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)

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New Zealand

Auckland
Wellington
Christchurch

chapman tripp

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.

2 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).

3 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*).

5 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

6 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

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

SUMMARY OF EVIDENCE

8 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

12 Based on my assessment in **Appendix 1**, the Site is considered geotechnically suitable for rezoning and future subdivision.

13 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.

14 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

15 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.

Dated: 5 March 2024

_____

Chris Thompson

APPENDIX 1

535 Mill Road, Ohoka

Geotechnical Assessment Report

Rolleston Industrial Developments Ltd

Reference: 773-CHCGE288040

1 June 2021

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

Revision history

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

Distribution

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

EXECUTIVE SUMMARY[1]

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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APPENDICES

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.

3. 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.

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/.

5. SITE PERFORMANCE

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

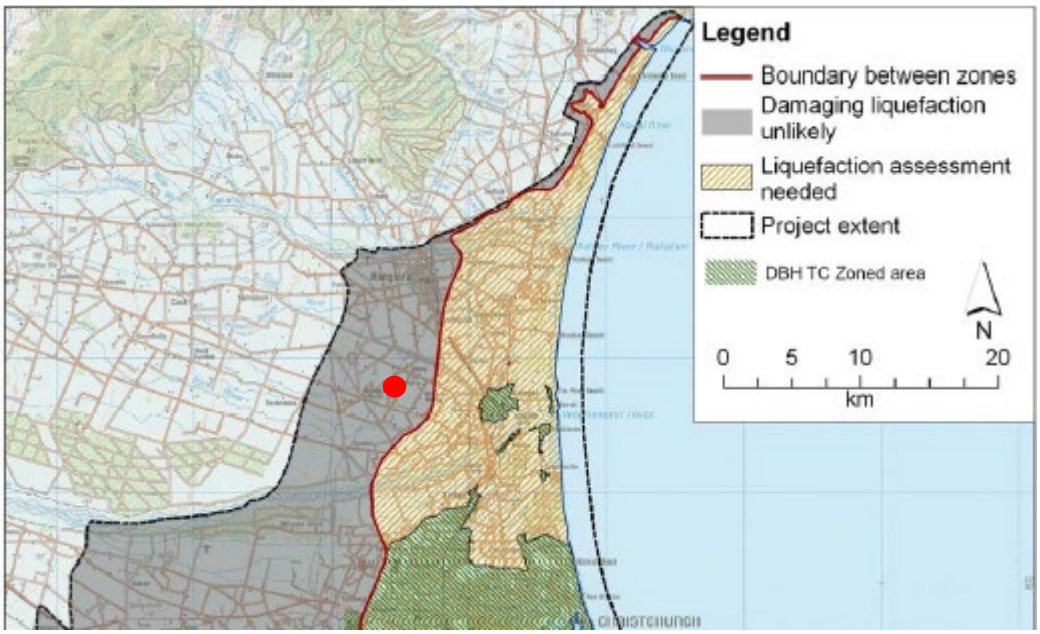


Figure 1: Extract from ECan liquefaction report (site location marked with red dot)

6. GROUND MODEL

6.1 GEOLOGY

The geological map[3] 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.

[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.

7. 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.

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

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.

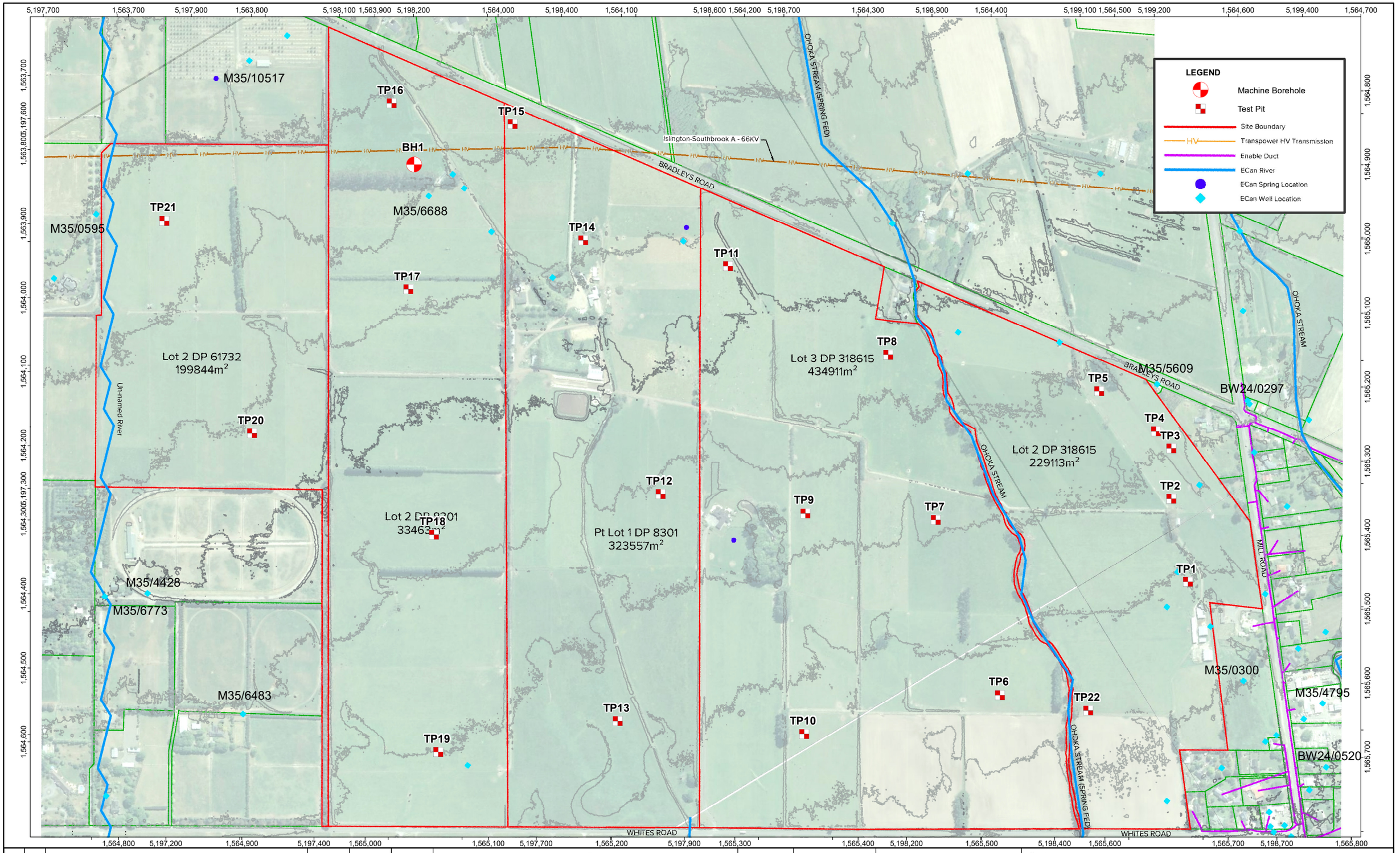
Rely on Tetra Tech Coffey for additional assistance

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



revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	CT	14.05.21

0 60 120 180 240
SCALE 1:5,500 (A3) METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

drawn	RZ
approved	CT
date	14.05.2021
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: ROLLESTON INDUSTRIAL DEVELOPMENT LTD.

