

Revised Geotechnical Investigation

92 Dunns Crossing Road Rolleston

Christchurch

Submitted to: Hughes Developments Ltd Christchurch



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Contents

1	Introduction
2	Site Description
3	Geological Model5
3.1	Regional Geology5
3.2	Geomorphology5
3.3	Geohazards6
3.3.1	Seismicity
3.3.2	Liquefaction and Lateral Spreading6
3.4	Site Investigation
3.5	ECan Boreholes7
3.6	Groundwater
3.7	Site Seismic Class
4	Liquefaction Analysis9
5	RMA Section 106 Requirements and Suitability to Subdivide9
6	Geotechnical Recommendations9
6.1	Earthworks9
6.2	Subdivision Roading 10
6.3	Stormwater Control
6.4	Foundations10
7	References
8	Limitations



Tables

Table 1:	Summary of Hand Auger Investigations
Table 2:	Summary of Test Pit Investigations
Table 3:	Generalised Summary of ECan Boreholes

Figures

Figure 1:	Site Location Plan
Figure 2:	Historical Aerial Photo – 1940 to 1944
Figure 3:	Nearby ECan Borehole Locations

Appendices

- Appendix 1: Site Plan and Inferred Paleo Channels
- Appendix 2: ENGEO Hand Auger and Test Pit Logs
- Appendix 3: ECan Borelogs

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1 Introduction

ENGEO Ltd was requested by Hughes Developments Ltd to undertake a geotechnical investigation of the property at 92 Dunns Crossing Road, Rolleston, Christchurch, and a neighbouring section off Goulds Road, as outlined in our variation proposal (ref: P2019.002.259_01).

The purpose of this assessment was to conceptualise 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 forty 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 forty-five test pits, including geotechnical logging of the exposed soils; and
- Preparation of this report outlining our findings on the ground conditions and the suitability of the site for residential subdivision, including 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.

ENGEO previously issued a Geotechnical Investigation report dated 6 December 2019 (ref: 12903.001.000_01), which included thirty-three hand augers and thirty-two test pit investigations. Our testing scope was reduced, due to three paddocks being unavailable for testing at that time. Subsurface testing has now been completed in the three remaining paddocks, finalising the testing for this site. This version of our report supersedes our original report for the site dated 6 December 2019.

2 Site Description

The site comprises of two properties with a total area of 30.8 ha and have the following legal descriptions (Canterbury Maps):

- 92 Dunns Crossing Road Lot 1 DP 61278 10.1 ha
- Lot 3 DP 57004 20.7 ha

They are located approximately 3 km southwest of Rolleston town centre. They are both bound to the southwest by Dunns Crossing Road. 92 Dunns Crossing Road is bound to all other sides by rural properties, whereas the neighbouring property is bound to the east by Goulds Road (Figure 1).





Figure 1: Site Location Plan

Images sourced from Canterbury Maps and "© OpenStreetMap contributors". 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 brownish grey river alluvium (Q2a).

3.2 Geomorphology

The site comprises relatively flat ground, with gentle undulations and depressions in some areas. As evident on aerial imagery (Canterbury Maps, 2019) and observed during our site walkover conducted on 21 November 2019, undulating and depressed ground can be attributed to paleo-channels, which traverse the site in a general northwest to southeast direction (Figure 2). Based on observations, sandy silt deposits with variable thickness (up to 0.6 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).

Figure 2: Historical Aerial Photo – 1940 to 1944



Image sourced from Canterbury Maps. Not to scale.



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 6 km north / northwest of the site and trends roughly east-west with a surface rupture length 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 extended to within 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 in an area mapped where "damaging liquefaction is unlikely" (NZGD Map CGD5140, 2012), and a "zone of very low liquefaction potential" (GNS, 2006).

3.4 Site Investigation

Site investigations to assess the shallow subsurface material types and strength characteristics were undertaken by ENGEO from 22 November to 6 December 2019. Forty-five test pits and forty-one hand auger investigations with associated Scala Penetrometer tests were completed to a maximum depth of 2.1 m below ground level. An extra hand auger investigation was required due to the shape of the site, and the grid pattern adopted to accurately plan the testing locations.

The investigations revealed subsurface conditions across the site are consistent with the published geological mapping, as summarised in Table 2. Hand auger and test pit logs are attached as Appendix 2 of this report.

Table 1: Summary of Hand Auger Investigations

Soil Type	Depth to Top of Layer (m)	General Layer Thickness (m)	Density / Consistency	Additional Comments
TOPSOIL	0.0	0.1 – 0.2	Firm to Stiff	-
Sandy SILT	0.1 – 0.2	0.1 – 0.5	Firm to Very Stiff	Consistent across the site



Soil Type	Depth to Top of Layer (m)	General Layer Thickness (m)	Density / Consistency	Additional Comments
TOPSOIL	0.0	0.1 – 0.3	Firm to Stiff	-
SILT	0.1 – 0.3	0.2 - 0.3	Stiff to Very Stiff	Present in TP11, 22, 24 and 40
Silty SAND / SAND	0.3 – 0.6	0.2 – 0.5	Medium Dense to Dense	Silty sand present in TP09, 11 and sand present in TP36
Sandy GRAVEL	0.1 – 1.0	Unknown	Medium Dense to Very Dense	Consistent across the site Noticeable sand increase in TP03, 04, and 09

Table 2: Summary of Test Pit Investigations

3.5 ECan Boreholes

A review of six deep ECan borehole logs was conducted. The first (M36/4449 & M36/4387), are located on-site, and appear to be water wells providing the properties irrigation and domestic supply. The other boreholes are located to the north (M36/4450), east (M36/20535), south (BX23/0895) and west (M36/7416) of the site.

Well logs from the six holes of interest are attached to this report as Appendix 3 and summarised in Table 3.

ECan Borehole	Total Depth (m)	Water Level Below Ground Level (m)	Generalised Borelog as Logged by Driller
BX23/0895	53	5.35	Varying sandy and silty gravel layers to 53 m.
M36/20535	30	7.1	Topsoil to 0.3 m with gravel from 0.3 to 30 m.
M36/4387	35	6.5	Grey / sandy gravel to 35 m, with a layer of clay-bound gravel from 6.6 to 20.7 m.
M36/4449	24	7.7	Gravel to 24 m with a layer of clay from 12 to 14 m and sandy gravel from 14 to 18 m.



ECan Borehole	Total Depth (m)	Water Level Below Ground Level (m)	Generalised Borelog as Logged by Driller
M36/4450	26	8.1	Gravel to 26 m with a layer of clayey gravel from 12 to 18 m, clay and sand from 22 to 24 m and 26 to 26.5 m.
M36/7416	47	5.18	Sandy gravel to 16.8 with a layer of clay-bound sandy gravel from 5.6 to 14.7 m, and predominant gravel to 23 m. Logs not available from 23 to 47 m.

Figure 3: Nearby ECan Borehole Locations



Aerial photograph sourced from Canterbury Maps. Not to scale.

3.6 Groundwater

Groundwater is recorded in the surrounding boreholes between approximately 5.18 m and 8.1 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 Analysis

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 future land performance to be in line with Technical Category 1 (TC1), 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 it considers that:

- There is a significant risk from natural hazards; or
- Sufficient provision has not been made for legal or physical access to each allotment to be created by the subdivision.

An assessment of the risk from natural hazards as required by the RMA includes the following:

- The likelihood of natural hazards occurring (whether individually or in combination);
- The material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and
- Any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

We have assessed the risk of natural hazards at the site in accordance with Section 106 of the Resource Management Act (RMA) and considered the risk to the site from rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. 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 natural hazards such as rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. 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 Earth filling for Residential Development. In particular, any areas to receive fill should be stripped of all 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 2V:1H 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 no steeper than 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 Roading

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 shallow 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 sandy gravel or engineered fill, below any topsoil. All topsoil shall be stripped from within building footprints, we anticipate this to be typically below 0.1 to 0.3 m depth based on our subsurface investigations.



7 References

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- The Ministry of Business, Innovation, and Employment (2016). New Zealand Geotechnical Database. Retrieved November 2019, 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 Developments 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 Engineering NZ/ACENZ Standard Terms of Engagement.
- v. This report is not to be reproduced either wholly or in part without our prior written permission.

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

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Report reviewed by

Greg Martin, CMEngNZ (PEngGeol) Principal Engineering Geologist



Jed Watts Engineering Geologist





APPENDIX 1: Site Plan and Inferred Paleo Channels







APPENDIX 2:

ENGEO Hand Auger and Test Pit Logs



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	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{1}{1} \cdot \frac{1}{2} \cdot \frac{1}$				F-St						
-	A	ML	SILT with some sand; brown. Low Sand, fine.	plasticity.				D	St-VSt						
-			End of Hole Depth: 0.2 m Termination Condition: Practical re	efusal											
-	-													>	>
-												•			
0.5 -															
-	_														
-	-														
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- 112	-														
	-											•			
												•			
068.6PJ															
JAUGER												•			
- HANL															
JEK 2019.1															
	and a	uger n	net practical refusal at 0.2 m depth o	on inferred grav	el.								<u> </u>		-
St.	andin 3 = T(g grou DPSO	IL, A = ALLUVIUM	m dopui.											

			VGEO		LC	CG	0	F	AUC	GER H	A08	
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N ate :2 pth :0 eter :5	lughes I/A 2/11/2 .4 m 0 mm	Dev 019	elopn	nents Lto	Shear Va Log Review La Lor	ane No : 1379 ged By : KF/CR ved By : JW atitude : -43.626009 gitude : 172.379583	
pth (m BGL)	iterial	CS Symbol	DESCRIPTION		aphic Symbol	vation (mRL)	ater Level	isture Cond.	nsistency/ nsity Index	Shear Vane drained Shear trength (kPa) sak/Remolded	Scala Penetrome Blows per 100m	eter m
De	TS Ma	SN ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	B <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u>	Ele	Wa	Mo	රී ඒ F-St	Un Pe S	2 4 6 8 1	0 12
-	ALLUVIUM	ML	SILT with some sand; greyish brow plasticity. Sand, fine.	vn. Low				D	VSt-H			
-			End of Hole Depth: 0.4 m Termination Condition: Practical re	fusal								
- 0.5												
-												
Ha Ha Score Sta	ind ai ala P andin 5 = T(uger n Penetro Ig grou OPSO	net practical refusal at 0.4 m depth o ometer met practical refusal at 0.6 i indwater was not encountered. IL	on inferred grav m depth.	el.							:

			VGEO		LC	C	0	F	AUC	GER H	IA09)			
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client I D Hole De Hole Diame	ient : H Ref. : N Date : 2 opth : 0 Deter : 5	lughes I/A 2/11/2 0.3 m 50 mm	Dev 019	elopn	nents Lto	i Shear V Log Review L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/Cl JW -43.6 172.3	R 2663 378167		
(m BGL) ו	rial	Symbol	DESCRIPTION		hic Symbol	ttion (mRL)	r Level	ure Cond.	istency/ ity Index	ear Vane ained Shear ngth (kPa) //Remolded	Sc	ala Pe	enetrom	ieter	
Depth	Mater	nsce			Grapt	Eleva	Water	Moist	Consi Densi	Sh Undra Stre Peak	В 2	ows p 4 6	er 100	nm 10 1:	2
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\underline{x} \cdot \underline{y}}{\underline{y}} \cdot \underline{\underline{x} \cdot \underline{y}}$				St						
	ALLUVIUM	ML	SILT with some sand; greyish brow plasticity. Sand, fine.	wn. Low				D	St-VSt						/
			End of Hole Depth: 0.3 m Termination Condition: Practical re	efusal			<u> </u>								>>
	-														
0.5															
2 17 17															
1.0-	-														
5000															
	-														
- 17:11.6															
1.5 H	and a	uger n	net practical refusal at 0.3 m depth	on inferred grav	/el.					1	ı;	<u>. :</u>		<u></u> ;	
	caia P tandin S = T(renetro Ig grou OPSO	ometer met practical refusal at 0.3 i indwater was not encountered. IL	m aepth.											

