Colville Wellbeing Centre

Geotechnical Factual Report

Prepared for Colville Community Health Trust
Prepared by Beca Limited

21 May 2021

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Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
A	Tatiana Lopez	Final Issue to Client	19/05/2021

Document Acceptance

Action	Name	Signed	Date
Prepared by	Tatiana Lopez		01/05/2021
Reviewed by	Harry Wahab		12/05/2021
Approved by	Geoff Cable		19/05/2021
on behalf of	Beca Limited		

1 Introduction

Colville Community Health Trust (CCHT) are interested in purchasing a property near Colville (89 Wharf Road) to develop a 'wellbeing centre' to provide health related services to the local community. The proposed development is understood to comprise several buildings, new accessways and associated infrastructure.

Beca Ltd (Beca) have previously provided CCHT some high-level architectural advice to assist refining their conceptual building plans.

CCHT have commissioned Beca Ltd (Beca) to investigate the ground conditions at a particular site within the 89 Wharf Road property. This will allow CCHT to better understand potential geotechnical constraints for development at this location.

The investigations undertaken by Beca comprised two hand augers and in-situ shear vane testing. This factual report details the data gathered during the geotechnical ground investigation.

2 Site Location and Description

89 Wharf Road is located 1.4km northwest of Colville. The property is in a rural area with moderately sloping hill sides. The site is understood to be used as a timber supply for a local sawmill. The property and the location of geotechnical testing is indicated on the Geotechnical Investigation Location Plan (Appendix A) and Figure 1 below.