project: 535 MILL ROAD, OHOKA

title: SITE PLAN

project no: 288040 | figure no: 01 | rev: A

MXD ref: 288040_01_GIS001_1

APPENDIX B: INVESTIGATION DATA

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP01***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N		▶			0		ML	**SILT**: low plasticity, brown, with trace of rootlets.	D				**TOPSOIL**
					0.5		ML	**SILT**: low plasticity, brown-grey with orange mottling.		St - VSt			**QUATERNARY ALLUVIUM**
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey with orange mottling.	W	MD - D			
					1.5				S				
								Excavation TP01 terminated at 1.7 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP02***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N		▶			0		ML	**SILT**: low plasticity, brown.	D				**FILL**
					0.5		ML	**Clayey SILT**: low - medium plasticity, pale brown with orange mottling.					**QUATERNARY ALLUVIUM**
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey-brown.	W				
					1.5				S				
					2.0			Excavation TP02 terminated at 1.9 m Target depth					
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP03***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:

drill model: Hitachi 14t, Track mounted | drilling fluid: Swamp Bucket | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N					0.0		ML	**SILT**: low plasticity, brown.	D				**FILL**
							GP	**Sandy GRAVEL**: brown-grey.					
							ML	**Clayey SILT**: medium plasticity, grey with orange mottling.					
			VS 150/ 40 kPa		0.5		ML	**Clayey SILT**: low to medium plasticity, grey-brown with orange mottling.		VSt	⊕ ⊙		**QUATERNARY ALLUVIUM**
			VS 120/ 21 kPa		1.0				W - S		⊕ ⊙		
		▶			1.5		GW	**Sandy GRAVEL**: medium to coarse grained, grey-brown, with trace of cobbles.	S				
					2.0			Excavation TP03 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								

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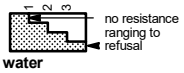
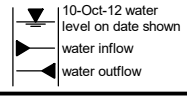
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP04***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration (1 2 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 (kPa) ⊕ remoulded ⊙ peak (50 100 150 200)	DCP (blows/ 100 mm) (2 4 6 8 10)	structure and additional observations
E N		Not Encountered	VS 203/ 53 kPa		0.5		GP	**SILTY GRAVEL**: medium to coarse grained, pale brown, with trace of cobbles.	M				**FILL**
							GW	**SILTY GRAVEL**: medium to coarse grained, pale brown.					
							ML	**Clayey SILT**: low to medium plasticity, grey-brown with orange mottling.		VSt - H	⊕ ⊙		**QUATERNARY ALLUVIUM**
					1.0			Excavation TP04 terminated at 0.6 m Target depth					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration (1 2 3) no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP05***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N					0		ML	**SILT**: low plasticity, pale brown.	D				**TOPSOIL**
E N			VS 81/ 33 kPa		0.5		ML	**Clayey SILT**: medium plasticity, grey-brown with orange mottling.		St	⊕⊙		**QUATERNARY ALLUVIUM**
E N					1.0		ML	**SILTY GRAVEL**: medium to coarse grained, grey with orange staining.		D			
E N					1.5			Excavation TP05 terminated at 1.0 m Target depth					DCP 1.0 - 1.1m: Refusal
					2.0								
					2.5								
					3.0								
					3.5								

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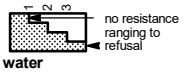
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

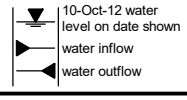
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP06***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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 (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
E N		Not Encountered	VS 156/ 42 kPa		0.0		ML	**SILT**: low plasticity, brown, with trace of rootlets.	D				**TOPSOIL**
					0.5		ML	**Clayey SILT**: medium plasticity, pale grey with orange mottling.	M	VSt	⊕ ⊙		**QUATERNARY ALLUVIUM**
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey-brown with orange staining.		D			DCP 0.8 - 0.9m: Refusal
					1.5			Excavation TP06 terminated at 1.6 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP07***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N					0		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.	M	VSt - H	VS UTP		**QUATERNARY ALLUVIUM**
		▶			1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey, with trace of cobbles.	W S				
					1.5			Excavation TP07 terminated at 1.6 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP08***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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 (kPa) ⊕ remoulded ⊙ peak (50 100 150 200)	DCP (blows/ 100 mm) (2 4 6 8 10)	structure and additional observations
E N		Not Encountered			0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
			VS 75/ 30 kPa		0.5		ML	**Clayey SILT**: medium plasticity, grey with orange mottling.	W	St - VSt	⊕⊙		**QUATERNARY ALLUVIUM**
			VS 165/ 33 kPa		1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey-brown, with trace of cobbles.	S	D	⊕ ⊙		DCP: 1.0 - 1.1m: Refusal
					1.5								
					2.0			Excavation TP08 terminated at 1.7 m Target depth					
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP09***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N					0.0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
			VS 114/ 31 kPa		0.5		ML	**Clayey SILT**: medium plasticity, pale grey-brown with orange staining.		St - VSt	⊕ ⊙		**QUATERNARY ALLUVIUM**
			VS 141/ 42 kPa		1.0				W		⊕ ⊙		
		▶			1.5		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								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP10***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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 (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
E, N					0		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		⊕ ⊙		
		▶			1.0		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								

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: NON CORED + DCP CHCGE288040 GINT.GPJ <<DrawingFile>> 24/05/2021 12:06

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP11***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration (1 2 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 (kPa) ⊕ remouded ⊙ peak (50 100 150 200)	DCP (blows/ 100 mm) (2 4 6 8 10)	structure and additional observations
E N		▶	VS 156/ 39 kPa		0.5		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
							ML	**Clayey SILT**: medium plasticity, grey-brown with orange mottling.		VSt	⊕ ⊙		**QUATERNARY ALLUVIUM**
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey with orange staining.	W / S				
					1.5			Excavation TP11 terminated at 1.2 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration (1 2 3) no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP12***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E, N		▶			0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
			VS 124/ 43 kPa		0.5		ML	**Clayey SILT**: medium plasticity, brown-grey with orange staining.		VSt	⊕ ⊙		**QUATERNARY ALLUVIUM**
			VS 113/ 18 kPa		1.0						⊕ ⊙		DCP 1.0 - 1.1: Refusal
							GW	**Sandy GRAVEL**: medium to coarse grained, grey with orange staining.	W				
					1.5				S				
								Excavation TP12 terminated at 1.6 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP13***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

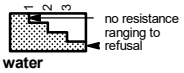
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (**SOIL NAME**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
E, N		Not Encountered			0.0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
			VS UTP		0.5		ML	**Clayey SILT**: low to medium plasticity, grey with orange mottling.		VSt - H	VS UTP		**QUATERNARY ALLUVIUM**
			VS UTP								VS UTP		
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey with orange staining, and trace of cobbles.	W				
					1.25			Excavation TP13 terminated at 1.25 m Target depth					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

