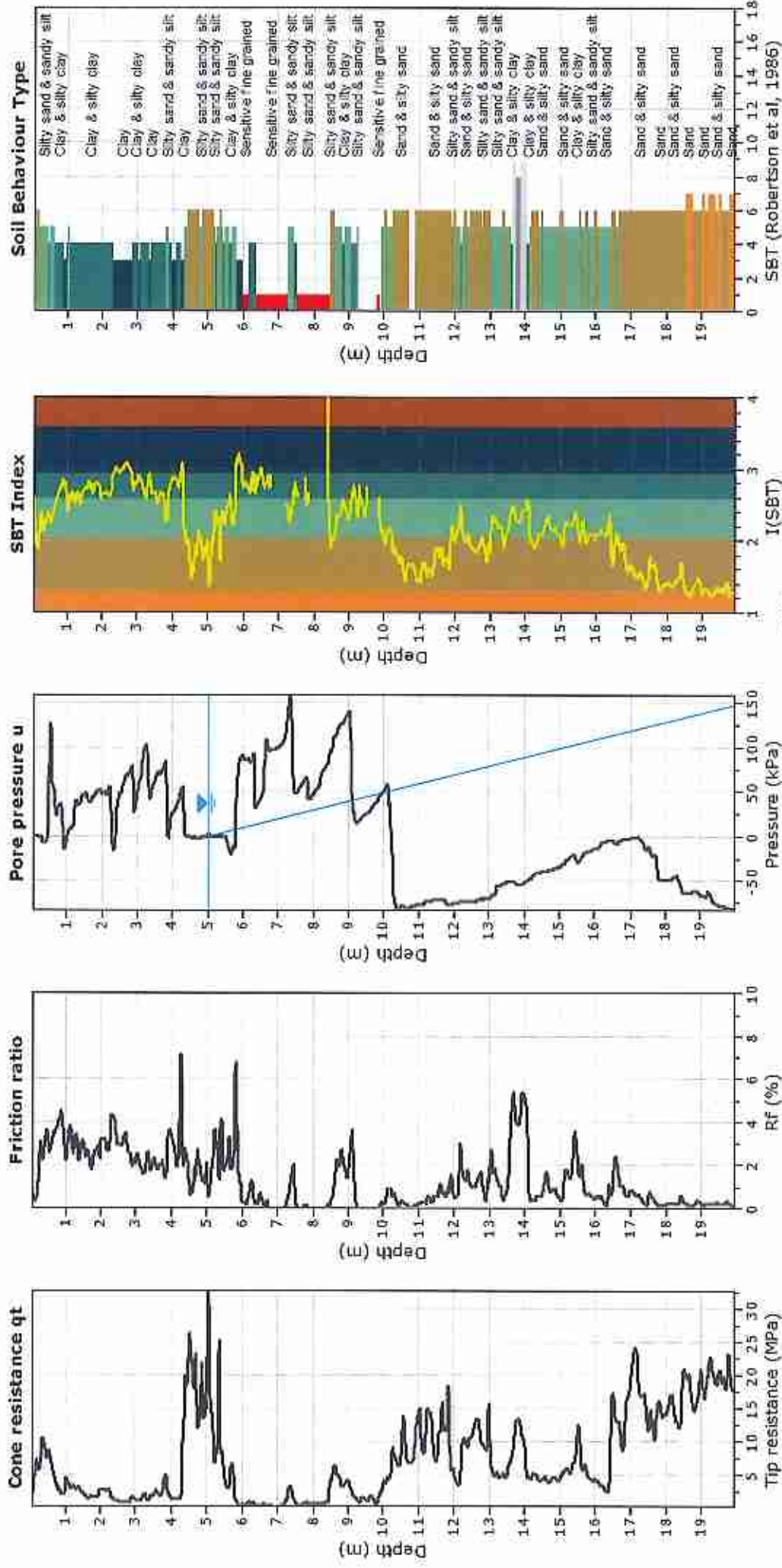
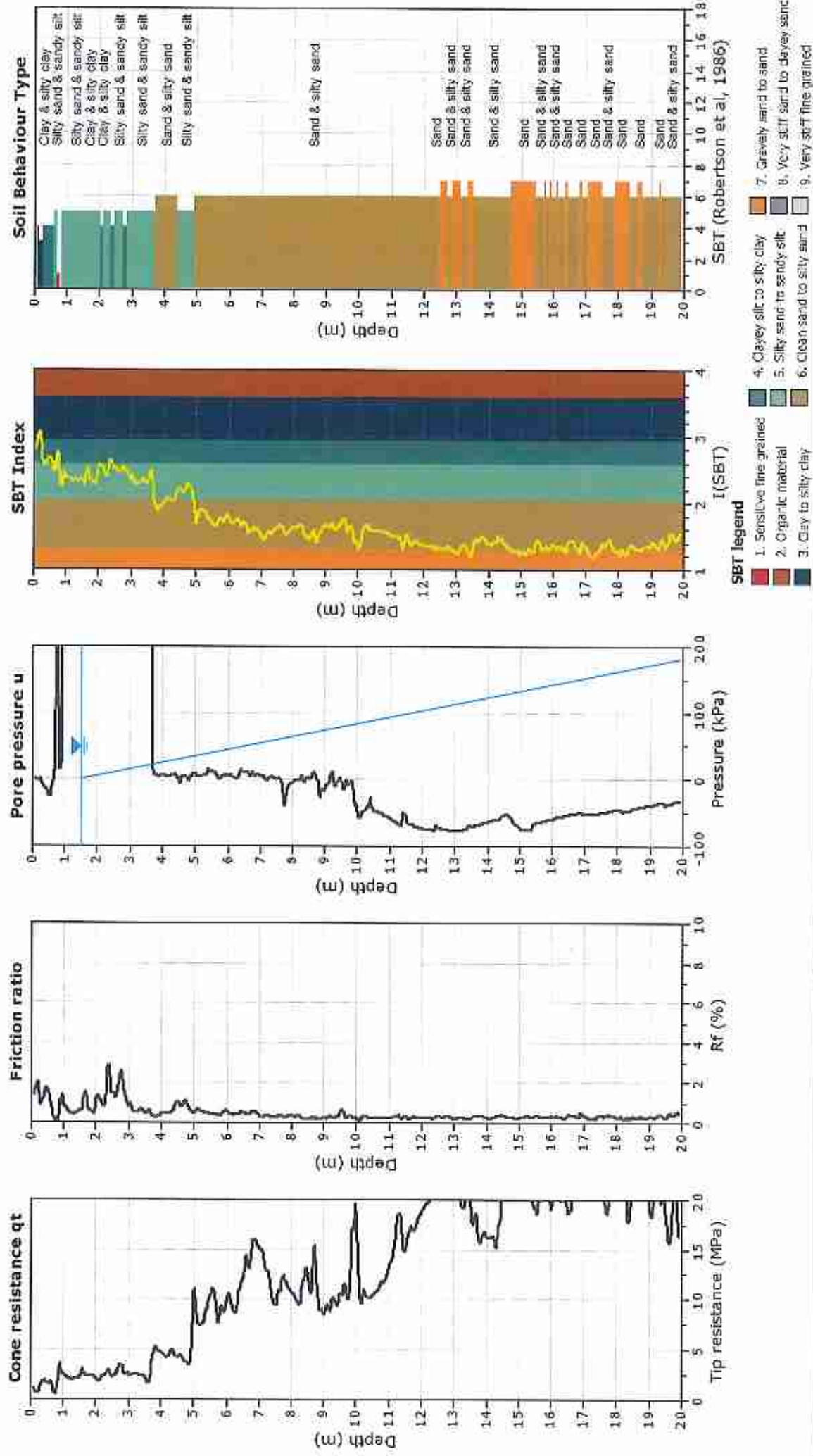
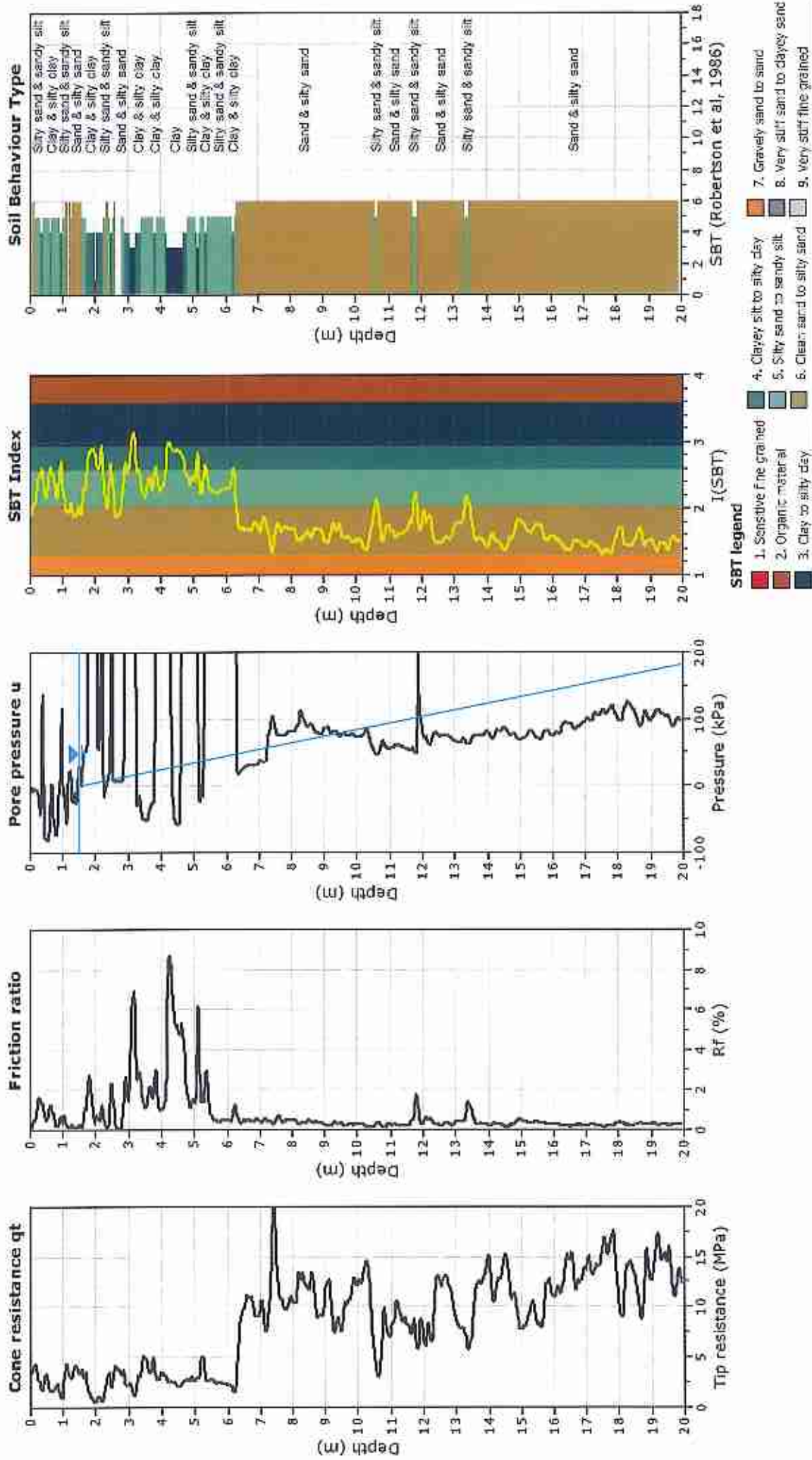