			VGEO		LC	C	0	F	AUC	SER H	IA10)		
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client I D Hole De Hole Diame	ient :H Ref. :N Date :2 Ppth :0 eter :5	lughes I/A 2/11/2 .5 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/CR JW -43.62 172.37	6452 7126	
Jepth (m BGL)	/aterial	JSCS Symbol	DESCRIPTION		Sraphic Symbol	Elevation (mRL)	Vater Level	Aoisture Cond.	Consistency/ Density Index	Shear Vane Jndrained Shear Strength (kPa) Peak/Remolded	Sc Bl	ala Per ows pe	r 100mr	er n
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].			>	~	F-St			+ 0	<u> </u>	
-			SILT with some sand; greyish brow plasticity. Sand, fine.	vn. Low										
-	ALLUVIUM	ML	Trace gravel and sand observed fr depth.	om 0.3 m				D	St-VSt		P			
0.5 -			End of Hole Depth: 0.5 m	fucal										
-	-													~
PLAIE 2.601 4/12/19														
2019.11.27 - האוש אטטבת ב	-													
Hann Vice 1.5 Ha Si St	and	uger n Penetro	net practical refusal at 0.5 m depth ometer met practical refusal at 0.7 n undwater was not encountered.	on inferred grav m depth.	vel.									



			VGEO		LC	C	0	F	AUC	SER H	IA12	1		
	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client I D Hole De Hole Diame	ient :⊢ Ref. :N Date :2 pth :0 eter :5	lughes I/A 2/11/2 .3 m 60 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/CR JW -43.620 172.37	5972 5908	
BGL)		ymbol			Symbol	ı (mRL)	ivel	Cond.	ncy/ ndex	Vane ed Shear h (kPa) molded	Sca	ala Pen	etrome	ter
Depth (m	Material	uscs sy	DESCRIPTION		Graphic \$	Elevation	Water Le	Moisture	Consiste Density I	Shear Undraine Strengtl Peak/Re	Blo 2 4	ows per	r 100mr 8 1(m) 12
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{x^{k+1}y}{1y} \cdot \frac{x^{k+1}y}{x^{k+1}y}$				F-St					
	ALLUVIUM	ML	SILT with some sand and trace gra brown. Low plasticity. Sand, fine.	avel; greyish				D	St-VSt		•			
-			End of Hole Depth: 0.3 m Termination Condition: Practical re	efusal			<u> </u>							>>
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0.5														
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1.5 Ha	 and a cala P	uger n Penetro	net practical refusal at 0.3 m depth o ometer met practical refusal at 0.3 l	on inferred grav	/el.								<u>;</u> ;;	
St St	andin S = T(g grou OPSO	Indwater was not encountered.	•										

			VGEO		LC	C	0	F	AUC	GER H	IA13				
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent : H Ref. : N pate : 2 pth : 0	lughes I/A 2/11/2 .3 m 0 mm	Dev 019	elopn	nents Lto	i Shear V. Log Review L Lor	ane No: 13 ged By: KF wed By: JW atitude: -43 ngitude: 17	79 /CR / 3.627 2.375	741		
ו BGL)		ymbol	DESCRIPTION		Symbol	ר (mRL) ו	evel	Cond.	ency/ Index	- Vane ed Shear th (kPa) emolded	Scala	Pene	tromet	er	
Depth (n	Material	uscs s			Graphic	Elevatio	Water Le	Moisture	Consiste Density	Shear Undrain Strengt Peak/R	Blow 2 4	s per 6	100mm 8 10	n 12	
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\sqrt{1}}{\sqrt{1}} \cdot \frac{\sqrt{1}}{\sqrt{1}}$				F-St						
	ALLUVIUM	ML	Sandy SILT with minor gravel; gre Low plasticity. Sand, fine. Gravel, subangular to subrounded.	yish brown. fine,				D	St-VSt						
-			End of Hole Depth: 0.3 m Termination Condition: Practical re	efusal			<u> </u>							>:	~
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0.5 -															
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1.0-	-														
	-														
	-														
1.5 ц	and a		net nractical refusal at 0.3 m depth /	on inferred grow	vel										_
	and an ala P andin S = T(enetro g grou	ometer met practical refusal at 0.3 m deptil ometer met practical refusal at 0.3 m indwater was not encountered.	m depth.											

			VGEO		L	C	0	F.	AUC	GER H	 A1 4	4		
	Ge 92	otec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent : H Ref. : N Pate : 2 pth : 0 eter : 5	lughes I/A 2/11/2 .4 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No ged By wed By atitude ngitude	: 1379 : KF/CF : JW : -43.62 : 172.3	R 2757 74573	
ı (m BGL)	ial	Symbol	DESCRIPTION		nic Symbol	tion (mRL)	- Level	ure Cond.	stency/ ty Index	ear Vane ained Shear ngth (kPa) /Remolded	S	cala Per	netrome	eter
Depth	Mater	nsce			Graph	Eleva	Water	Moist	Consi Densi	Sh Undra Strei Peak	2	Blows pe	er 100m 8 1	nm 0 12
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\sqrt{1}}{1} \cdot \frac{\sqrt{1}}{2} \cdot \frac{\sqrt{1}}{2}$				S-F					
-	ALLUVIUM	ML	Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.		•		D	St-VSt					
-			End of Hole Depth: 0.4 m Termination Condition: Practical re	efusal			I							>>
0.5 -														· · · · · · · · · · · · · · · · · · ·
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-														· · · · · · · · · · · · · · · · · · ·
1.0													:	· · · · · · · · · · · · · · · · · · ·
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1.5 Ha	nd au	uger n	net practical refusal at 0.4 m depth o	on inferred grav	vel.									<u>: :</u>
Sc Sta	ala P andin = T(enetro g gro∟)PS∩	ometer met practical refusal at 0.4 i indwater was not encountered. IL	m depth.										

			VGEO		LC	0	F	AUC	SER H	A15	5					
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N Pate :2 pth :0	lughes I/A 2/11/2 0.5 m 60 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/0 JW -43.0) CR 6282 374:	288 2337		
lepth (m BGL)	laterial	ISCS Symbol	DESCRIPTION		iraphic Symbol	levation (mRL)	Vater Level	foisture Cond.	consistency/ ensity Index	Shear Vane Indrained Shear Strength (kPa) Peak/Remolded	Sc	ala P	enet	rome	ter m	
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{1}{1} \cdot \frac{1}{2} \cdot \frac{1}$		>	2	S-F		2	4 6		3 10	<u>J 12</u>	<u>'</u>
-	V		Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.												
-	ALLUVIUN	ML	Trace gravel and becomes brownis 0.3 m depth.	sh grey from					F-VSt			\ \				
0.5 -			End of Hole Depth: 0.5 m	fued										<u> </u>		
-			Termination Condition: Practical re	erusai										/	····	>>•
-	-															
-	_															
1.0-																
														· · · · · · · · · · · · · · · · · · ·		
	and a cala P	uger n Penetro	net practical refusal at 0.5 m depth o ometer met practical refusal at 0.6	on inferred grav m depth.	vel.										•	
St St St St	andin S = T(g grou OPSO	indwater was not encountered. IL													

			VGEO		LC	DG	0	F /	AUC	SER H	IA16				
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N ate :2 pth :0 eter :5	lughes I/A 2/11/2 .6 m 0 mm	Dev 019	elopn	nents Lto	Shear V. Log Review L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/CF JW -43.62 172.37	R 19139 75002		
th (m BGL)	erial	SS Symbol	DESCRIPTION		phic Symbol	ation (mRL)	er Level	sture Cond.	sistency/ sity Index	hear Vane Irained Shear ength (kPa) ak/Remolded	Sca	ila Per	netrom	eter	
Dep	b Mate	nsc	SILT with some sand and trace ro	otlets; brown.		Elev	Wat	Mois	Con Den	Curd Str Pea	2 4	<u>6</u>	8 1	10 12	2
	TS	ML	Sandy SILT; greyish brown. Low p	lasticity. Sand,					S-F		•				
0.5		ML	fine. Becomes light greyish brown from Trace gravel encountered from 0.6	0.3 m depth.				D	F-VSt						
			End of Hole Depth: 0.6 m Termination Condition: Practical re	efusal											
	-														>>
	_														
17	_														
	-														
2019.11.21	-														
1.5															
	and a cala F tandin	uger n Penetro ng grou	net practical refusal at 0.6 m depth ometer met practical refusal at 0.7 Indwater was not encountered.	on inferred grav m depth.	el.										
<u>у</u> Т	S = T(OPSO	IL												

			VGEO	LOG OF AUGER HA17											
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Client : Hughes Developments Ltd Shear Vane No : 1379 Client Ref. : N/A Logged By : KF/CR Date : 22/11/2019 Reviewed By : JW Hole Depth : 0.3 m Latitude : -43.628389 Hole Diameter : 50 mm Longitude : 172.375254											
pth (m BGL)	aterial	SCS Symbol	DESCRIPTION		aphic Symbol	svation (mRL)	ater Level	visture Cond.	insistency/ insity Index	Shear Vane Idrained Shear ttrength (kPa) sak/Remolded	Scala Penetrom Blows per 100r			er	_
De	$\begin{array}{c c} \overset{\circ}{\rightarrow} & \overset{\circ}{\succ} & \overset{\circ}{\rightarrow} \\ & &$				<u>5</u>	Ë	Ň	Mc	රී මී S-F	200	2 4	6	8 10	12	_
			Sandy SILT; greyish brown. Low p fine.	lasticity. Sand,	<u></u>	<u>6</u>				-					
-	ALLUVIUM	ML						D	St-VSt						
-			End of Hole Depth: 0.3 m Termination Condition: Practical re	fusal			I							>:	Ì
-															
0.5															
	_														
	-														
- 10	_														
2.GDI 4/12															
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NZ DALA I	_														
- OGS.GPJ															
D AUGER I															
1.27 - HAN															
GER 2019.															
Hann Hi Hi Si	and a cala P	uger n Penetro	net practical refusal at 0.3 m depth o pometer met practical refusal at 0.3 i	on inferred grav n depth.	el.					<u> </u>	<u> ; ;</u>	_;	: :		
	anum 6 = T(SPSO	IL												



			VGEO	LOG OF AUGER HA19											
Geotechnical Investigation 92 Dunns Crossing Road Rolleston 12903				Client : Hughes Developments Ltd Shear Vane No : 1379 Client Ref. : N/A Logged By : KF/CR Date : 22/11/2019 Reviewed By : JW Hole Depth : 0.6 m Latitude : -43.627815 Hole Diameter : 50 mm Longitude : 172.376568											
h (m BGL)	rial	S Symbol	DESCRIPTION	hic Symbol ation (mRL) ar Level ture Cond. sistency/				sity Index near Vane angth (kPa) k/Remolded			a Penetrometer				
Deptl	Mate	USC:					Mois Dens				2 4 6 8 10			m) 12	!
	TS	ML	Low plasticity. Sand, fine [TOPSO]	otiets; brown. IL].	$\frac{\sqrt{y}}{1} \cdot \frac{\sqrt{y}}{\sqrt{y}} \cdot \frac{\sqrt{y}}{1}$				S-F						
- - 0.5 -	ALLUVIUM	ML	SILT with some sand; greyish brow plasticity. Sand, fine.	vn. Low		<u>4</u>		D	F-St						
		ML	Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.					St-VSt					····/·····	
	-		Termination Condition: Practical re	fusal											
	and a cala P andin 3 = T(uger n enetro g grou DPSO	net practical refusal at 0.6 m depth o ometer met practical refusal at 0.6 i undwater was not encountered. IL	on inferred grav n depth.	rel.										