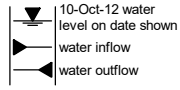
support
- M mud
- C casing
- N nil

penetration



no resistance ranging to refusal

water


10-Oct-12 water level on date shown
water inflow
water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP14***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***05 May 2021***
principal:	***-***
date completed:	***05 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N		Not Encountered	VS UTP		0.0		ML	**SILT**: low plasticity, brown.	D				**TOPSOIL**
					0.5		ML	**Clayey SILT**: low to medium plasticity, grey-brown with orange mottling.	W - M	VSt - H	VS UTP		**QUATERNARY ALLUVIUM**
					1.0		SP	**SILTY SAND**: medium grained, yellow-brown with orange staining.	S				
							GW	**Sandy GRAVEL**: medium to coarse grained, brown-grey.					
					1.5			Excavation TP14 terminated at 1.5 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP15***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***06 May 2021***
principal:	***-***
date completed:	***06 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N		Not Encountered	VS 209/ 62 kPa		0.0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
					0.5		ML	**Clayey SILT**: medium plasticity, grey with orange mottling.		VSt - H	⊕ ⊙		**QUATERNARY ALLUVIUM**
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey with orange staining, and trace of cobbles.	M / S				
					1.5			Excavation TP15 terminated at 1.5 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP16***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***06 May 2021***
principal:	***-***
date completed:	***06 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N					0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
			VS 166/ 67 kPa		0.5		ML	**Clayey SILT**: low to medium plasticity, pale grey with orange mottling.		VSt	⊕ ⊙		**QUATERNARY ALLUVIUM**
			VS 106/ 60 kPa		1.0					F	⊕ ⊙		
			VS 54/ 21 kPa						W		⊕		
		▶			1.5		GW	**Sandy GRAVEL**: medium to coarse grained, grey with orange staining, and trace of cobbles.	S				
								Excavation TP16 terminated at 1.7 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP17***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***06 May 2021***
principal:	***-***
date completed:	***06 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N		Not Encountered	VS 209/ 33 kPa		0.0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
					0.5		ML	**Clayey SILT**: low to medium plasticity, grey with orange mottling.		VSt - H	⊕ ⊙		**QUATERNARY ALLUVIUM**
							GW	**Sandy GRAVEL**: medium to coarse grained, grey with orange staining, and trace of cobbles.					
					1.0			Excavation TP17 terminated at 1.0 m Target depth					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP18***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***06 May 2021***
principal:	***-***
date completed:	***06 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

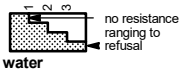
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (**SOIL NAME**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊙ peak (kPa) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N		Not Encountered	VS 70/ 34 kPa		0.0		ML	**SILT**: low plasticity, brown.	M				
					0.5		ML	**Clayey SILT**: medium plasticity, grey with orange mottling.		St	⊕⊙		
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey with orange staining.					
								Excavation TP18 terminated at 1.2 m Target depth					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

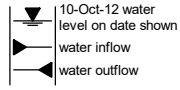
support
- M mud
- C casing
- N nil

penetration



no resistance ranging to refusal

water


10-Oct-12 water level on date shown
water inflow
water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP19***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***06 May 2021***
principal:	***-***
date completed:	***06 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N		Not Encountered			0.0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
			VS UTP		0.5		ML	**Clayey SILT**: low to medium plasticity, grey with orange staining.		VSt - H	VS UTP		**QUATERNARY ALLUVIUM**
			VS UTP		1.0		GW	**Sandy GRAVEL**: medium to coarse grained, brown-grey with orange staining.		D	VS UTP		
					1.5			Excavation TP19 terminated at 1.4 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP20***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***06 May 2021***
principal:	***-***
date completed:	***06 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E, N		Not Encountered			0.0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
			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		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								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration 1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP21***
sheet:	1 of 1
project no.	***773-CHCGE288040***
client:	***Rolleston Industrial Developments Limited***
date started:	***06 May 2021***
principal:	***-***
date completed:	***06 May 2021***
project:	***535 Mill Road***
logged by:	***B. Chau***
location:	***Ohoka, Christchurch 7676***
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 | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N		Not Encountered	VS 151/ 60 kPa		0.0		ML	**SILT**: low plasticity, brown.	M				
					0.5		ML	**Clayey SILT**: low to medium plasticity, grey-brown with orange mottling.		VSt	⊕ ⊙		
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey-brown with orange staining, and trace of cobbles.					
					1.5			Excavation TP21 terminated at 1.6 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
- D dense
- VD very dense

TETRA TECH COFFEY

Engineering Log - Excavation

Borehole ID.	***TP22***
sheet:	1 of 1
project no.	***773-CHCGE288040***
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***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.: -

drill model: Hitachi 14t, Track mounted | drilling fluid: Swamp Bucket | hole diameter : | vane id.: 1508

drilling information | **material substance**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E N					0		ML	**SILT**: low plasticity, brown.	M				**TOPSOIL**
					0.5		ML	**Clayey SILT**: medium plasticity, grey with orange mottling.		St - VSt			**QUATERNARY ALLUVIUM**
					1.0		GW	**Sandy GRAVEL**: medium to coarse grained, grey-brown with orange staining.	W	D			DCP 1.0 - 1.1m: Refusal
									S				
					1.5			Excavation TP22 terminated at 1.4 m Target depth					
					2.0								
					2.5								
					3.0								
					3.5								

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid 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
D	dense
VD	very dense

coffey geotechnics

Machine Borehole No. **BH01**

Engineering Log - Machine Borehole

Sheet 1 of 3

Project No: **GENZCHRI15188**

Client: **Vodafone NZ**

Date started: **7.7.2011**

Principal:

Date completed: **7.7.2011**

Project: **236 Bradleys Road, Ohoka**

Logged by: **SKK**

Machine Borehole Location: **Refer to site plan**

Checked by: **NH**

Drill model & mounting: VTR9700-Track 70mm (DT) | Easting: 2474175 m | Slope: -90° | R.L. Surface: m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 5759723 m | Bearing: | Datum: Ground

drilling information							material substance										rock mass defects				
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
Topsoil									TOPSOIL; No core from 0.00 to 0.40m	M	F										
									TOPSOIL; dark grey friable topsoil with roots												
Springston Fm (sps)						1		ML	SILT with traces of rootlets; brownish grey (mottled), firm, low plasticity, homogeneous						73						
				SPT 11,15,21 N*=36				SP GW	SAND wity traces of rootlets; bluesh grey, friable		D										
						2			Sandy fine to coarse GRAVEL; grey coloured, sub-rounded to rounded, loose to medium dense, homogeneous						87						
				SPT 50 N*=R		3		GW	Sandy silty fine to coarse GRAVEL; brownish, sub-rounded to rounded, loose to medium dense, traces of silt		VD										
Burnham Formation (nh) of Quaternary Age								GP	Medium to coarse GRAVEL; greyish colour, sub-rounded to rounded, very loose, bedded						100						
						4		GW	Sandy fine to medium GRAVEL; greyish, sub-angular to rounded, loose to medium dense, homogeneous												
				SPT 37,13 N*=R		5															
				SPT 50 N*=R		6		GP	Sandy fine to medium GRAVEL; greyish, sub-angular to rounded, loose to medium dense, homogeneous, more sandy						100						
						7		GW	Sandy fine to coarse GRAVEL; greyish, sub-rounded to rounded, loose to medium dense, homogeneous						100						
				SPT 50 N*=R				SP	Medium to coarse SAND; greyish, loose, homogeneous						100						
						8		GW													

method
AD auger drilling
OB open barrel
TT triple tube
W washbore

support
N nil
C casing

vane shear (kPa)
● remoulded
× peak
>>× peak greater than 200kPa
UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
U_{50} undisturbed sample 50mm diameter
U_{63} undisturbed sample 63mm diameter
D disturbed sample
N* SPT - sample recovered
Nc SPT with solid cone
Bs bulk sample
E environmental sample

