



ENGEO

— Expect Excellence —

Geotechnical Investigation

583 East Maddisons Road

Rolleston

Christchurch

Submitted to:

Hughes Development Ltd

Canterbury

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1 Introduction

ENGEO Ltd was requested by Hughes Development Ltd to undertake a geotechnical investigation of the property at 583 East Maddisons Road, Rolleston, Christchurch, as outlined in our variation proposal (ref. P2016.000.248).

The purpose of the assessment was to determine a geological model of the site; assess the likely future land performance; comment on the suitability of the site for residential subdivision; address the requirements of Section 106 of the Resource Management Act (RMA); and provide recommendations for subdivision works and foundations for typical timber framed residential dwellings.

Our scope of works included the following:

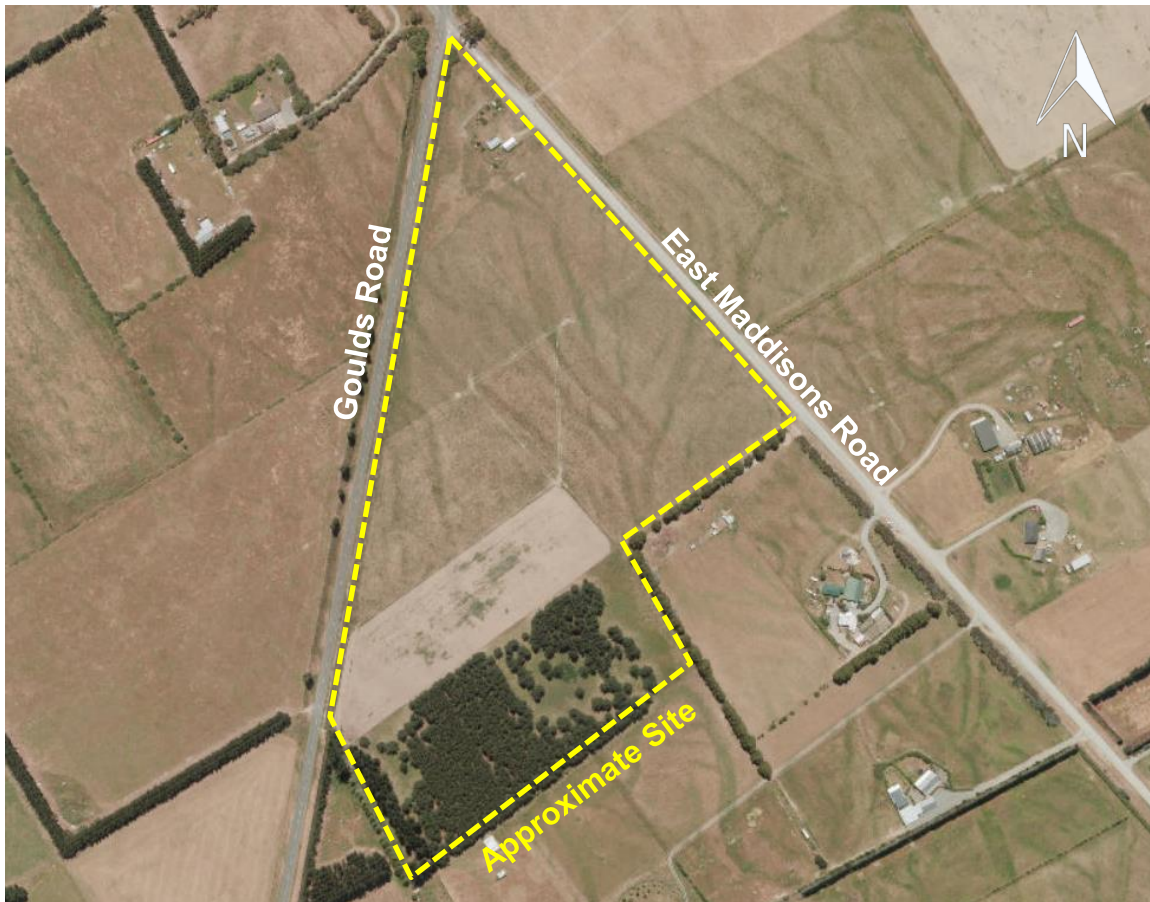
- Complete a desktop study of relevant available geotechnical and geological publications, including the NZ Geotechnical and Environment Canterbury Databases.
- Undertake a geotechnical site walkover.
- Undertake fourteen hand auger boreholes with associated Scala penetrometer tests to assess the near surface material types and strength characteristics.
- Organise and technically supervise the excavation of fourteen test pits, including geotechnical logging of the exposed soils.
- Preparation of this report outlining our findings on the ground conditions and the suitability of the site for residential subdivision. This will include geotechnical advice on the likely foundation Technical Category, conceptual foundation recommendations for typical timber framed residential dwellings, and address likely geohazards as required by Section 106 of the RMA.

2 Site Description

The site covers a total area of 10 ha, and has the following legal description (Selwyn District Council):

- 583 East Maddisons Road - Lot 1 DP 69688

It is located approximately 3.5 km south of Rolleston town centre, and is bound to the northeast by East Maddisons Road and the west by Goulds Road. Rural properties border the site on the remaining sides (Figure 1).

Figure 1: Site Location

Aerial photograph sourced from Canterbury Maps (retrieved December 2017). Not to scale.

3 Geological Model

3.1 Regional Geology

The site has been regionally mapped by GNS (Forsyth et al., 2008) as being underlain by grey river alluvium.

3.2 Geomorphology

The site comprises relatively flat ground, with gentle undulations and depressions in some areas. As evident on aerial imagery (Canterbury Maps, 2016) and observed during our site walkover conducted on 28 and 29 November 2017, undulating and depressed ground can be attributed to paleo-channels, which traverse the site in a general northwest to southeast trend. Based on observations, silt and sand deposits with variable thickness (up to 0.4 m) are expected to have in-filled the paleo-channels where they have not remained as channel features. Inferred paleo-channels have been mapped to give an indication of areas with potential channel in-fill (Appendix 1).

3.3 Geohazards

3.3.1 Seismicity

There are no known or mapped faults in the immediate area of the site, however the site may be at risk of ground shaking induced by movement of proximal or distal faults.

The site is located between two recently discovered fault systems, the Greendale Fault and the Port Hills Fault, the ruptures of which initiated the ongoing Canterbury Earthquake Sequence (CES). The Greendale Fault has been mapped approximately 5 km northwest / west of the site and trends roughly east-west with a surface rupture of approximately 28 km (GNS, 2015), while the Port Hills Fault remains unmapped as the fault did not rupture at the surface. Movement on the Port Hills Fault is believed to have occurred at a depth of 1 km to 2 km below ground surface.