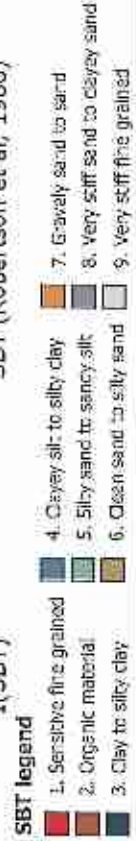
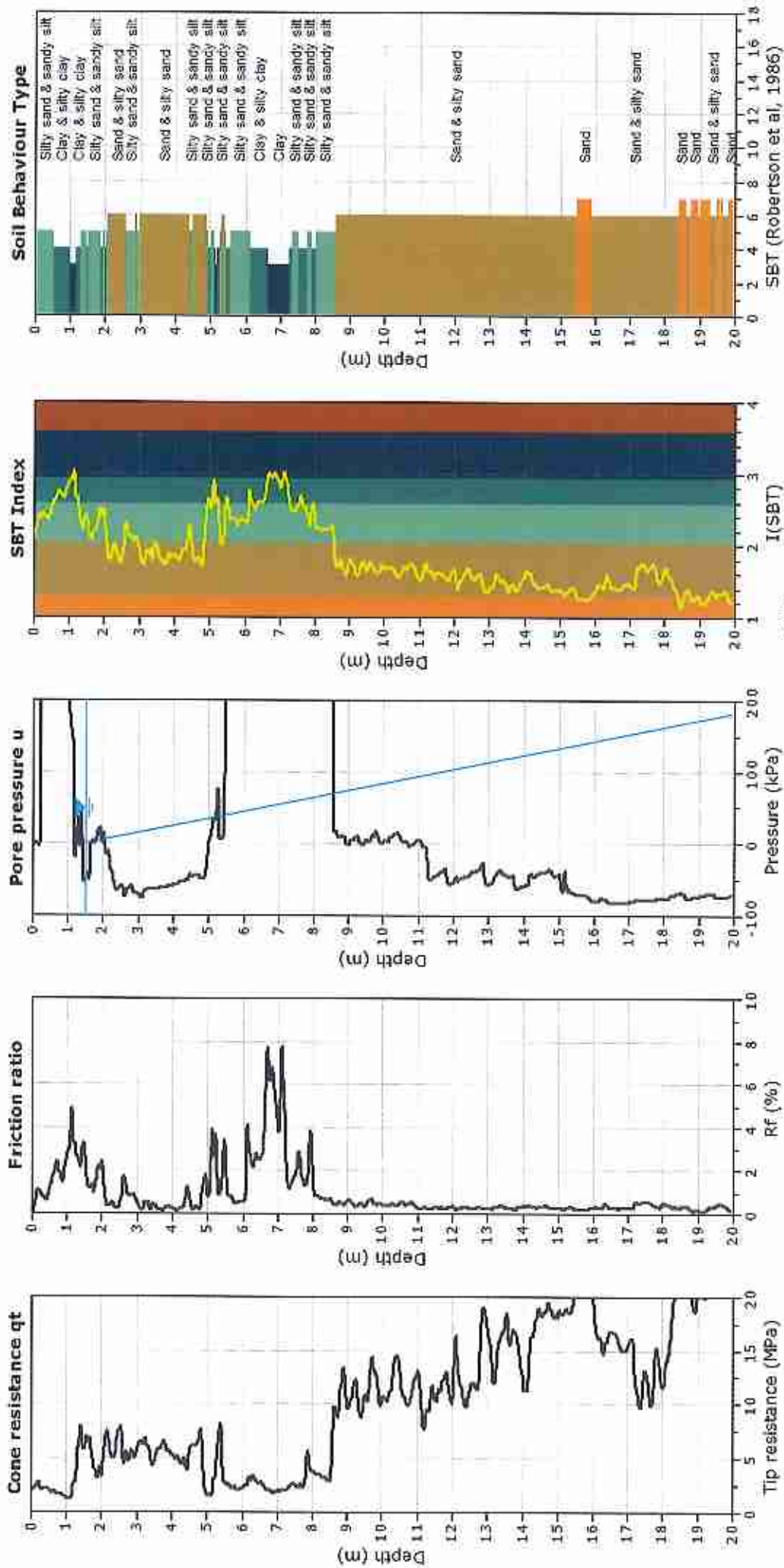
Project: GENZTAUC13086AF - The Lakes Stage 3
Location: The Lakes, Pyes Pa



- SBT legend**
- 1. Sensitive fine grained
 - 2. Organic material
 - 3. Clay to silty clay
 - 4. Clayey silt to silty clay
 - 5. Silty sand to sandy silt
 - 6. Clean sand to silty sand
 - 7. Gravely sand to sand
 - 8. Very stiff sand to clayey sand
 - 9. Very stiff fine grained







Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**
 principal:
 project: **THE LAKES STAGE 3 CONSTRUCTION**
 location: **WESTERN BOUNDARY OF LOT 01**