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss

moisture
D dry
M moist
W wet
S saturated

consistency/ density index
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
VL very loose
L loose
MD medium dense
D dense
VD very dense

weathering
UW unweathered
SW slightly weathered
MW moderately weathered
HW highly weathered
CW completely weathered
RS residual soil

rock mass strength
EW extremely weak
VW very weak
W weak
MS moderately strong
S strong
VS very strong
ES extremely strong

MACHINE BOREHOLE GENZCHRI15188.GPJ COFFEY.GDT 2.9.11

Form GEO 5.3 Rev.6

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Engineering Log - Machine Borehole

Machine Borehole No.	**BH01**
Sheet	2 of 3
Project No:	**GENZCHRI15188**

Client:	*Vodafone NZ*	Date started:	*7.7.2011*
Principal:		Date completed:	*7.7.2011*
Project:	*236 Bradleys Road, Ohoka*	Logged by:	*SKK*
Machine Borehole Location:	*Refer to site plan*	Checked by:	*NH*

Drill model & mounting: VTR9700-Track 70mm (DT) | Easting: 2474175 m | Slope: -90° | R.L. Surface: m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 5759723 m | Bearing: | Datum: Ground

drilling information (stratigraphy; method; support; water; notes samples, tests, etc; RL; depth metres) | **material substance** (graphic log core recovery; classification symbol; material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.; moisture condition; consistency/density index; weathering alteration; estimated strength EW VW W MS S VS ES; vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175) | **rock mass defects** (recovery %; RQD %; defect spacing mm 30 100 300 1000 3000; defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular general)

Stratigraphy: **Burnham Formation (nh) of Quaternary Age**

notes, samples, tests, etc	depth (m)	classification symbol	material	moisture condition	consistency/ density index	recovery %
		GW (cont)	Sandy fine to coarse GRAVEL; greyish, sub-angular to sub-rounded, loose to medium dense, homogeneous *(continued)*	M	VD	100
		GP				
		GW	Fine GRAVEL; greyish, sub-rounded to rounded, loose to medium dense, laminated			
SPT 50 N*=R	9	GP	Sandy fine to coarse GRAVEL; greyish, sub-angular to sub-rounded, medium dense, homogeneous	D		80
				M		
		GW	Medium to coarse GRAVEL; greyish, sub-angular to sub-rounded, very loose, homogeneous			
	10		Sandy fine to coarse GRAVEL; greyish, sub-angular to sub-rounded, medium dense, homogeneous			
SPT 50 N*=R		GW	Sandy fine to coarse GRAVEL; greyish, sub-angular to sub-rounded, medium dense, homogeneous			86
	11					
SPT 39,11 N*=R	12	GW	Sandy fine to coarse GRAVEL; greyish, sub-rounded to rounded, medium dense, homogeneous, fine to medium sand			93
	13					
SPT 5,19,18 N*=37		SP	Fine SAND; brownish colour, medium dense, lensoidal		D	100
	14	GW	Sandy fine to coarse GRAVEL; greyish colour, sub-rounded to rounded, medium dense, homogeneous - minor silt			
SPT 50 N*=R	15	GW	Sandy silty fine to coarse GRAVEL; grey, sub-rounded to rounded, very loose. Core collected in a sample bag	W	VD	
	16					

MACHINE BOREHOLE GENZCHRI15188.GPJ COFFEY.GDT 2.9.11

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Form GEO 5.3 Rev.6

coffey geotechnics

Machine Borehole No. **BH01**

Engineering Log - Machine Borehole

Sheet 3 of 3

Project No: ***GENZCHRI15188***

Client: ***Vodafone NZ***

Date started: ***7.7.2011***

Principal:

Date completed: ***7.7.2011***

Project: ***236 Bradleys Road, Ohoka***

Logged by: ***SKK***

Machine Borehole Location: ***Refer to site plan***

Checked by: ***NH***

Drill model & mounting: VTR9700-Track 70mm (DT) | Easting: 2474175 m | Slope: -90° | R.L. Surface: m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 5759723 m | Bearing: | Datum: Ground

drilling information							material substance							rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
								GW (cont)		W	VD						
									BH01 terminated at 16.5 metres.								
						17											
						18											
						19											
						20											
						21											
						22											
						23											
						24											

method
- **AD** auger drilling
- **OB** open barrel
- **TT** triple tube
- **W** washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- **UTP** unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

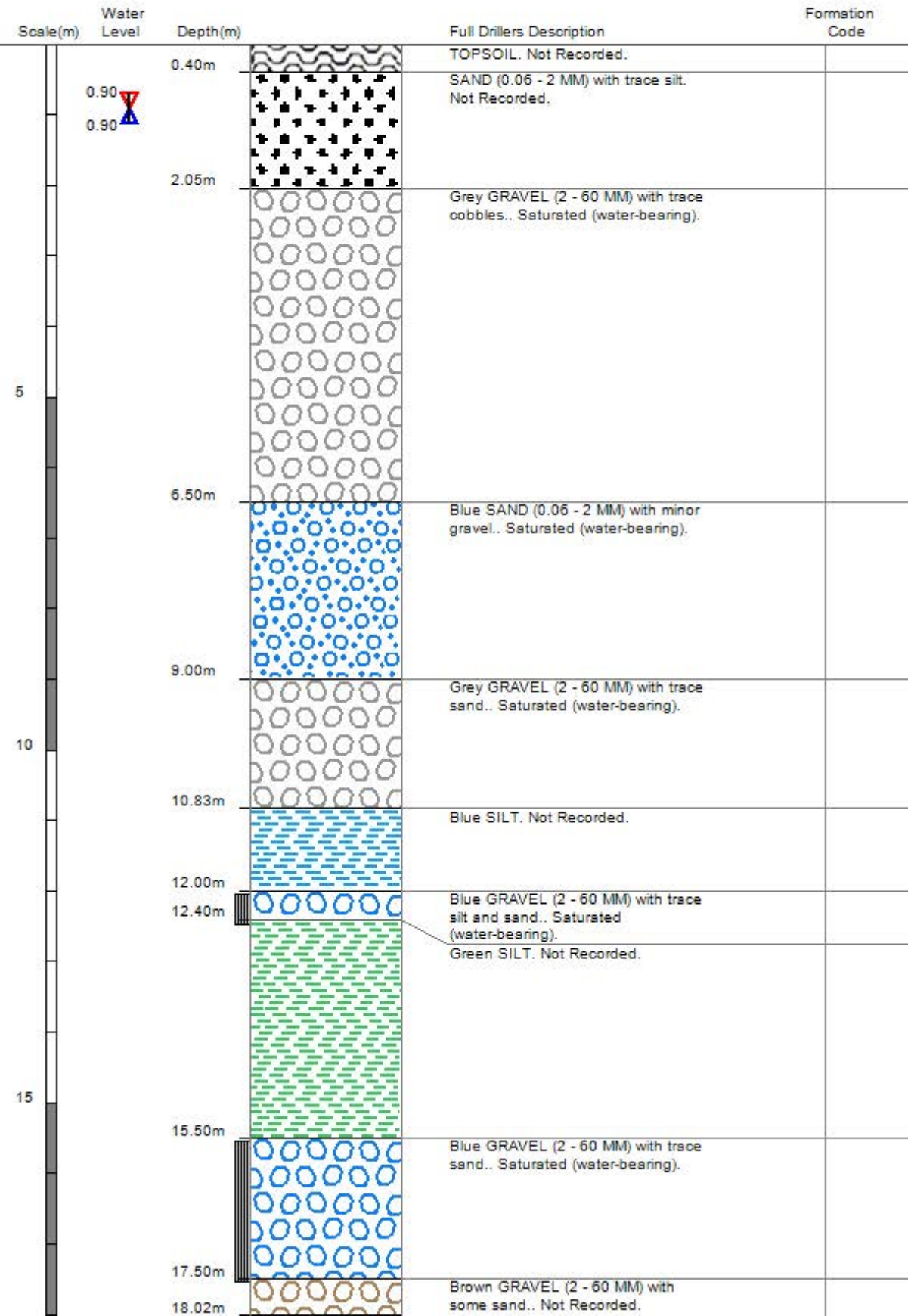
weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Borelog for well BW24/0297

