

Attachment 8

Geotech Memo



Urban & Environmental



TECHNICAL MEMORANDUM

DATE: 05 March 2025

W-P REF: 1496-01-24

TO: Ministry of Justice c/- The Building Intelligence Group

ATTN: s 9(2)(a)

FROM: s 9(2)(a), CPEng, FEngNZ

RE: Geotechnical Memorandum to support a referral Fast Track application at 14 Edmonton Road, Henderson

No. of Pages: 6 + attachments (site investigations, CV for s 9(2)(a))

Introduction

The Ministry of Justice (MoJ) proposes to lodge a Notice of Requirement application for a referral project under the Fast Track Approvals Act 2024 for a new Justice Facility at 14 Edmonton Road in Henderson, Auckland.

Wentz-Pacific Ltd (WP) has been retained to undertake geotechnical investigation and assessment of the proposed site for a new courthouse building, located at 14 Edmonton Road, Henderson. A The purpose of this memorandum is to:

- summarise the site investigations undertaken to date;
- provide an overview of the project requirements from a geotechnical engineering perspective;
- identify the potential geotechnical constraints associated with the site, and potential adverse effects of the development proposal; and,
- provide high-level comment on recommendations / mitigation measures that are likely to be required to address any geotechnical constraints or potential adverse effects.

A summary of preliminary conclusions and geotechnical recommendations is also included. A CV with the memo author's qualifications is contained in Attachment A.

Proposed Development and Geotechnical Engineering Requirements

The MoJ has purchased the site at 14 Edmonton Road in anticipation of building a new 'Justice Facility'. Given the proposal is for Notice of Requirement Application and the development proposal for a future building is not confirmed or known, the investigation and assessment provided in this memorandum is based on the concept development scheme for a future building envelope.

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s 9(2)(ba)(i)

. No major earthworks are anticipated to support the construction of a future building on the site.

The geotechnical engineering requirements for the site are considered to be primarily related to foundation support and recommendations for typical minor earthworks related to foundation excavation and site stripping.

Site Investigations to Date

Shallow investigations

Soil & Rock Consultants¹ drilled five hand auger boreholes across the site in August 2018 to depths of between 3 and 5 m below existing ground level (bgl). Within the boreholes shear vane testing at 0.5 metre intervals was carried out to similar depths, and dynamic cone penetrometer (DCP) testing carried out of the base of the boreholes to depths of up to 6.8 m (where practical refusal was encountered in hard material). The approximate locations of the hand auger boreholes are shown in Attachment B, and logs of the hand auger boreholes and DCP testing are contained in Attachment C.

Deep investigations

WP commissioned several deep site investigations at the site in September 2024. Four cone penetrometer tests (CPT01-CPT04) were performed at the approximate locations shown in Figure 1. The CPTs were advanced to depths of between about 6.7 and 13.4 m below existing ground (bgl) where practical refusal was encountered in inferred rock (East Coast Bays Formation). Two deep boreholes (BH01 and BH02) were drilled at the approximate locations shown in Figure 1. The boreholes were drilled to depths of 13.7 and 10.7 m, respectively, and terminated in confirmed bedrock (East Coast Bays Formation). The approximate locations of the deep investigations are shown in Attachment B, and logs of the CPTs and boreholes are contained in Attachment D.

A 3 m deep piezometer was installed in BH01 to allow periodic measurement of the groundwater at this location.

Site Conditions

The roughly rectangular-shaped and flat-lying site encompasses approximately 4450 m². The majority of the site is paved car parking, and part of the parking appears to be used for a bicycle track. A few established trees occupy parts of the perimeter of the site.

The site is bordered the north by the Oratia stream, the Alderman restaurant and Falls Park. Alderman Drive and Edmonton Road run along the west and south sides of the site, respectively. To the east, the site is bounded by the driveway into the Korean Presbyterian Church and primary residential properties beyond.

Generalised Ground Conditions

Published geological information² shows the site to be surfaced with late Pliocene to middle Pleistocene-aged alluvial sediments of the Puketoka Formation (Pup). The deep site investigations confirmed that these shallow sediments are underlain by early Miocene-aged sedimentary rock of the East Coast Bays Formation (Mwe).

¹Geotechnical Due-Diligence Investigation at 14 Edmonton Road, Henderson, Rev C, 13 February 2004, Soil & Rock Consultants.

²Edbrooke, S.W. (compiler), 2001. Geology of the Auckland area. Institute of Geological and Nuclear Sciences 1:250,000 geological map 3.

The ground profile at the site generally consists of:

- ~ 0.2 to 0.6 m: TOPSOIL and / or undocumented FILL
- ~0.6 to 6 m: Firm to very stiff, moderately to highly plastic silty CLAY and clayey SILT (Puketoka Formation alluvium)
- ~6 to 13 m: Dense SAND (residual soil) over very weak, completely to moderately weathered SANDSTONE (ECBF). The depth to rock appears to be shallowest in centre of site and deepens to the east and west

The depth to slightly weathered ECBF rock was proven in the deep boreholes at a depth of about 12 m in BH01 in the northeastern corner of the site, and about 8 m in BH02 in the southwestern corner of the site.

Groundwater

Groundwater was measured (at the time of drilling) in three of the 2018 hand auger boreholes located in the central and eastern half of the site, at depths ranging from 0.8 m to 2.6 m. A 3 m deep piezometer was installed in borehole MH01, located in the northeast corner of the site. This borehole is located relatively close to Oratia Stream which runs relatively close to the northern site boundary.

The groundwater levels measured in the piezometer were:

- 05 September 2024: 2.4 m
- 12 September 2024: 2.3 m
- 19 September 2024: 2.0 m

Wet to saturated soils were logged in both of the deep boreholes at a depth of about 4 m.

The invert of the nearby Oratia Stream was visually estimated to be about 6 m lower than the car park where the piezometer is located. Topographic contour information on the Auckland Council website³ shows the invert to be about 5 m lower than the car park.

Based on the above information, it is inferred that there is a perched water layer across the site at a depth of around 2 m, and possibly shallower in some areas, but that the “permanent” groundwater level is deeper – around 4 m (i.e., closer to the level of the nearby Oratia Stream). This will need to be confirmed by further measurements and possibly installation of a second piezometer should the depth to groundwater be required for design and / or construction.

