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Preliminary Geotechnical Investigation to Support Structure Plan and Plan Change Coatesville Riverhead Highway, Riverhead

Rev C

19 September 2023

Job No. 21640



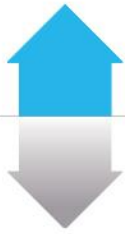
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**PRELIMINARY GEOTECHNICAL INVESTIGATION
TO SUPPORT PLAN CHANGE
Coatesville Riverhead Highway, Riverhead**

Job Number:	21640
Name of Project:	Coatesville Riverhead Highway, Riverhead
Client:	Fletcher Residential Ltd on behalf of Riverhead Landowner Group
Author:	Byron Smith, Senior Engineering Geologist, MEngNZ
Reviewer/Authoriser:	Dave Ouwejan, Principal Geotechnical Engineer, CMEngNZ, CPEng
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Author Signature:	
Reviewer/Authoriser Signature:	

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Geotechnical

Environmental

Stormwater

Hydrogeology

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1.0 Introduction

Soil & Rock Consultants (S&RC) were engaged by Fletcher Residential Ltd on behalf of Riverhead Landowner Group¹ to carry out a preliminary geotechnical investigation at Coatesville Riverhead Highway, Riverhead to support a proposed Structure Plan and Plan Change request.

The extent of the subject site is described in Section 2.0 of this report. Parts of the site have been previously investigated by others, as outlined in Section 4.0 of this report. The scope of our engagement was to:

- Drill 22 hand augerholes to a target depth of 3.0m in areas not previously investigated.
- Review available geotechnical data including:
 - Existing site data provided by Fletcher Residential Ltd (FRL)
 - Geotechnical investigation and completion reports for nearby subdivisions
 - Information from the New Zealand Geotechnical Database
- Prepare a Preliminary Geotechnical Investigation Report to support a Plan Change application for the entire subject site.

1.1 Limitations

This report has been prepared by S&RC for the sole benefit of Fletcher Residential Ltd on behalf of Riverhead Landowner Group (the client) with respect to the site described below and the scope described above. The data and/or opinions contained in this report may not be used in other contexts, for any other purpose or by any other party without our prior review and agreement. This report may only be read or transmitted in its entirety, including the appendices.

The recommendations given in this report are based on data obtained from discrete locations and soil conditions between locations are inferred only. A proportion of the data relied on has been prepared by other consultants, and S&RC take no responsibility for the accuracy of that data.

2.0 Site Description

The subject site comprises the properties listed in Table 1 and outlined (in purple) in Figure 1.

¹ The Riverhead Landowner Group includes Fletcher Residential Ltd, Matvin Group and The Neil Group.

Table 1 – Summary of Subject Site

Address	Legal Description	Area (Ha) (Rounded to 1 DP)	Investigated by
22 Duke St	Lot 20 DP 499876	6.3	S&RC
30 Cambridge Rd	Lot 1 DP 499822	4.9	S&RC
307 Riverhead Rd	Lot 2 DP 109763	6.8	CMW
1092 CRH	Lot 2 DP 164590	4.2	CMW
Lot 1 DP 164590, CRH	Lot 1 DP 164590	5.8	CMW
325 Riverhead Rd	Lot 1 DP 109763	6.2	CMW
306 Riverhead Rd	Lot 1 DP 109763	1.0	CMW
Lot 2 DP 164978, Lathrope Rd	Lot 2 DP 164978	8.4	CMW
328 Riverhead Rd	Pt Lot 2 DP 37432	7.0	CMW
51 Lathrope Rd	Lot 1 DP 64605	4.0	S&RC
340 Riverhead Rd	Pt Lot 2 DP 4818	6.0	S&RC
Lot 2 DP 64605, Lathrope Rd	Lot 2 DP 64605	4.0	
1140 CRH	Lot 1 DP 61985	2.4	S&RC
1156 CRH	Lot 1 DP 77992	0.8	S&RC
1158 CRH	Lot 2 DP 77992	0.8	S&RC
1170 CRH	Lot 3 DP 63577	1.6	S&RC
1186 CRH	Lot 2 DP 63577	4.3	S&RC
1194 CRH	Lot 1 DP 113506	5.4	S&RC
1200 CRH	Lot 1 DP 66488	0.4	S&RC

CRH = Coatesville Riverhead Highway

The site is generally near-level, with moderate slopes in some locations (generally on the edge of erosional gully features such as the southern side of 1194 CRH and the western side of 22 Duke St. Current land use generally comprises horticulture with some agriculture (grazing). Various residential and commercial (horticulture-related) buildings are present across the site. Large shelterbelts are present within the site.

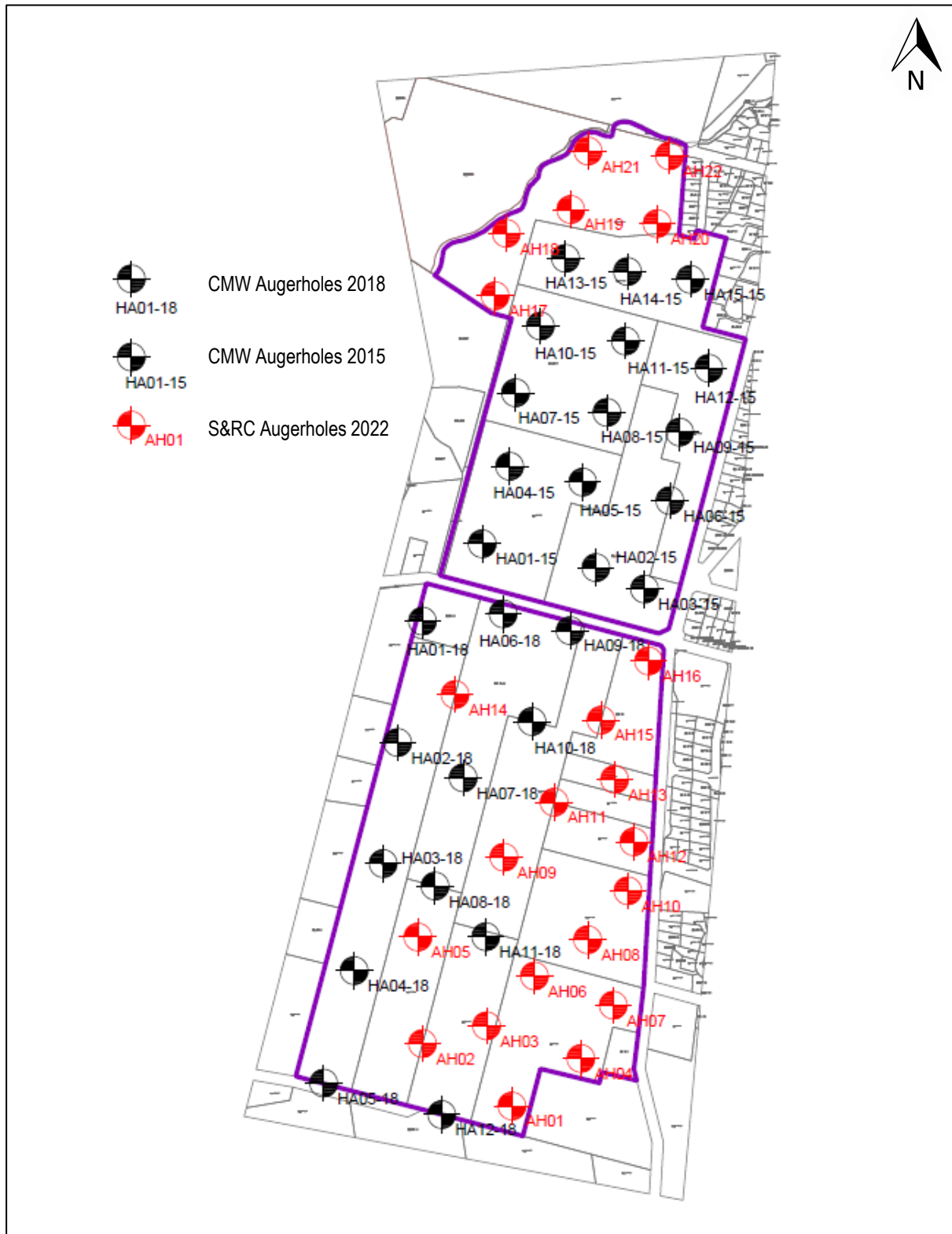


Figure 1: Site Extent and Augerhole Locations

2.1 Proposed Development

We understand that it is proposed to submit a plan change application to change the current site zoning (Future Urban) to a mixture of commercial and residential zones. The bulk of the 22 Duke Street property is proposed to be changed to Mixed Rural.

3.0 Geology

Reference to the GNS New Zealand Geological Web Map 1:250,000 Geology map, indicates the site is underlain by Puketoka Formation alluvial soils of the Tauranga Group (See Figure 2).

Alluvial soils are often susceptible to consolidation (resulting in settlement) when subjected to foundation or fill loads, particularly where organic soils are present. In addition, these soils shrink and swell with soil moisture content changes and can be sensitive, often rapidly losing strength in response to disturbance by construction plant and/or exposure to the elements.

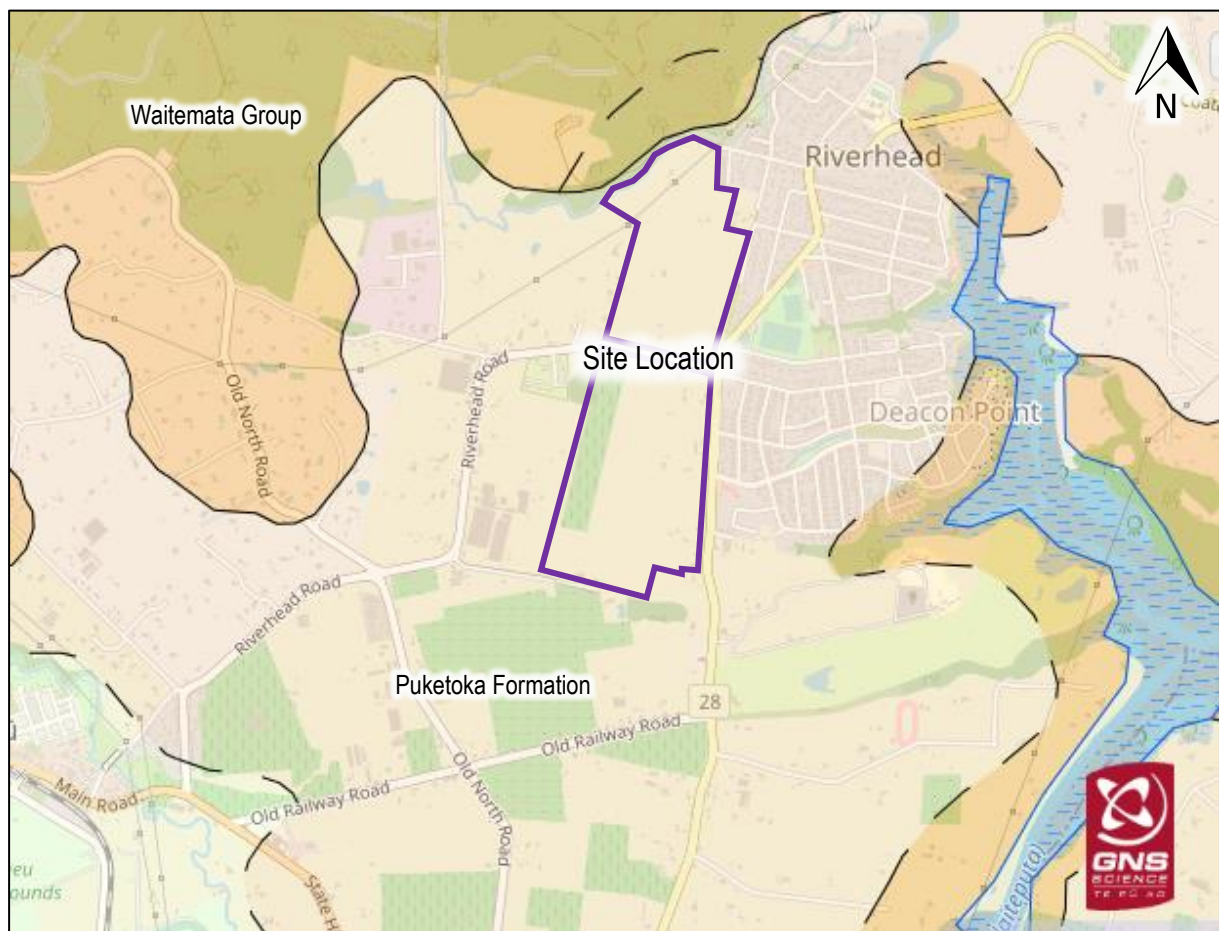


Figure 2: Geological Map (Source: GNS WebMaps Website)

4.0 Past Investigations

FRL has provided copies of the following past geotechnical reporting carried out within the subject site:

1. CMW Geosciences '*Preliminary Geotechnical Assessment Report for 307 & 325 Riverhead Road, 1092 Coatesville Riverhead Highway and 28 & 30 Cambridge Road, Riverhead*' dated 4 December 2015, Ref. AKL2016_0280AB Rev 0.
2. CMW Geosciences '*Preliminary Geotechnical Investigation for Pook Block Residential Development, Riverhead*' dated 15 October 2018, Ref AKL2018-0160AB Rev 0.

The above investigations comprised the drilling of 27 hand augerholes as summarised in Tables 2 and 3 below. The augerhole logs and location plans are attached as Appendix C.

Table 2: CMW 2015 Investigation Data

Test ID	Termination Depth	Depth to the base of Topsoil	Vane Shear Strength Range (kPa)	Groundwater Depth
All depths measured in (m) below present ground level. (Rounded to 1 DP)				
HA01-15	4.0	0.3	77 – 153	2.1
HA02-15	4.0	1.9	30 – 164	1.0
HA03-15	4.0	0.2	<10 – 191+	1.0
HA04-15	4.0	0.2	60 – UTP	2.0
HA05-15	4.0	0.2	77 – 191+	2.0
HA06-15	4.0	0.9	55 – 150	2.2
HA07-15	2.4	0.7	34 – UTP	1.0
HA08-15	4.0	0.2	44 – 123	2.0
HA09-15	4.0	0.2	74 – 161	2.0
HA10-15	2.6	0.2	52 – UTP	1.6
HA11-15	1.7	0.2	30 – UTP	1.1
HA12-15	4.0	0.8	68 – 98	1.0
HA13-15	3.1	0.2	107 – UTP	2.0
HA14-15	4.0	0.2	85 – UTP	3.3
HA15-15	2.6	0.2	71 – UTP	2.3

UTP = Unable to Penetrate

Table 3: CMW 2018 Investigation Data

Test ID	Termination Depth	Depth to the base of Topsoil/Fill	Vane Shear Strength Range (kPa)	Groundwater Depth
All depths measured in (m) below present ground level. (Rounded to 1 DP)				
HA01-18	5.0	0.3	58 – UTP	2.5
HA02-18	5.0	0.3	85 – 197+	2.0
HA03-18	5.0	0.6	58 – UTP	1.5
HA04-18	5.0	0.3	44 – 160	2.0
HA05-18	5.0	0.6	44 – 145	1.5
HA06-18	5.0	0.4	73 – UTP	0.8
HA07-18	5.0	0.4	73 – 183	0.8
HA08-18	5.0	0.3	78 – 186	1.9
HA09-18	5.0	1.1	70 – UTP	0.9
HA10-18	3.3	0.3	99 – UTP	1.8
HA11-18	5.0	0.4	87 – UTP	2.8
HA12-18	5.0	1.0	73 – 116	1.9

UTP = Unable to Penetrate

Reference has also been made to geotechnical reporting for a subdivision to the east of the subject site as follows:

1. Coffey Geotechnics (NZ) Ltd '*Geotechnical Investigation Report for a Residential Subdivision at 1135, 1147 and 1161 Coatesville Riverhead Highway, Riverhead*' Ref. GENZAUCK15395, dated 22 May 2012.
2. Coffey Geotechnics (NZ) Ltd '*Residential Subdivision Stage J3 at 1161 Coatesville-Riverhead Highway, Riverhead, Geotechnical Completion Report*', Ref. GENZAUK15847AB, dated 10 November 2015.

Review of the New Zealand Geotechnical database provided a number of water-bore drillers logs from bores either within, or close to the subject site. Relevant information is discussed in Section 6.0 of this report.

5.0 Soil & Rock Consultants Investigation

Our field investigation carried out on 10 & 17 January, 28 February, 01 March and 04 April 2022, comprised the following components:

- Visual appraisal of the site
- Drilling of 19 hand augerholes (AH01 to AH22, excluding AH03, AH12 & AH14) – Appendix B

Augerhole AH03, AH12 and AH14 were not drilled due to access issues or site constraints. Numerous attempts were made at drilling AH18 as detailed on the attached logs.

The test locations are shown on the attached Site Plans, Drawing Nos 21640/1 to 21640/4 inclusive (Appendix A). The locations were determined from hand-held GPS.

Measurements of undrained shear strength were undertaken in the augerholes at intervals of depth using a handheld shear vane in accordance with the New Zealand Geotechnical Society Guidelines for Handheld Shear Vane Tests, dated August 2001. Peak and remoulded vane shear strengths shown on the attached augerhole logs represent dial readings off the shear vane adjusted using the BS 1377 calibration correction factor.

A visual-tactile field classification of the soils encountered during drilling was carried out in accordance with “Guidelines for the Field Classification and Description of Soil and Rock for Engineering Purposes”, issued by the New Zealand Geotechnical Society Inc. (2005).

The findings of our investigation are summarised in Table 4.

Table 4 – Summary of Subsurface Conditions

Test ID	Termination Depth	Depth to the base of Topsoil/Fill	Vane Shear Strength Range (kPa)	Groundwater Depth	Weaker layers, Organic Clay and/or Peat
All depths measured in (m) below present ground level. (Rounded to 1 DP)					
AH01	3.0	0.4	35 – 151	NE	NE
AH02	3.0	1.7	0 – 61	NE	0.0 – 3.0+
AH04	3.0	0.2	60 – 133	2.4	2.1 – 2.4
AH05	3.0	0.4	51 – 121	2.9	2.0 – 3.0+
AH06	3.0	0.3	23 – 112	2.8	1.8 – 3.0+
AH07	3.0	0.3	74 – 88	NE	2.0 – 2.2

Test ID	Termination Depth	Depth to the base of Topsoil/Fill	Vane Shear Strength Range (kPa)	Groundwater Depth	Weaker layers, Organic Clay and/or Peat
All depths measured in (m) below present ground level. (Rounded to 1 DP)					
AH08	3.0	0.4	37 – 123	2.4	1.9 – 3.0+
AH09	3.0	NE	26 – 121	2.0	2.0 – 3.0+
AH10	3.0	0.6	60 – 200+UTP	2.8	2.1 – 3.0+
AH11	4.0	NE	5 – 85	2.2	1.0 – 2.9
AH13	3.0	0.4	37 – 159	2.8	1.5 – 2.0
AH15	3.0	NE	85 – 156	NE	NE
AH16	3.0	0.1	66 – 200+UTP	NE	NE
AH17*	0.2	0.2+	N/A	N/A	N/A
AH18A*	0.6	0.6+	200+UTP*	N/A	N/A
AH18B*	0.5	0.5+	N/A	N/A	N/A
AH18C*	0.1	0.1+	N/A	N/A	N/A
AH18D*	0.2	0.2+	N/A	N/A	N/A
AH18E*	0.2	0.2+	N/A	N/A	N/A
AH19	1.7	0.3	52 – 200+UTP	1.4	NE
AH20	1.5	0.2	81 – 116	NE	NE
AH21	3.0	0.2	41 – 188	2.6	2.3 – 3.0+
AH22	2.3	0.3	87 – 200+UTP	1.6	NE

N/A = Not Applicable, NE = Not Encountered, NT = Not Tested, * = Unable to reach target depth due to gravelly fill

6.0 Subsurface Conditions

The subsurface conditions described below are based on our review of geotechnical data both within and near the subject site.

