Appendix C: Investigation Logs

CMW GEOSCIENCES – SOIL (FIELD LOGGING GUIDE)

CMW Geosciences
Great People | Practical Solutions

SEQUENCE OF TERMS:
Fine: Soil Symbol –Soil Type –Colour –Structure –(Consistency) –(Moisture) –Bedding –Plasticity –Sensitivity –Additional Comments –Origin/Geological Unit
Coarse: Soil Symbol –Soil Type –Colour –Structure –Grading –Particle shape –(Relative Density) –(Moisture) –Bedding –Additional Comments –Origin/Geological Unit

The contents of this sheet are taken from the NZGS Guideline for the Field Classification and description of Soil and Rock for Engineering Purposes (Dec 2005) which should be read for context and for clarifications

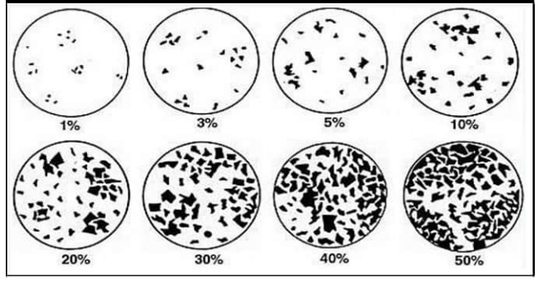
BEHAVIOURAL SOIL CLASSIFICATION SYSTEM / MODIFIED USCS

Major Divisions (behaviour based logging)			Soil Symbol	Soil Name
Coarse grained soils more than 65%>0.06mm	Gravel >50% of coarse fraction >2mm	Clean gravel <5% smaller 0.075mm	GW	Well graded gravel, fine to coarse gravel
			GP	Poorly graded gravel
		Gravel with >12% fines	GM	Silty gravel
			GC	Clayey gravel
	Sand ≥50% of coarse fraction <2mm	Clean sand	SW	Well-graded sand, fine to coarse sand
			SP	Poorly graded sand
		Sand with >12% fines	SM	Silty sand
			SC	Clayey sand
Fine grained soils 35% or more <0.06mm	Exhibits dilatant behaviour	inorganic	ML	Silt
			MH	Silt of high plasticity
		organic	OL	Organic silt
	No dilatant behaviour	inorganic	CL	Clay of low plasticity
			CH	Clay of high plasticity
		organic	OH	Organic clay
Highly Organic Soils			Pt	Peat

PROPORTIONAL TERMS DEFINITION

Fraction	Term	% of Soil Mass	Example
Major	(…) [UPPER CASE]	≥50 [major constituents]	GRAVEL
Subordinate	(…) [lower case]	20 – 50	Sandy
Minor	with some…	12 – 20	with some sand
	with minor…	5 – 12	with minor sand
	with trace of (or slightly)	< 5	with trace of sand (slightly sandy)

VISUAL PROPORTION PERCENTAGE



ROUNDING/PARTICLE SHAPE

Rounded	Subrounded	Subangular	Angular
			

CONSISTENCY TERMS FOR FINE SOILS

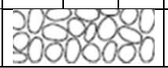
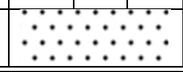
Descriptive term	Undrained Shear Strength (kPa)	Diagnostic Features	Abbreviation
Very Soft	<12	Easily exudes between fingers when squeezed	VS
Soft	12-25	Easily indented by fingers	S
Firm	25-50	Indented by strong finger pressure and can be indented by thumb pressure	F
Stiff	50-100	Cannot be indented by thumb pressure	St
Very Stiff	100-200	Can be indented by thumb nail	VSt
Hard	200-500	Difficult to indent by thumb nail	H

DENSITY INDEX (RELATIVE DENSITY) TERMS FOR COARSE SOILS

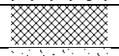
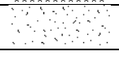
Descriptive term	Density Index (RD)	SPT "N" value (blows/300mm)	Dynamic Cone (blows/100mm)	Abbreviation
Very Dense	> 85	> 50	> 17	VD
Dense	65 - 85	30 - 50	7 - 17	D
Medium dense	35 - 65	10 - 30	3 - 7	MD
Loose	15 - 35	4 - 10	1 - 3	L
Very loose	< 15	< 4	0 - 2	VL

Note:
Where strength data cannot be confirmed Loosely Packed (LP) and Tightly Packed (TP) may be used.
No correlation is implied between Standard Penetration Test (SPT) and Dynamic Cone Penetrometer (Scala) Test values.
SPT "N" values are uncorrected.

GRAIN SIZE CRITERIA

TYPE	Boulders	Cobbles	Gravel			Sand			Silt	Clay	Organic Soil
			coarse	medium	fine	coarse	medium	fine			
Size Range (mm)	200	60	20	6	2	0.6	0.2	0.06	0.002		
Graphic Symbol											

ADDITIONAL GRAPHIC LOG SYMBOLS

Term	Symbol
Topsoil	
Fill	
Bitumen	
Concrete	

ORGANIC SOILS / DESCRIPTORS

Term	Description
Topsoil	Surficial organic soil layer that may contain living matter. However, topsoil may occur at greater depth, having been buried by geological processes or man-made fill, and should be termed a buried topsoil.
Organic clay, silt or sand	Contains finely divided organic matter; may have distinctive smell; may stain; may oxidize rapidly. Describe as for inorganic soils.
Peat	Consists predominantly of plant remains. **Firm:** Fibres already compressed together **Spongy:** Very compressible and open structure **Plastic:** Can be moulded in hand and smears in fingers **Fibrous:** Plant remains recognisable and retain some strength **Amorphous:** No recognisable plant remains
Rootlets	Fine, partly decomposed roots, normally found in the upper part of a soil profile or in a redeposited soil (e.g. colluvium or fill)
Carbonaceous	Discrete particles of hardened (carbonised) plant material.

SHADE AND COLOUR

1	2	3
light dark mottled streaked	pinkish reddish yellowish brownish greenish bluish greyish	pink red orange yellow brown green blue white grey black

MOISTURE CONDITION

Condition	Description	Coarse Soils	Fine Soils	Abbreviation
Dry	Looks and feels dry	Runs freely through hands	Hard, powdery or friable	D
Moist	Feels cool, darkened in colour	Tends to cohere	Weakened by moisture, but no free water on hands when remoulding	M
Wet			Weakened by moisture, free water forms on hands when handling	W
Saturated	Feels cool, darkened in colour and free water is present on the sample			S

BEDDING THICKNESS (Sedimentary)

Term	Bed Thickness
Thinly laminated	< 2mm
Laminated	2mm - 6mm
Very thin	6mm - 20mm
Thin	20mm - 60mm
Moderately thin	60mm - 200mm
Moderately thick	0.2m - 0.6m
Thick	0.6m - 2m
Very thick	> 2m

BEDDING INCLINATION

Term	Inclination (from horizontal)
Sub-horizontal	0º - 5º
Gently inclined	6º - 15º
Moderately inclined	16º - 30º
Steeply inclined	31º - 60º
Very steeply inclined	61º - 80º
Sub vertical	81º - 90º

SOIL STRUCTURE

Term	Description
Homogeneous	The total lack of visible bedding and the same colour and appearance throughout
Bedded	The presence of layers
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Polished	Fracture planes are polished or glossy
Slickensided	Fracture planes are striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensoidal	Discontinuous pockets of a soil within a different soil mass

GRADING (GRAVELS & SANDS)

Term	Description	
Well Graded	Good representation of all particle size ranges from largest to smallest	
Poorly Graded	Limited representation of grain sizes – further divided into:	
	Uniformly graded	Most particles about the same size
	Gap graded	Absence of one or more intermediate sizes

PLASTICITY (CLAYS & SILTS)

Term	Description
High plasticity	Can be moulded or deformed over a wide range of moisture contents without cracking or showing any tendency to volume change
Low plasticity	When moulded can be crumbled in the fingers; may show quick or dilatant behaviour

SENSITIVITY OF SOIL

Descriptive Term	Shear Strength Ratio = $\frac{undisturbed}{remoulded}$
Insensitive, normal	< 2
Moderately sensitive	2 – 4
Sensitive	4 – 8
Extra sensitive	8 – 16
Quick	> 16

CMW GEOSCIENCES – ROCK (FIELD LOGGING GUIDE)

SEQUENCE OF TERMS: (Weathering) – Colour – Fabric or Bedding – Rock Name – (Strength) – Discontinuities – Additional notes – Origin/Geological Unit

The contents of this sheet are taken from the NZGS Guideline for the Field Classification and description of Soil and Rock for Engineering Purposes (Dec 2005) which should be read for context and for clarifications

SCALE OF ROCK MASS WEATHERING

Term	Grade	Description
Unweathered (fresh rock)	UW	Rockmass shows no loss of strength, discolouration or other effects due to weathering. There may be slight discolouration on major rock mass defect surfaces or on clasts.
Slightly Weathered	SW	The rock mass is not significantly weaker than when fresh. Rock may be discoloured along defects, some of which may have been opened slightly.
Moderately Weathered	MW	The rock mass is significantly weaker than the fresh rock and part of the rock mass may have been changed to soil. Rock material may be discoloured and defect and clast surfaces will have a greater discolouration, which also penetrates slightly into the rock material. Increase in density of defects due to physical disintegration.
Highly Weathered	HW	Most of the original rock mass strength is lost. Material is discoloured and more than half the mass is changed to a soil by chemical decomposition or disintegration (increase in density of defects/fractures). Decomposition adjacent to defects and at the surface of clasts penetrates deeply into the rock material. Lithorelicts or corestones of unweathered or slightly weathered rock may be present.
Completely Weathered	CW	Original rock strength is lost, and the rock mass changed to a soil either by decomposition (with some rock fabric preserved) or by physical disintegration.
Residual Soil	RS	Rock is completely changed to a soil with the original fabric destroyed (pedological soil).

SHADE AND COLOUR

1	2	3
light dark mottled streaked	pinkish reddish yellowish brownish greenish bluish greyish	pink (pk) red (rd) orange (or) yellow (ye) brown (br) green (gr) blue (bl) white (wh) grey (gy) black (bk)

FABRIC TERMS

Fine (< 25mm)	Folded
Coarse (25 – 100mm)	Foliated
Massive (no fabric)	Gneissose
Banded	Interbedded
Bedded	Laminated
Cleaved	Lineated
Crossbedded	Schistose
Flowbanded	

BEDDING THICKNESS (Sedimentary)

Term	Bed Thickness
Thinly laminated	< 2mm
Laminated	2mm - 6mm
Very thin	6mm - 20mm
Thin	20mm - 60mm
Moderately thin	60mm - 200mm
Moderately thick	0.2m - 0.6m
Thick	0.6m - 2m
Very thick	> 2m

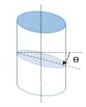
BEDDING INCLINATION

Term	Inclination (from horizontal)
Sub-horizontal	0º - 5º
Gently inclined	6º - 15º
Moderately inclined	16º - 30º
Steeply inclined	31º - 60º
Very steeply inclined	61º - 80º
Sub-vertical	81º - 90º

SEQUENCE OF DEFECT TERMS

Sequence	Depth/depth range, number of defects, type, orientation*/dip angle, shape, roughness, aperture, infill description, seepage, block size and block shape ** include orientation (dip direction) only if logging orientated core.*
Example (abbreviation)	9.5m: 1, JN, 0º, PL, R, CL, LM
Example (description)	At 9.5 metres is one joint at 0º. Planar, rough, closed, with limonite infill

DIP ANGLE / INCLINATION



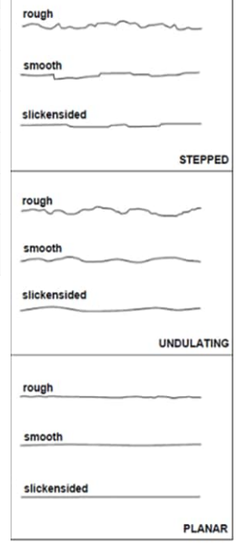
DEFECT TYPE TERMS

Term	Definition	Abbreviation
Drilling induced fracture	Fracture caused by drilling. Commonly smooth (core spun) or irregular (broke in tension)	DI
Contact	Surface between two different lithologies	CN
Bedding (may be open or closed)	Surface that separates each successive layer of stratified rock from its preceding layer either parallel or sub-parallel to layering	B
Foliation	Repetitive layering in rocks caused by shearing and formed parallel to the direction of shear or perpendicular to the direction of higher pressure	F
Cleavage	Break along a planar anisotropic surface in rock determined by structure and strength of the crystal lattice Smooth surfaces often having reflective surfaces	CV
Joint	Single fracture across which rock has little or no tensile strength, but which is not parallel or sub-parallel to layering or planar anisotropy in the rock substance. May be open or closed.	JN
Sheared Zone	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joint, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge-shaped blocks.	SZ
Sheared Surface	A near planar, curved or undulating surface, which is usually smooth, polished or slickensided	SS
Crushed Seam	Seam with roughly parallel, almost planar boundaries, composed of disorientated, usually angular fragments of the host rock. The seam has soil properties	CS
Decomposed Zone/Seam	Seam or zone of soil substance, often with gradational boundaries. Formed by weathering of the rock substance in place	WS
Infilled Seam/Zone	Seam or zone of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface	IS

PLANARITY AND ROUGHNESS

	Term	Description	Abbreviation
Planarity	Planar	The defect does not vary in orientation.	PL
	Undulating	The defect has a wavy surface.	UN
	Stepped	The defect has one or more well defined steps.	ST
	Note: The assessment of defect shape is partly influenced by the scale of the observation.		
Roughness	Slickensided	Grooved or striated surface usually polished.	SS
	Smooth	Smooth to touch. Few or no surface irregularities.	S
	Rough	Many small surface irregularities (amplitude generally more than 1mm). Feels like fine to coarse sandpaper.	R

PLANARITY AND ROUGHNESS EXAMPLES



APERTURE OF DISCONTINUITY SURFACES

Term	Aperture (mm)	Description	Abbreviation
Tight	Nil	Closed	CL
Very narrow	> 0 - 2		
Narrow	2 - 6		
Moderately narrow	6 - 20	Gapped	GA
Moderately wide	20 - 60	Open	OP
Wide	60 - 200		
Very wide	> 200		

SPACING OF DEFECTS/DISCONTINUITIES

Term	Spacing
Very widely spaced	> 2m
Widely spaced	600mm - 2m
Moderately widely spaced	200mm - 600mm
Closely spaced	60mm - 200mm
Very closely spaced	20mm - 60mm
Extremely closely spaced	< 20mm

ROCK GRAPHIC LOG SYMBOLS

Type	Symbol
Siltstone	
Sandstone	
Mudstone	
Limestone	
Coal	
Breccia	
Conglomerate	
Igneous	
Metamorphic	
Pyroclastic (Volcanic Ash)	
Gypsum	

ROCK STRENGTH TERMS

Term	Abbreviation	Field Identification of Specimen	Unconfined uniaxial compressive strength q_u (MPa)	Point load strength $I_{s(50)}$ (MPa)
Extremely strong	ES	Can only be chipped with geological hammer	> 250	> 10
Very strong	VS	Requires many blows of geological hammer to break it	100 - 250	5 - 10
Strong	S	Requires more than one blow of geological hammer to fracture it	50 - 100	2 - 5
Moderately strong	MS	Cannot be scraped or peeled with a pocket knife. Can be fractured with single firm blow of geological hammer	20 - 50	1 - 2
Weak	W	Can be peeled by a pocket knife with difficulty. Shallow indentations made by firm blow with point of geological hammer	5 - 20	< 1
Very weak	VW	Crumbles under firm blows with point of geological hammer. Can be peeled by a pocket knife	1 - 5	
Extremely weak (use soil description)	EW	Indented by thumb nail or other lesser strength terms used for soils	< 1	
Note: No correlation is implied between q_u and $I_{s(50)}$				

INFILL TYPE

Term	Abbreviation
Clean	CN
Coated (Material)	CO
Infill (Material)	IF
Stained (Material/Colour)	ST

INFILL MATERIAL

Term	Abbreviation
Clay	CL
Silt	Z
Sand	S
Gravel	G
Calcite	CA
Carbonaceous	CB
Limonite	LM
Manganese	MG
Mica	MI
Pyrite	PY
Quartz	QZ
Sulphides	SU

SEEPAGE

Term	Abbreviation
Wet	W
Seepage	SP
Flow	F

ROCK MASS BLOCK SHAPE

Block shape	Discontinuity Arrangement	Abbreviation
Polyhedral	Irregular discontinuities without arrangement into distinct sets, and of small persistence	Po
Tabular	One dominant set of parallel discontinuities (eg bedding planes), with other non-continuous discontinuities; block length and width >> thickness	Ta
Prismatic	Two dominant sets of discontinuities orthogonal and parallel, with a third irregular set; block length and width >> thickness	Pr
Equidimensional	Three dominant orthogonal sets of discontinuities, with some irregular discontinuities	Eq
Rhomboidal	Three or more dominant, mutually oblique sets of discontinuities; oblique shaped equidimensional blocks	Rh
Columnar	Several (usually more than three) sets of continuous, parallel discontinuities crossed by irregular discontinuities; length >> other dimensions	Co

DESCRIPTION OF BLOCK SIZE IN THE ROCK MASS

Term	Average Dimension	Abbreviation
Very Small	< 60mm	VS
Small	60 - 200mm	S
Medium	200 - 600mm	M
Large	600mm - 2m	L
Very Large	> 2m	VL