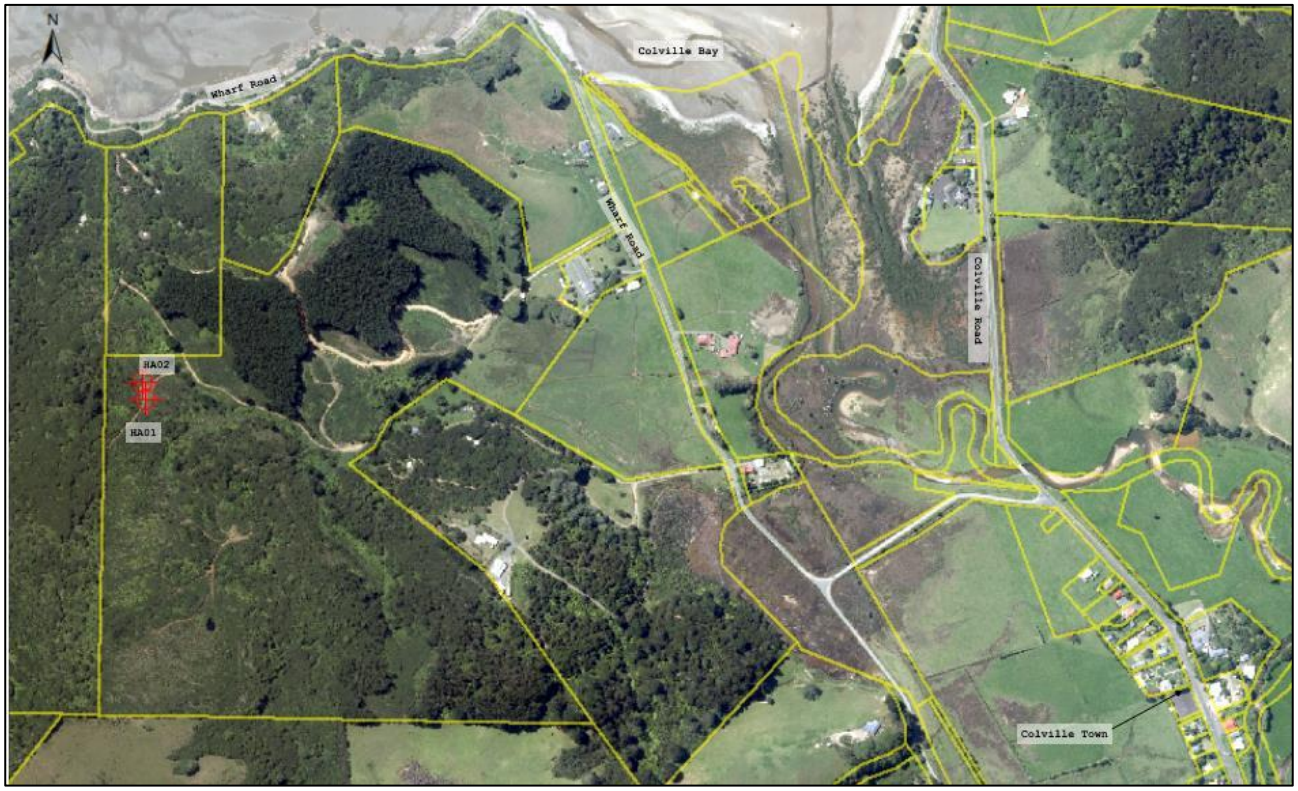

Figure 1. 89 Wharf Road property and location of hand augers, LINZ (2016-2019).

2.1 Site Geology

The published geological map of the area is indicated in the Auckland QMAP (Edbrooke, 2001), refer Figure 2. The site area is underlain by Kuaotunu Subgroup (Mcu) dated between 10.9 and 18.5 million years. It is

mainly represented by basaltic andesite, andesite and dacite (volcanic lavas) and pyroclastic (volcanic eruption ejecta) as part of Coromandel Volcanic Zone.

Lowland areas are characterized by fluvial deposits (Q1a) which are up to 14,000 years old and comprise sand, silt mud and clay with local gravel and peat beds.

The basement rocks in the area comprise greywacke of the Manaia Hill Group (Jm) which is between 42 and 159 million years old.