Topsoil was encountered across the site from the ground surface and *generally* ranged in thickness between 0.2m and 0.4m. The maximum depth of topsoil encountered was 1.9m (CMW HA02-15).

Fill was present within parts of the site ranging in depth between 0.3m and 1.7m below present ground level (bpgl). At a number of locations within the property at 22 Duke St, the fill could not be penetrated using hand equipment and therefore the fill thickness was not ascertained. Review of historic aerial photographs in this area shows evidence of past tipping.

The topsoil and fill (where encountered) were underlain by alluvial deposits of the Puketoka Formation. The alluvial soils generally comprised firm to very stiff silt with varying clay and sand proportions. Layers of peat and organic soils were encountered, generally below a depth of 2.0m, but shallower in some places.

A number of augerholes undertaken by CMW during their 2015 investigation logged weathered soils of the Waitemata Group underlying the alluvial soils and from the ground surface at some locations. Based on comparison of the soil descriptions between those logs and other logs around the site (both CMW and S&RC) we consider it more likely that the surface soils are alluvial in origin and form part of the Puketoka Formation, however Waitemata Group soils are likely to underlie the alluvial soils at shallow depth at the northern end of the site.

Dense sand was encountered in parts of the northern end of the site at depths of approximately 1.0m to 1.5m bpgl. In some cases the sand was too dense to penetrate using handheld equipment. A drillers log from a water bore drilled in the northern part of the site in 1988 shows a layer of sand from 2.0m to 3.0m, underlain by sandstone (inferred to be Waitemata Group rock).

Other water bore logs in or near the site, but further to the south, show the depth to sandstone ranging between approximately 9m and 33m - generally becoming deeper to the south.

7.0 Geotechnical Discussion

The subsurface conditions across the site (logged by CMW and S&RC) appear consistent with those reported to the west where residential subdivisions have been successfully completed. The results of our research and investigation suggest that the site is generally suitable for future urban development, subject to detailed geotechnical investigation at Resource Consent stage to address the constraints identified below.

7.1 Topsoil

The topsoil thickness across the site is variable with isolated deep areas, but generally between 0.2m and 0.4m across the majority of the site. Topsoil is an unsuitable subgrade to support foundations and will require stripping during subdivision bulk earthworks.

7.2 Fill

Our site observations and testing (and past reporting for parts of the site we were not able to access) show that there are a number of locations where past filling has been carried out. Key areas include the

properties at Lot 1 DP 164590, Coatesville-Riverhead Highway, 30 Cambridge Rd and 22 Duke Street, however fill is likely to be present in isolated areas across the site. Any fill material will require removal during subdivision earthworks. Some may be suitable for re-use.

7.3 Organic Soils

Organic silts and peat layers were encountered across the southern portion of the site, generally below a depth of 2.0m, although as shallow as 0.6m at one location (CMW HA05-18). Less organic material was encountered in the northern half of the site and was generally described as organic stained silts as opposed to the peat that was often encountered further south.

Organic soils are a significant geotechnical constraint due to their low strength and high compressibility. Where a thickness of around 2.0m of non-organic soil is present above organic material it is likely that lightweight residential buildings on stiffened raft-type foundations will be feasible, however reduced design bearing capacities (when compared to the 'good ground' values provided in NZS3604) may be required.

Where lesser thicknesses of non-organic material are present, remedial works may be required during bulk earthworks to improve the subgrade. These may comprise use of geogrid and/or geotextile stiffened rafts of engineered fill to spread building platform and roading loads. Similarly, earthworks will require careful design to ensure the thickness of non-organic materials at the ground surface is not reduced.

7.4 Groundwater

Groundwater measurements taken during the various investigations ranged between 0.8m and 3.3m below ground level. The investigations were carried out across summer, winter and autumn months. High groundwater levels were measured in both summer and winter. It is likely that civil works (drainage etc) and possibly bulk earthworks will encounter groundwater which will require special consideration at the time of construction.

Detailed investigation of groundwater levels is recommended prior to development.

7.5 Sensitive Soils

Shear strengths measured in the augerholes show that the soils generally range between 'moderately sensitive' and 'extra sensitive'. These soils are potentially susceptible to mechanical disturbance and/or exposure to the elements and soils that test well in-situ can perform poorly when construction is underway. Care is therefore required during construction to ensure the soils are protected to ensure favourable short and long-term subgrade and foundation performance.

Practical means of protecting the soils include avoidance of vibration-based compaction equipment, protecting the subgrade following initial site clearance, minimising the passage of heavy or vibrating construction plant, and extra care during earthworks.

7.6 Expansivity

Previous testing in the area by S&RC and others, combined with our understanding of the expansivity characteristics of Puketoka Formation soils, suggest that the expansivity class across the majority of the site is likely to be H (highly expansive) to E (extremely expansive). Site specific testing should be undertaken following bulk earthworks.

7.7 Slope Stability

We consider the areas of the site that are generally near level to gently sloping to have a low risk of global slope instability. The areas of moderately sloping land will require specific assessment for global land stability during detailed geotechnical investigations. We consider that prudent engineering and construction to good practice will mitigate the effects of global instability in these areas, and they do not propose an impediment to the proposed land rezoning.

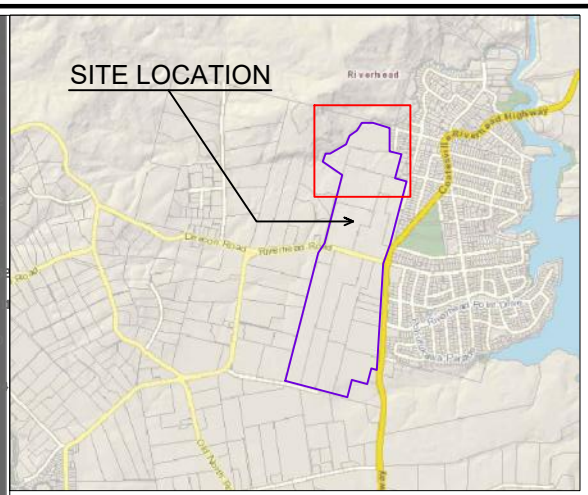
8.0 Further Investigation

Detailed geotechnical investigation must be carried out to inform the design of any future urban development and address the constraints discussed above. Such investigation will require machine drilling and CPT testing to provide sufficient data for analysis of settlement risk, combined with additional hand augerholes to improve data resolution.

End of Report Text – Appendices Follow

Appendix A

Test Location Plans









LOCATION MAP

NOTES:

1. Locations of features approximate only.
2. Location of all buried services to be verified prior to construction.
3. Original sheet size A3.
4. Boundary information on this Site plan adapted from Auckland Council Aerial Photographs and/or GIS Data.

KEY:

-  Site Boundary
-  S&RC Augerhole Locations
AH01
-  CMW 2015 Augerhole Locations
HA01-15
-  CMW 2018 Augerhole Locations
HA01-18
-  S&RC Proposed Composite Contamination Sample Locations
S03-2
-  S&RC Proposed Individual Contamination Sample Locations
S32

AMENDMENTS		
DATE	REV	DESCRIPTION

Check all dimensions and levels on site before commencing construction.
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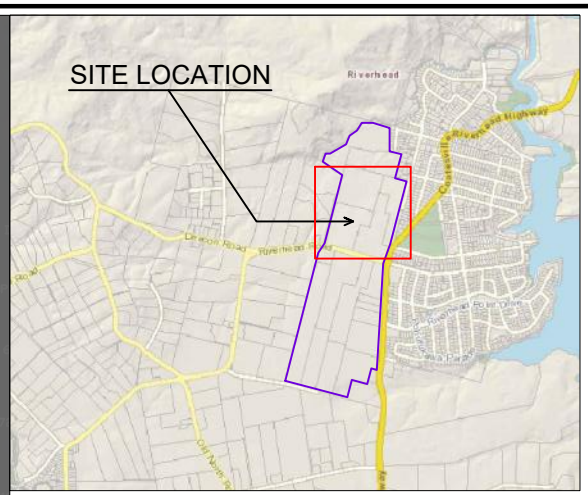


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SITE PLAN (1/4)

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
SITE LOCATION

LOCATION MAP

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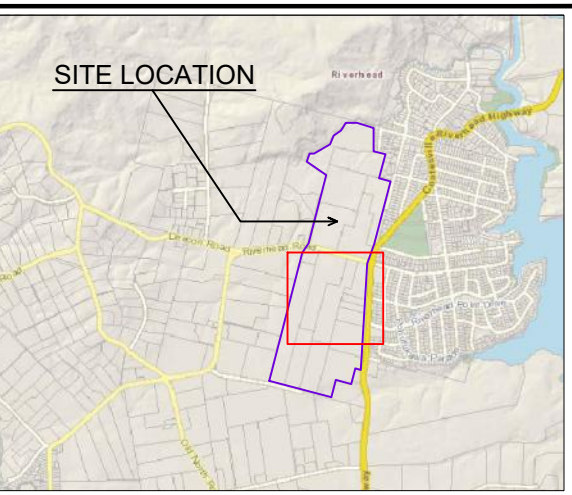


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SITE PLAN (2/4)

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Filename: 21640 - master plan gir rev a.dwg		



LOCATION MAP

- NOTES:
1. Locations of features approximate only.
 2. Location of all buried services to be verified prior to construction.
 3. Original sheet size A3.
 4. Boundary information on this Site plan adapted from Auckland Council Aerial Photographs and/or GIS Data.

- KEY:
- Site Boundary
 - S&RC Augerhole Locations
 - CMW 2015 Augerhole Locations
 - CMW 2018 Augerhole Locations
 - S&RC Proposed Composite Contamination Sample Locations
 - S&RC Proposed Individual Contamination Sample Locations

AMENDMENTS		
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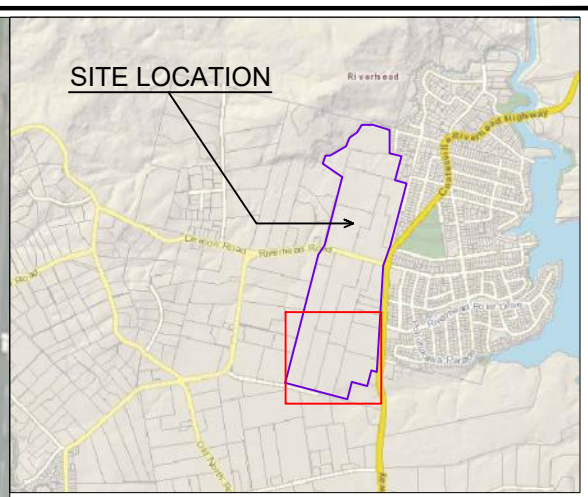
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SITE PLAN (3/4)

21640 / 3	DRAWN: M.Chan	DATE: 6-May-22
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	DESIGNED:	

Filename: 21640 - master plan gir rev a.dwg



LOCATION MAP

- NOTES:
1. Locations of features approximate only.
 2. Location of all buried services to be verified prior to construction.
 3. Original sheet size A3.
 4. Boundary information on this Site plan adapted from Auckland Council Aerial Photographs and/or GIS Data.

- KEY:
- Site Boundary
 - AH01 S&RC Augerhole Locations
 - HA01-15 CMW 2015 Augerhole Locations
 - HA01-18 CMW 2018 Augerhole Locations
 - S03-2 S&RC Proposed Composite Contamination Sample Locations
 - S32 S&RC Proposed Individual Contamination Sample Locations

AMENDMENTS		
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SITE PLAN (4/4)

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	DESIGNED:	
Filename: 21640 - master plan gir rev a.dwg		

Appendix B

S&RC Investigation Logs

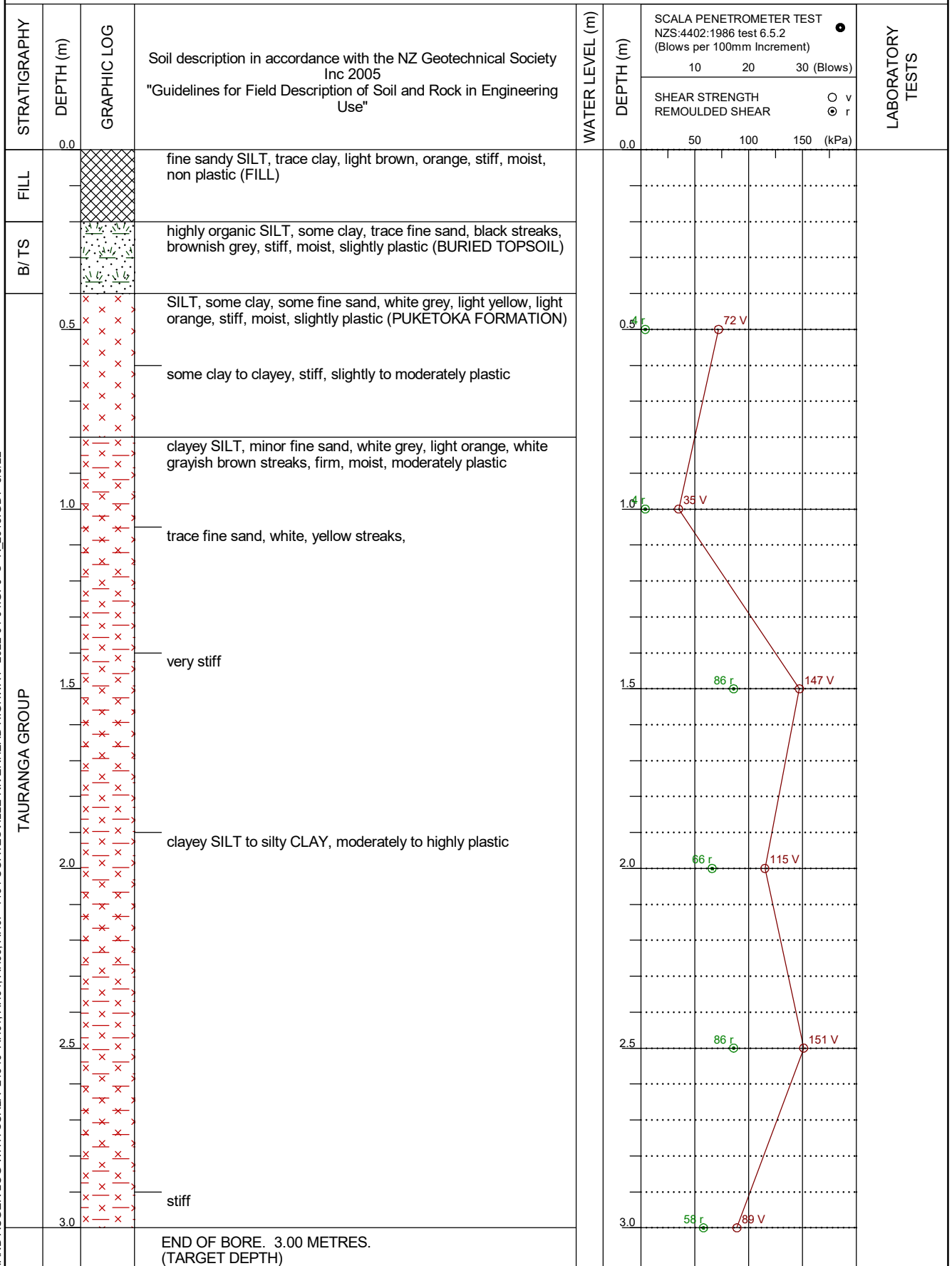


CLIENT: Fletcher Residential Limited
 PROJECT: Geotechnical Investigation, 1194 Coatesville Riverhead Highway, Riverhead

Auger Hole No: AH01
 Sheet 1 of 1

Drill Type: 50mm Hand Auger Project No: 21640 Logged By: RH
 Drilled By: RH Coordinates: Shear Vane No - Calibration Date: GEO119 - 10/03/2021
 Date Started: 4/4/22 Ground Elevation: Surface Conditions: Slightly Sloping, Grass
 Date Finished: 4/4/22 Water Level: Not Encountered

HAND AUGER LOG WITH SCALA 21640- AH01, AH04, AH06, AH07- 1194 COATESVILLE-RIVERHEAD HIGHWAY- 2022-04-04.GPJ S+R_2013.GDT 5/5/22



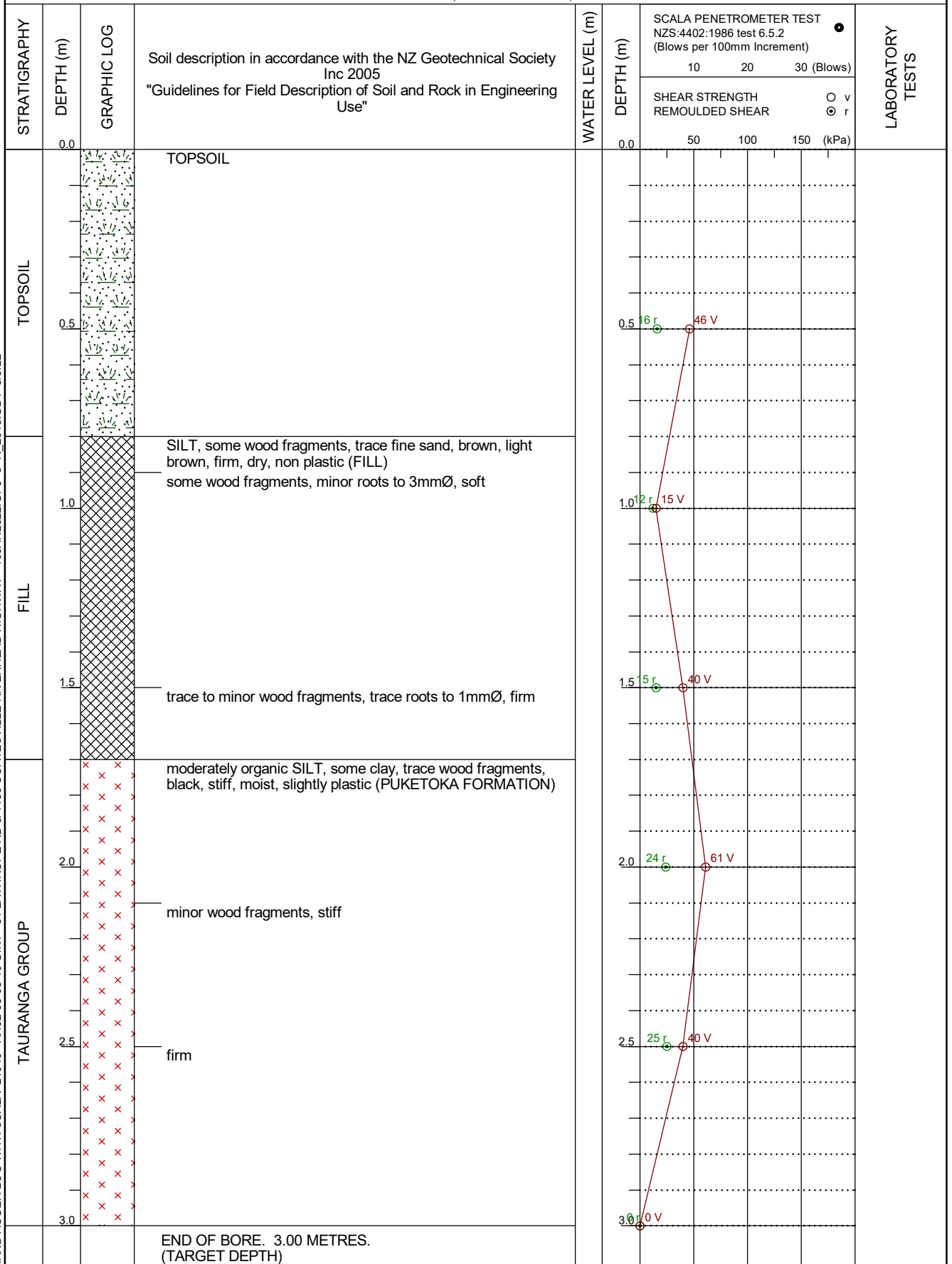


CLIENT: Fletcher Residential Limited
 PROJECT: Geotechnical Investigation, 51 Lathrope Rd & 1186 Coatesville Riverhead Highway, Riverhead