Borehole ID: **MH3A-01**
 sheet: 2 of 5
 project no: **GENZTAUC13086AF**
 date started: **17 Nov 2014**
 date completed: **17 Nov 2014**
 logged by: **SLC**
 checked by: **RBT**

position: E: 368122; N: 800007 (BOVIC2000) surface elevation: Not Specified angle from horizontal: 80°
 drill model: JD2, Light Vehicle mounted drilling fluid: Drill Pro casing diameter: HQ core id:

drilling information		material substance				rock mass defects				
method & support	water	HL (m)	depth (m)	graphic log	material description ROCK TYPE; grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & test	samples, tests & results (MPa)	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)
			8.0		Sandy SILT: non plastic, pale grey, sand is fine grained. (continued)					
			6.5		Silty SAND: fine grained, uniform, pale grey brown, trace fine grained gravels, trace clay.					
			6.75		sand becoming fine to medium grained, clay becoming absent, becoming grey.					
			7.0		6.95 m: sand becoming fine grained.					
			7.5		7.30 m: sand becoming fine to medium grained.					
			8.0		Sandy CLAY: low plasticity, pale orange brown, sand is fine to medium grained.					
			8.5		Silty SAND: fine grained, uniform, pale grey, some fine to medium grained pumice gravels.					
			8.20		becoming pale brown, pumice becoming absent.					
			8.30		with reddy brown lenses <100mm.					
			8.60		with trace clay below 8.2 metres.					
			8.80		with manganese specks at 8.8 metres.					
			8.90		becoming pale pink grey, 100mm pale grey brown sand lens at 8.95 metres.					
			9.50		9.50 m: sand becoming fine to coarse grained					
			9.60		9.60 m: sand becoming fine grained.					
			10.0		SAND: fine grained, uniform, pale grey.					
			10.5		10.40 m: sand becoming fine to coarse grained, some fine to coarse grained pumice gravels.					
			10.60		10.60 m: sand becoming fine grained.					

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method & support AS auger screwing AD auger drilling CB slow or blind bit W washbore NMLCNMLC core (51.3 mm) HQ wireline core (47.5mm) HQ wireline core (53.5mm) PQ wireline core (85.0mm) SPT standard penetration test HA hand auger	water 10/M12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (Augeha) for depth interval shown	graphic log / core recovery core recovered (specify type and scale material) no core recovered core run & ROD barrel withdrawn ROD = Rock Quality Designation (%)	weathering & alteration RS unaltered soil CW completely weathered HW highly weathered MW moderately weathered SW slightly weathered UW unweathered W weathered with A for alteration strength VW very weak W weak MS moderately strong S strong VS very strong ES extremely strong	defect type BS bedding shear PT parting JI joint SZ shear zone SS shear surface CO contact CS crushed seam SM seam roughness SL slickensided POL polished SO smooth RO rough VR very rough	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stain VN varnish CO coating
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Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**
 principal:
 project: **THE LAKES STAGE 3 CONSTRUCTION**
 location: **WESTERN BOUNDARY OF LOT 01**

Borehole ID: **MH3A-01**
 sheet: 3 of 5
 project no: **GENZTAUC13086AF**
 date started: **17 Nov 2014**
 date completed: **17 Nov 2014**
 logged by: **SLC**
 checked by: **RBT**

drilling information		material substance					rock mass defects				
method & support	water	graphic log	material description	weathering & alteration	estimated strength & ISIP	samples, field tests & IS(S) (MPa)	defect spacing (mm)	additional observations and defect descriptions			
water	PL (m)	depth (m)	ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	ISIP (kPa)	ISIP (kPa)	ISIP (kPa)	particular	general		
<p>position: E: 368122; N: 500007 (FOPC2000) surface elevation: Not Specified angle from horizontal: 60°</p> <p>drill model: J02, Light Vehicle mounted drilling fluid: Drill Pro casing diameter: 110 vane kl:</p>											
<p>MATUA SUB-GROUP</p>											
<p>11.30 m: sand becoming fine to coarse grained.</p> <p>11.80 m: becoming pale grey.</p> <p>12.00 m: becoming pale grey brown.</p> <p>12.45 m: minor silt below 12.45 metres, sand becoming fine to medium grained, trace medium grained gravels.</p> <p>13.00 m: sand becoming fine grained.</p> <p>13.80 m: sand becoming fine to coarse grained, minor silt inclusions <20mm.</p> <p>Silty SAND: fine to medium grained, poorly graded, pale brown.</p> <p>SAND: fine to coarse grained, well graded, pale gray brown.</p> <p>Sandy SILT: non plastic, pale pink grey, sand is fine to coarse grained.</p> <p>SILT: non plastic, pale pink grey, minor fine grained sand.</p> <p>15.10 m: with 150µm sand lense (fine to coarse grained, pale grey brown).</p> <p>15.30 m: with 50-100µm limonite/manganese pan (very dense).</p> <p>Sandy CLAY: high plasticity, pale brown, some fine to coarse grained sand, some silt.</p> <p>15.80 m: limonite and manganese inclusions <20mm at 15.8 metres.</p> <p>16.00 m: with minor manganese inclusions.</p>											
<p>SPT 2, 3, 4, 5, 5, / N=21</p> <p>SPT 5, 5, 7, 7, 10, 8 N=33</p> <p>SPT 25, 9, 9, 5, 5, 5 N=24</p>											
<p>HP 250 - 340 kPa</p> <p>HP 10 - 30 kPa</p>											
<p>method & support</p> <p>AS auger screwing</p> <p>AD auger drilling</p> <p>CD claw or blade silt</p> <p>W washbore</p> <p>NMLCNMLC core (51.0 mm)</p> <p>NC wireline core (47.5mm)</p> <p>HQ wireline core (63.5mm)</p> <p>PQ wireline core (85.0mm)</p> <p>S-P standard penetrometer test</p> <p>RA hand auger</p>		<p>water</p> <p>10/10H2, water level on date shown:</p> <p>water ink/water</p> <p>complete drilling fluid loss</p> <p>partial drilling fluid loss</p> <p>water pressure test result (logogram) for depth intervals shown</p>		<p>graphic log / core recovery</p> <p>core recovered (graphical scale indicates material)</p> <p>no core recovered</p> <p>core run & RQD</p> <p>barrel withdrawn</p> <p>RQD = Rock Quality Designation (%)</p>		<p>weathering & alteration*</p> <p>R8 residual soil</p> <p>OW completely weathered</p> <p>HW highly weathered</p> <p>MW moderately weathered</p> <p>SW slightly weathered</p> <p>UW unweathered</p> <p>W replaced with A for alteration strength</p> <p>VW very weak</p> <p>W weak</p> <p>M8 moderately strong</p> <p>S strong</p> <p>VS very strong</p> <p>ES extremely strong</p>		<p>defect type</p> <p>RS bedding shear</p> <p>PT parting</p> <p>JT joint</p> <p>SZ shear zone</p> <p>SS shear surface</p> <p>CD contact</p> <p>CS crushed seam</p> <p>SM seam</p> <p>roughness</p> <p>SL slickensided</p> <p>POL polished</p> <p>SO smooth</p> <p>RO rough</p> <p>VR very rough</p>		<p>planarity</p> <p>PL planar</p> <p>CU curved</p> <p>UN undulating</p> <p>ST stepped</p> <p>IR irregular</p> <p>coating</p> <p>CN clean</p> <p>SN stain</p> <p>VN varnish</p> <p>CO coating</p>	