			VGEO	LOG OF AUGER HA20											
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Client : Hughes Developments Ltd Shear Vane No : 1379 Client Ref. : N/A Logged By : KF/CR Date : 22/11/2019 Reviewed By : JW Hole Depth : 0.3 m Latitude : -43.627993 Hole Diameter : 50 mm Longitude : 172.377662											
m BGL)		Symbol				: Symbol on (mRL)	evel	e Cond.	ency/ Index	ar Vane ned Shear gth (kPa) Remolded	Scala Penetrometer				
Depth (Materia	USCS (Graphic	Elevatic	Water I	Moistur	Moistur Consist Density	Shea Undrair Streng Peak/F	Blows per 100mm 2 4 6 8 10 1			n 12		
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\sqrt{1}}{\sqrt{1}} \cdot \frac{\sqrt{1}}{\sqrt{1}} \cdot \frac{\sqrt{1}}{\sqrt{1}}$				S-F						
-	MI ML SILT with some sand and trace gravel; g brown. Low plasticity. Sand, fine.							D	St-VSt		•		·····	·····	/
-			End of Hole Depth: 0.3 m Termination Condition: Practical re	efusal		<u>.</u>	<u> </u>							>	·>•
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0.5 -	-														
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U AUGER I															
Hanny Ha	and a ala F	uger n Penetro	net practical refusal at 0.3 m depth o ometer met practical refusal at 0.3 l	on inferred grav m depth.	el.					I			<u></u>	_:_	
Standing groundwater was not encountered. TS = TOPSOIL															
			VGEO		LC	C	0	F	AUC	GER H	IA21				
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	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent : H Ref. : N Pate : 2 pth : 0	lughes I/A 2/11/2 .2 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No: 1: ged By: K wed By: J' atitude: -4 ngitude: 1	379 F/CR W 13.62 72.37	7255 7872		
ר BGL)		ymbol	DESCRIPTION		Symbol	ר (mRL)	evel	Cond.	ency/ Index	- Vane ed Shear th (kPa) emolded	Scala	a Pen	etrome	eter	
Depth (n	Material	uscs s			Graphic	Elevatio	Water Le	Moisture	Consiste Density	Shear Undrain Strengt Peak/Re	Blov 2 4	vs pe	r 100m 8 1	ım 0 12	
-	TOPSOIL	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{x^{4} y_{2}}{y_{1}} = \frac{x^{4} y}{x^{4}}$ $\frac{x^{4} y_{2}}{x^{4}} = \frac{x^{4} y}{x^{4}}$ $\frac{x^{4} y_{2}}{x^{4}} = \frac{x^{4} y}{x^{4}}$ $\frac{y_{1}}{x^{4}} = \frac{x^{4} y}{x^{4}}$			D	F-St						
-			End of Hole Depth: 0.2 m Termination Condition: Practical re	efusal	$i_j \propto i_j$										
-	-													/	<u> </u>
-	-														
0.5 -	-														
-	-												•		
-	-														
- 10 - 20	-														
	-														
	-														
- 1069															
INI - 17.11															
1.5 1.5 Ha	i and a	uger n	net practical refusal at 0.2 m depth	on inferred grav	vel.										
So St	ala P andin	enetro g grou	ometer met practical refusal at 0.3 undwater was not encountered.	m depth.											

			VGEO		LC	C	0	F	AUC	SER H	IA22	1		
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client I D Hole De Hole Diame	ient :⊢ Ref. :N Date :2 pth :0 eter :5	lughes I/A 2/11/2 .3 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/CR JW -43.62 ⁻ 172.37	7454 8955	
n BGL)		ymbol	DESCRIPTION		Symbol	n (mRL)	evel	e Cond.	ency/ Index	r Vane ed Shear th (kPa) emolded	Sca	ala Pen	etrome	ter
Depth (n	Material	uscs s			Graphic	Elevatio	Water Le	Moisture	Consiste Density	Shear Undrain Strengt Peak/R	Blo 2 4	ows per	r 100m 8 1(m) 12
	TS	ML	SILT with some sand and trace ro Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\mathbf{x} \cdot \mathbf{y}}{\mathbf{y}} \cdot \frac{\mathbf{x} \cdot \mathbf{y}}{\mathbf{x} \cdot \mathbf{y}}$				F-St					-
	ALLUVIUM	ML	SILT with some sand and trace grabrown. Low plasticity. Sand, fine.	avel; greyish				D	St-VSt					
-			End of Hole Depth: 0.3 m Termination Condition: Practical re	efusal			1							>>
-														
0.5														
												•		-
														-
														•
												•		-
- HANU - 12	-													-
JEK 2019.11	-													-
	and a	uger n	net practical refusal at 0.3 m depth	on inferred grav	/el.									
St	andin S = T(g grou DPSO	Indwater was not encountered.											

			VGEO		L	C	0	F	AUC	GER H	IA23				
	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client I D Hole De Hole Diame	ient : H Ref. : N Date : 2 Spth : 0 Seter : 5	Hughes V/A 22/11/2 0.3 m 50 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No : 13 ged By : KF wed By : JV atitude : -4 ngitude : 17	79 [;] /CR / 3.629 2.37{	267		
(m BGL)	ial	Symbol	DESCRIPTION		ic Symbol	ion (mRL)	Level	ure Cond.	stency/ ty Index	ear Vane iined Shear ngth (kPa) /Remolded	Scala	Pene	etrome	ter	_
Depth	Materi	nscs			Graph	Elevat	Water	Moistu	Consis Densit	She Undra Strer Peak	Blow 2 4	s per 6	100mr 8 10	m) 12	
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{x^{n} h_{y}}{h_{y}} \cdot \frac{x^{n}}{x^{n}}$	12 			S-F						
	ALLUVIUM	ML	Sandy SILT with trace gravel; brov plasticity. Sand, fine.	vn. Low				D	St-VSt			·····			
			End of Hole Depth: 0.3 m Termination Condition: Practical re	efusal										>	>
	-											:			
0.5	-														
	_														
61/21/#															
E 2.GUI 4	-														
	-														
NZ DALA															
-068.GPJ												:			
JAUGERI												:		:	
-K 2019.1	-														
	and a	uger n	net practical refusal at 0.3 m depth	on inferred grav	/el.										_
SCHH	cala F tandin	Penetro	ometer met practical refusal at 0.3 i undwater was not encountered.	m depth.											
	ין – נ	JP30	IL												

			VGEO		L	C	0	F	AUC	SER H	IA24				
	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :⊢ Ref. :N ate :2 pth :0	lughes I/A 2/11/2 .3 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No: 1: ged By: K wed By: J' atitude: -4 ngitude: 1	379 F/CR W 13.629 72.37)275 7732		
n BGL)		ymbol	DESCRIPTION		Symbol	n (mRL)	evel	e Cond.	ency/ Index	r Vane ed Shear th (kPa) emolded	Scala	a Pen	etrome	ter	
Depth (r	Material	uscs s			Graphic	Elevatio	Water Lo	Moisture	Consiste Density	Sheal Undrain Streng	Blov 2 4	vs per	100m	m 0 12	
	TS	ML	SILT with some sand and trace roo Low plasticity [TOPSOIL].	otlets; brown.	$\frac{\underline{x}^{n}}{\underline{y}} \cdot \underline{x}^{n}}{\underline{x}^{n}} \cdot \underline{x}^{n}}$				S-F			•			
-	ALLUVIUM	ML	Sandy SILT with minor gravel; bro plasticity. Sand, fine. Gravel, fine, subrounded.	wn. Low subangular to				D	St-VSt						
-			End of Hole Depth: 0.3 m Termination Condition: Practical re	efusal			<u> </u>								>>
-	-											•			
0.5 -												•			
-	_														
-	_														
-	-											•			
	-											•			
	_											•			
	-											•			
	-											•			
	-											•			
	-														
1.5 Ha	and a	uger n	net practical refusal at 0.3 m depth of	on inferred grav	el.										
Sc St St St	cala P andin S = T(enetro g grou DPSO	ometer met practical refusal at 0.3 i indwater was not encountered. IL	m depth.											

			VGEO		LC	C	0	F	AUC	SER H	A25	
	Ge 92	otec 2 Dui	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N Pate :2 pth :0	lughes I/A 2/11/2 .1 m 0 mm	Dev 019	elopm	nents Lto	Shear V Log Review L Lor	ane No : 1379 ged By : KF/Cl wed By : JW atitude : -43.62 ngitude : 172.3	R 28692 79095
Jepth (m BGL)	Material	JSCS Symbol	DESCRIPTION		Graphic Symbol	Elevation (mRL)	Nater Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Pe Blows p	netrometer er 100mm 8 10 12
	TS	ML	SILT with some sand and trace roo Low plasticity [TOPSOIL].	otlets; brown.	$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}$			D	F-St			
NU AUGEK ZO19.11.2/ - HAND AUGEK LOGS.GFJ NZ DATA LEMPLATE 2.GDI 4/12/19	- - - - -		End of Hole Depth: 0.1 m Termination Condition: Practical re	efusal	rel.							
St St St St	andin andin 3 = T(enetro g grou DPSOI	meter met practical refusal at 0.5 i indwater was not encountered. IL	m aeptn.								

			VGEO		LC	C	0	F	AUC	GER H	IA26			
	Ge 92	otec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N ate :2 pth :0 eter :5	lughes I/A 2/11/2 .2 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No: 13 ged By: K wed By: J\ atitude: -4 ngitude: 13	379 F/CR N 3.629 72.37	9562 8456	
I BGL)		ymbol			Symbol	ı (mRL)	ivel	Cond.	ncy/ ndex	Vane ed Shear h (kPa) molded	Scala	a Pen	etrome	ter
Depth (m	Material	uscs sy	DESCRIPTION		Graphic (Elevation	Water Le	Moisture	Consiste Density I	Shear Undraine Strengtl Peak/Re	Blov 2 4	vs pei 6	r 100m 8 10	m 0 12
-	TOPSOIL	ML	SILT with some sand and trace gra Low plasticity. Sand, fine [TOPSO	avel; brown. IL].	<u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u> <u>17</u>			D	F-St		•			
-			End of Hole Depth: 0.2 m Termination Condition: Practical re	efusal	$f_{j} \propto f_{j}$									
-												•		/ >
-												•		
0.5 -														
-	-													
												•		
-														
- 10 -												•		
	-													
	-													
												•		
14L - 17.11														
2 1.5 Ha	and a	uger n	net practical refusal at 0.2 m depth	on inferred grav	rel.								<u> </u>	<u> </u>
Sc St	ala P andin	enetro g grou	ometer met practical refusal at 0.3 i indwater was not encountered.	m depth.										



			VGEO		LC	C	0	F	AUC	GER H	IA28			
	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N ate :2 pth :0 eter :5	lughes I/A 2/11/2 .2 m 0 mm	Dev 019	elopm	nents Lto	Shear V Log Review L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/CR JW -43.63 172.37	0284 76702	
n BGL)		ymbol			Symbol	n (mRL)	evel	Cond.	ncy/ ndex	· Vane ed Shear h (kPa) emolded	Sca	ala Per	ietrome	eter
Depth (m	Material	NSCS S	DESCRIPTION		Graphic	Elevation	Water Le	Moisture	Consiste Density I	Shear Undraine Strengt Peak/Re	Blo 2 4	ows pe	r 100m 8 1	1m 0 12
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\sqrt{1}}{1} \cdot \frac{\sqrt{1}}{\sqrt{1}} \cdot \frac{\sqrt{1}}{\sqrt{1}}$				S-F					
-	A	ML	Sandy SILT with trace gravel; brov Low plasticity. Sand, fine.	vnish grey.				D	VSt-H					
-			End of Hole Depth: 0.2 m Termination Condition: Practical re	efusal										>>
-														
-														· · · · · · · · · · · · · · · · · · ·
0.5 -												:		
-	_													
-														
-	-													
	-													
	-													· · · · · · · · · · · · · · · · · · ·
- 1068.6FJ														
ант- 17-11- а														
	and a ala P	uger n Penetro	net practical refusal at 0.2 m depth ometer met practical refusal at 0.2 h	on inferred grav m depth.	el.									
St St St St St St St St St St St St St S	andin S = T(g grou OPSO	Indwater was not encountered. IL, A = ALLUVIUM											

