Attachment 9A

Geotechnical Factual Report prepared by Beca



Geotechnical Factual Report

May Road Development

Prepared for May 1 Limited

Prepared by Beca Limited

14 April 2022



Revision History

Revision No	Prepared By	Description	Date
1	Kent Thomas	For Issue	13/11/2020
2	Kent Thomas	Updated for Resource Consent	14/04/2022

Document Acceptance

Action	Name	Signed	Date
Prepared by	Kent Thomas	#	14/04/2022
Reviewed by	David Ansitss	Ldat	14/04/2022
Approved by	Dale Paice		
on behalf of	Beca Limited		

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.



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Contents

1	Intr	oduction	1
	1.1	Object and Scope of the Investigation	1
	1.2	Site Location and Description	2
	1.3	Site Geology	2
2	Site	e Investigation	3
		Standards and Calibration	
	2.2	Machine Boreholes	3
	2.3	Groundwater	4
3	Lab	ooratory Testing	5
4	Apı	plicability Statement	6
5	Ref	erences	7

Appendices

Appendix A – Site Investigation Location Plan

Appendix B – Machine Borehole Logs

Appendix C – Machine Borehole Photographs

Appendix D – Laboratory Testing Results

Appendix E – Calibration Certificates



1 Introduction

Beca Limited (Beca) has been commissioned by May 1 Limited to undertake a geotechnical investigation at their May Road properties in Mount Roskill (the Site). The Site is located on May Road in the suburb of Mount Roskill and encompasses the properties of 105, 105a-109a, and 119 May Road. The land at 54 Roma Road directly northwest of the Site will host a shaft site for Watercare Services Limited (Watercare)'s Central Interceptor tunnel and 105 May Road is currently being leased to facilitate construction activities. Figure 1 shows the Site, Watercare's land and adjacent lots.

This report forms part of a suite of reports prepared to consider the feasibility of the future Site development. The other reports are:

- Geotechnical Interpretive Report.
- Ecology Assessment.
- Land Contamination Assessment.
- · Contaminated Soils Management Plan.
- Civil and Stormwater Assessment.
- Erosion Control Sediment Plan.
- Concept Design Drawings.



Figure 1: Site Plan

1.1 Object and Scope of the Investigation

The purpose of the investigation was to gather geotechnical factual data as inputs to inform analysis, earthworks, and future optioneering for the Site. This report details the factual information collected during these investigations. To inform this report data was collected from four Machine Boreholes and is accompanied



by a suite of lab testing including Atterberg Limits, Particle Size Distribution, Organic Content and One-Dimensional Consolidation testing. A number of test pit investigations and contaminant monitoring boreholes were also undertaken as part of the Ecology and Land Contamination studies covered in separate reports. 105 May road is currently being leased to WaterCare and no investigations were undertaken on this property.

1.2 Site Location and Description

The Site is located on May Road in the suburb of Mount Roskill and encompasses the properties of 105, 105a-109a, and 119 May Road. The Site is located to the northwest of Mount Roskill, it is typically flat between elevations of 49 and 51 mRL, and rises gently to the west, with a low-lying swamp area in the north-western corner of the 105 property.

A north-west, south-east aligned drainage trench follows the north-eastern boundary of the Site, with a second perpendicular trench at the border between the property of 105 and 105a-109a May Road.

A number of large warehouse and smaller sheds structures are present on the 105a-109a May Road lots with various stockpiles of wood, refuse, and earth fill, while 105 and 119 May Road are predominately vacant. 105 May Road is currently being leased and serves as the location of the contractor's site offices as part of Watercare's Central Interceptor project.

The locations of the completed investigations were proposed in an attempt to define the extent of basalt lava flows present on the site. A site plan of investigations is shown in Appendix A.

1.3 Site Geology

The relevant published geological map - Geology of the Auckland area 1:250,000 (Edbrooke, 2001), shows the Site to be underlain by basalt lava flows consisting of dense, fine grained basalt rock, with the alternating sandstone and siltstone beds of the East Coast Bays Formation forming the ridgeline to the immediate west. The distribution of these units as reported on the map is shown in Figure 2 below.

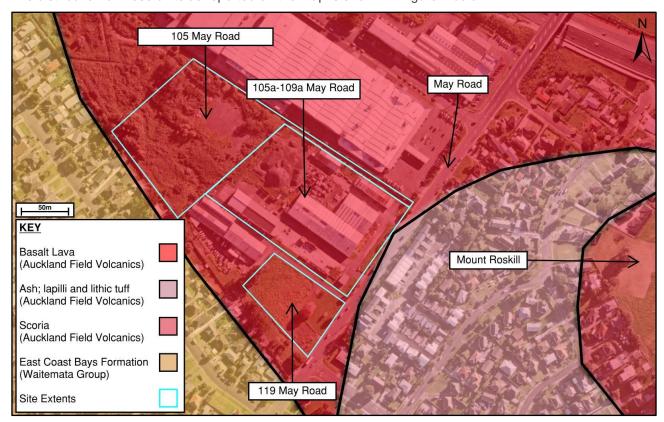


Figure 2: Mapped Geology of the Site (Edbrooke, 2001).



2 Site Investigation

The site investigation was commenced on 21 October 2020 and was completed by 27 October 2020. The investigation locations have been estimated following completion from Auckland Council GeoMaps in terms of NZTM and Auckland Vertical Datum (1946) and are presented in Appendix A. The site investigations were observed full-time by a Beca Engineering Geologist. Unless otherwise stated, all soil and rock logging has been undertaken by a Beca Engineering Geologist. All logs have been verified by a Beca Senior Engineering Geologist.

2.1 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).
Standard Penetration Testing	ASTM D 1586 -11 (1)
Standard Penetration Testing – Hammer Efficiency	ASTM D4633-10

Note: Standard adopted to provide for variation in SPT split spoon diameter with results reported in 75mm increments including seating drive.

Up to date calibration certificates for the following testing equipment used in the investigations are attached in Appendix E.

- Handheld shear vane
- SPT Hammer Efficiency

2.2 Machine Boreholes

Machine boreholes were drilled by Pro-Drill Limited using an excavator mounted drill rig. Drilling was undertaken using open barrel and triple-tube rotary drilling techniques. A summary of all machine boreholes undertaken is given Table 2.

Table 2 - Summary of Machine Boreholes Drilled

BH No.	Location	Easting	Northing	R.L. ground (m)	Total Depth (m)	Installation Details
BH01	119 May Road	1754240	5913474	50.50	17.20	Backfilled
BH02	105a May Road	1754200	5913582	50.00	18.60	Backfilled
BH03	105a May Road	1754238	5913552	50.00	20.33	Backfilled
BH04	105a May Road	1754294	513588	49.50	12.52	Backfilled

Field testing, undertaken during drilling of the machine boreholes comprised:

Standard Penetration Tests were typically carried out at nominal 1.5m centres and the uncorrected N-values are recorded on the borehole logs. SPT hammer efficiencies are presented on the borehole log sheets.



• Handheld shear vane tests were carried out within the end of the core barrel in cohesive soils. The vane details and corrected shear vane values are reported on the machine borehole logs.

All core samples were logged on site by a Beca Engineering Geologist. Machine borehole logs are presented in Appendix B and core photographs in Appendix C. After the core samples had been logged, they were wrapped in plastic to reduce moisture loss and placed in labelled core boxes before being transferred to a shed on 105a-109a May Road for storage. Some natural desiccation and degradation of the core samples will occur through time following storage. Upon completion, all boreholes were backfilled with pea gravel, and the upper 2.5m of each hole filled with bentonite pellets. Within BH04, PVC pipe was grouted in the hole to ~2.5m depth to serve as casing for drilling. This was trimmed flush with ground level and left in place following the completion of the hole.

2.3 Groundwater

Groundwater was observed in the boreholes during drilling and the boreholes were dipped following completion of drilling. At the time of the measurement(s) the boreholes were generally partially cased to 3.0m depth and the borehole had not been developed to remove drilling muds or other fluids added during the drilling process, and hence the water level is indicative only and does not allow for the interpretation of water levels or vertical gradients between individual units. Groundwater was observed in all of the boreholes. Table 3 summarises these observations.

Table 3 - Groundwater Measurements

Borehole ID	Date of measurement	Depth to water (m.b.g.l)	Depth to water (mRL)
BH01	27/10/2020 12:15:00	0.60	49.90
BH02	23/10/2020 08:00:00	0.70	49.30
	22/10/2020 08:00:00	1.40	48.60
BH03	20/10/2020 10:00:00	0.40	49.60
	21/10/2020 08:00:00	0.60	49.40
BH04	27/10/2020 08:00:00	1.80	47.70
m.b.a.l = meters l	below ground level.		



3 Laboratory Testing

Undisturbed push tube samples and disturbed soil samples were collected from machine boreholes during drilling. A Summary of samples collected, and tests performed is detailed in Table 4 below.

Table 4 – Summary of Samples and Laboratory Testing.

Borehole ID	Depth (r	n.b.g.l)	Sample Type	Tests Performed					
	Тор	Bottom							
BH01	4.95	5.10	Small Disturbed	Atterberg Limits					
				Wash Grading					
				Hydrometer Grading					
	8.10	8.25	Small Disturbed	Atterberg Limits					
				Wash Grading					
				Hydrometer Grading					
BH02	4.50	5.00	Undisturbed Tube	Wash Grading					
				Hydrometer Grading					
				Consolidation					
	7.95	8.15	Small Disturbed	Atterberg Limits					
				Wash Grading					
				Hydrometer Grading					
BH03	3.00	3.50	Undisturbed Tube	Wash Grading					
				Hydrometer Grading					
				Organic Content					
				Consolidation					
	7.95	8.15	Small Disturbed	Atterberg Limits					
				Wash Grading					
				Hydrometer Grading					
	10.95	11.10	Small Disturbed	Atterberg Limits					
				Wash Grading					
				Hydrometer Grading					

Envirolab Geotest Ltd, carried out testing of these samples. The tests undertaken, and the testing specifications, were as follows:

- Atterberg Limits: NZS4402, 1986; tests 2.2, 2.3 and 2.4
- Wash Grading: NZS4402, 1986; test 2.8.1 (wet sieve)
- Hydrometer Grading: NZS4402, 1986, test 2.8.4
- Organic Content: NZS4402, 1986; test 3.1
- Consolidation Test: NZS4402, 1986; test 7.1

The results of the laboratory testing are given in Appendix D together with a summary of the tests carried out.



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 and laboratory testing. 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

- ASTM D 1586-11Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils
- Beca (2020): Detailed Site Investigation Contamination.
- 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 Limited.
- 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





Appendix A – Site Investigation Location Plan



Appendix B – Machine Borehole Logs



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

VΕ vacuum excavation

SAMPLES

Dx Disturbed sample, number x Вx Bulk sample, number x

Ux(d) Undisturbed sample, number x, tube diameter d in mm

Water sample, number x Wx

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

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

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 = 40/10In situ shear strength and remoulded shear

strength respectively, as measured by

Geotechnics/ Pilcon Shear Vane

= 50/12 Vane shear strength and remoulded vane

shear strength respectively, corrected to

BS1377

UTP Unable To Penetrate with Shear Vane = 15 Ν

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

IJIJ 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 Slightly weathered SW UW Unweathered

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)



Fill



Silt



Cobbles



Sandstone



Fine igneous



Core loss



Sand



Boulders



Limestone



Coarse ianeous



Organics

Clay



Shells

Gravel



Mudstone

Siltstone



Basalt

Schist



ORGANIC SOILS Von Post Degree of Humification

Н1 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.

Н3 Very slightly decomposed or very slightly muddy peat, when pressed gives marked muddy water, no peat substance passes through the fingers and plant

Η4 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.