Large regional areas of faulting (GNS, 2015) namely the Ashley Fault, Porters Pass-Amberley Fault Zone, and the Hope and Alpine Faults, are further afield but present a high seismic hazard to the Christchurch area due to the anticipated size of earthquakes generated. The largest of these faults is the Alpine Fault, which has a return period of 250-300 years and is expected to produce a M8 earthquake. The last rupture on the Alpine Fault is believed to have occurred in 1717 (Pettinga et al., 2001).

3.3.2 Liquefaction and Lateral Spreading

The site is located within an area mapped as 'damaging liquefaction unlikely' (NZGD Map CGD5140, 2012).

3.4 Site Investigation

Site investigations to assess the shallow subsurface material types and strength characteristics were undertaken by ENGEO on 28 November and 29 November 2017. The investigations comprised 14 hand auger boreholes and 14 test pit investigations with associated Scala penetrometer tests.

The investigations revealed subsurface conditions across the site are consistent with the published geological mapping, as summarised in Table 1.

Table 1: Generalised Summary of Subsurface Conditions

Soil Type	Depth to Top of Layer (m)	Layer Thickness	Density/ Consistency
Topsoil	0.0	0.1 to 0.4	Medium-Dense
Sandy GRAVEL and GRAVEL	0.1 to 0.4	Unknown	Very Dense

3.5 ECan Boreholes

A review of two deep ECan borehole logs; one located near the northern end of the site (M36/4891), west of the site (M36/4346) and two to the south (M36/7648) was conducted (Canterbury Maps). The location of these boreholes is presented in Figure 2 and includes the well points on site that have no log data available. The logs from the three holes of interest are presented in Appendix 4 and indicate the site is broadly underlain by a mixture of sandy gravels to depths of at least 28.5 m below ground level. Layers of silt are recorded in the bore well west of the site (M36/4346).

Figure 2: Nearby ECan Borehole Locations

Aerial photograph sourced from Canterbury Maps (retrieved December 2017). Not to scale.

3.6 Groundwater

Groundwater is recorded in the surrounding boreholes between approximately 7 m and 8 m depth.

3.7 Site Seismic Class

In accordance with NZS 1170.5:2004, Class D applies to this particular site, defining it as a 'deep soft soil site'.

4 Liquefaction Assessment

Based on our site investigation and observations, and owing to the nature of the subsurface materials and depth to groundwater at the site, we consider the potential for liquefaction and lateral spreading on the site to be very low.

We therefore consider the site of the proposed subdivision to have Technical Category 1 (TC1) future land performance whereby future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances.

5 RMA Section 106 Requirements and Suitability to Subdivide

Section 106 of the Resource Management Act 1991 states a consent authority may refuse to grant a subdivision consent, or may grant a consent subject to specific consent conditions if the land is likely to be subject to the following:

- Erosion, including surface and subsurface erosion, associated with water and wind.
- Falling debris, including rockfall that could impact the site from upslope sources.
- Subsidence, which involves the removal of underlying support by natural or artificial means.
- Slippage, which is defined as the downslope transfer of materials by sliding and / or flowage.
- Inundation, which may be sourced from streams, coastal processes or excess precipitation.

Based on our observations and the nature of the site, its performance during the CES, and the site's distance from the nearest significant watercourse, we consider it is unlikely for the site to be subject to any of the above hazards and, as such, the site is considered suitable for subdivision from a geotechnical perspective.

6 Geotechnical Recommendations

6.1 Earthworks

Earthworks carried out for the subdivision shall be in accordance with NZS 4404:2010, Land Development and Subdivision Infrastructure and NZS 4431:1989, Code of Practice for Earthfilling for Residential Development. In particular, any areas to receive fill should be stripped of any vegetation, topsoil, non-engineered fill, soft or organic soils prior to fill placement.

Fill may comprise clean natural sandy gravel or silty soils, or clean imported soils and / or granular fill, compacted to achieve no less than 95% of maximum dry density. Fill faces steeper than 2:1 and higher than 600 mm should be retained and referred back to ENGEO. Although unlikely, where any springs or groundwater seeps are encountered they should be intercepted with suitable drainage and discharged to a Council approved outlet.

All unretained batters of pond and stormwater drains constructed with the native sandy gravel material should be at an inclination of 1V:3H, with protection schemes in place to control erosion of the formed batters within the waterways.

A comprehensive earthworks specification should be provided to the earthworks contractor prior to starting excavations and an inspection / testing regime agreed, along with a robust erosion and sediment control plan.

6.2 Subdivision Roding

Vegetation, any organic or deleterious material, topsoil and non-engineered fill should be removed from the site under pavement areas prior to aggregate placement. Based on our observations during testing, we consider the natural ground below the topsoil at the site should provide an adequate subgrade for the proposed pavement areas.

6.3 Stormwater Control

Concentrated stormwater flows from all impermeable areas must be collected and carried in sealed pipes to the Council system or an alternative disposal point subject to approval from Council. Uncontrolled stormwater must not be allowed to saturate the ground as this will potentially affect future foundation performance both statically and during future seismic activity.

6.4 Foundations

Foundations for future proposed residential dwellings within the subdivision may comprise pad, strip or slab foundations designed in accordance with the provisions of NZS 3604 Timber Framed Buildings.

Site specific testing will be required for Building Consent, to confirm the bearing materials and capacity. For preliminary design, we anticipate that a geotechnical Ultimate Bearing Capacity of 300 kPa may be assumed for foundations bearing on natural silt, sandy gravel or engineered fill, below any topsoil. We anticipate this to be typically below 0.3 m depth based on our subsurface investigations.

7 References

Canterbury Maps, Groundwater. Retrieved December 2017, from <http://canterburymaps.govt.nz/Viewer>.

Canterbury Maps, Historic Aerial Imagery. Retrieved December 2017, from <https://apps.canterburymaps.govt.nz/CanterburyHistoricAerialImagery>.

Forsyth, P., Barrell, D. J., & Jongens, R. (2008). Sheet 16 - Geology of the Christchurch Area 1:250,000. Lower Hutt: Institute of Geological and Nuclear Sciences.

GNS Science (2015). New Zealand Active Faults Database. Retrieved December 2017, from <http://data.gns.cri.nz/af>.

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Selwyn District Council (2015), Selwyn District Council Operative District Plan. Retrieved 2017, from <http://www.selwyn.govt.nz/services/planning/district-plan>.

Selwyn District Council, Property Search, retrieved December 2017 from <https://www.selwyn.govt.nz/my-property/rates/search-properties>.

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Standards Association of New Zealand (2004). NZS 1170.5:2004. Structural Design Actions Part 5: Earthquake Actions – New Zealand.

Standards Association of New Zealand (2010). NZS 3604:2010. Timber Framed Buildings.

Standards Association of New Zealand (2010). NZS 4404:2010. Land Development and Subdivision Infrastructure.

The Ministry of Business, Innovation, and Employment (2016). New Zealand Geotechnical Database. Retrieved December 2017, from <https://www.nzgd.org.nz>.

