

28 September 2020

Document Ref: AKL2020-0231AB Rev.0

Neil Construction Limited
PO Box 8751
Auckland 1150

Attention: Trevor Canty

Dear Sir

**RE: DUE DILIGENCE, GEOTECHNICAL INVESTIGATION REPORT
71 TRIG ROAD, WHENUAPAI**

1 INTRODUCTION AND SCOPE

CMW Geosciences (CMW) was engaged by Neil Construction Limited as part of their due diligence process to carry out preliminary geotechnical investigation and reporting of the site at 71 Trig Road, Whenuapai, which is being considered for the construction of light industrial buildings.

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced AKL2020-0231AA Rev.0, dated 10 September 2020.

The purpose of this report is to describe the investigation completed, the ground conditions encountered and to provide recommendations with respect to geotechnical aspects of the proposed subdivision development as detailed in our proposal letter

2 SITE DESCRIPTION

The site is located at 71 Trig Road, Whenuapai, legally described as Lots 2 and 5 and Lot 2 DP 101583, Lot 2 DP 117365 as illustrated in **Figure 1** below. The property has an approximate area of 6.9 hectares and is roughly rectangular in shape, stretching in a west to east direction.

The gradient across the site is generally consistent, falling gradually from the south at approximately RL42.0m down to RL25.5.0m in the north eastern corner with an approximate gradient of 1(V):15(H) across most of the site.

Auckland Council GIS maps a possible creek exiting the north-eastern corner of the site with numerous contributory overland flow paths mapped across the site.

The site itself currently comprises mostly pasture and overgrown, historic horticultural patches. Tall trees run along most of the paddock fence lines as well as being scattered in the north and north eastern areas of the property. An existing structure is located along the northern boundary.

The site is bound to the north by residential dwellings in the form of larger lifestyle blocks and to the west and south by farmland. The eastern boundary backs onto the wider Trig and Brigham Creek Road development site which has recently been cleared in preparation for earthworks to be undertaken (CMW has also been engaged by the client as the Geotechnical Engineer on this adjacent site).

The subject site is accessed by a gravel driveway which runs along the southern boundary and extends from the south-western corner off Trig Road.

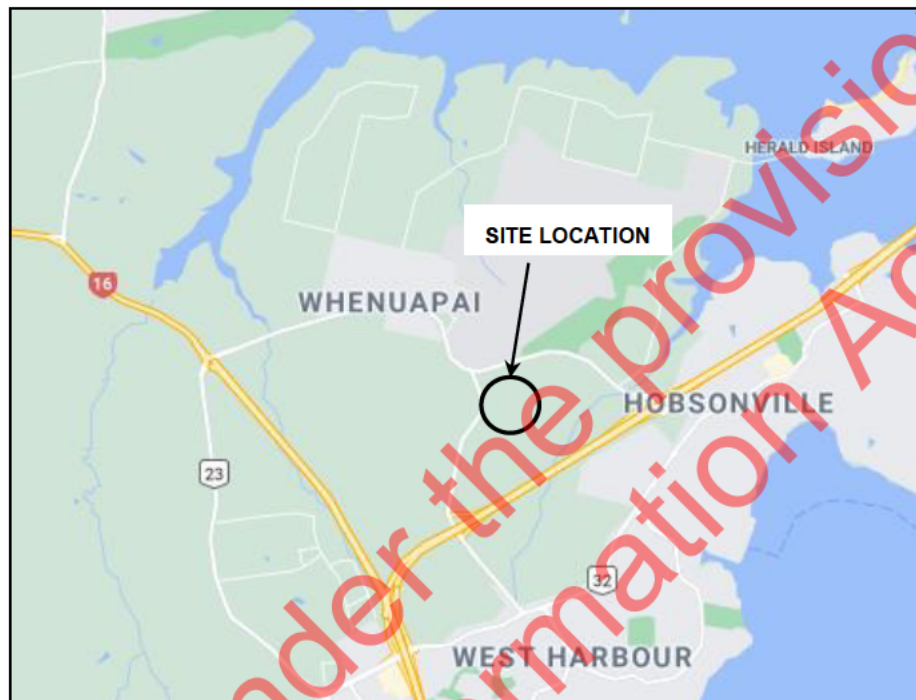


Figure 1: Site Location (Google Maps)

3 PROPOSED DEVELOPMENT

At the time of undertaking our investigation and reporting the project was in the early stages of planning and it was anticipated the geotechnical investigation would provide details of preliminary feasibility options for the site.