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Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**

principal:

project: **THE LAKES STAGE 3 CONSTRUCTION**

location: **WESTERN BOUNDARY OF LOT 01**

Borehole ID: **MH3A-01**

sheet: 4 of 5

project no.: **GENZTAUC13086AF**

date started: **17 Nov 2014**

date completed: **17 Nov 2014**

logged by: **SLC**

checked by: **RBT**

position: E: 368122; N: 800007 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90°
 drill model: J02; Light Vehicle mounted drilling fluid: Drill Pro casing diameter: HQ core ID:

drilling information			material substance			rock mass defects		
method & support	water	depth (m)	material description	weathering & alteration	estimated strength & IS50	samples, field tests & IS50 (MPa)	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)
		17.0	Sandy CLAY: high plasticity, pale brown, some fine to coarse grained sand, some sil. (continued)			SPT 3, 3, 4, 4, 4 N ¹⁰ =18		MATUA SUB-GROUP
		17.5	Silty CLAY: medium to high plasticity, pale brown grey.					
		17.5	17.40 m: becoming grey brown mottled pale brown and dark brown, minor manganese inclusions, some fine grained sand.					H _v 255 - 320 kPa
		18.0	Sandy SILT: non plastic to low liquid limit, grey brown, sand is fine to coarse grained, trace clay and manganese inclusions.			SPT 2, 2, 3, 2, 3, 2 N ¹⁰ =10		
		18.5	18.45 m: sand becoming fine to coarse grained.					
		19.5	19.35 m: with 20mm pale orange brown clay lense.			SPT 1, 2, 1, 1, 4, 5 N ¹⁰ =15		
		20.0	19.95 m: sand becoming fine to medium grained.					
		20.5	20.50 m: becoming grey with pale grey specks.					
		21.0				SPT 2, 2, 1, 3, 4, 5 N ¹⁰ =11		
		21.5	21.45 m: becoming grey brown.					

method & support AS auger screwing AD auger drilling CB claw or chain bit W washbore NMLQMLC core (51.9 mm) NQ wireline core (47.6 mm) HQ wireline core (63.5 mm) PQ wireline core (85.0 mm) SPT standard penetration test HA hand auger	water 100% 100% water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (megapascals) for depth interval shown	graphing / core recovery core recovered no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RE residual soil CW completely weathered HW highly weathered MW moderately weathered SW slightly weathered UW unweathered W weathered with alteration strength VW very weak W weak MS moderately strong S strong VS very strong ES extremely strong	defect type BS bedding shear PT parting JT joint SZ shear zone SS sheet surface CO contact CS crushed seam SM seam roughness S- slickensided PO polished SO smooth RO rough VR very rough	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SM stain VN varnish CO coating
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Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**

principal:

project: **THE LAKES STAGE 3 CONSTRUCTION**

location: **WESTERN BOUNDARY OF LOT 01**

Borehole ID: **MH3A-01**

sheet: 5 of 5

project no: **GENZTAUC13086AF**

date started: **17 Nov 2014**

date completed: **17 Nov 2014**

logged by: **SLC**

checked by: **RBT**

position: E: 368122; N: 600067 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90°
 drill model: JD2, Light Vehicle mounted drilling fluid: Drill Pro casing diameter: HQ vane id.:

drilling information			material substance				rock mass defects					
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & IS(50) X - wet N - normal P - wet S - wet	samples taken & IS(50) (MPa)	core run & RQD	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, slickiness, other)	
											particular	general
			22.5		Sandy SILT: non plastic to low liquid limit, grey brown, sand is fine to coarse grained, trace clay and manganese inclusions. (continued)							MATUA SUB-GROUP
			23.0					SF1 1, 0, 2, 3, 2, N=11				
			23.5									
			24.0									
			24.5		24.45 m: becoming pale brown							
			25.0		25.00 m: becoming pale brown with minor limonite staining.							
			25.5									
			26.0		Borehole MH3A-01 terminated at 25.95 m Target depth							
			26.5									
			27.0									

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method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore NMLQ/MQLC core (41.3 mm) NQ wireline core (47.8mm) HQ wireline core (63.5mm) PQ wireline core (85.3mm) SPT standard penetration test HA hand auger	water 10/10/12, water level on date shown water in flow complete drilling fluid loss partial drilling fluid loss water pressure test result (Lugeon) for depth interval shown	graphic log / core recovery core recovered (bearing separate labels suitable) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration RS residual soil CW completely weathered HW highly weathered MW moderately weathered SW slightly weathered UW unweathered *W repaired with A for alteration strength VW very weak W weak MS moderately strong S strong VS very strong ES extremely strong	defect type BS bedding shear PT parting JT joint SZ shear zone SS shear surface CO contact CS crushed seam SM seam roughness SL slickensided PDL polished SO smooth RO rough VR very rough	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stain VN veneer CO coating
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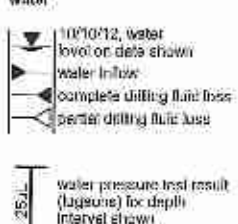
Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**
 principal:
 project: **THE LAKES STAGE 3 CONSTRUCTION**
 location: **WESTERN BOUNDARY OF LOT 06**

Borehole ID: **MH3A-02**
 sheet: 1 of 5
 project no.: **GENZTAUC13086AF**
 date started: **18 Nov 2014**
 date completed: **18 Nov 2014**
 logged by: **SLC**
 checked by: **RBT**

position: E: 366101; N: 798928 (BOPC2000) surface elevation: Not Specified angle from horizontal: BH°
 drill model: JD2, Light Vehicle mounted drilling fluid: Drill Flm hole diameter: 90 mm vane id.:

drilling information			material substance			rock mass defects		
method & support	water	depth (m)	material description	weathering & alteration	estimated strength & IS50	samples, field tests & IS50 (MPa)	defect spacing (mm)	additional observations and defect descriptions
			ROCK TYPE, grain characteristics, colour, structure, mineral assemblage					(type, inclination, planarity, roughness, coating, thickness, colour)
			start coring at 0.00m					particular
		0.5	Sandy SILT: non plastic, brown mottled orange brown and pale grey, sand is fine grained. Trace pumice gravels.					HILL/RE-WORKED ALLUVIUM
			Silty SAND: fine grained.					MATUA SUB-GROUP
		1.0	0.80 m: becoming pale orange brown mottled pale grey.					
		1.5	1.40 m: becoming dark red brown.					
		2.0	1.70 m: with clayey silt pocket <100mm (medium plasticity, pale pink grey).			SPT 1, 0, 1, 0, 1, 0 N*=2		
		2.5	SAND: fine to medium grained, well graded, brown grey with red specks.					
		3.0	Clayey SILT: medium liquid limit, pale brown pink, some fine to coarse sand, minor fine to medium grained sub-angular to sub-rounded rhyolitic gravels.					
		3.5	Sandy SILT: non plastic, pale grey to white, sand is fine grained.			SPT 0, 0, 1, 0, 0, 0 N*=1		
		4.0	Clayey SILT: non plastic, pale grey brown, trace fine grained sand.					
		4.5	Sandy SILT: low liquid limit, pale cream brown, sand is fine grained, minor clay.					
		5.0	5.00 m: with trace ironite staining.					
		5.2	5.20 m: with sand lenses <50mm (fine to medium grained, pale brown grey), minor manganese streaks.			SPT 1, 2, 2, 2, 3, 3 N*=10		

method & support AR niger screwing AD auger drilling CB claw or blade bit W washbars NMLCNMLC core (61.3 mm) NC wireline core (47.6mm) HQ wireline core (53.5mm) HJ wireline core (65.3mm) SPI standard penetration test HA hand auger	water  10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (logure) for depth interval shown	graphic log / core recovery  core recovered (specify rock or mineral) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration RS residual soil CW completely weathered HW highly weathered MW moderately weathered SW slightly weathered UW unweathered W* improved with A for strength strength VW very weak W weak MS moderately strong S strong VS very strong ER extremely strong	defect type BS bedding shear PT parting JT joint SZ shear zone SR shear surface CO contact CS crushed seam SM seam roughness S slickensided PO polished BO smooth RO rough VR very rough	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stain VN veneer CO coating
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Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**

principal:

project: **THE LAKES STAGE 3 CONSTRUCTION**

location: **WESTERN BOUNDARY OF LOT 06**

Borehole ID: **MH3A-02**

sheet: 2 of 5

project no: **GENZTAUC13086AF**

date started: **18 Nov 2014**

date completed: **18 Nov 2014**

logged by: **SLC**

checked by: **RBT**

position: E: 368167; N: 799329 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90°
 drill model: JD2, Light Vehicle mounted drilling fluid: Drill Pro hole diameter: 50 mm vane id: -

drilling information			material substance				rock mass defects			
method & support	well	HL (m)	depth (m)	material description ROCK TYPE; grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & IS(50) X=none Y=partial Z=moderate W=strong V=very strong E=extremely strong	sample, field tests & IS(50) (MPa) 1-500 P=pressure R=rate	COB & COR	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)
			5.0	Clayey SILT: medium liquid limit, pale brown.			SP1 2, 3, 3, 4, 4			MA1UA SUB-GROUP HP 340 kPa
			8.5	SAND: fine to medium grained, poorly graded, brown grey, trace silt, trace fine to medium grained sub-rounded pumice gravels.			N=16			
			7.0							
			7.5				SP1 2, 2, 3, 4, 5, 4			
			8.0				N=10			
			8.5	0.45 m: sand becoming coarse grained.						
			9.0				SP1 1, 2, 3, 3, 4, 4			
			9.5				N=14			
			10.0	Silty SAND: fine to medium grained, poorly graded, brown grey, minor fine to medium grained sub-rounded gravels.						
			10.5				SP1 3, 3, 3, 4, 4, 5			
							N=18			