Grid Reference (NZTM): 1576754 mE, 5210602 mN
Location Accuracy: 10 - 50m
Ground Level Altitude: m +MSD Accuracy:
Driller: McMillan Drilling Ltd
Drill Method: Cable Tool
Borelog Depth: 18.0 m Drill Date: 21-Oct-2015

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/0300

Grid Reference (NZTM): 1565501 mE, 5198781 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 23.9 m +MSD Accuracy: < 0.5 m
Driller: Job Osborne (& Co/Ltd)
Drill Method: Unknown
Borelog Depth: 114.0 m Drill Date: 07-Dec-1894

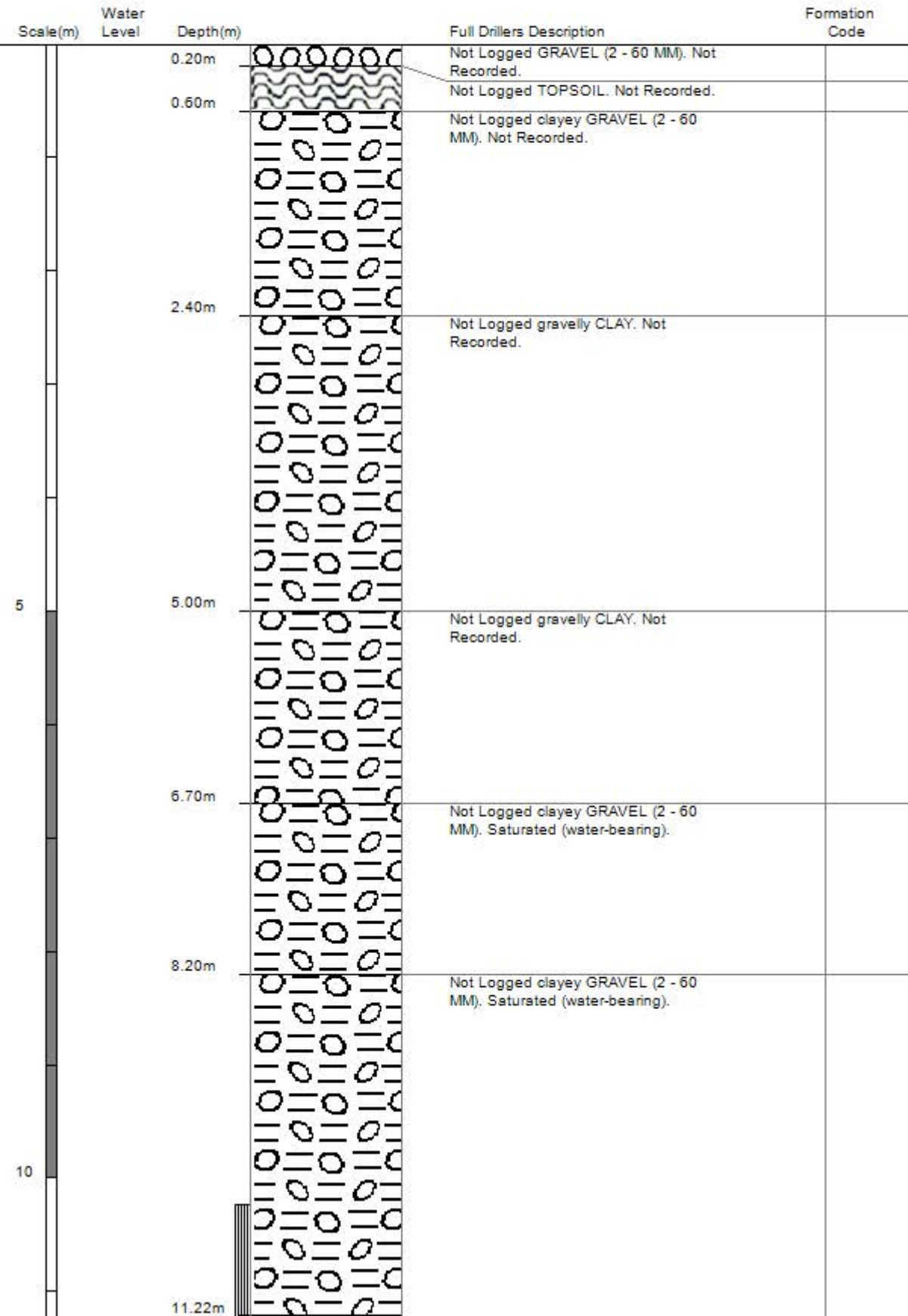
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
		0.30m	Topsoil	
		0.30m	Topsoil	
			Loose shingle	
		18.29m	Loose shingle	
		18.29m	Hard shingle	
		24.40m	Hard shingle	
		24.40m	Close shingle	
		59.70m	Close shingle	
		59.70m	Hard shingle	
		70.09m	Hard shingle	
		70.09m	Loose shingle	
		76.19m	Loose shingle	
		76.19m	Hard shingle	
		93.00m	Hard shingle	
		93.00m	Loose shingle	
		97.50m	Loose shingle	
		97.50m	Hard shingle	
		106.70m	Hard shingle	
		106.70m	Loose shingle	
		114.00m		

Borelog for well BW24/0520

Grid Reference (NZTM): 1565685 mE, 5198823 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: m +MSD Accuracy:
Driller: Clemence Drilling Contractors
Drill Method: Rotary/Percussion
Borelog Depth: 11.2 m Drill Date: 05-Mar-2019