No architectural or engineering design drawings have been supplied to date and we have prepared this report on the basis that a future development will broadly comprise minor cuts and fills to form a near level site supporting industrial buildings with shallow strip and pad foundations and widespread floor loads of up to 20kPa.

4 INVESTIGATION SCOPE

4.1 Desktop Study

A desktop study was carried out before commencing fieldwork. This included online research through Auckland Council Geo Maps, Dial Before You Dig, aerial photographs and review of existing information.

A review of historic and recent aerial photographs between 1959 and 2017 indicated the following activity:

- Between 1959 and 1996 the subject site was developed from agricultural land for horticultural purposes. The existing structure on site appears to have been constructed around the same time as the development of the land.

- From 2003 to approximately 2012 the sites horticultural development appears to have been let go and the area returned to farmland.
- From approximately 2015 onwards the site appears to have been returned to horticultural activities, however, to date the site is currently unattended.

4.2 Field Investigation

Following a Dial Before You Dig review, the field investigation was carried out on 16 September 2020. All fieldwork was carried out under the direction of CMW Geosciences in general accordance with the NZGS guidelines¹. The scope of the fieldwork was as follows:

- A walkover survey of the site to assess the general landform, site conditions and adjacent structures / infrastructure. The site walkover generally confirmed the existing contours of the area and there was no evidence of any recent change in the site conditions.
- Ten hand auger boreholes, denoted HA01-20 to HA10-20, were drilled using a 50mm diameter auger to target depths of up to 5.0m below existing ground levels to observe the near surface soil profile and to facilitate vane shear strength testing. All ten hand auger boreholes reached the target depth of 5.0m. Engineering logs of the hand augers, together with peak and remoulded vane shear strengths can be found appended to this report.

The approximate locations of the respective investigation sites referred to above are shown on the Site Investigation Plan appended to this report. Test locations were measured using a handheld GPS. Elevations were inferred from the existing Auckland Council GIS contours.

5 GROUND MODEL

5.1 Published Geology

Published geological maps² for the area depict the regional geology as comprising Late Pliocene to Mid Pleistocene alluvial deposits of the Puketoka Formation as illustrated in **Figure 2** below.

These alluvial clay and silt deposits include pumiceous mud, sand and gravel with muddy peat and lignite, rhyolitic pumice (including non-welded gnimbrite, tephra and alluvial pumice deposits) and massive micaceous sand beds. Below these upper soil layers, the deeper geological formation is reported to comprise interbedded muddy sandstones and siltstones of the East Cast Bays Formation within the Waitemata Group.

Based on the known history of the site and surrounding land levels, we expect that uncompacted fill may be present across some areas of the site due to soft landscaping and historic development.

¹ NZ Geotechnical Society (2005), Field Description of Soil and Rock, Guideline for the field classification and description of soil and rock for engineering purposes.

² Edbrooke, S. W. (compiler) 2001: Geology of the Auckland area. Institute of Geological & Nuclear Sciences 1:250 000 geological map 3. 1 sheet +74 p. Lower Hutt, New Zealand. Institute of Geological & Nuclear Sciences.



Figure 2: Regional Geology (GNS Science Geology Map)

5.2 Stratigraphic Units

5.2.1 Topsoil

Topsoil was encountered in all hand auger bore holes from depths of 0.1m to 0.4m. Topsoil was generally moist to wet and dark brown.

5.2.2 Puketoka Formation Alluvium

Alluvial deposits of the Puketoka Formation were encountered in all hand auger boreholes underlying the topsoil to the target depth of 5.0m. The extent of the alluvium was not observed due to the limitation on investigation depth. The alluvium generally comprised orange, brown, dark brown, grey mottled orange and black, clays, silty clays, clayey silts, silts and sandy silts. Minor organic staining and wood fragments were encountered throughout the alluvium.

These soils were generally firm to very stiff with vane shear strengths ranging from 39kPa to >193kPa and averaging around 100kPa to 130kPa. Outlier vane shear strengths of 40kPa in HA02-20, 52kPa in HA06-20 and 39kPa in HA08-20 were generally encountered where the groundwater was sitting or within organic stained material.

5.2.3 Waitemata Group Soils

Waitemata Group soils were not clearly identified within any of the hand auger boreholes, however based on investigations undertaken on the adjacent site we expect these soils to underlie the site at depth.

5.3 Groundwater

During the investigation, which was completed in early spring conditions (September 2020), groundwater was encountered within the boreholes at the depths provided in Table 1 below.