SAMPLES

Sample	Abbreviation
Undisturbed sample 50mm	U50
Undisturbed sample 63mm	U63
SPT – sample recovered	N*
SPT – solid core	N_c
Bulk disturbed sample	B
Core sample	C

ADDITIONAL TERMS

Term	Definition
UTP	Unable to penetrate
RQD	Percentage of recovered core in lengths in excess of 100mm
Recovery	Percentage of recovered core

GROUNDWATER

Symbol	Definition
	Water strike or standing groundwater at date given
	Water strike (superseded by piezometer dip)

WELL INSTALLATION DETAILS

Term	Symbol
Plain standpipe	
Slotted standpipe	
Inclinometer	

WELL BACKFILL DETAILS

Term	Symbol
Bentonite Seal	
Sand Backfill	
Gravel Backfill	
Grout/Bentonite	
Concrete	

DRILLING METHOD

	Term/Diameter	Abbreviation
Drilling Method	Hand Auger	HA
	Open Barrel	OB
	Triple Tube	TT
	Core Loss	X
	Wash Bore	WB
	Percussion	PER
	Sonic	SNC
	Standard Penetration Test	SPT
Core Size	83.0mm	PQ3
	61.1mm	HQ3

BOREHOLE LOG - MH01-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 30/10/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 1 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 389577.9mE; 830548.8mN Projection: EDENTM2000
Elevation: 24.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
		24.0		MH: Clayey SILT: Dark brown. Low plasticity. Moist. Some rootlets. (TS)						
		23.8		CH: Silty CLAY: Orange brown, mottled dark brown and grey. High plasticity. Moist. Very stiff. Topsoil intermixed. (Residual Soil)		VSt	100		OB / PQ3	
0.5	Peak = 162kPa Residual = 58kPa									
1.0	Peak = 81kPa Residual = 42kPa		1	*... at 0.45m, Becoming orange brown, streaked light grey.Topsoil absent.*						
				... at 1.00m, Becoming light grey, streaked orange brown.	M					
1.5	Peak = 120kPa	22.5								
1.5	Residual = 49kPa SPT: N* = 5 (0, 1 / 0, 1, 2, 2)		2	MH: Clayey SILT: Brown, occasionally streaked orange brown and grey. Low plasticity. Moist. Hard.		H	77		SPT	
				Completely weathered, brown, occasionally streaked orange brown and grey SILTSTONE. Extremely weak. (Hukerenui Mudstone)					OB / PQ3	
3.0	SPT: N* = 16 (1, 2 / 3, 3, 5, 5)	21.0	3	MH: Completely to highly weathered, dark grey brown SILTSTONE. Extremely weak. Highly fractured and sheared. Blocky. Interbedded highly weathered dark brown and greenish grey Hukurenui MUDSTONE. Very weak. (Mangakahia Complex)			93	46	SPT	
				... at 3.30m, Lenses of highly weathered limestone and Hukurenui mudstone. Very weak. Becoming highly fractured and dark brown, mottled light grey.					TT / HQ3	3.6m:1,JN,30°,PL,S,CL,CN,CS,
4.5	SPT: N* = 33 (3, 5 / 6, 8, 8, 11)		4						SPT	4.6m:1,JN,60°,PL,S,CL,ST,(CL),CS,
			5	*... at 4.80m, Mostly retrieved as clayey gravelly SILT. Fine to coarse gravel sized SILT clasts, angular to sub angular.*			85	38	TT / HQ3	
		18.4		Highly weathered, grey, blocky SILTSTONE. Very weak. Interbedded lenses of highly weathered, greenish grey and brown Hukurenui MUDSTONE. (Mangakahia Complex)	D to M					
6.0	SPT: N* = 41 (5, 6 / 9, 9, 10, 13)		6				87	95	SPT	
			7						TT / HQ3	6.9m:1,JN,35°,UN,R,GA,CO,(CL),VS, 7.2-7.5m:2,JN,10°,UN,R,GA,ST,(Z),VS,
7.5	SPT: Nc = 15 (2, 3 / 4, 3, 4, 4)		8				80	92	SPT	7.7-7.7m:2,JN,ST,SS,CL,CN,EC, 7.8m:1,JN,45°,PL,S,CL,ST,(CL),EC, 8.0m:1,JN,ST,S,CL,CN,EC, 8.2m:1,JN,10°,PL,S,CL,ST,(CL),EC, 8.6m:1,JN,20°,UN,R,GA,CO,(CL),VS, 8.7-9.1m:4,JN,10°,PL,R,GA,ST,(CL),VS,
9.0	SPT: Nc = 32 (5, 7 / 8, 8, 8, 8)		9				67	67	SPT	9.2m:1,JN,20°,PL,S,CL,ST,(Z),VS,
			10						TT / HQ3	9.6-9.7m:2,JN,5°,PL,S,CL,ST,(CL),VS,

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

BOREHOLE LOG - MH01-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 30/10/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 2 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 389577.9mE; 830548.8mN Projection: EDENTM2000
Elevation: 24.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
		10.5	SPT: Nc = 50+ (5, 12 / 16, 16, 18 for 50mm)		11										SPT	
							... from 11.40m to 11.55m, Lens of highly weathered, greenish grey Hukurenui MUDSTONE. Very weak.				100	100			TT / HQ3	10.9m:1,JN,10°,UN,S,CL,ST,(CL),VS, 11.2m:1,JN,35°,UN,R,GA,CO,(CL),VS, 11.6-12.0m:3,JN,20°,PL,S,CL,ST,(CL),VS,
		12.0	SPT: Nc = 31 (4, 7 / 7, 7, 8, 9)		12										SPT	12.2-12.4m:2,JN,5°,PL,R,CL,CN,VS,
							... from 12.60m to 12.70m, Lens of highly fractured material.				93	72			TT / HQ3	12.5-13.6m:3,JN,0°,PL,S,CL,ST,(CL),VS, 12.8-13.2m:2,JN,10°,PL,S,CL,ST,(CL),VS,
		13.5	SPT: Nc = 29 (6, 7 / 7, 7, 7, 8)		13										SPT	
					14						100	100			TT / HQ3	
		15.0	SPT: Nc = 36 (5, 5 / 7, 8, 10, 11)		15		Borehole terminated at 15.00 m								SPT	
					16											
					17											
					18											
					19											
					20											

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH01-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:30/10/2024

CMW Geosciences
Great People | Practical Solutions

MH01-24: 0.00m - 2.90m

MH01-24: 2.90m - 6.64m

PHOTOGRAPH SHEET - MH01-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:30/10/2024

CMW Geosciences
Great People | Practical Solutions

MH01-24: 6.64m - 10.80m

MH01-24: 10.80m - 14.20m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

PHOTOGRAPH SHEET - MH01-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:30/10/2024

CMW Geosciences
Great People | Practical Solutions

MH01-24: 14.20m - 15.00m

BOREHOLE LOG - MH02-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 30/10/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 1 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 389183.4mE; 830486.2mN Projection: EDENTM2000
Elevation: 41.75m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	Drilling Method/ Support
		41.8		OL: Clayey SILT: Dark brown. Low plasticity. Moist. Trace fine to coarse sand sized silt clasts. Some rootlets. (Topsoil)	M		100	OB / PQ3
		41.4		CH: CLAY: with some SILT. Orange brown, streaked light grey and pinkish red. High plasticity. Moist. Very stiff. (Alluvium)				
0.5	Peak = 116kPa Residual = 61kPa							
1.0	Peak = 116kPa Residual = 61kPa		1	*... at 1.00m, Becoming light grey, streaked orange and occasionally streaked red.*			80	
							80	
1.5	Peak = 133kPa							
1.5	Residual = 81kPa SPT: N* = 6 (0, 1 / 1, 1, 2, 2)							SPT
			2				57	OB / PQ3
3.0	Peak = 113kPa							
3.0	Residual = 68kPa SPT: N* = 5 (1, 1 / 1, 1, 2, 1)		3					SPT
							70	
			4	*... at 3.90m, Becoming purplish grey, occasionally streaked black and dark brown. Trace decomposing organics. Minor organic odour.*				OB / PQ3
4.5	SPT: N* = 4 (0, 1 / 1, 1, 1, 1)							SPT
			5		M	VSt	41	OB / PQ3
6.0	Peak = 49kPa							
6.0	Residual = 32kPa SPT: N* = 6 (1, 1 / 2, 1, 2, 1)		6	*... at 5.90m, Becoming light bluish grey, occasionally streaked black.*				SPT
							100	
			7					OB / PQ3
7.5	Peak = 65kPa							
7.5	Residual = 39kPa SPT: N* = 3 (0, 0 / 0, 1, 1, 1)							SPT
8.0	Peak = 73kPa Residual = 52kPa		8				80	SPT
9.0	SPT: N* = 5 (0, 1 / 1, 1, 2, 1)		9					SPT
							87	
			10					OB / PQ3

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:

Remarks:

BOREHOLE LOG - MH02-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 30/10/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 2 of 3
Position: 389183.4mE; 830486.2mN Projection: EDENTM2000
Elevation: 41.75m Datum: AUCKHT1946 Survey Source: Handheld GPS

CMW Geosciences
Great People | Practical Solutions

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering: RS CW HW MW SW UW	Recovery	RQD	Estimated Strength: EW VW W MS S VS ES	Defect Spacing (mm): <20 20-60 60-200 200-600 600-2000 >2000	Drilling Method/ Support	Structure & Other Observations
				29.0	11										SPT	
					12						90				OB / PQ3	
															SPT	
				28.2	13		CH: Silty CLAY: with some fine sand. Greenish grey, occasionally streaked black and purplish brown. Some decomposing organics - wood fragments and rootlets. (Alluvium)	M	F						OB / PQ3	
		13.5	SPT: N* = 0 (0, 0 / 0, 0, 0, 0)				MH: Clayey SILT: with some fine sand. Greenish grey, occasionally streaked black. Minor organics - wood decomposing fragments. (Colluvium)	M to W	F to St						SPT	
					14		*... at 14.50m, Becoming dark brownish grey, mottled greenish grey and black. Lenses of large organic wood fragments. Some fine to coarse sand sized SILT clasts. Subangular to subrounded clasts.*								OB / PQ3	
		15.0	SPT: N* = 12 (2, 3 / 3, 3, 3, 3)	26.8	15		Gravelly SILT with some clay and sand. Dark greyish brown, mottled brown and black. Moist. Sand is fine. Fine to coarse gravel sized SILT clasts, sub angular to angular. Well graded. Trace decomposing organics. (Colluvium)				70				SPT	
					16										TT / HQ3	
		16.5	SPT: N* = 7 (1, 1 / 2, 1, 2, 2)												SPT	
					17			M to W	F to St		80				TT / HQ3	
		18.0	SPT: N* = 1 (0, 0 / 0, 0, 0, 1)		18										SPT	
							... from 18.60m to 18.75m, Lens of wood fragments.				57				TT / HQ3	
					19										SPT	
					20											

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH02-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 30/10/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 3 of 3
Position: 389183.4mE; 830486.2mN Projection: EDENTM2000
Elevation: 41.75m Datum: AUCKHT1946 Survey Source: Handheld GPS

CMW Geosciences
Great People | Practical Solutions

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering: RS	Weathering: CW	Weathering: HW	Weathering: MW	Weathering: SW	Weathering: UW	Recovery	RQD	Estimated Strength: EW	Estimated Strength: VW	Estimated Strength: W	Estimated Strength: MS	Estimated Strength: S	Estimated Strength: VS	Estimated Strength: ES	Defect Spacing (mm): <20	Defect Spacing (mm): 20-60	Defect Spacing (mm): 60-200	Defect Spacing (mm): 200-600	Defect Spacing (mm): 600-2000	Defect Spacing (mm): >2000	Drilling Method/ Support	Structure & Other Observations
		20.5	SPT: N* = 19 (3, 3 / 3, 3, 5, 8)	20.6	21		*... from 20.75m to 20.80m, Lens of wood fragments.*									90														TT / HQ3 SPT	Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
							Highly weathered, dark greyish brown, massive MUDSTONE. Extremely weak. (Hukerenui Mudstone)																								
					22		Borehole terminated at 22.00 m																								
					23																										
					24																										
					25																										
					26																										
					27																										
					28																										
					29																										
					30																										

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

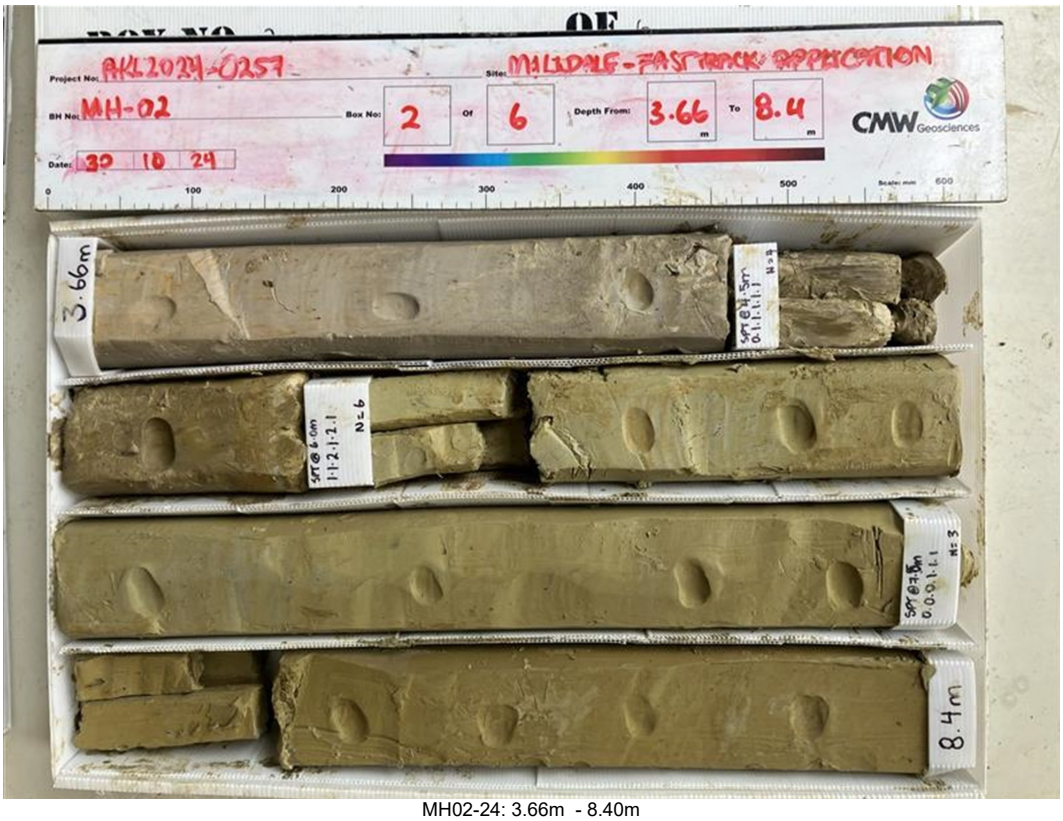
This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH02-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:30/10/2024

CMW Geosciences
Great People | Practical Solutions

MH02-24: 0.00m - 3.66m



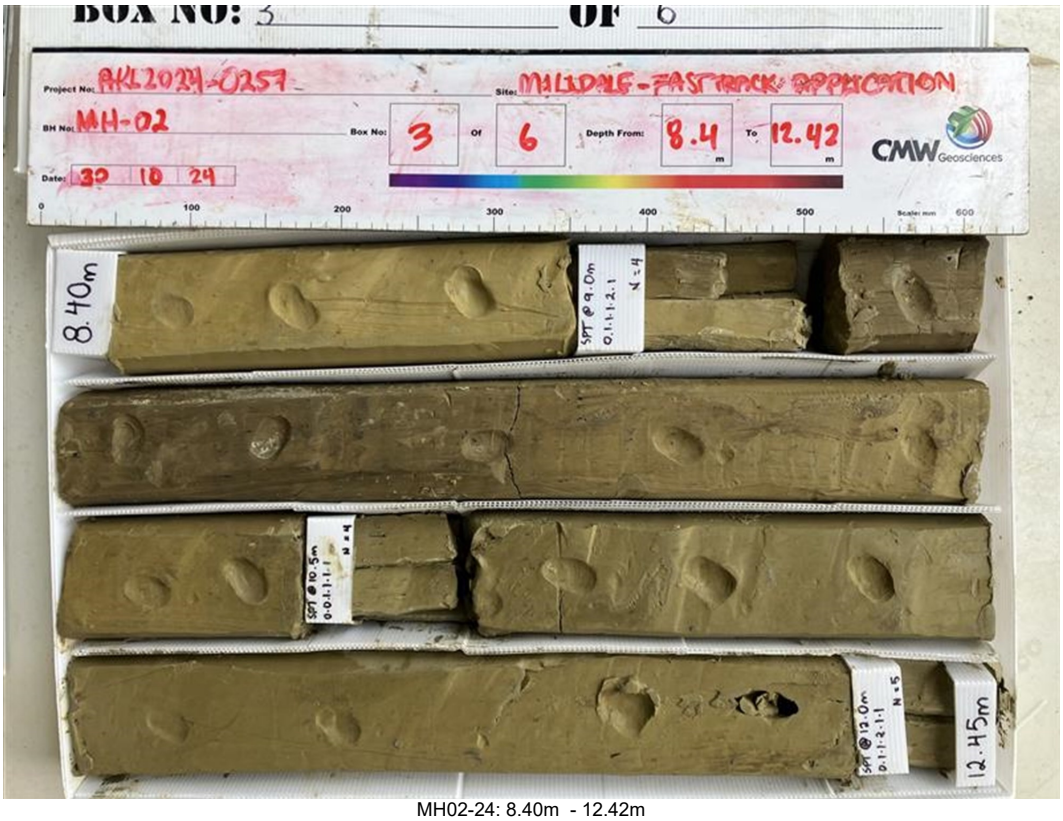
MH02-24: 3.66m - 8.40m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