Auger Hole No: AH02
 Sheet 1 of 1

Drill Type: 50mm Hand Auger Project No: 21640 Logged By: JT
 Drilled By: JT Coordinates: Shear Vane No - Calibration Date: GEO403 - 24/02/2021
 Date Started: 17/1/22 Ground Elevation: Surface Conditions: Near Level, Grass
 Date Finished: 17/1/22 Water Level: (NOT ENCOUNTERED)

HAND AUGER LOG WITH SCALA 21640 - AH02-05-08-10 GINT - 51 LATHROPE RD & 1186 COATESVILLE RIVERHEAD HIGHWAY - 10JAN2022 GPJ S+R 2013.GDT 5/5/22



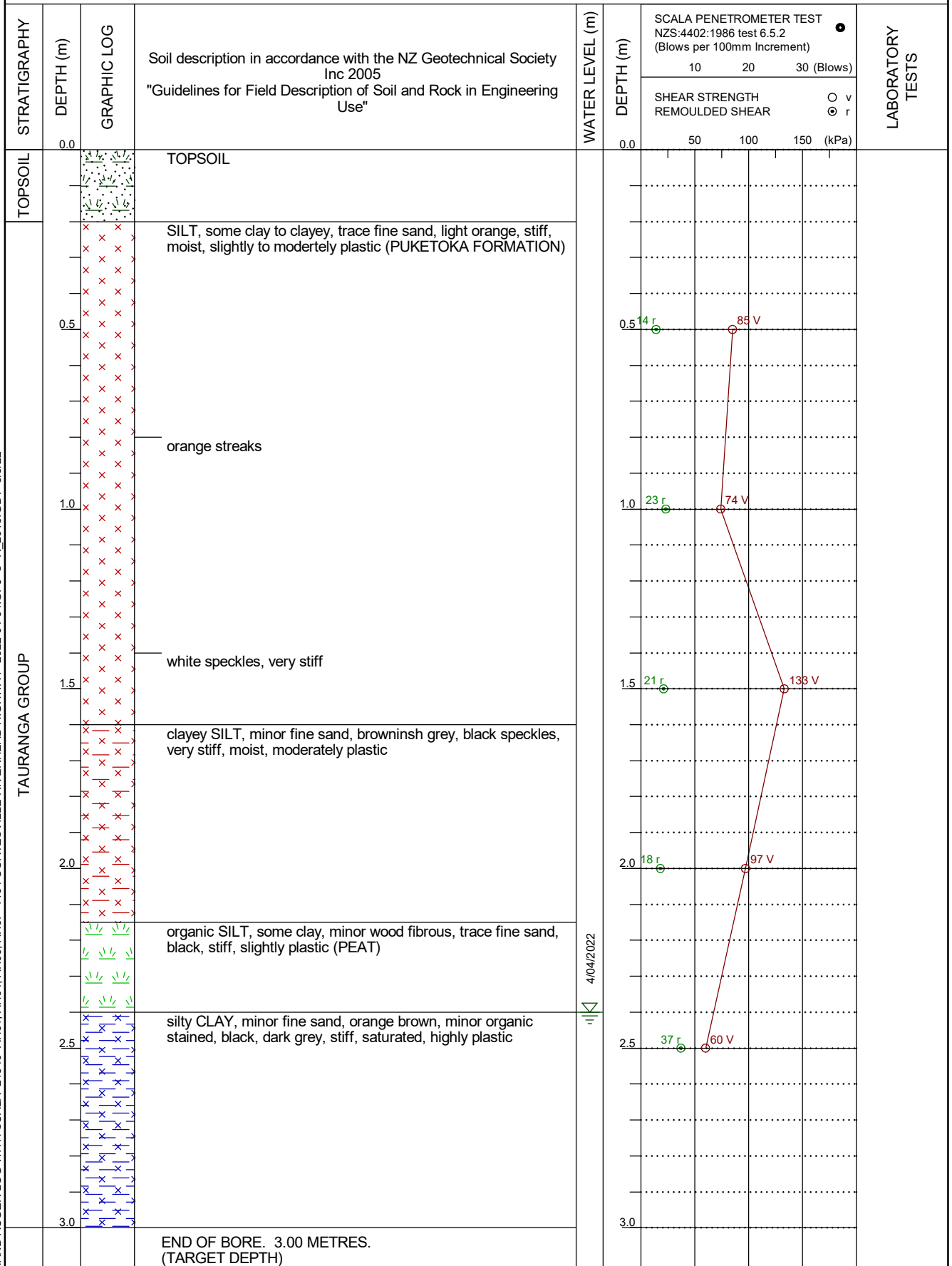


CLIENT: Fletcher Residential Limited
 PROJECT: Geotechnical Investigation, 1194 Coatesville Riverhead Highway, Riverhead

Auger Hole No: AH04
 Sheet 1 of 1

Drill Type: 50mm Hand Auger Project No: 21640 Logged By: TDS
 Drilled By: TDS Coordinates: Shear Vane No - Calibration Date: GEO122 - 20/12/2021
 Date Started: 4/4/22 Ground Elevation: Surface Conditions: Near Level, Soil
 Date Finished: 4/4/22 Water Level: 2.4m 4/04/2022

HAND AUGER LOG WITH SCALA 21640-AH01, AH04, AH06, AH07- 1194 COATESVILLE-RIVERHEAD HIGHWAY- 2022-04-04.GPJ S+R_2013.GDT 5/5/22



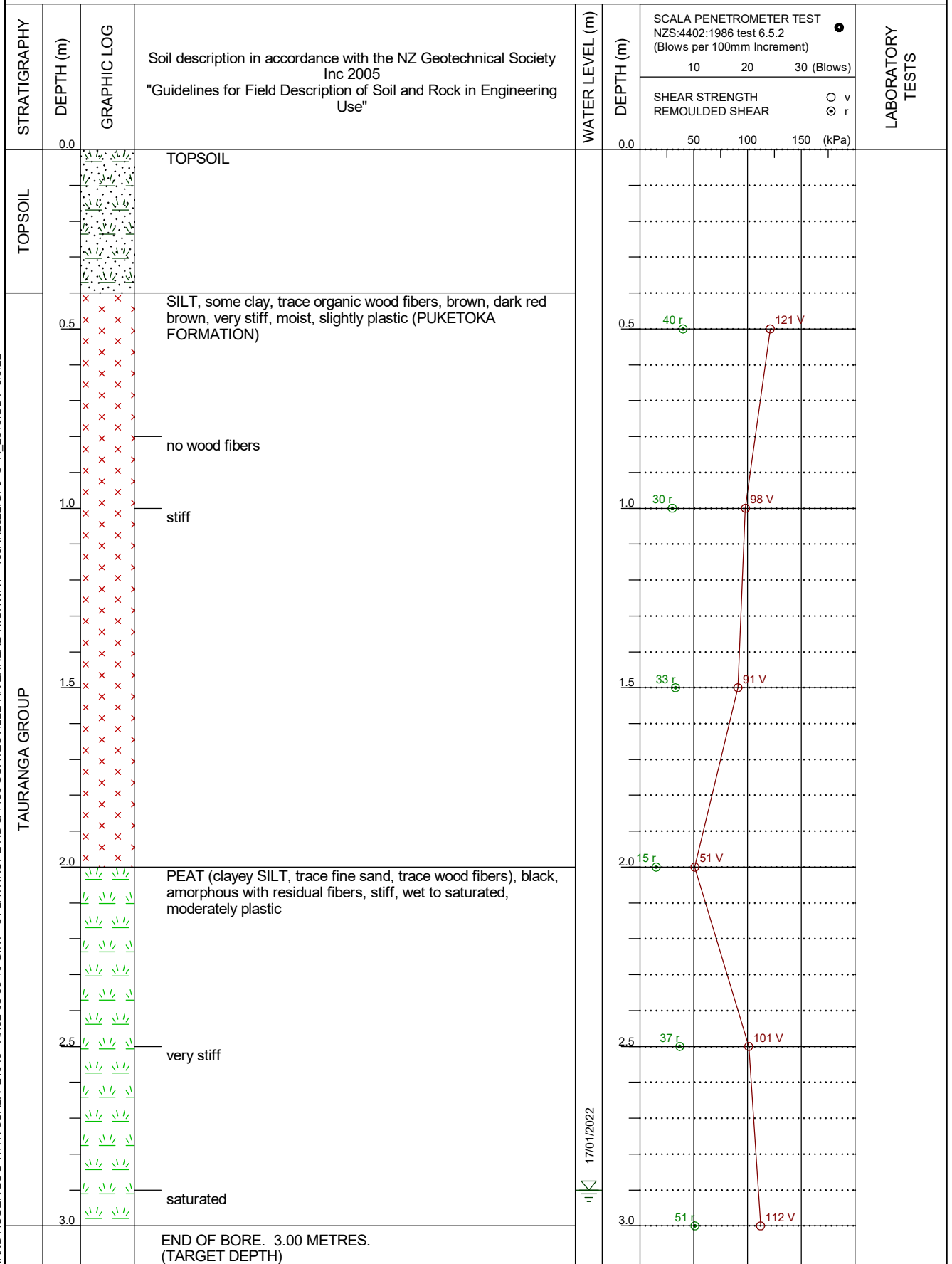


CLIENT: Fletcher Residential Limited
 PROJECT: Geotechnical Investigation, 51 Lathrope Rd & 1186 Coatesville Riverhead Highway, Riverhead

Auger Hole No: AH05
 Sheet 1 of 1

Drill Type: 50mm Hand Auger Project No: 21640 Logged By: JT
 Drilled By: JT Coordinates: Shear Vane No - Calibration Date: GEO403 - 24/02/2021
 Date Started: 17/1/22 Ground Elevation: Surface Conditions: Near Level, Soil
 Date Finished: 17/1/22 Water Level: 2.9m 17/01/2022

HAND AUGER LOG WITH SCALA 21640 - AH02-05-08-10 GINT - 51 LATHROPE RD & 1186 COATESVILLE RIVERHEAD HIGHWAY - 10JAN2022.GPJ S+R_2013.GDT 5/5/22



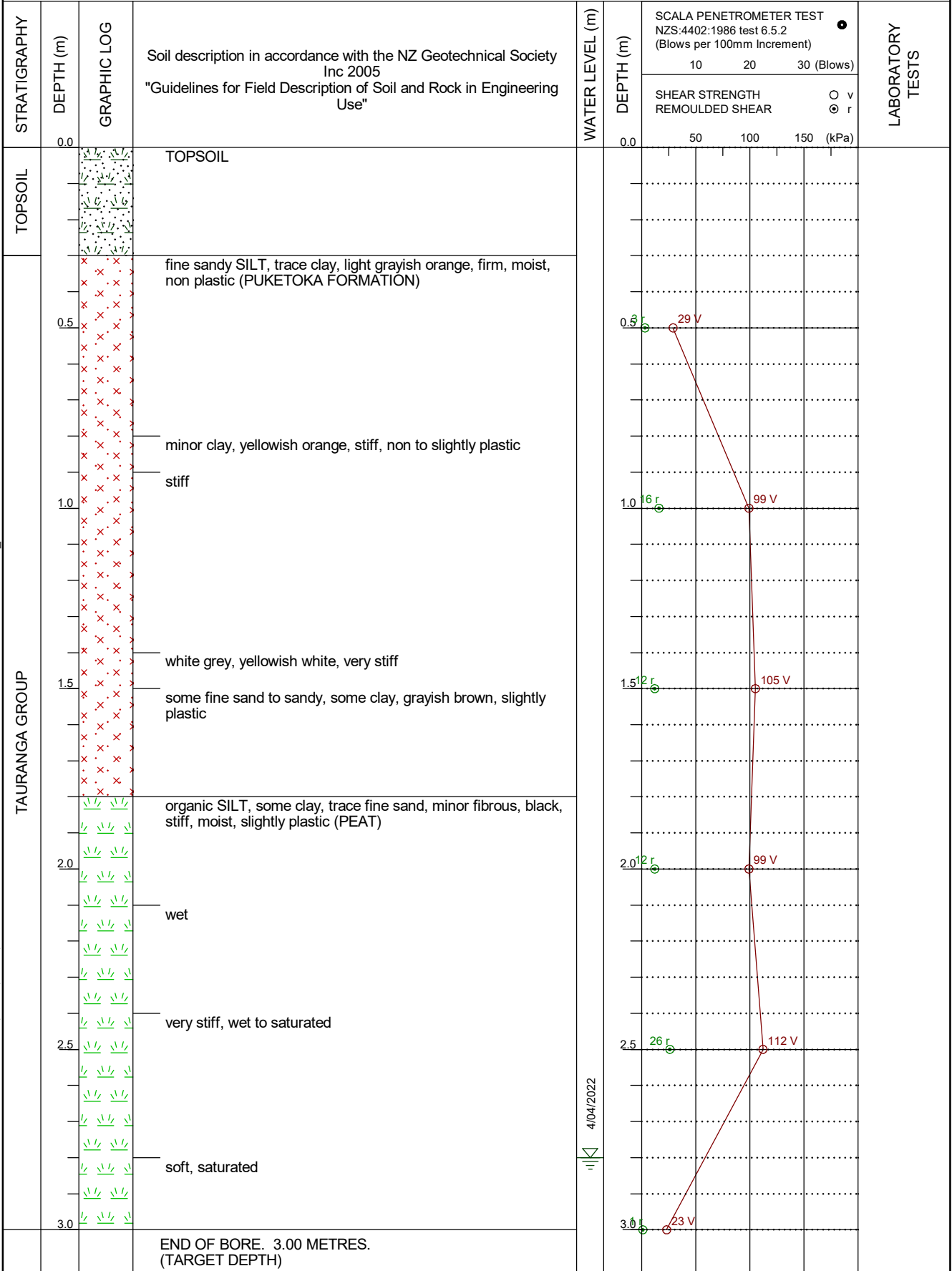


CLIENT: Fletcher Residential Limited
 PROJECT: Geotechnical Investigation, 1194 Coatesville Riverhead Highway, Riverhead

Auger Hole No: AH06
 Sheet 1 of 1

Drill Type: 50mm Hand Auger Project No: 21640 Logged By: RH
 Drilled By: RH Coordinates: Shear Vane No - Calibration Date: GEO119 - 10/03/2021
 Date Started: 4/4/22 Ground Elevation: Surface Conditions: Undulating, Soil
 Date Finished: 4/4/22 Water Level: 2.8m 4/04/2022

HAND AUGER LOG WITH SCALA 21640- AH01, AH04, AH06, AH07- 1194 COATESVILLE-RIVERHEAD HIGHWAY- 2022-04-04.GPJ S+R_2013.GDT 5/5/22



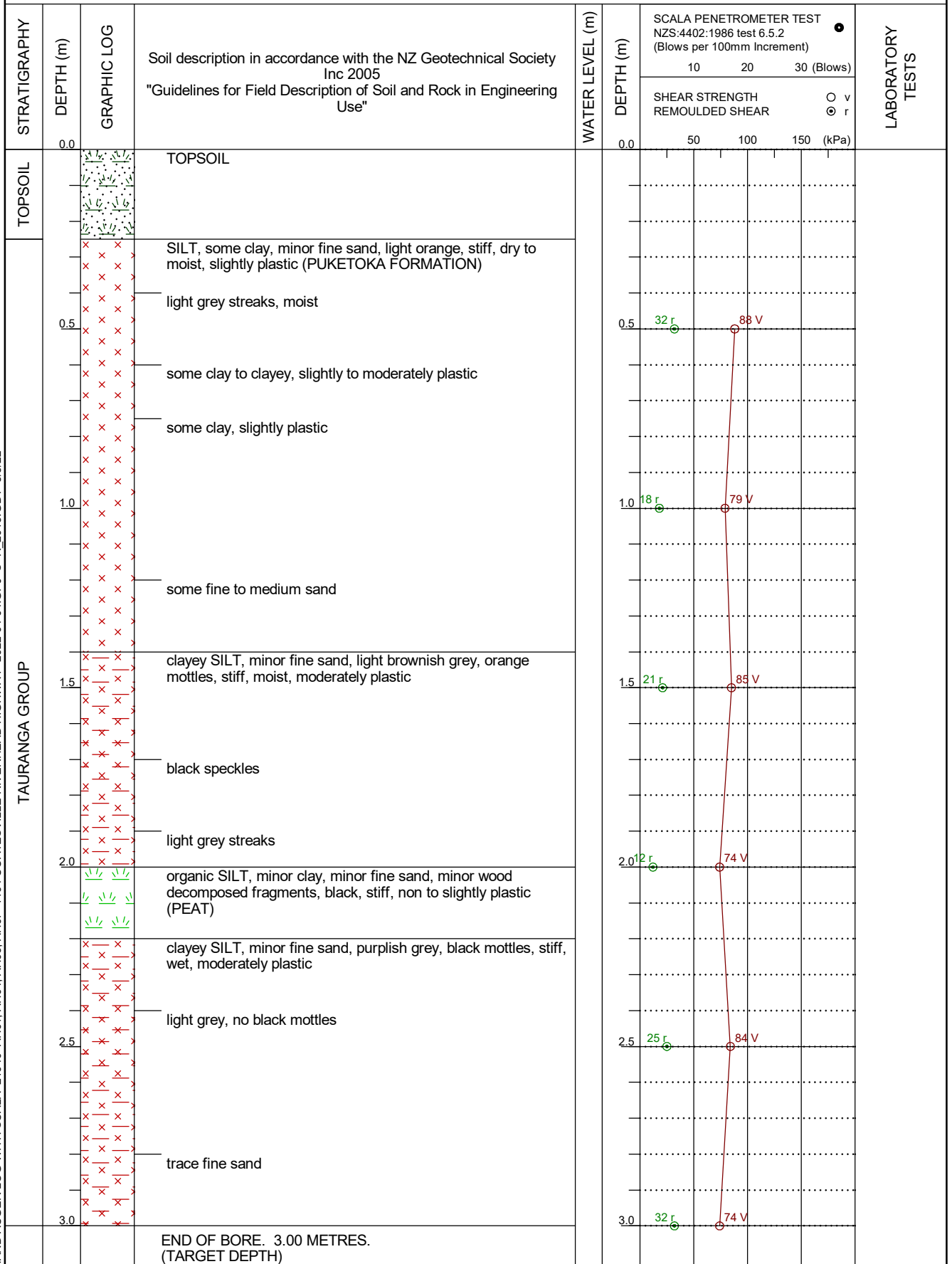


CLIENT: Fletcher Residential Limited
 PROJECT: Geotechnical Investigation, 1194 Coatesville Riverhead Highway, Riverhead

Auger Hole No: AH07
 Sheet 1 of 1

Drill Type: 50mm Hand Auger Project No: 21640 Logged By: MS
 Drilled By: MS Coordinates: Shear Vane No - Calibration Date: GEO354 - 2/07/2021
 Date Started: 4/4/22 Ground Elevation: Surface Conditions: Near Level, Grass
 Date Finished: 4/4/22 Water Level: Not Encountered

HAND AUGER LOG WITH SCALA 21640- AH01, AH04, AH06, AH07- 1194 COATESVILLE-RIVERHEAD HIGHWAY- 2022-04-04.GPJ S+R_2013.GDT 5/5/22





CLIENT: Fletcher Residential Limited

Auger Hole No: AH08

PROJECT: Geotechnical Investigation, 51 Lathrope Rd & 1186 Coatesville Riverhead Highway, Riverhead