Table 1: Groundwater Data		
Borehole	September 2020	
	Depth (mbgl)	Elevation (m RL)
HA01-20	4.0	29.0
HA02-20	2.2	32.6
HA03-20	4.4	35.6
HA04-20	3.2	29.5
HA05-20	4.5	31.0
HA06-20	2.5	29.3
HA07-20	1.0	28.8
HA08-20	2.7	26.7
HA09-20	4.8	31.1
HA010-20	2.2	29.7
Note: mbgl = metres below ground level. NE = Not Encountered.		

Groundwater was encountered in all of the hand auger boreholes during out investigation, between RL35.6m and RL26.7m. However, given the presence of a variable and clayey soil profile, it is possible that perched groundwater may occur at different levels during and following periods of rainfall. It should also be noted that groundwater will fluctuate seasonally.

6 PRINCIPAL GEOHAZARDS AND RECOMMENDATIONS

6.1 General

On the basis of our investigation and review of findings we are satisfied that the site is generally geotechnically suitable for a subdivision containing light industrial structures, subject to the comments and recommendations below.

6.2 Liquefaction

Soil liquefaction is a process where typically saturated, granular soils develop excess pore water pressures during cyclic (earthquake) loading that exceed that effective stress of the soil. In loose soils, some dilation can occur during this process, which can lead to individual soil grains moving into suspension. Following the onset of liquefaction, the shear strength and stiffness of the liquefied soil is effectively lost causing excessive differential settlement of the ground surface, bearing capacity failure and collapse of structures and low-angle

lateral spreading of slopes in liquefiable soils. In accordance with the NZGS guidance³ the liquefaction susceptibility of the soils on this site has been considered with respect to geological age and soil fabric.

Across this site, soils below the water table comprise alluvial deposits of the Puketoka Formation. These soils are significantly older than what case history data would suggest as being susceptible to liquefaction. In addition, they typically comprise silty clays and clays that are considered to be too fine grained to be at risk of liquefaction.

6.3 Load Induced Settlement

Based on the materials observed in our boreholes, settlement is considered to be a low risk for light weight commercial or industrial buildings. However, it is recommended that any soft materials in the creek/gully uncovered as part of earthworks operations, are undercut, and replaced with compacted engineered fill.

Soft subsoils may be subject to consolidation settlements due to potential loadings from industrial buildings and floor slabs. Pre-loading of soft soils, general ground improvement during earthworks and possibly piling, or reinforced fill rafts and basal reinforcements may be necessary to mitigate any significant settlement hazards across the industrial zones.

Depending on the proposed earthworks plans, settlement analyses may need to be undertaken as part of any future detailed investigation and design. This will allow for the development of appropriate ground remediation options if necessary.

6.4 Seismic Site Subsoil Category

Based on the conditions observed during the investigation, combined with experience working in the surrounding area, the seismic site subsoil category is provisionally assessed as being Class C (shallow soil site) in accordance with NZS 1170.5

6.5 Earthworks

All earthwork activities must be carried out in general accordance with the requirements of NZS 4431 and the requirements of the Auckland Council Infrastructure Development Code under the guidance of a Chartered Professional (Geotechnical) Engineer.

7 FURTHER WORK

This investigation and reporting has been undertaken to support a pre-purchase assessment of the site. If purchase proceeds, further detailed investigation will be required once design/development plans have been confirmed.

8 LIMITATION AND CLOSURE

This report has been prepared for our client Neil Construction Limited. Liability for its use is limited to these parties and to the scope of work for which it was prepared, as it may not contain sufficient information for other parties or for other purposes.

It should be noted that factual data for this report has been obtained from discrete locations using normal geotechnical investigation techniques. As such investigation methods by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site which have not been disclosed by the investigation and which have not been considered in the report.

³ Earthquake Geotechnical Engineering Practice, Module 3: Identification, assessment and mitigation of liquefaction hazards", (May 2016)

If site conditions encountered vary from those outlined above and/or if any unforeseen conditions develop, CMW must be advised immediately such that we can review the recommendations and advise any changes that may be required.