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method & support AR auger screwing AD auger drilling CS claw or blade bit W washbore NMLCNMLC core (51.3 mm) NQ wireline core (57.8mm) HQ wireline core (85.8mm) PQ wireline core (102mm) SP1 standard penetration test HA hand auger	water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lagions) for depth interval shown	graspable log / core recovery core recovered poor / weak / no core core run & RQD core run RQD = Rock Quality Designation (%)	weathering & alteration RS - residual soil CW - completely weathered LW - highly weathered MW - moderately weathered SW - slightly weathered UW - unweathered *W replaced with A for alteration strength VW - very weak W - weak MS - moderately strong S - strong VS - very strong ES - extremely strong	defect type HS - bedding shear PT - parting JT - joint SZ - shear zone SS - shear surface CO - contact CS - crushed seam SM - seam roughness SI - slickensided PQL - polished SO - smooth RO - rough VR - very rough	planarity PL - planar CU - curved UK - undulating ST - stepped IR - irregular coating CN - clean SN - stain VS - varnish CO - coating
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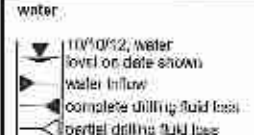
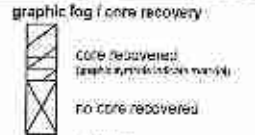
Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**
 principal:
 project: **THE LAKES STAGE 3 CONSTRUCTION**
 location: **WESTERN BOUNDARY OF LOT 06**

Borehole ID: **MH3A-02**
 sheet: 3 of 5
 project no: **GENZTAUC13086AF**
 date started: **18 Nov 2014**
 date completed: **18 Nov 2014**
 logged by: **SLC**
 checked by: **RBT**

position: E: 368161; N: 798929 (GPG2000) surface elevation: Not Specified angle from horizontal: 90°
 drill model: JF2, Light Vehicle mounted drilling fluid: Drill Pro hole diameter: 90 mm vane id:

drilling information			material substance		rock mass defects				
method & support	water	RL (m)	depth (m)	material description	weathering & alteration	estimated strength & IS50	samples field tests & In(50) (MPa)	defect spacing (mm)	additional observations and defect descriptions (type, location, planarity, roughness, coating, thickness, other)
			11.5	Silty SAND: fine to medium grained, poorly graded, brown grey, minor fine to medium grained sub-rounded gravels. (continued)					
			12.0	11.80 m: with 10mm silt lens at 11.8 metres.					
			12.5	SAND: fine to coarse grained, well graded, grey, trace fine grained sub-rounded gravels.			SPT 5, 3, 3, 4, 4 N ₆₀ =15		
			13.0						
			13.5	Silty SAND: fine to medium grained, poorly graded, brown to orange brown, trace clay.			SPT 5, 2, 3, 3, 4, 4 N ₆₀ =14		
			14.0						
			14.5						
			15.0						
			15.5	15.50 m: with sand lens <200mm (fine grained, grey brown, minor silt).			SPT 4, 3, 4, 3, 3, 4 N ₆₀ =11		
			16.0	15.80 m: sand lens <10mm (coarse grained, grey)					

method & support AS auger screwing AD auger drilling CD claw or blade bit W washbore NMLCNMLC core (71.0 mm) SQ wireline core (47.0 mm) HQ wireline core (63.5 mm) HQ wireline core (85.0 mm) SPI standard penetration test HA hard auger	water  water pressure test result (logarithmic for depth interval shown)	graphic log / core recovery  RQD = Rock Quality Designation (%)	weathering & alteration RS residual soil CW completely weathered HW highly weathered MW moderately weathered SW slightly weathered LW unweathered W replaces with A to describe strength VW very weak W weak MS moderately strong S strong VS very strong ES extremely strong	defect type BS bedding shear PT parting JT joint SZ shear zone SS shear surface CO contact CS crushed seams SM seam roughness SL slickensided PCL polished SO smooth RO rough VR very rough	planarity PL planar CU curved UN undulating SI stepped IR irregular coating CN clean SH silt VN veneer CO coating
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



Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**
 principal:
 project: **THE LAKES STAGE 3 CONSTRUCTION**
 location: **WESTERN BOUNDARY OF LOT 06**

Borehole ID: **MH3A-02**
 sheet: 4 of 5
 project no: **GENZTAUC13086AF**
 date started: **18 Nov 2014**
 date completed: **18 Nov 2014**
 logged by: **SLC**
 checked by: **RBT**

position: E: 388161; N: 799828 (BOPC2000) surface elevation: Not Specified angle from horizontal: 80°
 drill model: JD2, Light Vehicle mounted drilling fluid: Drill Pro hole diameter: 90 mm vane ID:.

drilling information		material substance				rock mass defects				
method & support	water	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & IQSD	samples, field tests & IQSD (MPa)	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)	
									particular	general
		17.0		Silty SAND: fine to medium grained, poorly graded, brown to orange brown, trace clay. (continued) 16.60 m: with sand lens <200mm (fine grained, grey brown, minor silt); 17.00 m: with sand lens <200mm (fine grained, grey brown, minor silt);			SPT 4, 3, 5, 5, 6, 5 N ^o -21		MATDA SUB-GROUP	
		18.0		SAND: coarse grained, uniform, grey. 18.45 m: with sand lens <200mm (fine grained, grey brown, minor silt);			SPT 3, 4, 5, 6, 6, 6 N ^o -23			
		19.5		19.40 m: with silty sand lens <150mm (fine to medium grained, pale brown grey);			SPT 3, 4, 5, 5, 5, 4 N ^o -19			
		20.5		Gravelly SAND: fine to coarse grained, well graded, pale orange brown, gravels are fine to medium grained sub-rounded pumice. 20.70 m: with sand lens <200mm (fine to medium grained, grey brown, minor silt);			SPT 4, 5, 6, 6, 6, 7 N ^o -25			
		21.0		SAND: fine to coarse grained, well graded, pale grey brown, trace fine grained gravels. 21.00 m: sand becoming fine to medium graded.						

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore NML/NMLC core (51.9 mm) ND wireline core (47.6 mm) LD wireline core (63.5 mm) FC wireline core (85.0 mm) SPT standard penetration test HA hand auger	water  50/10/12, water level on date shown  water inflow  complete drilling fluid loss  partial drilling fluid loss  water pressure test result (kPa/cm) for depth interval shown	graphic log / core recovery  core recovered  no core recovered core run & RQD  barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration RS residual soil CW completely weathered LW highly weathered MW moderately weathered SW slightly weathered UW unweathered WY tested with A ^o for alteration strength VV very weak W weak MS moderately strong S strong VS very strong ES extremely strong	defect type RS bedding shear PT parting JT joint SZ shear zone SS shear surface CO contact CS crushed seam SM seam roughness SL slickensided PDL polished SO smooth RO rough VR very rough	planarity PL planar CU curved UM undulating ST stepped IR irregular coating CN clean SN stain VN veneer CO coating
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C:_P_01_13185\010_Borehole Log_Cof_Borehole File: GENZTAUC13086AF_068H1.DWG <<DrawingFile>> 27/03/2014 11:28

Engineering Log - Cored Borehole

client: **THE LAKES LIMITED (2012)**
 principal:
 project: **THE LAKES STAGE 3 CONSTRUCTION**
 location: **WESTERN BOUNDARY OF LOT 06**