Geotechnical Investigation 92 Dunns Crossing Road Rolleston 12903 ¹ Billeston 12903 ¹ Clienter 100 Denteror 120 Ding 12003 ¹ Clienter 100 Denteror 100 D				VGEO		LC	C	0	F	AUC	GER H	A29			
Top Top Top Scala Penetrometer 00		Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client I D Hole De Hole Diame	ient : H Ref. : N Date : 2 Spth : 0 Seter : 5	lughes I/A 2/11/2 .2 m 0 mm	Dev 019	elopn	nents Lto	Shear Va Loge Review La Lon	ane No: 13 ged By: KF wed By: JW atitude: -43 ngitude: 17	79 /CR / 3.630 2.375	1074 5758	
E The set of the product of the pr	BGL)		mbol			ymbol	(mRL)	/el	Cond.	icy/ idex	Vane d Shear i (kPa) molded	Scala	Pene	etromete	er
g ML Sll.T with scale gravel; brown. Low ✓ ML Sandy SlL.T with trace gravel; brown. Low ✓ ML Baldistly. Sand fine Image: Sandy SlL.T with trace gravel; brown. Low Image: Sandy SlL.T with trace gravel; brown. Low ✓ ML End of Helo Depth: 0.2 m Termination Condition: Practical refusal >> 0.5 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	Depth (m	Material	uscs sy	DESCRIPTION		Graphic S	Elevation	Water Lev	Moisture	Consister Density Ir	Shear Undraine Strength Peak/Rei	Blow 2 4	s per 6	100mm 8 10	12
Sandy SiLT with trace gravel; brown. Low End of Hale Depth: 0.2 m Termination Condition: Practical refusal 0.5 1.0		TS	ML	SILT with some sand and trace roo Low plasticity. Sand fine [TOPSO]	otlets; brown. L].	$\frac{\underline{x}^{\mathbf{i}} \cdot \underline{y}_{\mathbf{i}}}{\underline{y}_{\mathbf{i}}} \cdot \frac{\underline{x}^{\mathbf{i}} \cdot \underline{y}_{\mathbf{i}}}{\underline{x}^{\mathbf{i}} \cdot \underline{y}_{\mathbf{i}}}$									
End of Hele Depth: 0.2 m Termination Condition: Practical refusal 0.5 - 1.0 - 1.0 - 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 = CTOPSID. A = ALLUVIDM	-	A	ML	Sandy SILT with trace gravel; brov plasticity. Sand, fine.	vn. Low								····/		
0.5 - 1.0 - 1.0 - 1.0 - 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 = TOPSOL, A = ALLUVIUM	-			End of Hole Depth: 0.2 m Termination Condition: Practical re	efusal										
0.5 - - - - - - - - - - - - - -	-	-													>>
0.5	-	-													
1.0 1.0 - - - - - - - - - - - - -	0.5 -														
Index Index <td< td=""><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	_														
1.0- 1.0- 1.0- 1.5- 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 = TOPSOL A = ALLUVIUM															
1.0- 1.0- 1.0- 1.5- 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. T5 = TOPSOIL, A = ALLUVIUM	-														
1.0- 1.0- 1.0- 1.5- 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. A = ALLUVIUM	-														
1.0- 1.0- 1.5- 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, A = ALLUVIUM	 0 1	-													
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. A = ALLUVIUM	1.0-	-													
1.5 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, A = ALLUVIUM															
1.5 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. A = ALLUVIUM															
1.5 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. A = ALLUVIUM															
1.5 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. A = ALLUVIUM													:		
1.5 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. A = ALLUVIUM	-														
Scala Penetrometer met practical refusal at 0.3 m depth. Standing groundwater was not encountered. TS = TOPSOIL, A = ALLUVIUM	7 1.5 Ha	and a	uger n	net practical refusal at 0.2 m depth	on inferred grav	/el.									
	Sc St St	ala P andin S = T(enetro	ometer met practical refusal at 0.3 i undwater was not encountered. II A = ALLUVIUM	m depth.										

			VGEO		LC	CG	0	F	AUC	SER H	IA30	
	Ge 92	otec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N Pate :2 pth :0	lughes I/A 2/11/2 .4 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No: 1379 ged By: KF/CF wed By: JW atitude: -43.63 ngitude: 172.3	R 9101 76531
BGL)		ymbol			Symbol	ı (mRL)	ivel	Cond.	ncy/ ndex	Vane ed Shear h (kPa) emolded	Scala Per	netrometer
Depth (m	Material	uscs s	DESCRIPTION		Graphic (Elevatior	Water Le	Moisture	Consiste Density I	Shear Undraine Strengti Peak/Re	Blows pe	er 100mm 8 10 12
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand fine [TOPSO]	otlets; brown. L].	$\frac{\lambda^{1}I_{y}}{I_{z}} \cdot \frac{\lambda^{1}I_{y}}{\lambda^{1}I_{y}}$				S-F			
-	ALLUVIUM	ML	Sandy SILT with minor gravel; gre Low plasticity. Sand, fine. Gravel, medium, subangular to subrounde	yish brown. fine to d.				D	St-VSt			*
-			End of Hole Depth: 0.4 m Termination Condition: Practical re	efusal								
0.5 -												
-												
-												
-												
1.0												
- 12.11.21												
1.5												
Ha So	ind ai ala P andin	uger n enetro	net practical refusal at 0.4 m depth o ometer met practical refusal at 0.3 i undwater was not encountered	on inferred grav m depth.	el.							
TS	5 = T() PSO										

			VGEO		LC	C	0	F	AUC	GER H	A 31			
	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N Pate :2 pth :0	lughes I/A 2/11/2 .3 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No : : ged By : wed By : . atitude : : ngitude : :	1379 <f cr<br="">JW -43.630 172.377</f>	521 78	
h (m BGL)	rial	S Symbol	DESCRIPTION		hic Symbol	ation (mRL)	r Level	ture Cond.	istency/ ity Index	iear Vane ained Shear angth (kPa) v/Remolded	Sca	la Pene	trometer	
Dept	Mate	USC:			Grap	Eleva	Wate	Moist	Cons Dens	Stree Peal	2 4	ws per	100mm 8 10	12
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand fine [TOPSO]	otlets; brown. L].	$\frac{1}{1} \cdot \frac{1}{2} \cdot \frac{1}{2}$				F-St					
-	ALLUVIUM	ML	Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.				D	St-H					
-			End of Hole Depth: 0.3 m Termination Condition: Practical re	fusal								•		>>
0.5 -														
	nnd ai ala P andin 5 = T(uger n lenetro g grou DPSO	net practical refusal at 0.3 m depth o ometer met practical refusal at 0.3 i undwater was not encountered. IL	on inferred grav n depth.	rel.									

			VGEO		LC	C	0	F	AUC	GER H	IA32				
	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client I D Hole De Hole Diame	ient :⊢ Ref. :N Date :2 pth :0 eter :5	lughes I/A 2/11/2 .3 m 60 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No:1 ged By:F wed By:C atitude:- ngitude:1	1379 (F/CR JW 43.63 172.37	1356 7566		
BGL)		mbol			Symbol	(mRL)	vel	Cond.	lcy/ hex	Vane d Shear າ (kPa) molded	Sca	la Pen	etrome	ter	
Depth (m	Material	uscs sy	DESCRIPTION		Graphic S	Elevation	Water Le	Moisture	Consister Density Ir	Shear Undraine Strength Peak/Re	Blo 2 4	ws pe 6	r 100m 8 1	m 0 12	
	TS	ML	SILT with some sand and trace roo Low plasticity. Sand fine [TOPSOI	otlets; brown. L].	$\frac{\sqrt{1_{y}}}{1_{y}} \cdot \frac{\sqrt{1}}{\sqrt{1_{y}}}$				S-F						
	ALLUVIUM	ML	Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.				D	St-VSt			•			/
-			End of Hole Depth: 0.3 m Termination Condition: Practical re	efusal											~> •
-	-														
0.5															
-	-														
	-														
-	-														
- 14	-														
	_														
	_														
- LUGS.GPJ															
IN AUGER														:	
ин - /7.11.															
1.5 Hannel Ha	and a	uger n enetro	net practical refusal at 0.3 m depth o ometer met practical refusal at 0.3 i	on inferred grav m depth.	/el.					I	<u> </u>			:	
St St	andin S = T(g grou OPSO	Indwater was not encountered. IL												

			VGEO		LC	C	0	F	AUC	GER H	IA33		
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N Pate :2 pth :0	lughes I/A 2/11/2 .6 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No : 1379 ged By : KF/Cl wed By : JW atitude : -43.6 ngitude : 172.3	R 32691 77909	
(m BGL)	ial	Symbol	DESCRIPTION		iic Symbol	tion (mRL)	Level	ure Cond.	stency/ ty Index	ear Vane ained Shear ngth (kPa) /Remolded	Scala Pe	netrometer	
Depth	Mater	nscs			Graph	Elevat	Water	Moistu	Consi Densi	She Undra Stret Peak	Blows p 2 4 6	er 100mm <u>8 10 12</u>	
-	TOPSOIL	ML	SILT with some sand and trace roo Low plasticity. Sand fine [TOPSOI	otlets; brown. L].	$\frac{\sqrt{t_2}}{\sqrt{t_2}} \frac{\sqrt{t_1}}{\sqrt{t_2}}$				F-St				
0.5 -	ALLUVIUM	ML	Sandy SILT with trace gravel; grey Low plasticity. Sand, fine. Gravel becomes minor from 0.5 m	ish brown.		2		D	VSt-H				•
			Gravel, fine to medium, subangula subrounded.	r to									
			End of Hole Depth: 0.6 m Termination Condition: Practical re	fusal									
Ha So St	and ai cala P andin	uger n 'enetro Ig grou	net practical refusal at 0.6 m depth o ometer met practical refusal at 0.6 n undwater was not encountered.	on inferred grav m depth.	el.								

			VGEO		LC	DG	0	F	AUC	SER H	IA 34			
	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N Pate :0 pth :0 eter :5	lughes //A 6/12/2 .3 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No: 1 ged By: k wed By: J atitude: -4 ngitude: 1	379 F/MK W 43.625 72.376	477 6421	
lepth (m BGL)	laterial	ISCS Symbol	DESCRIPTION		sraphic Symbol	levation (mRL)	Vater Level	loisture Cond.	tonsistency/ lensity Index	Shear Vane Indrained Shear Strength (kPa) Peak/Remolded	Scal Blov	a Pene ws per	trometer	
	TOPSOIL N	D ML	SILT with some sand and trace ro Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].		Ш	>	2	F-St	E	24	6	8 10	12
-	ALLUVIUM	ML	Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.				D	St-H					
			Termination Condition: Practical re	efusal										
Ha So St	and a ala P andin	uger n Penetro Ig grou	net practical refusal at 0.3 m depth ometer met practical refusal at 0.3 undwater was not encountered.	on inferred grav m depth.	vel.					I				•

			VGEO		LC	DG	0	F	AUC	GER H	IA35				
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client I D Hole De Hole Diame	ient :H Ref. :N Date :0 Ppth :0	lughes I/A 6/12/2 .1 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/MH JW -43.62 172.3	< 25997 75209		
BGL)		/mbol			Symbol	(mRL)	vel	Cond.	ncy/ ndex	Vane d Shear າ (kPa) molded	Sca	ıla Per	netrom	neter	
Depth (m	Material	uscs sy	DESCRIPTION		Graphic S	Elevation	Water Le	Moisture	Consister Density Ir	Shear Undraine Strength Peak/Re	Blo 2 4	ows pe 6	er 100ı 8	mm 10 12	2
	PSOL	ML	SILT with some sand and trace ro Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	<u>17</u> . <u>17</u> . <u>11</u> <u>17</u> . <u>11</u> <u>17</u> . <u>11</u>			D	F-St						
	10		End of Hole Depth: 0.1 m Termination Condition: Practical re	efusal											
															>>
0.5															
Ì															
	-														
1.0-															
H S S	and a cala F tandin	uger n Penetro Ig grou	net practical refusal at 0.1 m depth ometer met practical refusal at 0.3 indwater was not encountered.	on inferred grav m depth.	/el.										

			VGEO		LC	DG	0	F	AUC	GER H	IA36		
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N Pate :0 pth :0 eter :5	lughes I/A 6/12/2 .3 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review Lor	ane No : 137 ged By : KF/ wed By : JW atitude : -43 ngitude : 172	'9 'MK .62654 <i>'</i> 2.37383	1
ı (m BGL)	ial	Symbol	DESCRIPTION		nic Symbol	tion (mRL)	- Level	ure Cond.	stency/ ty Index	ear Vane ained Shear ngth (kPa) /Remolded	Scala	Penetro	meter
Depth	Mater	nsce			Graph	Eleva	Water	Moist	Consi Densi	Sh Undra Strei	Blows 2 4	per 10 6 8	0mm <u>10 12</u>
	TOPSOIL	ML	SILT with some sand and trace ro Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\underline{x}^{T}}{\underline{y}^{T}} \cdot \frac{\underline{x}^{T}}{\underline{y}^{T}} \cdot \frac{\underline{x}^{T}}{\underline{y}^{T}}$	4 2 2			F-St				
_	ALLUVIUM	ML	Sandy SILT with minor gravel; gre Low plasticity. Sand, fine. Gravel, subangular to subrounded.	yish brown. fine,				D	VSt-H				
			Termination Condition: Practical re	etusal									
Ha So Sta	and a ala P andin	uger n Penetro ng grou	net practical refusal at 0.3 m depth ometer met practical refusal at 0.3 undwater was not encountered.	on inferred grav m depth.	vel.								