For and on behalf of CMW Geosciences

Prepared by:



Jasmine Walden

Project Engineering Geologist

Reviewed and authorised by:



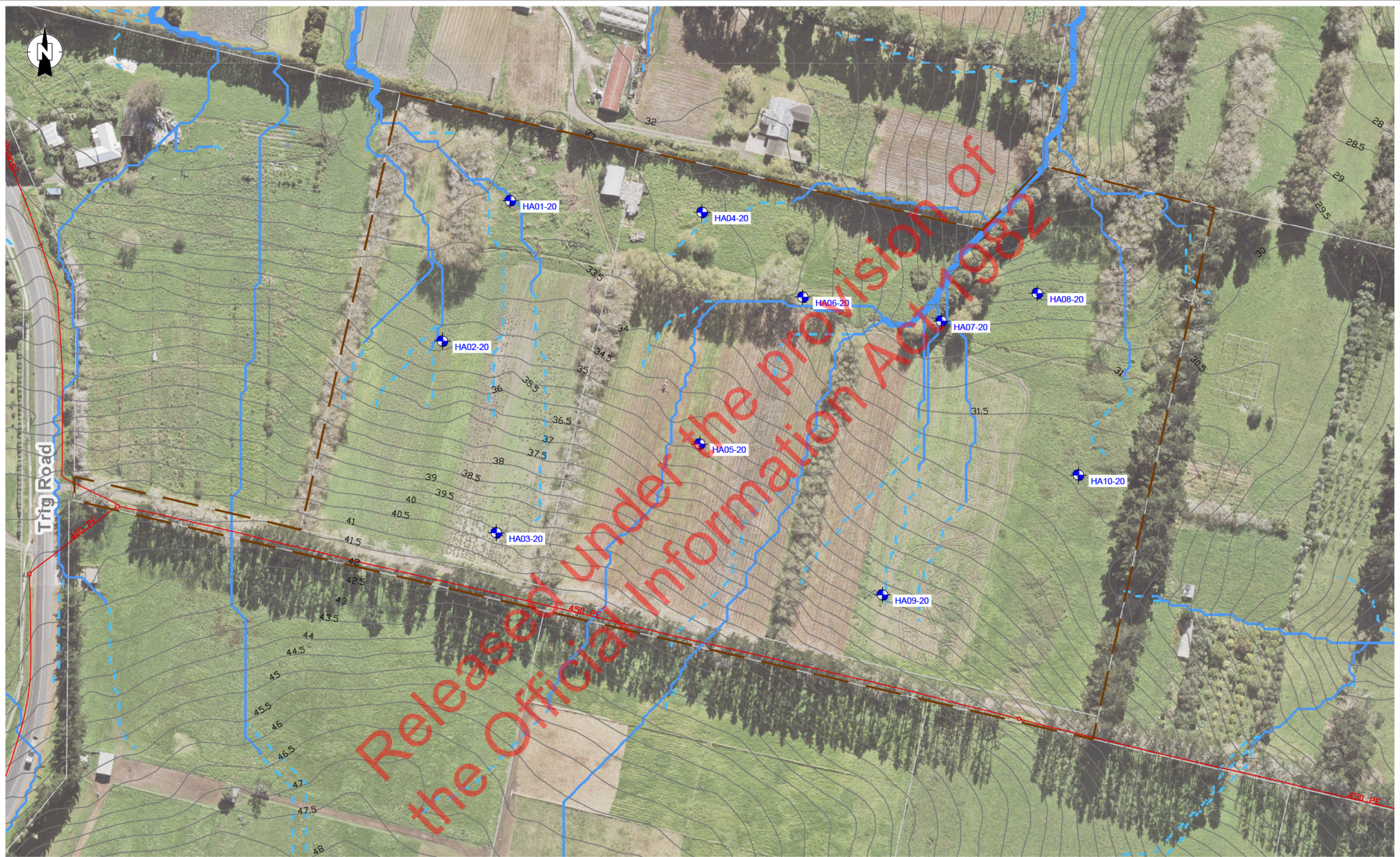
Andrew Linton

Principal Geotechnical Engineer




Distribution: 1 electronic copy to Neil Construction Limited via email
Original held at CMW Geosciences

Attachments: Site Investigation Plan
Hand Auger Borehole Logs



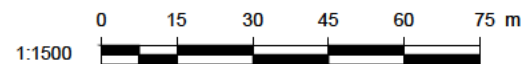


LEGEND:

-  HA01-20 HAND AUGER (HA) LOCATION
-  SITE BOUNDARY
-  400 PE WASTEWATER LINE

NOTES:

1. BASE PLAN ADAPTED FROM AUCKLAND COUNCIL GIS.
OVERLAND FLOW PATH FROM AUCKLAND COUNCIL GIS.



CLIENT:	NEIL CONSTRUCTION LIMITED		DRAWN:	WPJ	PROJECT No:	AKL2020-0231
PROJECT:	71 TRIG ROAD, WHENUAPAI		CHECKED:	JW	DRAW NG:	01
TITLE:	SITE INVESTIGATION PLAN		REVISION:	0	SCALE:	1:1500
			DATE:	21/09/2020	SHEET:	A3