PHOTOGRAPH SHEET - MH02-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:30/10/2024

CMW Geosciences
Great People | Practical Solutions



MH02-24: 8.40m - 12.42m

MH02-24: 12.42m - 15.95m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

PHOTOGRAPH SHEET - MH02-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:30/10/2024

CMW Geosciences
Great People | Practical Solutions

MH02-24: 15.95m - 20.80m

MH02-24: 20.80m - 22.00m

BOREHOLE LOG - MH03-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 01/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 1 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 389005.0mE; 830427.9mN Projection: EDENTM2000
Elevation: 44.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering: RS CW HW MW SW UW	Recovery	RQD	Estimated Strength: EW VW W MS S VS ES	Defect Spacing (mm): <20 20-60 60-200 200-600 600-2000 >2000	Drilling Method/ Support	Structure & Other Observations
		0.0	SPT: N* = 2 (0, 0 / 0, 1, 0, 1)	44.0	0		OL: Clayey SILT: with minor fine to medium gravel. Dark brown. Low plasticity. Some rootlets. (Topsoil)	M								
				43.5			CH: CLAY: with some SILT. Orange brown, streaked light grey. High plasticity. Moist. Stiff. (Alluvium)				71				OB / PQ3	
		1.0	Peak = 74kPa Residual = 39kPa		1		*... at 0.65m, Light grey, streaked orange and red.*									
		1.5	Peak = 103kPa													
		1.5	Residual = 52kPa SPT: N* = 2 (0, 1 / 0, 1, 0, 1)					M	St						SPT	
					2						30				OB / PQ3	
		3.0	SPT: N* = 1 (0, 0 / 0, 0, 0, 1)	41.0	3		OH: CLAY: with minor silt. Greyish purple, streaked light grey, occasionally speckled black. High plasticity, moist. Soft. Trace decomposed organics. (Alluvium)									
									S						SPT	
					4		*... at 3.95m, Becoming bluish grey. Occasionally speckled black. Becoming firm.*				87				OB / PQ3	
		4.5	Peak = 84kPa													
		4.5	Residual = 49kPa SPT: N* = 2 (0, 0 / 0, 1, 0, 1)												SPT	
					5						80				OB / PQ3	
		6.0	Peak = 52kPa													
		6.0	Residual = 29kPa SPT: N* = 3 (0, 0 / 0, 1, 1, 1)					M							SPT	
					6		*... at 6.30m, Becoming purplish grey, streaked black.*		F							
					7						83				OB / PQ3	
		7.5	Peak = 55kPa													
		7.5	Residual = 32kPa SPT: N* = 3 (0, 0 / 1, 1, 0, 1)													
					8						73				OB / PQ3	
		9.0	Peak = 68kPa	35.0	9		CH: CLAY: with some silt and trace fine sand. Bluish grey, streaked black. High plasticity. Moist. Firm. Trace decomposing organics. (Alluvium)								SPT	
		9.0	Residual = 49kPa SPT: N* = 5 (0, 1 / 1, 1, 1, 2)				*... at 9.45m, Becoming dark greyish brown, streakeded black. Minor fine sad.*				77				OB / PQ3	
					10											

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH03-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 01/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 2 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 389005.0mE; 830427.9mN Projection: EDENTM2000
Elevation: 44.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
		10.5 10.5	Peak = 49kPa Residual = 26kPa SPT: N* = 8 (1, 1 / 1, 2, 3, 2)		11				F		73				SPT OB / PQ3	
		12.0 12.0	Peak = 52kPa Residual = 32kPa SPT: N* = 4 (0, 0 / 0, 0, 2, 2)		12		... *at 12.00m, Becoming very stiff.*	M	VSt						SPT OB / PQ3	
		13.5 13.5	SPT: N* = 15 (1, 2 / 2, 4, 4, 5) Peak = UTP	30.6 30.4	13 14		CH: Silty CLAY : Orange brown. High plasticity. Moist. Hard. Completely weathered, orange brown, MUDSTONE. Extremely weak. (Hukerenui Mudstone) Completely to highly weathered, massive MUDSTONE. Extremely to very weak. (Hukerenui Mudstone)		H					SPT OB / PQ3	
		15.0	SPT: N* = 16 (2, 2 / 3, 4, 4, 5)		15 16 17 18 19 20		Borehole terminated at 15.00 m								SPT	

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH03-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:01/11/2024

CMW Geosciences
Great People | Practical Solutions

MH03-24: 0.00m - 4.50m

MH03-24: 4.50m - 8.86m

PHOTOGRAPH SHEET - MH03-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:01/11/2024

CMW Geosciences
Great People | Practical Solutions

MH03-24: 8.86m - 12.68m

MH03-24: 12.68m - 15.00m

BOREHOLE LOG - MH04-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 04/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 1 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388661.4mE; 830177.3mN Projection: EDENTM2000
Elevation: 59.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
		59.0		OL: Clayey SILT: Dark brown. Low plasticity, moist to wet. Some rootlets. (Topsoil)	M to W					
0.5	Peak = 116kPa Residual = 52kPa	58.8		CH: Silty CLAY: Orange brown, streaked light grey, occasionally mottled brown. High plasticity. Moist. Very stiff. Minor roots. (Residual Soil)	M	VSt				
1.0	Peak = 126kPa Residual = 32kPa	58.3	1	MH: Clayey SILT: Orange brown, streaked light grey. Low to medium plasticity. Moist. Very stiff. (Residual Soil)	M	VSt	100		OB / PQ3	
1.5	SPT: N* = 13 (1, 2 / 2, 2, 4, 5) Peak = UTP	57.7		... at 0.90m, Becoming low plasticity.	M	H				
1.5		57.5							SPT	
		57.0	2	MH: SILT: with trace fine sand and clay. Low plasticity. Moist. Hard. Completely weathered light orange brown, streaked grey and mottled dark orange SILTSTONE. Extremely weak. (Residual Soil)			83		OB / PQ3	
3.0	SPT: N* = 20 (2, 4 / 4, 5, 5, 6)		3	... at 1.30m, Becoming hard. Highly weathered, purplish brown, streaked light grey and orange, massive MUDSTONE. Extremely weak to very weak. Interbedded lenses of SILTSTONE. (Mangakahia Complex)					SPT	
		55.5		Highly weathered, light grey, streaked orange SILTSTONE. Extremely weak. Intebedded MUDSTONE lenses and limonite staining. Fine to medium gravel sized silt clasts. (Mangakahia Complex)			87		TT / HQ3	3.6m:1,JN,100°,UN,S,CL,CN,(CL),CS, 3.9m:1,JN,PL,S,CL,ST,(CL),CS,
			4	Highly weathered, dark grey, SILTSTONE. Very weak. Highly fractured. (Mangakahia Complex)					SPT	
			5				80		TT / HQ3	5.0-5.1m:2,JN,5°,PL,R,CL,CN,VS, 5.3-5.7m:6,JN,10°,PL,S,CL,ST,(CL),CS,
6.0	SPT: N* = 31 (5, 7 / 8, 8, 7, 8)		6						SPT	
7.0	SPT: N* = 32 (7, 8 / 12, 9, 6, 5)		7				93		TT / HQ3	6.9m:1,JN,45°,PL,S,CL,CN,W,
		51.8		Highly to moderately weathered, dark grey, mottled greenish brown massive SILTSTONE. Very weak. Interbedded MUDSTONE. (Mangakahia Complex)						
		51.4		Highly weathered, dark grey, occasionally mottled brown and greenish grey, SILTSTONE. Very weak. Highly fractured. Interbedded lenses of highly weathered MUDSTONE. (Mangakahia Complex)					SPT	
			8				100		TT / HQ3	8.1-8.4m:6,JN,5°,PL,S,GA,CN,VS, 8.7-8.8m:3,JN,20°,UN,S,CL,CO,(CL),CS,
		50.2		Highly weathered, dark grey, fine SANDSTONE. Extremely weak. (Mangakahia Complex)						
9.0	SPT: N* = 40 (3, 5 / 6, 10, 12, 12)	50.0	9	Highly to moderately weathered, dark grey, streaked greyish brown and greenish grey, massive SILTSTONE. Very weak. Interbedded highly weathered, extremely weak MUDSTONE and fine SANDSTONE. (Mangakahia Complex)					SPT	
			10						TT / HQ3	

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH04-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 04/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 2 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388661.4mE; 830177.3mN Projection: EDENTM2000
Elevation: 59.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
		10.5	SPT: N* = 29 (4, 5 / 5, 8, 8, 8)		11										SPT	
															TT / HQ3	11.4m:1,JN,60°,PL,R,CL,CN, W,
		12.0	SPT: N* = 46 (4, 7 / 7, 8, 9, 22)		12											11.9m:1,JN,UN,S,CL,CN,W,
															SPT	
					13						7				TT / HQ3	
		13.5	SPT: N* = 29 (7, 8 / 8, 7, 7, 7)												SPT	
					14		... from 14.07m to 14.18m, Highly fractured lens of MUDSTONE.									
				44.8			Highly weathered, grey, massive, fine SANDSTONE. Very weak. (Mangakahia Complex)				60				TT / HQ3	14.4-14.6m:1,JN,75°,PL,S,CL, CO,(CL),VW,
							... from 14.57m to 14.67m, Becoming highly fractured. Blocky.									
		15.0	SPT: N* = 32 (7, 8 / 7, 7, 9, 9)		15										SPT	
				43.6			Highly weathered, dark grey brown, massive MUDSTONE. Very weak. Interbedded lenses of SILTSTONE and SANDSTONE. (Mangakahia Complex)									
					16		... from 15.60m to 15.70m, Lens of blocky fabric.								TT / HQ3	15.7m:1,JN,15°,PL,S,GA,CO, (CL),W,
		16.5	SPT: N* = 50+ (8, 14 / 14, 10, 13, 13)												SPT	16.6m:1,JN,15°,PL,S,CL,ST, (CL),W,
					17										TT / HQ3	
		18.0	SPT: N* = 50+ (12, 18 / 12, 13, 17, 8 for 40mm)		18										SPT	
															TT / HQ3	
					19										SPT	
					20											

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

BOREHOLE LOG - MH04-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 04/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 3 of 3
Position: 388661.4mE; 830177.3mN Projection: EDENTM2000
Elevation: 59.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

CMW Geosciences
Great People | Practical Solutions

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering: RS CW HW MW SW UW	Recovery	RQD	Estimated Strength: EW VW W MS S VS ES	Defect Spacing (mm): <20 20-60 60-200 200-600 600-2000 >2000	Drilling Method/ Support	Structure & Other Observations
					21										TT / HQ3	
															SPT	
					22										TT / HQ3	
															SPT	
					23										TT / HQ3	
					24		Borehole terminated at 24.00 m									
					25											
					26											
					27											
					28											
					29											
					30											

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH04-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:04/11/2024

CMW Geosciences
Great People | Practical Solutions

MH04-24: 0.00m - 2.45m

MH04-24: 2.45m - 6.75m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

PHOTOGRAPH SHEET - MH04-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:04/11/2024

CMW Geosciences
Great People | Practical Solutions

MH04-24: 6.75m - 10.38m

MH04-24: 10.38m - 16.10m

PHOTOGRAPH SHEET - MH04-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:04/11/2024

CMW Geosciences
Great People | Practical Solutions

MH04-24: 16.10m - 20.30m

MH04-24: 20.30m - 24.00m

BOREHOLE LOG - MH05-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 05/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 1 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388727.6mE; 829918.8mN Projection: EDENTM2000
Elevation: 64.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
		64.0		OL: Clayey SILT: Dark brown. Low plasticity. Wet. Some rootlets. Trace gravel. Gravel is fine and sub rounded to sub angular. (Topsoil)	W					
0.5	Peak = 133kPa Residual = 65kPa	63.8		CH: Silty CLAY: Orange brown, mottled grey brown. High plasticity. Moist. Very stiff. Trace rootlets. (Residual Soil)	M	VSt	93		OB / PQ3	
1.0	Peak = 133kPa Residual = 71kPa		1	*... at 0.40m, Becoming orange brown, streaked light grey and orange.*						
1.5	Peak = 126kPa Residual = 58kPa			*... at 1.50m, Trace fine to coarse sand sized SILT clasts.*					SPT	
1.5	SPT: = 3 (0, 1 / 1, 1, 0, 1)	62.0	2	Completely weathered, light grey brown, occasionally mottled bluish, purplish and greenish grey, massive MUDSTONE. Extremely weak. (Hukerenui Mudstone)	M		63	100	OB / PQ3	
3.0	SPT: = 18 (1, 3 / 3, 4, 5, 6)		3						SPT	
		60.5		Completely weathered greenish grey, SILSTONE. Extremely weak. Highly fractured and sheared. Retrieved as silty gravel. Fine to medium sized gravel clasts, subangular to subrounded. (Mangakahia Complex)	M		100		TT / HQ3	
		59.8	4	Highly weathered, grey, massive, fine SANDSTONE. Weak. (Mangakahia Complex)						
4.5	SPT: N* = 50+ (6, 9 / 13, 14, 18, 5 for 10mm)			*... from 4.25m to 4.32m, Lens of highly to moderately weathered SANDSTONE. Weak.*					SPT	
			5	*... at 4.95m, Becoming moderately weathered, massive, fine SANDSTONE. Weak.*	M		100		TT / HQ3	5.4-5.6m:2,SZ,10°,UN,S,OP,IF,(CL),W,
				... at 5.65m, Interbedded lenses of highly weathered, brown MUDSTONE. Very weak. Tightly interlocking fabric.						5.8m:1,SZ,20°,UN,S,GA,IF,(CL),W,
6.0	SPT: N* = 10 (3, 4 / 3, 3, 2, 2)		6						SPT	
		57.6		Highly weathered, dark grey brown occasionally mottled orange, grey and green, massive MUDSTONE. Very weak. (Mangakahia Complex)	D to M		100		TT / HQ3	6.8m:JN,10°,PL,R,GA,CO,(CL),W,
			7							7.0m:1,JN,PL,R,CL,ST,(CL),W,
		56.6		Moderately weathered, grey, massive MUDSTONE. Weak. Interbedded lenses of SILTSTONE and SANDSTONE. (Mangakahia Complex)	D to M		100		SPT	7.2m:1,JN,15°,ST,R,CL,CN,W,
7.5	SPT: Nc = 20 (2, 4 / 4, 5, 5, 6)		8						TT / HQ3	7.4m:1,JN,5°,PL,R,CL,ST,(CL),W,
				... from 8.75m to 8.90m, Lens of moderately weathered, grey, fine to medium SANDSTONE. Weak.						8.3m:1,SZ,15°,UN,S,OP,IF,(CL),VW,
9.0	SPT: Nc = 20 (2, 4 / 4, 5, 5, 6)		9				100		SPT	
			10						TT / HQ3	

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

BOREHOLE LOG - MH05-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 05/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 2 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388727.6mE; 829918.8mN Projection: EDENTM2000
Elevation: 64.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering: RS CW HW MW SW UW	Recovery	RQD	Estimated Strength: EW VW W MS S VS ES	Defect Spacing (mm): <20 20-60 60-200 200-600 600-2000 >2000	Drilling Method/ Support	Structure & Other Observations
		10.5	SPT: Nc = 19 (3, 3 / 3, 4, 6, 6)		11						100				SPT	
				52.6			Highly weathered, brownish grey, mottled orange and greenish grey, massive MUDSTONE. Very weak. Tightly interlocking fabric. Interbedded lenses of highly weathered SILTSTONE and fine SANDSTONE (Mangakahia Complex). (Hukerenui Mudstone)								TT / HQ3	11.1-11.7m:2,JN,30°,PL,S,CL, ST,(CL),W,
		12.0	SPT: Nc = 21 (2, 3 / 4, 5, 5, 7)		12						100				SPT	
					13										TT / HQ3	
		13.5	SPT: Nc = 31 (2, 4 / 6, 8, 8, 9)												SPT	
					14			D to M			100				TT / HQ3	14.8-14.9m:3,JN,10°,PL,S,CL, ST,(CL),MW,
		15.0	SPT: Nc = 42 (2, 4 / 10, 14, 10, 8)		15										SPT	
											100				TT / HQ3	15.5-15.5m:1,SZ,25°,UN,S,OP ,IF,(CL),MW,
		16.5	SPT: Nc = 22 (3 ,4 for 5mm / 5, 5, 6, 6 for 5mm)		16										SPT	
					17						100				TT / HQ3	
		18.0	SPT: Nc = 50+ (7, 8 / 10, 13, 15, 12 for 35mm)	46.0	18		Moderately weathered, grey, massive SILTSTONE. Weak. Tightly interlocking fabric. Interbedded highly weathered Hukurenui MUDSTONE. (Mangakahia Complex)								SPT	
					19			D to M			100				TT / HQ3	
		19.5	SPT: Nc = 41 (13, 12 / 12, 13, 16 for 35mm)				Highly weathered, brownish grey, mottled orange and greenish grey, massive MUDSTONE. Very weak. Tightly interlocking fabric. Interbedded lenses of highly weathered SILTSTONE and fine SANDSTONE (Mangakahia Complex). (Hukerenui Mudstone)								SPT	19.7m:1,JN,PL,S,CL,CN,VW,
				44.0	20											