Н8 Well decomposed or very muddy peat with very indistinct growth structure. 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



Borehole ID: BH01 調 Beca **Machine Borehole Log** Sheet 1 of 2 Proiect: May Road Development Project Number: 3126366 105-119 May Road, Mount Roskill Site Location: Client: May 1 Limited Vertical Datum: 119 May Road, 70m down drive, west side in Coordinate System: **NZTM** Auckland (1946) Location: grassed area. Ground Level (mRL): 5913474.0 Northing: 50.50 Easting: 1754240.0 Location Method: Auckland Council GIS Drilling In Situ Tests Graphic Log Depth (m) Samples Soil / Rock Description Recover Su (kPa) Method SPT $\widehat{\Xi}$ GWL 귐 0.00-1.50m: no recovery. Vacuum excavation. Logged units observed downhole. 0.00-0.80m: clayey SILT, minor fine sand; light brown; moist, high plasticity. [Fill]. 0.5 50.0 149/16 % \mathbb{R} 0.80-1.50m: clayey SILT, minor fine sand, minor organics; light grey; moist, high plasticity. 49.5 Organics: amorphous. [Holocene Alluvium]. 178/36 49.0 Stiff, clayey SILT, minor organics, trace fine sand; light brownish grey; moist, high plasticity. 97/43 Holocene Alluvium Organics: fibrous 1.80m: firm: dark brown. 48.5 Firm, fibrous PEAT, some clay; black; moist, high plasticity. %00I OB Sile Stiff, fine sandy, SILT, some clay, minor organics; greenish grey; moist, high plasticity. 48.0 Organics: fibrous. Stiff, fine to medium gravelly SILT, some clay, minor fine to coarse sand; dark grey; moist, low UTP 47.5 plasticity. Gravel: sub-rounded, UW basaltic lapilli (Ash) %29 Very stiff, fine to coarse sandy SILT, some clay; dark grey; moist, high plasticity. SPT Stiff, fine to medium gravelly SILT, some clay, minor fine to coarse sand; dark grey; moist, low plasticity. Gravel: sub-rounded, UW basaltic lapilli 3.30-3.45m: no recovery. 47.0 3.5 2 3 Firm, fine to coarse sandy SILT, some clay, trace fine gravel; dark grey; moist, low plasticity. N=7Gravel: sub-rounded, UW basaltic lapilli. %26 8 4.0 46.5 Stiff, fine to medium gravelly SILT, some clay, minor fine to coarse sand; dark grey; wet, low plasticity. Gravel: sub-rounded, UW basaltic lapilli. 3.63m: minor gravel. 3.90m: firm. UTP 4.5 46.0 %29 Stiff, fine to medium gravelly SILT, minor fine to coarse sand, minor clay; dark grey; wet, low 0 SPT plasticity. Gravel: sub-rounded, UW, basaltic lapilli.
Stiff, fibrous PEAT, some silt; black; moist, non-plastic. Organics: fibrous and tree gum. 5.0 45.5 4.50-4.80m: fibrous wood 4.80-4.95m: no recovery. 46/21 Firm, clayey SILT, some fine sand, trace organics; light grey mottled orange; moist, high N=329% 9 plasticity. Organics: amorphous. 5.5 45.0 5.30-6.00m: no recovery. Core bound by wood in barrel. 6.0 44.5 Stiff, clayey SILT, some fine sand; light grey; moist, high plasticity. %29 SPT 0 6.30-6.45m: no recovery.
Stiff, clayey SILT, some fine sand; light grey; moist, high plasticity. Puketoka Formation 6.70m: minor fine sand. %26 OB 43.5 7.25m: some fine sand: brownish grev. 70/32 0 43.0 Firm, fine sandy SILT, some clay, minor organics; light brownish grey; moist, high plasticity. %82 Organics: fibrous and amorphous. SP. 0 0 7.85-7.95m: no recovery. 8.0 42.5 Firm, fine sandy SILT, some clay, minor organics; light brown speckled black; moist, high plasticity. Organics: fibrous and amorphous. N=2 Firm to stiff, clayey SILT, some organics, minor fine sand; brown speckled black; moist, high 100% OB plasticity. Organics: fibrous and amorphous. 8.5 42.0 Stiff, fine sandy SILT, some clay, minor organics; light brown speckled black; moist, high 73/24 0 41.5 9.0 plasticity. Organics: fibrous and amorphous 100% Firm to stiff, clayey SILT, minor organics, minor fine sand; light brown speckled black; moist, SPT 0 high plasticity. Organics: fibrous and amorphous. 0 9.5 41.0 0 %98 N=09.85m: 10mm bed of fine to medium sand. 27/10/2020 Date Started: Date End: 28/10/2020 Comments: Logged By: KT Drilled By: Pro-Dill Auck Ltd Hole terminated at target depth. Groundwater level measured on the morning of the final day of drilling. Vane No: GEO1509 Equipment: **Excavator Mounted Rig** AVF = Auckland Volcanic Field. Vane Type: **FIELD** Method: RC Vane Width: 15 mm Inclination: 90.00 deg SPT No: **CAT 308** Diameter: 85 mm 96.80 % Fluid Type: For Explanation of Symbols and Abbreviations See Key Sheet

Beca		N	Aachine Bor	ehole Log	Borehole ID:	BH01 Sheet 2 of 2
Site Location: 10	lay Road Devel 05-119 May Roa 9 May Road, 70r	ad, Mount Ro			May 1 Limited	Auckland (1946)
	assed area.	,	Northing: Easting:	5913474.0	Ground Level (mRL):	50.50 Auckland Council GIS
wery lod lod log	N Situ Tests (kPa) CAN CAN CAN CAN CAN CAN CAN CA	Depth (m) RL (m)	Graphic Log	Soil / Rock Descrip	otion	Geological Unit
100% 100% 86% OB SPT OB	7/21 0 1 1 1 1 0 0 0 N=2	10.5 - 40.0 - 11.0 - 39.5 - 11.5 - 39.0 - 12.5 - 38.0 - 12.5 - 38.0 - 13.5 - 13.5 - 37.0 - 14.0 - 36.5 - 15.0 - 35.5 - 15.5 - 35.0 - 15.0 - 15	Firm to stiff, clayey high plasticity. Organ 10.15m: some fine s 10.35-10.50m: no res 10.35-10.50m: no res 10.75m: some fine s 10.75m: some fine s 10.75m: some fine s 10.95m: some fine s	covery. inor organics, trace fine sand; light lifetrous and amorphous. sand sand. dium sandy SILT, trace clay; dark g ghly weathered, dark grey, SILTSTO ist, high plasticity.) ghly weathered, dark grey, fine to me, ininor clay; dark grey, moist, low p ghly weathered, dark grey, fine to me, ininor clay dark grey, moist, low pl ghly weathered, dark grey, fine to me, ininor clay dark grey; moist, low pl grey weathered, dark grey; moist, low pl are closely spaced, thin to moderate ecovery. Core slipped from barrel. ecovery. Solid cone SPT. weathered, dark grey, SILTSTONE weathered, dark grey, fine to mediun weathered, dark grey, fine to coarse tone bed. Bed inclined 15°. weathered, dark grey, fine SANDST rallel parting, 15°, planar, smooth, weathered, dark grey, fine SANDST rallel parting, 15°, planar, smooth, weathered, dark grey, fine to mediun weathered, dark grey, fine SANDST rallel parting, 15°, planar, smooth, weathered, dark grey, fine to mediun weathered, dark grey, fine to mediun weathered, dark grey, fine SANDST rallel parting, 15°, planar, smooth, weathered, dark grey, fine to mediun	rey; moist, low plasticity. [Hone (Hard, clayey SILT, so edium SANDSTONE. (Hard, lasticity). INE. (Hard, clayey SILT, so edium SANDSTONE. (Hard asticity). INE. (Hard, clayey SILT, so edium SANDSTONE. (Hard asticity). INE. (Hard, clayey SILT, so edium SANDSTONE. (Hard asticity). INE. (H	Downwe fine d, fine to me fine
		19.5 — 31.0 —				
Logged By: Pane No: Control Vane Type: Pane Width: Control Con	KT D GEO1509 E FIELD M 15 mm Ir CAT 308 D 96.80 % F	Date End: Drilled By: Equipment: Method: notination: Diameter: Fluid Type:	Pro-Dill Auck Ltd Excavator Mounted Rig RC 90.00 deg 85 mm Water	Comments: Hole terminated at target depth Groundwater level measured o AVF = Auckland Volcanic Field.	n the morning of the fina	al day of drilling.

Borehole ID: BH02 調 Beca **Machine Borehole Log** Sheet 1 of 2 Proiect: May Road Development Project Number: 3126366 Site Location: 105-119 May Road, Mount Roskill Client: May 1 Limited 105a May Road, north west corner of Vertical Datum: Coordinate System: **NZTM** Auckland (1946) Location: hardstand. Ground Level (mRL): 5913582.0 Northing: 50.00 Easting: 1754200.0 Location Method: Auckland Council GIS Drilling In Situ Tests Graphic Log Depth (m) Recovery Soil / Rock Description Samples Su (kPa) Method SPT $\widehat{\Xi}$ GWL 귐 0.00-1.50m: no recovery. Vacuum excavation. Logged units observed downhole. 0.00-0.80m: fine to coarse gravelly CLAY, minor fine to coarse sand; light orange; moist, high plasticity. Gravel: sub-angular, SW, basalt. 0.5 49.5 90/29 % \mathbb{R} 0.80-1.50m: clayey SILT, minor fine sand; dark grey; moist, high plasticity. 49.0 70/29 Fibrous PEAT; dark brown; moist, non-plastic. Organics: fibrous wood. 57/29 عاد عاد 1.70-3.00m: no recovery. Corebound. 48.0 13% OB 47.5 47.0 Soft, clayey SILT, minor fine sand, minor organics; brownish grey; moist, high plasticity. Holocene Alluvium %99 SPT Organics: fibrous and amorphous Soft, fibrous PEAT, some silt, minor clay; black; moist, low plasticity. Organics: fibrous wood 0 46.5 and amorphous. 3.5 0 sile 3.25-3.45m: no recovery. O ale ale Soft, fibrous PEAT, some silt, some clay; black; moist, high plasticity. Organics: fibrous and N=1%26 8 46.0 Firm, clayey SILT, trace fine sand, trace organics; dark grey; moist, high plasticity. Organics: amorphous Firm to Stiff, organic SILT, some clay, trace fine sand; dark brown; moist, high plasticity. 97/22 Organics: amorphous 4.5 45.5 100% 4.50-5.00m: undisturbed tube. 5 45.0 Firm, organic SILT, some clay, trace fine sand; dark brown; moist, high plasticity. Organics: 100% SPI 0 0 5.5 44 5 100% OB Soft, fine to medium sandy SILT, minor clay; dark grey; wet, low plasticity. N=0 44.0 AVF (Ash) Stiff, fine to medium sandy clayey SILT, trace fine gravel; dark grey; moist, high plasticity. 100% 0 SP Gravel: sub-angular, UW, basaltic lapilli. 0 6.00m: 50mm bed silty fine to medium GRAVEL, some fine to coarse sand. Firm, fine to medium sandy SILT, minor clay; dark grey; moist, low plasticity 0 43.5 O Firm, fine to coarse sandy SILT, some clay, minor fine gravel; dark grey; moist, low plasticity. Gravel: sub-angular, UW, basaltic lapill. N=0%98 Stiff, fibrous PEAT, some clay, minor silt; dark brown; moist, high plasticity. Organics: fibrous OB 43.0 and amorphous Firm, clayey SILT, some fine sand, minor organics; brown; moist, high plasticity. Organics: 0 42.5 Very stiff, fine to medium sandy SILT, some clay, trace organics; light brownish grey; moist, %29 SP. 0 high plasticity. Organics: amorphous Puketoka Formation 0 7.35-7.50m: no recovery 8.0 42.0 Stiff, fine to medium sandy SILT, some clay, trace organics; light brownish grey; moist, high n plasticity. Organics: amorphous 7.80-7.95m: no recovery. N=0 OB Stiff, fine to medium sandy SILT, some clay, trace organics; light brownish grey; moist, high 8.5 41.5 8 plasticity. Organics: amorphous 49/29 Stiff, clayey SILT, fine sand, trace organics; light grey; moist, high plasticity. Organics: amorphous. 0 9.0 41.0 8.65m: firm. 100% 0 SPT 8.70m: brown. 8.80-9.00m: no recovery. 0 Firm, clayey SILT, minor fine sand, minor organics; brown; moist, high plasticity. Organics: 9.5 40.5 amorphous 71% Very stiff, clayey SILT, some fine sand; light grey; moist, high plasticity. N=39.45m: minor organics. Organics: fibrous. 22/10/2020 Date Started: Date End: 23/10/2020 Logged By: KT Drilled By: Pro-Dill Auck Ltd Hole terminated at target depth. Groundwater level measured on the morning of the final day of drilling. Vane No: GEO1509 Equipment: **Excavator Mounted Rig** AVF = Auckland Volcanic Field. Vane Type: **FIELD** Method: RC Vane Width: 15 mm Inclination: 90.00 deg SPT No: **CAT 308** Diameter: 85 mm 96.80 % Fluid Type: For Explanation of Symbols and Abbreviations See Key Sheet