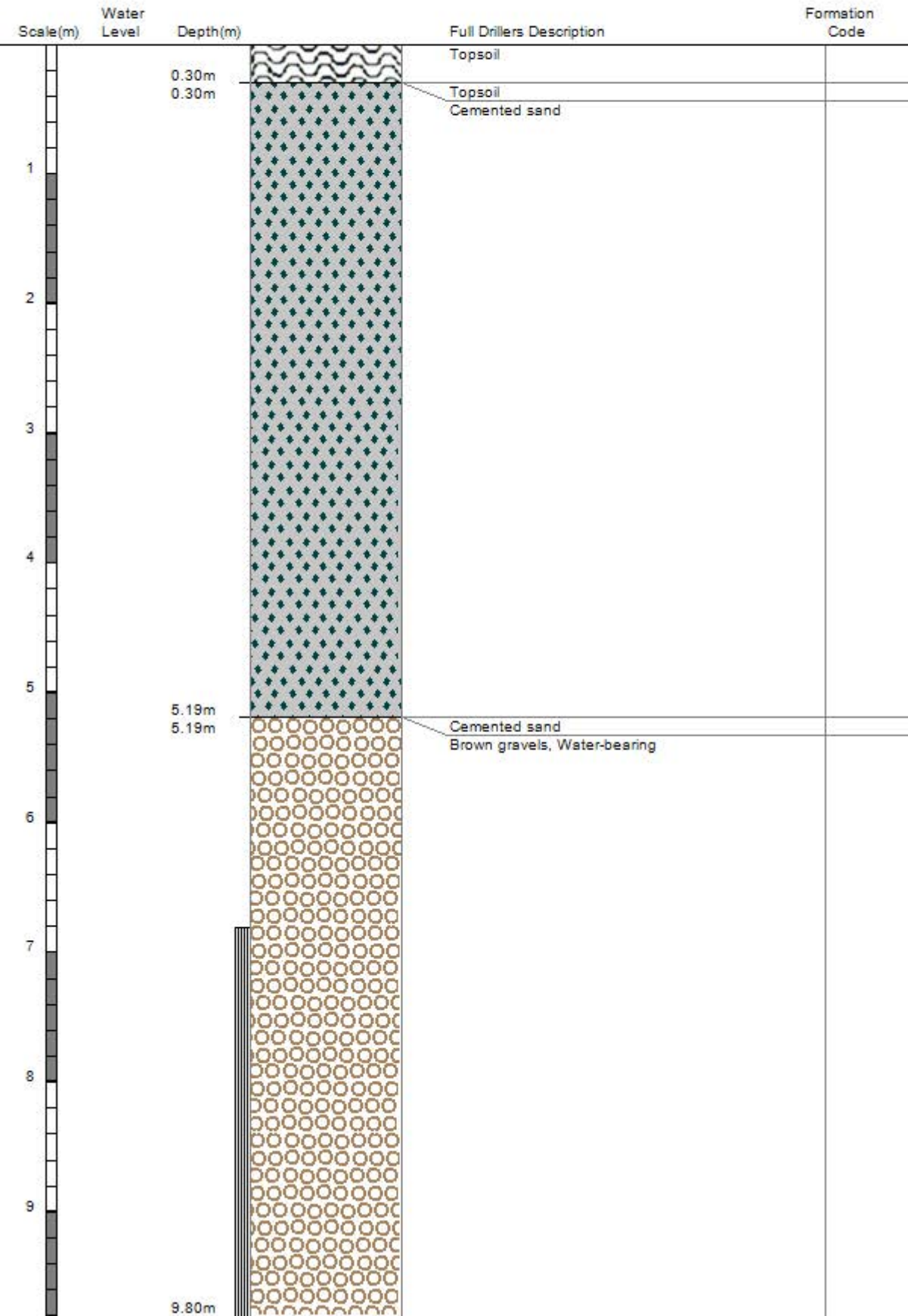
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/0595

Grid Reference (NZTM): 1563949 mE, 5197621 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 30.8 m +MSD Accuracy: < 0.5 m
Driller: A M Bisley & Co
Drill Method: Auger Rig
Borelog Depth: 9.8 m Drill Date: 09-Aug-1967

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/4428

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:

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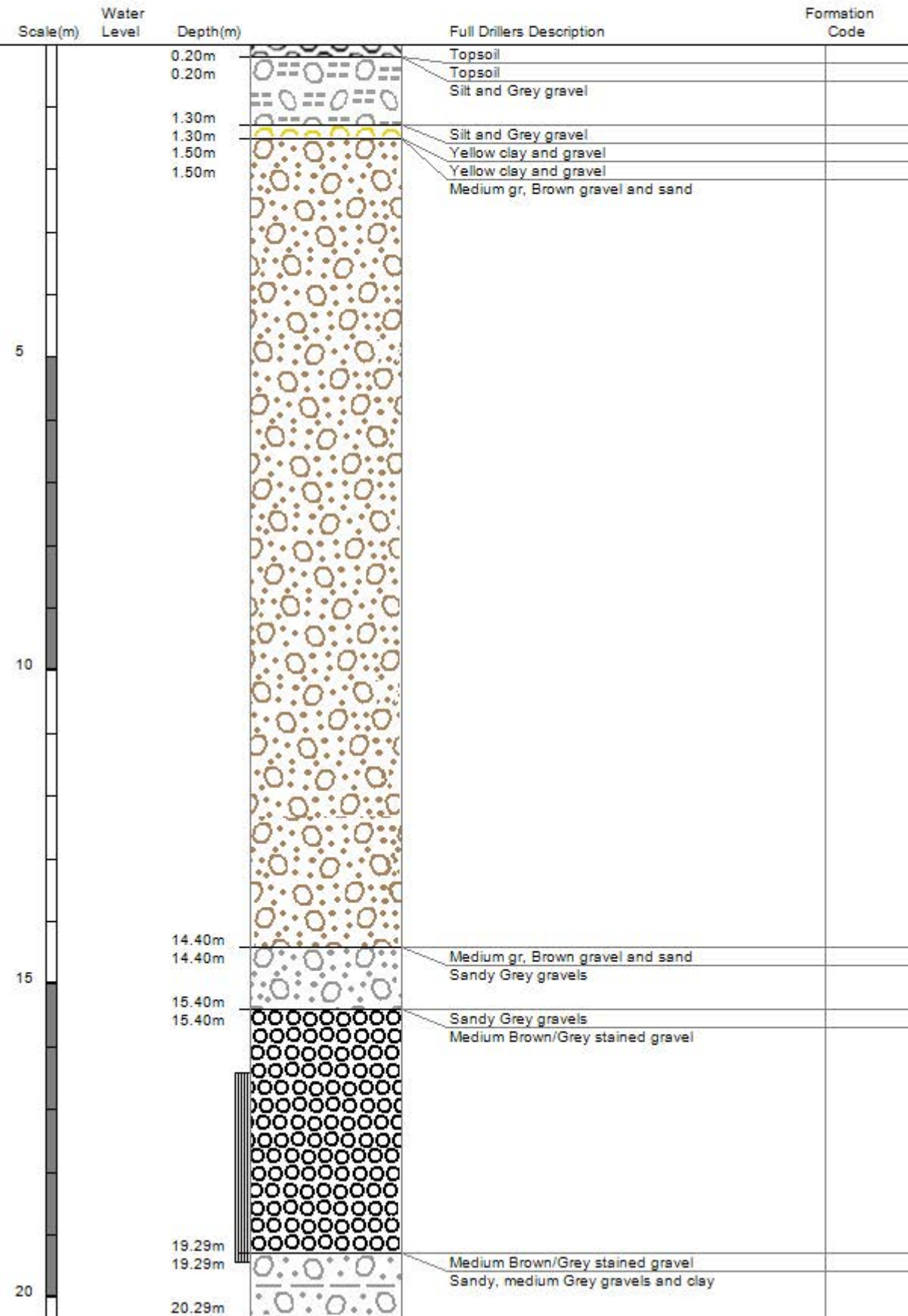

Borelog for well M35/4795

Grid Reference (NZTM): 1565596 mE, 5198870 mN
Location Accuracy: 1 - 2m
Ground Level Altitude: 21.1 m +MSD Accuracy: < 0.1 m
Driller: A M Bisley & Co
Drill Method: Driven Pipe
Borelog Depth: 13.0 m Drill Date: 01-Jul-1983