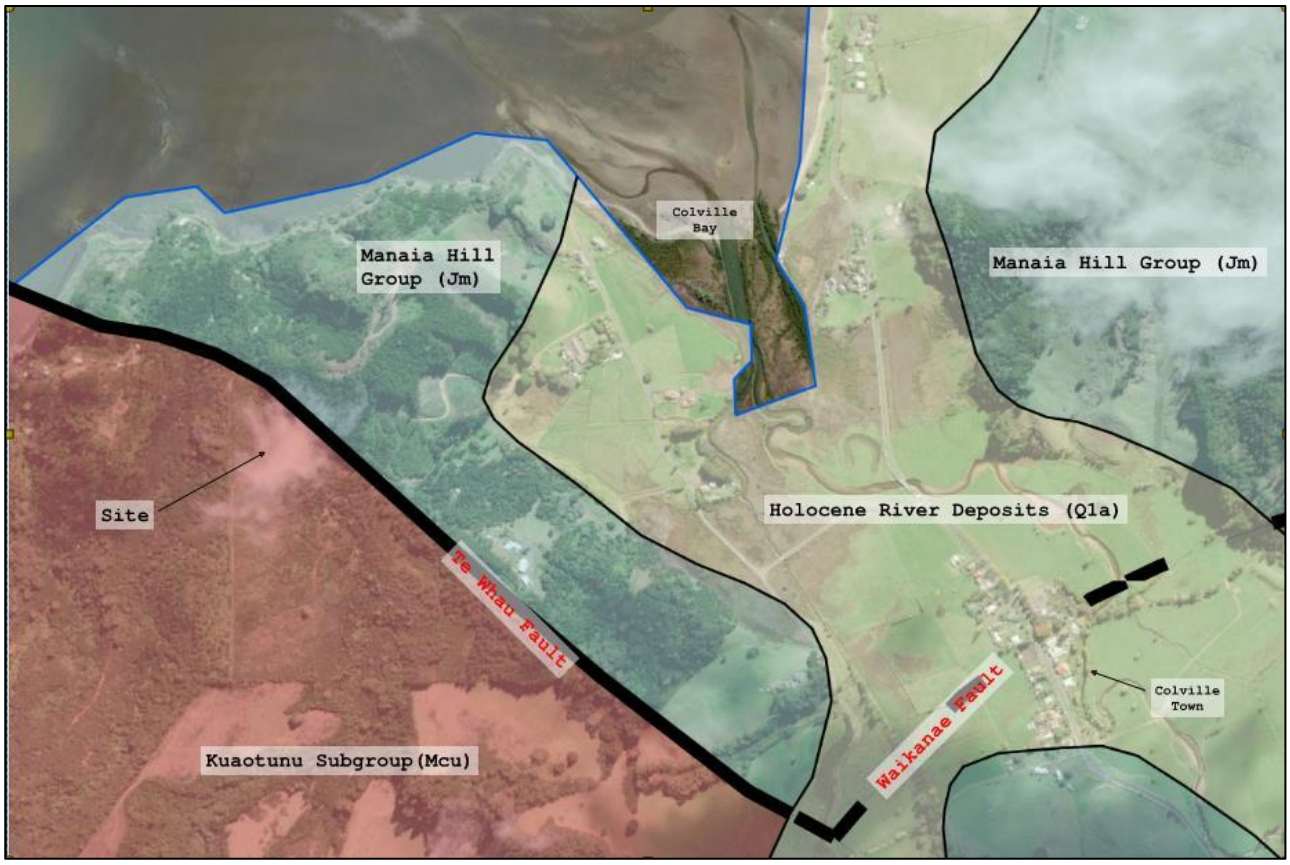

Figure 2 Surficial geology (Edbrooke, Colville.

The Te Whau Fault is a mapped faultlline that runs through the property immediately to the northeast of the site. According to GNS, this fault has been inactive since the Miocene (5 to 23 million years ago). This intersects the Waikanae Fault, which is also believed to be inactive and since the Miocene (Faults database - GNS).

3 Site Investigation

The site investigation was carried out on the 28th April 2021. The investigation locations have been surveyed at the completion of testing using a handheld GPS and coordinates were recorded in New Zealand Transverse Mercator. The site investigations and soil logging were undertaken by a Beca Engineering Geologist. All logs have been verified by a Beca Senior Engineering Geologist.

3.1 Standards and Calibration

The site investigation was undertaken in general accordance with the NZ Ground Investigation Specification (2017) unless otherwise stated. A list of standards used during the site investigation is shown in Table 1, below.

Table 1 - Summary of Standards used in this Investigation

Field Procedure	Standard Used
Soil and Rock logging	In general accordance with New Zealand Geotechnical Society Guidelines (NZGS, 2005).
Handheld shear vane testing	In general accordance with New Zealand Geotechnical Society Guidelines (NZGS, 2001).

An up to date calibration certificate for the handheld shear vane used in the investigation is attached in Appendix C.

3.2 Hand Auger Hole

Two hand augers were drilled and logged on site by Beca staff. The hand auger locations are shown in Geotechnical Investigation Location Plan in Appendix A. Hand auger logs and photographs are attached in Appendix B.

In-situ testing comprised handheld shear vanes undertaken at approximately 0.5 m centres in each hand auger hole.

A summary of the hand augers undertaken is given in Table 3.2.

Table 2 - Summary of hand augers

Name	Easting (m)	Northing (m)	Elevation (m)
HA01	1819971	5943253	35
HA02	1819969	5943270	36

4 Applicability Statement

This report has been prepared by Beca on the specific instructions of our Client. It is solely for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. Any use or reliance by any person contrary to the above, to which Beca has not given its prior written consent, is at that person's own risk.

This is a factual report of site investigation. The site investigation has been undertaken at discrete locations and no inferences about the nature and continuity of ground conditions away from the investigation locations are made. Furthermore, logs are provided presenting description of the soils and geology based on our observation of the samples recovered in the fieldwork and may not be truly representative of the actual underlying conditions.

No interpretation of the investigation results has been made in this report. Should you be in any doubt as to the applicability of this report for the proposed development described herein, it is essential that you carry out independent investigations to satisfy your needs.