Borehole ID: **MH3A-02**
 sheet: 5 of 5
 project no.: **GENZTAUC13086AF**
 date started: **18 Nov 2014**
 date completed: **18 Nov 2014**
 logged by: **SLC**
 checked by: **RBT**

position: E: 368161; N: 799929 (BOPD2000) surface elevation: Not Specified angle from horizontal: 90°
 drill model: J22, Light Vehicle mounted drilling fluid: Drill Pro hole diameter: 90 mm vent id:

drilling information		material substance				rock mass defects			
method & support	water	depth (m)	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength A only K=0-40 O=0-100 W=0-5 S=0-5 E=0-5	samples, field tests & lab tests (MPa) + = test - = failure	core log & RQD	defect spacing (mm) 0 50 100 200 300	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular general
		22.5	SAND: fine to coarse (graded, well graded, pale grey brown, trace fine-grained gravels. (continued)						MATUA SUB-GROUP
		22.5	22.40 m: with trace fine to medium grained rhyolite gravels.						
		23.0	22.50 m: with trace silt.						
		23.5	23.80 m: sand becoming fine grained,						
		24.0							
		24.5							
		25.0	Silty SAND: fine grained, uniform, pale grey brown, minor fine grained pumice gravels.						
		25.5							
		26.0	Borehole MH3A-02 terminated at 25.95 m Target depth						
		26.5							
		27.0							

C:\P\3-01 LIBRARY\ELB\2241 Log COF 30035HQ E COHEL GENZTAUC13086AF CBS14.LGS - 20141118 11:23
 No. Observations

method & support AS auger augering AD auger drilling CB claw or blade bit W washhole NMLCNMLC core (51.3mm) NK1 wireline core (47.5mm) LQ2 wireline core (63.5mm) PC wireline core (85.0mm) SPT standard penetration test HA hand auger	water 10/10/12, water level on date shown water fillow complete drilling fluid loss partial drilling fluid loss water pressure test result (kPa/cm) for depth interval shown	graphic log / core recovery core recovered (by core recovery) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration RS residual soil CW completely weathered HW highly weathered MW moderately weathered SW slightly weathered UW unweathered W replaced with A for alteration strength VW very weak W weak MS moderately strong S strong VS very strong ES extremely strong	defect type BS bedding shear PT parting JT joint SZ shear zone SS shear surface CO contact CS crushed seam SM seam roughness SL slickensided POL polished ST smooth RO rough VR very rough	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SM silt VN veneer CO coating
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Engineering Log - Trial Pit

Client: **THE LAKES 2012 LTD**
 Principal:
 Project: **THE LAKES STAGE 3 CONSTRUCTION**
 Trial pit location: **Refer to site plan**

Trial Pit No. **TP02**
 Sheet **1** of **1**
 Project No: **GENZTAUC13086AF**
 Date started: **15.3.2013**
 Date completed: **15.3.2013**
 Logged by: **RBT**
 Checked by: **RBT**

Equipment type: PII Orientation: Easting: 368275 m R.L. Surface: m
 Excavation dimensions: m long m wide Vane No: DR2244 Northing: 799811.2 m Datum:

excavation information				material substance				
stratigraphy	notes, samples, tests, etc	RL	depth, metres	graphic log	classification symbol	Material Description <small>(Soil name, plasticity or grading, colour, secondary components, Moisture, sensitivity, strength, Structure, bedding, orientation, defects, Origin, structural observations, Root cause, grain size & type, colour, texture, inclusions & minor components, Weill (e.g. moisture, strength, etc.))</small>	measure condition consistency/ density index	structure and additional observations
Te Ranga Inghimbrite	Younger Ash Groundwater not encountered		1	[Symbol]	DL	Organic SILT; greyish brown, numerous rootlets.	D-M	Vane shear test (remoulded) (peak) kPa 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700 5800 5900 6000 6100 6200 6300 6400 6500 6600 6700 6800 6900 7000 7100 7200 7300 7400 7500 7600 7700 7800 7900 8000 8100 8200 8300 8400 8500 8600 8700 8800 8900 9000 9100 9200 9300 9400 9500 9600 9700 9800 9900 10000 10100 10200 10300 10400 10500 10600 10700 10800 10900 11000 11100 11200 11300 11400 11500 11600 11700 11800 11900 12000 12100 12200 12300 12400 12500 12600 12700 12800 12900 13000 13100 13200 13300 13400 13500 13600 13700 13800 13900 14000 14100 14200 14300 14400 14500 14600 14700 14800 14900 15000 15100 15200 15300 15400 15500 15600 15700 15800 15900 16000 16100 16200 16300 16400 16500 16600 16700 16800 16900 17000 17100 17200 17300 17400 17500 17600 17700 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Engineering Log - Trial Pit

Trial Pit No. **TP03**
 Sheet 1 of 1
 Project No. **GENZTAUC13086AF**
 Date started: **14.3.2013**
 Date completed: **14.3.2013**
 Logged by: **KB**
 Checked by: **RBT**

Client: **THE LAKES 2012 LTD**
 Principal:
 Project: **THE LAKES STAGE 3 CONSTRUCTION**
 Trial pit location: **Refer to site plan**

Equipment type: Pit Orientation: Facing: 368541.5 m R.L. Surface: m
 Excavation dimensions: m long m wide Vane No: DR2244 Northing: 789781.1 m Datum:

excavation information				material substance								
stratigraphy	water	notes samples, tests, etc	R.L.	depth metres	graphic log	classification symbol	Material Description <small>Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure bedding, conformation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, shear etc. defects.</small>	moisture condition	consistency/ density index	vane shear (remoulded) (peak) kPa	structure and additional observations	
Younger Ash	Groundwater not encountered	Sample 6		0		OL	TOPSOIL	D				
		Sample 7		1		ML	SILT; light brown. Minor rootlets, friable, dry.					
		Sample 8		2		ML	- becoming orange brown and moist.	M				
				2		ML	SILT with trace sand and clay, orange brown, Occasional rootlets. Greasy when reworked.					
				3		ML	SILT with trace to minor sand; orange. Slightly cohesive.					
RA		Sample 9		3		SP	Fine to coarse SAND with minor silt, orange brown, Pumiceous, well graded. - becoming light brown/white.					
HA		Sample 10		4		ML	Clayey SILT; brown, Medium plasticity and greasy when reworked. - becoming orange brown.				UTP	
				5			(max. reach of excavator) RA = Rotochu Ash HA = Hamilton Ash Test pit TP03 (terminated at 4.7 metres.					
				6								

Sketch:

classification symbols and soil description based on New Zealand Geotechnical Society Inc 2005

notes, samples, tests
 U₆₀ undisturbed sample 60mm diameter
 U₆₃ undisturbed sample 63mm diameter
 D disturbed sample
 S₆ bulk sample
 F nonenvironmental sample
 R refusal

vane shear (kPa)
 ● remoulded
 x peak
 >>>x peak greater than 200kPa
 UTP unable to penetrate

Water
 10%/98 water level on date shown
 water inflow
 water outflow

moisture:
 D dry
 M moist
 W wet
 S saturated

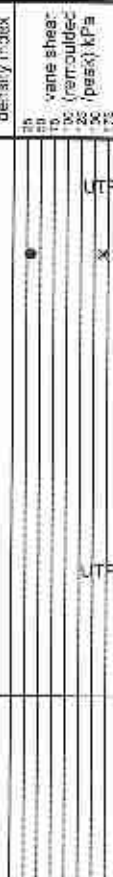
consistency/ density index
 VS very soft VL very loose
 S soft L loose
 F firm MD medium dense
 St stiff () dense
 VS_t very stiff VD very dense
 H hard

Engineering Log - Trial Pit

Client: **THE LAKES 2012 LTD**
 Principal:
 Project: **THE LAKES STAGE 3 CONSTRUCTION**
 Trial pit location: **Refer to site plan**

Trial Pit No. **TP04**
 Sheet **1** of **1**
 Project No: **GENZTAUC13086AF**
 Date started: **14.3.2013**
 Date completed: **14.3.2013**
 Logged by: **RBT**
 Checked by: **RBT**

Equipment type: PII Orientation: Easting: 388508.5 m R.L. Surface: m
 Excavation dimensions: m long m wide Vane No: DR2244 Northing: 799726.0 m Datum:

excavation information				material substance				structure and additional observations
stratigraphy	notes samples, tests, etc	HI	depth metres	graphic log	classification symbol	Material Description <small>Soil name, plasticity or grading, colour, secondary components, Moisture, consistency, strength, fracture, bedding, orientation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, etc.</small>	moisture condition	
TS	Sample 1		0		OL	Organic SILT with trace clay, dark grey/brown, Occasional wood fragments and building debris, friable, (FILL)	D	
Younger Ash	Sample 2		1		ML	SILT with minor very fine sand, light yellow/brown. Dry, friable, very stiff. - occasional tree roots (2-5mm).		
Younger Ash	Sample 3		2		ML	SILT with minor clay, orange/brown, Occasional rootlets. Very slight plasticity, moist.	M	
RA	Sample 4		3		ML	SILT with trace to minor fine sand and trace clay; bright orange, stiff, friable to very slightly cohesive, moist.	M	
RA	Sample 4		3		SP	SILT with trace sand and minor clay, orange/brown. Stiff in-situ but becomes greasy when reworked, moist to wet.	M	
HA	Sample 5		4		ML	SAND with trace to minor silt; light orange/grey. Fungus, friable, moist. - becomes pale orange/white and minor to some silt below 3.4m.		
HA	Sample 5		5		ML	Clayey SILT, chocolate brown, very stiff in-situ, friable when reworked. Non plastic, moist. - becoming mottled chocolate brown/orange brown. - becoming orange brown.		
			6			(max. reach of excavator) RA = Rotokohu Ash HA = Hamilton Ash Test pit TP04 terminated at 4.8 metres.		