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH05-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 05/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 3 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388727.6mE; 829918.8mN Projection: EDENTM2000
Elevation: 64.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering: RS CW HW MW SW UW	Recovery	RQD	Estimated Strength: EW VW W MS S VS ES	Defect Spacing (mm): <20 20-60 60-200 200-600 600-2000 >2000	Drilling Method/ Support	Structure & Other Observations
		21.0	SPT: = 41 (6, 8 / 8, 8, 10, 15)		21			M							TT / HQ3	
															SPT	
					22										TT / HQ3	
		22.5	SPT: = 50+ (9, 9 / 10, 17, 17, 6 for 15mm)				Borehole terminated at 22.50 m								SPT	
					23											
					24											
					25											
					26											
					27											
					28											
					29											
					30											

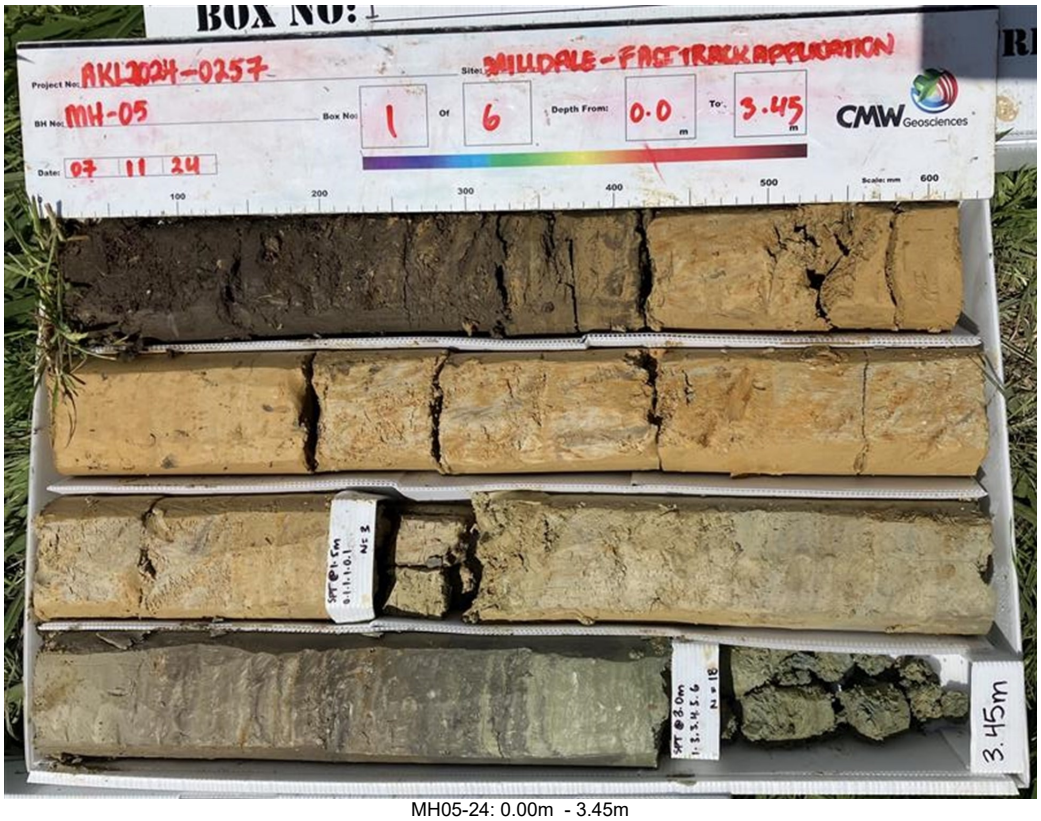
Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH05-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:05/11/2024

CMW Geosciences
Great People | Practical Solutions



MH05-24: 0.00m - 3.45m

MH05-24: 3.45m - 6.85m

PHOTOGRAPH SHEET - MH05-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:05/11/2024

CMW Geosciences
Great People | Practical Solutions

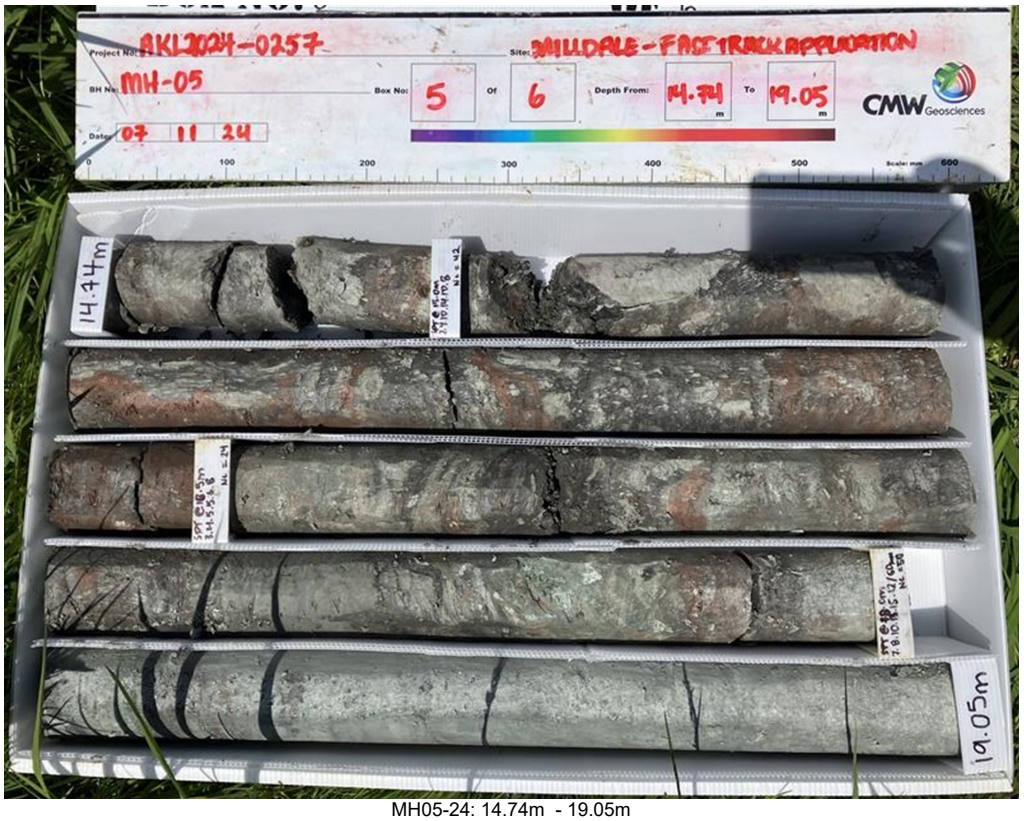
MH05-24: 6.85m - 10.50m

MH05-24: 10.50m - 14.74m

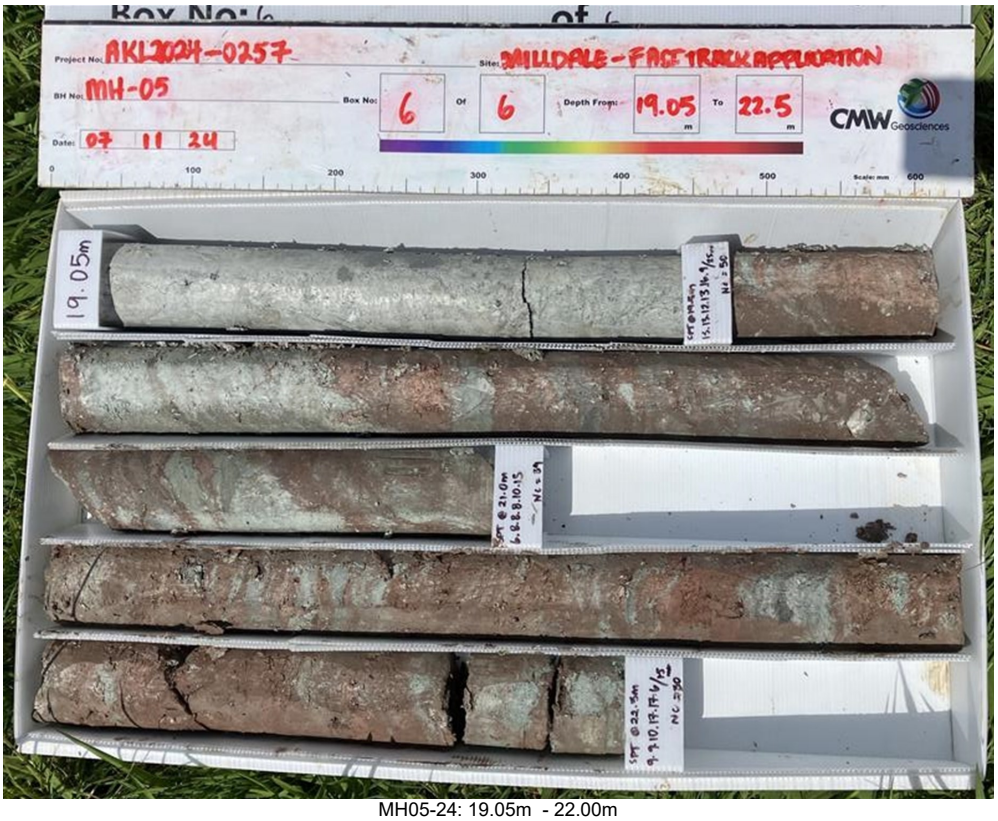
PHOTOGRAPH SHEET - MH05-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:05/11/2024

CMW Geosciences
Great People | Practical Solutions



MH05-24: 14.74m - 19.05m



MH05-24: 19.05m - 22.00m

BOREHOLE LOG - MH06-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 07/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 1 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388631.2mE; 829915.7mN Projection: EDENTM2000
Elevation: 45.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
		45.0	OL: Clayey SILT: Dark brown. Low plasticity. Moist to wet. Some topsoil. Trace fine to coarse sand sized SILT clasts. (Topsoil)	M to W					
		44.9							
		44.8	MH: Clayey SILT: with minor fine sand. Greyish brown, mottled orange brown. Low plasticity. Moist. Stiff. Trace rootlets. (Colluvium)	M	St	72		OB / PQ3	
1.5 1.5	Peak = 116kPa Residual = 61kPa SPT: N* = 11 (0, 0 / 2, 2, 3, 4)	43.5	CI: Silty CLAY: Orange brown, mottled grey brown and black. Medium to high plasticity. Moist. Firm to stiff. Trace organics - roots, rootlets and fine to coarse gravel. (Colluvium)	M to W	F to St	100		SPT	
		42.5	GC: Clayey gravelly SILT. : Light grey, mottled orange brown. Low plasticity. Moist to wet. Firm to stiff. Fine to coarse sand sized SILT clasts. Some GRAVEL clasts. Gravel is fine, sub angular to angular. (Colluvium)			71	0	OB / PQ3	
3.0	SPT: Nc = 50+ (16 ,34 for 50mm /)		Completely to highly weathered, grey, streaked grey brown, thinly laminated SILTSTONE. Very weak. Highly fractured and sheared. Retrieved as silty GRAVEL. Gravel is fine to coarse, sub angular to angular. (Mangakahia Complex)					TT / HQ3	
						100	0	SPT	
4.5	SPT: Nc = 50+ (14 ,36 for 70mm /)							TT / HQ3	4.2m:1,JN,ST,R,OP,ST,(Z),CS, 4.4-4.9m:6,JN,0°,UN,R,OP,CO ,(CL),VS,
		39.3	Highly weathered, light grey, streaked brownish grey, with steeply inclined bedding, SILTSTONE. Weak. Tightly interlocking fabric. Thinly laminated MUDTONE inclusions. (Mangakahia Complex)	D to M		87	41	SPT	
6.0	SPT: Nc = 50+ (18 ,32 for 55mm /)							TT / HQ3	5.2m:1,JN,60°,PL,S,CL,CO, (CL),CS, 5.4-5.6m:4,JN,0°,UN,R,OP,IF, (CL),EC, 5.7-5.9m:1,JN,25°,PL,S,CL,ST ,(CL),CS,
						100	73	SPT	6.2-6.4m:2,JN,0°,UN,R,GA,C O,(CL),CS,
7.5	SPT: Nc = 50+ (20 ,30 for 35mm /)							TT / HQ3	6.7m:1,JN,PL,R,GA,CO, (CL),CS, 7.0-7.4m:5,JN,10°,UN,R,GA,S T,(CL),VS,
						100	65	SPT	7.8-7.9m:2,JN,35°,UN,R,OP,IF ,(CL),VS,
			... from 8.20m to 8.25m, Lens of highly fractured SILTSTONE.					TT / HQ3	8.6m:1,JN,70°,PL,S,CL,ST, (CL),VS, 8.7-8.7m:2,JN,30°,UN,R,GA,C O,(CL),VS,
9.0	SPT: Nc = 50+ (25 ,25 for 15mm /)								
			... from 9.09m to 9.48m, Lens of highly fractured SILTSTONE. Retrieved as silty GRAVEL. Gravel angular to sub angular.			100	53	SPT	
			... from 9.70m to 9.60m, Lens of highly fractured SILTSTONE. Retrieved as coarse GRAVEL. Gravel angular to sub angular.					TT / HQ3	9.5-9.7m:3,JN,45°,PL,S,CL,ST ,(CL),VS, 9.8-10.4m:9,JN,30°,UN,R,CL, ST,(CL),EC,

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:

Remarks: Groundwater not encountered. Piezometer installed.

BOREHOLE LOG - MH06-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 07/11/2024
Borehole Location: Refer to Site Plan Logged by: ST Checked by: MJC Scale: 1:50 Sheet 2 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388631.2mE; 829915.7mN Projection: EDENTM2000
Elevation: 45.00m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	Material Description	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
10.5	SPT: Nc = 50+ (18 ,32 for 55mm /)				SPT	10.6-11.0m:3,JN,5°,UN,R,GA, CO,(CL),VS,
			100	48	TT / HQ3	11.4-11.4m:4,JN,30°,PL,R,CL, CO,(CL),EC, 11.5-11.7m:2 ,JN,70°,ST,S,CL, CN,CS,
12.0	SPT: Nc = 50+ (17 ,33 for 50mm /)	*... from 11.55m to 12.95m, Lens of highly fractured SILTSTONE, blocky, GRAVEL. Gravel is fine to coarse. Angular.*			SPT	
			100	48	TT / HQ3	12.6-13.0m:2,JN,10°,UN,S,GA ,ST,(CL),CS,
					SPT	13.6m:3,JN,20°,PL,S,CL,ST, (CL),MW,
		... from 14.50m to 14.60m, Lens of highly fractured SILTSTONE, blocky. Retrieved as coarse GRAVEL. Angular.			TT / HQ3	14.8m:1,JN,75°,PL,S,CL,ST, (CL),W,
15.0	SPT: Nc = 50+ (27 ,23 for 20mm /)	Borehole terminated at 15.00 m			SPT	

Termination Reason: Target Depth Reached.
Shear Vane No: 1824 DCP No:

Remarks: Groundwater not encountered. Piezometer installed.