5 References

NZ Geotechnical Society, 2005: Field Description for Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes.

NZ Geotechnical Society, 2001: Guidelines for the Handheld Shear Vane Test

NZ Standard 4402, 1986, Methods of Testing Soils for Civil Engineering Purposes

Edbrooke S. W. (Compiler) 2001: Geology of the Auckland Area. Scale 1:250,000. Lower Hutt: Institute of Geological and Nuclear Sciences.

Land Information New Zealand, LINZ data service. [Online]. Available at: https://data.linz.govt.nz/data/category/topographic/ [Accessed May 2021].

GNS Science, 2020. New Zealand Faults Database. [Online]. Available at: https://data.gns.cri.nz/geology/ [Accessed April 2021].

A

Appendix A – Geotechnical Investigation Location Plan

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No.	Revision	By	Chk	Appd	Date
1	FINAL ISSUED TO CLIENT	CP	HW	GC	17/05/21

Drawing Originator: Beca

Original Scale (A1)	Design	TL	17/05/21
	Drawn	TL	17/05/21
Reduced Scale (A3)	Dsg Verifier	CP	17/05/21
	Dwg Check	HW	17/05/21

* Refer to Revision 1 for Original Signature

Client: COLVILLE COMMUNITY HEALTH TRUST

Project: COLVILLE WELLBEING CENTRE

Title: GEOTECHNICAL INVESTIGATION LOCATION PLAN

Discipline: GEOTECHNOCAL

Drawing No.: 001

Rev.

BLUEBEAM

DO NOT SCALE

IF IN DOUBT ASK.

B

Appendix B – Hand Auger Logs and Photographs

Log Key Sheet

WATER

Water level on date shown

METHOD *(shows drilling method)*

OB	open barrel
Wash	wash boring
TT	triple tube
UT	thin walled undisturbed tube
SPT	standard penetration test – open nose sampler
Nc	standard penetration test – solid nose sampler
MA	machine auger
PS	piston sample
PCT	percussion – top drive
PCB	percussion – bottom drive
Conc	concentrics
Sonic	sonic
HA	hand auger
VE	vacuum excavation

SAMPLES

Dx	Disturbed sample, number x
Bx	Bulk sample, number x
Ux(d)	Undisturbed sample, number x, tube diameter d in mm
Wx	Water sample, number x

MOISTURE

Dry, looks and feels dry
Moist, no free water on hand when remoulding
Wet, free water on hand when remoulding
Saturated, soil below water table

SOIL AND ROCK DESCRIPTIONS

Soil and Rock Descriptions are generally as described in the NZ Geotechnical Society "Field Description of Soil and Rock – Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes", dated December 2005.
Vane Shear Strength measurements in accordance with the NZ Geotechnical Society "Guideline for hand held shear vane test" dated August 2001.

IN SITU TESTS

SV	= 40/10	In situ shear strength and remoulded shear strength respectively, as measured by Geotechnics/ Pilcon Shear Vane
τ	= 50/12	Vane shear strength and remoulded vane shear strength respectively, corrected to BS1377
UTP	=	Unable To Penetrate with Shear Vane
N	= 15	SPT uncorrected blow count for 300mm penetration
N_c	= 50+	SPT uncorrected blow count for 300 mm penetration using solid nose sampler

★	**Laboratory Test(s) carried out:**
AL	Atterberg limits
UU	Unconsolidated undrained triaxial
PSD	Particle size
CU	Consolidated undrained triaxial
CONS	Consolidation
COMP	Compaction
UCS	Unconfined compression