NZS 1170.5 Site Subsoil Class

Based on the results of our deep investigations, the site subsoil class is ‘Class C – shallow soil’ as defined by NZS 1170.5:2004.

³Auckland Council (2024). GeoMaps, viewed 23 October, <https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>



Potential Geological / Geotechnical Constraints and Hazards

Landsliding, Erosion, Subsidence

The site is flat lying and not bordered by steeply sloping terrain or ground that otherwise appears to be potentially unstable or prone to slippage. At the time of our site investigation, no evidence of erosion or ground subsidence was observed, and the risk of these is considered to be very low.

No mitigation required.

Falling Debris

There are no uphill sources of debris that can impact this site.

No mitigation required.

Liquefaction Hazard

WP's analysis has confirmed that the site soils are not susceptible to liquefaction due to their predominantly fine-grained and plastic nature (shallow clayey and silty soils) and dense state (underlying sandy residual soil from weathering of East Coast Bays formation).

No mitigation required.

Expansive Soils

The near-surface soils found in the hand auger holes are generally characterised as having slight to moderate plasticity, but some highly plastic clayey soils were found at a depth of around 1 m. In the absence of specific laboratory testing to confirm otherwise, the shallow soils should be assumed to be 'Site Class H – Highly Expansive' as described in B1/AS1 or 'H1' as per AS 2870:2011.

Mitigation through standard engineering design.

Compressible Soils

The alluvial Puketoka Formation soils at the site vary in strength and stiffness both vertically and horizontally across the site. However, the site investigations to date have not identified any peat, highly organic, or otherwise very weak and/or compressible soils.

No mitigation required. Deep piles required to support structure as discussed below.

Flooding potential

A small portion of the northern part of the site is shown to be located within an Auckland Council-identified 'flood plain' area (Geomaps, 2025) – indicating that it is predicted to be covered by water as a result of a 1 in 100-year flood. An overland flow path identified as draining an area of between 3 ha and 100 ha with southerly flow direction is also shown to run through the central portion of the site. The potential for flooding at the site is being assessed by others and has not been addressed by WP.

Conclusions and Recommendations

Geotechnical constraints / potential adverse effects of proposed development

No significant geotechnical constraints have been identified on the site and a future building is not considered to have any adverse effects from a geotechnical perspective. The multi-storey structure will require deep foundations (e.g., bored concrete piles) which is not uncommon for support of heavy structures on relatively soft alluvial Puketoka Formation soils.

WP understands that there may be a requirement to include a suspended floor slab to accommodate overland flow beneath the building during a flood event. The floor slab would be structurally designed to span between pile caps and / or foundation beams and comprise typical engineering design without need for special mitigation measures from a geotechnical perspective.

Foundation Considerations

A future building will require a deep pile foundation extending into the slightly weathered East Coast Bays Formation rock. The depth to the top of a suitable founding layer for end-bearing piles (i.e., slightly weathered ECBF rock) is anticipated to range from about 8 m in the western part of the site to about 13 m in the eastern part, and possibly somewhat shallower in the central part of the site.

For conceptual design, an Ultimate Limit State design bearing capacity of 2 MPa can be assumed for bored concrete piles founded in slightly weathered ECBF. This is based on a geotechnical strength reduction factor (ϕ_g) of 0.5 for all load combinations including earthquake overstrength.

The soils supporting shallow foundation beams should be assumed to be highly reactive / expansive (i.e., Site Class H – Highly Expansive in B1/AS1 or H1 in AS 2870:2011) for conceptual design. The reactivity class should be confirmed with appropriate laboratory testing for later stages of design.

Earthworks Considerations

Based on the information from the 2018 Soil & Rock Consultants shallow investigations, it should be assumed that in the order of 0.4 m of topsoil and/or undocumented fill will need to be removed from within building footprints, car parks and driveways, etc. Site earthworks are not anticipated to extend to the perched or permanent ground water tables (depth of about 2 to 2.5 m), hence dewatering of excavations is not anticipated.

Applicability and Limitations

WP's work was completed in general accordance with WP's consultant agreement with the Ministry of Justice (MoJ) dated 21 August 2024. This memorandum was prepared solely for the use of the Ministry of Justice (the Client) and their project consultants with respect to the particular brief given to WP. No other entity or person shall use or rely upon this memorandum without prior review and written agreement by us. This memorandum is for information only and is not intended to be used for design or building consent.