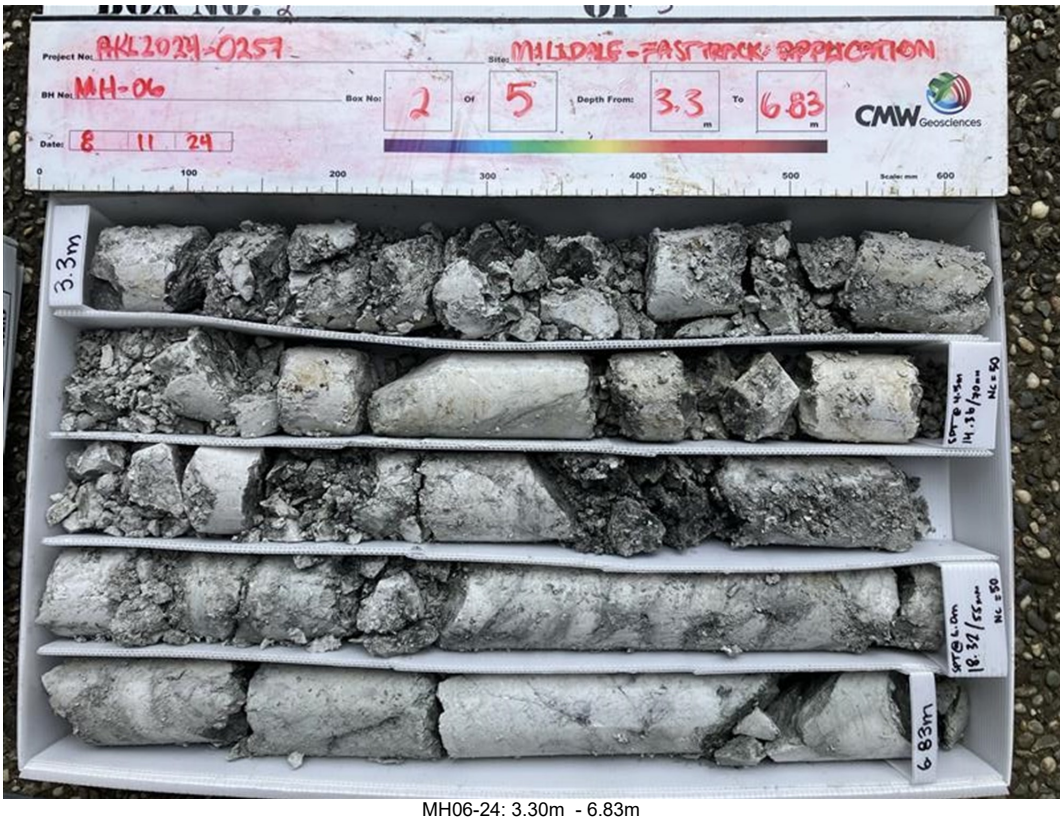
This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH06-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:07/11/2024

CMW Geosciences
Great People | Practical Solutions

MH06-24: 0.00m - 3.30m



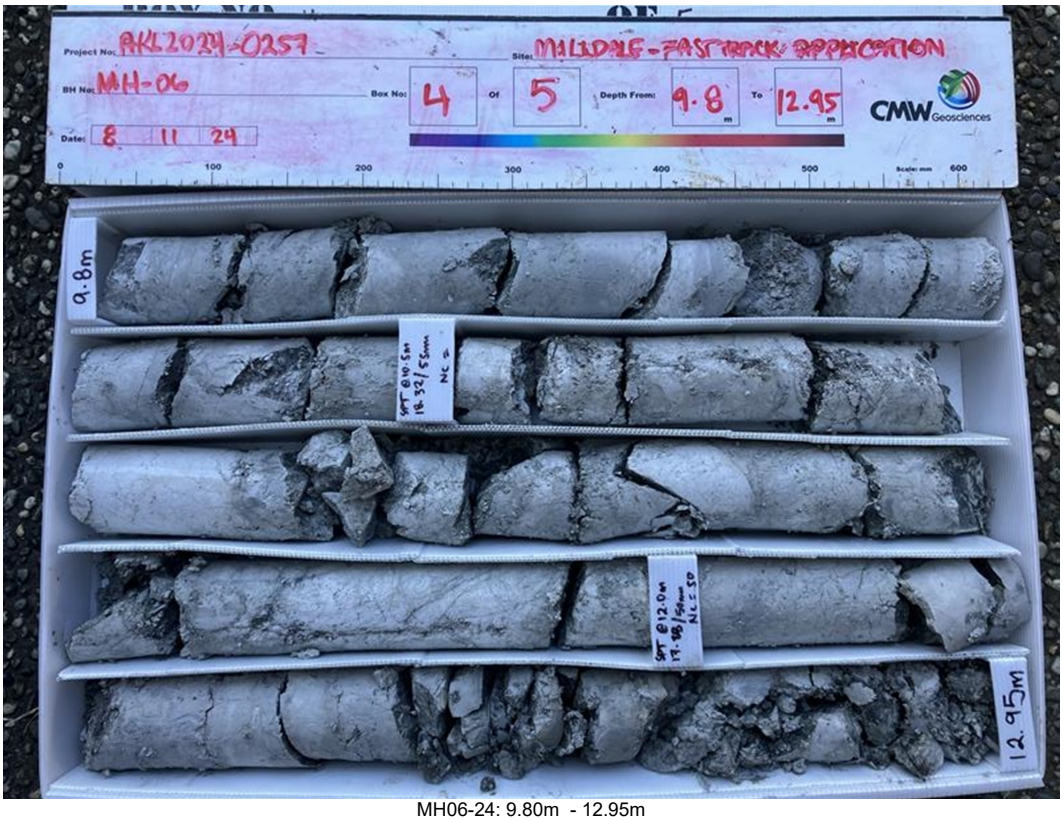
MH06-24: 3.30m - 6.83m

PHOTOGRAPH SHEET - MH06-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:07/11/2024

CMW Geosciences
Great People | Practical Solutions

MH06-24: 6.83m - 9.80m

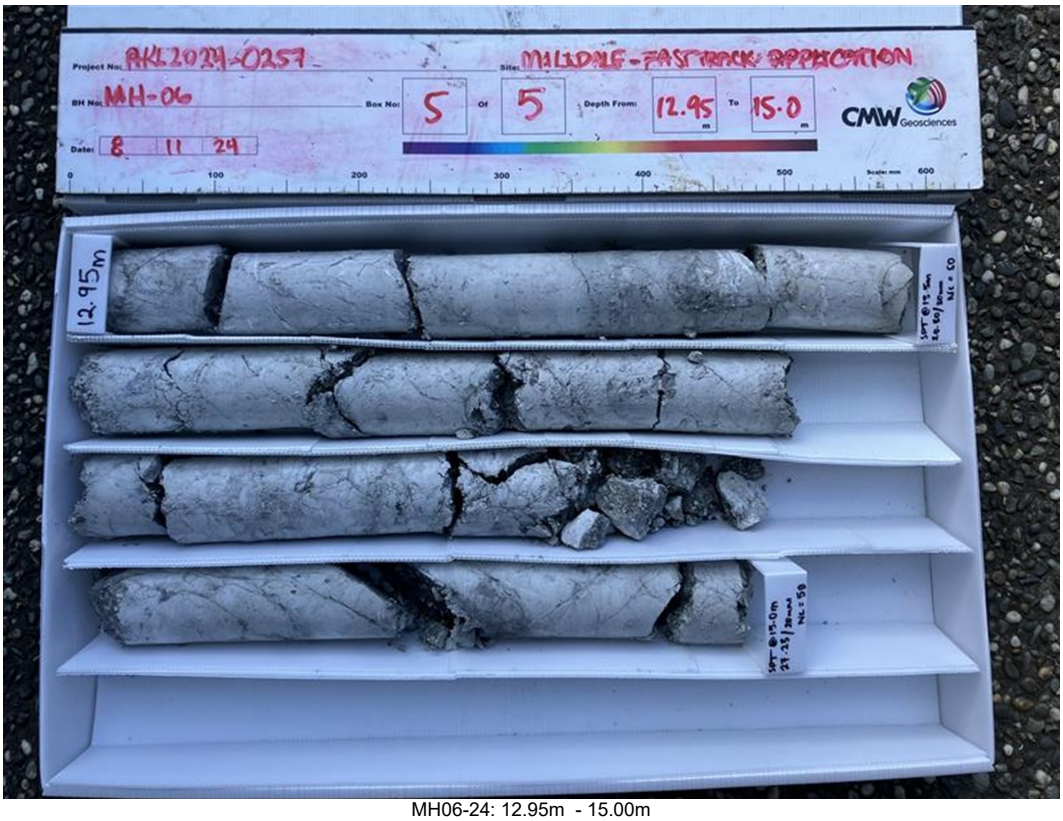


MH06-24: 9.80m - 12.95m

PHOTOGRAPH SHEET - MH06-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:07/11/2024

CMW Geosciences
Great People | Practical Solutions



MH06-24: 12.95m - 15.00m

BOREHOLE LOG - MH07-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 11/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 1 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388515.5mE; 829929.9mN Projection: EDENTM2000
Elevation: 35.73m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
		35.7		OL: Organic SILT with minor clay: Dark brown. Low plasticity. With minor rootlets. (Topsoil)		F	60		OB / PQ3	
		35.4		ML: Clayey SILT: Dark brown mottled orange. Low plasticity. With trace limonite staining. (Alluvium)						
0.5	Peak = 86kPa Residual = 14kPa	35.2		CH: Silty CLAY: Light greenish grey mottled orange. High plasticity. With trace organics, limonite staining, and fine gravel sized limonite inclusions. (Alluvium)		S	100		OB / PQ3	
			1							
		34.6		GW: Completely weathered, greyish white, massive, LIMESTONE: Extremely weak. Recovered as fine to coarse SAND and fine GRAVEL. Loosely packed. Well graded. With trace limonite staining. (Mahurangi Limestone)			100	0	TT / HQ3	
1.2	Peak = UTP	34.5					0	0	SPT	
1.5	SPT: Nc = 50+ (24 ,26 for 35mm /)									
		33.9		Highly weathered, greyish white, blocky, LIMESTONE: Very weak. Highly fractured. With trace limonite staining. (Mahurangi Limestone)						
			2	Moderately weathered, whitish grey, blocky, LIMESTONE : Very weak. Highly fractured. With trace clay matrix. (Mahurangi Limestone)			86	45	TT / HQ3	
3.0	SPT: Nc = 50+ (17 ,33 for 65mm /)		3		W to S		100	0	SPT	3.0m:1,JN,45°,PL,S,CL,CN,EC,
				... at 3.50m, With minor dark grey calcite filled veins.		H	100	29	TT / HQ3	3.3m:1,JN,50°,CU,R,CL,CN,EC, 3.3m:1,JN,30°,CU,R,CL,CN,EC, 3.5-3.6m:1,JN,45°,PL,R,CL,CN,EC,
			4							4.3-4.5m:SZ,EC,
4.5	SPT: Nc = 50+ (20 ,30 for 65mm /)						100	0	SPT	4.6m:1,JN,15°,IR,R,CL,CN,EC,
			5				100	51	TT / HQ3	4.6-4.7m:SZ,EC, 4.8m:1,JN,15°,IR,R,CL,CN,EC, 5.1m:1,JN,10°,PL,R,CL,CN,EC, 5.2m:1,JN,10°,IR,R,CL,CN,EC, 5.2m:1,JN,20°,PL,R,CL,CN,EC, 5.5m:1,JN,20°,PL,R,CL,CN,EC, 5.5-5.6m:1,JN,50°,PL,R,CL,CN,EC, 5.7-5.7m:1,JN,55°,PL,R,CL,CN,EC,
6.0	SPT: Nc = 50+ (25 ,25 for 20mm /)		6				0	0	SPT	

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH07-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 11/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 2 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388515.5mE; 829929.9mN Projection: EDENTM2000
Elevation: 35.73m Datum: AUCKHT1946 Survey Source: Handheld GPS

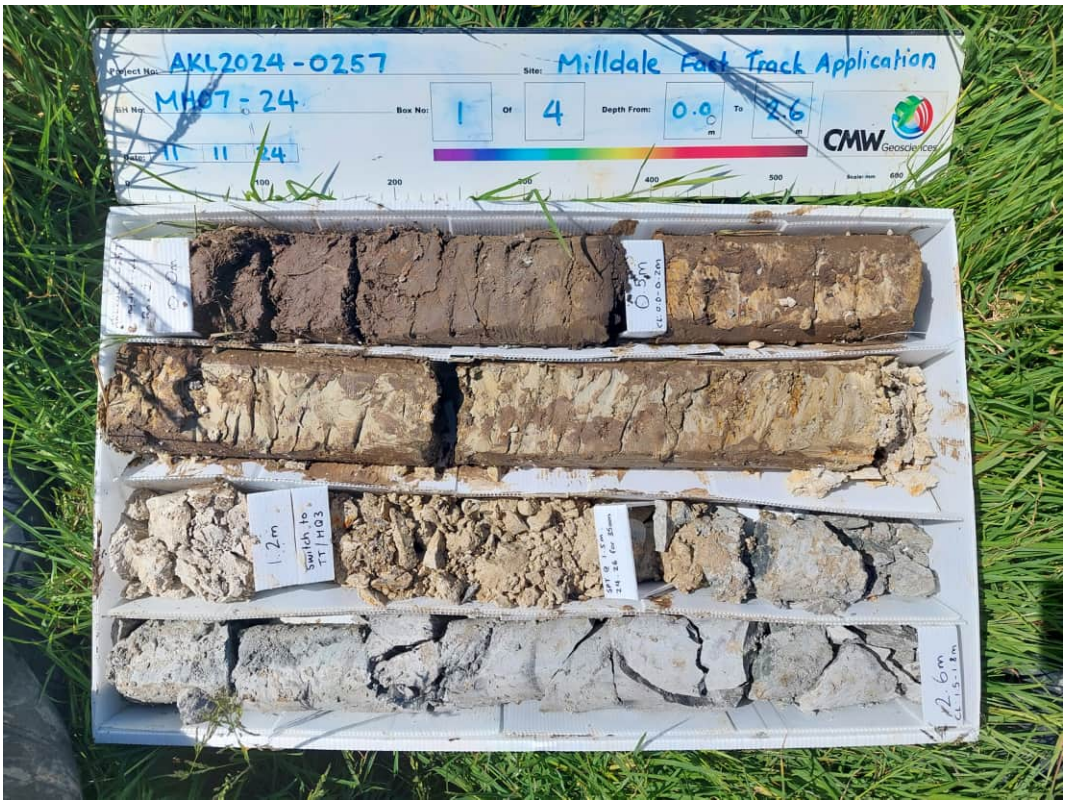
Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
							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)			RS CW HW MW SW UW			EW VW W MS S VS ES	<20 20-60 60-200 200-600 600-2000 >2000		Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
					7						100	25			TT / HQ3	6.2m:1,JN,10°,IR,R,CL,CN,EC, 6.4m:1,JN,15°,IR,R,CL,CN,EC, 6.4m:1,JN,10°,IR,R,CL,CN,EC, 6.5m:1,JN,20°,UN,R,CL,CN,EC, 6.6m:1,JN,45°,PL,R,CL,CN,EC, 6.7m:1,JN,10°,PL,R,CL,CN,EC, 7.0m:1,JN,5°,IR,R,CL,CN,EC, 7.1-7.2m:1,JN,45°,PL,S,CL,IF,(S),EC, 7.3-7.3m:1,JN,40°,PL,R,CL,CN,EC,
		7.5	SPT: Nc = 50+ (31 ,19 for 20mm /)								0	0			SPT	
					8						89	28			TT / HQ3	7.8m:1,JN,5°,UN,R,CL,CN,EC, 7.9m:1,JN,5°,IR,R,CL,CO,(CA),EC, 8.1m:1,JN,15°,IR,R,CL,CO,(CA),EC, 8.2m:1,JN,20°,CU,R,CL,CN,EC, 8.4m:1,JN,75°,CU,R,CL,CO,(CA),EC,
		9.0	SPT: Nc = 50+ (23 ,27 for 27mm /)		9						100	0			SPT	9.1m:1,JN,10°,IR,R,CL,CO,(CA),EC,
											100	37			TT / HQ3	9.2m:1,JN,10°,IR,R,CL,CN,EC, 9.4-9.6m:SZ,EC, 9.7-9.8m:1,JN,60°,PL,R,CL,CN,EC, 9.8m:1,JN,5°,IR,R,CL,CN,EC,
		10.0	SPT: Nc = 50+ (50 for 40mm /)		10						0	0			SPT	
					11											
					12											
							Borehole terminated at 10.12 m									

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

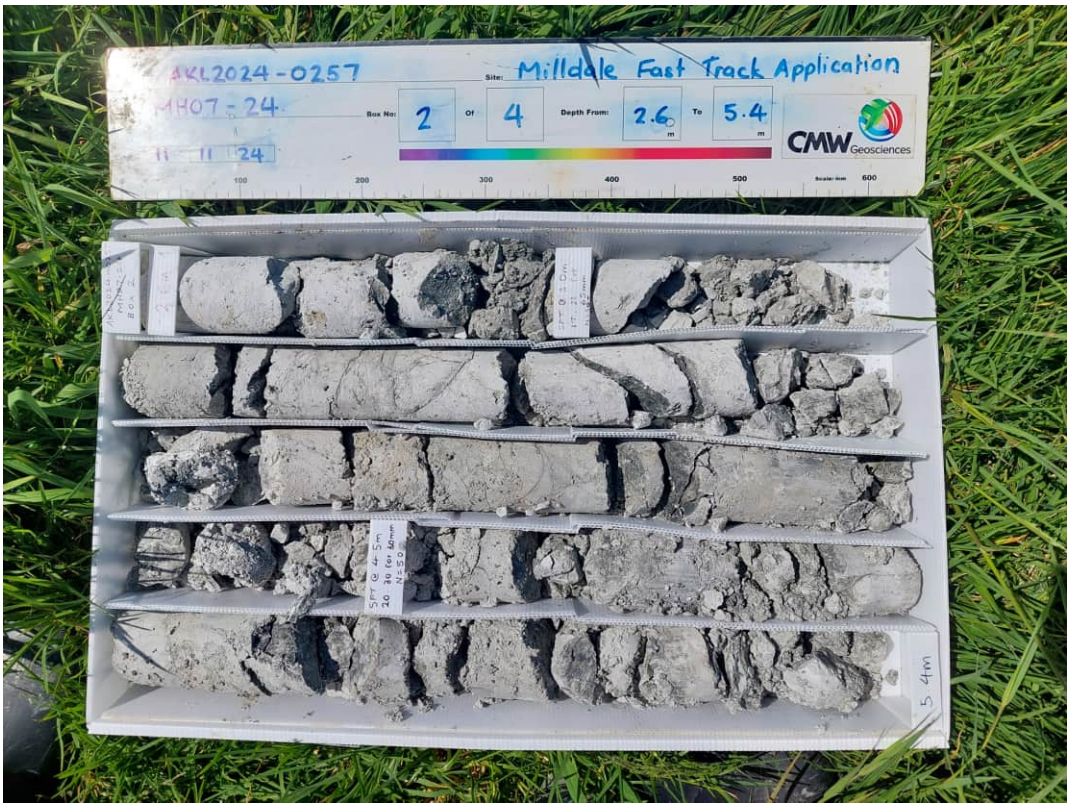
PHOTOGRAPH SHEET - MH07-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:11/11/2024