			VGEO		LC	C	0	F	AUC	GER H	IA37	,		
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent : H Ref. : N ate : 0 pth : 0 eter : 5	lughes I/A 6/12/2 .4 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Revie L Lor	ane No : ged By : wed By : atitude : ngitude :	1379 KF/M JW -43.6 172.3	IK 25788 374136	6
(m BGL)	al	Symbol	DESCRIPTION		c Symbol	on (mRL)	Level	re Cond.	tency/ y Index	ar Vane ined Shear gth (kPa) Remolded	Sc	ala Pe	enetron	neter
Depth	Materia	nscs			Graphi	Elevati	Water	Moistu	Consis Density	She Undrai Stren Peak/I	BI 2 4	owsp 46	er 100 8	mm 10 12
	TOPSOIL	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{x^{1}}{y} \cdot \frac{x^{1}}{y} \cdot \frac{x^{1}}{y}$	*			F-St					
-			Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.										
-	ALLUVIUM	ML						D	VSt-H					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
			Gravel becomes minor from 0.3 m Gravel, fine, subrounded to rounde	depth. ed.									•	
-			End of Hole Depth: 0.4 m Termination Condition: Practical re	fusal										
0.5 -														
0.0														
-	-													
-														
1.0	-													
				on information										
Ha So St	and a ala P andin	lenetro g grou	net practical refusal at 0.4 m depth (pmeter met practical refusal at 0.3) indwater was not encountered.	n depth.	el.									

			VGEO		LC	DG	0	F	AUC	SER H	A38	
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent : H Ref. : N ate : 0 pth : 0	lughes //A 6/12/2 .4 m 0 mm	Dev 019	elopn	nents Lto	Shear V. Log Review L Lor	ane No : 1379 ged By : KF/MK ved By : JW atitude : -43.62506 gitude : 172.3743	85 72
m BGL)	_	Symbol	DESCRIPTION		c Symbol	on (mRL)	-evel	e Cond.	tency/ Index	ar Vane ned Shear gth (kPa) Remolded	Scala Penetro	ometer
Depth (Materia	USCS 3			Graphic	Elevatio	Water L	Moistur	Consist Density	Shea Undrair Streng Peak/F	Blows per 10 2 4 6 8	00mm 10 12
_	TOPSOIL	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\sqrt{t_2}}{\sqrt{t_2}} \frac{\sqrt{t_1}}{\sqrt{t_2}}$ $\frac{\sqrt{t_2}}{\sqrt{t_2}} \frac{\sqrt{t_2}}{\sqrt{t_2}}$ $\frac{\sqrt{t_2}}{\sqrt{t_2}} \frac{\sqrt{t_2}}{\sqrt{t_2}}$ $\frac{\sqrt{t_2}}{\sqrt{t_2}} \frac{\sqrt{t_2}}{\sqrt{t_2}}$				F-St		•	
_	ALLUVIUM	ML	Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.				D	St-VSt			
-			End of Hole Depth: 0.4 m Termination Condition: Practical re	fusal								>>
0.5 -	-											
-												
2												
	-											
	-											
			not practical refugal at 0.4 m data	on informed areas								
Sc St	and al ala P andin	enetro g grou	meter met practical refusal at 0.4 m depth of ometer met practical refusal at 0.4 m depth of ometer meters at 0.4 m depth of ometers at 0.4 m depth	n depth.	୯ ୮.							

			VGEO		LC	CG	0	F	AUC	SER H	A39			
	Ge 92	eoteo 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N ate :0 pth :0 eter :5	lughes I/A 6/12/2 .2 m 0 mm	Dev 019	elopn	nents Lto	Shear V. Log Review L Lor	ane No : : ged By : wed By : . atitude : : ngitude : :	1379 <f mk<br="">JW -43.6252 172.375</f>	291	
BGL)		mbol			ymbol	(mRL)	/el	Cond.	icy/ idex	Vane d Shear i (kPa) molded	Sca	ıla Pene	tromete	ər
Depth (m	Material	uscs sy	DESCRIPTION		Graphic S	Elevation	Water Lev	Moisture	Consister Density Ir	Shear Undraine Strength Peak/Rei	Blc 2 4	ws per	100mm 8 10	ו 12
	TOPSOIL	ML	SILT with some sand and trace roo Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	$\frac{\sqrt{1}}{\sqrt{1}} \cdot \frac{\sqrt{1}}{\sqrt{1}}$				F-St					
_	A	ML	Sandy SILT with trace gravel; grey Low plasticity. Sand, fine.	ish brown.		2		D	VSt-H		•			
-			End of Hole Depth: 0.2 m Termination Condition: Practical re	fusal		<u> </u>							×	
-	-													>>
-	_													
0.5 -	-													
-														
6 17 17 1														
	-													
-	-													
1.0-	-													
Ha Sc Sta	and a ala P andin = ALI	uger n Penetro Ig grou LUVIU	net practical refusal at 0.2 m depth o ometer met practical refusal at 0.2 i indwater was not encountered. M	on inferred grav n depth.	el.					I	<u> </u>	.	•	

			VGEO		LC	C	0	F /	AUC	SER H	A40				
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ent :H Ref. :N ate :0 pth :0 eter :5	lughes I/A 6/12/2 .4 m 0 mm	Dev 019	relopn	nents Lto	Shear V Log Review L Lor	ane No: 1 ged By: k wed By: J atitude: ngitude: 1	379 (F/MK W 43.624 72.37	1561 5659		
ו BGL)		ymbol			Symbol	(mRL) ר	evel	Cond.	ncy/ Index	· Vane ed Shear h (kPa) emolded	Scal	a Pene	etrome	ter	
Depth (m	Material	NSCS S	DESCRIPTION		Graphic	Elevation	Water Le	Moisture	Consiste Density I	Shear Undraine Strengt Peak/Re	Blo 2 4	ws per 6	100mi 8 10	m) 12	
-	TOPSOIL	ML	SILT with some sand and trace ro Low plasticity. Sand, fine [TOPSO	otlets; brown. IL].	<u>A. 1.</u> <u>A. 1.</u> <u>A.</u> <u>A. 1.</u> <u>A. 1.</u>				F-St						
-	ALLUVIUM	ML	Sandy SILT with trace gravel and r greyish brown. Low plasticity. San No rootlets encountered from 0.3	rootlets; d, fine. m depth.				D	VSt-H						
0.5 -			End of Hole Depth: 0.4 m Termination Condition: Practical re	fusal											*>
Ha So Sta	and ai ala P andin	uger n Penetro Ig grou	net practical refusal at 0.4 m depth ometer met practical refusal at 0.4 undwater was not encountered.	on inferred grav m depth.	el.										

			VGEO		LC	C	0	F	AUC	SER H	A41			
	Ge 92	eotec 2 Du	chnical Investigation nns Crossing Road Rolleston 12903	Cli Client F D Hole De Hole Diame	ient :H Ref. :N Date :0 Septh :0	lughes I/A 6/12/2 .2 m 0 mm	Dev 019	elopn	nents Lto	Shear V Log Review L Lor	ane No: 1 ged By: k wed By: J atitude: ngitude: 1	379 (F/MK W 43.624 72.37(1739 6636	
BGL)		mbol			ymbol	(mRL)	/el	Cond.	icy/ idex	Vane d Shear i (kPa) molded	Scal	a Pene	etrometer	r
Depth (m	Material	USCS Sy	DESCRIPTION		Graphic S	Elevation	Water Lev	Moisture (Consister Density Ir	Shear Undrained Strength Peak/Rer	Blo 2 4	ws per 6	100mm 8 10	12
	TOPSOIL	ML	SILT with some sand, trace gravel brown. Low plasticity. Sand, fine [and rootlets; [OPSOIL].	$\frac{\sqrt{1}}{\sqrt{1}} \cdot \frac{\sqrt{1}}{\sqrt{1}}$		-		St-VSt					
-	A	ML	Sandy SILT with trace gravel and i greyish brown. Low plasticity. San	ootlets; d, fine.	<u></u>			D	VSt-H					
-			End of Hole Depth: 0.2 m Termination Condition: Practical re	fusal		1								
-	_													
-	-													>>
0.5 -	-													· · · ·
-	-													
	-													· · · ·
												- - - - - - - - - - - - - - - - - - -		
Ha Sc Sta	and a ala P andin = ALI	uger n Penetro Ig grou LUVIU	net practical refusal at 0.2 m depth ometer met practical refusal at 0.4 undwater was not encountered. M	on inferred grav m depth.	/el.								<u>.</u>	÷



Geotechnical Investigation 92 Dunns Crossing Road Rolleston 12903 Client : Hughes Developments Ltd Shear Vane No : NA Date : 25/11/2019 Reviewed By : JM Digger Type/Size : 24 Tonne Eucket Type/Size : 8 bucket Excavator Client : Hughes Developments Ltd Shear Vane No : NA Date : 25/11/2019 Reviewed By : JM Digger Type/Size : 8 bucket Excavator Latitude : 43.625 Bucket Type/Size : 8 bucket Excavator Of the status Scale P Bigger Type/Size : 8 bucket Excavator Torpe Size : 8 bucket Excavator Of the status Scale P Bigger Type/Size : 8 bucket Excavator Torpe Size : 8 bucket Excavator Of the status Scale P Bigger Type/Size : 8 bucket Excavator OF the status Scale P Bigger Type/Size : 8 bucket Excavator OF the status Scale P Bigger Type/Size : 8 bucket Excavator OF the status Scale P Bigger Type/Size : 8 bucket Excavator OF the status Scale P Bigger Type/Size : 8 bucket Excavator OF the status Scale P Bigger Type/Size : 8 bucket Excavator OF the status Scale P Bigger Type/Size : 8 bucket Excavator OF the status Scale P Bigger Type/Size : 8 bucket Excavator OF the status Scale P Bigger Type/Size : 8 bucket Excavator OF th	LOG OF TEST PIT TP02	LO	EO	Æ	E	N							
Image: Second ability (Relative Scale) I	Client : Hughes Developments Ltd Shear Vane No : N/A Date : 25/11/2019 Logged By : KF at Pit Depth : 2 m Reviewed By : JW r Type/Size : 24 Tonne Latitude : -43.625528 t Type/Size : Bucket Excavator Longitude : 172.379116	Client : Date : Max Test Pit Depth : Digger Type/Size : Bucket Type/Size :	vestigation sing Road on	Inve ossii ston 03	nical s Cr Rolle 129	echni)unns R	eote 2 Di	Ge 92					
92 ML SILT with some sand and tree roots; light brownish grey. Low plasticity. Sand, fine ITOPSOIL]. 9.5 Sandy fine to coarse GRAVEL with some silt and trace roots; hownish grey. Low plasticity. Sand, fine ITOPSOIL]. 9.5 Sandy fine to coarse GRAVEL with some silt and trace roots; hownish grey. Low plasticity. Sand, fine ITOPSOIL]. 9.6 Trace cobbles and silt encountered from 0.6 m depth. 1.0 ML 0.5 GW 0.6 GW No rootlets observed from 1.0 m depth. 0.6 GW Cobbles become minor from 1.6 m depth. MD-D MD-D D D D D D D D D D D O O D O D O O D O D D D D D D D D	Nater Level Mater Level Mater Level Mater Level Nater Level Moisture Cond. Moisture Cond. (KPa)	CRIPTION	DES	USCS Symbol	ability Scale) Harder	kcavatal Plative S	Easier (Bela)	Material	Depth (m BGL)				
0.5 -	ee roots; light <u>A & A</u> y. Sand, fine <u>V. 40</u> F-St	and and tree roots; light ow plasticity. Sand, fine	SILT with some subrownish grey. Lo [TOPSOIL].	ML				TS	-				
2.0 Depth of Excavation: 2 m Termination Condition: Target depth	Image: Silt and trace rootlets; brownish grey. Well graded, subangular to subrounded. Sand, fine to medium. D Image: Silt and trace coollets; brownish grey. Well graded, subangular to subrounded. Sand, fine to medium. D Image: Silt and trace coollets and silt encountered from 0.6 m depth. D Image: Silt and trace coollets and silt encountered from 0.6 m depth. MD-D Image: Silt and trace coollets observed from 1.0 m depth. MD-D Image: Silt and trace coollets observed from 1.6 m depth. M Image: Silt and trace coollets observed from 1.6 m depth. M Image: Silt and trace coollets become minor from 1.6 m depth. M Image: Silt and trace coollets become minor from 1.6 m depth. M												
	yet depth	ion: 2 m dition: Target depth	Depth of Excavati Termination Conc						2.0-				
Test pit met target depth					t depth	target (met f	t pit r	Tes				