Sketch

classification symbols and soil description <small>based on New Zealand Geotechnical Society Inc 2005</small>	Vane shear (kPa) ● remoulded X peak --X peak greater than 200kPa UTP unable to penetrate water ▽ 10/100 water level on date shown ▲ water inflow ▴ water outflow	moisture D dry M moist W wet S saturated	consistency/ density Index VS very soft S soft F firm St stiff VSs very stiff H hard VL very loose L loose MD medium dense D dense VD very dense
notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample S soil sample E environmental sample X refusal			

TRIAL PIT 13086AF INVESTIGATION DATA (PJ) COFFEY.GDT 27.3.15
 Form GEO 5.0 Rev.3

Engineering Log - Trial Pit

Trial Pit No: **TP05**
 Sheet: 1 of 1
 Project No: **GENZTAUC13086AF**
 Date started: **14.3.2013**
 Date completed: **14.3.2013**
 Logged by: **KB**
 Checked by: **RBT**

Client: **THE LAKES 2012 LTD**
 Principal:
 Project: **THE LAKES STAGE 3 CONSTRUCTION**
 Trial pit location: **Refer to site plan**

Equipment type: Pit Orientation: Easting: 268597.6 m R.L. Surface: m
 Excavation dimensions: m long m wide Vane No: DR2244 Northing: 799812.3 m Datum:

excavation information				material substance							
stratigraphy	water	notes samples, tests, etc	RL	depth, metres	graphic log	classification symbol	Material Description <small>Soil name, plasticity or grading, colour, secondary components, Moisture, sensitivity, strength, Structure, bedding, cementation, defects, Origin, additional observations, Rock name, grain size & type, colour, fabric, inclusions & minor components, Weathering, moisture, strength, defects.</small>	moisture condition	consistency/ density index	vane shear (remoulded) (peak) kPa	structure and additional observations
Younger Ash		Sample 11		0		OL	TOPSOIL	D			
		Sample 12		1		ML	SILT, light brown. Friable, dry. - becoming orange brown.	M			
		Sample 13		2		ML	SILT with trace sand and clay; orange brown, low plasticity and greasy when reworked.				
				3		ML	SILT with trace to minor sand and trace clay; bright orange. - becoming orange brown.				
	RA	Groundwater no: encountered	Sample 14		4		SP	Fine to coarse SAND with trace silt; orange brown. Well graded. - becoming light brown/white with occasional silt lenses.			
	Hamilton Ash		Sample 15		5		ML	Clayey SILT; brown. Low plasticity and greasy when reworked. - becoming orange brown mottled brown, less stiff below 4.5m. - becoming light brown/orange brown below 5.0m.			UTP
		Sample 16		6							
							(Target depth) RA = Rotoehu Ash				

Sketch Test pit TP05 terminated at 6 metres.

Sketch

classification symbols and soil description based on New Zealand Geotechnical Society Inc 2009

notes, samples, tests
 U₆ undisturbed sample 50mm diameter
 U₃₀ undisturbed sample 63mm diameter
 D disturbed sample
 H₅ bulk sample
 E environmental sample
 R refusal

vane shear (kPa):
 ● remoulded
 X peak
 >>X peak greater than 200kPa
 UTP unable to penetrate

water
 10/100 water level on data shown
 water inflow
 water outflow

moisture
 LT dry
 M moist
 W wet
 S saturated







consistency/ density index:
 VS very soft VL very loose
 S soft L loose
 F firm MD medium dense
 St stiff D dense
 VSt very stiff VD very dense
 H hard

Engineering Log - Trial Pit

Client: **THE LAKES 2012 LTD**
 Principal:
 Project: **THE LAKES STAGE 3 CONSTRUCTION**
 Trial pit location: **Refer to site plan**

Trial Pit No. **TP09**
 Sheet **1** of **1**
 Project No: **GENZTAUC13086AF**
 Date started: **30.5.2013**
 Date completed: **30.5.2013**
 Logged by: **RBT**
 Checked by: **RBT**

Equipment type: Pile Orientation: Easting: m R.L. Surface: m
 Excavation dimensions: m long m wide Vane No.: Nothing: m Datum:

excavation information				material substance			
stratigraphy	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	Material Description <small>S&T name, plasticity or grading, colour, secondary constituents, texture, sensitivity, strength, structure, bedding, orientation, debris, origin, additional observations. Rock name, grain size & type, colour, texture, inclusions & minor components. Weathering, modulus, strength, etc.</small>	structure and additional observations
Fill BT Younger Ashes RA HA	Groundwater not encountered		1		SP	SAND with minor silt, pale grey, fine to medium grained. Occasional bricks and constructional debris (fill).	
			1.5		OL	Highly organic SILT, dark brown (buried topsoil).	
			2		ML	SILT with some clay and fine sand, orange brown, firm to stiff, moist.	
			4		SP	- Grades to very fine silty SAND, becoming brownish grey.	
			5		MI	SILT with some clay and trace sand, chocolate brown, hard, sand is fine grained, moist (Hamilton Ash).	
			6			Silt, becoming dark orange brown.	

Sketch

<p>classification symbols and soil description based on New Zealand Geotechnical Society Inc 2005</p> <p>notes, samples, tests</p> <p>U₆ undisturbed sample 60mm diameter U₃₀ undisturbed sample 63mm diameter D disturbed sample S₄ bulk sample O₁₀₀ environmental sample R refusal</p>	<p>vane shear (kPa)</p> <p>● unconfined X peak =X peak greater than 200kPa U/I* unshiny to penetrate</p> <p>water</p> <p>▽ 10/100 water level on scale shown ▲ water inflow ▼ water outflow</p>	<p>moisture</p> <p>D dry M moist W wet S saturated</p>	<p>consistency/ density index</p> <p>VB very soft VL very loose S soft L loose F firm MD medium dense St stiff U dense VSt very stiff VD very dense H hard</p>
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TRIAL PIT 13086AF INVESTIGATION DATA.GPJ COFFEY.GDT 27.3.13

Engineering Log - Trial Pit

Trial Pit No. **TP10**
 Sheet 1 of 1
 Project No: **GENZTAUC13086AF**
 Date started: **30.5.2013**
 Date completed: **30.5.2013**
 Logged by: **RBT**
 Checked by: **RBT**

Client: **THE LAKES 2012 LTD**
 Principal:
 Project: **THE LAKES STAGE 3 CONSTRUCTION**
 Trial pit location: **Refer to site plan**

Equipment type: Pit Orientation: Easting: m R.L. Surface: m
 Excavation dimensions: m long m wide Vane No: Northing: m Datum:

excavation information				material substance							
stratigraphy	water	notes samples, tests, etc.	RL	depth metres	graphic log	classification symbol	Material Description <small>Sol name, plasticity or grading, colour, secondary components, moisture, sensitivity, strength, structure, bedding, cementation, defects. Origin, soil/rock observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.</small>	moisture condition	consistency/ density index	vane shear (kPa) <small>(unmodified peak)</small>	structure and additional observations
TS				1		CL	Topsail, highly organic silt (Fill).	M			
				2		ML	SILT with trace sand, pale orange grey, fine lustrous but becomes soft and greasy when re-worked, sand is fine to medium grained, moist.				
				3							
				4		MH	Sandy SILT (silty SAND), pale grey with black flecks, firm to stiff in situ, silty portion becoming firm and slightly plastic when re-worked, sand is fine to medium grained, moist to wet. - Increasing sand content below 4.5m, (grading to SAND) with some silt-silty sand.	M-W			
TI				5			ECBH, target depth TS=Topsoil TI = Te Ranga Ignimbrite Test pit TP10 terminated at 4.5 metres.				
				6							