HAND AUGER BOREHOLE LOG - HA01-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: FS Checked by: JW Scale: 1:25

Sheet 1 of 1

Position: 1744840.0mE; 5926203.0mN Projection: NZTM

Elevation: 33.00m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			33.0			OL: TOPSO L: dark brown.	M to W				
	0.4	Peak = 155kPa Residual = 40kPa	32.7			ML: Clayey SILT: brown mottled dark brown and orange. Very stiff, low plasticity, moderately sensitive. (Puketoka Formation)					
						... at 0.60m, becoming greyish brown mottled orange.					
	0.8	Peak = 134kPa Residual = 37kPa									
						... at 1.00m, becoming light grey mottled orange.					
	1.2	Peak = 142kPa Residual = 40kPa					M				
	1.6	Peak = 174kPa Residual = 67kPa									
	2.0	Peak = 136kPa Residual = 67kPa									
							VSt				
	2.4	Peak = 110kPa Residual = 64kPa	30.7			CH: CLAY with minor silt: light grey. Stiff to very stiff high plasticity, insensitive to moderately sensitive. (Puketoka Formation)					
	2.8	Peak = 107kPa Residual = 64kPa									
						... at 3.00m, becoming light grey mottled orange.	M to W				
	3.2	Peak = 110kPa Residual = 70kPa				... at 3.20m, becoming dark grey with minor black mottling.					
	3.6	Peak = 123kPa Residual = 60kPa									
						... at 3.80m, silt becoming absent.	W				
	4.0	Peak = 104kPa Residual = 67kPa									
						... at 4.20m, becoming grey.					
	4.4	Peak = 78kPa Residual = 60kPa					S	St			
						... at 4.60m, becoming dark grey.					
	4.8	Peak = 88kPa Residual = 67kPa									
						Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 1620

DCP No:

Remarks: Groundwater encountered at 4.0m.

HAND AUGER BOREHOLE LOG - HA02-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: FS Checked by: JW Scale: 1:25 Sheet 1 of 1

Position: 1744811.0mE; 5926143.0mN Projection: NZTM

Elevation: 34.75m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
16-09-2020			34.8			OL: TOPSO L: dark brown.	M to W				
	0.4	Peak = 83kPa Residual = 21kPa	34.4			ML: Clayey SILT: brown and grey. Stiff to very stiff, low plasticity, moderately sensitive. (Puketoka Formation)					
	0.8	Peak = 123kPa Residual = 59kPa				... at 0.80m, becoming grey mottled orange.					
	1.2	Peak = 112kPa Residual = 48kPa		1		... at 1.20m, becoming light grey.	W	St to VSt			
	1.6	Peak = 128kPa Residual = 53kPa									
	2.0	Peak = 140kPa Residual = 59kPa		2		... at 2.00m, becoming light grey mottled orange.					
	2.4	Peak = 155kPa Residual = 64kPa	32.4			CL: CLAY w h trace silt: dark grey. Very stiff to hard, low plasticity. (Puke ka Formation)					
	2.8	Peak = >187									
	3.2	Peak = UTP		3		... from 3.00m to 3.10m, contains trace fine grained sand.		VSt to H			
	3.6	Pea = >187					S				
	4.0	Peak = 120kPa Residual = 60kPa		4		ML: SILT with trace clay: dark grey. Firm, low plasticity, insensitive. (Puketoka Formation)		VSt			
	4.4	Peak = 40kPa Residual = 33kPa						F			
	4.8	Peak = 160kPa Residual = 107kPa						VSt			
				5		Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 1620

DCP No:

Remarks: Groundwater encountered at 2.2m.

HAND AUGER BOREHOLE LOG - HA03-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: FS Checked by: JW Scale: 1:25