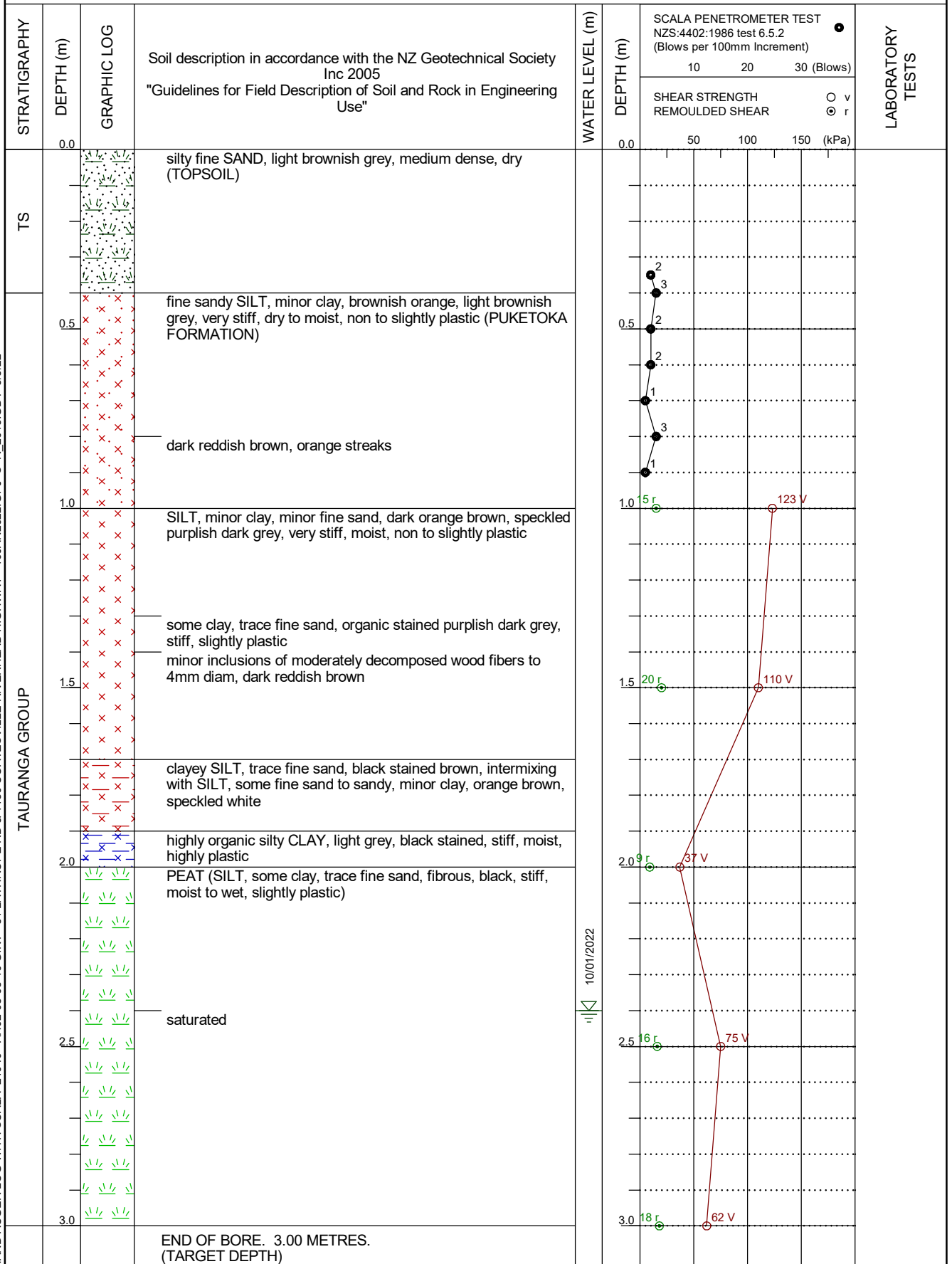
Sheet 1 of 1

Drill Type: 50mm Hand Auger
 Drilled By: RH
 Date Started: 10/1/22
 Date Finished: 10/1/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: 2.4m 10/01/2022

Logged By: RH
 Shear Vane No - Calibration Date: GEO765 - 10/03/2021
 Surface Conditions: Near Level, Long Grass

HAND AUGER LOG WITH SCALA 21640 - AH02-05-08-10 GINT - 51 LATHROPE RD & 1186 COATESVILLE RIVERHEAD HIGHWAY - 10JAN2022 GPJ S+R 2013.GDT 5/5/22





CLIENT: Fletcher Residential Ltd

Auger Hole No: AH09

PROJECT: Geotechnical Investigation, 1140 Coatesville-riverhead Highway & 340 Riverhead Road, Riverhead

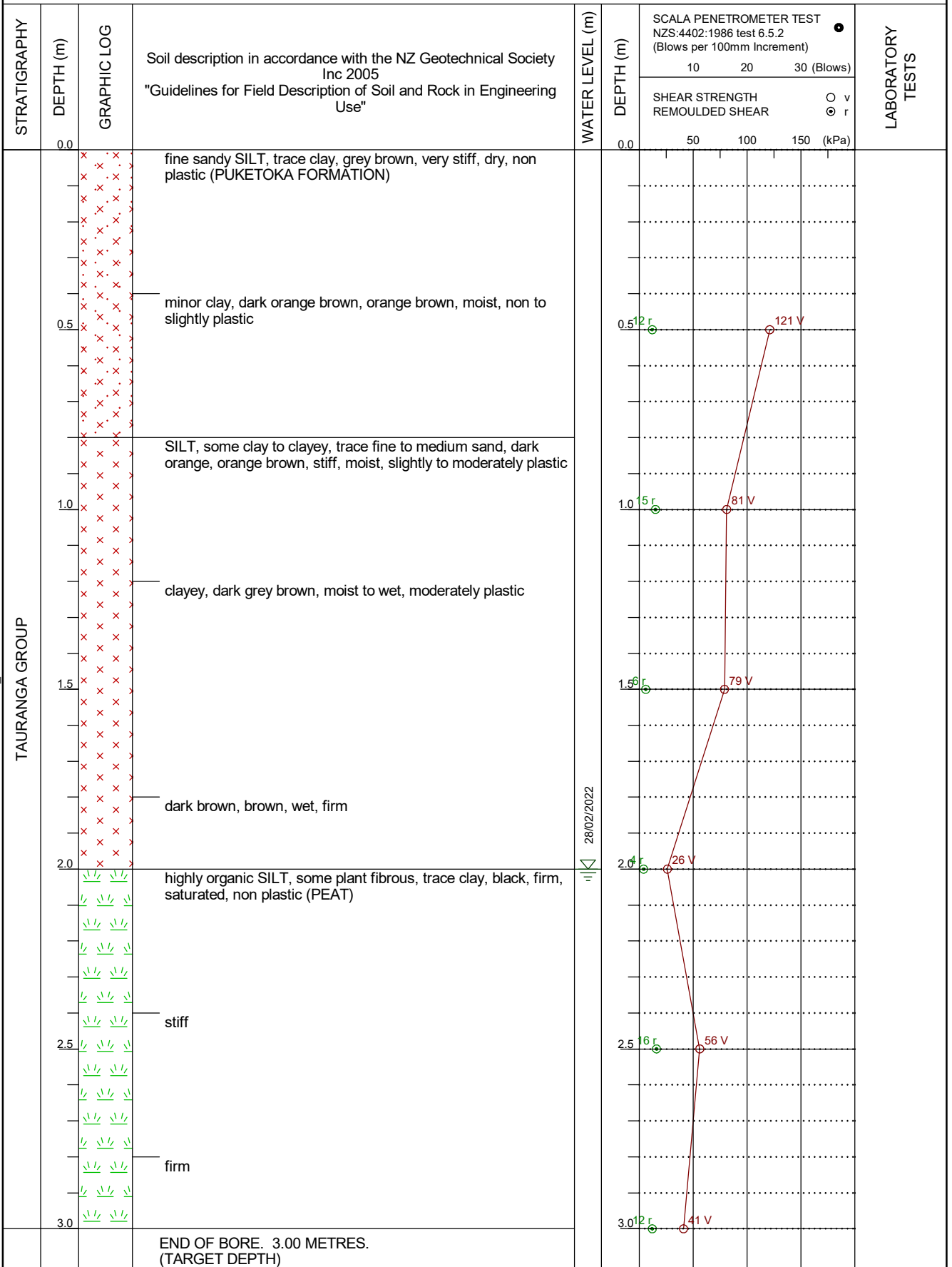
Sheet 1 of 1

Drill Type: 50mmØ Hand Auger
 Drilled By: DEG
 Date Started: 28/2/22
 Date Finished: 28/2/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: 2.0m 28/02/2022

Logged By: DEG
 Shear Vane No - Calibration Date: GEO361 - 12/08/2021
 Surface Conditions: Near Level, Soil

HAND AUGER LOG WITH SCALA 21640- AH09- AH16- 1140 CRH& 340 RIVERHEAD RD- 2022-09-01.GPJ S+R 2013.GDT 5/5/22





CLIENT: Fletcher Residential Limited

Auger Hole No: AH10

PROJECT: Geotechnical Investigation, 51 Lathrope Rd & 1186 Coatesville Riverhead Highway, Riverhead

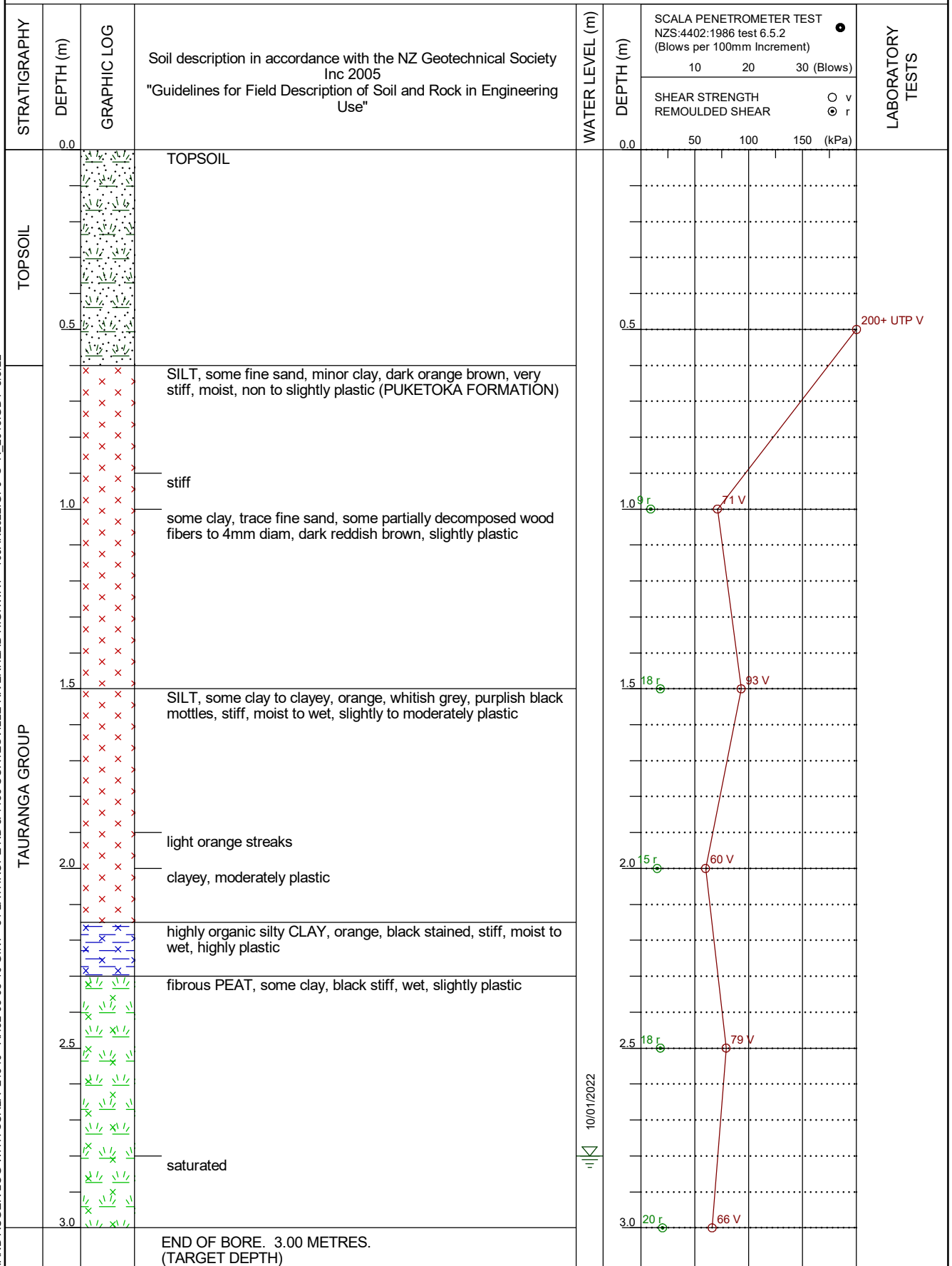
Sheet 1 of 1

Drill Type: 50mm Hand Auger
 Drilled By: RH
 Date Started: 10/1/22
 Date Finished: 10/1/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: 2.8m 10/01/2022

Logged By: RH
 Shear Vane No - Calibration Date: GEO765 - 10/03/2021
 Surface Conditions: Near Level, Long Grass

HAND AUGER LOG WITH SCALA 21640 - AH02-05-08-10 GINT - 51 LATHROPE RD & 1186 COATESVILLE RIVERHEAD HIGHWAY - 10JAN2022.GPJ S+R_2013.GDT 5/5/22





CLIENT: Fletcher Residential Ltd

Auger Hole No: AH11

PROJECT: Geotechnical Investigation, 1140 Coatesville-riverhead Highway & 340 Riverhead Road, Riverhead

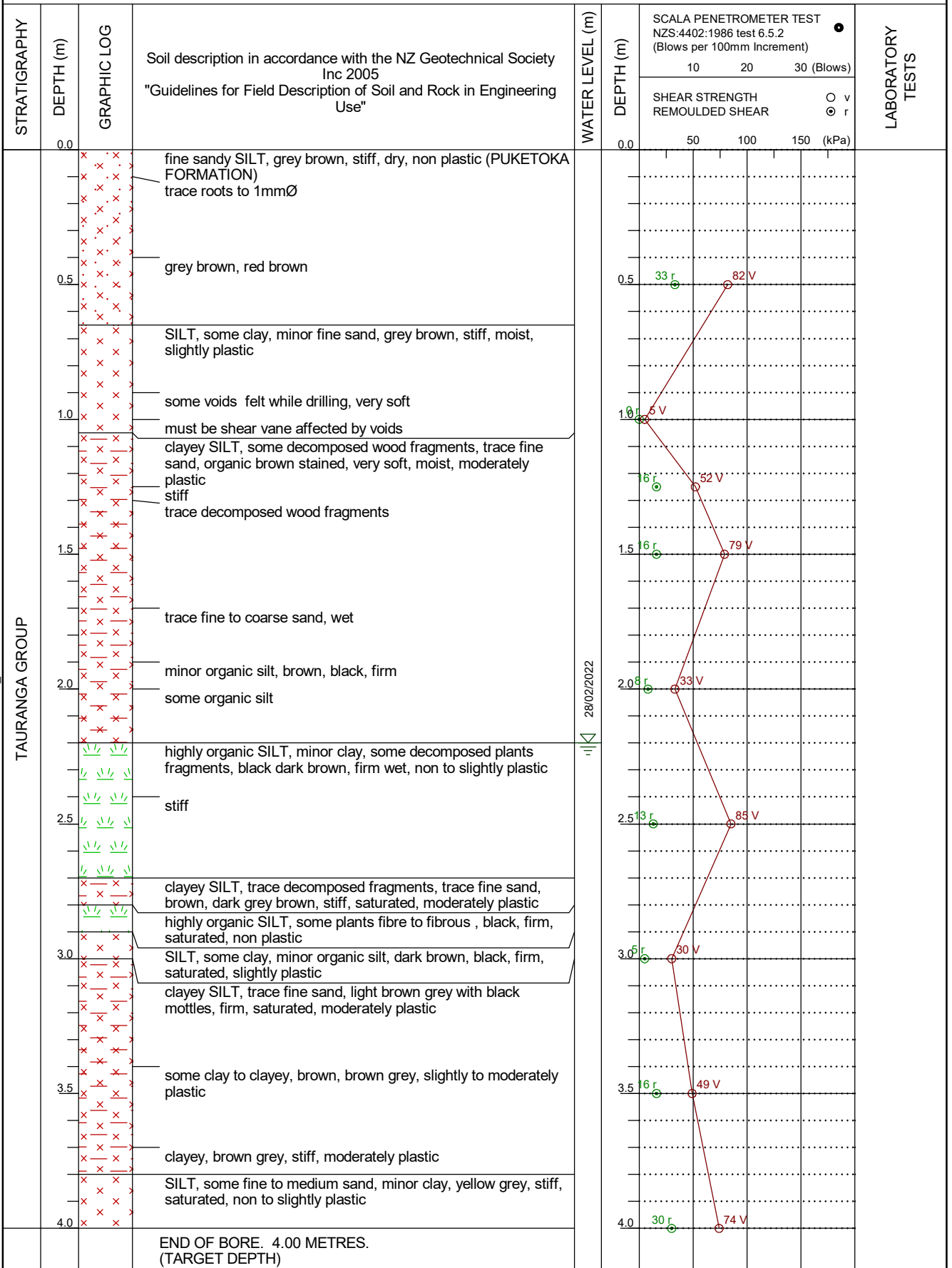
Sheet 1 of 1

Drill Type: 50mmØ Hand Auger
 Drilled By: DEG
 Date Started: 28/2/22
 Date Finished: 28/2/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: 2.2m 28/02/2022

Logged By: DEG
 Shear Vane No - Calibration Date: GEO361 - 12/08/2021
 Surface Conditions: Near Level, Beside Gravel Access

HAND AUGER LOG WITH SCALA 21640- AH09- AH16- 1140 CRH& 340 RIVERHEAD RD- 2022-09-01.GPJ S+R 2013.GDT 5/5/22





CLIENT: Fletcher Residential Ltd

Auger Hole No: AH13

PROJECT: Geotechnical Investigation, 1140 Coatesville-riverhead Highway & 340 Riverhead Road, Riverhead

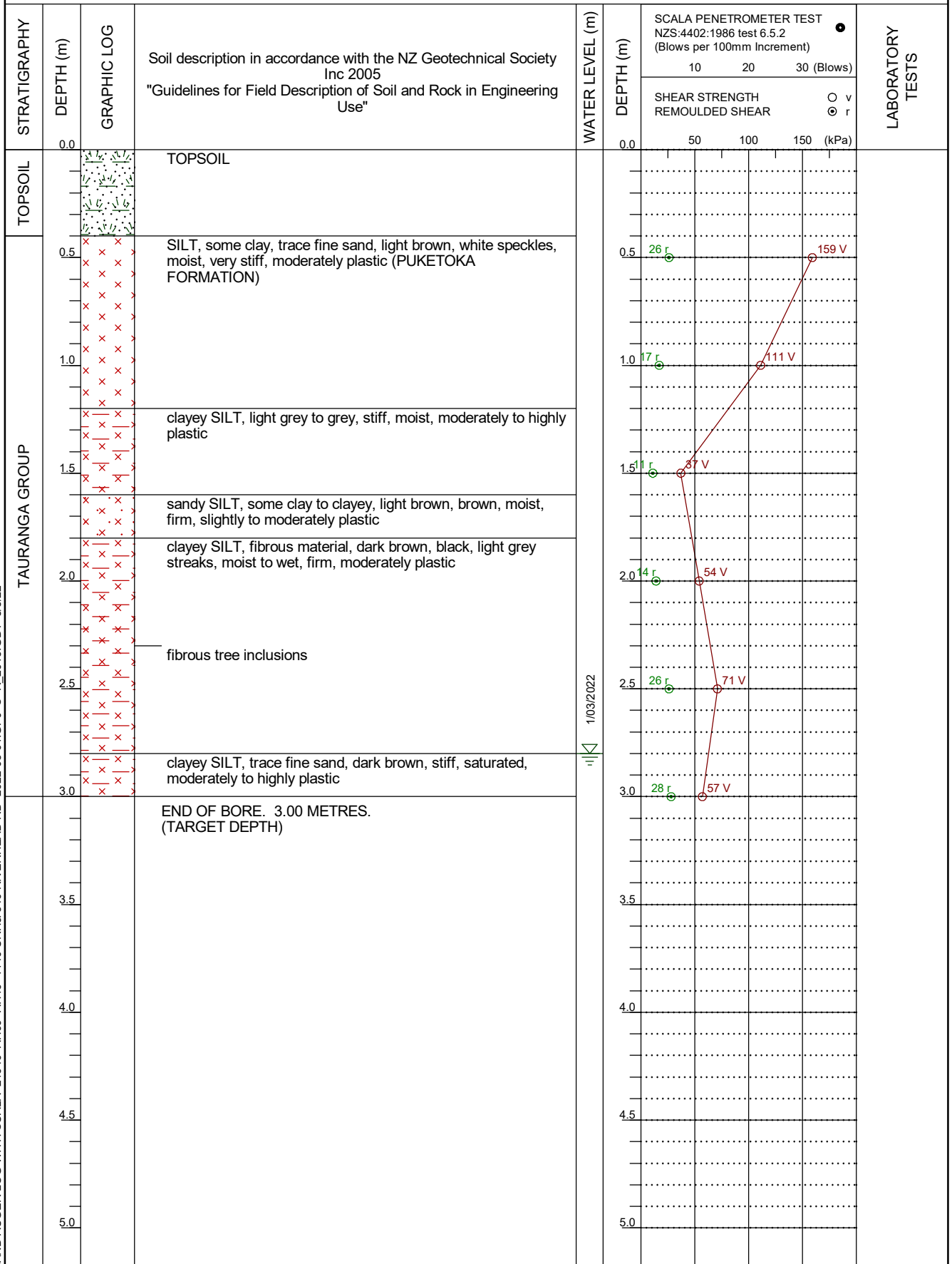
Sheet 1 of 1

Drill Type: 50mmØ Hand Auger
 Drilled By: TDS
 Date Started: 1/3/22
 Date Finished: 1/3/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: 2.8m 1/03/2022