Borehole ID: BH02 Machine Borehole Log 調Beca Sheet 2 of 2 Proiect: May Road Development Project Number: 3126366 105-119 May Road, Mount Roskill Site Location: Client: May 1 Limited Vertical Datum: 105a May Road, north west corner of Coordinate System: **NZTM** Auckland (1946) Location: hardstand. Ground Level (mRL): 5913582.0 Northing: 50.00 Easting: 1754200.0 Location Method: Auckland Council GIS Drilling In Situ Tests Geological Unit Graphic Log Depth (m) GWL Return Recovery Samples Soil / Rock Description Su (kPa) SPT $\widehat{\Xi}$ Very stiff, fine to medium sandy SILT, some clay, minor organics; greenish grey; moist, high Puketoka Formation OB plasticity. Organics: fibrous 10.20-10.50m: no recovery UTP 10.5 39.5 Very stiff, fine to medium sandy SILT, minor organics, trace fine gravel, trace clay; green; 100% SPT moist, low plasticity. Gravel: sub-rounded, MW, siltstone. Extremely weak, highly weathered, greenish grey, SILTSTONE. (Hard, clayey SILT, trace fine 39.0 100% OB sand; greenish grey; moist, high plasticity). Extremely weak, highly weathered, greenish grey, fine to medium SANDSTONE. (Hard, fine to medium sandy SILT, minor clay; greenish grey; moist, low plasticity). 38.5 Extremely weak, highly weathered, greenish grey, SILTSTONE. (Hard, clayey SILT, trace fine sand; greenish grey; moist, high plasticity.) Extremely weak, moderately weathered, dark grey, fine to medium SANDSTONE. 100% 11.45m: very weak, slightly weathered. 38.0 12.0 11.80m: 50mm siltstone bed. Bed is sub-horizontal. 11.95m: 10mm carbonaceous band. Band is sub-horizontal. 12.30m: 30mm siltstone bed. Bed is sub-horizontal. 37.5 % + 12.50-12.76m: no recovery. Solid cone SPT. 20 28 Very weak, slightly weathered, dark grey, SILTSTONE 22/35 Weak, slightly weathered, light grey, fine to medium SANDSTONE. (Concretion) 13.0 37.0 mm Very weak, slightly weathered, dark grey, fine to medium SANDSTONE Nc=50+ Very weak, slightly weathered, dark grey, SILTSTONE. 13.25m: defect, 60°, planar, smooth, very narrow, clean. 84% 13.5 36.5 Very weak, slightly weathered, dark grey, fine to medium SANDSTONE Very weak, slightly weathered, dark grey SILTSTONE interbedded with fine to medium SANDSTONE. Beds are closely spaced, thin, sub-horizontal East Coast Bays Formation 14.0 36.0 13.80-14.00m: no recovery %0 8 SP 14.00-14.45m: no recovery. Solid cone SPT. 10 14.5 35.5 Very weak, slightly weathered, dark grey, fine to coarse SANDSTONE 10 Very weak, slightly weathered, dark grey, SILTSTONE 15 Extremely weak, slightly weathered, fine to medium SANDSTONE. Core recovered as Nc=44 %06 %29 15.0 35.0 14.72m: 10mm carbonaceous band. Band is sub-horizontal.

Very weak, slightly weathered, dark grey, SILTSTONE interbedded with fine to medium SANDSTONE. Beds are closely spaced, thin, sub-horizontal. 15.5 34.5 Very weak, slightly weathered, dark grey, fine to medium SANDSTONE. -Dα\$¢Ω 36/65 15.21m: 10mm carbonaceous band. Band is sub-horizontal. mm 15.40m: coarse sandstone. Nc=50+ 15.50-15.64m: no recovery. Solid cone SPT 16.0 34.0 Very weak, slightly weathered, dark grey, SILTSTONE interbedded with fine SANDSTONE. Beds are closely spaced, thin, sub-horizontal.

15.89m: defect, 80°, undulating, very narrow, calcite infill.

Very weak, slightly weathered, dark grey, fine SANDSTONE. 100% %00I 33.5 16.35m: 40mm carbonaceous band. Band is sub-horizontal. 16.40m: 50mm carbonaceous band. Band is sub-horizontal Weak to very weak, slightly weathered, grey, coarse SANDSTONE 17.00-17.14m: no recovery. Solid cone SPT. 33.0 -D¢gN □ 38/65 Very weak, slightly weathered, dark grey, coarse SANDSTONE mm Weak to moderately strong, slightly weathered, light grey, coarse SANDSTONE Nc=50+ 32.5 (Concretion) Very weak, slightly weathered, dark grey, fine SANDSTONE 45% 45% Very weak, slightly weathered, dark grey, SILTSTONE Very weak, slightly weathered, dark grey, fine to medium SANDSTONE 18.0 32.0 17.75-18.50m: no recovery. Core slipped from barrel 35 31.5 က် 🗅 18.50-18.60m: no recovery. Solid cone SPT 15/20 18.60 - End of Borehole mm Nc=50-19.0 31.0 19.5 30.5 22/10/2020 Date Started: Date End: 23/10/2020 Comments: Logged By: KT Drilled By: Pro-Dill Auck Ltd Hole terminated at target depth. Groundwater level measured on the morning of the final day of drilling. Vane No: GEO1509 Equipment: **Excavator Mounted Rig** AVF = Auckland Volcanic Field. Vane Type: **FIELD** Method: RC Vane Width: 15 mm Inclination: 90.00 deg SPT No: **CAT 308** Diameter: 85 mm 96.80 % Fluid Type: For Explanation of Symbols and Abbreviations See Key Sheet

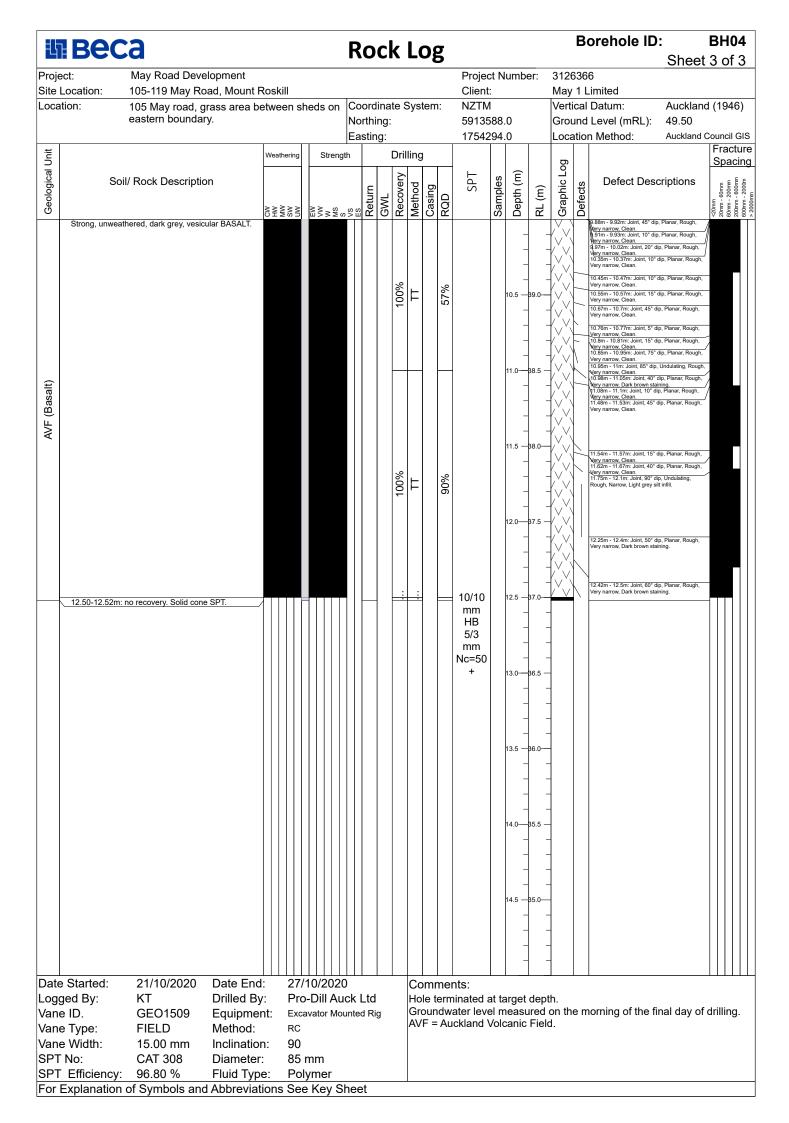
Borehole ID: BH03 調Beca Machine Borehole Log Sheet 1 of 3 Proiect: May Road Development Project Number: 3126366 105-119 May Road, Mount Roskill Site Location: Client: May 1 Limited Vertical Datum: Location: 105a Mary Road, north end of timber storage Coordinate System: **NZTM** Auckland (1946) warehouse. Ground Level (mRL): 5913552.0 Northing: 50.00 Easting: 1754238.0 Location Method: Auckland Council GIS Drilling In Situ Tests **Graphic Log** Depth (m) Soil / Rock Description Samples Recover Su (kPa) SPT Ξ GWL 귐 0.00-1.50m: no recovery. Vacuum excavation. Logged units observed downhole. 0.00-1.10m: fine to coarse GRAVEL some CLAY, minor fine to coarse sand, minor cobbles; reddish brown; moist, non-plastic. Gravel and cobbles: sub-angular, SW, scoria. 0.5 49.5 0.20m: greenish grey. 138/29 % \mathbb{R} 49.0 124/43 1.10-1.50m; clavey SILT, some fine to coarse gravel, minor fine to coarse sand, trace organics; light grey speckled black; moist, high plasticity. Gravel: sub-angular, SW, scoria. .40m: no grave 48.5 97/43 Stiff, clayey SILT, minor fine sand, minor organics: dark brown; moist, high plasticity. Organics: amorphous. 100% 1.60m: no organics; greenish grey. OB 48.0 1.70m: minor organics: dark brown. Organics: fibrous and amorphous. Stiff, fine to medium sandy SILT, minor clay; light brownish grey; moist, low plasticity. Firm, clayey SILT, minor fine sand, minor organics; dark brown; moist, high plasticity, 57/9 sensitive. Organics: fibrous. 47.5 2.40m: 40mm bed of fine to medium SAND. 100% OB 2.50m: soft 35/13 2.60m: firm 47.0 Firm, spongy PEAT, some clay; black; moist, high plasticity. Organics: amorphous and fibrous 100% 3.00-3.50m: undisturbed tube. 3.5 46.5 Firm, spongy PEAT, some clay; black; moist, low plasticity. Organics: amorphous and fibrous Holocene Alluvium %29 0 SP rootlets sile 3/6 3/6 4.0 46.0 100% عاد عاد OB ale N=1 43/16 عاد 0 4.5 45.5 %29 0 SPT sile 0 Soft, organic SILT, some clay; dark brown; moist, low plasticity. Organics: amorphous 0 4.80-4.95m: no recovery. 5.0 45.0 0 Soft, clayey SILT, some organics, trace fine to medium SAND; dark brown mottled light grey; moist, high plasticity. Organics: fibrous and amorphous. 100% N=09 44 5 5.5 19/11 44.0 100% SPT 0 0 43.5 O Stiff, clayey SILT, some fine to medium sand; dark grey; moist, high plasticity. N=081% OB 6.80m: 20mm bed of coarse sand. 43.0 Stiff, fine to medium sandy, SILT, some clay, trace fine gravel; dark grey; moist, high plasticity. Gravel: sub-angular, UW, basaltic lapilli. Medium dense, fine to medium GRAVEL, some silt, some fine to coarse sand; dark grey; 0 42.5 moist, non-plastic. Gravel: angular to sub-angular, UW, basaltic lapilli. %99 SP. Medium dense, fine to coarse sand, some silt, minor fine gravel, trace clay; dark grey; moist, non-plastic. Gravel: sub-angular, UW, basaltic lapilli 0 8.0 42.0 7.30-7.50m: no recovery. Stiff, fine to medium sandy, SILT, some clay, trace fine gravel; dark grey; moist, high plasticity. 0 Gravel: sub-angular, UW, basaltic lapilli N=2 95% OB Medium dense, fine to medium GRAVEL, some silt, some fine to coarse sand; dark grey; 8.5 41.5 moist, non-plastic. Gravel: angular to sub-angular, UW, basaltic lapilli 7.75-7.95m: no recovery Stiff, fine to coarse sandy SILT, some clay, minor fine to medium gravel; dark grey; moist, 0 41.0 9.0 high plasticity. Gravel: sub-angular, UW, basalt. 100% 0 8.15m: 10mm bed of gravel. SPT 0 8.70m: 10mm bed of gravel. Medium dense, silty fine to coarse Gravel, some fine to coarse sand, minor clay; dark grey; 9.5 40.5 0 moist, non plastic. Gravel: sub-angular, UW, basaltic lapilli. %29 8.90m: 50mm some clay; low plasticity N=09.00-9.45m: no recovery. Uphole in SPT 20/10/2020 Date Started: Date End: 21/10/2020 Comments: Logged By: KT Drilled By: Pro-Dill Auck Ltd Hole terminated at target depth. Groundwater level measured on the morning of the final day of drilling. Vane No: GEO1509 Equipment: **Excavator Mounted Rig** AVF = Auckland Volcanic Field. Vane Type: **FIELD** Method: RC Vane Width: 15 mm Inclination: 90.00 deg SPT No: **CAT 308** Diameter: 85 mm 96.80 % Fluid Type: For Explanation of Symbols and Abbreviations See Key Sheet