8 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Development Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.
- iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- iv. This Limitation should be read in conjunction with the Engineers NZ/ACENZ Standard Terms of Engagement.
- v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by



Jed Watts

Engineering Geologist

Report reviewed by



Greg Martin, CMEngNZ (PEngGeol)

Principal Engineering Geologist

APPENDIX 1:
Site Plan and Test Locations

APPENDIX 2:
Test Pit Logs



LOG OF TEST PIT TP01

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer								
		Easier	Harder								Blows per 100mm								
											2	4	6	8	10	12			
0.0 - 0.5	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].			D											
0.5 - 1.0	ALLUVIUM			GW	Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to medium.			M											
1.0 - 1.5					Sand becomes fine to coarse from 1.0 m depth. Becomes wet at 1.1 m depth														
1.5 - 2.1											W								
					Depth of Excavation: 2.1 m Termination Condition: Target depth														

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP02

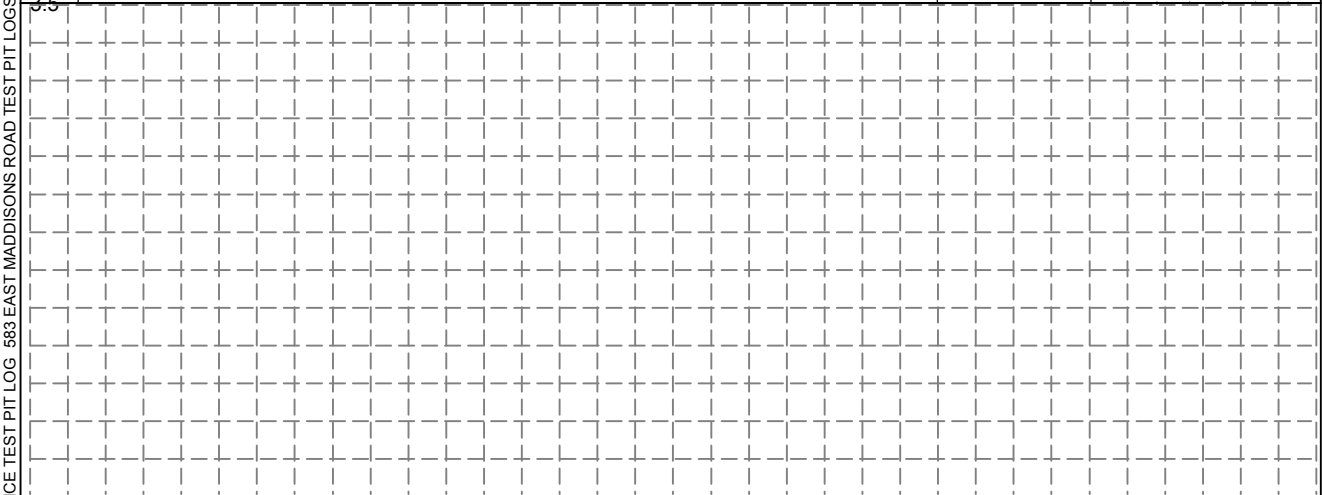
Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2.3 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer								
		Easier	Harder								Blows per 100mm								
											2	4	6	8	10	12			
0.0 - 0.5	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].			D											
0.5 - 1.0	ALLUVIUM			GW	Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to medium.			M											
1.0 - 1.5					Becomes wet at 1.2 m depth														
1.5 - 2.3					Sand becomes fine to coarse from 1.4 m depth.						W								
2.3 - 2.5	Depth of Excavation: 2.3 m Termination Condition: Target depth																		

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT 5/12/17



Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP03

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 3 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer					
		Easier	Harder								Blows per 100mm					
											2	4	6	8	10	12
0.0	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].											
0.5					Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to medium.		D									
1.0					Becomes wet at 0.9 m depth		M									
1.5	ALLUVIUM			GW												
2.0							W									
3.0					Depth of Excavation: 3 m Termination Condition: Target depth											

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



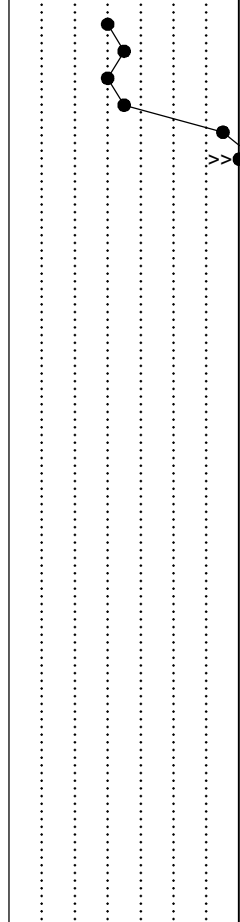
LOG OF TEST PIT TP04

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer					
		Easier	Harder								Blows per 100mm					
											2	4	6	8	10	12
0.0	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].			D								
0.5	ALLUVIUM			GW	Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to medium.			M								
0.7					Becomes wet at 0.7 m depth				W							
2.1	Depth of Excavation: 2.1 m Termination Condition: Target depth															



GEOSCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP05

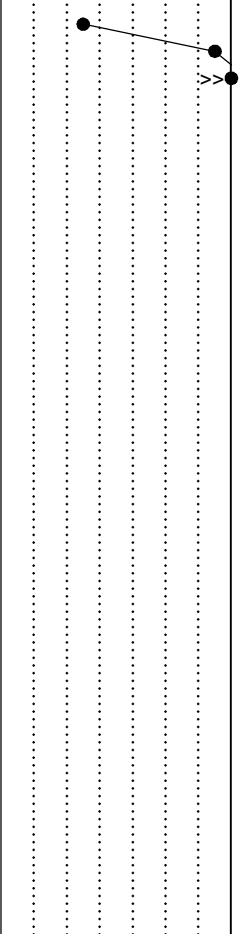
Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer						
		Easier	Harder								Blows per 100mm						
											2	4	6	8	10	12	
0.0 - 0.5	TS			ML	SILT with trace sand and rootlets; light brown. Low plasticity [TOPSOIL].			D									
0.5 - 1.0	ALLUVIUM			GW	Sandy fine to coarse GRAVEL; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to medium. Encountered some cobbles from 0.7 m depth.			M									
1.0 - 2.0					Becomes wet at 1.0 m depth			W									
2.0 - 2.5	Depth of Excavation: 2 m Termination Condition: Target depth																

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17



Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP06

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 3 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer						
		Easier	Harder								Blows per 100mm						
	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].						2	4	6	8	10	12	
0.5	ALLUVIUM			GW	Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to medium.												
1.0					Becomes wet at 1.0 m depth												
1.5				Encountered some cobbles from 1.2 m depth.													
2.0																	
2.5																	
3.0																	
3.5					Depth of Excavation: 3 m Termination Condition: Target depth												