WEATHERING

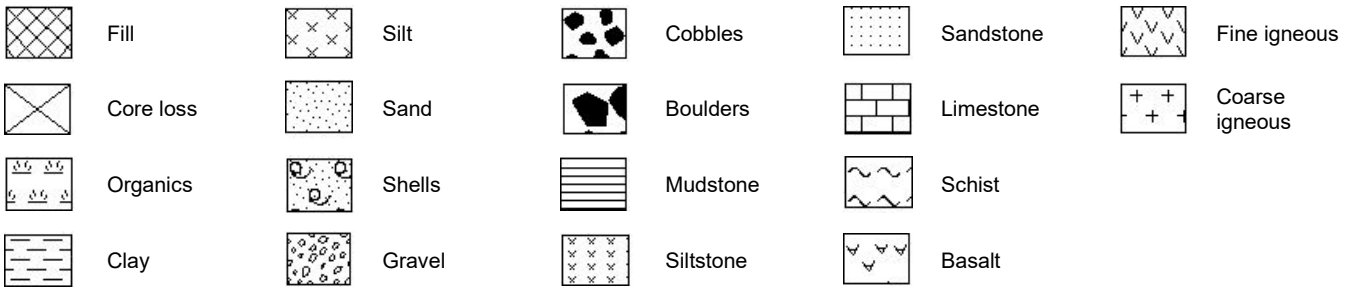
CW	Completely weathered
HW	Highly weathered
MW	Moderately weathered
SW	Slightly weathered
UW	Unweathered

CONSISTENCY

Cohesive Soils	Undrained Shear Strength (kPa)
Very soft	<12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very stiff	100 to 200
Hard	>200

Non-cohesive Soils	SPT – Uncorrected
Very loose	0 to 4
Loose	4 to 10
Medium dense	10 to 30
Dense	30 to 50
Very dense	>50

GRAPHIC LOG (1 or a combination of the following)



ORGANIC SOILS

Von Post Degree of Humification

H1	Completely unconverted and mud-free peat, when pressed gives clear water and plant structure is visible.
H2	Practically unconverted and mud-free peat, when pressed gives almost clear water and plant structure is visible.
H3	Very slightly decomposed or very slightly muddy peat, when pressed gives marked muddy water, no peat substance passes through the fingers and plant structure is less visible.
H4	Slightly decomposed or slightly muddy peat, when pressed gives marked muddy water and plant structure is less visible.
H5	Moderately decomposed or very muddy peat with growth structure evident but slightly obliterated.
H6	Moderately decomposed or very muddy peat with indistinct growth structure.
H7	Fairly well decomposed or very muddy peat but the growth structure can just be seen.
H8	Well decomposed or very muddy peat with very indistinct growth structure.
H9	Practically decomposed or mud-like peat in which almost no growth structure is evident.
H10	Completely decomposed or mud peat where no growth structure can be seen, entire substance passes through the fingers when pressed.

Hand Auger Log

Hand Auger ID: **HA01**

Project:	Colville Wellbeing Center	**Project Number:**	3208532
Site Location:	89 Wharf Road	**Client:**	Colville Community Health Trust
Location:	Refer to Geotechnical Testing Plan Location	**Coordinate System:**	NZTM2000
		Northing:	5943253.0
		Easting:	1819971.0
		Vertical Datum:	NZVD 2016
		Ground level (mRL):	35.00 approx.
		Location Method:	Handheld GPS

Groundwater (m)	In Situ Tests: Su (kPa)	In Situ Tests: Scala blows/50mm	Samples	Depth (m)	RL (m)	Graphic Log	Soil/ Rock Description	Geological Unit
							"Stiff" SILT with some clay, some organics, minor fine to medium sand; dark brown; moist, low plasticity. Organics: rootlets and amorphous.	Topsoil
							"Very stiff" SILT with some clay, minor fine to medium sand, trace organics; dark brown; moist, low plasticity.	Kuaotunu Subgroup
	202/89			0.5	34.5		Hard silty CLAY minor fine to medium sand; brown mottled grey; moist, high plasticity.	
	171/100			1.0	34.0		Very stiff silty CLAY minor fine to medium sand; grey with red (FeO) staining; moist, high plasticity.	
							Hard CLAY with some silt, minor fine to medium sand; greyish red, moist, high plasticity.	
	UTP			1.5	33.5			
							Very stiff CLAY with some silt, trace fine sand; reddish orange, moist, high plasticity.	
	171/81			2.0	33.0			
	141/95			2.5	32.5		Very stiff CLAY with some silt, trace fine gravel; white, red, brown with red yellow and grey mix, moist, high plasticity.	
	128/67			3.0	32.0		3.00m - End of hand auger	
				3.5	31.5			
				4.0	31.0			
				4.5	30.5			