Borehole ID: BH03 調 Beca **Machine Borehole Log** Sheet 2 of 3 Proiect: May Road Development Project Number: 3126366 105-119 May Road, Mount Roskill Site Location: Client: May 1 Limited Vertical Datum: 105a Mary Road, north end of timber storage Coordinate System: **NZTM** Auckland (1946) Location: Ground Level (mRL): warehouse 5913552.0 Northing: 50.00 Easting: 1754238.0 Location Method: Auckland Council GIS Drilling In Situ Tests Graphic Log Depth (m) Samples Soil / Rock Description Recover Su (kPa) GWL Return SPT $\widehat{\mathbb{E}}$ 귒 Stiff, clayey SILT, minor organics, trace fine sand; brown; moist, high plasticity. Organics: %19 OB 9.65m: some organics; dark brown. UTP 10.5 39.5 9.80m: minor organics 78% 2 Very stiff, clayey SILT, some fine to medium sand, minor organics: light brownish grey; moist, SPT high plasticity. Organics: fibrous. 10.00m: light grey. 10.15-10.50m: no recovery. 39.0 2 Very stiff, clayey SILT, some fine to medium sand, minor organics: light brownish grey; moist, high plasticity. Organics: fibrous 38% OB 38.5 10.85-10.95m: no recovery Puketoka Formation Very stiff, fine to medium sandy, SILT, some clay, minor organics; light grey; moist, high plasticity. Organics: fibrous 11.35-12.00m: no recovery 12.0 38.0 Very stiff, clavey SILT, some fine o medium sand, minor organics; light brownish grey; moist, 44% SP. high plasticity. Organics: fibrous 12.20-12.45m: no recovery. 37.5 Very stiff, clayey SILT, some fine to medium sand, minor organics; light brownish grey speckled white, green, and black; moist, high plasticity. Organics: amorphous. N=4%00I OB 13.0 37.0 103/29 13.5 36.5 100% SP 14.0 36.0 2 Very stiff, fine to medium sandy, SILT, some clay, minor organics: brown speckled black; moist, high plasticity. N=6Very stiff, fine to medium sandy SILT, some clay; greenish grey; moist, high plasticity. (HW 86% 14.5 35.5 SANDSTONE) 14.70m: 30mm bed of clayey SILT (HW SILTSTONE). Bed is sub-horizontal 14.85-15.00m: no recovery. UTP 15.0 35.0 Very stiff, fine to medium sandy SILT, some clay; greenish grey; moist, high plasticity. (HW 100% SPT Extremely weak, highly weathered, dark grey, SILTSTONE. (Hard, clayey SILT, trace fine 15.5 34 5 sand; dark grey; moist, high plasticity). 8 Extremely weak, moderately weathered, dark grey, fine to medium SANDSTONE. (Hard, fine to medium sandy SILT, minor clay; dark grey; moist, low plasticity). 100% OB N=28 15.45m: coarse SANDSTONE. 16.0 34.0 15.70m: fine to medium SANDSTONE East Coast Bays Formation 16.30m: coarse SANDSTONE 33.5 93% 16.50m: fine to medium SANDSTONE 93% 16.55m: defect, 25°, planar, smooth, very narrow, clean. 10 33.0 % SPT 17.00-17.30m: no recovery. Solid cone SPT. 14 20 Very weak, moderately weathered, dark grey, SILTSTONE interbedded with fine to medium 30/70 32.5 SANDSTONE. Beds are closely spaced, thin, sub-horizontal. mm Nc=50+ 88% 17.75m: 10mm carbonaceous bed. Bed inclined 5°. 88% 18.0 32.0 18.05m: 20mm carbonaceous bed. Bed inclined 5° 18.35-18.50m: no recovery 18.5 31.5 18.50-18.89m: no recovery. Solid cone SPT. 12 %0 SPT 15 15 Very weak, slightly weathered, dark grey, SILTSTONE interbedded with fine to medium 19.0 31.0 15 SANDSTONE. Beds are closely spaced, thin, sub-horizontal. 5/15 %89 %89 mm Very weak, slightly weathered, dark grey, fine to medium SANDSTONE. Nc=50+ 19.5 30.5 18.65-20.00m: no recovery. 20/10/2020 Date Started: Date End: 21/10/2020 Comments: Logged By: KT Drilled By: Pro-Dill Auck Ltd Hole terminated at target depth. Groundwater level measured on the morning of the final day of drilling. Vane No: GEO1509 Equipment: **Excavator Mounted Rig** AVF = Auckland Volcanic Field. Vane Type: **FIELD** Method: RC Vane Width: 15 mm Inclination: 90.00 deg SPT No: **CAT 308** Diameter: 85 mm 96.80 % Fluid Type: For Explanation of Symbols and Abbreviations See Key Sheet

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Pro Sit		ct:	atio	on:		May R 105-11					Roskill				Project Number Client:	: 3126366 May 1 Limited	0110010	01 0
-		on:				105a Ma warehou	ary Roa					orage	Coordinate S Northing: Easting:	System:	NZTM 5913552.0 1754238.0	Vertical Datum: Ground Level (mRL): Location Method:	Auckland (50.00 Auckland Cour	·
		Dril	ling			In Situ	Tests				70							_
GWL	Return	Recovery	Method	Casing	RQD	Su (kPa)	SPT	Samples	Depth (m)	RL (m)	Graphic Log				Soil / Rock Desc	ription		Geological Unit
		%0	SPT				8 12		=	-		20.0	0-20.33m: no i	recovery. Sol	lid cone SPT.			
							15 20		20.5 —	29.5 —		20.3	3 - End of Bore	ehole				
							15/30 mm		-									
							Nc=50+		21.0 —	29.0 —								
									=	_								
									21.5 —	28.5 —								
									22.0 —	28.0 —								
									-	-								
									22.5 —	27.5 —								
									23.0 —	27.0 —								
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									29.5 —	20.5 — — —								
Da	te S	 Star	ted	<u> </u>		20/10/	2020		ate Er	1 nd:	21/10	 /2020		Commen	ts:			
Lo	gge	d B	y:			KT		D	rilled I	Ву:	Pro-Dill	Auck L		Hole termi	inated at target dep	th.	and down of draw	inc
		No: Typ				GEO1 FIELD			quipm ethod		Excava RC	itor Mou	inted Rig	AVF = Auc	iter level measured okland Volcanic Fie	on the morning of the firld.	iai day of drill	ıng.
Va	ne \	Wid				15 mm	1	Ir	nclinati	ion:	90.00	_						
SP SP		lo: Effic	cier	icv.		CAT 3 96.80			iamete luid Ty		85 mr Water							
						of Symb							heet	1				

哲	веса			Ro	ocl	k	Lc	og						В	orehole ID: Sheet	BH04
Proje		velopment coad, Mount Roskill							Proj Clie		Numl	er:	312 Max			1 01 0
Loca	•	grass area between sh	eds on	Coor Nortl East	hing:		Syst	em:	NZ 591				Vert Gro	ical und	Datum: Auckland Level (mRL): 49.50	Council GIS
al Unit		Weathering	Streng	jth		Drill	ling		.				Log			Fracture Spacing
Geological Unit	Soil/ Rock Descript	CW WWW SWW	EW W MS W	VS VS ES	GWL	Recovery	Method	Casing	SPT	Samples	Depth (m)	RL (m)	Graphic Log	Defects	Defect Descriptions	<20mm 20mm - 60mm 60mm - 200mm 200mm - 600mm 600mm - 2000m
Hill	0.00-1.50m: no recovery, Vacuum ev Logged units observed downhole. 0.00-1.40m: fine to coarse gravelly (silt, minor fine to coarse sand; orang plasticity. Gravel: sub-angular, SW, t	CLAY, some e; moist, high				%0	VE				0.5 -	49.0-				
	1.40-1.50m: clayey SILT, trace fine s moist, high plasticity. Firm, clayey SILT, minor fine to medi trace fine gravel; light grey mottled chigh plasticity. Gravel: sub-rounded, 1.60-2.00m: no recovery. Strong, unweathered, dark grey, ves.	um sand, range; moist, UW, basalt.			•	20%	08		_		1.5 -	48.0-				
AVF (Basalt)	3.35-3.50m: no recovery. Strong, unweathered, dark grey, ves	icular BASALT.				%06	<u> </u>	%0Z			3.0-	46.5 -			2.2m - 2.25m: Joint, 15" dip, Undulating, Rough, Kery narrow, Dark brown staining. 2.35m: -2.45m: Joint, 75" dip, Pianar, Rough, Very narrow, Dark brown staining. 2.48m - 2.52m: Joint, 15" dip, Pianar, Rough, Narrow, Dark brown staining. Infill 2.54m: -2.55m: Joint, 20" dip, Pianar, Rough, Narrow, Dark brown staining. Joint Joi	
						100%	IPT TT	% Z 0	ents:		4.0	45.0			4.14m - 4.22m: Joint, 50° dip, Undulating, Rough Very narrow, Dark brown staining. 4.56m - 4.62m: Joint, 45° dip, Undulating, Rough Very narrow, Dark brown staining. 4.75m - 4.76m: Joint, 5° dip, Planar, Rough, Very narrow, Dark brown staining. 4.78m - 4.82m: Joint, 15° dip, Planar, Rough, Very depression of the planar of	
Logg Vane Vane Vane SPT SPT	Type: FIELD 15.00 mm	Drilled By: Pro- Equipment: Excar Method: RC Inclination: 90 Diameter: 85 r Fluid Type: Poly	/mer	ick Lt unted f			Hol Gro	e ter und\	minate	evel r	neas	ured	on th	ie m	norning of the final day of	drilling.

Project: May Road Development Project Number: 3126366 Site Location: 105-119 May Road, Mount Roskill Client: May 1 Limited	of 3
Site Location: 105-119 May Road, Mount Roskill Client: May 1 Limited	
Location: 105 May road, grass area between sheds on Coordinate System: NZTM Vertical Datum: Auckland (19	946)
eastern boundary. Northing: 5913588.0 Ground Level (mRL): 49.50 Easting: 1754294.0 Location Method: Auckland Coun	ail OIC
	acture
	acing
Soil/ Rock Description	300mm 2000m
Soil/ Rock Description Solid Rock Description Solid Rock (m) Solid Rock (m)	Jmm - 200mm J0mm - 600mm J0mm - 2000m
5.00-5.05m: no recovery. Solid cone SPT.	5 7 5
Strong, unweathered, dark grey, vesicular BASALT. Strong, unweathered, dark grey, vesicular BASALT.	
5/3	
mm Very narrow, Dark brown staining. Very narrow, Dark brown staining. Very narrow, Dark brown staining. Sough, Narrow, Dark brown staining. Sough, Very narrow, Dark brown staining. Very narrow, Dark brown	
+ 5.5 —44.0 — V Safrow, Dark from staining. V Safrow, Dark from staining. Safrow, Dark from staining.	
800 Spsm - 5.97m: Joint, 5° dip, Undulating, Rough, Very narrow, Clean.	
6.0—43.5—V 6.25m - 6.3m: Joint, 40° dip, Undulating, Rough,	
Very narrow, Cilean.	
6.3m - 6.5m: Joint, 80° dip, Undulating, Rough, Very narrow, Clean.	
6.5 –43.0 — (Am: Joint, 50° dip, Planar, Rough, Very)	
harrow, Light grey sit infill. (5.5m. Joint, 6.5m. Joint, 6.5m, Drint, 6.0dip, Planar, Rough, Very / farrow, Light grist linfill.	
6.86m - 6.93m: Joint, 55° dip, Planar, Rough, Very narrow, Light grey sit infill.	
7.0—42.5—/ Very narrow, Clean.	
100%	
Tom-7.6m: Joint, 50° dip, Planar, Smooth, Very	
T.5 —42.0— 7.5 —42.0— 7.5 —42.0— 7.5 —7.92m: Joint, 15° dip, Planar, Smooth, Very narrow, Ight grey slit Intilli.	
7.88m - 7.92m: Joint, 15° dip, Planar, Smooth, Very narrow, light grey silt Infill.	
7.95m - 7.97m: Joint, 15° dip, Planar, Smooth, Ney narrow, light grey silt infill.	
7.99m - 8m. Joint, 15* dip, Planar, Smooth, Very Arrows (ight grey sit infill.)	
Very narrow, light grey silt infill.	
8.5 -41.0 -	
8,72m - 8,78m: Joint, 60° dip, Planar, Rough. Very narrow, light grey sitt infill. 8,81m - 8,89m: Joint, 60° dip, Planar, Rough.	
8.81m - 8.89m: Joint, 60° dip, Planar, Rough, Very norw, light grey sit infill.	
9.0—40.5 — V Rey narrow, Clean. 9m-9m-1m: Joint, 65° dip, Planar, Rough, Very	
9.15m - 9.18m: Joint, 25° dip, Planar, Rough, Very narrow, Clean.	
9 2m - 9 22m: Joint, 25° dip, Planar, Rough, Very Narrow, Clean. 9 2m - 9 32m: Joint, 45° dip, Planar, Rough, Very Narrow, Clean.	
Very narrow. Dark brown staining. 9.43m. 9.46m. joint, 45° dip, Planar, Rough, Very narrow, Clean.	
9.5 —40.0 — / V Sam - 9.49m: Joint, 45° dip, Planar, Rough, Very narrow, Clean. 9.73m - 9.75m; Joint, 20° dip, Planar, Rough,	
Very narrow, Clean.	
900 975m - 9.85m: Joint, 50° dip, Planar, Rough, Very narrow, Dark brown staining.	
9.8m - 9.9m: Joint, 50° dip, Planar, Rough, Very Narrow, Dark brown staining. 9.8m - 9.9m: Joint, 45° dip, Planar, Rough, Very Narrow, Joint, 45° dip, Planar, Rough,	
Date Started: 21/10/2020 Date End: 27/10/2020 Comments:	
Logged By: KT Drilled By: Pro-Dill Auck Ltd Hole terminated at target depth. Vane ID. GEO1509 Equipment: Excavator Mounted Rig Groundwater level measured on the morning of the final day of drilling.	ina
Vane ID. GEO1509 Equipment: Excavator Mounted Rig Vane Type: FIELD Method: RC GEO4509 Groundwater level measured on the morning of the final day of drilling AVF = Auckland Volcanic Field.	ırıy.
Vane Width: 15.00 mm Inclination: 90	
SPT No: CAT 308 Diameter: 85 mm	
SPT Efficiency: 96.80 % Fluid Type: Polymer For Explanation of Symbols and Abbreviations See Key Sheet	





