
			000000000		
			500000000		
			000000000		
			500000000		
		5.90m	000000000	Condition	
1		5.90m	5.55	Good loose Water-bearing gravel Tight sandy claybound gravel	
			.000		
8		7.00m	00.0.	THE THE TAX AND THE PERSON OF	
		7.00m	00000000	Tight sandy claybound gravel Water-bearing gravel	
			000000000000000000000000000000000000000		
		7.90m _ 7.90m	0000000°	Water-bearing gravel Tight silty claywashed gravel	
			000000	right only daywaaried gravel	
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			00000000		
Ц		14.00m	0000000000	C	
		14.00m	000000	Good loose well sorted gravel Tighter silty heavy claywashed gravel	
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		22.40m	00=000		
		22.40m	00=000	Tighter silty heavy claywashed gravel Good Water-bearing claywashed	- 1
			N-20000	gravel	

Grid Reference (NZTM): 1563865 mE, 5197951 mN

Location Accuracy: 50 - 300m Ground Level Altitude: 32.0 m +MSD Accuracy: < 2.5 m

Driller: Clemence Drilling Contractors Drill Method: Rotary/Percussion



Scale(m)	Water Level	Depth(m)		Full Drillers Description	Formation Code
		0.50m	2222	top soil	
H		1.50		solid yellow clay	
3 <u>-</u> 9 5		1.50m _	0:0:0:0: :0:0:0:0:0:0:0:0:0:0:0:0:0:0:0	sandy gravel	
		3.70m	9.9.9.		
H		4.00m	000000	silty claybound gravel claywashed gravel	6
		4.55m	000-000		
5		5.50m	000000000	poor water-bearing gravel	
		5.80m	9: 0::9::	sandy claywashed gravel	
				very sandy water-bearing gravel	
10		8.20m _	000000000000000000000000000000000000000	orange water-bearing gravel	
15		15.10m		very sandy water-bearing gravel	
			00000000 00000000 00000000 00000000 0000	better water-bearing gravel	
			000000000	orange water-bearing gravel	
20		18.80m _	00000000 00000000 00000000 00000000 0000	lightly stained water-bearing gravel	

23.16m