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP07

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2.2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer						
		Easier	Harder								Blows per 100mm						
											2	4	6	8	10	12	
0.0	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].			D									
0.5	ALLUVIUM			GW	Fine to coarse GRAVEL with some fine to coarse sand and cobbles; brownish grey. Well graded, sub-rounded to rounded.			M									
1.0					Becomes wet at 1.0 m depth			W									
2.2	Depth of Excavation: 2.2 m Termination Condition: Target depth																

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP08

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 3 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer								
		Easier	Harder								Blows per 100mm								
											2	4	6	8	10	12			
0.0 - 0.5	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].			D											
0.5 - 1.0	ALLUVIUM			GW	Fine to coarse GRAVEL with some fine to coarse sand and cobbles; brownish grey. Well graded, sub-rounded to rounded.			M											
1.0 - 1.5					Becomes wet at 1.0 m depth														
1.5 - 3.0											W								
Depth of Excavation: 3 m Termination Condition: Target depth																			

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP09

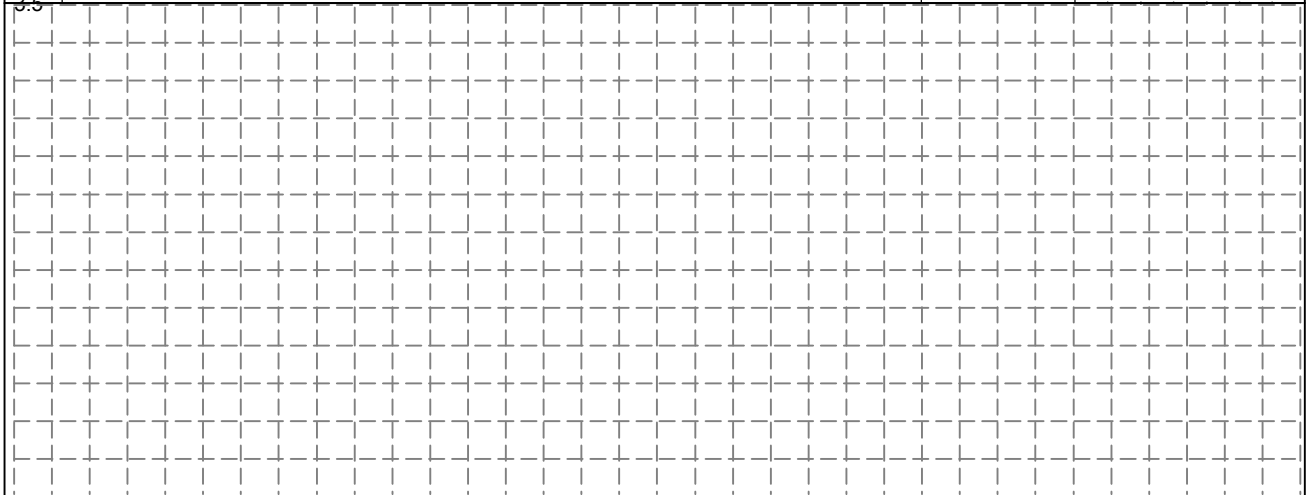
Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2.4 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer							
		Easier	Harder								Blows per 100mm							
											2	4	6	8	10	12		
0.0 - 0.5	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].													
0.5 - 1.1	ALLUVIUM			GW	Fine to coarse GRAVEL with some fine to coarse sand and cobbles; brownish grey. Well graded, sub-rounded to rounded.													
1.1 - 1.5				GW	Becomes wet at 1.1 m depth Sandy GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.													
1.5 - 2.4				GW														
2.4	Depth of Excavation: 2.4 m Termination Condition: Target depth																	

GEOSCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17



Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP10

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 3 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer						
		Easier	Harder								Blows per 100mm						
											2	4	6	8	10	12	
0.0	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].												
0.5					Fine to coarse GRAVEL with some fine to coarse sand; brownish grey. Well graded, rounded. Encountered some cobbles from 0.4 m depth.												
1.0					Becomes wet at 1.2 m depth												
1.5	ALLUVIUM			GW													
2.0																	
2.5																	
3.0					Depth of Excavation: 3 m Termination Condition: Target depth												
3.5																	

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP11

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer						
		Easier	Harder								Blows per 100mm						
											2	4	6	8	10	12	
0.0 - 0.5	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].			D									
0.5 - 1.2	ALLUVIUM			GW	Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.			M									
1.2 - 2.0					Becomes wet at 1.2 m depth			W									
					Depth of Excavation: 2 m Termination Condition: Target depth												

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP12

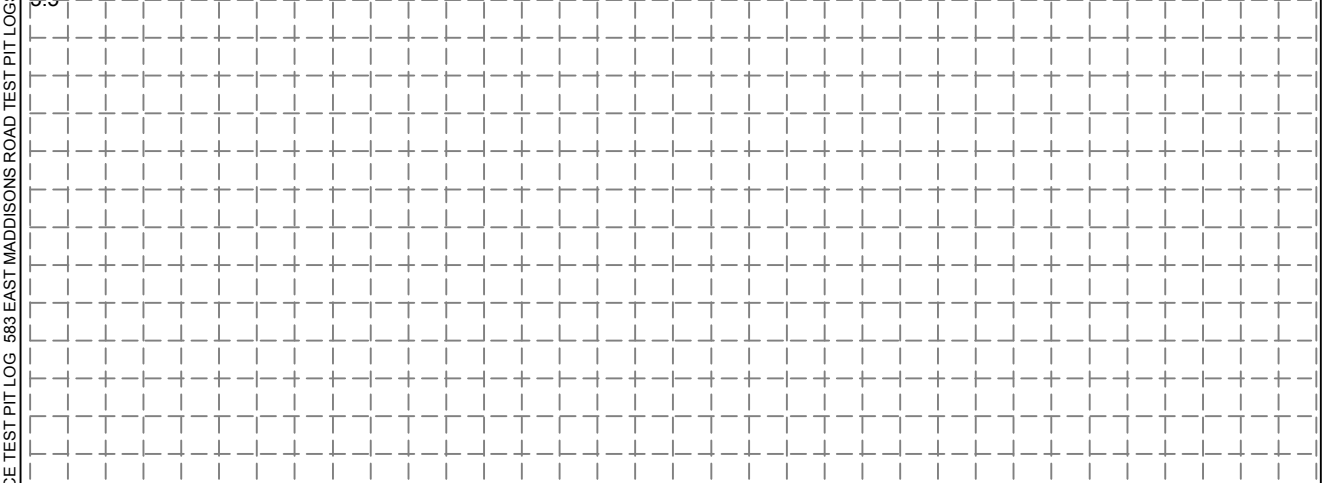
Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2.2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer						
		Easier	Harder								Blows per 100mm						
											2	4	6	8	10	12	
0.0 - 0.5	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].			D									
0.5 - 1.0	ALLUVIUM			GW	Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.			M									
1.0 - 2.2					Becomes wet at 1.0 m depth			W									
Depth of Excavation: 2.2 m Termination Condition: Target depth																	

GEOSCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17



Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP13

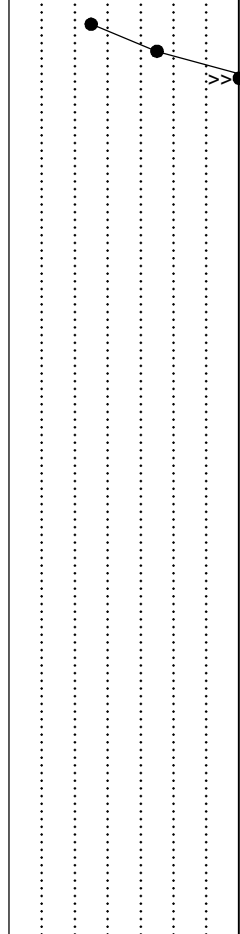
Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer						
		Easier	Harder								Blows per 100mm						
											2	4	6	8	10	12	
0.0 - 0.5	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].			D									
0.5 - 1.0	ALLUVIUM			GW	Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to medium.			M									
1.0 - 1.5					Becomes wet at 0.9 m depth												
1.5 - 2.0					Sand becomes fine to coarse from 1.2 m depth.			W									
					Depth of Excavation: 2.1 m Termination Condition: Target depth												

GEOSCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17



Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL



LOG OF TEST PIT TP14

Geotechnical Investigation
 583 East Maddisons Road
 Rolleston
 12903.000.000 - 023

Client : Hughes Development Ltd
Date : 28/11/17
Max Test Pit Depth : 3 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : HB
Reviewed By : JW
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale)		USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer						
		Easier	Harder								Blows per 100mm						
											2	4	6	8	10	12	
0.0 - 0.5	TS			ML	SILT with trace rootlets; light brown. Low plasticity [TOPSOIL].												
0.5 - 1.2	ALLUVIUM			GW	Sandy fine to coarse GRAVEL with some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to medium.			D									
1.2 - 1.5							Becomes wet at 1.2 m depth Sand becomes fine to coarse from 1.3 m depth.			M							
1.5 - 3.0																	
3.0 - 3.5					Depth of Excavation: 3 m Termination Condition: Target depth												

GEO SCIENCE TEST PIT LOG - 583 EAST MADDISONS ROAD TEST PIT LOGS.GPJ - NZ MASTER DATA TEMPLATE.GDT - 5/12/17

Excavator met target depth.
 Scala Penetrometer met practical refusal
 Standing groundwater was not encountered

TS=TOPSOIL

APPENDIX 3:
Hand Auger Borehole Logs

LOG OF AUGER HA01

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.2 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer								
									Blows per 100mm								
									2	4	6	8	10	12			
	TS	ML	SILT with minor sand, trace gravel and rootlets; brown. [TOPSOIL]			D											
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal														


GEOSCIENCE HAND AUGER - 583 MADDISON ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.3 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL

LOG OF AUGER HA02

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.4 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]												
			End of Hole Depth: 0.4 m Termination Condition: Practical refusal			D									
0.5															
1.0															



GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.4 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL

LOG OF AUGER HA03

Geotechnical Investigation
583 East Maddisons Road
Farringdon
12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No : 1150
Client Ref. : Logged By : EG/JDW
Date : 28/11/17 Reviewed By : JW
Hole Depth : 0.5 m Latitude :
Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL]												
	A	ML	SILT; yellowish brown. Low plasticity.			D									
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					201							
1.0	Hand auger met practical refusal at 0.5 m depth on inferred gravel. Scala Penetrometer met practical refusal at 0.6 m depth. Standing groundwater was not encountered TS = TOPSOIL														


GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

A = ALLUVIUM

LOG OF AUGER HA04

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.3 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer							
									Blows per 100mm							
									2	4	6	8	10	12		
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]			D										
	End of Hole Depth: 0.3 m Termination Condition: Practical refusal															
0.5																
1.0																

GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.4 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL



LOG OF AUGER HA05

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.2 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace gravel and rootlets; brown. Low plasticity [TOPSOIL]			D									
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal												
0.5															
1.0															

GEOSCIENCE HAND AUGER - 583 MADDISSONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.3 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL



LOG OF AUGER HA06

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.2 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]			D									
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal												

GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.1 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL



LOG OF AUGER HA07

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.2 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]			D									
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal												
0.5															
1.0															

GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.4 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL



LOG OF AUGER HA08

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.2 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]			D									
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal												

GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.2 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL



LOG OF AUGER HA09

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.2 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]			D									
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal												
0.5															
1.0															


GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.3 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL

LOG OF AUGER HA10

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.2 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL]												
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal												
0.5															
1.0															

GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.3 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL

LOG OF AUGER HA11

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.2 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer							
									Blows per 100mm							
									2	4	6	8	10	12		
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL].													
	End of Hole Depth: 0.2 m Termination Condition: Practical refusal															
0.5																
1.0																



GEOSCIENCE HAND AUGER - 583 MADDISSONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.4 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL

LOG OF AUGER HA12

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
 Client Ref. : Logged By : EG/JDW
 Date : 28/11/17 Reviewed By : JW
 Hole Depth : 0.3 m Latitude :
 Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer							
									Blows per 100mm							
									2	4	6	8	10	12		
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]													
		ML	SILT with trace sand; brownish grey. Low plasticity.			D										
	End of Hole Depth: 0.3 m Termination Condition: Practical refusal															
0.5															>>	
1.0																

GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
 Scala Penetrometer met practical refusal at 0.5 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL



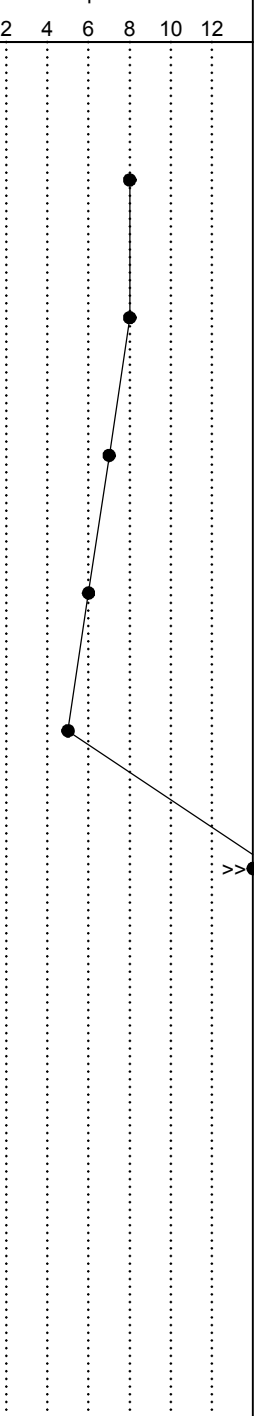
LOG OF AUGER HA13

Geotechnical Investigation
 583 East Maddisons Road
 Farringdon
 12903.000.000 - 023