Appendix C – Machine Borehole Photographs



BOX: 1 Depth: 0.00 m to 4.15 m



BOX: 2 Depth: 4.15 m to 7.95 m





BOX: 3 Depth: 7.95 m to 10.95 m

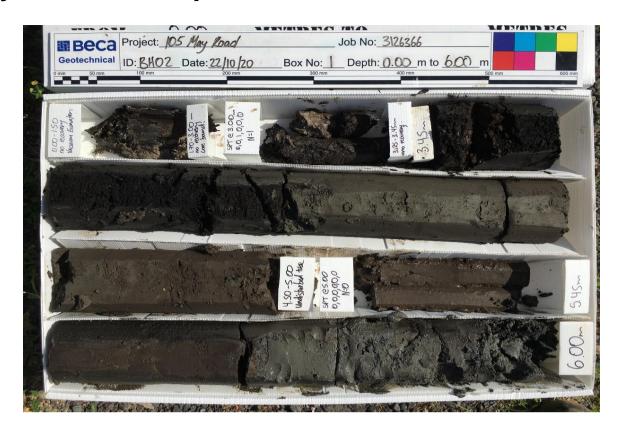


BOX: 4 Depth: 10.95 m to 13.25 m





BOX: 5 Depth: 13.25 m to 17.20 m

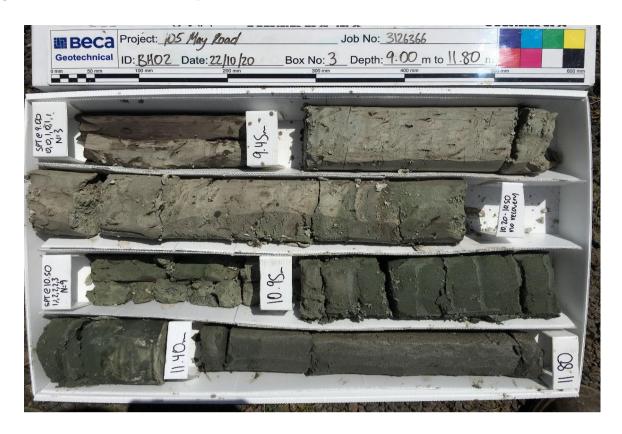


BOX: 1 Depth: 0.00 m to 6.00 m



BOX: 2 Depth: 6.00 m to 9.00 m





BOX: 3 Depth: 9.00 m to 11.80 m



BOX: 4 Depth: 11.80 m to 15.64 m





BOX: 5 Depth: 15.64 m to 18.60 m



BOX: 1 Depth: 0.00 m to 4.50 m



BOX: 2 Depth: 4.50 m to 7.20 m





BOX: 3 Depth: 7.20 m to 10.95 m



BOX: 4 Depth: 10.95 m to 14.35 m



BOX: 5 Depth: 14.35 m to 17.00 m



BOX: 6 Depth: 17.00 m to 20.33 m





BOX: 1 Depth: 0.00 m to 3.50 m



BOX: 2 Depth: 3.50 m to 6.30 m

May Road Development



BOX: 3 Depth: 6.30 m to 9.05 m



BOX: 4 Depth: 9.05 m to 11.55 m



May Road Development



BOX: 5 Depth: 11.55 m to 12.52 m



Appendix D – Laboratory Testing Results

Sheet 1 of 13

21 Pitt Street P O Box 6345 Auckland 1141 Ph. 300-9380

SUN	SUMMARY OF	Š Š	TEST	T RESULTS	Report: 2103L:01	ort: %L:01										
Job N	Job Name : 105 May Road	5 May	Road	Job No: 3126366/100/GA												
Client	Client: May 1 Limited	Limited	Ω.	Date: 13 November 2020												
Test Pit No.	Sample No.	Depth (m)	Sample Type	Sample Description	Nai	Natural	Atterberg Limits	L	Grading (Hydro)	t/m³	Clay Index	Consol	CBR	Organic Content	Perm k m/s	Triaxial CUPP
					WC%	Bulk Density t/m³	SE	72						1100000		
BH01	T1031	4.95- 5.10	SD	Clayey fine to medium sandy SILT; blueish grey; wet; moderately plastic.	52.9		×	×	×							
F	T1032	8.10- 8.25	SD	Silty clayey fine to medium SAND; yellowish grey mottled brown; wet; highly plastic.	51.3		×	×	×							
BH02	T1033	4.50- 5.00	TU	Sandy clayey SILT, trace gravel; brownish grey; wet, highly plastic.	100				×			×				
	T1034	6.45- 6.60	SD	Silty SAND, minor clay, trace fine gravel; blueish grey; wet; moderately plastic.	36.1		×	×	×							7.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0
вн03	T1035	3.00- 3.50	ST	PEAT; dark brownish grey; wet highly plastic.	540							×		×		
	T1036	7.95- 8.15	SD	Silty SAND, minor fine gravel, minor clay; dark brownish grey; wet; moderately plastic.	28.0		×	×	×							
	T1037	10.95 11.10	SD	Clayey silty fine to medium SAND; yellowish grey mottled brown; wet; moderately plastic.	52.4		×	×	×							
ACCREDITED LABORATORY	LABORATORY	ENVIROL REPORT ACCRED THIS RE NOTE: IA	AB GEOTES ED HEREIN I ITATION, WI IPORT MAY N	ENVIROLAB GEOTEST IS ACCREDITED BY INTERNATIONAL ACCREDITATION NEW ZEALAND. ALL TESTS REPORTED HEREIN HAVE BEEN PERFORMED IN ACCORDANCE WITH THE LABORATORY'S SCOPE OF ACCREDITATION, WITH THE EXCEPTION OF TESTS MARKED*, WHICH ARE NOT ACCREDITED. THIS REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL NOTE: IANZ ENDORSEMENT DOES NOT COVER SOIL DESCRIPTIONS.					TEST NZS 44	' STA! 02: 1986;	TEST STANDARDS: NZS 4402: 1986; Test 2.1,2.2,2.3,2.4,2.8.4,3.1.2,7.1	S: .2,2.3,2.4	2.8.4,3.1	.2,7.1		Sheet 1 of 13
		REPORT X = DATA	RELATES OF ATTACHED	REPORT RELATES ONLY TO SAMPLES TESTED; SAMPLING WAS UNDERTAKEN BY OTHERS. X = DATA ATTACHED, UT = UNDISTURBED TUBE SAMPLES, SD = SMALL DISTURBED SAMPLES					АИТНО	RISED S	AUTHORISED SIGNATORY	7	igarkova – A	N.Ágarkova – Authorised Signatory		1
				The state of the s								ľ	31,110	The second of the second		



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

ATTERBERG LIMITS

Job Name: 105 May Road

Date: 13 November 2020

Job No: 3126366/100/GA

Report No: 2103L:01

Client: May 1 Limited

Tested By: N.Agarkova

Sample Type: SD/UT

Checked By: E.Fang

Test Standard: NZS 4402: 1986, Test 2.1,2.2,2.3,2.4

History: As Received

Test Performed On: Sub 425µm

Bore No.	Sample No.	Depth (m)	Sample Description	Water Content (%)	Liquid Limit	Cone Penetration Limit	Plastic Limit	Plasticity Index
BH01	T1031	4.95- 5.10	Clayey fine to medium sandy SILT; blueish grey; wet; moderately plastic.	52.9	28	-	14	14
	T1032	8.10- 8.25	Silty clayey fine to medium SAND; yellowish grey mottled brown; wet; highly plastic.	51.3	55	-	22	33
BH02	T1034	6.45- 6.60	Silty SAND, minor clay, trace fine gravel; blueish grey; wet; moderately plastic.	36.1	33	_	21	12
BH03	T1036	7.95- 8.15	Silty SAND, minor fine gravel, minor clay; dark brownish grey; wet; moderately plastic.	28.0	32	•	22	10
	T1037	10.95- 11.10	Clayey silty fine to medium SAND; yellowish grey mottled brown; wet; moderately plastic.	52.4	23	-	14	9
·······						***************************************		
						7		
								1991941111
								14100.01

Comments:

IANZ

Authorised Signatory:

N. Agarkova - Authorised Signatory

GS-362R-404-F02 Rev. No. 05



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

DETERMINATION OF THE ORGANIC MATTER CONTENT

Job Name: 105 May Road

Date: 13 November 2020

Job No: 3126366/100/GA

Report No: 2103L:01

Client: May 1 Limited

Tested By: N.Agarkova

Sample Type: Undisturbed Tube

Checked By: S.Shah

Test Standard: NZS 4402: 1986, Test 3.1.2

History: Natural

Bore/Test Pit No.	Sample No.	Depth (m)	Sample Description	Organic Matter Content (%)
BH03	T1035	3.00- 3.50	Peat; dark brownish grey; wet highly plastic.	60

Comments:

ACCREDITED LABORATERY

Authorised Signatory:.

N.Agarkova - Authorised Signatory

GS-362R-431-F01 Rev. No. 05

\Meridio\Hubs\New Zealand\Clients\Projects\NZ\362\3620506\2 - Job Planning and Management\Job reporting\2103L-01 Determination of the Organic Matter Content.docm

If Geotest

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

PARTICLE SIZE DISTRIBUTION - WET SIEVE/HYDROMETER METHOD

Job Name: 105 May Road Client: May 1 Ltd Date: 13 November 2020

Job No.: 3126366 Tested By: B.Alves / Checked By: E.Fang

N.Agarkova

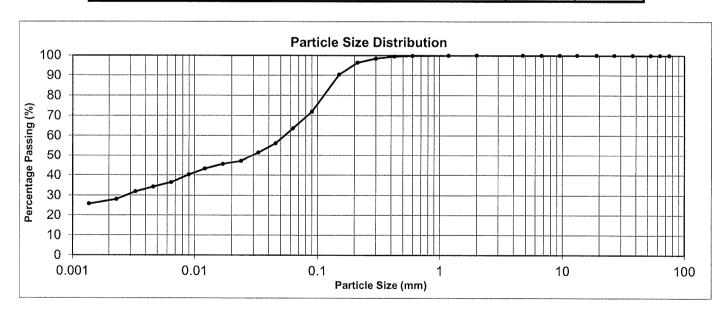
Bore No.: BH01 **Sample No.:** T1031 **Depth (m):** 4.95-5.10

Sample Type: SD History: As Received Report No.: 2103L:01

Sample Description: Clayey fine to medium sandy SILT; blueish grey; wet; moderately plastic.