Logged By: TDS
 Shear Vane No - Calibration Date: GEO122 - 20/12/2021
 Surface Conditions: Near Level, Soil

HAND AUGER LOG WITH SCALA 21640- AH09- AH16- 1140 CRH& 340 RIVERHEAD RD- 2022-09-01.GPJ S+R 2013.GDT 5/5/22





CLIENT: Fletcher Residential Ltd

Auger Hole No: AH15

PROJECT: Geotechnical Investigation, 1140 Coatesville-riverhead Highway & 340 Riverhead Road, Riverhead

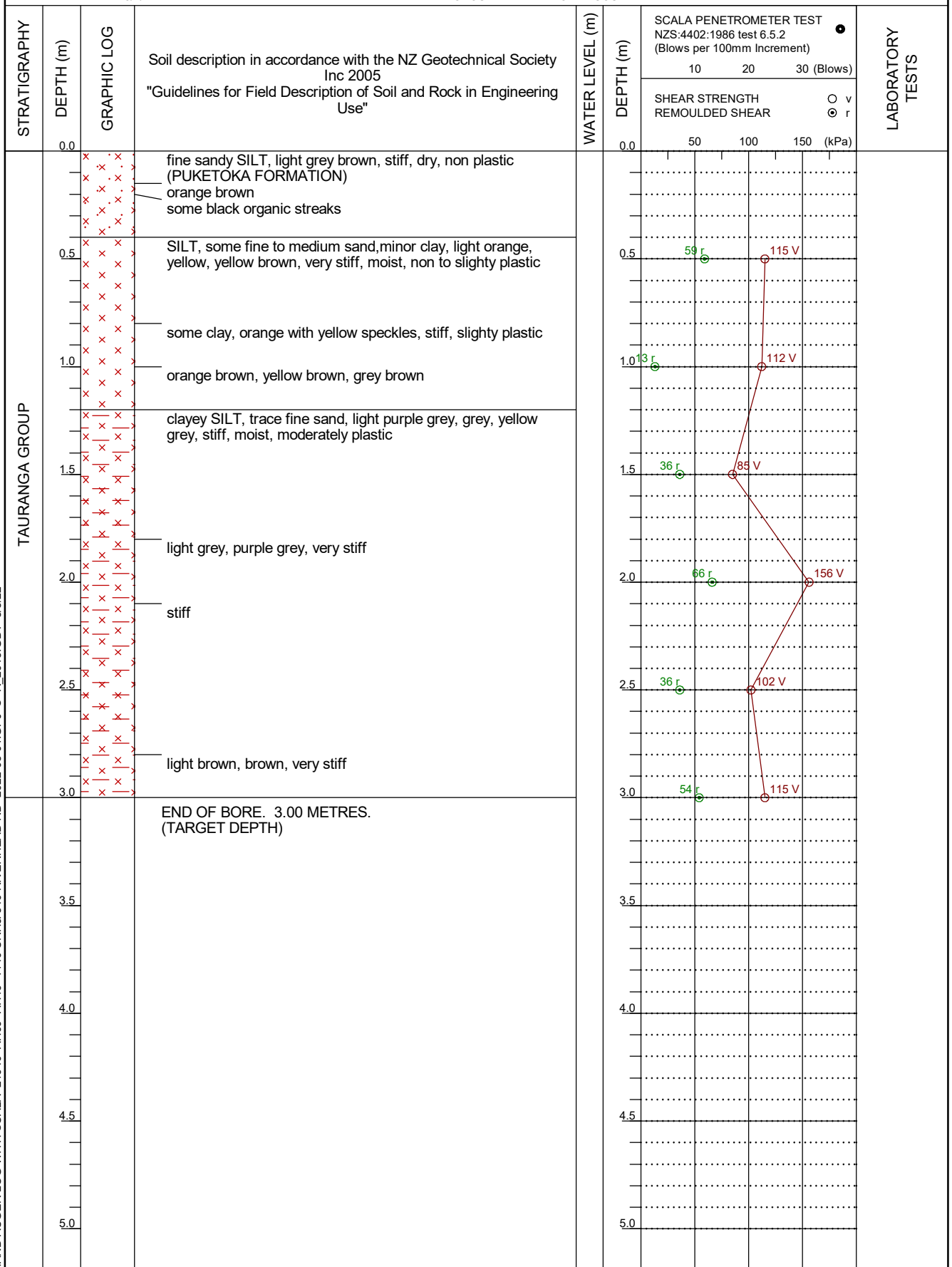
Sheet 1 of 1

Drill Type: 50mmØ Hand Auger
 Drilled By: DEG
 Date Started: 28/2/22
 Date Finished: 28/2/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: GROUND WATER NOT ENCOUNTERED

Logged By: DEG
 Shear Vane No - Calibration Date: GEO361 - 12/08/2021
 Surface Conditions: Slightly Sloping, Grass

HAND AUGER LOG WITH SCALA 21640- AH09- AH16- 1140 CRH& 340 RIVERHEAD RD- 2022-09-01.GPJ S+R 2013.GDT 5/5/22





CLIENT: Fletcher Residential Ltd

Auger Hole No: AH16

PROJECT: Geotechnical Investigation, 1140 Coatesville-riverhead Highway & 340 Riverhead Road, Riverhead

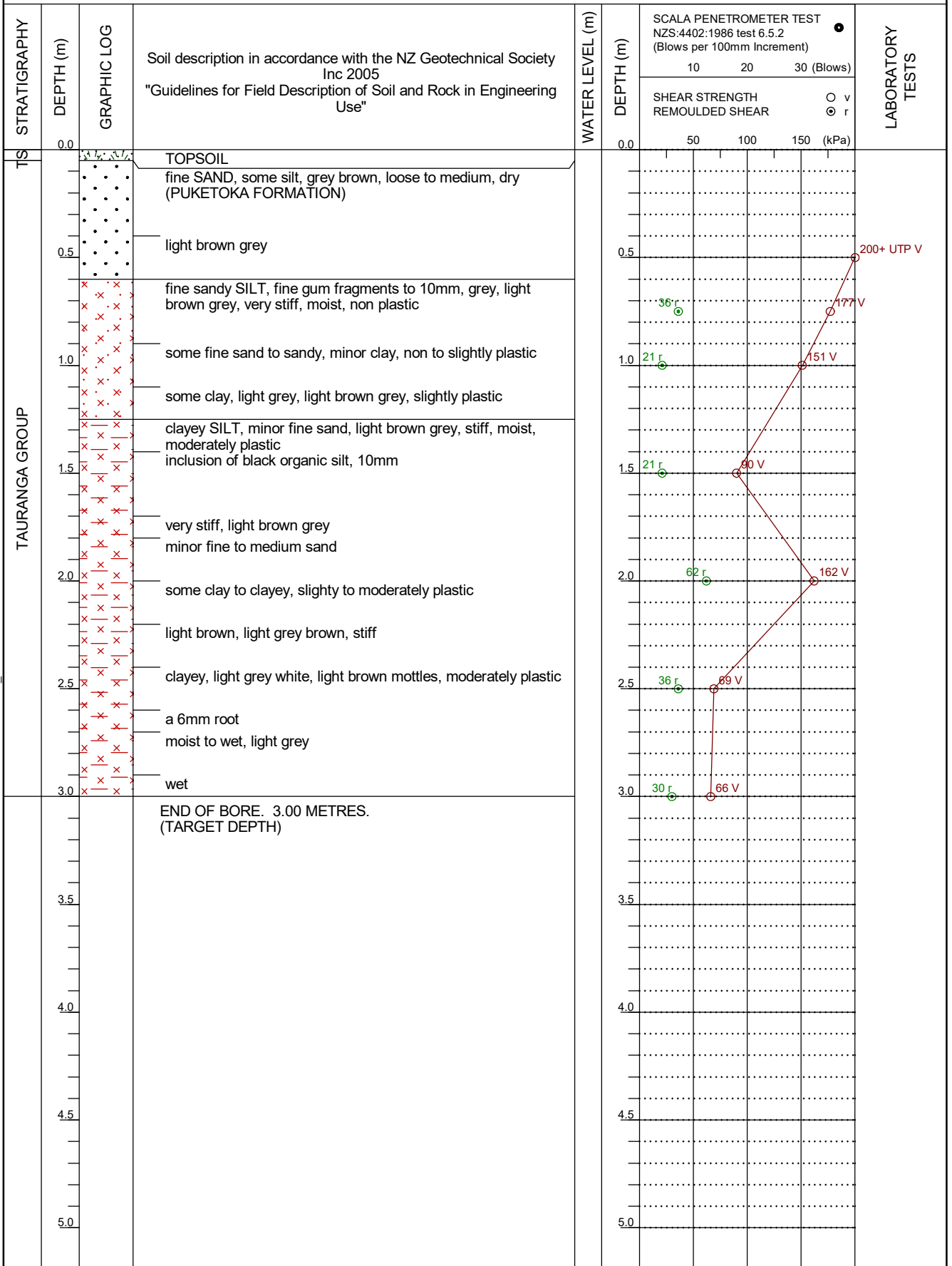
Sheet 1 of 1

Drill Type: 50mmØ Hand Auger
 Drilled By: DEG
 Date Started: 28/2/22
 Date Finished: 28/2/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: GROUND WATER NOT ENCOUNTERED

Logged By: DEG
 Shear Vane No - Calibration Date: GEO361 - 12/08/2021
 Surface Conditions: Near Level, Grass

HAND AUGER LOG WITH SCALA 21640- AH09- AH16- 1140 CRH& 340 RIVERHEAD RD.- 2022-09-01.GPJ S+R 2013.GDT 5/5/22





CLIENT: Fletcher Residential Ltd
 PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

Auger Hole No: AH17
 Sheet 1 of 1

Drill Type: 50mmØ Hand Auger Project No: 21640 Logged By: RH
 Drilled By: RH Coordinates:
 Date Started: 28/2/22 Ground Elevation:
 Date Finished: 28/2/22 Water Level: Not Encountered Shear Vane No - Calibration Date: GEO765 - 10/03/2021
 Surface Conditions: Near Level, Grass

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SCALA PENETROMETER TEST NZS:4402:1986 test 6.5.2 (Blows per 100mm Increment)			LABORATORY TESTS
						10	20	30 (Blows)	
						SHEAR STRENGTH REMOULDED SHEAR			
						50 100 150 (kPa)			
FILL	0.0		fine sandy SILT, some fine to medium subangular gravel, trace medium to coarse sand, light bluish grey, hard, dry, non plastic (FILL)		0.0				
	0.5		END OF BORE. 0.20 METRES. (GRAVEL OBSTRUCTION)		0.5				
	1.0				1.0				
	1.5				1.5				
	2.0				2.0				
	2.5				2.5				
	3.0				3.0				

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22- 22 DUKE ST - 28FEB2022.GPJ S+R_2013.GDT 5/5/22



CLIENT: Fletcher Residential Ltd
 PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

Auger Hole No: AH18(A)
 Sheet 1 of 1

Drill Type: 50mmØ Hand Auger Project No: 21640 Logged By: RH
 Drilled By: RH Coordinates: Shear Vane No - Calibration Date: GEO765 - 10/03/2021
 Date Started: 28/2/22 Ground Elevation: Surface Conditions: Slightly Sloping, Grass
 Date Finished: 28/2/22 Water Level: Not Encountered

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SCALA PENETROMETER TEST NZS:4402:1986 test 6.5.2 (Blows per 100mm Increment)			LABORATORY TESTS
						10	20	30 (Blows)	
						SHEAR STRENGTH REMOULDED SHEAR			
						(kPa)			
FILL	0.0		fine sandy SILT, trace clay, trace fine angular gravel, light grayish, brown, hard, dry, non plastic (FILL)		0.0				
	0.5		SILT, some clay to clayey, trace fine sand, light grey, occasionally orange streaks, hard, dry to moist, slightly to moderately plastic		0.5				200+ UTP V
	1.0		END OF BORE. 0.55 METRES. (GRAVEL OBSTRUCTION)		1.0				
	1.5				1.5				
	2.0				2.0				
	2.5				2.5				
	3.0				3.0				

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22- 22 DUKE ST - 28FEB2022.GPJ S+R_2013.GDT 5/5/22



CLIENT: Fletcher Residential Ltd
 PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

Auger Hole No: AH18(B)
 Sheet 1 of 1

Drill Type: 50mmØ Hand Auger Project No: 21640 Logged By: RH
 Drilled By: RH Coordinates: Shear Vane No - Calibration Date: GEO765 - 10/03/2021
 Date Started: 28/2/22 Ground Elevation: Surface Conditions: Slightly Sloping, Grass
 Date Finished: 28/2/22 Water Level: Not Encountered

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SCALA PENETROMETER TEST NZS:4402:1986 test 6.5.2 (Blows per 100mm Increment)			LABORATORY TESTS
						10	20	30 (Blows)	
FILL	0.0		fine sandy SILT, trace clay, trace rootlets, light grayish, brown, hard, dry, non plastic (FILL)		0.0				
			SILT, some clay to clayey, light grey, orange blue streaks, white speckles, very stiff to hard, moist to dry, slightly to moderately plastic						
	0.5		END OF BORE. 0.45 METRES. (GRAVEL OBSTRUCTION)		0.5				
	1.0				1.0				
	1.5				1.5				
	2.0				2.0				
	2.5				2.5				
	3.0				3.0				

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22- 22 DUKE ST - 28FEB2022.GPJ S+R_2013.GDT 5/5/22



CLIENT: Fletcher Residential Ltd
 PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

Auger Hole No: AH18(C)
 Sheet 1 of 1

Drill Type: 50mmØ Hand Auger Project No: 21640 Logged By: RH
 Drilled By: RH Coordinates:
 Date Started: 28/2/22 Ground Elevation:
 Date Finished: 28/2/22 Water Level: Not Encountered Shear Vane No - Calibration Date: GEO765 - 10/03/2021
 Surface Conditions: Slightly Sloping, Grass

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	SCALA PENETROMETER TEST NZS:4402:1986 test 6.5.2 (Blows per 100mm Increment)			LABORATORY TESTS
					10	20	30 (Blows)	
	0.0							
F			fine sandy SILT, trace to minor clay, light grayish brown, hard, dry, non to slightly plastic (FILL)					
	0.5		END OF BORE. 0.10 METRES. (GRAVEL OBSTRUCTION)					
	1.0							
	1.5							
	2.0							
	2.5							
	3.0							

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22- 22 DUKE ST - 28FEB2022.GPJ S+R_2013.GDT 5/5/22



CLIENT: Fletcher Residential Ltd
 PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

Auger Hole No: AH18(D)
 Sheet 1 of 1

Drill Type: 50mmØ Hand Auger Project No: 21640 Logged By: RH
 Drilled By: RH Coordinates: Shear Vane No - Calibration Date: GEO765 - 10/03/2021
 Date Started: 28/2/22 Ground Elevation: Surface Conditions: Slightly Sloping, Grass
 Date Finished: 28/2/22 Water Level: Not Encountered

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SCALA PENETROMETER TEST NZS:4402:1986 test 6.5.2 (Blows per 100mm Increment)			LABORATORY TESTS
						10	20	30 (Blows)	
FILL	0.0		fine sandy SILT, minor clay, light grayish brown, hard, moist to dry, non to slightly plastic (FILL)		0.0				
	0.5		END OF BORE. 0.20 METRES. (GRAVEL OBSTRUCTION)		0.5				
	1.0				1.0				
	1.5				1.5				
	2.0				2.0				
	2.5				2.5				
	3.0				3.0				

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22- 22 DUKE ST - 28FEB2022.GPJ S+R_2013.GDT 5/5/22



CLIENT: Fletcher Residential Ltd

Auger Hole No: AH18(E)

PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

Sheet 1 of 1

Drill Type: 50mmØ Hand Auger
 Drilled By: RH
 Date Started: 28/2/22
 Date Finished: 28/2/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: Not Encountered

Logged By: RH
 Shear Vane No - Calibration Date: GEO765 - 10/03/2021
 Surface Conditions: Slightly Sloping, Grass

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22- 22 DUKE ST - 28FEB2022.GPJ S+R_2013.GDT 5/5/22

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SCALA PENETROMETER TEST NZS:4402:1986 test 6.5.2 (Blows per 100mm Increment)			LABORATORY TESTS
						10	20	30 (Blows)	
FILL	0.0		fine sandy SILT, trace clay, light grayish brown, very stiff to hard, moist, non plastic (FILL)		0.0				
	0.5		END OF BORE. 0.20 METRES. (GRAVEL OBSTRUCTION)		0.5				
	1.0				1.0				
	1.5				1.5				
	2.0				2.0				
	2.5				2.5				
	3.0				3.0				