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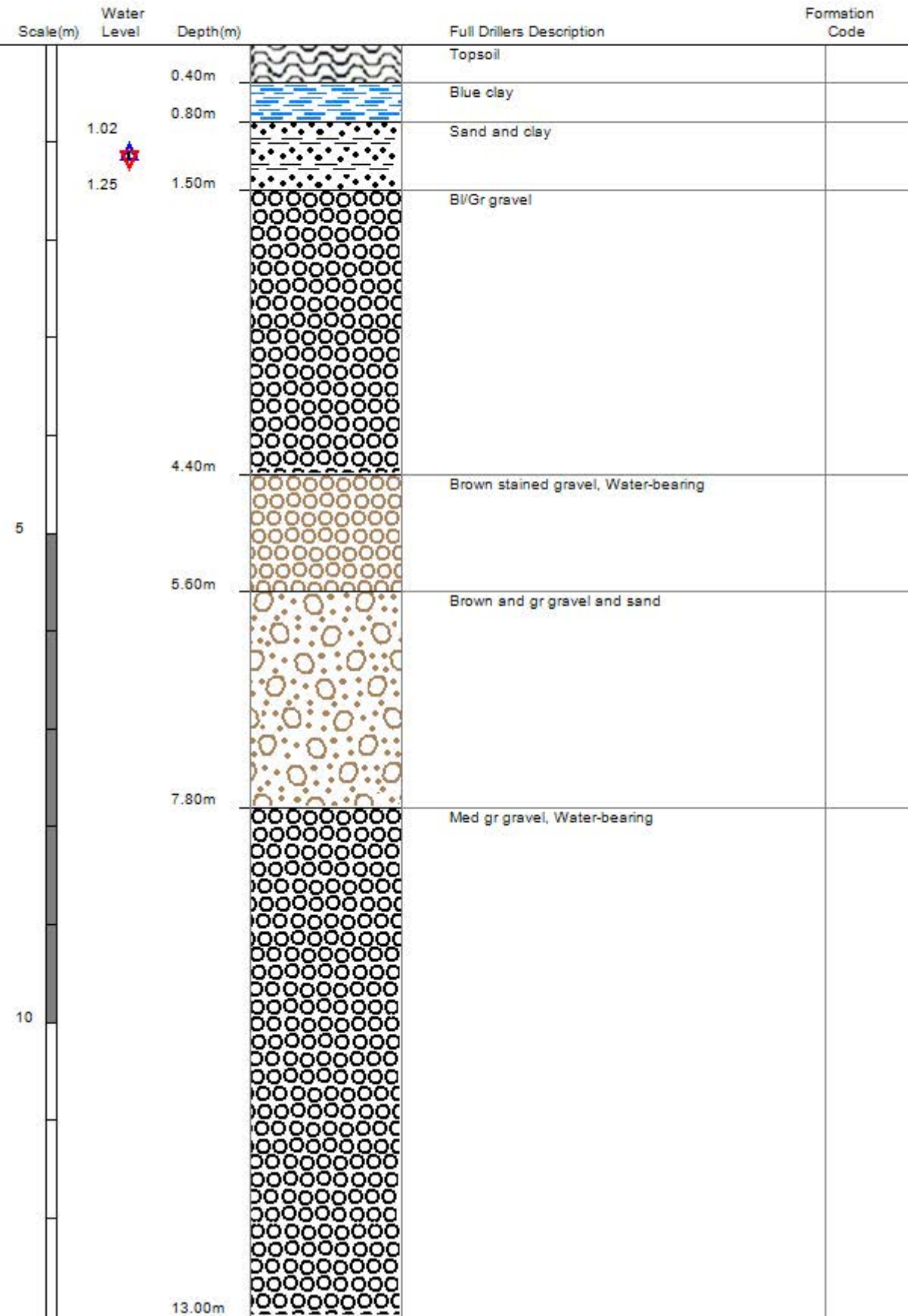

Borelog for well M35/5609

Grid Reference (NZTM): 1565032 mE, 5198906 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 26.4 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Cable Tool
Borelog Depth: 18.8 m Drill Date: 26-Jan-1989

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Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
			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		
		3.50m	Black stained small to medium sandy gravels	
			Medium Brown stained sandy gravels, trace Brown/Yellow clay, wl 2.4	
		4.19m		
		4.19m	Medium Brown stained sandy gravels, 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		
		4.80m	Grey/Brown small to medium sandy gravel, odd large stone, Water-bearing, wl 2.4 to end of well	
5			Very sandy Grey/Brown gravels nb	
		5.40m		
		5.40m	Very sandy Grey/Brown gravels nb	
			Brown and Black stained small to medium sandy gravels, Water-bearing	
		9.10m		
		9.10m	Brown and Black stained small to medium sandy gravels, Water-bearing	
			Grey/Brown sandy gravels, trace Brown clay, Water-bearing	
		9.60m		
		9.60m	Grey/Brown sandy gravels, trace Brown clay, Water-bearing	
			Grey/Brown sandy gravels, Water-bearing	
10		10.70m		
		10.70m	Grey/Brown sandy gravels, Water-bearing	
			Grey/Brown sandy gravels, trace Brown clay, Water-bearing	
		11.80m		
		11.80m	Grey/Brown sandy gravels, trace Brown clay, Water-bearing	
			Grey/Brown sandy gravels, trace Brown clay, Water-bearing, very loose	
		13.20m		
		13.20m	Grey/Brown sandy gravels, trace Brown clay, Water-bearing, very loose	
			Grey/Brown sandy gravels, sticky Brown clay, Water-bearing	
		14.50m		
		14.50m	Grey/Brown sandy gravels, sticky Brown clay, Water-bearing	
15			Grey/Brown sandy gravels, trace Brown clay, Water-bearing	
		15.60m		
		15.60m	Grey/Brown sandy gravels, trace Brown clay, Water-bearing	
			Small to medium Brown polished gravels, sandy large lumps, sticky Brown clay	
		16.10m		
		16.10m	Small to medium Brown polished gravels, sandy large lumps, sticky Brown clay	
			Grey/Brown small to medium sandy gravels, trace Black stained	
		16.79m		
		16.79m	Grey/Brown small to medium sandy gravels, trace Black stained	
			Pea gravels, Grey/Brown and sandy, trace Brown clay, free flowing	
		17.60m		
		17.60m	Pea gravels, Grey/Brown and sandy, trace Brown clay, free flowing	
			Small to medium Grey/Brown sandy gravels, trace Brown clay, Water-bearing	
		18.00m		
		18.00m	Small to medium Grey/Brown sandy gravels, trace Brown clay, Water-bearing	
			Small to medium Grey/Brown sandy gravels, trace Brown clay, Water-bearing, tighter	
		18.79m		

Borelog for well M35/6483

Grid Reference (NZTM): 1564742 mE, 5197412 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 27.1 m +MSD Accuracy: < 0.5 m
Driller: Clemence Drilling Contractors
Drill Method: Cable Tool
Borelog Depth: 20.0 m Drill Date: 29-Nov-1990

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Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
			Clay and topsoil	
		0.89m		
		0.89m	Clay and topsoil	
			Tight, compact gravel	
		3.00m		
		3.00m	Tight, compact gravel	
			Loose gravel	
5		5.09m		
		5.09m	Loose gravel	
			Tight claybound gravel	
		5.40m		
		5.40m	Tight claybound gravel	
			Sandy Water-bearing gravel	
		9.69m		
		9.69m	Sandy Water-bearing gravel	
10			Tight claywashed gravel	
		11.30m		
		11.30m	Tight claywashed gravel	
			Loose Water-bearing claywashed gravel	
		14.60m		
		14.60m	Loose Water-bearing claywashed gravel	
15			Tight claybound gravel	
		18.00m		
		18.00m	Tight claybound gravel	
			Good loose Water-bearing gravel	
		20.00m		