Test Standard: NZS4402: 1986, Test 2.8.4 Dispersion: Sodium hexametaphosphate, pH = 9

Sieve Size	termined by	Sieve Size		Part. Size	etermined by	Part. Size	
mm	% Passing		% Passing	mm	% Passing	mm	% Passing
75	100	2.0	100	0.045	56	0.0014	26
63	100	1.18	100	0.033	52		
53	100	0.600	100	0.024	47		
37.5	100	0.425	99	0.017	46		
26.5	100	0.300	98	0.012	43		
19	100	0.212	96	0.009	40		
13.2	100	0.150	90	0.006	36	*****	
9.5	100	0.090	72	0.005	34		
6.75	100	0.063	64	0.003	32		
4.75	100			0.002	28	<u></u>	



% Clay	% Silt	% Sand	% Gravel	Max. size:
27	37	36	0	0.425um



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N. Agarkova - Authorised Signatory

据 Geotest

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

PARTICLE SIZE DISTRIBUTION - WET SIEVE/HYDROMETER METHOD

Job Name: 105 May Road

Client: May 1 Ltd

Date: 13 November 2020

Job No.: 3126366

Tested By: B.Alves /

Checked By: E.Fang

JOD NO., 3120300

N.Agarkova

Danth (m) 0 40 0 0

Bore No.: BH01

Sample No.: T1032

Depth (m): 8.10-8.25

Sample Type: SD

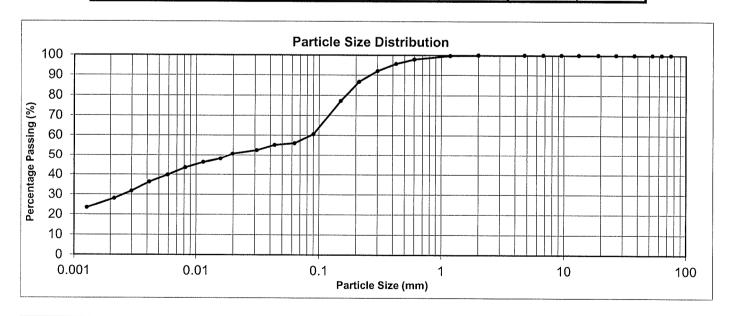
History: As Received

Report No.: 2103L-01

Sample Description: Silty clayey fine to medium SAND; yellowish grey mottled brown; wet; highly plastic.

Test Standard: NZS4402: 1986, Test 2.8.4 **Dispersion:** Sodium hexametaphosphate, pH = 9

	termined by	Sieving		Fraction De	etermined by	/ Hydromete	r
Sieve Size		Sieve Size		Part. Size		Part. Size	· · · · · · · · · · · · · · · · · · ·
mm	% Passing	mm	% Passing	mm	% Passing	mm	% Passing
75	100	2.0	100	0.043	55	0.0013	24
63	100	1.18	100	0.031	53		
53	100	0.600	98	0.020	51		····
37.5	100	0.425	96	0.016	48		***
26.5	100	0.300	92	0.011	46		
19	100	0.212	87	0.008	43	-	
13.2	100	0.150	77	0.006	40		
9.5	100	0.090	61	0.004	36		
6.75	100	0.063	56	0.003	32		
4.75	100			0.002	28		



% Clay	% Silt	% Sand	% Gravel	Max. size:
27	29	44	0	0.600µm



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N, Agarkova - Authorised Signatory

If Geotest

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

PARTICLE SIZE DISTRIBUTION - WET SIEVE/HYDROMETER METHOD

Job Name: 105 May Road Client: May 1 Ltd Date: 13 November 2020

Job No.: 3126366 Tested By: B.Alves / Checked By: E.Fang

N.Agarkova

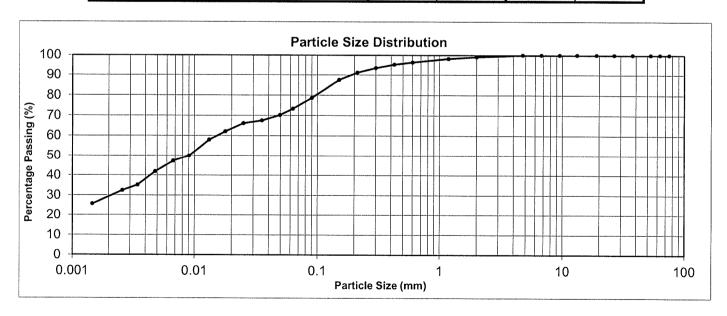
Bore No.: BH02 Sample No.: T1033 Depth (m): 4.50-5.00

Sample Type: UT History: As Natural Report No.: 2103L:01

Sample Description: Sandy clayey SILT, trace gravel; brownish grey; wet, highly plastic.

Test Standard: NZS4402: 1986, Test 2.8.4 **Dispersion:** Sodium hexametaphosphate, pH = 9

	termined by				stermined by	/ Hydromete	·
Sieve Size		Sieve Size		Part. Size		Part. Size	
mm	% Passing	mm	% Passing	mm	% Passing	mm	% Passing
75	100	2.0	99	0.049	70	0.0015	26
63	100	1.18	98	0.035	68		
53	100	0.600	96	0.025	66		*****
37.5	100	0.425	95	0.018	62		
26.5	100	0.300	94	0.013	58		
19	100	0.212	91	0.009	50		
13.2	100	0.150	88	0.007	47		
9.5	100	0.090	79	0.005	42		
6.75	100	0.063	73	0.003	35		
4.75	100			0.003	32		



	% Clay	% Silt	% Sand	% Gravel	Max. size:
1	29	44	26	1	6.75mm



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

PARTICLE SIZE DISTRIBUTION - WET SIEVE/HYDROMETER METHOD

Job Name: 105 May Road

Client: May 1 Ltd

Date: 13 November 2020

Job No.: 3126366

Tested By: B.Alves /

Checked By: E.Fang

000 110.. 0120000

N.Agarkova

Donth (m): 6 45 6 60

Bore No.: BH02

Sample No.: T1034

Depth (m): 6.45-6.60

Sample Type: SD

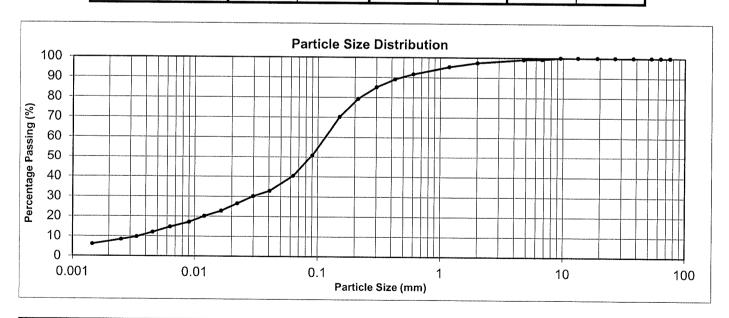
History: As Received

Report No.: 2103L:01

Sample Description: Silty SAND, minor clay, trace fine gravel; blueish grey; wet; moderately plastic.

Test Standard: NZS4402: 1986, Test 2.8.4 **Dispersion:** Sodium hexametaphosphate, pH = 9

	termined by			Fraction De	etermined by	/ Hydromete	r
Sieve Size		Sieve Size		Part. Size		Part. Size	
mm	% Passing	mm	% Passing	mm	% Passing	mm	% Passing
75	100	2.0	97	0.040	33	0.0015	6
63	100	1.18	95	0.030	30		
53	100	0.600	92	0.022	27		
37.5	100	0.425	89	0.016	23		
26.5	100	0.300	85	0.012	20		
19	100	0.212	79	0.009	17		***************************************
13.2	100	0.150	70	0.006	15		
9.5	100	0.090	51	0.005	12		
6.75	99	0.063	40	0.003	10		
4.75	99			0.003	8		



% Clay	% Silt	% Sand	% Gravel	Max. size:
7	33	57	3	6.75mm



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

PARTICLE SIZE DISTRIBUTION - WET SIEVE/HYDROMETER METHOD

Job Name: 105 May Road Client: May 1 Ltd Date: 13 November 2020

Job No.: 3126366 Tested By: B.Alves / Checked By: E.Fang

N.Agarkova

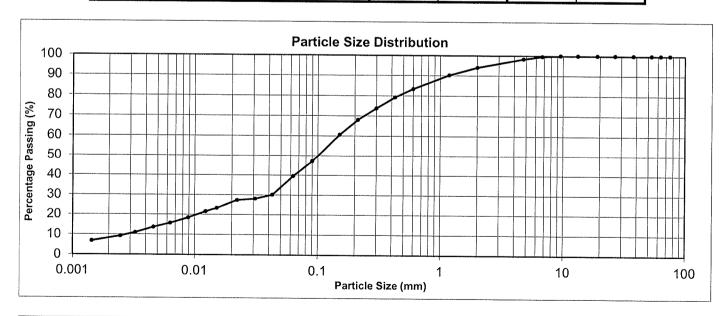
Bore No.: BH03 **Sample No.:** T1036 **Depth (m):** 7.95-8.15

Sample Type: SD History: As Received Report No.: 2103L:01

Sample Description: Silty SAND, minor fine gravel, minor clay; dark brownish grey; wet; moderately plastic.

Test Standard: NZS4402: 1986, Test 2.8.4 **Dispersion:** Sodium hexametaphosphate, pH = 9

	termined by				etermined by	/ Hydromete	r
Sieve Size		Sieve Size		Part. Size		Part. Size	
mm	% Passing	mm	% Passing	mm	% Passing	mm	% Passing
75	100	2.0	94	0.043	30	0.0014	
63	100	1.18	90	0.031	28		
53	100	0.600	83	0.022	27		
37.5	100	0.425	79	0.015	23		
26.5	100	0.300	74	0.012	22		
19	100	0.212	68	0.009	18		
13.2	100	0.150	61	0.006	16		
9.5	100	0.090	47	0.005	14		
6.75	100	0.063	40	0.003	11		
4.75	98			0.002	9		



% Clay	% Silt	% Sand	% Gravel	Max. size:
8	31	54	6	4.75mm



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NAgarkova - Authorised Signatory

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

PARTICLE SIZE DISTRIBUTION - WET SIEVE/HYDROMETER METHOD

Job Name: 105 May Road

Client: May 1 Ltd

Date: 13 November 2020

Job No.: 3126366

Tested By: B.Alves /

Checked By: E.Fang

N.Agarkova

Bore No.: BH03

Sample No.: T1037

Depth (m): 10.95-11.10

Sample Type: SD

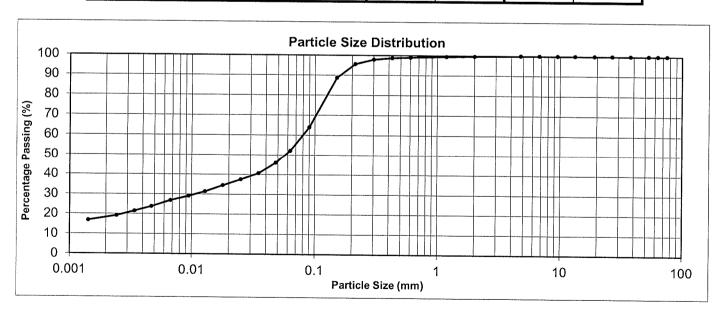
History: As Received

Report No.: 2103L-01

Sample Description: Clayey silty fine to medium SAND; yellowish grey mottled brown; wet, moderately plastic.

Test Standard: NZS4402: 1986, Test 2.8.4 **Dispersion:** Sodium hexametaphosphate. pH = 9

	termined by			Fraction Determined by Hydrometer				
Sieve Size		Sieve Size		Part. Size		Part. Size		
mm	% Passing	mm	% Passing	mm	% Passing	mm	% Passing	
75	100	2.0	100	0.048	46	0.0014	17	
63	100	1.18	99	0.035	41			
53	100	0.600	99	0.025	38			
37.5	100	0.425	99	0.018	34			
26.5	100	0.300	98	0.013	31		*****	
19	100	0.212	96	0.009	29		***************************************	
13.2	100	0.150	89	0.007	27			
9.5	100	0.090	64	0.005	24		*******	
6.75	100	0.063	52	0.003	21			
4.75	100			0.002	19			



0/ 4:				
% Clay	% Silt	% Sand	% Gravel	Max. size:
18	34	Δ7	0	0.600
		- T /		TO BUUUUM I



Authorised Signatory.

M.Agarkova - Authorised Signatory

調 Geotest

21 Pitt Street PO Box 6345 Auckland 1141 Ph:(09) 300 9380 Fax:(09) 300 9292

ONE DIMENSIONAL CONSOLIDATION (OEDOMETER) TEST

Job Name: 105 May Road Client: May 1 Limited Date: 13 November 2020

Job No.: 3126366/100/GA Location: - Depth (m): 4.50-5.00

Bore/Test Pit No.: BH02 Sample No.: T1033 Report No: 2103L:01

Sample Type: Undisturbed Tube History: Natural

Sample Description: Sandy clayey SILT, trace gravel; brownish grey; wet, highly plastic.