Date Started:	28/04/2021	**Vane ID:**	1249	**Comments:**
Logged By:	TL / CP	**Vane Width:**	19mm	Hand auger locations set out by CCHT.
Diameter:	50mm	**Vane Type:**	Hand held	Hand auger terminated at target depth.
				No groundwater observed. Hand auger hole backfilled with cuttings.

For Explanation of Symbols and Abbreviations See Key Sheet

Hand Auger Log

Hand Auger ID: **HA02**

Project:	Colville Wellbeing Center	**Project Number:**	3208532
Site Location:	89 Wharf Road	**Client:**	Colville Community Health Trust
Location:	Refer to Geotechnical Testing Plan Location	**Coordinate System:**	NZTM2000
		Northing:	5943270.0
		Easting:	1819969.0
		Vertical Datum:	NZVD 2016
		Ground level (mRL):	35.00 approx.
		Location Method:	Handheld GPS

Groundwater (m)	In Situ Tests: Su (kPa)	In Situ Tests: Scala blows/50mm	Samples	Depth (m)	RL (m)	Graphic Log	Soil/ Rock Description	Geological Unit
							"Very stiff" SILT, minor clay, some organics trace fine to coarse sand; dark brown; dry, low plasticity. Organics: rootlets and amorphous.	Topsoil
							Very stiff, minor clay, trace fine to medium sand, trace organics; dark brown and grey mixture; moist, low plasticity. Organics: fibrous.	Kuaotunu Subgroup
	190/95			0.5	35.5			
							Hard SILT, minor clay, trace fine sand, trace fine gravel; dark greyish brown; moist, low plasticity.	
	202			1.0	35.0			
	183/100			1.5	34.5		Very stiff SILT, some clay, trace fine sand; grey with red and orange streaks; moist, high plasticity.	
	174/103			2.0	34.0		2.00m - End of hand auger	
				2.5	33.5			
				3.0	33.0			
				3.5	32.5			
				4.0	32.0			
				4.5	31.5			

Date Started:	28/04/2021	**Vane ID:**	1249	**Comments:**
Logged By:	TL / CP	**Vane Width:**	19mm	Hand auger locations set out by CCHT.
Diameter:	50mm	**Vane Type:**	Hand held	Hand auger terminated at target depth.
				No groundwater observed. Hand auger hole backfilled with cuttings.

For Explanation of Symbols and Abbreviations See Key Sheet

Collville Wellbeing Centre

HA01 **DEPTH: 0.0 to 3 m**

HA02 **DEPTH: 0.0 to 2 m**

C

Appendix C – Calibration Certificates of Field Equipment

21 Pitt St
PO Box 6345
Auckland 1141
Ph: (09) 300-9380

GEOTECHNICS SHEAR VANE CALIBRATION REPORT SHEET

Vane Number: GEO1249

Vane Dimensions							
Measured by: S.Shah				**Date Measured:** 4 November 2020			
Diameter (mm)	**Height (mm)**	**Thickness (mm)**	**Rod Diameter (mm)**	**Area Ratio**	**Vane Size (mm)**	**Friction**	**K**
19.04	29.10	1.48	6.33	24.27	19	-	0.02017
33.85	50.90	1.50	6.33	12.66	33	-	0.11193

Calibration Authority: Strainer Systems Ltd
Calibration Standard: In-house method P3
Calibration Date: 27 October 2020
Calibration Authority Rep #: 692
Calibration Interval: 2 Yearly

Calculated by: S.Shah
Checked by: N.Agarkova/E.Fang
Date Entered: 4 November 2020
Date Checked: 4 November 2020
Report Number: 2710201