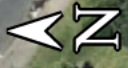
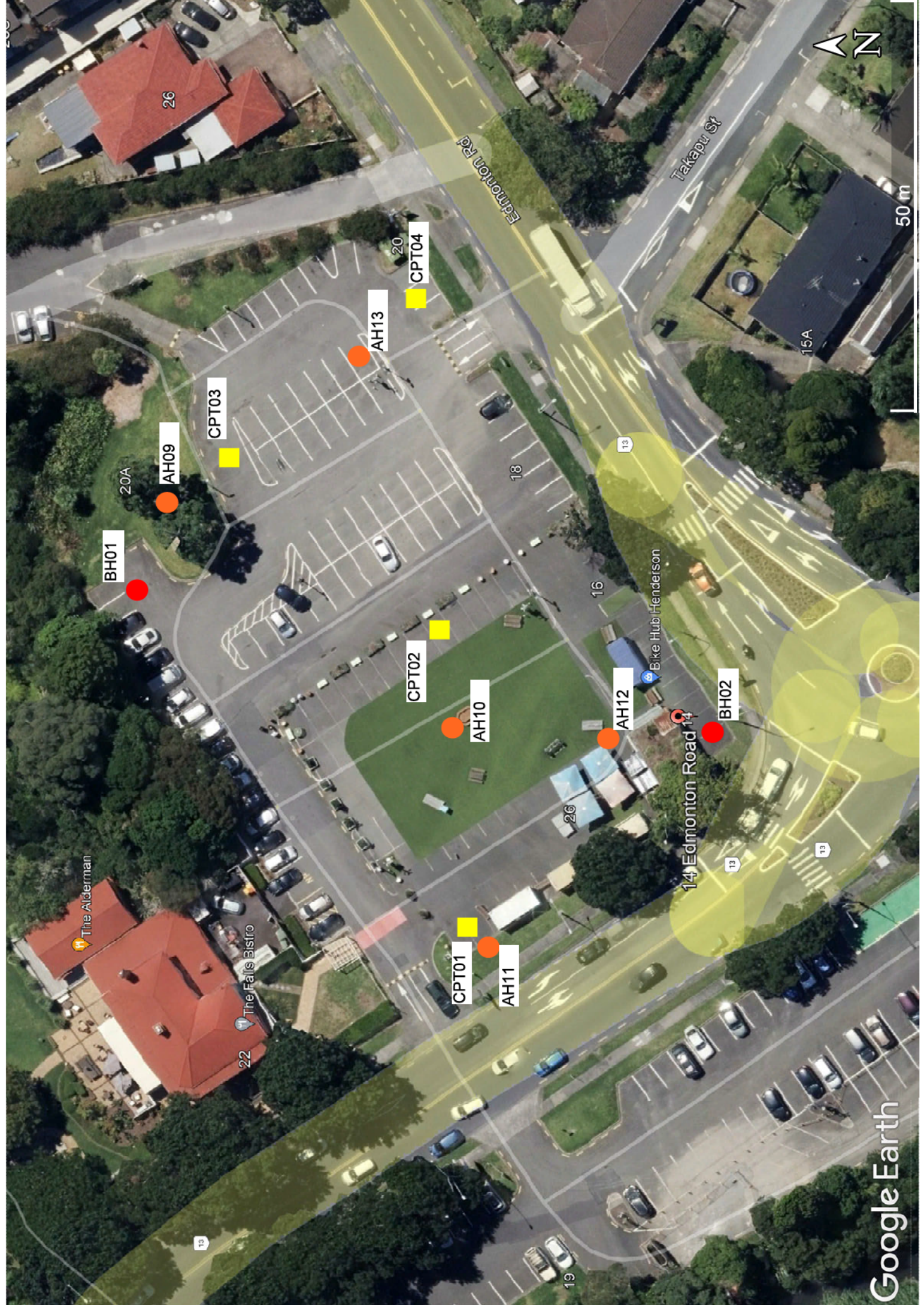
WP's services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. There is no other warranty, either expressed or implied.

The opinions and recommendations in this memorandum are based on subsurface information collected from discrete investigation / test locations, and the subsurface conditions away from these locations are inferred. It must be appreciated that the actual soil conditions could vary from those described herein.

ATTACHMENT A
CV OF s 9(2)(a)

ATTACHMENT B
LOCATIONS OF SITE INVESTIGATIONS





50 m

Google Earth

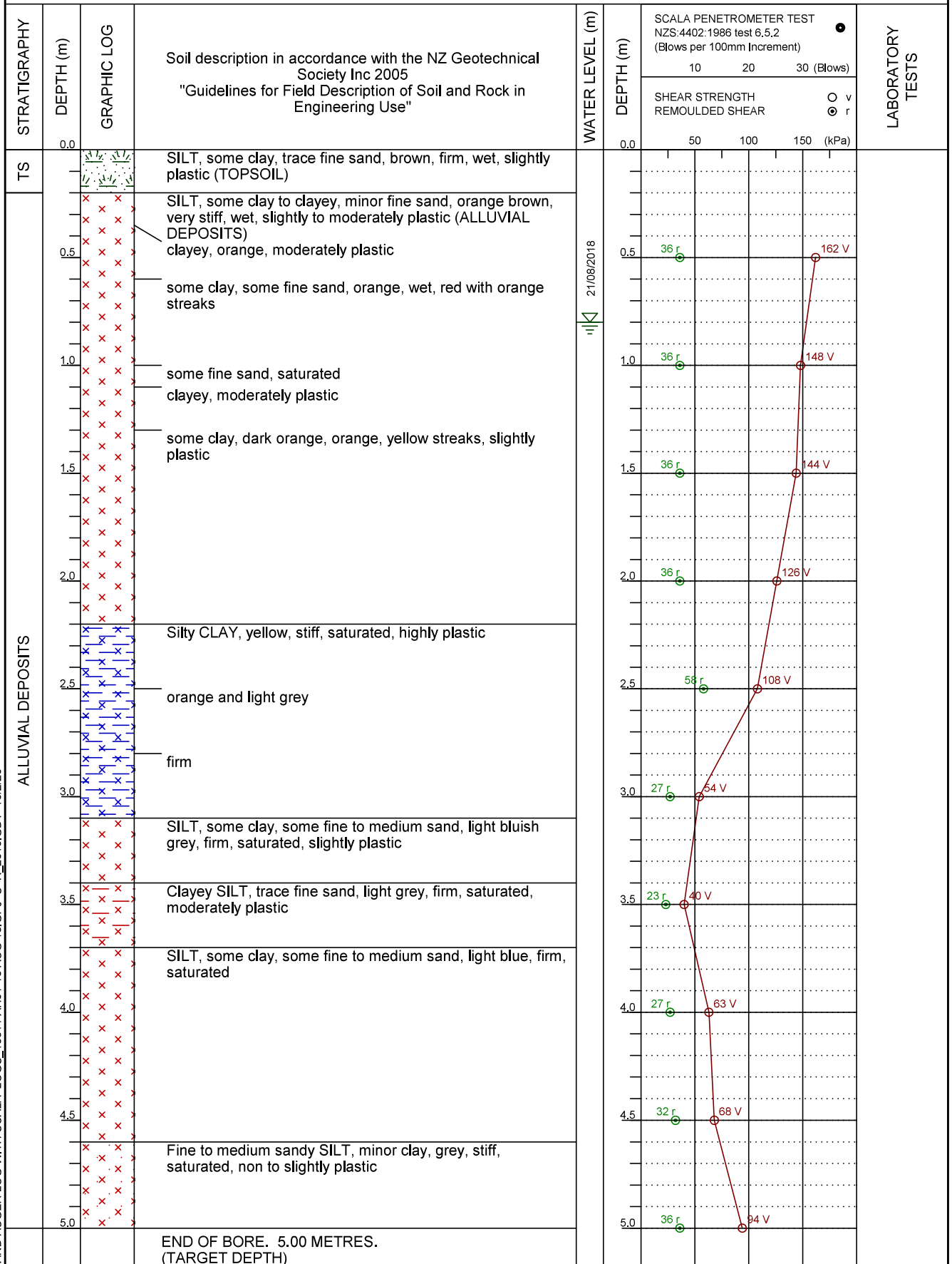
ATTACHMENT C
2018 SITE INVESTIGATION DATA