Client : Hughes Developments Ltd **Shear Vane No** :
Client Ref. : **Logged By** : EG/JDW
Date : 28/11/17 **Reviewed By** : JW
Hole Depth : 0.4 m **Latitude** :
Hole Diameter : 50 mm **Longitude** :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
0.0 - 0.1	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]												
0.1 - 0.4	A	ML	SILT with trace sand; yellowish brown. Low plasticity.			D									
0.4 - 0.6			End of Hole Depth: 0.4 m Termination Condition: Practical refusal												

GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17





Hand auger met practical refusal at 0.4 m depth on inferred gravel. **A = ALLUVIUM**
 Scala Penetrometer met practical refusal at 0.6 m depth.
 Standing groundwater was not encountered
 TS = TOPSOIL

LOG OF AUGER HA14

Geotechnical Investigation
583 East Maddisons Road
Farrington
12903.000.000 - 023

Client : Hughes Developments Ltd Shear Vane No :
Client Ref. : Logged By : EG/JDW
Date : 28/11/17 Reviewed By : JW
Hole Depth : 0.4 m Latitude :
Hole Diameter : 50 mm Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer						
									Blows per 100mm						
									2	4	6	8	10	12	
	TS	ML	SILT with trace gravel, sand and rootlets; brown. Low plasticity [TOPSOIL]												
	A	ML	SILT with trace sand; yellowish brown. Low plasticity.			D									
			End of Hole Depth: 0.4 m Termination Condition: Practical refusal												
0.5															
1.0															

GEOSCIENCE HAND AUGER - 583 MADDISONS ROAD HA LOGS.GPJ - NZ DATA TEMPLATE 2.GDT 5/12/17

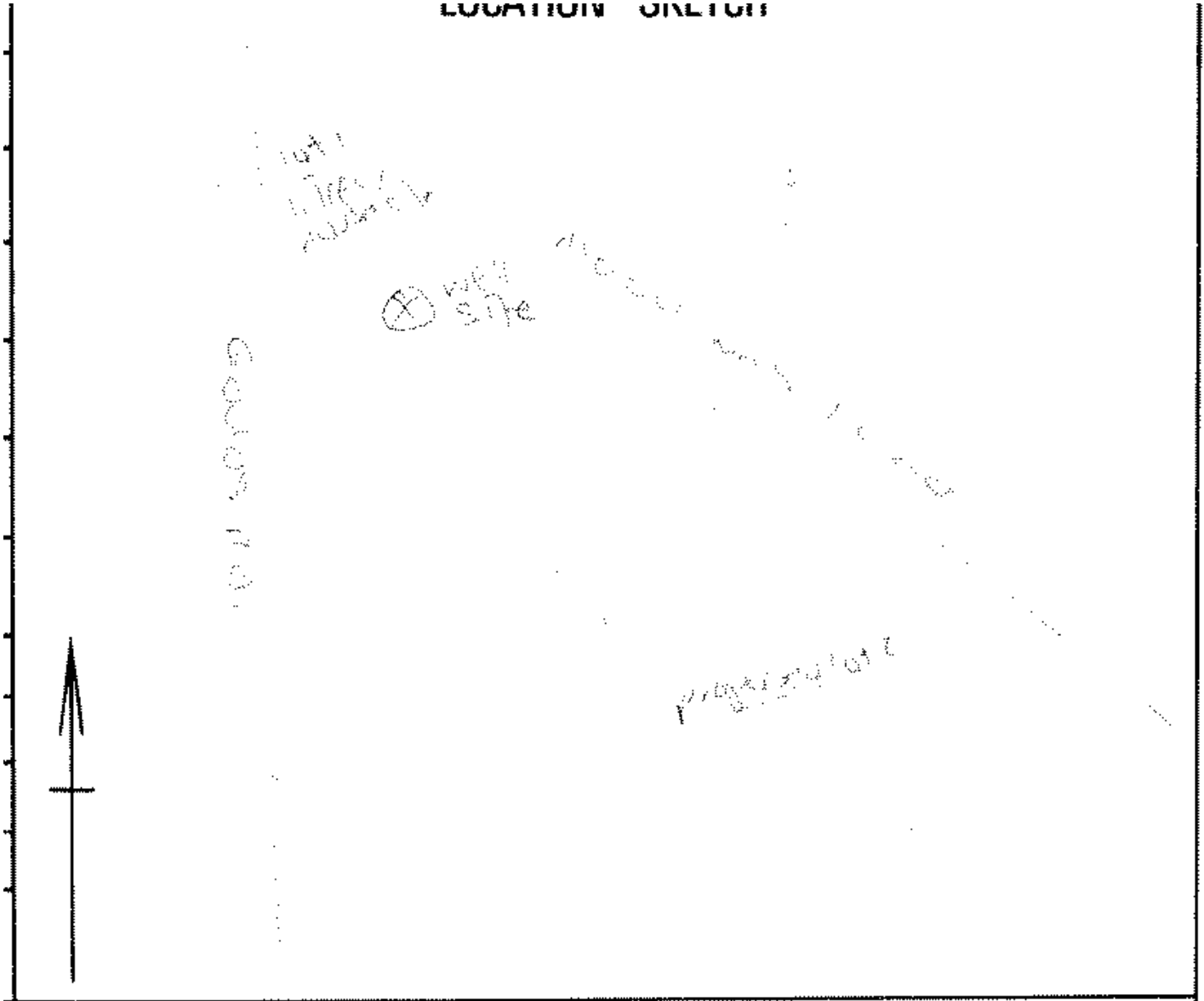
Hand auger met practical refusal at 0.4 m depth on inferred gravel. A = ALLUVIUM
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered
TS = TOPSOIL

APPENDIX 4:
ECan Well Logs



Bore or Well No	M36/4891		
Well Name	CNR MADDISONS & GOULDS ROAD		
Owner	Mr & Ms B N & J A Stevens & Gray		
Well Number	M36/4891	File Number	CO6C/06015
Owner	Mr & Ms B N & J A Stevens & Gray	Well Status	Active (exist, present)
Street/Road	CNR MADDISONS & GOULDS ROAD	NZTM Grid Reference	BX23:50117-70000
Locality	ROLLESTON	NZTM X and Y	1550117 - 5170000
Location Description		Location Accuracy	50 - 300m
CWMS Zone	Selwyn - Waihora	Use	Domestic and Stockwater,
Groundwater Allocation Zone	Selwyn-Waimakariri	Water Level Monitoring	--
Depth	25.25m	Water Level Count	0
Diameter	150mm	Initial Water Level	7.38m below MP
Measuring Point Description		Highest Water Level	
Measuring Point Elevation	39.15m above MSL (Lyttelton 1937)	Lowest Water Level	
Elevation Accuracy	< 2.5 m	First reading	
Ground Level	0.00m above MP	Last reading	
Strata Layers	6	Calc Min 95%	8.70m below MP
Aquifer Name	Riccarton Gravel	Aquifer Tests	0
Aquifer Type	Unknown	Yield Drawdown Tests	1
Drill Date	05 May 1995	Max Tested Yield	8 l/s
Driller	Clemence Drilling Contractors	Drawdown at Max Tested Yield	4 m
Drilling Method	Unknown	Specific Capacity	2.25 l/s/m
Casing Material	UNKNOWN	Last Updated	08 Nov 2013
Pump Type	Unknown	Last Field Check	
Water Use Data	No		