The uncertainty of the shear vane (spring) calibration has been determined by Strainer Systems Limited to be:			
Gauge Reading Kpa	Range 0-50	Range 60-100	Range 110-140
Average Expanded uncertainty N.m	0.03	0.04	0.05
Ave.Coverage factor (k)	2.6	2.8	2.8

Dial Gauge Reading	Applied Torque (Nm)	Vane Shear Strength 19mm (kPa)	Vane Shear Strength 33mm (kPa)	Dial Gauge Reading	Applied Torque (Nm)	Vane Shear Strength 19mm (kPa)	Vane Shear Strength 33mm (kPa)
0	0	0	0	**50**	1.52	76	14
2	0.08	4	1	**52**	1.58	78	14
4	0.16	8	1	**54**	1.63	81	15
6	0.24	12	2	**56**	1.69	84	15
8	0.31	16	3	**58**	1.74	86	16
10	0.39	19	4	**60**	1.80	89	16
12	0.45	22	4	**62**	1.85	92	17
14	0.51	25	5	**64**	1.91	95	17
16	0.56	28	5	**66**	1.96	97	18
18	0.62	31	6	**68**	2.02	100	18
20	0.68	34	6	**70**	2.07	103	18
22	0.74	36	7	**72**	2.12	105	19
24	0.79	39	7	**74**	2.17	108	19
26	0.85	42	8	**76**	2.22	110	20
28	0.91	45	8	**78**	2.27	112	20
30	0.97	48	9	**80**	2.32	115	21
32	1.02	51	9	**82**	2.37	118	21
34	1.08	53	10	**84**	2.42	120	22
36	1.13	56	10	**86**	2.47	123	22
38	1.19	59	11	**88**	2.53	125	23
40	1.25	62	11	**90**	2.58	128	23
42	1.30	64	12	**92**	2.63	130	24
44	1.36	67	12	**94**	2.68	133	24
46	1.41	70	13	**96**	2.73	136	24
48	1.47	73	13	**98**	2.79	138	25

Notes:
Vane Shear Strength = Torque Applied / K

Authorised Signatory.....
D.Anstiss - Quality Manager

21 Pitt St
PO Box 6345
Auckland 1141
Ph: (09) 300-9380

GEOTECHNICS SHEAR VANE CALIBRATION REPORT SHEET

Vane Number: GEO1249

Vane Dimensions							
Measured by: S.Shah				**Date Measured:** 4 November 2020			
Diameter (mm)	Height (mm)	Thickness (mm)	Rod Diameter (mm)	Area Ratio	Vane Size (mm)	Friction	K
19.04	29.10	1.48	6.33	24.27	19	-	0.02017
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Gauge Reading Kpa	Range 0-50	Range 60-100	Range 110-140
Average Expanded uncertainty N.m	0.03	0.04	0.05
Ave.Coverage factor (k)	2.6	2.8	2.8

Dial Gauge Reading	Applied Torque (Nm)	Vane Shear Strength 19mm (kPa)	Vane Shear Strength 33mm (kPa)	Dial Gauge Reading	Applied Torque (Nm)	Vane Shear Strength 19mm (kPa)	Vane Shear Strength 33mm (kPa)
100	2.84	141	25				
102	2.89	143	26				
104	2.94	146	26				
106	2.99	148	27				
108	3.05	151	27				
110	3.10	154	28				
112	3.17	157	28				
114	3.24	160	29				
116	3.31	164	30				
118	3.37	167	30				
120	3.44	171	31				
122	3.51	174	31				
124	3.57	177	32				
126	3.63	180	32				
128	3.70	183	33				
130	3.76	186	34				
132	3.82	190	34				
134	3.89	193	35				
136	3.95	196	35				
138	4.02	199	36				
140	4.08	202	36				

Notes:
Vane Shear Strength = Torque Applied / K

Authorised Signatory.....
D.Anstiss - Quality Manager