Sheet 1 of 1

Position: 1744834.0mE; 5926061.0mN Projection: NZTM

Elevation: 40.00m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			40.0			OL: TOPSO L: dark brown.					
	0.4	Peak = 91kPa Residual = 13kPa	39.6			ML: Clayey SILT: greyish brown mottled orange. Stiff to very stiff, low plasticity, insensitive to sensitive (Puketoka Formation)					
	0.8	Peak = 185kPa Residual = 63kPa				... at 0.80m, becoming light brownish grey mottled orange.					
	1.2	Peak = UTP				... at 1.20m, becoming light grey mottled orange.					
	1.6	Peak = 160kPa Residual = 88kPa					M				
	2.0	Peak = 150kPa Residual = 96kPa									
	2.4	Peak = 174kPa Residual = 110kPa									
	2.8	Peak = 147kPa Residual = 90kPa				... at 2.60m, becoming light grey mottled orange and red.					
	3.2	Peak = 120kPa Residual = 64 kPa				... at 3.0m, becoming orange mottled grey.					
	3.6	Peak = 131kPa Residual = 70kPa					W				
	4.0	Peak = 118kPa Residual = 67kPa				... at 4.20m, becoming light brownish grey.					
	4.4	Peak = 96kPa Residual = 64kPa	35.5			CL: CLAY with minor silt: dark grey. Very stiff, low plasticity, insensitive. (Puketoka Formation)					
	4.8	Peak = 160kPa Residual = 90kPa					S	VSt			
				5		Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 1620

DCP No:

Remarks: Groundwater encountered at 4.4m.

HAND AUGER BOREHOLE LOG - HA04-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: FS

Checked by: JW

Scale: 1:25

Sheet 1 of 1

Position: 1744922.0mE; 5926198.0mN Projection: NZTM

Elevation: 32.75m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Reliability	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			32.8			OL: TOPSO L: dark brown.	M				
	0.4	Peak = 94kPa Residual = 27kPa	32.4			ML: Clayey SILT: orangeish brown. Stiff to very stiff, low plasticity, insensitive to moderately sensitive. (Puketoka Formation)					
	0.8	Peak = 134kPa Residual = 59kPa				... at 0.80m, becoming grey mottled orange.					
	1.2	Peak = 136kPa Residual = 53kPa		1							
	1.6	Peak = 127kPa Residual = 67kPa				... at 1.50m, becoming light grey.	M to W				
	2.0	Peak = 147kPa Residual = 78kPa		2		... at 1.90m, becoming grey and dark grey.					
	2.4	Peak = 131kPa Residual = 67kPa				... at 2.20m, becoming light grey mottled orange.		St to VSt			
	2.8	Peak = 126kPa Residual = 62kPa		3		... at 2.0m, becoming with minor clay and trace fine grained sand, whitish grey mottled orange.					
	3.2	Peak = 107kPa Residual = 59kPa									
	3.6	Peak = 88kPa Residual = 43kPa				... at 3.50m, becoming with some fine grained sand, clay becoming absent.					
	4.0	Peak = 91kPa Residual = 43kPa		4			S				
	4.4	Peak = 110kPa Residual = 56kPa	28.6			ML: Sandy SILT: light brownish grey mottled orange. Very stiff, low plasticity, insensitive to moderately sensitive. Sand is fine grained, poorly graded. (Puketoka Formation)		VSt			
	4.8	Peak = 115kPa Residual = 53kPa									
				5		Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: DCP No:

Remarks: Groundwater encountered at 3.2m.

HAND AUGER BOREHOLE LOG - HA05-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: FS Checked by: JW Scale: 1:25

Sheet 1 of 1

Position: 1744921.0mE; 5926099.0mN Projection: NZTM

Elevation: 35.50m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			35.5			OL: TOPSO L: dark brown.					
	0.4	Peak = 107kPa Residual = 27kPa	35.2			ML: Clayey SILT: dark brownish grey mottled orange. Very stiff to hard, low plasticity, insensitive to sensitive. (Puketoka Formation)					
	0.8	Peak = 120kPa Residual = 37kPa									
	1.2	Peak = 144kPa Residual = 56kPa				... at 1.20m, becoming grey mottled orange.					
	1.6	Peak = >187				... at 1.50m, becoming light grey mottled orange					
	2.0	Peak = >187									
	2.4	Peak = >187									
	2.8	Peak = 174kPa Residual = 107kPa				... at 2.60m, becoming light grey mottled orange and red.					
	3.2	Peak = 120kPa Residual = 59kPa	32.3			CH: CLAY with face silt: light grey mottled orange and red. Stiff, low plasticity, insensitive. (Puketoka Formation)					
	3.6	Peak = 70kPa Residual = 51kPa				... at 3.50m, becoming dark brownish grey mottled black.					
	4.0	Peak = 88kPa Residual = 64kPa				... at 3.80m, becoming grey with minor black mottling.					
	4.4	Peak = 67kPa Residual = 53kPa				... from 4.50m to 4.70m, contains 200mm lens of dark brown to black clay.					
	4.8	Peak = 78kPa Residual = 64kPa									
						Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 1620

DCP No:

Remarks: Groundwater encountered at 4.5m.