LOCATION SKETCH



OTHER DATA

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	23.25	25.25				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
05 May 1995	1	8	105.585472	3.56	4

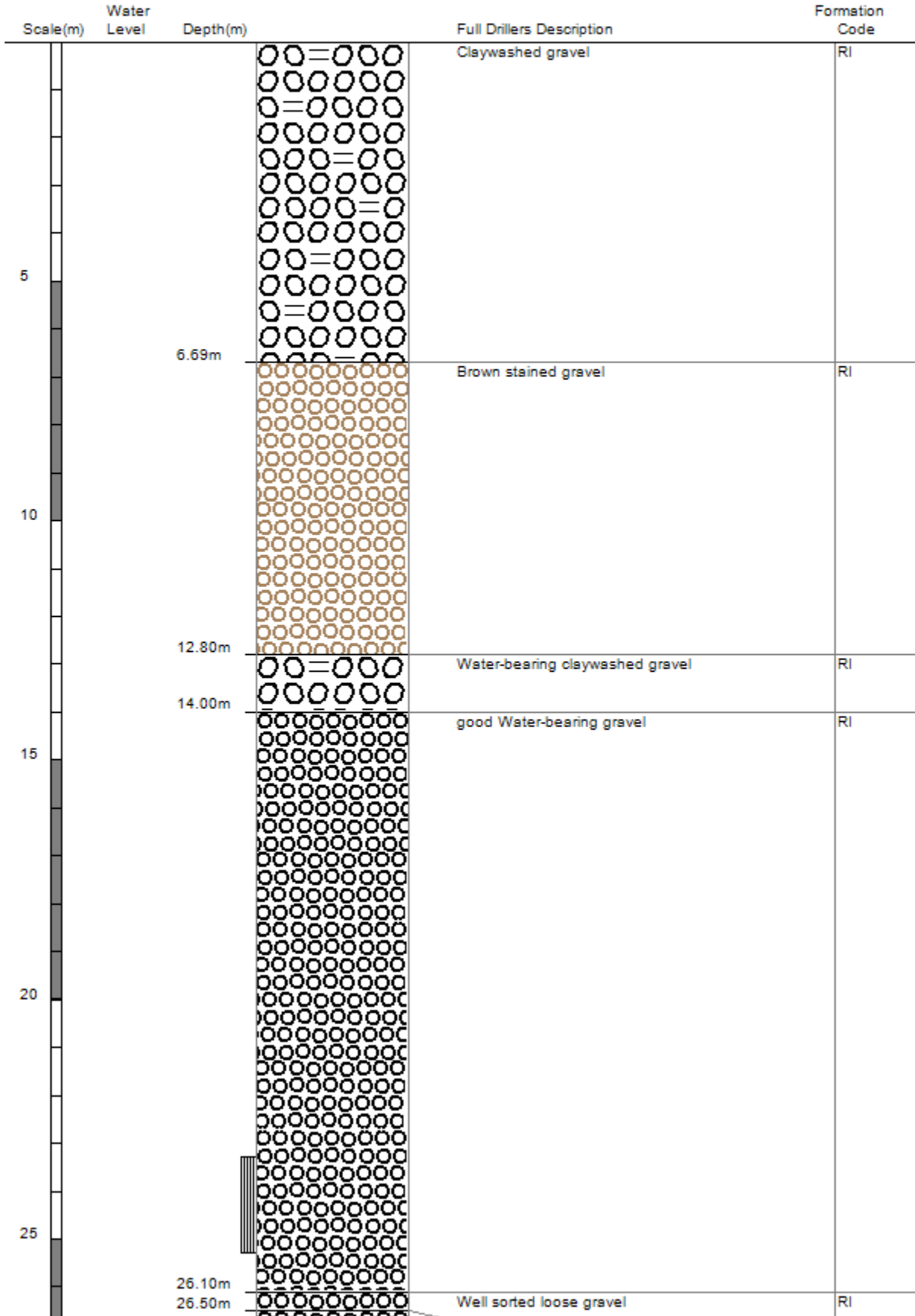
Comments

Comment Date	Comment
	Wood and grey pug below 26.7 m to unkown depth. -incomplete log.