Test Standard: NZS 4402:1986,Test 7.1 Tested By: N.Agarkova Checked By: S.Shah

Test Condition: Inundated at 1 minute interval on initial load sequence

Initial Water Content	(%)	99.1	Solid Density (assumed)	(t/m ³)	2.7
Initial Bulk Density	(t/m ³)	1.43	Saturation Ratio (Initial)	Ì	0.97
Initial Dry Density	(t/m³)	0.72	Saturation Ratio (Final)		1.0
Cycle Time (Ave)	(Hrs)	8	Temperature Range	(°C)	20-23
Area of Ring	(mm²)	1963	Initial Void Ratio	(e)	2.76
Height of Ring	(mm)	20.2	Date Tested	6 - 9 November 2020	***************************************

Applied Pressure	(kPa)		40 E	25	Γ Ω	400	000	100	200	000	
Applied Fressure	(KPa)	6	12.5	25	50	100	200	400	800	200	50
Compression	(%)	0.55	0.85	1.3	2.3	4.4	10.0	22.0	33.0	31.6	29.7
Void Ratio	(e)	2.74	2.73	2.72	2.68	2.60	2.39	1.94	1.52	1.57	1.65
	()						2.00	1.0	1.02	1.07	1.00
Coefficient of consolidation		-	11	20	19	11	4.6	1.7	1.5		_
Cv Log	(m²/yr)					' '	7.0	1.7	1.0	_	_
Coefficient of volume compressibi		0.92	0.46	0.33	0.42	0.42	0.59	0.67	0.36	_	_
Mv	(m^2/MN)						2.00	5,0,	0.00		

*Comment:

IANZ ALCREDITED LABORATORY

Authorised Signatory.....

N. Agarkova - Authorised Signatory

GS-362R-462-F01 Rev. No. 10

調 Geotest

21 Pitt Street PO Box 6345 Auckland 1141 Ph:(09) 300 9380 Fax:(09) 300 9292

ONE DIMENSIONAL CONSOLIDATION (OEDOMETER) TEST

Job Name: 105 May Road

Client: May 1 Limited

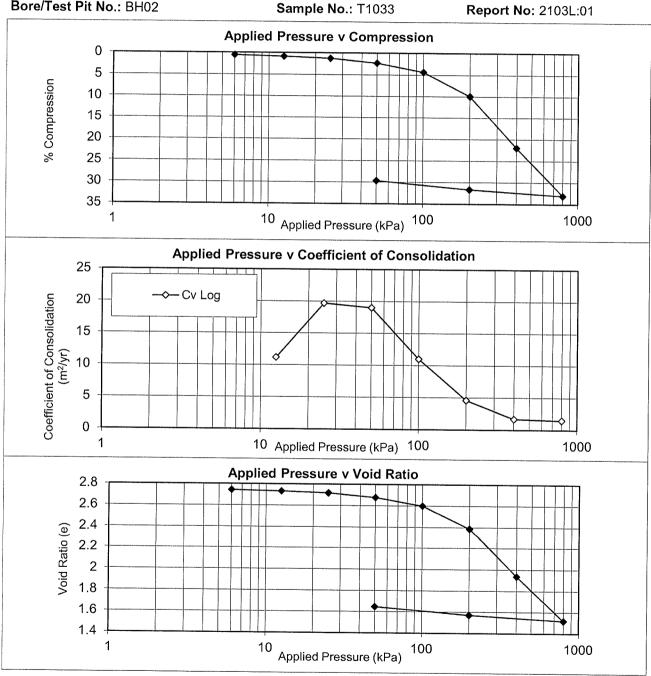
Date: 13 November 2020

Job No.: 3126366/100/GA

Location: -

Depth (m): 4.50-5.00

Bore/Test Pit No.: BH02





GS-362R-462-F01 Rev. No. 10

Authorised Signatory...N. Agerkova ... Authorised Signatory



21 Pitt Street PO Box 6345 Auckland 1141 Ph:(09) 300 9380 Fax:(09) 300 9292

ONE DIMENSIONAL CONSOLIDATION (OEDOMETER) TEST

Job Name: 105 May Road

Client: May 1 Limited

Date: 13 November 2020

Job No.: 3126366/100/GA

Location: -

Depth (m): 3.00-3.50

Bore/Test Pit No.: BH03

Sample No.: T1035

Report No: 2103L:01

Sample Type: Undisturbed Tube

History: Natural

Sample Description: PEAT; dark brownish grey; wet highly plastic.

Test Standard: NZS 4402:1986, Test 7.1

Tested By: N.Agarkova

Checked By: S.Shah

Test Condition: Inundated at 1 minute interval on initial load sequence

Initial Water Content	(%)	540	Solid Density (assumed)	(t/m ³)	1.59
Initial Bulk Density	(t/m ³)	0.91	Saturation Ratio (Initial)		0.84
Initial Dry Density	(t/m ³)	0.14	Saturation Ratio (Final)		1.0
Cycle Time (Ave)	(Hrs)	4	Temperature Range	(°C)	20-23
Area of Ring	(mm²)	1960	Initial Void Ratio	(e)	10.2
Height of Ring	(mm)	19.9	Date Tested	6 - 9 November 2020	

Applied Pressure	(kPa)		10 E	O.F.	50	400	000	400	000		
Applied Fressure	(KFa)	6	12.5	25	50	100	200	400	800	200	50
Compression	(%)	1.92	4.15	8.8	16.3	27.8	40.5	52.1	61.2	59.1	56.6
Void Ratio	(e)	9.98	9.73	9.21	8.37	7.08	5.65	4.36	3.34	3.58	3.86
Coefficient of consolidation		-	-	23	9.3	7.8	4.8	1.4	0.7		
Cv Square root	(m ² /yr)						.,•	, , ,	0.7		
Coefficient of volume compressibili		3.20	3.49	3.88	3.30	2.75	1.76	0.97	0.48	_	
Mv	(m^2/MN)							5.07	5. 10		

*Comment:

Authorised Signatory...

N. Agarkova - Authorised Signatory



21 Pitt Street PO Box 6345 Auckland 1141 Ph:(09) 300 9380 Fax:(09) 300 9292

ONE DIMENSIONAL CONSOLIDATION (OEDOMETER) TEST

Job Name: 105 May Road

Client: May 1 Limited

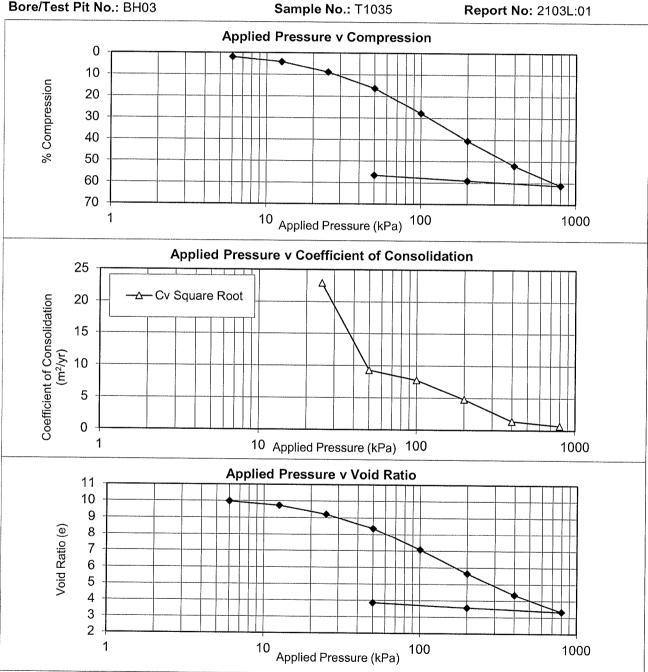
Date: 13 November 2020

Job No.: 3126366/100/GA

Location: -

Depth (m): 3.00-3.50

Bore/Test Pit No.: BH03



GS-362R-462-F01 Rev. No. 10

Authorised Signatory. N. Agarkova.... Authorised Signatory

N. Ke





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

GEOTECHNICS SHEAR VANE CALIBRATION REPORT SHEET

Vane Number: Geo1509 (19mm blade replaced)

	Vane Dimensions							
Measured b	y: S.Shah			Date Measur	ed: 5 February	2020		
Diameter (mm)	Height (mm)	Thickness (mm)	Rod Diameter (mm)	Area Ratio	Vane Size (mm)	Friction	K	
18.98	28.92	1.44	6.30	23.89	19	-	0.01993	
33.16	51.38	1.50	6.33	12.98	33	-	0.10785	

Calibration Authority: The Maeasurement & calibration C Calculated by: S.Shah Calibration Standard: ISO 6789/2003 Calibration Date: 1February 2019 Calibration Authority Rep #: 692 Calibration Interval: 2 Yearly

Checked by: N.Agarkova Date Entered: 5 February 2020 Date Checked: 5 February 2020

Report Number: 712288

The uncertaint	The uncertainty of the shear vane calibration has been determined by The MCC to be:						
Gauge Reading kPa	-						
Expanded uncertainty kPa	±5.1						
Coverage factor	2.0						

	le de State	Vane Shear	Vane Shear	Di LO		Vane Shear	Vane Shear
Dial Gauge	Applied	Strength	Strength	Dial Gauge	Applied	Strength	Strength
Reading	Torque (Nm)	19mm (kPa)	33mm	Reading		19mm (kPa)	33mm
0	0	0	0	50	1.40	70	13
2	0.10	5	1	52	1.45	73	13
4	0.16	8	1	54	1.51	76	14
6	0.21	11	2	56	1.56	78	14
8	0.26	13	2	58	1.61	81	15
10	0.32	16	3	60	1.67	84	15
12	0.37	19	3	62	1.72	86	16
14	0.43	21	4	64	1.78	89	16
16	0.48	24	4	66	1.83	92	17
18	0.53	27	5	68	1.88	95	17
20	0.59	29	5	70	1.94	97	18
22	0.64	32	6	72	1.99	100	18
24	0.70	35	6	74	2.05	103	19
26	0.75	38	7	76	2.10	105	19
28	0.80	40	7	78	2.15	108	20
30	0.86	43	8	80	2.21	111	20
32	0.91	46	8	82	2.26	113	21
34	0.97	48	9	84	2.32	116	21
36	1.02	51	9	86	2.37	119	22
38	1.07	54	10	88	2.42	122	22
40	1.13	57	10	90	2.48	124	23
42	1.18	59	11	92	2.53	127	23
44	1.24	62	11	94	2.59	130	24
46	1.29	65	12	96	2.64	132	24
48	1.34	67	12	98	2.69	135	25

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: Geo1509 (19mm blade replaced)

			Vane I	Dimensions			
Measured by: S.Shah Date Measured: 5 February 2020							
Diameter (mm)	Height (mm)	Thickness (mm)	Rod Diameter (mm)	Area Ratio	Vane Size (mm)	Friction	K
18.98	28.92	1.44	6.30	23.89	19	-	0.01993
33.16	51.38	1.50	6.33	12.98	33	-	0.10785

Calibration Authority: The Maeasurement & calibration C Calculated by: S.Shah Calibration Standard: ISO 6789/2003 Calibration Date: 1February 2019 Calibration Authority Rep #: 692 Calibration Interval: 2 Yearly

Checked by: N.Agarkova Date Entered: 5 February 2020 Date Checked: 5 February 2020 Report Number: 712288

The uncertaint	The uncertainty of the shear vane calibration has been determined by The MCC to be:						
Gauge Reading kPa	-						
Expanded uncertainty kPa	±5.1						
Coverage factor	2.0						

Dial Gauge Reading	Applied Torque (Nm)	Vane Shear Strength 19mm (kPa)	Vane Shear Strength 33mm	Dial Gauge Reading	Applied Torque (Nm)	Vane Shear Strength 19mm (kPa)	Vane Shear Strength 33mm
100	2.75	138	25				
102	2.80	141	26				
104	2.86	143	26				
106	2.91	146	27				
108	2.96	149	27	1			
110	3.02	151	28				
112	3.07	154	28	1			
114	3.13	157	29	1			
116	3.18	160	29	1			
118	3.23	162	30				
120	3.29	165	30				
122	3.34	168	31				
124	3.40	170	31				
126	3.45	173	32				
128	3.50	176	32				
130	3.56	178	33				
132	3.61	181	33				
134	3.67	184	34				
136	3.72	187	34				
138	3.77	189	35				
140	3.83	192	35				