			Ve	Æ	Ю	LO	GO	FΤ	Έ	S	r Pl	Τ ΤΡ	05			
	Ge 92	eotec 2 Dur	hnical nns Cr Rolle 129	Inve ossir ston	estigation ng Road	Client : F Date : 2 Max Test Pit Depth : 1 Digger Type/Size : 2 Bucket Type/Size : E	Hughes [25/11/20 1.8 m 24 Tonne Bucket E	Develo 19 e xcava	opme	ents l	td She. Re	ar Vane No Logged By eviewed By Latitude Longitude): N/A (): KF (): JW (): -43.6 (): 172.3	26522 375592	2	
Depth (m BGL)	Material	Excav (Relati uasie E	vatability ve Scale) auge Hat Hat	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Blov 2 4	a Penet vs per ^ 6 8	romet 100mn 3 10	er n 12
	TS			ML	SILT with some sa rootlets; brown. Lo [TOPSOIL].	and, trace gravel and ow plasticity. Sand, fine	$\frac{1}{2\sqrt{1^2}} \cdot \frac{1}{2\sqrt{1^2}} \cdot \frac{1}{\sqrt{1}}$			D	F-St		•			
Sandy fine to coarse GRAVEL with some site and trace rootlets; greys horwn. Well graded, subangular to subrounded. Sand, fine to medium. Trace cobbles and silt encountered from 0.6 m depth. No rootlets observed from 0.9 m depth. M MD-D Becomes grey from 1.4 m depth. Cobbles become minor from 1.7 m depth. 2.0-												$\overline{\lambda}$				
2.0-	_				Depth of Excavation Termination Cond	on: 1.8 m lition: Target depth										•
	st pit	met tar	get depth) (practi	cal refusal.	TQ	; = TOP	GOII				<u> </u>				









		EN	E	Æ	0	LO	G O	FT	Έ	S	r Pi	T TP [,]	10		
	Ge 92	eotechni 2 Dunns Ro	cal Cro olles 129	Inve ossir ston 03	stigation ng Road	Client : F Date : 2 Max Test Pit Depth : 1 Digger Type/Size : 2 Bucket Type/Size : E	Hughes [25/11/20 1.9 m 24 Tonne Bucket E	Develo 19 e xcavat	opme	ents I	_td Shea Re	ar Vane No Logged By eviewed By Latitude Longitude	D:N/A y:KF y:JW D:-43.6274 D:172.376	457 289	
Depth (m BGL)	Material	Excavatab (Relative So	Harder Harder	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Pe Blows p 2 4 6	enetro per 10	ometer 00mm 10 12
	TOPSOIL			ML	Sandy SILT with t brown. Low plastic [TOPSOIL].	race gravel and rootlets; city. Sand, fine	$\frac{\sqrt{1}}{\sqrt{2}} \cdot \frac{\sqrt{1}}{\sqrt{2}}$			D	St-VSt			•	
0.5	_				silt; greyish brown subangular to sub coarse. No silt and trace of from 0.6 m depth.	well graded, rounded. Sand, fine to									
1.0- 1.5				GW	Sand becomes so	me from 1.0 m depth.				М	MD-D				
	-				Depth of Excavati Termination Cond	on: 1.9 m lition: Target depth									
01ECH IEST PILLOG 2019.11.27 - IEST PILLOGS.GPJ NZ MASTER UP	st pit	met target d	epth	nracti	cal refusal										







			VC	Æ	Ο	LOC	3 O	FΤ	Έ	S٦	r Pl	T TP [,]	14				
	Ge 92	eotec 2 Du	hnica nns C Roll 12	l Inve rossii eston 903	estigation ng Road	Client : H Date : 2 Max Test Pit Depth : 2 Digger Type/Size : 2 Bucket Type/Size : B	ughes I 6/11/20 m 4 Tonne ucket E	Develo 19 e xcavat	opme	ents L	td She	ar Vane No Logged By eviewed By Latitude Longitude): N/A (): KF (): JW (): -43 (): 172	.6286 2.374	642		
Depth (m BGL)	Material	Exca (Relati Easier	vatability ve Scale	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Sca Blo 2	ala Pe ows p 4 6	enetr ber 1 8 8	omete D0mn 10 ⁻	ər n 12
	TS			ML	SILT with some sa rootlets; brown. Lo [TOPSOIL].	and, trace gravel and ow plasticity. Sand, fine	<u>17</u> <u>1</u> 1				F-St			•			
	-		· ·	GW	Fine to medium G and silt; brownish subangular to sub medium.	RAVEL with some sand grey. Well graded, rounded. Sand, fine to				D	MD-D				_	······	
0.5	ALLUVIUM			GW	Sandy fine to coar cobbles; grey. We subrounded. Sand Cobbles become to Cobbles become to Depth of Excavati Termination Cond	rse GRAVEL with trace all graded, subangular to d, fine to coarse. minor from 1.1 m depth.				Μ	MD-D						
	st pit	met tal	get depr	th et pract	cal refusal.	TS	= TOPS	SQII									




		_		e	Æ	0	LO	GO	FΤ	Έ	S	r Pl	T TP [,]	17				
	Ge 92	eote 2 D	echnie unns Ro	cal Cro olle 129	Inve ossir ston 03	stigation ng Road	Client : F Date : 2 Max Test Pit Depth : 2 Digger Type/Size : 2 Bucket Type/Size : 5	Hughes [26/11/20 2 m 24 Tonne Bucket E	Develo 19 e xcavat	opme	ents I	td She	ar Vane No Logged By eviewed By Latitude Longitude): N/A (): KF (): JW (): -43 (): 172	.628 2.376	312 954		
Depth (m BGL)	Material	Easier (ba)	cavatabi ative So	ility Harder Harder	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Sca Blo 2	ala Po owsp 4 6	enetr ber 1 8 8	omet 00mn 10	ər n 12
-	TS				ML	SILT with some sa rootlets; brown. Lo [TOPSOIL].	and, trace gravel and ow plasticity. Sand, fine	$\frac{\mathbf{x}^{1} 1_{\mathbf{y}}}{1_{\mathbf{y}}} \cdot \mathbf{x}^{1}$				F-St			•			
-	_		·		GW	Fine to medium G sand, silt and trac grey. Well graded subrounded. Sand	RAVEL with some e rootlets; brownish , subangular to d, fine.				D	MD-D	-		•	/		<u>/</u> ,
0.5 -	5 - Sandy fine to coarse GRAVEL with trace rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse.																	
1.0-	Sand becomes some from 0.8 m depth. No rootlets observed from 0.9 m depth.																	
-	ALLUVIUI				GW	Trace cobbles end depth.	countered from 1.1 m				м	MD-D						•••••••••••••••••••••••••••••••••••••••
1.5 -	-					Cobbles become i	minor from 1.6 m depth.											•••••••••••••••••••••••••••••••••••••••
2.0-	-					Depth of Excavati Termination Cond	on: 2 m lition: Target depth						-					
													1				;	÷
Tes Sca Sta	st pit ala Pe ndino	met enetr	target d ometer undwat	epth met er w	practi	cal refusal. encountered.	TS	s = TOPS	SOIL									







		EN	e	Æ	Ο	LO	G O	F 1	Ē	S	l bi	T TP	21			
	Ge 92	eotechni 2 Dunns Re	cal Cro olle 129	Inve ossir ston 03	estigation ng Road	Client Date Max Test Pit Depth Digger Type/Size Bucket Type/Size	: Hughes : 26/11/20 : 1.9 m : 24 Tonne : Bucket E	Develo 19 e Excava	opme tor	ents I	td She. Re	ar Vane No Logged By eviewed By Latitudo Longitudo):N// /:KF /:JW):JW):-43	A 9.6290 2.3765	26 52	
Depth (m BGL)	Material	Excavatab (Relative So	ility cale) Harder	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Sca Bl	ala Per ows pe 4 6	netro er 10 8	meter 0mm 10 12
-	TS			ML	SILT with some sa rootlets; brown. Lo [TOPSOIL].	and, trace gravel and ow plasticity. Sand, fine	$\frac{x^{N}}{I_{f}} \cdot \frac{x^{N}}{x^{N}}$				F-St			•	//	
- - 0.5 - -	-		· · · · · · · · · · · · · · · · · · ·	GW	Fine to medium G sand, silt and trac brown. Well grade subrounded. No silt encountere	RAVEL with some e rootlets; greyish ed, subangular to ed from 0.4 m depth.				D	MD-D	-				
- - - - - - - - - - - - - - - - - - -	ALLUVIUM			GW	Sandy fine to coar graded, subangula fine to coarse. Trace cobbles end depth. Sand becomes so	rse GRAVEL; grey. We ar to subrounded. Sand countered from 1.0 m me from 1.3 m depth.				М	MD-D					
2.0-	-				Depth of Excavation Termination Cond	on: 1.9 m ition: Target depth										
Tes	t pit l	met target c	epth met	practi	ical refusal.		-S = TOPS	SOIL								





		ENG	Æ	Ο	LOC	6 O	FΤ	Έ	S	r Pi	т тр	24		
	Ge 92	eotechnical 2 Dunns Cr Rolle 129	Inve ossii eston 903	estigation ng Road I	Client : H Date : 20 Max Test Pit Depth : 2 Digger Type/Size : 2 Bucket Type/Size : B	ughes [5/11/20 m 1 Tonne ucket E	Develo 19 e xcavat	pme or	ents L	td Shea Re	ar Vane No Logged By eviewed By Latitude Longitude): N/A (): KF (): JW (): -43.62 (): 172.37	9807 76332	2
Depth (m BGL)	Material	Excavatability (Relative Scale is is is is is is is is is is is is is	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala I Blows 2 4	Penet	trometer 100mm 3 10 12
-	TS		ML	SILT with some so rootlets; brown. Lo [TOPSOIL].	and, trace gravel and ow plasticity. Sand, fine	$\frac{\sqrt{1}}{1} \cdot \frac{\sqrt{1}}{\sqrt{1}} \cdot \frac{\sqrt{1}}{\sqrt{1}}$				F-St		٩		
-			ML	Sandy SILT with t greyish brown. Lo	race gravel and rootlets; w plasticity. Sand, fine.					St-H				
0.5 -	0.5 - GW Fine to medium GRAVEL with some sand and silt; brownish grey. Well graded, subangular to subrounded. Sand, fine to medium. D MD-E													
- - - - - - - - - - - - - - - - - - -	ALLUVIUM		GW	Sandy fine to coal cobbles; grey. We subrounded. Sand Becomes moist fr Sand becomes tra depth. Sand becomes tra depth.	rse GRAVEL with trace ell graded, subangular to d, fine to coarse. om 1.0 m depth. ace from 1.2 to 1.4 m				М	MD-D				
	-			Depth of Excavati Termination Conc	on: 2 m lition: Target depth									
	st pit i	met target depti	1											