CMW Geosciences
Great People | Practical Solutions



MH07-24: 0.00m - 2.60m



MH07-24: 2.60m - 5.40m

PHOTOGRAPH SHEET - MH07-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:11/11/2024

CMW Geosciences
Great People | Practical Solutions

MH07-24: 5.40m - 8.50m

MH07-24: 8.50m - 10.04m

BOREHOLE LOG - MH08-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 12/11/2024
Borehole Location: Refer to Site Plan Logged by: JH Checked by: MJC Scale: 1:50 Sheet 1 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388445.6mE; 829704.0mN Projection: EDENTM2000
Elevation: 69.41m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
		69.4		OL: Organic SILT : Dark brown. Low plasticity. Trace rootlets. (Topsoil)			80		OB / PQ3	
		69.1		ML: Clayey SILT : Light grey streaked yellowish brown. Low plasticity. Trace limonite staining. (Hukerenui Mudstone)						
0.5	Peak = 175kPa Residual = 32kPa						100		TT / HQ3	
1.0	Peak = 127kPa Residual = 35kPa		1				100		OB / PQ3	
1.5	Peak = 175kPa				M					
1.5	Residual = 48kPa SPT: N* = 8 (1, 1 / 2, 1, 2, 3)					VSt	67		SPT	
			2							
		67.0		*... from 2.30m to 2.40m, Trace reddish brown.*			86		OB / PQ3	
				ML: Clayey SILT : Light grey streaked light yellowish brown. Low plasticity. (Hukerenui Mudstone)						
		66.5								
3.0	SPT: N* = 11		3	Completely weathered, bluish grey, interbedded MUDSTONE : Extremely weak. Interbedded with reddish brown. Minor medium to coarse gravel sized, subangular silt clasts. (Hukerenui Mudstone)			67		SPT	
3.0	(1, 2 / 2, 2, 3, 4) Peak = UTP									
			4				81		OB / PQ3	
4.5	SPT: N* = 15 (2, 3 / 3, 4, 4, 4)						89		SPT	
			5							
							67		OB / PQ3	
6.0	SPT: Nc = 22 (3, 4 / 5, 5, 5, 7)		6				0		SPT	
			7				29		TT / HQ3	
7.5	SPT: Nc = 21 (2, 2 / 3, 4, 6, 8)						0		SPT	
		61.5								
			8	Highly weathered, bluish grey, interbedded MUDSTONE : Extremely weak. Interbedded with SILTSTONE. Minor medium to coarse gravel sized silt clasts, tightly interlocked. (Hukerenui Mudstone)			67	67	TT / HQ3	8.3m:DI,5°,UN,R,CL,ST, (CL),CS,
							83	83	TT / HQ3	
9.0	SPT: Nc = 20 (4, 4 / 3, 5, 5, 7)		9				0		SPT	
							64	36	TT / HQ3	9.8m:1,DI,5°,UN,R,CL,CN,CS,
			10	*... at 9.90m, Thin lens of Clayey SILT. Reddish brown.*						

Termination Reason: Target Depth Reached.
Shear Vane No: DCP No:
Remarks: Groundwater not encountered.

BOREHOLE LOG - MH08-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 12/11/2024
Borehole Location: Refer to Site Plan Logged by: JH Checked by: MJC Scale: 1:50 Sheet 2 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388445.6mE; 829704.0mN Projection: EDENTM2000
Elevation: 69.41m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
10.5	SPT: Nc = 20 (2, 4 / 5, 5, 5, 5)		11	... at 11.10m, Interbedded with reddish brown SILTSTONE. ... from 11.35m to 11.50m, Reddish brown.		50 / 0 / 57 / 100 / 0	36 / 0 / 86	TT / HQ3 / SPT / TT / HQ3	10.4m:1,DI,5°,UN,R,CL,CN,CS,
12.0	SPT: Nc = 27 (3, 3 / 5, 6, 7, 9)	56.8	12	Moderately weathered, bluish grey, interbedded MUDSTONE : Extremely weak. Interbedded with reddish brown SILTSTONE. (Hukerenui Mudstone)		73 / 83 / 0	73 / 83	TT / HQ3 / SPT / TT / HQ3	11.8m:1,SZ,W,
13.5	SPT: Nc = 31 (3, 6 / 7, 7, 8, 9)		13						
			14			10 / 0 / 67	10 / 0 / 67	TT / HQ3 / SPT / TT / HQ3	
			15		D	0 / 22	0		14.9-15.0m:2,DI,CS,
16.5	SPT: Nc = 33 (3, 5 / 6, 7, 9, 11)		16	... from 16.10m to 17.00m, Reddish brown.		67 / 0	5		
			17			80 / 38	48 / 38	TT / HQ3 / SPT / TT / HQ3	
18.0	SPT: Nc = 46 (5, 7 / 9, 11, 13, 13)		18			0 / 10 / 0 / 17	10 / 0 / 17	TT / HQ3 / SPT / TT / HQ3	17.9-17.7m:3,DI,CS, 18.4-18.6m:2,DI,CS,
19.5	SPT: Nc = 42 (4, 5 / 7, 9, 11, 15)		19			0 / 100	0 / 89	TT / HQ3 / SPT / TT / HQ3	
			20						

Termination Reason: Target Depth Reached.
Shear Vane No: DCP No:
Remarks: Groundwater not encountered.

BOREHOLE LOG - MH08-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 12/11/2024
Borehole Location: Refer to Site Plan Logged by: JH Checked by: MJC Scale: 1:50 Sheet 3 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388445.6mE; 829704.0mN Projection: EDENTM2000
Elevation: 69.41m Datum: AUCKHT1946 Survey Source: Handheld GPS

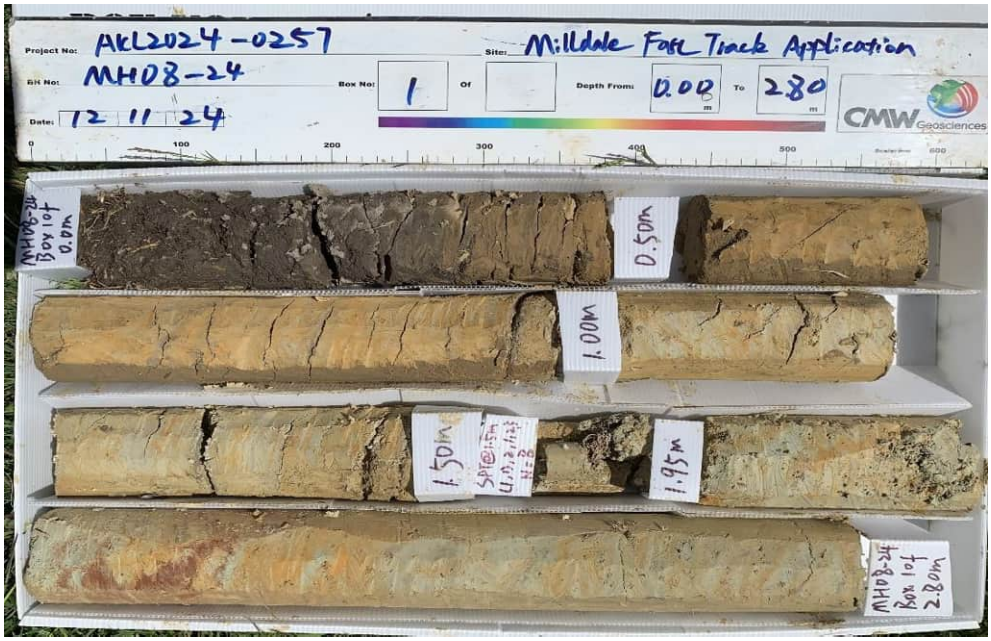
Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit))	Moisture Condition	Consistency/ Relative Density	Weathering (RS CW HW MW SW UW)	Recovery	RQD	Estimated Strength (EW VW W MS S VS ES)	Defect Spacing (mm) (<20 20-60 60-200 200-600 600-2000 >2000)	Drilling Method/ Support	Structure & Other Observations
		21.0	SPT: Nc = 37 (4, 5 / 6, 6, 11, 14)		21						100	100			TT / HQ3	
											25	25			X	
															TT / HQ3	
											0				SPT	
					22						100	100			TT / HQ3	
											75	75				
		22.5	SPT: Nc = 43 (/ 18, 25)				Borehole terminated at 22.50 m				80	80			TT / HQ3	
					23											
					24											
					25											
					26											
					27											
					28											
					29											
					30											

Termination Reason: Target Depth Reached.
Shear Vane No: DCP No:
Remarks: Groundwater not encountered.

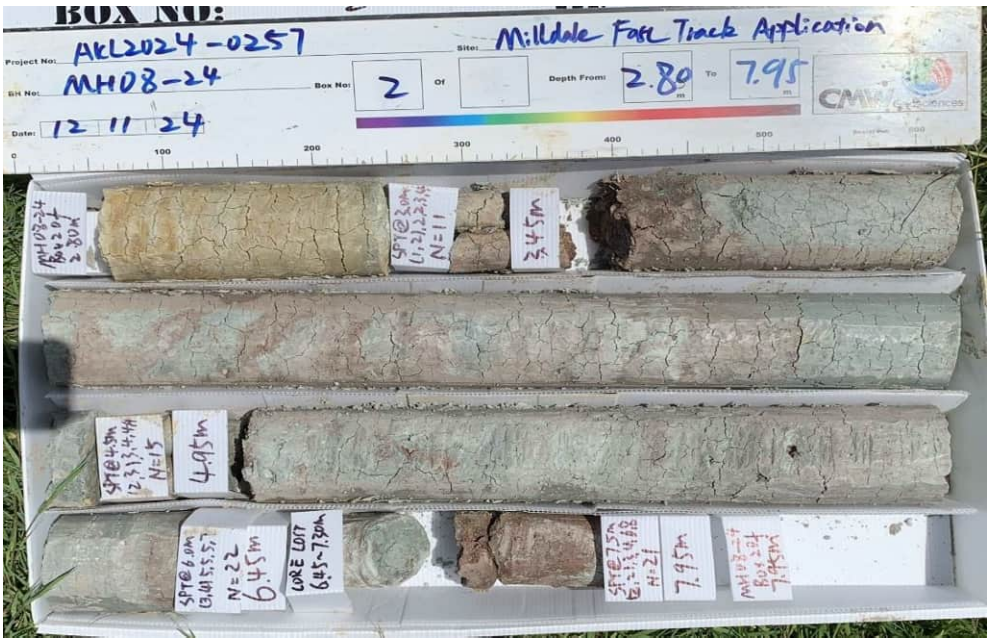
This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE CORE PHOTOGRAPHS: MH08-24

Client:	Fulton Hogan Land Development Limited		
Project:	Milldale Fast Track Application	Location:	Wainui East
Project No:	AKL2024-0257	Date:	12/11/24
Position:	E: 388445.6, N: 829704.0	Contractor:	Prodrill
Logged by:	JH	Checked by:	MJC



MH08-24: 0.0m to 2.8m



MH08-24: 2.8m to 7.95m

BOREHOLE CORE PHOTOGRAPHS: MH08-24

Client:	Fulton Hogan Land Development Limited		
Project:	Milldale Fast Track Application	Location:	Wainui East
Project No:	AKL2024-0257	Date:	12/11/24
Position:	E: 388445.6, N: 829704.0	Contractor:	Prodrill
Logged by:	JH	Checked by:	MJC

MH08-24: 7.95m to 13.35m

MH08-24: 13.35m to 20.4m

BOREHOLE CORE PHOTOGRAPHS: MH08-24

Client:	Fulton Hogan Land Development Limited		
Project:	Milldale Fast Track Application	Location:	Wainui East
Project No:	AKL2024-0257	Date:	12/11/24
Position:	E: 388445.6, N: 829704.0	Contractor:	Prodrill
Logged by:	JH	Checked by:	MJC

MH08-24: 20.4m to 22.5m

BOREHOLE LOG - MH09-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 12/11/2024 - 13/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 1 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388675.9mE; 829755.5mN Projection: EDENTM2000
Elevation: 42.46m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
		42.5		OL: Organic SILT: Dark brown mottled dark orange. Low plasticity. With minor rootlets. With trace limonite staining. (Topsoil)		S	100		OB / PQ3	
		42.2		CH: Silty CLAY: Dark brownish orange. High plasticity. With trace rootlets. (Hukerenui Mudstone)		F				
0.5	Peak = 116kPa Residual = 40kPa	42.0		ML: Clayey SILT: Orange brown mottled orange. Low plasticity. With trace rootlets. (Hukerenui Mudstone)		VS	100		OB / PQ3	
		41.6		CH: Silty CLAY: Brownish grey mottled orange. High plasticity. With trace limonite staining. (Hukerenui Mudstone)		S				
1.0	Peak = 73kPa Residual = 23kPa		1				100		OB / PQ3	
1.5 1.5	Peak = 127kPa Residual = 34kPa SPT: N* = 4 (0, 0 / 1, 1, 1, 1)						100		SPT	
			2	*... at 2.50m, Becoming dark brownish grey mottled light brown.*	S	F to St	100		OB / PQ3	
		39.6		ML: Completely weathered, dark grey mottled orange and brown, massive, SILTSTONE : Extremely weak. Recovered as SILT with trace clay and fine sand. Low plasticity. With trace limonite staining. (Hukerenui Mudstone)						
3.0 3.0	SPT: N* = 6 (1, 1 / 1, 1, 2, 2) Peak = UTP		3	*... at 3.10m, Becoming dark grey with trace purplish grey streaks.*			100		SPT	
				... at 3.50m, Becoming dark grey streaked greenish grey.			100	100	TT / HQ3	
4.5	SPT: N* = 14 (3, 4 / 4, 3, 3, 4)		4							
		37.8		Highly weathered, dark grey, blocky, SILTSTONE : Extremely weak. Higly fractured. Recovered as fine to medium gravel sized siltstone clasts. Angular. (Mangakahia Complex)			100	0	SPT	
			5				100	90	TT / HQ3	
6.0	SPT: N* = 31 (3, 5 / 5, 8, 9, 9)		6							5.9m:1,JN,10°,UN,R,CL,CO, (CL),CS,

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH09-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 12/11/2024 - 13/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 2 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388675.9mE; 829755.5mN Projection: EDENTM2000
Elevation: 42.46m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
			7				100	44	SPT	
							100	86	TT / HQ3	
7.5	SPT: Nc = 16 (2, 3 / 3, 3, 3, 7)						100	0	SPT	7.8-7.8m:1,JN,70°,UN,R,CL,CO,(CL),W,
			8							7.9m:1,JN,5°,ST,SS,CL,CO,(CL),CS,
							100	76	TT / HQ3	8.3-8.3m:1,JN,70°,PL,SS,CL,CO,(CL),CS,
										8.5m:1,JN,55°,CU,SS,CL,CO,(CL),CS,
										8.6m:1,JN,5°,UN,SS,CL,CO,(CL),CS,
9.0	SPT: Nc = 27 (3, 4 / 5, 6, 8, 8)		9		W to S	VSt to H				
							100	56	SPT	9.0m:1,JN,10°,CU,SS,CL,CO,(CL),CS,
		32.9		Highly weathered, dark grey, massive, SILTSTONE : Very weak. (Mangakahia Complex)						9.5m:1,JN,5°,CU,SS,CL,CO,(CL),CS,
			10				100	81	TT / HQ3	9.6m:1,JN,15°,PL,SS,CL,CO,(CL),MW,
10.5	SPT: Nc = 38 (4, 6 / 6, 8, 11, 13)									10.4-10.4m:1,JN,45°,PL,SS,CL,CO,(CL),CS,
							56	0	SPT	
			11							
							100	100	TT / HQ3	11.2-11.3m:1,JN,30°,UN,SS,CL,CO,(CL),W,
12.0	SPT: Nc = 40 (5, 7 / 7, 10, 10, 13)		12							

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

BOREHOLE LOG - MH09-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 12/11/2024 - 13/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 3 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388675.9mE; 829755.5mN Projection: EDENTM2000
Elevation: 42.46m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering: RS	CW	HW	MW	SW	UW	Recovery	RQD	Estimated Strength: EW	VW	W	MS	S	VS	ES	Defect Spacing (mm): <20	20-60	60-200	200-600	600-2000	>2000	Drilling Method/ Support	Structure & Other Observations
		13.5	SPT: Nc = 41 (4, 7 / 7, 9, 11, 14)		13											100	100													TT / HQ3	
					14											11	0													SPT	
		15.0	SPT: Nc = 50+ (7, 7 / 9, 12, 16, 13 for 50mm)		15		Borehole terminated at 15.00 m									100	100													TT / HQ3	
					16																										
					17																										
					18																										

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH09-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:12/11/2024

CMW Geosciences
Great People | Practical Solutions

MH09-24: 0.00m - 2.37m

MH09-24: 2.37m - 4.50m

PHOTOGRAPH SHEET - MH09-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:12/11/2024

CMW Geosciences
Great People | Practical Solutions

MH09-24: 4.50m - 7.90m

MH09-24: 7.90m - 10.90m

PHOTOGRAPH SHEET - MH09-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:12/11/2024