HAND AUGER BOREHOLE LOG - HA06-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: CK Checked by: JW Scale: 1:25 Sheet 1 of 1

Position: 1744965.0mE; 5926161.8mN Projection: NZTM

Elevation: 31.80m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			31.8			TOPSOIL: (Puketoka Formation)					
	0.4	Peak = 165kPa Residual = 47kPa	31.5			CH: CLAY with minor silt: light grey streaked trace orange and light brown. High plasticity, moderately sensitive. (Puketoka Formation)					
	0.8	Peak = 141kPa Residual = 44kPa				... from 0.70m to 1.20m, ... becoming CLAY					
	1.2	Peak = 132kPa Residual = 66kPa		1		... from 1.20m to 2.60m, ... becoming whitish grey streaked orange and light brown	M				
	1.6	Peak = 135kPa Residual = 52kPa									
	2.0	Peak = 177kPa Residual = 83kPa		2			VSt				
	2.4	Peak = 171kPa Residual = 85kPa									
	2.8	Peak = 116kPa Residual = 41kPa	29.2			CH: Silty CLAY: light greyish white mottled orange and black. High plasticity, moderately sensitive. (Puketoka Formation)					
	3.2	Peak = 135kPa Residual = 50kPa		3							
	3.6	Peak = 138kPa Residual = 55kPa					W				
	4.0	Peak = 52kPa Residual = 39kPa	27.9			CH: CLAY: black. High plasticity (Puketoka Formation)					
	4.4	Peak = 91kPa Residual = 41kPa	27.6			CH: Silty CLAY with minor sand: light brownish grey mottled black. High plasticity, sand is fine grained. (Puketoka Formation)		St			
	4.8	Peak = 138kPa Residual = 58kPa						VSt			
				5		Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 2904

DCP No:

Remarks: Groundwater encountered at 2.5m.

HAND AUGER BOREHOLE LOG - HA07-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: CK Checked by: JW Scale: 1:25

Sheet 1 of 1

Position: 1745024.3mE; 5926151.6mN Projection: NZTM

Elevation: 29.75m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			29.8			TOPSOIL:					
			29.6			MH: Clayey SILT: dark brown streaked orange. Low plasticity. (Puketoka Formation)					
	0.4	Peak = 152kPa Residual = 63kPa						VS			
			29.2			CH: CLAY: light greyish brown mottled black. High plasticity, insensitive to sensitive. (Puketoka Formation)	M				
	0.8	Peak = 97kPa Residual = 22kPa									
				1		... from 1.10m to 3.10m, ... becoming streaked orange and dark brown					
	1.2	Peak = 74kPa Residual = 17kPa									
								St			
	1.6	Peak = 77kPa Residual = 14kPa									
	2.0	Peak = 69kPa Residual = 28kPa		2							
	2.4	Peak = 102kPa Residual = 52kPa									
								VSt			
	2.8	Peak = 72kPa Residual = 33kPa									
				3				W			
	3.2	Peak = 97kPa Residual = 44kPa				... from 3.10m to 3.70m, ... becoming light brown mottled black					
	3.6	Peak = 97kPa Residual = 41kPa				... from 3.70m to 4.10m, ... becoming dark greyish brown mottled trace dark orange					
								St			
	4.0	Peak = 85kPa Residual = 25kPa		4		... from 4.10m to 5.00m, ... becoming grey with trace of hard clay inclusions which are coarse gravel sized					
	4.4	Peak = 94kPa Residual = 28kPa									
	4.8	Peak = 97kPa Residual = 33kPa									
				5		Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 2904

DCP No:

Remarks: Groundwater encountered at 1.0m.

HAND AUGER BOREHOLE LOG - HA08-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: CK Checked by: JW Scale: 1:25