Drill Type: 50 mm Hand Auger
 Drilled By: DG
 Date Started: 21/8/18
 Date Finished: 21/8/18

Project No: 18511
 Coordinates:
 Ground Elevation:
 Water Level: 0.8m 21/08/2018

Logged By: DG
 Shear Vane No - Calibration Date: DR1768 - 21/12/2017
 Surface Conditions: Level, grass

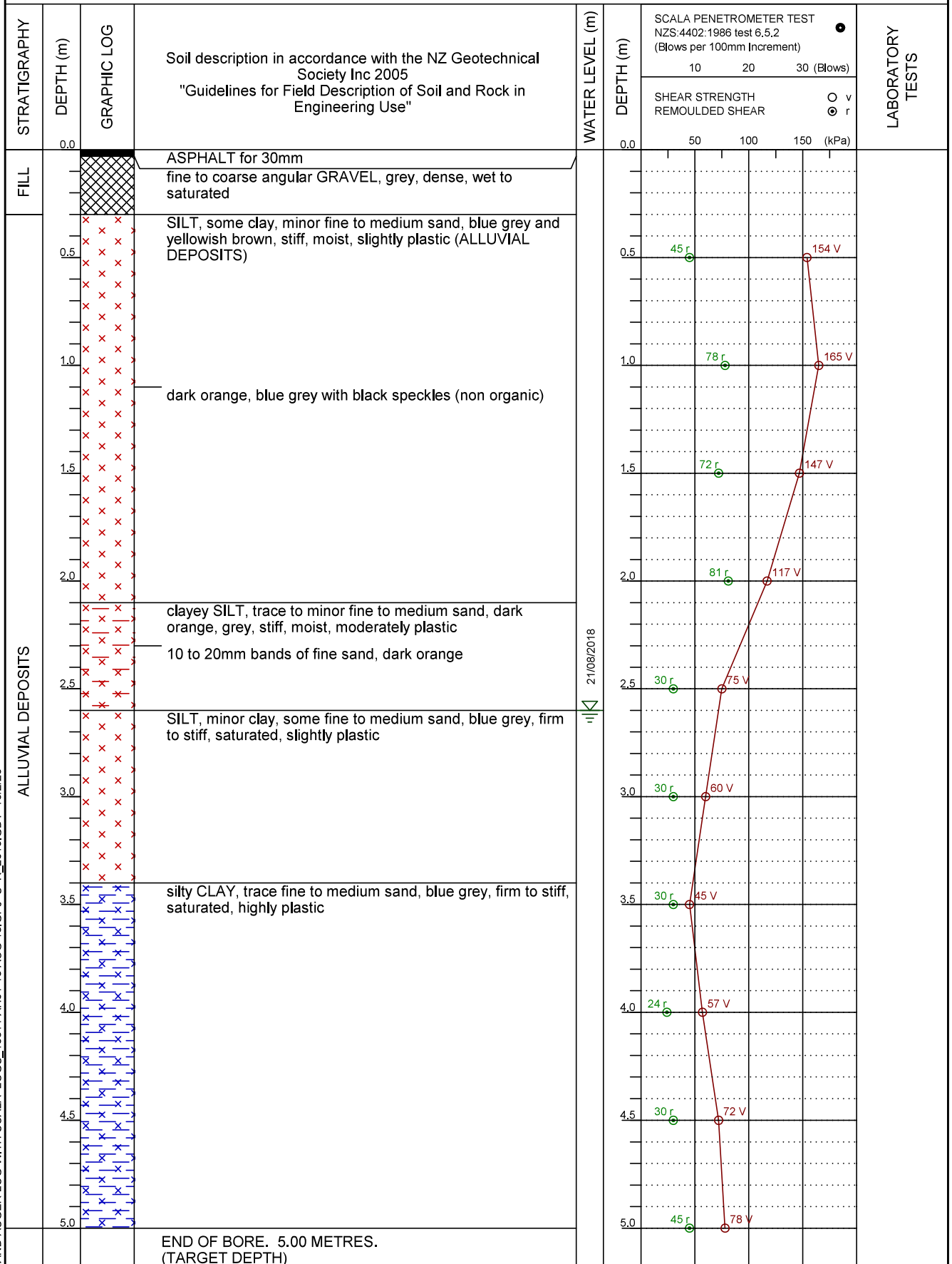


HAND AUGER LOG WITH SCALA LOGS_18511-AH01-13 AUG 18.GPJ S+R_2013.GDT 13/2/23

Drill Type: 50 mm Hand Auger
Drilled By: NC
Date Started: 21/8/18
Date Finished: 21/8/18

Project No: 18511
Coordinates:
Ground Elevation:
Water Level: 2.6m 21/08/2018

Logged By: NC
Shear Vane No - Calibration Date: GEO122 - 1/12/2017
Surface Conditions: Near Level Asphalt