		ENG	Æ	O	LO	G O	FΤ	Έ	S	r Pi	T TP	30			
	Ge 92	eotechnical 2 Dunns Cr Rolle 129	Inve ossir eston 903	estigation ng Road	Client Date Max Test Pit Depth Digger Type/Size Bucket Type/Size	: Hughes [: 27/11/20 : 2 m : 24 Tonne : Bucket E	Develo 19 e xcava	opme	ents I	td She. Re	ar Vane No Logged By eviewed By Latitude Longitude): N/A (): KF (): JW (): -43.63 (): 172.3	1103 78188		
Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Blows 2 4	Peneti s per 1 6 8	rometer 00mm 10 12	2
-	TS		<u>ML</u> GW	SILT with some some some some some some some some	and, trace gravel and ow plasticity. Sand, fine RAVEL with some e rootlets; greyish ed, subangular to d, fine.					F-St		•			×
0.5 -	Σ		GW	Fine to coarse GF and trace cobbles graded, subangula fine to coarse.	RAVEL with some sand ; brownish grey. Well ar to subrounded. Sand				D	MD-D	-				
1.0	ALLUVIU		GW	Sandy fine to coar cobbles; grey. We subrounded. Sand Trace cobbles end depth.	se GRAVEL with trace Il graded, subangular to d, fine to coarse.				Μ	MD-D					
2.0-	-			Depth of Excavati Termination Cond	on: 2 m lition: Target depth										
Tes	st pit	met target depti enetrometer me	n t practi	ical refusal.		-S = TOPS	501L								













			IC	Æ	0	LO	G O	FΤ	Έ	S	r Pi	T TP:	37		
	G e 92	eotech 2 Duni	nnical ns Cro Rolle 129	Inve ossir ston 003	stigation ng Road	Client : Date : Max Test Pit Depth : Digger Type/Size : Bucket Type/Size :	Hughes [05/12/20 2 m 24 Tonne Bucket E	Develo 19 e xcavat	pme	ents l	td Shea	ar Vane No Logged By eviewed By Latitude Longitude): N/A (): KF/C (): JW (): -43.6 (): 172.3	R 625636 37306	
Depth (m BGL)	Material	Excava (Relative .a. .a. .s. .s. 	atability e Scale) Jap Hata	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Blow 2 4	a Penetr vs per 1 6 8	ometer 00mm 10 12
	TS			<u>ML</u> GW	SILT with some sa rootlets; brown. Lo [TOPSOIL]. Fine to coarse GF silt and trace rootl graded, subangula fine.	and, trace gravel and bw plasticity. Sand, fine RAVEL with some sand, ets; greyish brown. Well ar to subrounded. Sand,				D	F-St MD-D			•	, And
0.5				GW	Sandy fine to coar cobbles; grey. We subrounded. Sand	rse GRAVEL with trace Il graded, subangular to d, fine to coarse.					MD-D				
1.5	ALLU ALLU			GW	Fine to coarse GF and trace cobbles subangular to sub coarse.	RAVEL with some sand ; grey. Well graded, rounded. Sand, fine to				М	MD-D				
2.0-	-				Sand becomes tra Depth of Excavation Termination Cond	ace from 1.8 m depth. on: 2 m ition: Target depth									
Te Sc St	st pit ala P andin	met targ enetrome	et depth eter met lwater w	i. targei vas not	t depth encountered.	TS	S = TOPS	SOIL							

		EN	C	Æ	0	LO	GΟ	FΤ	Έ	S	l bi.	T TP:	38		
	Ge 92	eotechni 2 Dunns R	cal Cr olle 129	Inve ossii ston	estigation ng Road	Client : Date : Max Test Pit Depth : Digger Type/Size : Bucket Type/Size :	Hughes I 05/12/20 2 m 24 Tonne Bucket E	Develo 19 e Excavat	opme	ents I	_td Shea Re	ar Vane No Logged B eviewed B Latitude Longitude): N/A): KF/C): JW): JW): -43.6): 172.3	R 25349 373725	
Depth (m BGL)	Material	Excavatat (Relative S	oility cale) Harder	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Blow 2 4	a Peneti vs per 1 6 8	rometer 00mm 10 12
- - - - - - - - - - - -	TS			<u>ML</u> GW	SILT with some si rootlets; brown. Lo [TOPSOIL]. Fine to coarse GF silt and trace rootl graded, subangula fine. Sandy fine to coal cobbles; grey. We subrounded. Sand	and, trace gravel and ow plasticity. Sand, fine RAVEL with some sand, ets; greyish brown. Wel ar to subrounded. Sand, rse GRAVEL with trace Il graded, subangular to d, fine to coarse.				D	St-VSt MD-D	-		•	
1.0				GW	Sand becomes tra depth. Cobbles become r	ace from 0.9 to 1.2 m minor from 1.4 m depth.				М	MD-D				
					No rootlets encou depth. Depth of Excavation Termination Cond	ntered from 1.6 m on: 2 m lition: Target depth									
OTECH LEST PHI LOG 2019.12.XX - KEMAINING IP LOGS.GPU NZ MAS S	st pit	met target d	depth r met	1. t targe	t depth	Τ:	S = TOPS	SOIL							







		EN	C	Æ	O	LOC	G O	FΤ	Έ	S	r Pi	T TP4	42				
	Ge 92	eotechnie 2 Dunns Ro	cal Cro olle 129	Inve ossir ston	estigation ng Road	Client : H Date : 0 Max Test Pit Depth : 2 Digger Type/Size : 2 Bucket Type/Size : E	lughes [5/12/20 m 4 Tonne Bucket E	Develo 19 e xcavat	opme	ents I	td She	ar Vane No Logged By eviewed By Latitude Longitude):N/ /:KF /:JV):JV):-4	A F/CR V 3.624 2.376	293 6247		
Depth (m BGL)	Material	Excavatab (Relative So	ility cale) Harder	USCS Symbol	DES	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	So B 2	ala P lows (enetr per 1 <u>6 8</u>	omet 00mr <u>10</u>	er n 12
	TS		•	ML	SILT with some sa brown. Low plastic [TOPSOIL].	and and trace rootlets; city. Sand, fine	$\frac{x^{4}}{y} \cdot \frac{x^{4}}{x^{4}} \cdot \frac{x^{4}}{y}$				F-St		•	•			
-	-			GW	Fine to coarse GF silt and trace rootl graded, subangula	AVEL with some sand, ets; greyish brown. Well ar to subrounded. Sand,	2			D	MD-D			•			/>>
0.5	-				Sandy fine to coar cobbles and rootle subangular to sub coarse. Sand becomes tra	rse GRAVEL with trace ets; grey. Well graded, rounded. Sand, fine to ace from 0.7 m depth.											
1.0	ALLUVIUM			GW						М	MD-D						
1.5 - - -	-				Cobbles become r No rootlets encour depth.	ninor from 1.4 m depth.											•••••••••••••••••••••••••••••••••••••••
-0.2 EMPLA					Depth of Excavation Termination Cond	on: 2 m ition: Target depth								•			· · · · ·
SOTECH TEST PIT LOG 2019.12.XX - REMAINING 1P LOGS.GPJ NZ MASIE	st pit	met target d	epth met	I. targe	t depth	TS Pa	= TOPS	GOIL	ollap	ose ol	bserved	from 0.4 m	deptl	; 	<u> </u>		<u>.</u>





GEOTECH TEST PIT LOG 2019.12.XX - REMAINING TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 9/12/19

					E	Æ	Ο	LOC	G O	F 1	Ē	S	l bi	T TP4	5			
	Ģ	Ge 92	ote Dι	chnic unns (Ro 1	al Cro Ile: 29	Inve ossir ston 03	stigation ng Road	Client : H Date : 0 Max Test Pit Depth : 2 Digger Type/Size : 2 Bucket Type/Size : B	ughes [5/12/20 1 m 4 Tonne ucket E	Develo 19 e xcava	opme	ents I	Ltd Shea	ar Vane No Logged By eviewed By Latitude Longitude	: N/A : KF/CR : JW : -43.62 : 172.37	816 8736		
Depth (m BGL)	Material	()	Easier Blaz	avatabili tive Sca	Harder (alt	USCS Symbol	DESC	CRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala I Blows 2 4	Penet per 1 <u>6 8</u>	00mm	۶ ۱ ۱ <u>2</u>
	- v	2				ML	SILT with some sa brown. Low plastic [TOPSOIL].	and and trace rootlets; city. Sand, fine	$\frac{\underline{x^{1}}}{\underline{y^{2}}} \cdot \underline{\underline{x^{1}}}_{\underline{y^{2}}} \cdot \underline{\underline{x^{1}}}_{\underline{y^{2}}}$				F-St		•			
0.5	-					GW	Fine to coarse GR silt and trace rooth graded, subangula fine.	AVEL with some sand, ets; greyish brown. Well ar to subrounded. Sand,				D	MD-D					//
1.0	.0 .0 .0 .0 .0 .0 .0 .0 .0 .0																	
1.5	-					GW	Sand becomes tra depth. Cobbles become r	ace from 1.5 to 1.7 m minor from 1.8 m depth.				М	MD-D					
	_						Depth of Excavation	on: 2.1 m lition: Target depth	X									
	est pi cala tandi	nt m Per ing	net ta netro grou	arget de ometer r undwate	pth net r w	target as not	t depth encountered.	TS Par	= TOPS tial side	SOIL wall c	ollap	se o	bserved	from 0.8 m o	depth.			







Bore or Well No	BX23/0895				nvironment
Well Name	Selwyn Roa	d			anterbury
Owner	Mike & Tania	a Croucher		Kau	nihera Taiao ki Waitaha
Well Number		BX23/0895		File Number	
Owner		Mike & Tania Crouc	her	Well Status	Active (exist, present)
Street/Road		Selwyn Road		NZTM Grid Reference	BX23:49887-68726
Locality		Springston		NZTM X and Y	1549887 - 5168726
Location Description				Location Accuracy	50 - 300m
CWMS Zone		Selwyn - Waihora		Use	Domestic and Stockwater,
Groundwater Allocatio	roundwater Allocation Zone		i	Water Level Monitoring	
Depth	epth			Water Level Count	1
Diameter		150mm		Initial Water Level	5.80m below MP
Measuring Point Descr	ription	Top of Casing		Highest Water Level	5.80m below MP
Measuring Point Eleva	tion			Lowest Water Level	5.80m below MP
Elevation Accuracy				First reading	06 May 2019
Ground Level		0.45m below MP		Last reading	06 May 2019
Strata Layers		9		Calc Min 95%	
Aquifer Name				Aquifer Tests	0
Aquifer Type				Yield Drawdown Tests	1
Drill Date		16 Apr 2019		Max Tested Yield	
Driller		Clemence Drilling C	Contractors	Drawdown at Max Tested Yield	
Drilling Method		Rotary/Percussion		Specific Capacity	0.56 l/s/m
Casing Material		Steel		Last Updated	01 Oct 2019
Pump Type				Last Field Check	06 May 2019
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	51.5	53.5				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
06 May 2019	1	2.5	32.99546	4.5	15

Borelog for well BX23/0895

Grid Reference (NZTM): 1549888 mE, 5168727 mN Location Accuracy: 50 - 300m Ground Level Altitude: m +MSD Accuracy: Driller: Clemence Drilling Contractors Drill Method: Rotary/Percussion Borelog Depth: 53.3 m Drill Date: 16-Apr-2019





Bore or Well No	M36/4387			Envii	ronment
Well Name	DUNNS CRO	SSING RD			erbury
Owner	Mr & Mrs I G	& D C Robertson		Kaunihera	Taiao ki Waitaha
Well Number		M36/4387		File Number	CO6C/02792
Owner		Mr & Mrs I G & D C Rober	rtson	Well Status	Active (exist, present)
Street/Road		DUNNS CROSSING RD		NZTM Grid Reference	BX23:49703-68988
Locality		ROLLESTON		NZTM X and Y	1549703 - 5168988
Location Description				Location Accuracy	2 - 15m
CWMS Zone		Selwyn - Waihora		Use	Domestic Supply,
Groundwater Allocation	on Zone	Selwyn-Waimakariri		Water Level Monitoring	
Depth		35.60m		Water Level Count	0
Diameter		200mm		Initial Water Level	5.65m below MP
Measuring Point Desc	cription			Highest Water Level	
Measuring Point Eleva	ation	36.46m above MSL (Lytte	lton 1937)	Lowest Water Level	
Elevation Accuracy		< 2.5 m		First reading	
Ground Level		0.00m above MP		Last reading	
Strata Layers		5		Calc Min 95%	6.50m below MP
Aquifer Name				Aquifer Tests	0
Aquifer Type		Unknown		Yield Drawdown Tests	2
Drill Date		11 Oct 1991		Max Tested Yield	18 l/s
Driller		McMillan Drilling Ltd		Drawdown at Max Tested Yield	10 m
Drilling Method		Rotary/Percussion		Specific Capacity	1.64 l/s/m
Casing Material		STEEL		Last Updated	08 Nov 2013
Pump Type		Unknown		Last Field Check	
Water Use Data		Yes			