CLIENT: Fletcher Residential Ltd

Auger Hole No: AH19

PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

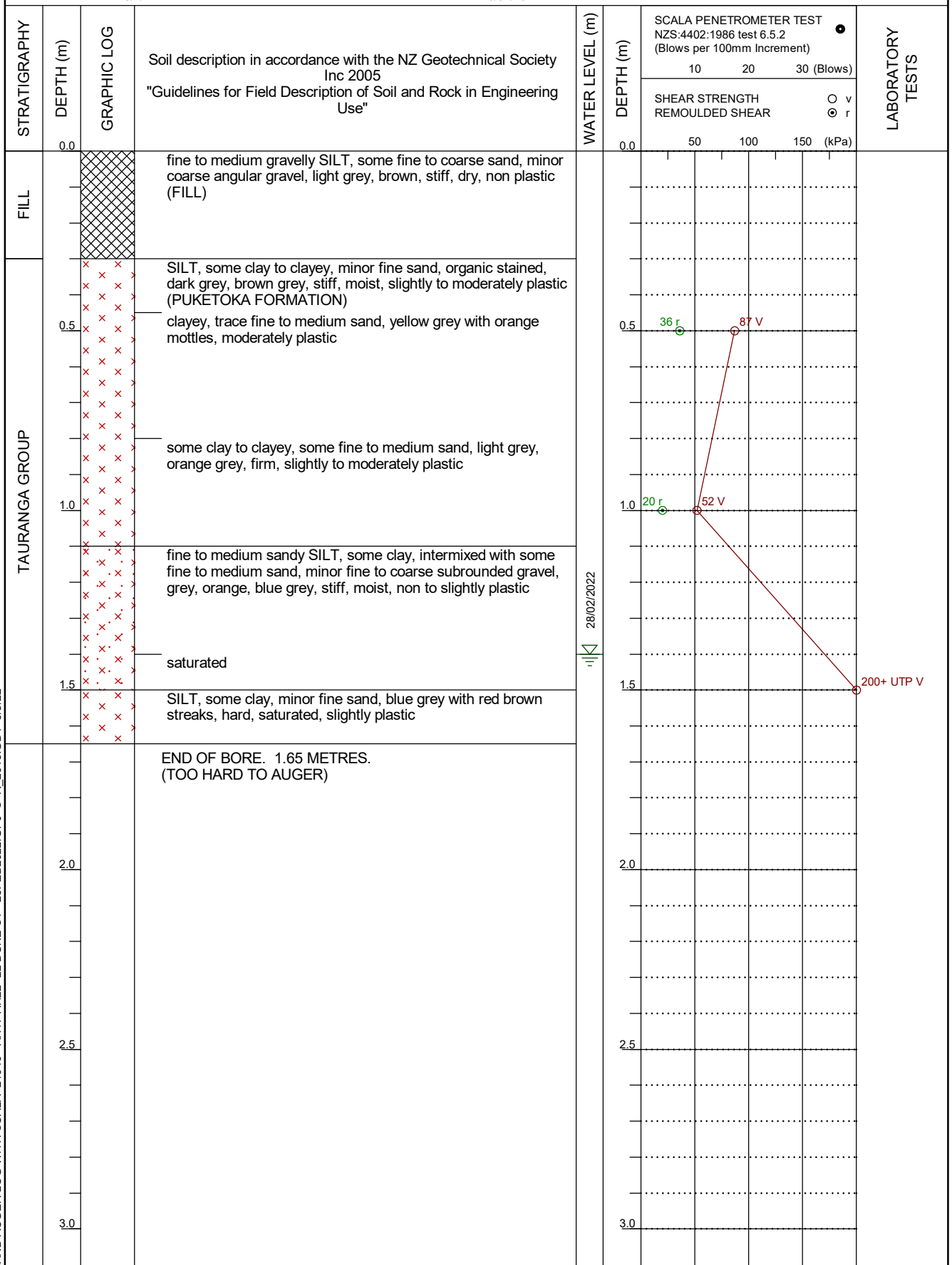
Sheet 1 of 1

Drill Type: 50mmØ Hand Auger
 Drilled By: DEG
 Date Started: 28/2/22
 Date Finished: 28/2/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: 1.4m 28/02/2022

Logged By: DEG
 Shear Vane No - Calibration Date: GEO361 - 12/08/2021
 Surface Conditions: Slightly Sloping, Grass

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22 - 22 DUKE ST - 28FEB2022.GPJ S+R 2013.GDT 5/5/22





CLIENT: Fletcher Residential Ltd

Auger Hole No: AH20

PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

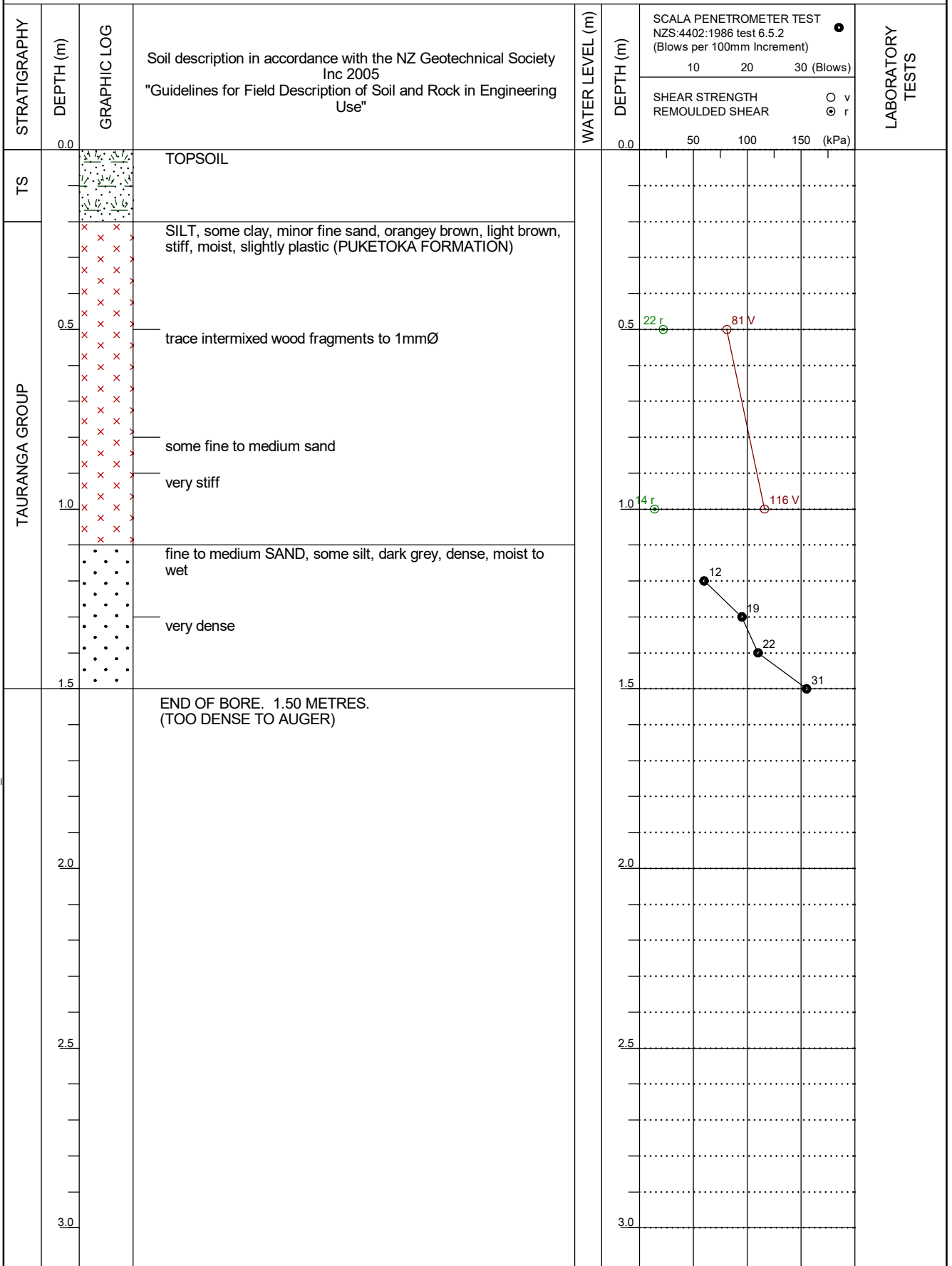
Sheet 1 of 1

Drill Type: 50mmØ Hand Auger
 Drilled By: KM
 Date Started: 28/2/22
 Date Finished: 28/2/22

Project No: 21640
 Coordinates:
 Ground Elevation:
 Water Level: Not Encountered

Logged By: KM
 Shear Vane No - Calibration Date: GEO2199 - 18/10/2021
 Surface Conditions: Near Level, Grass

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22 - 22 DUKE ST - 28FEB2022.GPJ S+R_2013.GDT 5/5/22



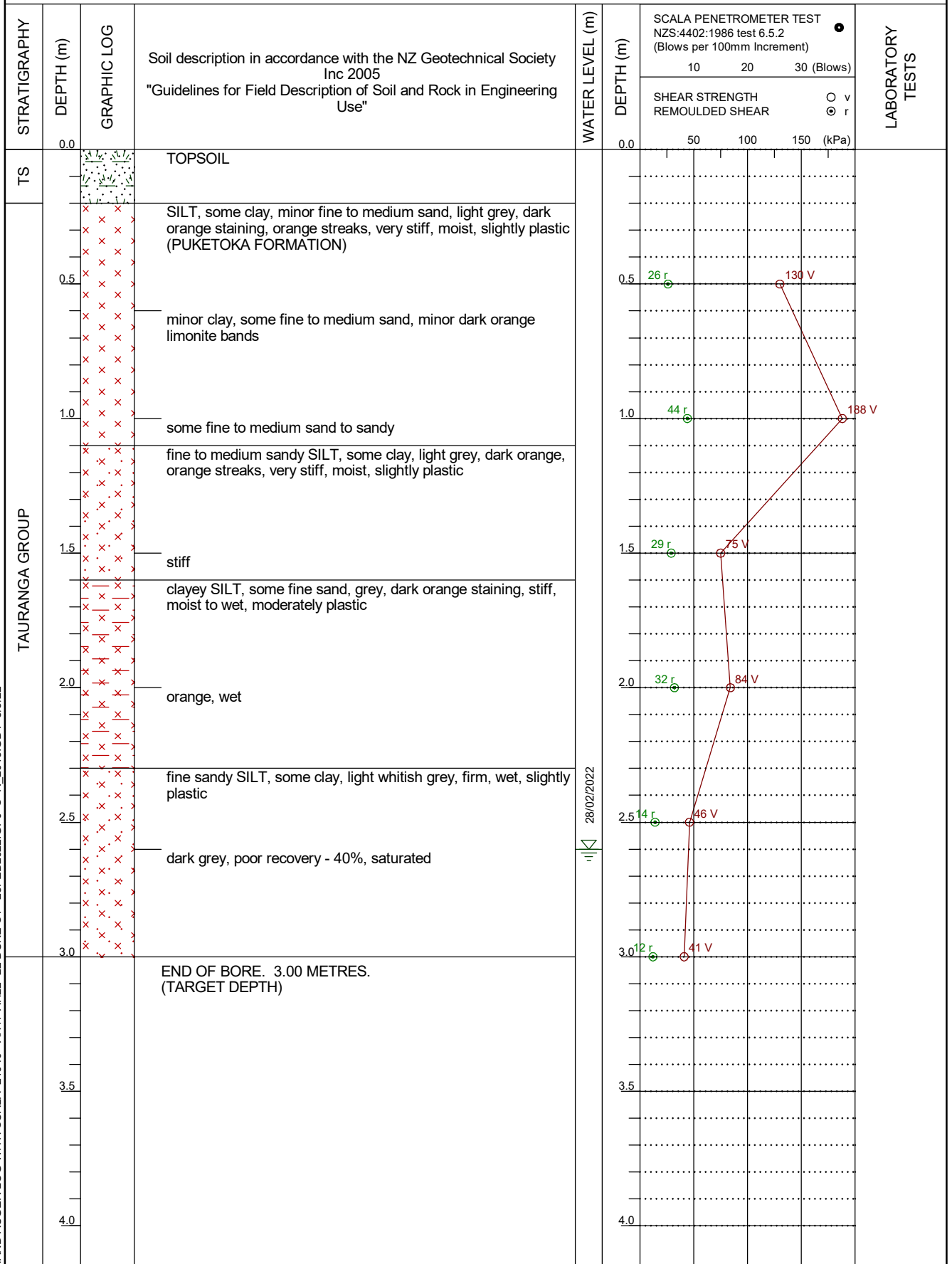


CLIENT: Fletcher Residential Ltd
 PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

Auger Hole No: AH21
 Sheet 1 of 1

Drill Type: 50mmØ Hand Auger Project No: 21640 Logged By: KM
 Drilled By: KM Coordinates: Shear Vane No - Calibration Date: GEO2199 - 18/10/2021
 Date Started: 28/2/22 Ground Elevation: Surface Conditions: Slightly Sloping, Long Grass
 Date Finished: 28/2/22 Water Level: 2.6m 28/02/2022

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22- 22 DUKE ST - 28FEB2022.GPJ S+R_2013.GDT 5/5/22



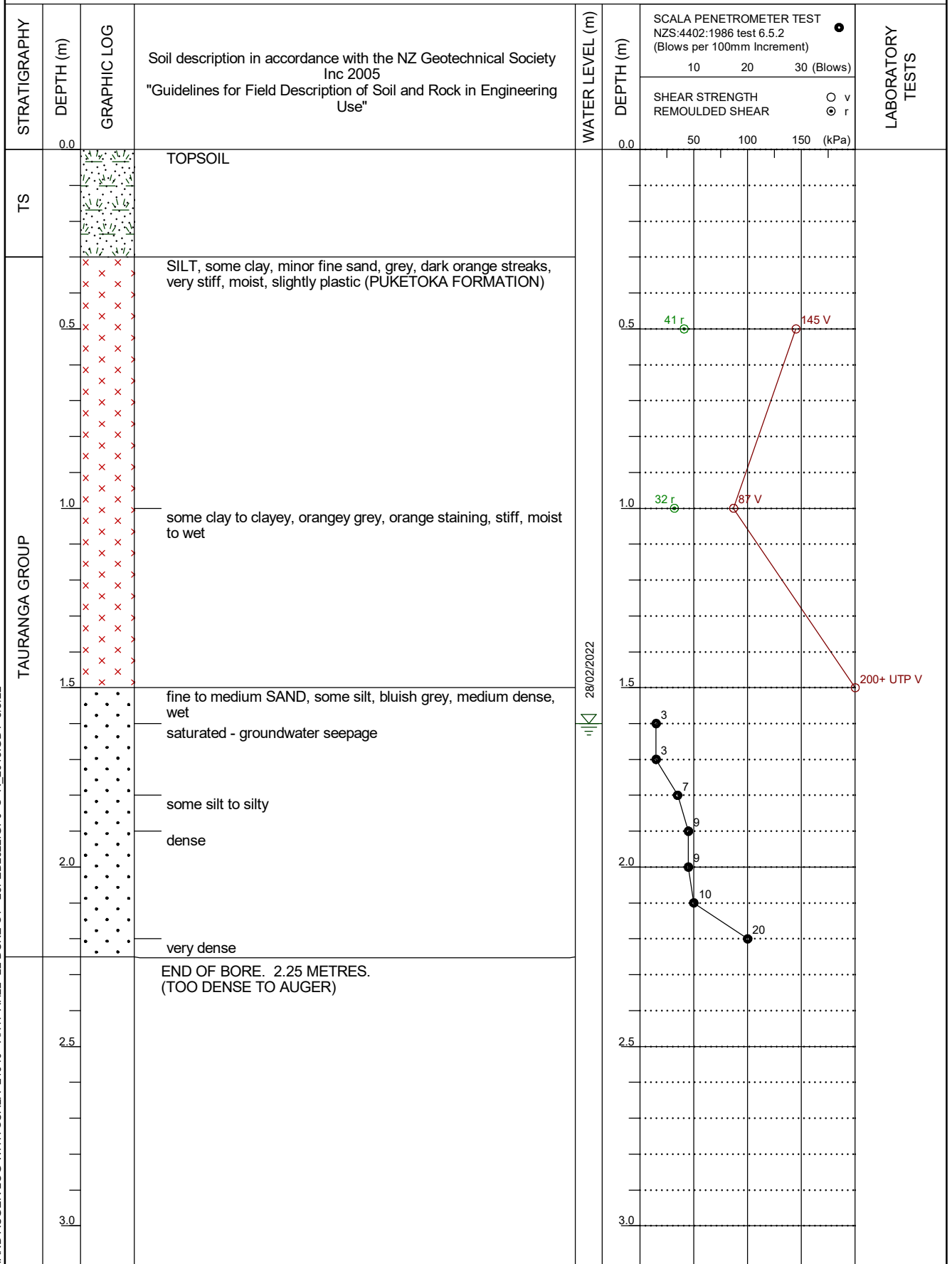


CLIENT: Fletcher Residential Ltd
 PROJECT: Geotechnical Investigation, 22 Duke St, Riverhead

Auger Hole No: AH22
 Sheet 1 of 1

Drill Type: 50mmØ Hand Auger Project No: 21640 Logged By: KM
 Drilled By: KM Coordinates: Shear Vane No - Calibration Date: GEO2199 - 18/10/2021
 Date Started: 28/2/22 Ground Elevation: Surface Conditions: Near Level, Grass
 Date Finished: 28/2/22 Water Level: 1.6m 28/02/2022

HAND AUGER LOG WITH SCALA 21640 - AH17-AH22 - 22 DUKE ST - 28FEB2022.GPJ S+R 2013.GDT 5/5/22



Appendix C

Past Investigation Logs and Plans

HAND AUGER BOREHOLE - HA01-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MP Checked by: TL		Position: Survey Source:		Elevation: Datum:		Hole Diameter: 50mm Angle from horizontal: 90°								
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments Rock: Weathering; colour; fabric; rock name; strength; additional comments	Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments	
									5	10	15	20		
Tauranga Group					OL: Topsoil.									
					CL: Silty CLAY: orange. Very stiff, moist, low plasticity.		MS	V-148(49)						
					CH: CLAY, with minor silt: orange. Very stiff, moist, high plasticity.		MS	V-101(40)						
			1		...becoming light grey		M							
					...becoming stiff		MS	V-104(48)						
							IS	V-99(57)						
			2				MS	V-97(45)						
						...becoming with trace fine sand and peat, has texture of fine to medium sand		MS	V-77(38)					
						...becoming very stiff with minor coarse sand and fine gravel of completely weathered extremely weak SILTSTONE, very well rounded		MS	V-112(31)					
			3				W							
Waitemata Group					CH: CLAY, with some fine sand: light grey. Very stiff, moist, high plasticity.		S	V-153(36)						
					MH: Clayey SILT, with some fine sand: grey. Very stiff, wet, high plasticity.		MS	V-120(31)						
					ML: Fine sandy SILT, with some clay: grey. Very stiff, wet, low plasticity.		S	V-148(34)						
		4			Borehole terminated at 4.0m									
		5												

Termination reason: Target Depth Reached

Remarks: Groundwater seepage at 2.1 meters, standing groundwater at 2.8 meters at end of borehole.