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





Calibrated on: 13th March 2020

	CAT 308 - 10M_3										
		2									
AR: LE:	11.68 cm	l ²									8 t/m³
	LE: 10.5 m EM: 2,109 t/cm² WS: 5,123.0 m/s JC: 0.90 []										
	Max Meas		mnr Str	000						Γ Length	
	Maximum			655						kimum Ve	
	Energy of		CITICITE							kimum Fo	
	Energy Tr		atio - Ra	ited						al Displac	
	Blows per		tatio ita	itou				_	/ I I I I I I I I I I I I I I I I I I I	ai Diopido	CITICITE
BL#	Depth	BLC	CSX	DMX	EFV	ETR	BPM	RAT	VMX	FMX	DFN
	m	bl/m	Мра	mm	J	(%)	bpm		m/s	tn	mm
1	0.0	0	169.2	73	426.41	89.9	1.9	1.4	4.67	20	69
2	0.0	0	175.2	78	478.72	100.9	29.3	1.4	4.43	21	78
3	0.0	0	177.2	60	452.46	95.3	29.3	1.1	4.40	21	60
4	0.0	0	179.3	50	451.62	95.2	29.1	0.8	4.45	21	50
5	0.0	0	183.1	42	450.52	94.9	29.1	0.8	4.42	22	42
6	0.0	0	181.2	33	446.80	94.2	29.0	8.0	4.44	22	33
7	0.0	0	185.1	30	446.73	94.1	28.9	1.1	4.42	22	30
8	0.0	0	183.6	33	455.19	95.9	28.9	1.1	4.44	22	33
9	0.0	0	183.6	30	450.20	94.9	28.9	1.1	4.42	22	30
10	0.0	0	182.3		450.59	95.0	28.8	1.1	4.43	22	26
11	0.0	0	182.7	21	447.54	94.3	28.8	1.1	4.48	22	21
12	0.0	0	187.1	22	449.63	94.8	28.9	1.1	4.53	22	22
13	0.0	0	185.6	21	451.15	95.1	28.8	1.1	4.53	22	21
14	0.0	0	182.2	22	445.66	93.9	28.9	1.1	4.56	22	22
15	0.0	0	184.3	22	460.33	97.0	28.8	1.1	4.60	22	22
16	0.0	0	181.0	21	453.58	95.6	28.8	1.1	4.63	22	21
17	0.0	0	179.9	18	458.34	96.6	28.8	1.1	4.79	21	17
18	0.0	0	181.4	22	461.53	97.3	28.7	1.1	4.87	22	22
19	0.0	0	183.4	19	463.60	97.7	28.8	1.1	5.03	22	19
20 21	0.0 0.0	0 0	181.4 181.1	15 17	469.77 472.23	99.0 99.5	28.8 28.7	1.1 1.1	5.09 5.23	22 22	15 17
22	0.0	0	183.7	17	467.55	99.5 98.5	28.7 28.7	1.1	5.29	22	17
23	0.0	0	184.9	18	472.27	99.5	28.7	1.1	5.29	22	18
24	0.0	0	183.0	17	469.95	99.0	28.6	1.1	5.32	22	17
25	0.0	0	180.4	12	466.36	98.3	28.7	1.1	5.19	21	12
26	0.0	0	186.3	16	475.30	100.2	28.6	1.1	5.40	22	16
27	0.0	Ö	183.2	14	469.43	98.9	28.7	1.1	5.52	22	14
28	0.0	Ö	184.0	16	471.18	99.3	28.6	1.1	5.44	22	16
29	0.0	Ö	184.3	17	471.25	99.3	28.6	1.1	5.54	22	17
30	0.0	Ö	186.4	16	467.63	98.5	28.6	1.1	5.41	22	16
		rerage	182.2	27	459.12	96.8	27.9	1.1	4.84	22	27
		- 3 -				lowe anal			-		

Total number of blows analyzed: 30

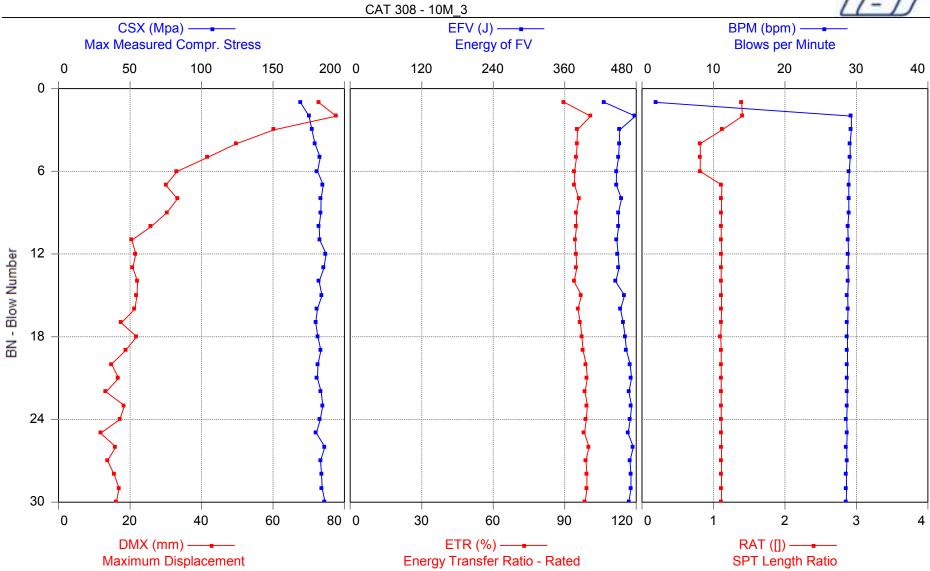
BL# Sensors

1-30 F1: [468BW1] 210.8 (1.00); F2: [468BW2] 210.4 (1.00); A3: [K5608] 300.0 (1.00); A4: [K5724] 320.0 (1.00)

Time Summary

Drive 1 minute 0 second 2:46 p.m. - 2:47 p.m. BN 1 - 30

Printed: 13-March-2020 Test started: 13-March-2020

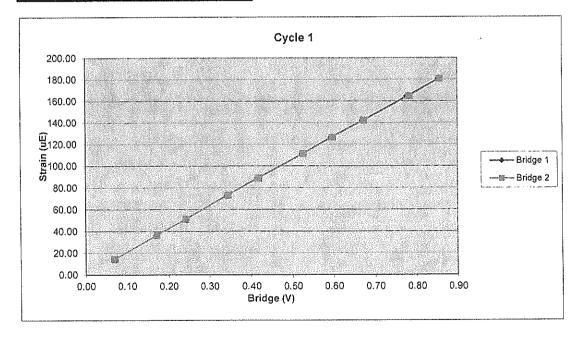




468BW	C	ycle 1		
Sample	Force (lb)	Strain (µE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	782.94	14.25	0.07	0.07
3	1946.02	36.44	0.17	0.17
, 4	2764.49	51.27	0.24	0.24
5	3936.16	73.24	0.34	0.35
6	4754.05	88.74	0.42	0.42
7	6000.50	111.15	0.52	0.53
8	6807.06	126.47	0.59	0.60
9	7671.22	142.02	0.67	0.67
10	8917.48	164.67	0.78	0.78
11	9779.69	180.59	0.85	0.86

Bridge 1		Bridge 2	
Force Calibration (lb/V)	11462.56	Force Calibration (lb/V)	11424.53
Offset	-11.05	Offset	-13.80
Correlation	0.999998	Correlation	0.999998
Strain Calibration (µE/V)	211.61	Strain Calibration (µE/V)	210.90
Offset	0.18	Offset	0.12
Correlation	0.999980	Correlation	0.999979

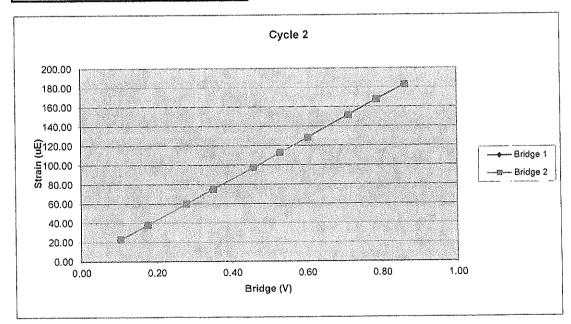
Force Strain Calibration	
EA (Kips)	54167.22
Offset	-20.34
Correlation	0.999979



468BW	Су	cle 2		
Sample	Force (lb)	Strain (µE)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	1183.58	22.91	0.10	0.10
3	1997.95	37,74	0.18	0.18
4	3167.48	59.66	0.28	0.28
5	3990.05	74.82	0.35	0.35
6	5219.91	97.20	0.46	0.46
7	6026.27	112.64	0.53	0.53
8	6879.11	128.25	0.60	0.60
9	8120.29	151.22	0.71	0.71
10	8983.67	167.28	0.79	0.79
11	9849.19	182.73	0.86	0.86

Bridge 1		Bridge 2	
Force Calibration (lb/V)	11433,10	Force Calibration (lb/V)	11420.68
Offset	-9.50	Offset	-13.99
Correlation	0.999997	Correlation	0.999997
Strain Calibration (µE/V)	211.36	Strain Calibration (µE/V)	211.13
Offset	0.82	Offset	0.74
Correlation	0.999989	Correlation	0.999994

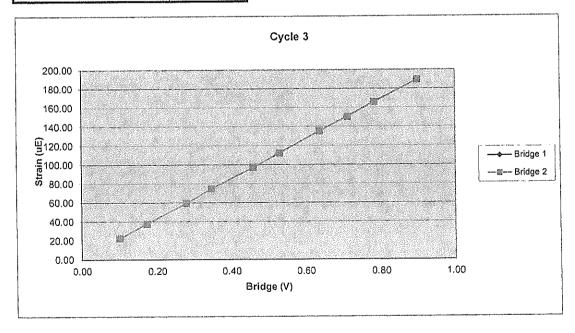
Force Strain Calibration	
EA (Kips)	54092.14
Offset	-53.77
Correlation	0.999993



468BW	Cy	cle 3		
Sample	Force (lb)	Strain (μΕ)	Bridge 1 (V)	Bridge 2 (V)
1	0.00	0.00	0.00	0.00
2	1164.45	22,45	0.10	0.10
3	1968.67	37.63	0.17	0.17
4	3174.51	59.55	0.28	0.28
5	3952.56	74,53	0.35	0.35
6	5203.31	97.35	0.46	0.46
7	6009.09	112.15	0.53	0.53
8	7260.23	135.29	0.64	0.64
9	8112.87	150,35	0.71	0.71
10	8925.09	165.78	0.78	0.78
11	10236,76	189.35	0.90	0.90

Bridge 1		Bridge 2	
Force Calibration (lb/V)	11388.71	Force Calibration (lb/V)	11364.29
Offset	-8.01	Offset	-0.35
Correlation	0.999997	Correlation	0.999998
Strain Calibration (µE/V)	209.54	Strain Calibration (µE/V)	209.09
Offset	1.25	Offset	1.39
Correlation	0.999988	Correlation	0.999990

Force Strain Calibration	
EA (Kips)	54349.04
Offset	-75.61
Correlation	0.999985



Bridge Excitation (V) Shunt Resitor (ohm) 5 60.4k

Calibration Factors	468BW		
Bridge 1 (µE/V)	210.84	Bridge 2 (µE/V)	210.38
EA Factor (Kips)	54202.80	Area (in^2)	1.81

2/27/2019

Pile Dynamics Inc 30725 Aurora Rd Solon, OH 44139

Traceable to N.I.S.T.

Certificate of Calibration

EMP Piletec Pty Ltd Certifies that the

SPT Analyzer

using a PDA calibration box (Serial No.: 1010SA) whose output was calibrated was calibrated on 28th February 2019 Serial Number 4508 TB

This certificate is valid for 2 years from the above date

with test equipment traceable to NIST

AUSTRALIA

EMP Piletec Pty Ltd

Certificate Number: EMP/PDA/08/19

20 Larch Street, Blackburn, Victoria 3130, Australia A Pile Dynamics, Inc. Authorized Representative

Certificate of Calibration

Client:

Pro Drill Ltd

11 Alpito Place, Pukekohe, Auckland, New Zealand

Instrument:

PR Accelerometer

Manufacturer:

Pile Dynamics Inc., USA

Serial No.:

K5724

Calibration method:

In-house Procedure SM/CP/004

Calibration Result:

Calibration Factor: 320 g/V

Calibration Standard Used:

Master accelerometer Serial No. 56587

Traceability NML/4316/E/15

Calibration Date:

28th February 2019



Approved Signatory:

EMP Piletec Pty Ltd

Pile Dynamics, Inc. Authorized Representative

20 Larch Street, Blackburn, Victoria 3130, Australia Tel: 61 3 9893 4286

www.empasia.co

Certificate of Calibration

Client:

Pro Drill Ltd

11 Alpito Place, Pukekohe, Auckland, New Zealand

Instrument:

PR Accelerometer

Manufacturer:

Pile Dynamics Inc., USA

Serial No.:

K5608

Calibration method:

In-house Procedure SM/CP/004

Calibration Result:

Calibration Factor: 300 g/V

Calibration Standard Used:

Master accelerometer Serial No. 56587

Traceability NML/4316/E/15

Calibration Date:

28th February 2019



Approved Signatory:

EMP Piletec Pty Ltd

Pile Dynamics, Inc. Authorized Representative

20 Larch Street, Blackburn, Victoria 3130, Australia Tel: 61 3 9893 4286

www.empasia.co