Bore Log

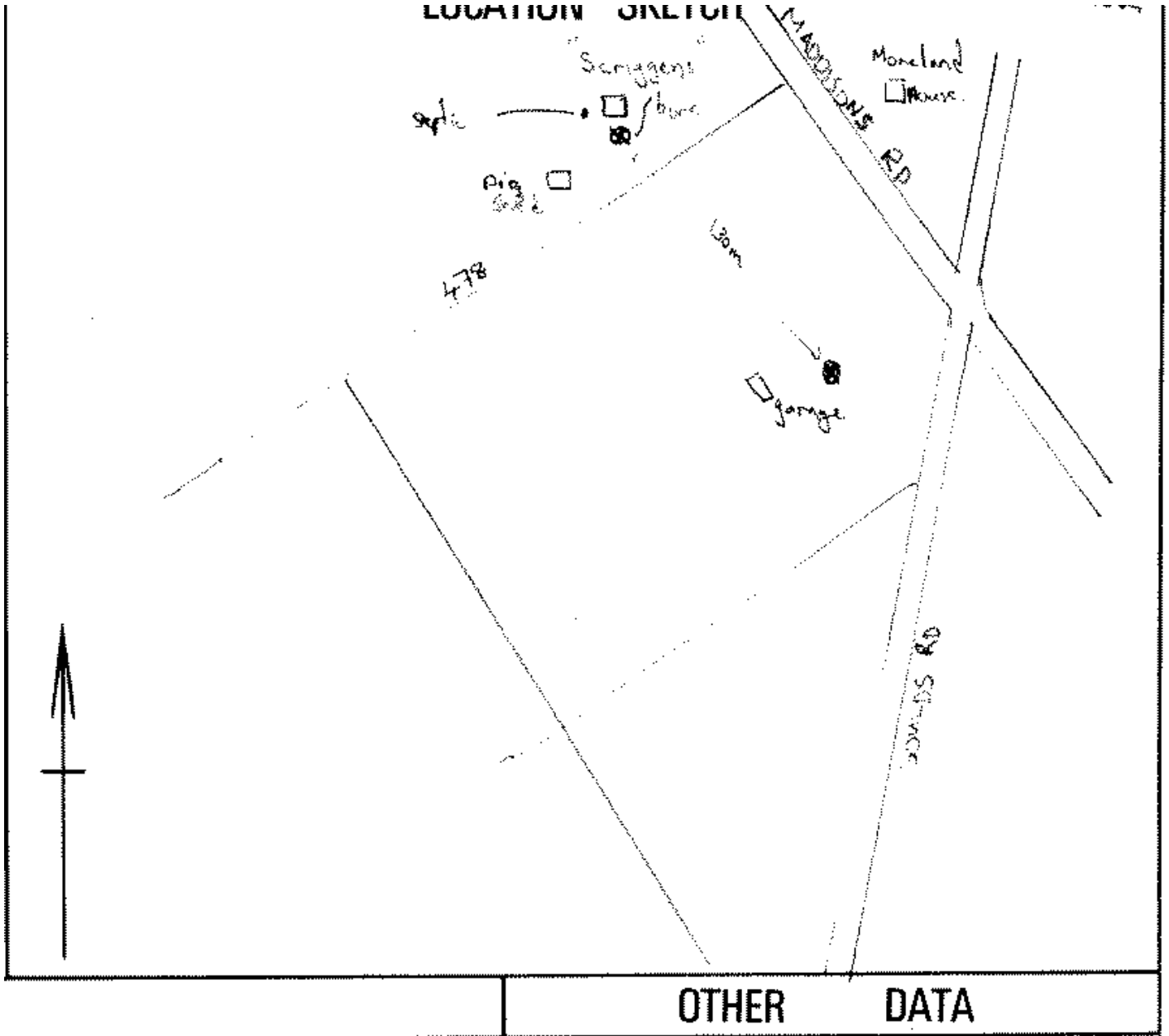
Borelog for well M36/4891

Grid Reference (NZTM): 1550118 mE, 5170001 mN
 Location Accuracy: 50 - 300m
 Ground Level Altitude: 39.2 m +MSD Accuracy: < 2.5 m
 Driller: Clemence Drilling Contractors
 Drill Method: Unknown
 Borelog Depth: 26.7 m Drill Date: 05-May-1995





Bore or Well No	M36/4346		
Well Name	CNR MADDISONS & GOULDS RDS		
Owner	MAIN M.R.		
Well Number	M36/4346	File Number	
Owner	MAIN M.R.	Well Status	Active (exist, present)
Street/Road	CNR MADDISONS & GOULDS RDS	NZTM Grid Reference	BX23:49967-69900
Locality	ROLLESTON	NZTM X and Y	1549967 - 5169900
Location Description		Location Accuracy	50 - 300m
CWMS Zone	Selwyn - Waihora	Use	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	Water Level Monitoring	--
Depth	26.80m	Water Level Count	0
Diameter	150mm	Initial Water Level	
Measuring Point Description		Highest Water Level	
Measuring Point Elevation	39.12m above MSL (Lyttelton 1937)	Lowest Water Level	
Elevation Accuracy	< 2.5 m	First reading	
Ground Level	0.00m above MP	Last reading	
Strata Layers	15	Calc Min 95%	8.50m below MP
Aquifer Name	Riccarton Gravel	Aquifer Tests	0
Aquifer Type	Unknown	Yield Drawdown Tests	1
Drill Date	01 Apr 1991	Max Tested Yield	6 l/s
Driller	Dynes Road Drilling	Drawdown at Max Tested Yield	5 m
Drilling Method	Cable Tool	Specific Capacity	1.33 l/s/m
Casing Material	STEEL	Last Updated	08 Nov 2013
Pump Type	Unknown	Last Field Check	
Water Use Data	No		



Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	24.8	26.8				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Apr 1991	1	6.1	80.50892	4.57	4

No comments for this well

Bore Log

Borelog for well M36/4346

Grid Reference (NZTM): 1549968 mE, 5169901 mN
 Location Accuracy: 50 - 300m
 Ground Level Altitude: 39.1 m +MSD Accuracy: < 2.5 m
 Driller: Dynes Road Drilling
 Drill Method: Cable Tool
 Borelog Depth: 28.5 m Drill Date: 01-Apr-1991



Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code	
			No Log No Log	Not logged	RI
5		4.00m	Large to medium gravel, small amount of silt	RI	
		6.00m	Silt	RI	
		8.00m	Gravel and silt	RI	
10		11.50m	Very tight clay, small shingle	RI	
		14.00m	Tight clay and shingle	RI	
15		16.00m	Tight clay, small gravel	RI	
		18.00m	Clay and gravel, not as tight	RI	
		18.50m	Gravel, some water	RI	
		19.00m	Tight clay gravel	RI	
20		21.00m	Tight clay and small to medium gravel, some amount of water	RI	
		22.00m	Open medium gravel	RI	
		24.00m	Small to medium gravel	RI	
25		26.00m	Small gravel	RI	
		28.00m	Grey silt with wood	BR	
		28.50m			



Bore or Well No	M36/7648		
Well Name	East Maddisons Road		
Owner	Mr & Ms PM & KI Tilling & Thompson		
Well Number	M36/7648	File Number	CO6C/21547
Owner	Mr & Ms PM & KI Tilling & Thompson	Well Status	Active (exist, present)
Street/Road	East Maddisons Road	NZTM Grid Reference	BX23:50377-69690
Locality	Rolleston	NZTM X and Y	1550377 - 5169690
Location Description		Location Accuracy	50 - 300m
CWMS Zone	Selwyn - Waihora	Use	Domestic and Stockwater,
Groundwater Allocation Zone	Selwyn-Waimakariri	Water Level Monitoring	--
Depth	26.00m	Water Level Count	0
Diameter	150mm	Initial Water Level	8.10m below MP
Measuring Point Description		Highest Water Level	
Measuring Point Elevation	35.66m above MSL (Lyttelton 1937)	Lowest Water Level	
Elevation Accuracy	< 5 m	First reading	
Ground Level	0.00m above MP	Last reading	
Strata Layers	7	Calc Min 95%	7.90m below MP
Aquifer Name		Aquifer Tests	0
Aquifer Type		Yield Drawdown Tests	2
Drill Date	15 May 2004	Max Tested Yield	8 l/s
Driller	Dynes Road Drilling	Drawdown at Max Tested Yield	4 m
Drilling Method	Cable Tool	Specific Capacity	2.24 l/s/m
Casing Material	STEEL	Last Updated	08 Nov 2013
Pump Type		Last Field Check	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	24	26				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
15 May 2004	1	3.4	44.8738251	1.52	3
15 May 2004	2	8.33	109.940872	3.96	4

No comments for this well

Bore Log

Borelog for well M36/7648

Grid Reference (NZTM): 1550378 mE, 5169691 mN
 Location Accuracy: 50 - 300m
 Ground Level Altitude: 35.7 m +MSD Accuracy: < 0.5 m
 Driller: Dynes Road Drilling
 Drill Method: Cable Tool
 Borelog Depth: 26.0 m Drill Date: 15-May-2004