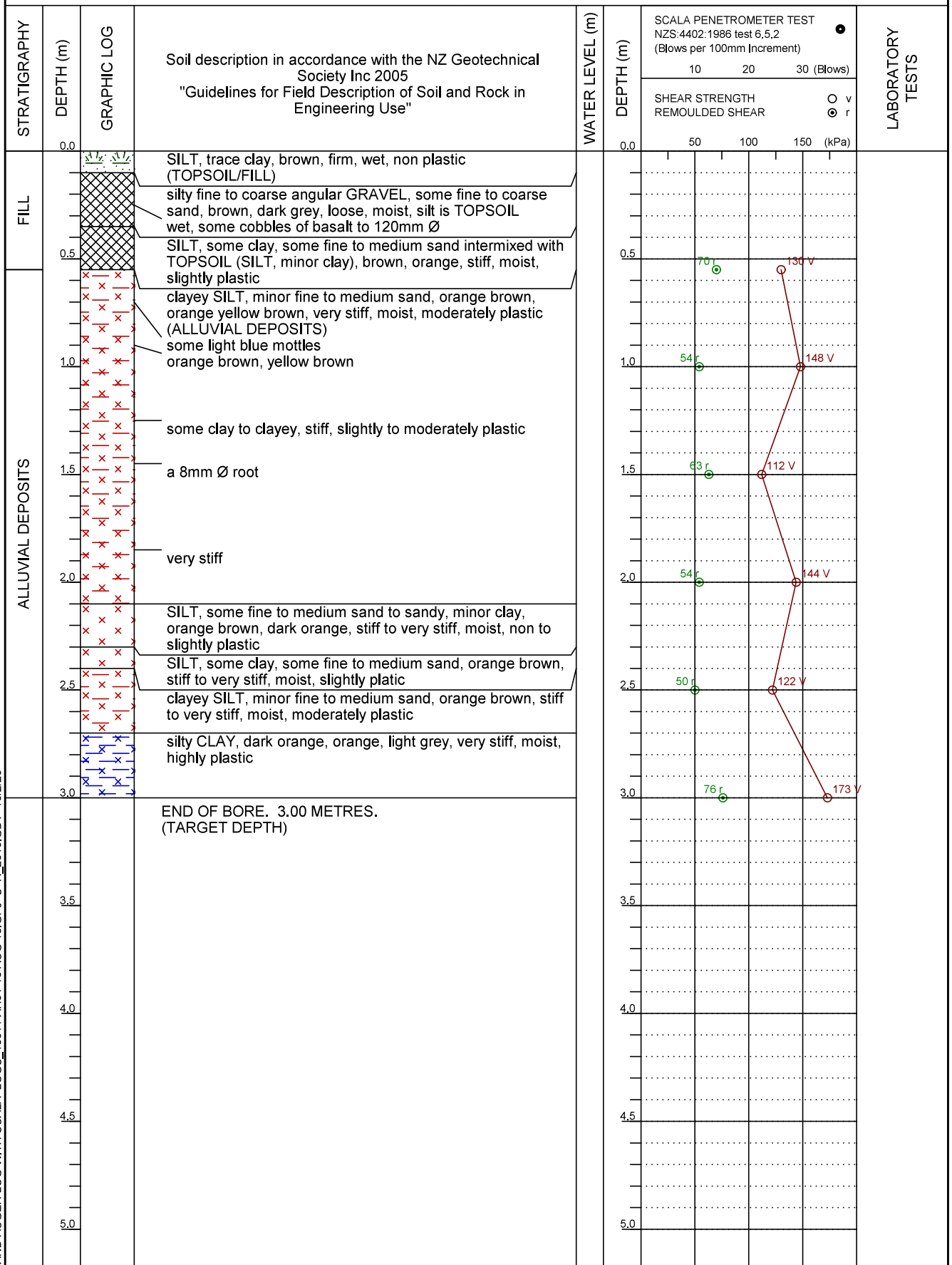


HAND AUGER LOG WITH SCALA LOGS_18511-AH01-13 AUG-18.GPJ S+R_2013.GDT 13/2/23

Drill Type: 50 mm Hand Auger
Drilled By: DG
Date Started: 21/8/18
Date Finished: 21/8/18

Project No: 18511
Coordinates:
Ground Elevation:
Water Level: Ground Water Not Encountered

Logged By: DG
Shear Vane No - Calibration Date: DR1768 - 21/12/2017
Surface Conditions: Slightly Sloping Grass