CMW Geosciences
Great People | Practical Solutions

MH09-24: 10.90m - 14.40m

MH09-24: 14.40m - 15.43m

BOREHOLE LOG - MH10-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 14/11/2024
Borehole Location: Refer to Site Plan Logged by: JH Checked by: MJC Scale: 1:50 Sheet 1 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388749.9mE; 829630.9mN Projection: EDENTM2000
Elevation: 73.10m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
		73.1		OL: Organic SILT : Dark brown. Low plasticity. Trace rootlets. (Topsoil)						
		72.9		ML: Clayey SILT : Yellowish brown streaked light grey. Low plasticity. Trace limonite staining. (Hukerenui Mudstone)						
0.5	Peak = 146kPa Residual = 38kPa						80		OB / PQ3	
							90		OB / PQ3	
1.0	Peak = 111kPa Residual = 51kPa		1	*... at 1.00m, Becoming light grey streaked yellowish brown. Minor limonite staining.*	M	VSt	100		OB / PQ3	
1.5	Peak = 127kPa Residual = 35kPa						100		SPT	
1.5	SPT: N* = 5 (0, 0 / 1, 1, 1, 2)		2	*... at 1.95m, Minor decomposing tree roots.*			67		OB / PQ3	
				... from 2.30m to 2.40m, Trace brown.						
		70.3		Completely weathered, grey with trace reddish brown MUDSTONE : Extremely weak. Recovered as Clayey SILT. Low plasticity. (Hukerenui Mudstone)						
3.0	SPT: N* = 12 (1, 2 / 2, 3, 3, 4) Peak = UTP		3		D to M		89		SPT	
3.0		69.6		*... from 2.80m to 3.00m, Interbedded with dark grey bands.* Highly weathered, bluish grey with reddish brown, interbedded MUDSTONE : Extremely weak. Interbedded with SILTSTONE. Minor medium gravel sized silt clasts. (Hukerenui Mudstone)			95	95	TT / HQ3	3.7m:1,JN,15°,PL,SS,CL,CN, CS, 3.9m:1,DI,10°,CS,
4.5	SPT: N* = 13 (1, 3 / 2, 3, 4, 4)		4				78		SPT	
			5	*... from 5.00m to 6.80m, Reddish brown becoming absent.*			67	67	TT / HQ3	
6.0	SPT: Nc = 7 (1, 1 / 2, 1, 2, 2)		6				0		SPT	
		66.3		Moderately weathered, bluish grey with reddish brown, interbedded MUDSTONE : Extremely weak. Interbedded with SILTSTONE. Trace medium gravel sized silt clasts. (Hukerenui Mudstone)			76	76	TT / HQ3	
7.5	SPT: Nc = 25 (2, 4 / 5, 5, 7, 8)		7	*... from 7.10m to 7.20m, Interbedded with minor dark grey bands.*			0		SPT	
			8				48	48	TT / HQ3	
9.0	SPT: Nc = 15 (2, 1 / 3, 3, 4, 5)		9				0		SPT	
			10				48	48	TT / HQ3	

Termination Reason: Target Depth Reached.
Shear Vane No: 1620 DCP No:

Remarks: Groundwater not encountered. Piezometer installed slotted and screened from 16.5m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH10-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 14/11/2024
Borehole Location: Refer to Site Plan Logged by: JH Checked by: MJC Scale: 1:50 Sheet 2 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388749.9mE; 829630.9mN Projection: EDENTM2000
Elevation: 73.10m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
10.5	SPT: Nc = 28 (3, 3 / 6, 6, 8, 8)		11			0		SPT	
						69	69	TT / HQ3	
						100	75	TT / HQ3	11.7-11.8m:1,SZ,CS,
12.0	SPT: Nc = 21 (2, 3 / 3, 5, 6, 7)		12			0		SPT	
						82	82	TT / HQ3	
			13			100	100	TT / HQ3	
13.5	SPT: Nc = 21 (2, 2 / 3, 5, 5, 8)					0		SPT	
			14			95	95	TT / HQ3	
15.0	SPT: Nc = 27 (2, 3 / 4, 6, 8, 9)		15		D to M	0		SPT	
						89	89	TT / HQ3	15.8m:1,DI,25°,CS,
			16	... at 16.15m, Lens of light grey SILTSTONE.		100	100	TT / HQ3	
16.5	SPT: Nc = 25 (3, 5 / 4, 5, 7, 9)					0		SPT	
			17			100	100	TT / HQ3	
						88	88	TT / HQ3	
18.0	SPT: Nc = 27 (2, 4 / 4, 6, 7, 10)		18			0		SPT	
						100	100	TT / HQ3	
			19			86	86	TT / HQ3	
19.5	SPT: Nc = 50+ (3, 7 / 13, 14, 15, 8 for 30mm)			Borehole terminated at 19.50 m		0		SPT	
			20						

Termination Reason: Target Depth Reached.
Shear Vane No: 1620 DCP No:

Remarks: Groundwater not encountered. Piezometer installed slotted and screened from 16.5m..

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE CORE PHOTOGRAPHS: MH10-24

Client:	Fulton Hogan Land Development Limited		
Project:	Milldale Fast Track Application	Location:	Wainui East
Project No:	AKL2024-0257	Date:	14/11/24
Position:	E: 388749.9, N: 829630.9	Contractor:	Prodrill
Logged by:	JH	Checked by:	MJC

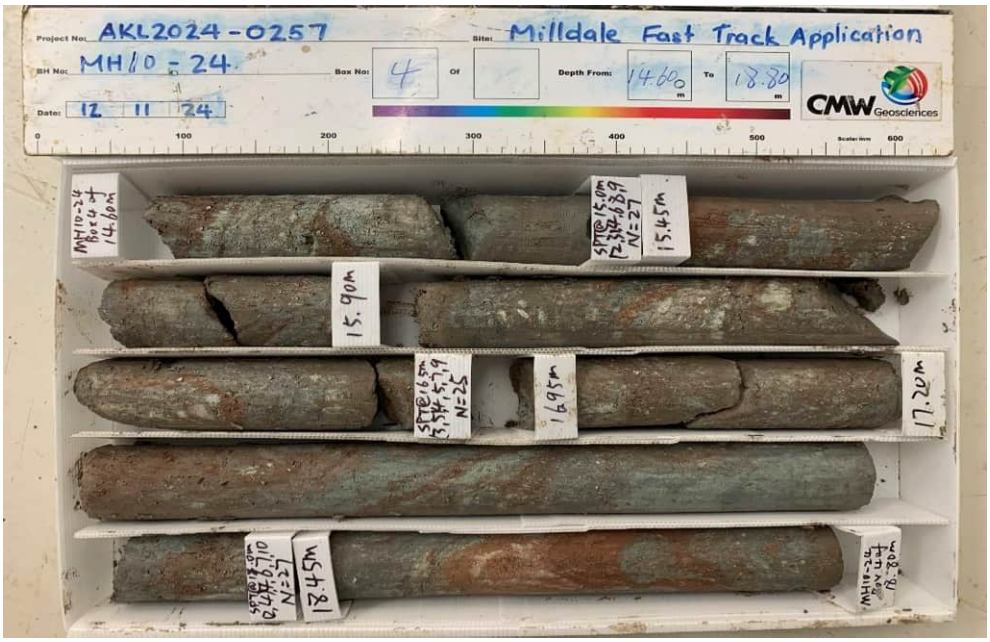
MH10-24: 0.0m to 3.0m

MH10-24: 3.0m to 9.45m

BOREHOLE CORE PHOTOGRAPHS: MH10-24

Client:	Fulton Hogan Land Development Limited		
Project:	Milldale Fast Track Application	Location:	Wainui East
Project No:	AKL2024-0257	Date:	14/11/24
Position:	E: 388749.9, N: 829630.9	Contractor:	Prodrill
Logged by:	JH	Checked by:	MJC

MH10-24: 9.45m to 14.6m



MH10-24: 14.6m to 18.8m

BOREHOLE CORE PHOTOGRAPHS: MH10-24

Client:	Fulton Hogan Land Development Limited		
Project:	Milldale Fast Track Application	Location:	Wainui East
Project No:	AKL2024-0257	Date:	14/11/24
Position:	E: 388749.9, N: 829630.9	Contractor:	Prodrill
Logged by:	JH	Checked by:	MJC

MH10-24: 18.8m to 19.5m

BOREHOLE LOG - MH11-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 14/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 1 of 3
Position: 388602.9mE; 829564.0mN Projection: EDENTM2000
Elevation: 57.48m Datum: AUCKHT1946 Survey Source: Handheld GPS

CMW Geosciences
Great People | Practical Solutions

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
		0.5	Peak = 127kPa Residual = 48kPa	57.5	0		OL: Organic SILT: Dark brown mottled brown. Low plasticity. With some rootlets.		VS to S						OB / PQ3	
				57.2			(Topsoil)				100					
							CH: Silty CLAY: Greyish brown mottled orange. High plasticity. With trace limonite staining. With trace rootlets. (Hukerenui Mudstone)									
					1				F		100				OB / PQ3	
		1.5 1.5	SPT: N* = 12 (1, 2 / 2, 4, 3, 3) Peak = UTP	56.2			ML: Clayey SILT with trace fine sand: Light brownish grey mottled orange. Low plasticity. With trace limonite staining. (Hukerenui Mudstone)				100				SPT	
				55.5	2		ML: Completely weathered, dark grey, massive, SILTSTONE : Extremely weak. Recovered as Clayey SILT. Low plasticity. With trace decomposing wood fragments. With trace limonite staining. (Hukerenui Mudstone)		St		100				OB / PQ3	
							... at 2.24m, Becoming blocky. Tightly interlocking fabric.	M to W								
		3.0 3.0	SPT: N* = 27 (3, 5 / 6, 6, 7, 8) Peak = UTP		3						100				SPT	
							... at 3.40m, Becoming dark grey									
				53.4	4		GP: Highly weathered, dark grey, blocky, SILTSTONE : Extremely weak. Tightly interlocking fabric. Recovered as fine to coarse GRAVEL. Angular. Well graded. (Hukerenui Mudstone)		VSt to H		100	95			TT / HQ3	4.0m:1,JN,55°,IR,R,CL,CN,EC,
		4.5	SPT: Nc = 48 (4, 8 / 11, 12, 13, 12)								47	95			SPT	
					5						100	100			TT / HQ3	
		6.0	SPT: Nc = 50+		6											

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH11-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 14/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 2 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388602.9mE; 829564.0mN Projection: EDENTM2000
Elevation: 57.48m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
			(5, 9 / 9, 12, 13, 16 for 55mm)								53	65			SPT	6.3m:1,JN,0°,ST,R,CL,CN,MW,
					7						100	93			TT / HQ3	6.6m:1,JN,0°,IR,R,CL,CN,CS, 6.9-7.0m:1,JN,60°,ST,R,CL,CN,VS, 7.2m:1,JN,0°,CU,R,CL,CN,VS,
		7.5	SPT: Nc = 50+ (8, 14 / 15, 16, 19 for 70mm)								100	48			SPT	7.7m:1,JN,5°,IR,SS,CL,CO,(CL),MW, 7.8m:1,JN,0°,IR,SS,CL,CO,(Z),CS,
					8						100	68			TT / HQ3	7.9m:1,JN,3°,ST,R,CL,CN,VS, 8.2m:1,JN,10°,CU,R,CL,CN,CS,
		9.0	SPT: Nc = 50+ (5, 13 / 11, 16, 16, 7 for 35mm)		9				H		78	67			SPT	8.8m:1,JN,15°,ST,R,CL,CN,MW, 8.9m:1,JN,25°,ST,R,CL,CN,CS, 9.2m:1,JN,0°,IR,SS,CL,IF,(CL),VS, 9.3-9.3m:1,JN,45°,ST,R,CL,CN,VS,
					10						100	100			TT / HQ3	9.5m:1,JN,2°,ST,R,CL,CN,CS, 10.0m:1,B,60°,W, 10.0m:1,JN,15°,ST,R,CL,CN,CS,
		10.5	SPT: Nc = 43 (5, 6 / 8, 9, 10, 16)								100	86			SPT	
					11						100	100			TT / HQ3	11.3m:1,B,5°,PL,CL,W,
		12.0	SPT: Nc = 50+ (6, 9 / 12, 19, 19 for 50mm)		12											

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH11-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 14/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 3 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388602.9mE; 829564.0mN Projection: EDENTM2000
Elevation: 57.48m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
							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)			RS CW HW MW SW UW			EW VW W MS S VS ES	<20 20-60 60-200 200-600 600-2000 >2000		Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
					13						43	0			SPT	
											100	100			TT / HQ3	
		13.5	SPT: Nc = 50+ (5, 8 / 15, 16, 19 for 75mm)								47	0			SPT	
					14						100	98			TT / HQ3	
		15.0	SPT: Nc = 50+ (8, 11 / 14, 12, 16, 8 for 30mm)		15						0	0			SPT	
							Borehole terminated at 15.40 m									
					16											
					17											
					18											

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH11-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:14/11/2024

CMW Geosciences
Great People | Practical Solutions

MH11-24: 0.00m - 2.10m

MH11-24: 2.10m - 4.50m

PHOTOGRAPH SHEET - MH11-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:14/11/2024

CMW Geosciences
Great People | Practical Solutions

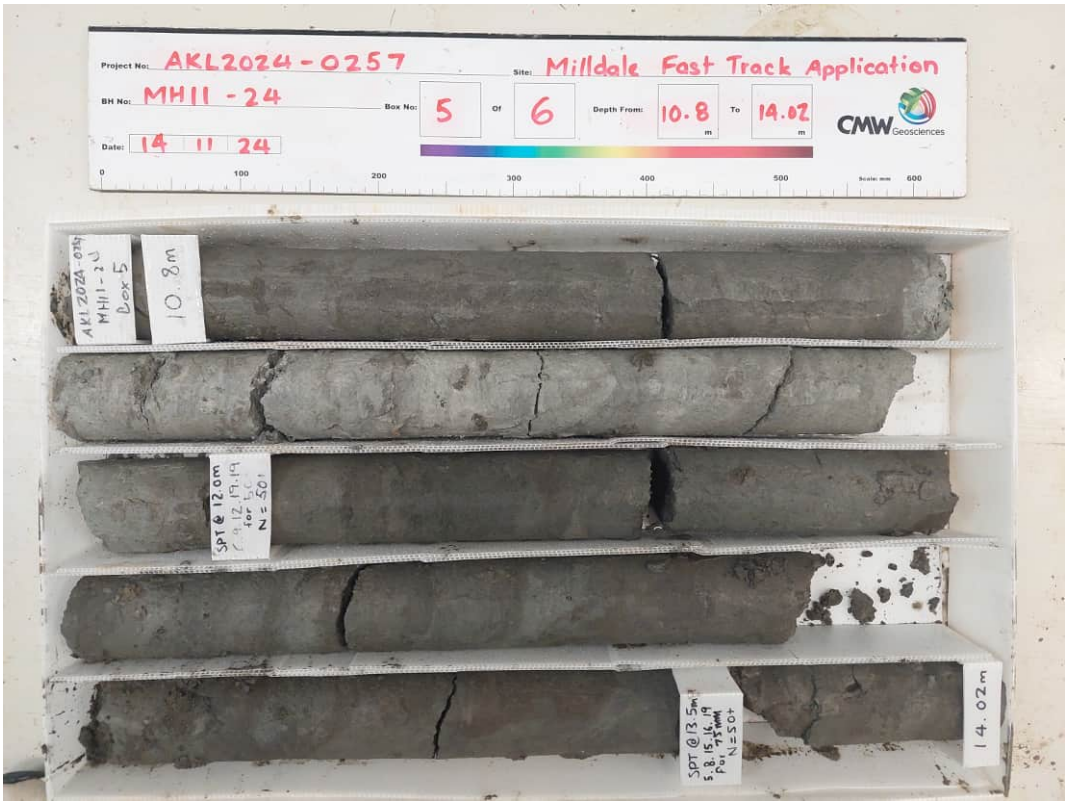
MH11-24: 4.50m - 8.00m

MH11-24: 8.00m - 10.80m

PHOTOGRAPH SHEET - MH11-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:14/11/2024

CMW Geosciences
Great People | Practical Solutions



MH11-24: 10.80m - 14.02m

MH11-24: 14.02m - 15.40m

BOREHOLE LOG - MH12-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 18/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 1 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388460.1mE; 829500.2mN Projection: EDENTM2000
Elevation: 36.90m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
				36.9			OL: Organic SILT: Dark brown. Low plasticity. With some rootlets. (TS)		VS to S		60				OB / PQ3	
				36.5			CH: Silty CLAY with trace fine sand: Orange brown streaked grey. High plasticity. With trace rootlets. (Alluvium)				84				OB / PQ3	
		0.5	Peak = 127kPa Residual = 48kPa													
		1.0	Peak = 110kPa Residual = 76kPa		1		*... at 1.02m, Becoming light brownish grey mottled orange brown.*				100				OB / PQ3	
		1.5	Peak = 85kPa													
		1.5	Residual = 40kPa SPT: N* = 2 (0, 1 / 0, 1, 0, 1)				*... from 1.70m to 1.73m, Decomposing wood fragment.*		S to F		82				SPT	
					2			M to W			71				OB / PQ3	
				34.1			ML: Completely weathered, dark greenish grey, massive, SILTSTONE : Extremely weak. Recovered as SILT with minor fine sand. Dark greenish grey. Low plasticity. (Mangakahia Complex)									
		3.0	SPT: N* = 3 (0, 0 / 0, 1, 1, 1) Peak = UTP		3				St		100				SPT	
		3.0							VSt		100				OB / PQ3	
					4											
				32.7			GW: Highly weathered, dark grey, blocky, LIMESTONE : Extremely weak. Tightly interlocking fabric. Highly fractured. Recovered as fine to coarse GRAVEL. Angular. Well graded. (Mahurangi Limestone)				83				TT / HQ3	
		4.5	SPT: N* = 50+ (6, 12 / 15, 17, 18 for 50mm)								44				SPT	
					5						100				TT / HQ3	
		6.0	SPT: Nc = 45 (5, 13 / 14, 12, 9, 10)		6											