Sheet 1 of 1

Position: 1745065.3mE; 5926163.3mN Projection: NZTM

Elevation: 29.40m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			29.4			TOPSOIL:					
	0.4	Peak = 168kPa Residual = 66kPa	29.1			CH: CLAY: light grey streaked orange and brown. High plasticity, insensitive to moderately sensitive. (Puketoka Formation)					
	0.8	Peak = 165kPa Residual = 69kPa									
	1.2	Peak = 149kPa Residual = 72kPa				... from 1.20m to 1.80m, ... becoming whitish grey streaked pale dark orange		VSt			
	1.6	Peak = 171kPa Residual = 99kPa				... from 1.80m to 2.50m, ... becoming whitish grey		M			
	2.0	Peak = 141kPa Residual = 85kPa									
	2.4	Peak = 69kPa Residual = 41kPa				... from 2.50m to 2.70m, ... becoming black		St			
	2.8	Peak = 39kPa Residual = 17kPa				... from 2.70m to 3.10m, ... becoming light greyish brown streaked black		F			
	3.2	Peak = 69kPa Residual = 39kPa				... from 3.10m to 4.20m, ... becoming streaked orange					
	3.6	Peak = 83kPa Residual = 41kPa						St			
	4.0	Peak = 113kPa Residual = 55kPa						W			
	4.4	Peak = 83kPa Residual = 41kPa				... from 4.20m to 5.00m, ... becoming light greyish brown with minor 1-5cm black wood fragment		VSt			
	4.8	Peak = 88kPa Residual = 41kPa						St			
						Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 2904

DCP No:

Remarks: Groundwater encountered 2.7m.

HAND AUGER BOREHOLE LOG - HA09-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: CK Checked by: JW Scale: 1:25

Sheet 1 of 1

Position: 1744999.2mE; 5926034.5mN Projection: NZTM

Elevation: 35.90m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			35.9			TOPSOIL:					
	0.4	Peak = UTP	35.7			CH: CLAY with minor silt: Orange brown mottled grey and dark brown. High plasticity. (Puketoka Formation)					
	0.8	Peak = 163kPa Residual = 74kPa									
	1.2	Peak = UTP									
	1.6	Peak = >193				... from 1.30m to 2.30m, ... becoming whitish grey streaked orange					
	2.0	Peak = UTP									
	2.4	Peak = UTP				... from 2.30m to 2.70m, ... becoming streaked pinkish red					
	2.8	Peak = UTP				... from 2.70m to 2.90m, ... becoming dark brown streaked black with trace fine grained sand					
	3.2	Peak = 149kPa Residual = 111kPa				... from 2.90m to 3.30m, ... becoming light grey streaked dark brown					
	3.6	Peak = 152kPa Residual = 124kPa				... from 3.3 m to 5.00m, ... becoming whitish grey streaked orange and yellow					
	4.0	Peak = 108kPa Residual = 80kPa									
	4.4	Peak = 77kPa Residual = 55kPa									
	4.8	Peak = 83kPa Residual = 52kPa									
						Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 2904

DCP No:

Remarks: Groundwater encountered at 4.8m.

HAND AUGER BOREHOLE LOG - HA10-20

Client: Neil Construction Limited
Project: 71 Trig Road
Site Location: Whenuapai
Project No.: AKL2020-0231
Date: 16/09/2020
Borehole Location: See site plan



Logged by: CK Checked by: JW Scale: 1:25

Sheet 1 of 1

Position: 1745082.9mE; 5926085.7mN Projection: NZTM

Elevation: 31.90m

Datum: AUCKHT1946

Survey Source: AC Geomaps

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			31.9			TOPSOIL:					
	0.4	Peak = UTP	31.7			CH: Silty CLAY: light greyish brown streaked orange. High plasticity. (Puketoka Formation)					
	0.8	Peak = 168kPa Residual = 72kPa	31.2			CH: CLAY: whitish grey streaked orange. High plasticity. (Puketoka Formation)	D				
	1.2	Peak = 179kPa Residual = 88kPa	30.6			ML: Clayey SILT with minor sand: whitish grey streaked orange. Low plasticity, sand is fine grained. (Puketoka Formation)					
	1.6	Peak = UTP	30.2			CH: Silty CLAY: whitish grey streaked orange. High plasticity. (Puketoka Formation)	M				
	2.0	Peak = UTP		2		... from 2.20m to 2.40m, ... becoming light greyish white streaked trace orange					
	2.4	Peak = 72kPa Residual = 50kPa				... from 2.40m to 4.00m, ... becoming CLAY					
	2.8	Peak = 69kPa Residual = 41kPa									
	3.2	Peak = 66kPa Residual = 41kPa									
	3.6	Peak = 77kPa Residual = 44kPa									
	4.0	Peak = 80kPa Residual = 50kPa		4		... from 4.00m to 4.40m, ... becoming light greyish white					
	4.4	Peak = 102kPa Residual = 58kPa				... from 4.40m to 5.00m, ... becoming with some fine grained sand					
	4.8	Peak = 61kPa Residual = 44kPa									
				5		Borehole terminated at 5.0 m					

Termination Reason: Target depth reached

Shear Vane No: 2904

DCP No:

Remarks: Groundwater encountered at 2.2m.