HAND AUGER LOG WITH SCALA LOGS_18511_AH01-13 AUG 18.GPJ S+R_2013.GDT 13/2/23

Drill Type: 50 mm Hand Auger

Drilled By: NC

Date Started: 21/8/18

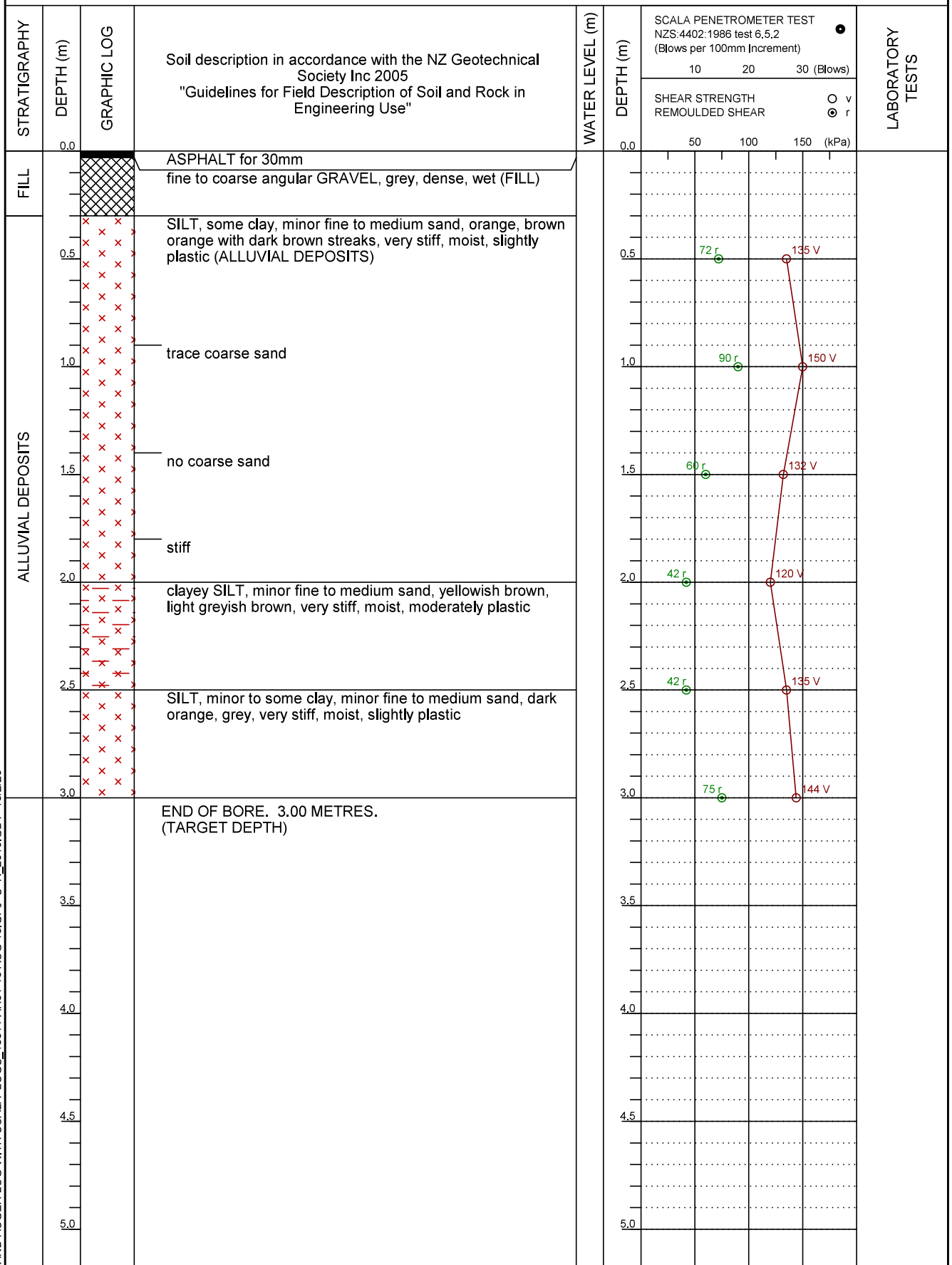
Date Finished: 21/8/18

Project No: 18511

Coordinates:
Ground Elevation:
Water Level: Ground Water Not Encountered

Logged By: NC

Shear Vane No - Calibration Date: GEO122 - 1/12/2017

Surface Conditions: Near Level Asphalt


HAND AUGER LOG WITH SCALA LOGS_18511-AH01-13 AUG 18.GPJ S+R_2013.GDT 13/2/23



Soil & Rock Consultants
Your responsive & cost-effective engineers

CLIENT: Ministry of Justice

PROJECT: 14 Edmonton Road, Henderson, Auckland

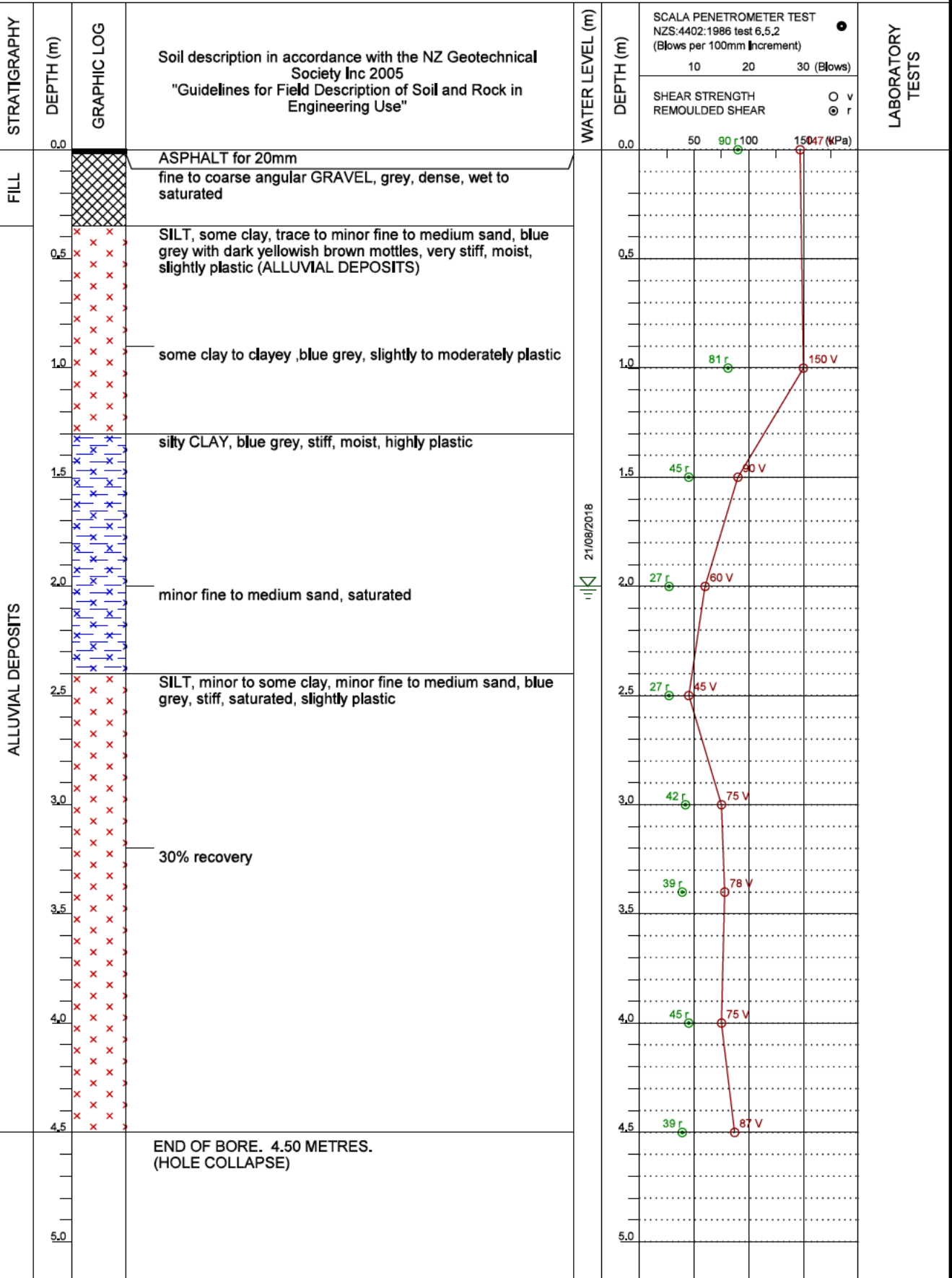
Auger Hole No: AH13

Sheet 1 of 1

Drill Type: 50 mm Hand Auger
Drilled By: NC
Date Started: 21/8/18
Date Finished: 21/8/18

Project No: 18511
Coordinates:
Ground Elevation:
Water Level: 2.0m 21/08/2018

Logged By: NC
Shear Vane No - Calibration Date: GEO122 - 1/12/2017
Surface Conditions: Near Level Asphalt



HAND AUGER LOG WITH SCALA LOGS_18511_AH01-13 AUG 18.GPJ S+R_2013.GDT 13/2/23



SCALA PENETROMETER SHEET - TABLE OF BLOWS PER INCREMENT

JOB NAME: 14 Edmonton Road, Henderson JOB NO: 18511 TESTED BY: DEG/JL/NC DATE: 21/08/2018