Borelog for well M36/4387

Grid Reference (NZTM): 1549704 mE, 5168988 mN Location Accuracy: 2 - 15m Ground Level Altitude: 36.5 m +MSD Accuracy: < 2.5 m Driller: McMillan Drilling Ltd Drill Method: Rotary/Percussion Borelog Depth: 35.6 m Drill Date: 11-Oct-1991



Scale(m)	Water Level	Depth(m)		Full Drillers Description	Formation Code
		0.30m -	000000	_ Earth Large Grev gravels	
П			000000		
Н		2.50m	000000		
Н			0.0.0	Sandy gravels	
Н			0::0::0		
5			p: 0: 0: q		
		6.50m _	<u>)</u>	Claybound arrivals	
H			000000	Claybound glaveis	
H			000000		
H			000000		
10			000000		
Ц					
			000000		
Π			000000		
Н			000000		
Н			000000		
15					
			000000		
			000000		
			000000		
			000000		
20		20.70m			
Н			0:0:0:	Free sandy gravels	
Н			0:0:0		
Н			p::o::o::q		
			0.0.0		
25			p. 0. 0. d		
H					
H			0.00.00		
30			b: 0: 0: d		
			0:.0::0::		
Π			0.0.0		
Н		_	p::0::0::C		
Н		Π	0.0		
H			D::0::0		
35			0.0.0		
		35.59m	0.1010		

Bore or Well No	M36/4449			Envir	ronment
Well Name	DUNNS CROSSING RD				erbury
Owner	TYACK GJ & FR			Kaunihera	Taiao ki Waitaha
Well Number		M36/4449		File Number	CO6C/02046
Owner		TYACK GJ & FR		Well Status	Not Used
Street/Road		DUNNS CROSSING RD		NZTM Grid Reference	BX23:49508-69470
Locality		ROLLESTON		NZTM X and Y	1549508 - 5169470
Location Description		LOT 1		Location Accuracy	50 - 300m
CWMS Zone		Selwyn - Waihora		Use	Irrigation,
Groundwater Allocatio	n Zone	Selwyn-Waimakariri		Water Level Monitoring	
Depth		24.20m		Water Level Count	0
Diameter		150mm		Initial Water Level	
Measuring Point Descr	iption			Highest Water Level	
Measuring Point Elevat	ion	38.81m above MSL	(Lyttelton 1937)	Lowest Water Level	
Elevation Accuracy		< 2.5 m		First reading	
Ground Level		0.00m above MP		Last reading	
Strata Layers		9		Calc Min 95%	7.70m below MP
Aquifer Name		Riccarton Gravel		Aquifer Tests	0
Aquifer Type		Unknown		Yield Drawdown Tests	1
Drill Date		09 Jun 1992		Max Tested Yield	6 l/s
Driller		Dynes Road Drilling		Drawdown at Max Tested Yield	5 m
Drilling Method		Cable Tool		Specific Capacity	1.36 l/s/m
Casing Material				Last Updated	08 Nov 2013
Pump Type		Unknown		Last Field Check	
Water Use Data		No			
Borelog for well M36/4449

Grid Reference (NZTM): 1549508 mE, 5169471 mN Location Accuracy: 50 - 300m Ground Level Altitude: 38.8 m +MSD Accuracy: < 2.5 m Driller: Dynes Road Drilling Drill Method: Cable Tool Borelog Depth: 24.2 m Drill Date: 09-Jun-1992



Scale(m)	Water Level	Depth(m)		Full Drillers Description	Formation Code
5			000000000 000000000 000000000 0000000	Medium-small gravel	
		8.00m _		Medium-small gravel, very open	
10		10.00m		Medium-small gravel	
		12.00m	000000 000000 000000	Claybound small-medium gravel	
15		-		Small to large sandy gravel	
20		18.00m _		Medium gravel,Water-bearing	
20		22.00m		Small-medium gravel,clean,open	
		24.00m		Small to medium gravel,stained	

Bore or Well No	M36/4450		Envi		ronment	
Well Name	DUNNS CRO	SSING RD		Cant	erbury	
Owner	Mr & Mrs L K & J C Blackmore			Kauniher	a Taiao ki Waitaha	
Well Number	Well Number			File Number	CO6C/02046	
Owner		Mr & Mrs L K & J C Black	more	Well Status	Active (exist, present)	
Street/Road		DUNNS CROSSING RD		NZTM Grid Reference	BX23:49388-69660	
Locality		ROLLESTON		NZTM X and Y	1549388 - 5169660	
Location Description		DP61278 LOT 2		Location Accuracy	50 - 300m	
CWMS Zone		Selwyn - Waihora		Use	Irrigation,	
Groundwater Allocation Zone		Selwyn-Waimakariri		Water Level Monitoring		
Depth		25.20m		Water Level Count	0	
Diameter	Diameter			Initial Water Level		
Measuring Point Desc	cription			Highest Water Level		
Measuring Point Elev	ation	39.62m above MSL (Lyttelton 1937)		Lowest Water Level		
Elevation Accuracy		< 2.5 m		First reading		
Ground Level		0.00m above MP		Last reading		
Strata Layers		8		Calc Min 95%	8.10m below MP	
Aquifer Name		Riccarton Gravel		Aquifer Tests	0	
Aquifer Type		Unknown		Yield Drawdown Tests	1	
Drill Date		09 Apr 1992		Max Tested Yield	6 l/s	
Driller		Dynes Road Drilling		Drawdown at Max Tested Yield	6 m	
Drilling Method	Drilling Method			Specific Capacity	1.00 l/s/m	
Casing Material				Last Updated	08 Nov 2013	
Ритр Туре		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	23.2	25.2				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
09 Apr 1992	1	6.1	80.50892	6.1	0

No comments for this well

Borelog for well M36/4450

Grid Reference (NZTM): 1549388 mE, 5169661 mN Location Accuracy: 50 - 300m Ground Level Altitude: 39.6 m +MSD Accuracy: < 2.5 m Driller: Dynes Road Drilling Drill Method: Cable Tool Borelog Depth: 26.5 m Drill Date: 09-Apr-1992





Bore or Well No	M36/7416		Env		ronment
Well Name	SELWYN	ROAD			erbury
Owner	Kilsyth Lim	nited		Kauniher	a Taiao ki Waitaha
Well Number		M36/7416		File Number	CO6C/20361
Owner		Kilsyth Limited	1	Well Status	Active (exist, present)
Street/Road		SELWYN ROA	AD.	NZTM Grid Reference	BX23:49058-68781
Locality		ROLLESTON		NZTM X and Y	1549058 - 5168781
Location Description	Location Description			Location Accuracy	50 - 300m
CWMS Zone		Selwyn - Waih	iora	Use	Irrigation,
Groundwater Allocation	Groundwater Allocation Zone		akariri	Water Level Monitoring	
Depth		46.90m		Water Level Count	0
Diameter	Diameter			Initial Water Level	5.50m below MP
Measuring Point Descrip	tion	ТоС		Highest Water Level	
Measuring Point Elevation	on	35.86m above MSL (Lyttelton 1937)		Lowest Water Level	
Elevation Accuracy		< 5 m		First reading	
Ground Level		0.32m below MP		Last reading	
Strata Layers		13		Calc Min 95%	11.10m below MP
Aquifer Name				Aquifer Tests	0
Aquifer Type				Yield Drawdown Tests	1
Drill Date		18 Aug 2003		Max Tested Yield	
Driller		McMillan Drilli	ng Ltd	Drawdown at Max Tested Yield	
Drilling Method	Drilling Method		sion	Specific Capacity	3.83 l/s/m
Casing Material	Casing Material			Last Updated	08 Nov 2013
Ритр Туре				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	44.9	46.9				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
18 Aug 2003	1	15.91128	209.999985	4.15	3

Borelog for well M36/7416 page 1 of 2

Grid Reference (NZTM): 1549058 mE, 5168781 mN Location Accuracy: 50 - 300m Ground Level Altitude: 35.5 m +MSD Accuracy: < 0.5 m Driller: McMillan Drilling Ltd Drill Method: Rotary/Percussion Borelog Depth: 47.7 m Drill Date: 18-Aug-2003



	Water				Formation
Scale(m)	Level	Depth(m)		Full Drillers Description	Code
		0.30m _		Earth and gravels	
		0.30m		Sandy gravels	
Н			1:0::0::0	Sandy gravels	
			b. d. d. d.		
Ц			i de l'action de la		
			D::0::0::0		
Н			0.0000		
			i a a a a a a a a a a a a a a a a a a a		
Н					
			0::0::0		
5			·····		
ĭ H					
		5.60m		Construction and a	
H		5.60m	0.0.0.	Wet cleybound sendy gravels	
			<u></u>	Wet daybound sandy gravels	
			<u></u>		
			0		
H			0.0.0		
			<u>00.0.</u>		
			0:0:0		
10			0:.0::0:		
Ц		11.00m _	.0.0.0		
		11.00m	000.1	Weter beering cleybound sendy gravels	
			<u> </u>	water-bearing claybound sandy gravels	
П			.0.0.0		
			0		
Н		13.10m _	<u> </u>		
		13.10m	000.	Water-bearing claybound sandy gravels	
Ц			<u></u>	water-bearing claybound sandy gravels	
			.0.0.0		
15		14.70m	8	> Water-bearing claybound sendy gravels	
15		14.70m		Medium water-bearing stained	
				gravels, some sand	
_					
			$[\dot{a}, \dot{a}, \dot{a}, \dot{a}, \dot{a}]$		
		16.80m		Medium water bearing stained	
		10.80m		oravels, some sand	
				Small to medium water-bearing gravels	
H			000000000		
			00000000000		
			0000000000		
		19.70m _		Constitution and the state the state of the second	
20		19.70m	000000000000000	Medium water-bearing stained gravels	
			pooooooo		
Ц			000000000		
Н		22.50	0000000000		
		22.50m	$\overline{\beta}$	Medium water-bearing steined gravels	
Ц		22.00M		water-bearing sandy gravels	
			1:0::0:0		
			hind		

Bore or Well No	M36/2053	5	Envi		vironment
Well Name	870 Gould	s Road	Cant		nterbury
Owner	Mr S & Mr	s M Baxter		Kauni	ihera Taiao ki Waitaha
Well Number		M36/20535		File Number	CO6C/31914
Owner		Mr S & Mrs M Baxte	er	Well Status	Active (exist, present)
Street/Road		870 Goulds Road		NZTM Grid Reference	BX23:50017-69231
Locality		Rolleston		NZTM X and Y	1550017 - 5169231
Location Description				Location Accuracy	10 - 50m
CWMS Zone		Selwyn - Waihora		Use	Domestic and Stockwater,
Groundwater Allocation Zone		Selwyn-Waimakariri		Water Level Monitoring	
Depth		30.00m		Water Level Count	0
Diameter		150mm		Initial Water Level	7.10m below MP
Measuring Point Descri	ption			Highest Water Level	
Measuring Point Elevat	ion	35.00m above MSL (Lyttelton 1937)		Lowest Water Level	
Elevation Accuracy		< 5 m		First reading	
Ground Level		0.00m above MP		Last reading	
Strata Layers		4		Calc Min 95%	
Aquifer Name				Aquifer Tests	0
Aquifer Type				Yield Drawdown Tests	0
Drill Date		04 Feb 2011		Max Tested Yield	
Driller		Daly Water Wells L	td	Drawdown at Max Tested Yield	
Drilling Method		Rotary Rig		Specific Capacity	
Casing Material		STEEL		Last Updated	07 Dec 2011
Pump Type				Last Field Check	
Water Use Data		No			

No screen data for this well

No step tests for this well

Borelog for well M36/20535

Grid Reference (NZTM): 1550018 mE, 5169231 mN Location Accuracy: 10 - 50m Ground Level Altitude: 35.0 m +MSD Accuracy: < 0.5 m Driller: Daly Water Wells Ltd Drill Method: Rotary Rig Borelog Depth: 30.0 m Drill Date: 04-Feb-2011