HAND AUGER BOREHOLE - HA02-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 01/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MB Position: Elevation:
 Checked by: TL Survey Source: Datum: Hole Diameter: 50mm
 Angle from horizontal: 90°

Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description		Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments
					Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments	Rock: Weathering; colour; fabric; rock name; strength; additional comments				5	10	15	20	
Topsoil	▼		1		OL: Organic SILT: black. Stiff, moist, low plasticity.		M		V-63(8)					
					...becoming dark brown									
					...becoming with some wood inclusions									
					...becoming saturated									
					...becoming firm									
Tauranga Group			2		CL: Silty CLAY, with some fine sand and organic inclusions: brown. Stiff, moist, low plasticity.		MS		V-90(25)					
Waitemata Group			3		ML: Fine to medium sandy SILT, with some clay: grey. Stiff, moist, low plasticity.		M		V-90(5)					
					...becoming very stiff									
			4		Borehole terminated at 4.0m				V-150(27)					
			5											

Termination reason: Target Depth Reached

Remarks: Groundwater seepage at 1.0 meter, standing groundwater at 1.4 meters at end of borehole

HAND AUGER BOREHOLE - HA03-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 01/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MB Checked by: TL		Position: Survey Source:		Elevation: Datum:		Hole Diameter: 50mm Angle from horizontal: 90°								
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description		Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments
					Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments	Rock: Weathering; colour; fabric; rock name; strength; additional comments				5	10	15	20	
Tauranga Group			0		OL: Topsoil.									
			0.5		MH: Clayey SILT: brown (organic stained). Stiff, moist, high plasticity.		ES		V-68(7)					
			1.0		CL: Silty CLAY: light brown. Very stiff, moist, low plasticity.		M		V-191+					
			1.5						V-191+					
			2.0		...becoming wet		ES		V-101(7)					
			2.5				W							
			3.0		OL: Silty organic CLAY, with wood inclusions: dark brown. Saturated, firm, low plasticity.		S		V-NA (SV sinking)					
			3.5		CL: Sandy CLAY, with minor silt: brownish grey. Very stiff, moist, low plasticity.		M		V-191+					
			4.0		ML: Pumiceous sandy SILT: light grey. Soft, wet, no plasticity.		W							
			4.5		CH: CLAY: dark brown. Soft, saturated, high plasticity.		IS		V-25(14)					
		5.0		...with trace organic inclusions		S		MS	V-16(8)					
		5.5						MS	V-21(7)					
			4.0		Borehole terminated at 4.0m									

Termination reason: Target Depth Reached

Remarks: Standing groundwater at 1.0 meter at end of borehole

HAND AUGER BOREHOLE - HA04-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MB Checked by: TL		Position: Survey Source:		Elevation: Datum:		Hole Diameter: 50mm Angle from horizontal: 90°								
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description		Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments
					Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments	Rock: Weathering; colour; fabric; rock name; strength; additional comments				5	10	15	20	
Tauranga Group			0		OL: Topsoil.									
			0.5		MH: Clayey SILT, with trace topsoil: brown, Very stiff, moist, high plasticity.			MS	V-134(49)					
			1.0		CL: Silty CLAY: light grey, mottled orange. Stiff, moist, low plasticity.			MS	V-90(38)					
			1.5		...with some coarse sand, very stiff			MS	V-175(68)					
			2.0		...sand absent, stiff			MS	V-89(30)					
Waitemata Group			2.2				M	S	V-60(10)					
			2.5		CL: Silty CLAY: grey. Very stiff, moist, low plasticity.			MS	V-77(25)					
			3.0					MS	V-120(33)					
			3.5						V-191+					
			4.0		Borehole terminated at 4.0m				V-191+					
			4.0						V-UTP					

Termination reason: Target Depth Reached

Remarks: Groundwater seepage at 2.2 meters, standing groundwater at 2.0 meters at end of borehole

HAND AUGER BOREHOLE - HA05-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 01/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MB		Position:		Elevation:		Hole Diameter: 50mm				
Checked by: TL		Survey Source:		Datum:		Angle from horizontal: 90°				
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description		Dynamic Cone Penetrometer (Blow/100 mm)	Comments		
					Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments	Rock: Weathering; colour; fabric; rock name; strength; additional comments				
				Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	5	10	15	20
Tauranga Group			0	OL: Topsoil.						
			1	MH: Clayey SILT, with some fine sand: orange. Very stiff, moist, high plasticity.	S	V-161(33)				
			2	ML: SILT, with some fine sand and clay: orange. Very stiff, moist, low plasticity.	MS	V-137(36)				
			3	ML: Fine sandy SILT, with some clay: light grey. Very stiff, wet, low plasticity.	MS	V-191+				
			4	...becoming wet		V-191+				
			5	...becoming stiff		V-191+				
			6		MS	V-77(22)				
			7		MS	V-101(33)				
			8		MS	V-109(36)				
			9		MS	V-137(46)				
		10		MS	V-142(41)					
		11	Borehole terminated at 4.0m							

Termination reason: Target Depth Reached

Remarks: Groundwater seepage at 2.0 meters, standing groundwater at 3.4 meters at end of borehole

HAND AUGER BOREHOLE - HA06-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 01/12/2015
 Borehole Location: See site plan



Logged by: MB Checked by: TL		Position: Survey Source:	Elevation: Datum:	Hole Diameter: 50mm Angle from horizontal: 90°										
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments Rock: Weathering; colour; fabric; rock name; strength; additional comments	Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments	
									5	10	15	20		
Tauranga Group					OL: Topsoil.		S	V-55(11)						
							MS	V-71(25)						
			1		CL: Silty CLAY, with trace wood inclusions: brown (organic stained). Very stiff, moist, low plasticity.		MS	V-150(41)						
					CH: CLAY, with some silt and fine sand: greyish brown. Very stiff, moist, high plasticity.		M	V-120(55)						
			2		...becoming stiff		MS	V-89(44)						
							MS	V-85(34)						
							MS	V-93(41)						
			3		CL: Silty CLAY, with some fine sand: brownish grey, mottled black. Stiff, moist, low plasticity.		MS	V-96(30)						
					...becoming wet and interbedded with some sandy and clayey SILT beds		W	V-86(27)						
			4		Borehole terminated at 4.0m		MS	V-97(30)						
			5											

Termination reason: Target Depth Reached

Remarks: Groundwater inflow at 2.8 meters, standing groundwater at 2.2 meters at end of borehole

HAND AUGER BOREHOLE - HA07-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



Logged by: MB Checked by: TL		Position: Survey Source:		Elevation: Datum:		Hole Diameter: 50mm Angle from horizontal: 90°								
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments Rock: Weathering; colour; fabric; rock name; strength; additional comments	Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm) 5 10 15 20				Comments	
Tauranga Group	▼		1		OL: Organic clayey SILT: dark brownish black. Stiff, moist, low plasticity.		S	V-55(8)						
					CL: Silty CLAY, with some fine sand: light greyish brown. Firm, moist, low plasticity.		S	V-34(7)						
					CL: Sandy CLAY, with some organic inclusions: greyish orange. Very stiff, moist, low plasticity.	M	S	V-191(27)						
					...100 mm thick: with subordinate wood inclusions		S	V-130(23)						
Waitemata Group			2		ML: Sandy SILT, with some clay: grey. Very stiff, moist, low plasticity.		ES	V-164(14)						
					SM: Silty fine to coarse SAND: grey. 'Dense', moist.			V-UTP						
					Borehole terminated at 2.4m									
			3											
			4											
			5											

Termination reason: Unable To Penetrate Further

Remarks: Groundwater encountered at 1.0 meter

HAND AUGER BOREHOLE - HA08-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MB Checked by: TL		Position: Survey Source:		Elevation: Datum:		Hole Diameter: 50mm Angle from horizontal: 90°								
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments Rock: Weathering; colour; fabric; rock name; strength; additional comments	Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments	
									5	10	15	20		
Tauranga Group					OL: Topsoil.									
					ML: SILT, with some clay: brownish orange. Very stiff, moist, low plasticity.			V-101(14)						
								V-120(16)						
				1		CL: Silty CLAY: light orange brown. Very stiff, moist, low plasticity.	M		V-123(38)					
								V-115(36)						
				2		MH: Clayey SILT, with some fine sand and trace organic inclusions: brown. Stiff, wet, high plasticity.			V-74(19)					
								V-55(7)						
								V-68(7)						
				3			W		V-44(25)					
									V-55(16)					
			4		Borehole terminated at 4.0m			V-88(30)						

Termination reason: Target Depth Reached

Remarks: Groundwater seepage encountered at 2.0, standing groundwater at 3.0 meters at end of borehole.

HAND AUGER BOREHOLE - HA09-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 01/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MB Checked by: TL		Position: Survey Source:		Elevation: Datum:		Hole Diameter: 50mm Angle from horizontal: 90°								
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments Rock: Weathering; colour; fabric; rock name; strength; additional comments	Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments	
									5	10	15	20		
Tauranga Group			0		OL: Topsoil.									
			0.5		CL: Silty CLAY: orange. Very stiff, moist, low plasticity.		MS	V-161(46)						
			1.0		CH: CLAY: light grey mottled orange. Very stiff, moist, high plasticity.		M	MS V-118(41)						
			1.5		CH: CLAY: light grey mottled orange. Very stiff, moist, high plasticity.			MS V-137(62)						
			2.0		...with some silt trace fine sand. Almost white with orange mottles.			MS V-135(60)						
			2.4		CL: Silty CLAY: orange/red/light grey. Stiff, moist, low plasticity.			IS V-96(55)						
			2.8		...with fine to medium sized sand grains			MS V-74(19)						
			3.2					MS V-82(21)						
			3.8				W	MS V-109(33)						
			4.0			Borehole terminated at 4.0m		S	V-98(14)					
			4.0				MS	V-93(25)						

Termination reason: Target Depth Reached

Remarks: Groundwater seepage at 2.4metres, standing groundwater at 2.0 metres at end of borehole.

HAND AUGER BOREHOLE - HA10-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



Logged by: MP Checked by: TL		Position: Survey Source:		Elevation: Datum:		Hole Diameter: 50mm Angle from horizontal: 90°								
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description		Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments
					Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments	Rock: Weathering; colour; fabric; rock name; strength; additional comments				5	10	15	20	
Tauranga Group					OL: Topsoil.									
					CL: Silty CLAY: brown. Stiff, moist, low plasticity.									
					ML: Fine sandy SILT, with minor clay: brown, mottled orange. Stiff, moist, low plasticity.		S	V-52(12)						
					MH: Clayey SILT: brown. Stiff, moist, high plasticity.		S	V-66(10)						
Waitemata Group			1		...becoming very stiff									
					Interbedded ML: fine sandy SILT with some clay and CH: CLAY, with trace fine sand: grey. Very stiff, moist, respectively low and high plasticity.		M	V-148(33)						
			2				MS	V-162(47)						
								V-UTP						
					Borehole terminated at 2.6m									
			3											
			4											
			5											

Termination reason: Unable To Penetrate Further

Remarks: Groundwater at 1.6 meters at end of borehole.

HAND AUGER BOREHOLE - HA11-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MP		Position:		Elevation:		Hole Diameter: 50mm					
Checked by: TL		Survey Source:		Datum:		Angle from horizontal: 90°					
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description		Dynamic Cone Penetrometer (Blow/100 mm)	Comments			
					Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments	Rock: Weathering; colour; fabric; rock name; strength; additional comments					
				Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	5	10	15	20	
Topsoil					OL: Topsoil.						
Tauranga Group					CL: Silty CLAY: brown. Firm, moist, low plasticity.	M	MS	V-30(10)			
					ML: Fine Sandy SILT: brown. Stiff, wet, low plasticity.		MS	V-56(25)			
			1		...becoming dark brown	W	S	V-75(16) V-UTP			
Waitemata Group					Interlayered CH:CLAY and ML:Fine Sandy SILT: grey, Hard, moist, low/high plasticity.	M		V-UTP			
Borehole terminated at 1.7m											
			2								
			3								
			4								
			5								

Termination reason: Unable To Penetrate Further

Remarks: Standing groundwater at 1.1 metres at end of borehole

HAND AUGER BOREHOLE - HA12-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 01/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MB Position: Elevation:
 Checked by: TL Survey Source: Datum: Hole Diameter: 50mm
 Angle from horizontal: 90°

Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments Rock: Weathering; colour; fabric; rock name; strength; additional comments	Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments
									5	10	15	20	
Topsoil					OL: Topsoil.		S	V-88(14)					
					MH: Clayey SILT: with some fine sand, brown to dark brown. Stiff, moist to wet, high plasticity. ...becoming wet	M to W	S	V-68(14)					
Tauranga Group			1		ES V-68(8)		ES	V-68(8)					
					CL: Silty CLAY: with trace fine sand, brown with slight orange stains. Stiff, moist, low plasticity.	M	MS	V-82(30)					
			2		CL: Sandy CLAY: with some silty SAND, brown. Stiff, moist to wet, low plasticity. SAND is fine to coarse grained.		S	V-93(22)					
						M to W	S	V-98(19)					
Waitemata Group							S	V-96(19)					
			3		ML: Sandy SILT: with some clay, grey. Hard, moist to wet, low plasticity.			V-UTP					
					MH: Clayey SILT: with sand, grey. Hard, moist, low plasticity.	M		V-UTP					
			4		Borehole terminated at 4.0m			V-UTP					
			5										

Termination reason: Target Depth Reached

Remarks: Groundwater seepage at 1.2 metres, standing groundwater at 1.0 metre at end of borehole.

HAND AUGER BOREHOLE - HA13-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MB Position: Elevation: Hole Diameter: 50mm
 Checked by: TL Survey Source: Datum: Angle from horizontal: 90°

Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments Rock: Weathering; colour; fabric; rock name; strength; additional comments	Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments	
									5	10	15	20		
Waitemata Group			0		OL: Topsoil.									
			0.5		CL: Silty CLAY: orange. Hard, moist, low plasticity.			V-191+						
			1.0		CH: CLAY: orange. Very stiff, moist, high plasticity.		MS	V-123(55)						
			1.5		ML: Sandy SILT: with some clay, light grey with some orange mottles. Very stiff to hard, moist, low plasticity.		M	V-107(36)						
			2.0		...becoming wet			V-191+						
			2.5		...becoming wet			V-UTP V-UTP						
			3.0		...becoming grey			V-UTP						
		3.1		Borehole terminated at 3.1m			V-UTP							

Termination reason: Unable To Penetrate Further

Remarks: Groundwater seepage at 2.0 metres, standing groundwater at 2.9 metres at end of borehole.

HAND AUGER BOREHOLE - HA14-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



Logged by: MB Checked by: TL		Position: Survey Source:		Elevation: Datum:		Hole Diameter: 50mm Angle from horizontal: 90°				
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments Rock: Weathering; colour; fabric; rock name; strength; additional comments	Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm) 5 10 15 20	Comments
Waitemata Group			0		OL: Topsoil					
			0.5		CL: Silty CLAY: with topsoil in cracks, orange. Very stiff to hard, moist, low plasticity. Some limonite staining.			V-UTP		
			1.0		...trace topsoil absent			S V-142(26)		
			1.5		...light grey streaked orange			S V-85(21)		
			2.0		MH: Clayey SILT: orange. Stiff, moist, low plasticity.	M		V-UTP		
			2.5		ML: SILT: orange. Hard, moist, low to no plasticity.			V-UTP		
			3.0		CH: CLAY: orange/grey. Hard, moist to wet, high plasticity.			V-UTP		
			3.5		Interlayered CH/CL:CLAY and MH: SILT: grey. Hard, high plasticity			V-UTP		
			4.0		Borehole terminated at 4.0m	M to W		V-UTP		
				5.0						

Termination reason: Target Depth Reached

Remarks: Standing groundwater at 3.3 metres at end of borehole.

HAND AUGER BOREHOLE - HA15-15

Client: Neil Construction Limited
 Project: Riverhead and Cambridge Road Subdivision
 Site Address: Riverhead
 Project No: AKL2016_0280
 Date: 02/12/2015
 Borehole Location: See site plan



1:25 Sheet 1 of 1

Logged by: MP		Position:		Elevation:		Hole Diameter: 50mm								
Checked by: TL		Survey Source:		Datum:		Angle from horizontal: 90°								
Unit	Groundwater	RL (m)	Depth (m)	Graphic Log	Material Description		Moisture Condition	Sensitivity	Shear Strengths (kPa) Peak (Residual)	Dynamic Cone Penetrometer (Blow/100 mm)				Comments
					Soil: USC; Soil type; colour; structure; strength; moisture; bedding; plasticity; sensitivity; additional comments	Rock: Weathering; colour; fabric; rock name; strength; additional comments				5	10	15	20	
Tauranga Group			0	OL: Topsoil.										
			0.5	ML: SILT: with some clay, brown. Very stiff, moist, high plasticity.		Q	V-144(7)							
			1.0	CL: Silty CLAY: brown. Very stiff, moist, low plasticity.		S	V-133(23)							
			1.5	CH: CLAY: orange mottled light grey. Stiff, moist, high plasticity. <i>...becoming brown (organic stained)</i>		MS	V-62(25)							
			2.0	CL: Silty CLAY: brown. Stiff, moist, low plasticity.		S	V-71(14)							
Waitemata Group			2.3	Interlayered CH:CLAY and MH:Clayey SILT: grey. Hard, moist, high plasticity.			V-192+							
			2.6	Borehole terminated at 2.6m			V-UTP							
			3.0											
			4.0											
			5.0											

Termination reason: Unable To Penetrate Further

Remarks: Standing groundwater at 2.3 metres at end of borehole.



LEGEND

- STREAM FORMATION
- POND
- AREAS OF FILL OR TOPSOIL STOCKPILES
- HA0X-15 DENOTES APPROXIMATE HAND AUGER BOREHOLE LOCATION
- DENOTES APPROXIMATE SITE BOUNDARY

IMAGE SOURCED FROM AUCKLAND COUNCIL GIS VIEWER

<p>CMW Geosciences (NZ) Ltd Chapman Morton Woodward</p>	CLIENT: NEIL CONSTRUCTION LIMITED	DRAWN: TL	PROJECT: AKL2016_0280
	PROJECT: RIVERHEAD AND CAMBRIDGE ROADS RIVERHEAD	CHECKED: AA	FIGURE: 01
	TITLE: SITE AND GEOMORPHOLOGY PLAN	REVISION: 0	SCALE: 1:2500
		DATE: 03/12/2015	SHEET: A3



LEGEND:
 HA01-18 HAND AUGER (HA) LOCATION
 SITE BOUNDARY

NOTES:
 1. BASE PLAN ADAPTED FROM: AUCKLAND COUNCIL GIS MAP



CLIENT:	FLETCHER LIVING	DRAWN:	FMS	PROJECT No:	AKL2018-0160
PROJECT:	POOK BLOCK, RIVERHEAD	CHECKED:	JW	FIGURE:	01
TITLE:	SITE INVESTIGATION PLAN	REVISION:	A	SCALE:	1:4000
		DATE:	01/10/2018	SHEET:	A3

BOREHOLE LOG - HA01-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 25/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: JW		Position: E.1741246.0m N.5930310.0m		Elevation: RL 27.30m		Hole Diameter: 50mm							
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°							
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results										
				27.3			OL: TOPSOIL						
		0.4	Peak = 203+ kPa	27.0			CH: Silty CLAY: grey streaked orange. High plasticity. Trace limonite staining and trace rootlets. (Puketoka Formation)						
		0.8	Peak = UTP				... at 0.80m, becoming orange streaked grey						
		1.2	Peak = 203+ kPa	26.4	1		CH: CLAY with minor silt and trace fine sand: grey streaked orange. High plasticity. (Puketoka Formation) ... at 1.10m, with trace rootlets	M					
		1.6	Peak = 203+ kPa				... at 1.60m, with some fine sand	VSt					
		2.0	Peak = 203+ kPa	25.3	2		CH: Sandy CLAY with trace silt: grey. High plasticity. Sand is fine to medium grained with trace organic staining. (Puketoka Formation)						
		2.4	Peak = 119kPa Residual = 44kPa				... at 2.50m, becoming saturated with trace fine organic inclusions				HA		
		2.8	Peak = 125kPa Residual = 44kPa				... at 3.00m, 100mm layer of organic stained CLAY, black, high plasticity						
		3.2	Peak = 58kPa Residual = 27kPa	24.2	3		CH: CLAY with minor fine to medium sand and trace silt: grey. High plasticity. (Puketoka Formation) ... at 3.40m, becoming greenish grey			St			
		3.6	Peak = 116kPa Residual = 61kPa				... at 3.60m, 100mm layer of organic stained CLAY, black with organic inclusions			S			
		4.0	Peak = 139kPa Residual = 73kPa	23.3	4		CH: Sandy CLAY with minor silt: grey. High plasticity. Sand is fine to medium grained. (Puketoka Formation) ... at 3.90m, 50mm seam of decomposed wood						
		4.4	Peak = 160kPa Residual = 116kPa							VSt			
		4.8	Peak = UTP	22.8			CL: Sandy CLAY: greenish grey. Low plasticity. Sand is medium to coarse grained, sub-rounded with trace fine sand grained pumiceous clasts. (Puketoka Formation)						
					5		Borehole terminated at 5.0 m						

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 2.5m.

BOREHOLE LOG - HA02-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: FYZ		Position: E.1741202.0m N.5930091.0m		Elevation: RL 31.40m		Hole Diameter: 50mm							
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°							
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results										
				31.4			OL: TOPSOIL						
		0.4	Peak = 197+kPa	31.1			ML: Clayey SILT: light brown, low plasticity. (Puketoka Formation) ... at 0.50m, with trace black organic deposits.	M					
		0.8	Peak = 197+kPa										
		1.2	Peak = 197+kPa	30.3 30.2	1		MH: SILT with some clay : brown, high plasticity. (Puketoka Formation) CH: CLAY: light brown with orange streaks, high plasticity. (Puketoka Formation)	M to W	VSt to H				
		1.6	Peak = 197+kPa	29.9 29.8			ML: SILT with minor clay: brownish grey with light orange streaks, low plasticity. (Puketoka Formation) CH: CLAY: light grey, high plasticity. (Puketoka Formation)						
		2.0	Peak = 197+kPa		2			M					
		2.4 2.5-3.0	Peak = 99kPa Residual = 70kPa 1 D				... at 2.40m, becoming with minor light orange streaks.		St	HA			
		2.8	Peak = 110kPa Residual = 82kPa						VSt				
		3.2	Peak = 87kPa Residual = 56kPa				... at 3.20m, becoming light brownish grey.		St				
		3.6	Peak = 127kPa Residual = 42kPa					W					
		4.0	Peak = 85kPa Residual = 59kPa	27.6	4		CH: Silty CLAY with trace black organic deposits : dark brown with minor light orange streaks, high plasticity. (Puketoka Formation) ... at 4.10m, becoming light grey with some fine sand		VSt				
		4.4	Peak = 104kPa Residual = 56kPa	27.0			CH: Pumiceous silty CLAY with minor white fine to medium sub-angular pumiceous sand : light brownish grey, high plasticity. (Puketoka Formation)		VSt				
		4.8	Peak = 127kPa Residual = 68kPa										
					5		Borehole terminated at 5.0 m						

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 2.0m.