Borelog for well M35/6688

Grid Reference (NZTM): 1564192 mE, 5198081 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 31.0 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Cable Tool
Borelog Depth: 18.0 m Drill Date: 04-May-1992

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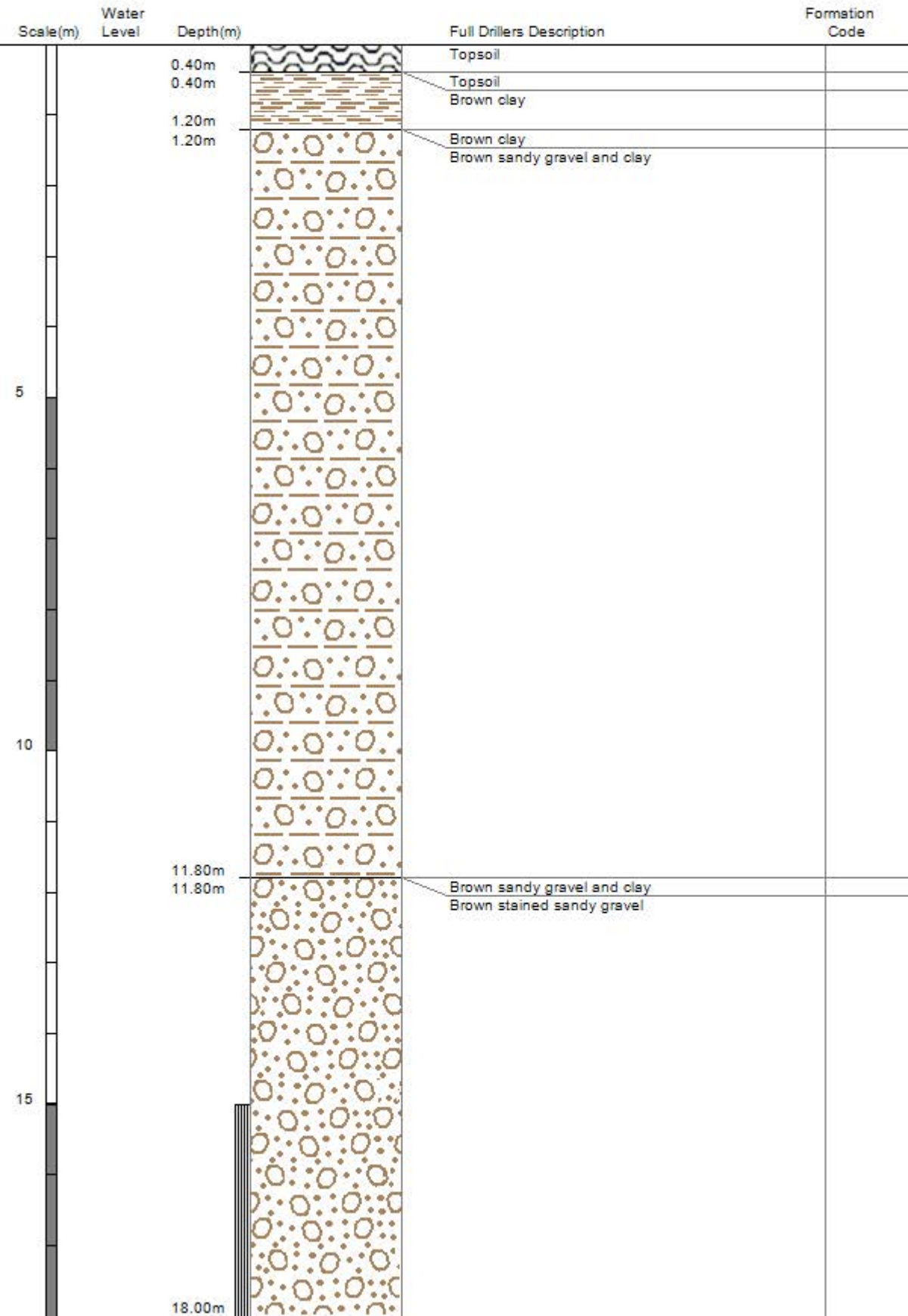

Borelog for well M35/6773

Grid Reference (NZTM): 1564472 mE, 5197322 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 28.1 m +MSD Accuracy: < 0.5 m
Driller: Clemence Drilling Contractors
Drill Method: Cable Tool
Borelog Depth: 24.0 m Drill Date: 10-Sep-1993

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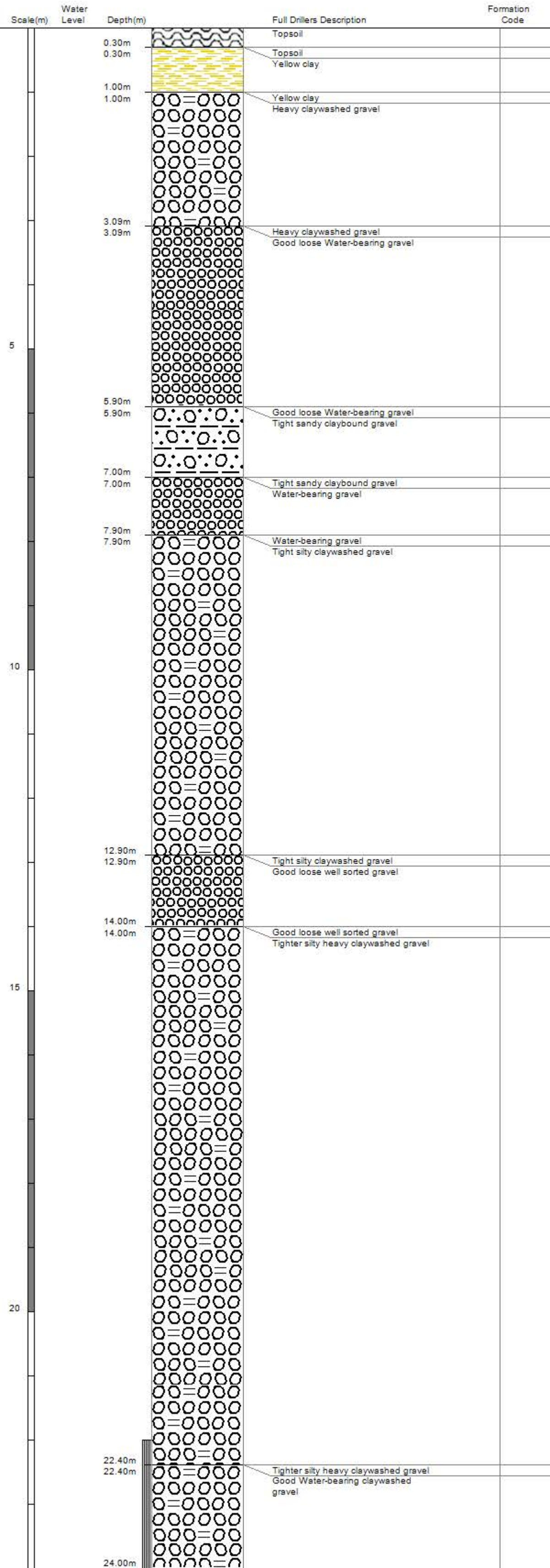

Borelog for well M35/10517

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
Borelog Depth: 23.2 m Drill Date: 08-Feb-2005

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