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

BOREHOLE LOG - MH12-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 18/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 2 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388460.1mE; 829500.2mN Projection: EDENTM2000
Elevation: 36.90m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
			7	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)			100	22	SPT	Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
							100	46	TT / HQ3	
7.5	SPT: Nc = 50+ (21 ,29 for 30mm /)						0	0	SPT	
		29.1	8	Moderately weathered, light grey streaked white, blocky, LIMESTONE : Very weak. Tightly interlocking fabric. Highly fractured. Fractures infilled with calcite. (Mahurangi Limestone)	S	H	100	39	TT / HQ3	7.7m:1,JN,0°,UN,R,CL,CO,(CA),W, 7.8-7.9m:1,JN,40°,IR,R,CL,IF,(CA),CS, 8.0m:1,JN,10°,ST,R,CL,CN,CS, 8.3m:1,JN,15°,ST,R,CL,CO,(CA),CS, 8.4-8.5m:1,JN,60°,PL,R,CL,CO,(CA),CS, 8.7m:1,JN,20°,PL,R,CL,CO,(CA),MW, 8.8m:1,JN,10°,ST,R,CL,CN,CS, 8.9m:1,JN,5°,ST,R,CL,CO,(CA),MW, 9.1m:1,JN,20°,IR,R,CL,CO,(CA),CS, 9.3m:1,JN,15°,ST,R,CL,CO,(CA),CS, 9.4m:1,JN,10°,ST,R,CL,CO,(CA),CS, 9.5m:1,JN,5°,ST,R,CL,CN,CS, 9.6m:1,JN,5°,IR,R,CL,CO,(CA),CS, 9.8m:1,JN,10°,UN,R,CL,CN,CS,
9.0	SPT: Nc = 50+ (24 ,26 for 15mm /)		9				10 0	0	SPT	
							100	47	TT / HQ3	
10.0	SPT: Nc = 50+ (31 ,19 for 20mm /)		10	Borehole terminated at 10.09 m			0	0	SPT	
			11							
			12							

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

PHOTOGRAPH SHEET - MH12-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:18/11/2024

CMW Geosciences
Great People | Practical Solutions

MH12-24: 0.00m - 3.00m

MH12-24: 3.00m - 5.70m

PHOTOGRAPH SHEET - MH12-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:18/11/2024

CMW Geosciences
Great People | Practical Solutions

MH12-24: 5.70m - 8.50m

MH12-24: 8.50m - 10.09m

BOREHOLE LOG - MH13-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 19/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 1 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388693.8mE; 829452.8mN Projection: EDENTM2000
Elevation: 54.35m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Moisture Condition	Consistency/ Relative Density	Recovery	RQD	Drilling Method/ Support
		54.3		OL: Organic SILT: Dark brown. Low plasticity. With minor rootlets. (Topsoil)		VS to S			
		54.1		ML: Clayey SILT: Light brownish grey mottled orange with trace white streaks. Low plasticity. With trace rootlets and fine, loose black sand clasts. Blocky fabric. (Colluvium)			100		OB / PQ3
0.5	Peak = UTP						66		OB / PQ3
1.0	Peak = UTP	53.4	1	CH: Silty CLAY: Light purple grey mottled orange. High plasticity. With trace fine gravel sized siltstone nodules. Subangular. (Northland Allochthon)			100		OB / PQ3
1.5 1.5	Peak = 124kPa Residual = 45kPa SPT: N* = 6 (1, 1 / 2, 1, 2, 1)	52.8		ML: Clayey SILT with trace fine sand: Light brownish grey mottled orange. Low plasticity. With trace limonite staining and rootlets. (Northland Allochthon)		F to St	33		SPT
			2		M to W				
		51.7		CH: Completely weathered, dark grey, massive, MUDSTONE : Extremely weak. Recovered as Silty CLAY. High plasticity. With trace limonite staining. With trace gravel sized siltstone inclusions. White. Subangular to rounded. (Northland Allochthon)			62		OB / PQ3
3.0	SPT: N* = 5 (1, 1 / 1, 1, 1, 2)	51.3	3	ML: Completely weathered, grey, blocky, SILTSTONE : Extremely weak. Highly fractured. Tightly interlocking fabric. Recovered as Clayey SILT with trace fine sand. Grey mottled reddish brown and greenish grey. Low plasticity. (Northland Allochthon)		VS to S	100		SPT
				... from 3.80m to 3.90m, Large siltstone clast. 100mm in diameter. Reddish brown. Rounded.		St to VSt			
			4	*... from 3.90m to 4.40m, Softened zone, potential shear plane.*		VS	86		OB / PQ3
4.5	SPT: N* = 17 (1, 2 / 3, 4, 5, 5)			*... at 4.40m, Becoming greenish grey mottled reddish orange with minor whitish grey streaks.*			89		SPT
			5				67		OB / PQ3
6.0	SPT: N* = 13 (2, 2 / 2, 3, 3, 5)		6						

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH13-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 19/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 2 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388693.8mE; 829452.8mN Projection: EDENTM2000
Elevation: 54.35m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
					7		... at 6.50m, Becoming dark grey mottled dark green.				56				SPT	
											100	100			OB / PQ3	
		7.5	SPT: N* = 20 (2, 5 / 4, 4, 6, 6)								67	0			SPT	
				46.3	8		ML: Highly weathered, dark grey, blocky, SILTSTONE : Extremely weak. Highly fractured. Tightly interlocking fabric. Recovered as Clayey SILT with trace fine sand. Low plasticity. (Northland Allochthon) ... at 8.00m, Becoming dark grey with trace greenish grey streaks.				100	100			TT / HQ3	8.5-8.5m:2,JN,45°,CU,R,CL,IF,(CL),CS,
		9.0	SPT: Nc = 20 (3, 4 / 3, 4, 6, 7)		9						33	0			SPT	8.9-8.9m:1,JN,30°,PL,SS,CL,CO,(CL),CS,
					10						100	92			TT / HQ3	9.7m:1,JN,20°,ST,SS,CL,CO,(CL),MW,
		10.5	SPT: Nc = 39 (4, 7 / 8, 9, 11, 11)								100	100			SPT	10.4m:1,JN,0°,UN,R,CL,CO,(Z),MW,
					11						100	100			TT / HQ3	10.9-11.0m:1,JN,45°,IR,R,CL,CO,(CL),MW,
		12.0	SPT: Nc = 25 (3, 5 / 7, 6, 6, 6)		12											12.0m:1,JN,60°,PL,R,CL,CN,MW,

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

BOREHOLE LOG - MH13-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 19/11/2024
Borehole Location: Refer to Site Plan Logged by: SS Checked by: MJC Scale: 1:30 Sheet 3 of 3

CMW Geosciences
Great People | Practical Solutions

Position: 388693.8mE; 829452.8mN Projection: EDENTM2000
Elevation: 54.35m Datum: AUCKHT1946 Survey Source: Handheld GPS

Depth	Type & Results	RL (m)	Depth (m)	Material Description	Recovery	RQD	Drilling Method/ Support	Structure & Other Observations
					100	67	SPT	
			13		100	90	TT / HQ3	12.5m:1,JN,5°,IR,SS,CL,IF,(CL),MW, 12.6m:1,JN,10°,IR,SS,CL,IF,(Z),MW, 12.8m:1,JN,15°,IR,R,CL,CN,MW,
13.5	SPT: Nc = 33 (5, 5 / 7, 7, 9, 10)							13.2m:1,JN,10°,IR,R,CL,CO,(CL),MW, 13.3m:1,JN,40°,IR,R,CL,CO,(Z),MW, 13.4m:1,JN,20°,CU,S,CL,CN,MW, 13.6m:1,JN,30°,CU,S,CL,CN,MW,
					49	0	SPT	
			14		100	72	TT / HQ3	
15.0	SPT: Nc = 28 (4, 4 / 5, 6, 8, 9)		15		0	0	SPT	
				Borehole terminated at 15.54 m				
			16					
			17					
			18					

Termination Reason: Target Depth Reached.
Shear Vane No: 1702 DCP No:
Remarks:

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

PHOTOGRAPH SHEET - MH13-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:19/11/2024

CMW Geosciences
Great People | Practical Solutions

MH13-24: 0.00m - 3.00m

MH13-24: 3.00m - 6.45m

PHOTOGRAPH SHEET - MH13-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:19/11/2024

CMW Geosciences
Great People | Practical Solutions

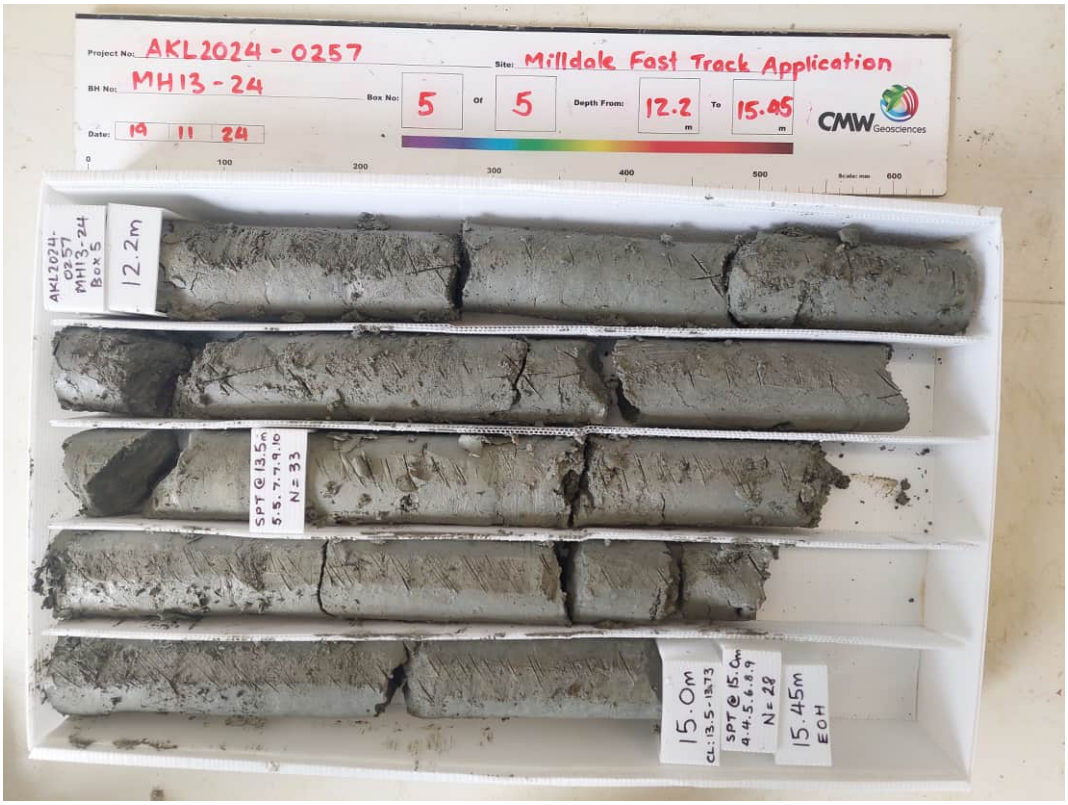
MH13-24: 6.45m - 9.00m

MH13-24: 9.00m - 12.20m

PHOTOGRAPH SHEET - MH13-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Location: Wainui East
Project ID: AKL2024-0257
Date:19/11/2024

CMW Geosciences
Great People | Practical Solutions



MH13-24: 12.20m - 15.45m

BOREHOLE LOG - MH14-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 18/11/2024
Borehole Location: Refer to Site Plan Logged by: JH Checked by: MJC Scale: 1:50 Sheet 1 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388615.4mE; 829374.3mN Projection: EDENTM2000
Elevation: 66.20m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
				66.2			OL: Organic SILT : Dark brown. Low plasticity. Trace rootlets. (Topsoil)								OB / PQ3	
				66.0			ML: Clayey SILT : Yellowish brown streaked trace grey. Low plasticity. (Hukerenui Mudstone)									
		0.5	Peak = 159kPa Residual = 45kPa				*... at 0.50m, Becoming light grey streaked yellowish brown. Trace limonite staining.*				90					
					1						100				OB / PQ3	
		1.5	Peak = 140kPa Residual = 32kPa SPT: N* = 6 (0, 1 / 1, 2, 1, 2)					M	VSt		89				SPT	
		1.5			2											
											100				OB / PQ3	
		3.0	SPT: N* = 14 (1, 1 / 2, 4, 4, 4) Peak = UTP	63.2	3		*... at 2.90m, Becoming brown.*									
		3.0					Completely weathered, bluish grey with reddish brown MUDSTONE : Extremely weak. Recovered as Clayey SILT. (Hukerenui Mudstone)	D to M			100				SPT	
				62.2	4		Highly weathered, light whitish grey SILTSTONE: Extremely weak. Highly fractured, tightly interlocked fabric. (Mangakahia Complex)				86				TT / HQ3	
		4.5	SPT: Nc = 19 (2, 2 / 3, 4, 6, 6)								89				SPT	
				61.2	5		Highly weathered, grey with reddish brown MUDSTONE : Extremely weak. (Hukerenui Mudstone)				100				TT / HQ3	
				61.0												
				60.7			Highly weathered, dark grey, interbedded SANDSTONE : Extremely weak. Interbedded with MUDSTONE. (Hukerenui Mudstone)				60				TT / HQ3	
		6.0	SPT: Nc = 34 (3, 3 / 6, 8, 9, 11)		6						0				SPT	
				59.8			Highly weathered, grey with reddish brown MUDSTONE : Extremely weak. Minor medium gravel sized silt clasts. (Hukerenui Mudstone)									
					7		Moderately weathered, bluish grey with trace reddish brown, massive MUDSTONE : Extremely weak. (Hukerenui Mudstone)	D			100	100			TT / HQ3	
		7.5	SPT: Nc = 39 (4, 6 / 7, 8, 10, 14)								0				SPT	
					8						100	100			TT / HQ3	
		9.0	SPT: Nc = 50+ (7, 10 / 23, 27 for 30mm for 0mm for 0mm)		9						0				SPT	
				57.0			Moderately weathered, light whitish grey, massive SILTSTONE: Extremely weak. Highly fractured, tightly interlocked fabric. Trace laminated MUDSTONE inclusions. (Mangakahia Complex)				100	68			TT / HQ3	9.8-10.0m:1,SZ,CS,
					10											

Termination Reason: Target Depth Reached.
Shear Vane No: DCP No:
Remarks: Groundwater not encountered.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

BOREHOLE LOG - MH14-24

Client: Fulton Hogan Land Development Limited
Project: Milldale Fast Track Application
Site Location: Wainui East
Project No.: AKL2024-0257
Date: 18/11/2024
Borehole Location: Refer to Site Plan Logged by: JH Checked by: MJC Scale: 1:50 Sheet 2 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 388615.4mE; 829374.3mN Projection: EDENTM2000
Elevation: 66.20m Datum: AUCKHT1946 Survey Source: Handheld GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Weathering	Recovery	RQD	Estimated Strength	Defect Spacing (mm)	Drilling Method/ Support	Structure & Other Observations
		10.5	SPT: Nc = 50+ (9, 16 / 22, 28 for 55mm for 0mm for 0mm)		11						0				SPT	10.6-10.5m:1,SZ,CS,
											100	100			TT / HQ3	11.3m:1,JN,15°,UN,R,CL,CN, CS,
		12.0	SPT: Nc = 50+ (6, 10 / 24, 26 for 40mm)		12						0				SPT	
							... from 12.40m to 12.70m, Dark grey.				100	100			TT / HQ3	
		13.5	SPT: Nc = 50+ (8, 11 / 29, 21 for 30mm for 0mm for 0mm)		13						0				SPT	
					14						89	89			TT / HQ3	
		15.0	SPT: Nc = 50+ (10, 14 / 40, 10 for 5mm for 0mm for 0mm)		15		Borehole terminated at 15.00 m									
					16											
					17											
					18											
					19											
					20											

Termination Reason: Target Depth Reached.
Shear Vane No: DCP No:
Remarks: Groundwater not encountered.

BOREHOLE CORE PHOTOGRAPHS: MH14-24

Client:	Fulton Hogan Land Development Limited		
Project:	Milldale Fast Track Application	Location:	Wainui East
Project No:	AKL2024-0257	Date:	18/11/24
Position:	E: 388615.4, N: 829374.3	Contractor:	Prodrill
Logged by:	JH	Checked by:	MJC

MH14-24: 0.0m to 3.0m

MH14-24: 3.0m to 7.95m

BOREHOLE CORE PHOTOGRAPHS: MH14-24

Client:	Fulton Hogan Land Development Limited		
Project:	Milldale Fast Track Application	Location:	Wainui East
Project No:	AKL2024-0257	Date:	18/11/24
Position:	E: 388615.4, N: 829374.3	Contractor:	Prodrill
Logged by:	JH	Checked by:	MJC

MH14-24: 7.95m to 11.2m

MH14-24: 11.2m to 15.0m