BOREHOLE LOG - HA03-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 25/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: JW		Position: E.1741176.0m N.5929870.0m		Elevation: RL 33.40m		Hole Diameter: 50mm							
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°							
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results										
				33.4			OL: TOPSOIL						
		0.4	Peak = 160kPa Residual = 29kPa										
				32.8			CH: CLAY with trace silt and trace fine sand: dark brown. High plasticity. Organic staining with trace organics inclusions. (Alluvium)			VSt			
		0.8	Peak = 102kPa Residual = 29kPa				... at 1.00m, mottled black with minor organic inclusions			M			
				1									
		1.2	Peak = 99kPa Residual = 29kPa				... at 1.50m, becoming saturated						
				31.8			OH: CLAY with some organics and trace silt: dark brown streaked black. High plasticity. With some organic inclusions and minor rootlets. (Alluvium)						
		1.6	Peak = 58kPa Residual = 26kPa										
		2.0	Peak = 64kPa Residual = 29kPa							St			
				2									
		2.4	Peak = 73kPa Residual = 26kPa								HA		
				30.8			OH: Organic CLAY: black. High plasticity. (PEAT) (Alluvium)						
		2.8	Peak = 116kPa Residual = 38kPa										
				3									
		3.2	Peak = 116kPa Residual = 44kPa							S	VSt		
				29.8			CH: Organic stained CLAY with trace silt: dark brown/black. High plasticity. Trace organic inclusions. (Alluvium)						
		3.6	Peak = 87kPa Residual = 58kPa										
				4			... at 4.00m, with some organics and trace peat inclusions			St			
		4.0	Peak = 203+ kPa										
				29.0			CH: CLAY with some fine to medium sand and trace silt: dark grey/organic stained. High plasticity. Trace organic inclusions. (Puketoka Formation)				VSt		
		4.4	Peak = 203+ kPa										
		4.8	Peak = UTP										
				5			Borehole terminated at 5.0 m						

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 1.5m.

BOREHOLE LOG - HA04-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: JW		Position: E.1741125.0m N.5929678.0m		Elevation: RL 35.20m		Hole Diameter: 50mm							
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°							
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results										
				35.2			OL: TOPSOIL						
		0.4	Peak = 134kPa Residual = 26kPa	34.8			CL: Silty CLAY: dark brown. Low plasticity. Trace rootlets, trace organic staining and trace organic inclusions. (Alluvium) CH: Silty CLAY: brown. High plasticity. Trace organics. (Alluvium)			VSt			
		0.8	Peak = 160kPa Residual = 35kPa				... at 0.80m, becoming brown mottled black			M			
		1.2	Peak = 44kPa Residual = 29kPa	34.0			... at 1.20m, with minor organic inclusions CH: CLAY with some organics: dark brown streaked black. High plasticity. Trace rootlets. (Alluvium)						
		1.6	Peak = 44kPa Residual = 32kPa				... at 1.50m, 50mm layer of brown decomposed wood			F			
		2.0	Peak = 49kPa Residual = 17kPa	33.2	2		... at 1.90m, 100mm layer of decomposed wood OH: Organic CLAY: black. High plasticity. Trace fibrous peat inclusions and trace rootlets. (PEAT) (Alluvium)				HA		
		2.4	Peak = 61kPa Residual = 17kPa										
		2.8	Peak = 73kPa Residual = 23kPa										
		3.2	Peak = 87kPa Residual = 73kPa	32.0	3		OH: Organic stained CLAY with trace rootlets: dark brown/black. High plasticity. (Alluvium)			St			
		3.6	Peak = 90kPa Residual = 70kPa							S			
		4.0	Peak = 87kPa Residual = 29kPa		4								
		4.4	Peak = 102kPa Residual = 73kPa								VSt		
		4.8	Peak = 73kPa Residual = 46kPa								St		
					5		Borehole terminated at 5.0 m						

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 2.0m.

BOREHOLE LOG - HA05-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: JW		Position: E.1741069.0m N.5929476.0m		Elevation: RL 37.00m		Hole Diameter: 50mm									
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°									
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)			Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results									5	10	15	
				37.0			OL: TOPSOIL								
		0.4	Peak = 87kPa Residual = 29kPa					St							
				36.4			OH: Organic CLAY with trace silt: black. High plasticity. (PEAT) (Alluvium)	M							
		0.8	Peak = 131kPa Residual = 17kPa					VSt							
				1											
		1.2	Peak = 67kPa Residual = 15kPa												
				1.6				St							
				35.2			OH: Organic CLAY with some rootlets: black. High plasticity. Minor inclusions of fibrous peat. (PEAT) (Alluvium)								
		2.0	Peak = 145kPa Residual = 29kPa					VSt							
				2											
		2.4	Peak = 70kPa Residual = 29kPa												
				2.8											
				3											
		3.2	Peak = 87kPa Residual = 58kPa				CH: Organic stained CLAY with minor silt and trace fine sand: dark brown/black. High plasticity. Trace rootlets. (Alluvium)	S							
				33.8											
		3.6	Peak = 73kPa Residual = 29kPa				... at 3.60m, with minor rootlets	St							
				4											
		4.0	Peak = 78kPa Residual = 29kPa												
				4.4											
		4.4	Peak = 87kPa Residual = 61kPa												
				4.8											
		4.8	Peak = 93kPa Residual = 58kPa												
				5			Borehole terminated at 5.0 m								

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 1.5m.

BOREHOLE LOG - HA06-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: FYZ		Position: E.1741393.0m N.5930323.0m		Elevation: RL 29.50m		Hole Diameter: 50mm									
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°									
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)			Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results									5	10	15	
				29.5			OL: TOPSOIL								
		0.4	Peak = 113kPa Residual = 17kPa	29.1			CH: Silty CLAY: dark brown, high plasticity. (Puketoka Formation)	M to W							
		0.8	Peak = 104kPa Residual = 14kPa				... at 0.70m, with trace white pumiceous sand.			VSt					
		1.2	Peak = 130kPa Residual = 45kPa	28.3			... at 1.00m, with trace black organic deposits.								
		1.6	Peak = 85kPa Residual = 56kPa				CH: Silty CLAY with minor fine sand and trace black organic deposits: light brownish grey, high plasticity. (Puketoka Formation)								
		2.0	Peak = 73kPa Residual = 42kPa							St					
		2.4	Peak = 96kPa Residual = 51kPa				... at 2.50m, with trace black organic deposits.			W		HA			
		2.8	Peak = 155kPa Residual = 85kPa	26.7			CH: Silty CLAY with some fine sand: light brownish grey, high plasticity. (Puketoka Formation)								
		3.2	Peak = 197+kPa	26.3			CH: Sandy CLAY with fine sand: light brownish grey, high plasticity. (Puketoka Formation)								
		3.6	Peak = 197+kPa												
		4.0	Peak = 197+kPa												
		4.4	Peak = UTP				SM: SAND with minor silt and organic wood deposits : dark brown, fine to medium grand. (Puketoka Formation)								
		4.8	Peak = UTP					S		MD to D					
					5		Borehole terminated at 5.0 m								

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 0.8m.

BOREHOLE LOG - HA07-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: FYZ		Position: E.1741320.0m N.5930025.0m		Elevation: RL 31.70m		Hole Diameter: 50mm							
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°							
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results										
				31.7			OL: TOPSOIL						
		0.4	Peak = 85kPa Residual = 23kPa	31.3			ML: Clayey SILT: dark brown, low plasticity. (Puketoka Formation)	M to W	St				
		0.8	Peak = 110kPa Residual = 14kPa										
					1		... at 1.00m, with trace black organic deposits.	W to S					
		1.2	Peak = 113kPa Residual = 48kPa						VSt				
		1.6	Peak = 73kPa Residual = 56kPa	30.4			CH: Silty CLAY with minor white fine to medium grand sub-angular pumiceous sand: light brownish grey, high plasticity. (Puketoka Formation) ... at 1.40m, with trace rootlets.						
		2.0	Peak = 76kPa Residual = 56kPa	29.7		2	CH: Silty CLAY with trace fine sand and with some black organic deposits: light brownish grey, high plasticity. (Puketoka Formation)	W	St				
		2.4	Peak = 116kPa Residual = 73kPa				... at 2.50m, with trace white fine pumiceous sand.			HA			
		2.8	Peak = 183kPa Residual = 56kPa										
		3.2	Peak = 118kPa Residual = 48kPa	28.7		3	CH: Silty CLAY with minor white fine to coarse grand sub-angular pumiceous sand and trace black organic deposits: light brownish grey, high plasticity. (Puketoka Formation)	W to S					
		3.6	Peak = 141kPa Residual = 39kPa	28.2			CL: Sandy CLAY with minor white fine to medium grand sub-angular pumiceous sand: light grey, low plasticity. (Puketoka Formation)		S				
		4.0	Peak = 132kPa Residual = 31kPa			4							
		4.4	Peak = 85kPa Residual = 68kPa	27.5			CH: Silty CLAY with some fine sand: light grey, high plasticity. (Puketoka Formation)	W to S	St				
		4.8	Peak = 127kPa Residual = 85kPa						VSt				
					5		Borehole terminated at 5.0 m						

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 0.8m.

BOREHOLE LOG - HA08-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: JW		Position: E.1741270.0m N.5929831.0m		Elevation: RL 33.20m		Hole Diameter: 50mm							
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°							
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results										
				33.2			OL: TOPSOIL						
		0.4	Peak = 134kPa Residual = 20kPa	32.9			CL: Silty CLAY: brown. Low plasticity. Trace organics. (Alluvium)						
							... at 0.60m, mottled black with trace rootlets			VSt			
		0.8	Peak = 186kPa Residual = 35kPa							M			
		1.2	Peak = 99kPa Residual = 20kPa										
		1.6	Peak = 87kPa Residual = 17kPa	31.7			CH: CLAY with some organics: dark brown streaked black. High plasticity. (Alluvium)						
		2.0	Peak = 87kPa Residual = 15kPa	31.2	2		OH: Organic CLAY with trace rootlets: black. High plasticity. With some fibrous peat inclusions. (PEAT) (Alluvium)						
		2.4	Peak = 119kPa Residual = 17kPa				... at 2.40m, becoming low plasticity				HA		
		2.8	Peak = 119kPa Residual = 23kPa										
		3.2	Peak = 163kPa Residual = 58kPa										
		3.6	Peak = 87kPa Residual = 29kPa										
		4.0	Peak = 78kPa Residual = 46kPa	29.2	4		CH: CLAY with trace fine sand and trace silt: brown. High plasticity. Organic stained. (Alluvium)						
		4.4	Peak = 116kPa Residual = 78kPa				... at 4.40m, greyish brown with trace fine grained pumiceous clasts						
		4.8	Peak = 160kPa Residual = 87kPa				... at 4.80m, with minor medium gravel sized pumiceous clasts				VSt		
					5		Borehole terminated at 5.0 m						

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 1.9m.

BOREHOLE LOG - HA09-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 25/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: JW		Position: E.1741514.0m N.5930292.0m		Elevation: RL 30.00m		Hole Diameter: 50mm									
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°									
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)			Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results									5	10	15	
				30.0			OL: TOPSOIL								
		0.4	Peak = 84kPa Residual = 20kPa	29.5			OL: TOPSOIL: with trace silty mulch/garden material. Reddish brown. Low plasticity.	M							
							... at 1.00m, 50mm seam of decomposed wood								
		1.2	Peak = 160kPa Residual = 55kPa	28.9			CL: Silty CLAY with minor fine to medium sand: greyish brown. Low plasticity. Trace organics. (Puketoka Formation) ... at 1.20m, trace pumiceous streaks								
		1.6	Peak = UTP	28.4			CH: CLAY with some fine to medium gravel sized pumiceous clasts, minor silt and minor fine to medium sand: whitish grey. High plasticity. (Puketoka Formation)								
		2.0	Peak = UTP	28.0			CH: Sandy CLAY with minor silt: greyish brown. High plasticity. Sand is fine grained. (Puketoka Formation) ... at 1.95m, 50mm layer of organic stained CLAY								
				27.8			CH: CLAY with trace silt and trace fine sand: brownish grey. High plasticity. Trace black organic staining. (Puketoka Formation)								
		2.4	Peak = 142kPa Residual = 87kPa	27.6			CH: Organic stained CLAY: black. High plasticity. Trace organic inclusions. (Puketoka Formation)								
		2.8	Peak = 87kPa Residual = 49kPa	27.2			CH: CLAY with trace silt and trace fine sand: brownish grey. High plasticity. Trace black organic staining. (Puketoka Formation)					HA			
		3.2	Peak = 73kPa Residual = 46kPa	26.5			CH: Organic stained CLAY with minor silt and trace fine to medium sand: black. High plasticity. Trace organic inclusions. (Puketoka Formation)	S							
							... at 3.40m, poor recovery								
		3.6	Peak = 70kPa Residual = 44kPa	26.5			CH: Silty CLAY with minor fine to medium sand: dark brown. High plasticity. Organic staining. (Puketoka Formation)								
		4.0	Peak = 113kPa Residual = 81kPa	26.0			CH: Organic stained CLAY with minor silt and minor fine to coarse sand: dark brown. High plasticity. With trace organic inclusions. (Puketoka Formation)								
		4.4	Peak = 122kPa Residual = 73kPa												
		4.8	Peak = 131kPa Residual = 90kPa												
							Borehole terminated at 5.0 m								

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 0.9m

BOREHOLE LOG - HA10-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: FYZ		Position: E.1741446.0m N.5930126.0m		Elevation: RL 31.70m		Hole Diameter: 50mm								
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°								
Well	Groundwater	Samples & Insitu Tests		Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)			Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results								RL (m)	5	10	
				31.7		OL: TOPSOIL								
		0.4	Peak = 147kPa Residual = 48kPa	31.4		CH: Silty CLAY: dark brown, high plasticity. (Puketoka Formation)	M							
		0.8	Peak = 144kPa Residual = 17kPa	31.1		ML: SILT with minor clay: dark brown, low plasticity. (Puketoka Formation)	VSt							
		1.2	Peak = 99kPa Residual = 39kPa	30.8		CH: Silty CLAY with trace black organic deposits : dark brown, high plasticity. (Puketoka Formation)	M to W							
		1.6	Peak = 105kPa Residual = 42kPa				St							
		2.0	Peak = 99kPa Residual = 28kPa	29.6		CH: CLAY: dark grey, high plasticity. (Puketoka Formation)	VSt							
		2.4	Peak = 144kPa Residual = 39kPa	29.4		CH: Sandy CLAY with some fine grand sand and trace black organic deposits : light brownish grey, high plasticity. (Puketoka Formation)	S							
		2.8	Peak = 113kPa Residual = 56kPa				W to S							
		3.2	Peak = UTP				VSt							
						Borehole terminated at 3.3 m	H							
												20		

Termination reason: Unable to Penetrate Further

Remarks: Groundwater encountered at 1.8m.

BOREHOLE LOG - HA11-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: JW		Position: E.1741362.0m N.5929740.0m		Elevation: RL 33.70m		Hole Diameter: 50mm							
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°							
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)	Structure & Other Observations
		Depth	Type & Results										
				33.7			OL: TOPSOIL						
		0.4-0.8 0.4	1 D Peak = UTP	33.3			CL: Silty CLAY: brown. Low plasticity. Trace organics. (Alluvium)						Expansive Sample
		0.8	Peak = 142kPa Residual = 29kPa				... at 0.80m, becoming high plasticity						
		1.2	Peak = 102kPa Residual = 35kPa				... at 1.00m, mottled black with minor organic inclusions						
		1.6	Peak = 113kPa Residual = 23kPa	32.1			CH: CLAY with minor silt: dark brown mottled black. High plasticity. Organic Stained with trace organic inclusions. (Alluvium)	M					
		2.0	Peak = 122kPa Residual = 41kPa						VSt				
		2.4	Peak = 145kPa Residual = 35kPa	31.6			CH: Organic CLAY: black. High plasticity. Fibrous/plastic peat inclusions. (PEAT) (Alluvium)						
		2.8	Peak = 142kPa Residual = 44kPa				... at 2.40m, becoming low plasticity and with amorphous peat inclusions				HA		
		3.2	Peak = 102kPa Residual = 73kPa				... at 2.80m, becoming saturated						
		3.6	Peak = 87kPa Residual = 44kPa										
		4.0	Peak = 87kPa Residual = 52kPa	29.7			CH: Organic stained CLAY with minor silt: black. High plasticity. With a 2-5mm layer of peat every 100-150mm. (Alluvium)	S					
		4.4	Peak = 90kPa Residual = 44kPa				... at 4.00m, poor recovery						
		4.8	Peak = 87kPa Residual = 58kPa				... at 4.30m, 100mm seam of decomposed wood			St			
					5		Borehole terminated at 5.0 m						

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 2.8m.

BOREHOLE LOG - HA12-18

Client: Fletcher Living
 Project: Pook Block, Lathrope Road, Riverhead
 Site Location: Pook Block, Lathrope Road, Riverhead
 Project No.: AKL2018-0160
 Date: 24/09/2018
 Borehole Location: Refer to site plan



1:25 Sheet 1 of 1

Logged by: JW		Position: E.1741280.0m N.5929421.0m		Elevation: RL 35.00m		Hole Diameter: 50mm									
Checked by: JMJ		Survey Source: Auckland Council GIS		Datum: AUCKHT1946 (NZTM)		Angle from horizontal: 90°									
Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Recovery	Drilling Method/Support	Dynamic Cone Penetrometer (Blows/100mm)			Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results									5	10	15	
				35.0			OL: TOPSOIL								
		0.4	Peak = 102kPa Residual = 35kPa	34.8			CL: Silty CLAY with trace fine sand: orange and light brown. Low plasticity. (Uncontrolled Fill)								
		0.8	Peak = 110kPa Residual = 29kPa	34.6			CH: CLAY with some silt and minor fine sand: greyish brown streaked orange. High plasticity. Trace organic staining and limonite streaks. (Uncontrolled Fill)			VSt					
		1.2	Peak = 87kPa Residual = 35kPa	34.0	1		CH: Silty CLAY: light brown with orange streaks. High plasticity. Trace limonite streaks. (Alluvium)			M					
		1.6	Peak = 90kPa Residual = 38kPa				... at 1.60m, 50mm layer of CLAY with some silt. Yellowish brown mottled orange. High plasticity			St					
		2.0	Peak = 110kPa Residual = 44kPa	33.1	2		CL: Organic stained silty CLAY: dark brown mottled yellowish brown. Low plasticity. Trace rootlets, trace topsoil and peat inclusions. (Alluvium)								
		2.4	Peak = 116kPa Residual = 44kPa												
		2.8	Peak = 119kPa Residual = 73kPa	32.2			CH: Organic CLAY: black. High plasticity. With some plastic peat inclusions. Trace seams of CLAY, yellowish brown. High plasticity. With minor rootlets and minor organics. (PEAT) (Alluvium)			VSt					
		3.2	Peak = 102kPa Residual = 58kPa												
		3.6	Peak = 73kPa Residual = 55kPa							S					
		4.0	Peak = 90kPa Residual = 70kPa												
		4.4	Peak = 87kPa Residual = 58kPa												
		4.8	Peak = 90kPa Residual = 61kPa							St					
					5		Borehole terminated at 5.0 m								

Termination reason: Target Depth Reached

Remarks: Groundwater encountered at 1.9m.