Depth of Penetration [mm]	AH09	AH10	AH11	AH12	AH13						
DEPTH START[m] ➡	5.00	5.00	3.00	3.00	4.50						
50 mm	SUNK	SUNK	1	0.5	1						
100			2	0.5	2						
150		↓	2	11	1						
200		1	2	1	2						
250	↓	1	2	1	1						
300	1	1	3	1	2						
350	1	1	4	1	2						
400	2	2	5	1	2						
450	2	2	5	1	2						
500	1	2	5	1	4						
550	2	2	7	1	4						
600	2	2	6	1	5						
650	2	3	6	1	6						
700	2	1	10	2	5						
750	2	2	10	2	4						
800	2	3	10	2	4						
850	2	2	10	2	6						
900	2	2	10	2	6						
950	2	3		2	4						
1000	2	3		3	10						
1050	3	2		5	8						
1100	3	4		4	10						
1150	3	4		3	8						
1200	4	4		3	10						
1250	3	4		4	10						
1300	3	4		5	10						
1350	4	8		7	12						
1400	5	20+		8	12						
1450	4			8							
1500	4			10							
1550	6			10							
1600	7			10							
1650	10			10							
1700	11			10							
1750	14										
1800	20+										
1850											
1900											
1950											
2000											
DEPTH END [m] ➡	6.80	6.40	3.90	4.70	5.90						

Testing Method: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

ATTACHMENT D
2024 SITE INVESTIGATION DATA



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<div><div><div><div><div><div></div><div>LDE</div><div>engineers • scientists</div></div></div><div><div>BOREHOLE LOG</div></div></div></div><div><div>Hole No.:</div><div>MH01</div></div></div>																
<div><div>Client:Wentz-Pacific Ltd</div><div>Project:Geotechnical Investigation</div><div>Site Location:14 Edmonton Road, Henderson</div></div>					<div><div>Contractor:Pro-Drill Ltd (Akl)</div><div>Rig:SLG</div><div>Driller:Clutch</div></div>					<div><div>Project ID:27042</div><div>Start Date:03/09/2024</div><div>End Date:03/09/2024</div></div>						
<div><div>Test Location:See plan</div><div>Located By:Site plan/map</div></div>					<div><div>Coordinates:5917489mN, 1745742mE</div><div>Elevation:6.5m</div></div>					<div><div>Grid:NZVD2016</div><div>Datum:Ground</div></div>						
RL (m)	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Sampling	Water in/out flow	Backfill/Installation/ Groundwater
		Material extracted by Hydro Excavation.			SPT blows/75mm Shear vane peak/residual											
6											Hydrovac	0				Bentonite
5			1													
		Silty CLAY (Alluvial Soil); brown and grey mottled light brown. Very stiff; moist; high plasticity; insensitive; with minor limonite.	2		1/1/1/1/2/2 N = 6						SPT	100				
4		2.75m: becoming orange and grey mottled light brown; with trace limonite									Open Barrel	58				
			3		138 / 81 kPa 1/1/1/1/1/1 N = 4						SPT	100				
3		Silty CLAY; orange/brown mottled grey. Very stiff; moist; medium plasticity; with some limonite staining.									Open Barrel	53				
			4													
2		Clayey SILT, with minor sand; brown/grey. Firm; wet to saturated; low plasticity; sand, fine.			34 / 15 kPa 0/0/0/0/1/0 N = 1						SPT	100				
			5													
1		5.10m: becoming orange/brown Silty CLAY; light grey. Firm; wet to saturated; high plasticity. 5.30m: becoming light brown/grey, with organic staining 5.40m: with 50mm bed andy SILT, with minor clay. Firm; wet to saturated; low plasticity. 5.50m: with trace medium sand sized organic inclusions									Open Barrel	100				
Remarks: Defect spacing and RQD should be considered to be conservative as a proportion of the defects are likely to be drilling induced.					PIEZO	DATE	LEVEL	REMARK	Hole Depth: 13.65		Inclination: 90.00					
					1	19/09/2024	2.00		Logged By: MK		Checked By: JL					
					1	12/09/2024	2.30		FINAL		Sheet 1 of 3					
					1	5/09/2024	2.40									
Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).																

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BOREHOLE LOG											Hole No.: MH01					
Client: Wentz-Pacific Ltd				Contractor: Pro-Drill Ltd (Akl)				Project ID: 27042								
Project: Geotechnical Investigation				Rig: SLG				Start Date: 03/09/2024								
Site Location: 14 Edmonton Road, Henderson				Driller: Clutch				End Date: 03/09/2024								
Test Location: See plan				Coordinates: 5917489mN, 1745742mE				Grid: NZVD2016								
Located By: Site plan/map				Elevation: 6.5m				Datum: Ground								
RL (m)	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Sampling	Water in/out flow	Backfill/ Installation/ Groundwater
0	Puketoka Fm	Sandy SILT, with minor clay; grey. Firm; wet; low plasticity.			SPT blows/75mm Shear vane peak/residual 0/0/1/5/12/4 N = 9						SPT	100				
		Clayey SILT, with trace sand; dark grey. Hard; moist; low plasticity; sand, fine.														
-0.7	Residual East Coast Bays Formation	Silty SAND (Residual Soil), with trace clay; dark grey. Dense; moist; non-plastic.	7								Open Barrel	92				
					5/5/6/9/10/15 N = 40						SPT	0				
			8.50m: with very thin bed of carbonaceous material	8			EW	RS				Triple tube	100			
-0.9			9		7/7/1/8/9/10/15 N = 42						SPT	0				
-3	Weathered East Coast Bays Formation	Moderately weathered; dark grey; SILTSTONE; very weak.				VW	MW	CS	9.60m: 4 Joints, Planar, 80°-90° Rough to 10m		Triple tube					
		Weathered SANDSTONE; dark grey; Extremely weak.	10					MW S	9.95m: Parting, Planar, 70°-90° Rough		Triple tube	100	63			
								CS	10.20m: 3 Joints, Planar, 80°-90° Rough to 10.5m							
					9/11/1/13/15/20 for 10mm N = 50+	EW	CW	MW S			SPT	100	0			
-4		Moderately weathered; dark grey; SILTSTONE; very weak.	11						11.10m: 8 Joints, Planar, 80°-90° Rough to 12.0m		Triple tube					
		11.20m: with thin bed very dense silty Sand to extremely weak SANDSTONE,														
-5		Slightly weathered; dark grey; Fine to medium grained SANDSTONE; weak.				W	SW	WS				100	58			
Remarks: Defect spacing and RQD should be considered to be conservative as a proportion of the defects are likely to be drilling induced.				PIEZO	DATE	LEVEL	REMARK		Hole Depth:		Inclination:					
				1	19/09/2024	2.00			13.65		90.00					
				1	12/09/2024	2.30			Logged By:		Checked By:					
				1	5/09/2024	2.40			MK		JL					
Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).								FINAL		Sheet 2 of 3						

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<div><div><div>LDE</div><div>engineers • scientists</div></div><div>BOREHOLE LOG</div></div>										Hole No.: <div>MH01</div>																																																																																																																								
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Test Location: See plan					Coordinates: 5917489mN, 1745742mE					Grid: NZVD2016																																																																																																																								
Located By: Site plan/map					Elevation: 6.5m					Datum: Ground																																																																																																																								
<table><tr><td rowspan="2">RL (m)</td><td rowspan="2">Geology</td><td rowspan="2">Material Description</td><td rowspan="2">Depth (m)</td><td rowspan="2">Graphic Log</td><td rowspan="2">In Situ Testing</td><td rowspan="2">Strength</td><td rowspan="2">Weathering</td><td rowspan="2">Defect Spacing</td><td rowspan="2">Defects and Drilling Remarks</td><td rowspan="2">Depth (m)</td><td rowspan="2">Drilling Method</td><td rowspan="2">TCR (%)</td><td rowspan="2">RQD (%)</td><td rowspan="2">Sampling</td><td rowspan="2">Water in/out flow</td><td rowspan="2">Backfill/Installation/ Groundwater</td></tr><tr></tr><tr><td>-6</td><td rowspan="2">Less Weathered East Coast Bays Formation</td><td rowspan="2">[CONT] Slightly weathered; dark grey; Fine to medium grained SANDSTONE; weak.</td><td rowspan="2">12.35</td><td rowspan="2"></td><td rowspan="2">SPT blows/75mm Shear vane peak/residual 12/20/31/19 for 20mm N = 50+</td><td rowspan="2">W</td><td rowspan="2">SW</td><td rowspan="2">WS</td><td rowspan="2">12.35m: Joint, Planar, 70°, Rough</td><td rowspan="2">12.35</td><td rowspan="2">Triple tube</td><td rowspan="2">60</td><td rowspan="2">60</td><td rowspan="2"></td><td rowspan="2">No groundwater observations during drilling</td><td rowspan="2"></td></tr><tr></tr><tr><td>-7</td><td></td><td>EOH: 13.65m</td><td></td><td></td><td>7/43 N = 50+</td><td></td><td></td><td></td><td>13.20m: 1 Joint, Planar to curved, 70°, Rough</td><td></td><td>SPT</td><td>0</td><td>0</td><td></td><td></td><td></td></tr><tr><td>-8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>-9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>-10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>-11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>												RL (m)	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Sampling	Water in/out flow	Backfill/Installation/ Groundwater	-6	Less Weathered East Coast Bays Formation	[CONT] Slightly weathered; dark grey; Fine to medium grained SANDSTONE; weak.	12.35		SPT blows/75mm Shear vane peak/residual 12/20/31/19 for 20mm N = 50+	W	SW	WS	12.35m: Joint, Planar, 70°, Rough	12.35	Triple tube	60	60		No groundwater observations during drilling		-7		EOH: 13.65m			7/43 N = 50+				13.20m: 1 Joint, Planar to curved, 70°, Rough		SPT	0	0				-8																	-9																	-10																	-11																
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						1	19/09/2024	2.00		13.65		90.00																																																																																																																						
						1	12/09/2024	2.30		Logged By: MK		Checked By: JL																																																																																																																						
						1	5/09/2024	2.40																																																																																																																										
Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).										FINAL		Sheet 3 of 3																																																																																																																						

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BOREHOLE LOG											Hole No.: MH02						
Client: Wentz-Pacific Ltd					Contractor: Pro-Drill Ltd (Akl)					Project ID: 27042							
Project: Geotechnical Investigation					Rig: SLG					Start Date: 03/09/2024							
Site Location: 14 Edmonton Road, Henderson					Driller: Clutch					End Date: 03/09/2024							
Test Location: See plan					Coordinates: 5917418mN, 1745721mE					Grid: NZVD2016							
Located By: Site plan/map					Elevation: 7.4m					Datum: Ground							
RL (m)	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing SPT blows/75mm Shear vane peak/residual	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Sampling	Water in/out flow	Backfill/ Installation/ Groundwater	
7	Puketoka Formation	Materials extracted by Hydro Excavation.									Hydrovac	0					
1																	
6		1.50m: with sandy fine to medium gravel			1/1/1/1/1/2 N = 5												
2		Silty CLAY (Alluvial Soil); orange and grey streaked light brown. Very stiff; moist; high plasticity.									SPT	100					
5		Silty CLAY; orange and grey mottled light brown. Stiff; moist; high plasticity; moderately sensitive.									Open Barrel	95					
4	Puketoka Formation	Sandy SILT, with trace clay; light brown mottled light grey/blue. Very loose; saturated; non-plastic; with trace fine gravel sized, rounded pumice and clay clasts.			89 / 37 kPa 0/0/1/0/0/0 N = 1						SPT	100					
3		Silty CLAY, with minor sand; orange mottled grey. Stiff; moist to wet; medium plasticity; sand, fine.									Open Barrel	100					
4		Silty fine to coarse SAND, with trace clay; dark grey. Loose; saturated; non-plastic; with trace fine gravel sized, rounded pumice and clay clasts .															
3	Residual East Coast Bays Formation	4.65m: with 20mm bed of limonite			3/4/7/8/10/12 N = 37						SPT	100					
2		Silty medium SAND (Residual Soil); dark grey. Dense; moist; non-plastic; with coarse white sand sized clasts.									Triple tube	62					
5		5.80m: becoming silty fine sand, with occasional carbonaceous laminae															
Remarks: Defect spacing and RQD should be considered to be conservative as a proportion of the defects are likely to be drilling induced. Some gravel falling downhole over first run					PIEZO	DATE	LEVEL	REMARK	Hole Depth: 10.65		Inclination: 90.00						
					Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).				Logged By: MK		Checked By: JL						
									FINAL		Sheet 1 of 2						