Sketch:

classification symbols and soil description <small>based on New Zealand Geotechnical Society Inc 2005</small>	vane shear (kPa) ● remoulded X peak XX peak greater than 200kPa LTP unable to penetrate water ▼ 100/98 water level on date shown ▼ water inflow ▲ water outflow	moisture D dry W moist W wet S saturated	consistency/ density index VS very soft VL very loose S soft L loose F firm MD medium dense ST stiff D dense VSt very stiff VD very dense H hard
notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample Cs bulk sample Em environmental sample R soil			

TRIAL PIT 13086AF INVESTIGATION DATA (G.P.) COFFEY (SOT) 27.3.15



Borehole No. MB 34

Site: Pves Pa West Urbanisation

Sheet: 1 of 3

Job No. 16944

Date Excavated: TU 13/5/03

RL Ground:

Logged By: MTT

Description of Soil	Soil Symbol	Depth (m)	SPT	GROUNDWATER	CORE RECOVERY	Undrained Shear Strength (kPa)		
						50	100	150
Topsoil	uw	0.0 - 0.5						
SILT: Very clayey, moderately cohesive Dark brown yellow, stiff, slightly moist	x/x	0.5 - 1.0						
SPT 450 : Very clayey, moderately cohesive brown yellow silt RECOVERY stiff, sensitive	x/x	1.0 - 1.5	15 15 2	SEE P3 FOR GW DATA	100%			
Some sand, slightly cohesive cream brown, stiff (medium dense), sensitive, moist	x/x	1.5 - 2.0						
SPT 300 : Sandy pale yellow orange silt, loose, moist RECOVERY	x/x	2.0 - 2.5	0 1		100%			
SILT: Very sandy, non cohesive, cream loose, moist, sensitive, Dilatent	x/x	2.5 - 3.0						
	x/x	3.0 - 3.5						
	x/x	3.5 - 4.0						
	x/x	4.0 - 4.5						

EXCAVATION METHOD: 75mm φ MACHINE AUGER + HOLLOW. SPT



Borehole No. MB 34

Site:

Pyes Pa West Urbanisation

Sheet: 2 of 3

Job No. 16944

Date Excavated: Tu 13/5/03

RL Ground:

Logged By: MA

Description of Soil	Soil Symbol	Depth (m)	Undrained Shear Strength (kPa)		
			50	100	150
SPT 450 RECOVERY Sandy cream brown soft	X X	0			
	X	1			
Silty sand, loose	SP	1			
SAND: very silty, non cohesive, pale cream brown, loose, sensitive Dilatent	SP	5			
		5.5			
		6			
		6.5			
SPT 450 RECOVERY pumice sand, grey, loose	PP	6.5			
fine grained pumice cream, firm, sensitive Dilatent	P	7			
		7.5			
		8			
		8.5			
SPT 450 RECOVERY grey pumice sand medium Dense	PP	9			
Cream Pumice, Dense	PP	9.5			
		10			
		10.5			
SILT: very sandy, cream, Dense solid drilling.	XX	11			
		11.5			
		12			
		12.5			
	TE BANCA	13			
	XX	13.5			
	XX	14			
	XX	14.5			

EXCAVATION METHOD: 75mm ϕ MACHINE AUGER & HOLLOW SFC



Borehole No. MB 34

Site:

Eyes Pa West Urbanisation

Sheet: 3 of 3

Job No. 16944

Date Excavated: Tu 13/5/03

RL Ground:

Logged By: MAT

Description of Soil	Soil Symbol	Depth (m)	SPT	GROUNDWATER	CORE RECOVERY	Undrained Shear Strength (kPa)		
						50	100	150
SPT 450 RECOVERY	Pumiceous clayey silt, cream dense	2-5	N=9		100%			
SILT: very clayey, cream, very stiff, sensitive, dilatant								
SPT 450 RECOVERY	Very fine grained pumiceous silt, pale grey cream, very stiff, sensitive, slightly moist	3-4	N=5		100%			
Pumice sand: fines content is low, grey, medium dense, very moist								
SPT 350 RECOVERY	MEDIUM DENSE DENSE pumice sand grey with yellow banding	5-8	N=16		100%			
FOB @ 12.5m: TARGET DEPTH.								

EXCAVATION METHOD: 75mm φ MACHINE AUGER Et HOLLOW SPT



Borehole No. MB 35

Site: Pyes Pa West Urbanisation

Sheet: 1 of 3

Job No. 16944

Date Excavated: W. 14/5/03

RL Ground:

Logged By: MAA

Description of Soil	Soil Symbol	Depth (m)	SPT	CORROSION	CORE RECOVERY	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL	EE	0.0 - 0.1						
Sand; very silty, grey, loose	EE	0.1 - 0.2						
SPT 450 : Grey pumice sand RECOVERY : loose Medium Dense	EE	0.2 - 0.3						
Silty grey pumice sand medium Dense : Core in excellent condition	EE	0.3 - 0.4			100%			
SPT 450 : Silty grey pumice sand RECOVERY : medium Dense	EE	0.4 - 0.5			100%			
SAND : Very silty, brown orange	EE	0.5 - 0.6						
grey	EE	0.6 - 0.7						

EXCAVATION METHOD: 75mm ϕ MACHINE AUGER ET HOLLOW SPT



Borehole No. MB 35

Site: Pyes Pa West Urbanisation

Sheet: 3 of 3

Job No. 16944

Date Excavated: W 14/5/03

RL Ground:

Logged By: MAt

Description of Soil	Soil Symbol	Depth (m)	SPT	CORRECTION	Undrained Shear Strength (kPa)		
					50	100	150
pumice sand, grey, Dense		0-10.5		100%			
SPT 450 : Grey pumice sand; Dense RECOVERY		10.5-11.0	1				
		11.0-11.5	3				
		11.5-12.0	10				
Grey, pumice sand, Dense		12.0-13.5	N=13	40%			
Backfall prevents SPT from being undertaken @ 12.0m		12.0-13.5					
pumice sands, grey Dense		13.5-15.0		20-30%			
EOB @ 13.5m : TARGET DEPTH		13.5					

EXCAVATION METHOD: 75 mm ϕ MACHINE AUGER Et HOLLOW SPT



Borehole No. MB 36

Site: Pyes Pa West Urbanisation

Sheet: 1 of 5

Job No. 16944

Date Excavated: W 14/5/03

RL Ground:

Logged By: MJA

Description of Soil	Soil Symbol	Depth (m)	SPT	GROUNDWATER	CORE RECOVERY	Undrained Shear Strength (kPa)		
						50	100	150
SILT: Very clayey, moderately cohesive Dark brown yellow, stiff, slightly moist	X	0.0 - 0.5		BOREHOLE DRY	100%			
	X	0.5 - 1.0						
SPT 300 RECOVERY: very clayey, moderately cohesive brown yellow soft, slightly moist	X	1.0 - 1.5	1	M4	100%			
	X	1.5 - 2.0	2					
pale brown yellow	X	2.0 - 2.5		100%	100%			
	X	2.5 - 3.0						
SAND: pumice, pale grey, loose	Po	3.0 - 3.5		M4	100%			
	Po	3.5 - 4.0						
SILT: Very clayey, cohesive, Dark brown orange, stiff, moist and sticky down to 6.0m	Hm	4.0 - 4.5	4	100%	100%			
	X	4.5 - 5.0						
	X	5.0 - 5.5						
	X	5.5 - 6.0						

- Po = Post Rotachin Ashes
- Ro = Rotachin
- Hm = Hamstow Ashes

EXCAVATION METHOD: 75mm MACHINE AUGER Et HOLLOW SPT



SIRISAPPAN & PARTNERS

Borehole No. MB 36

Site:

Pyes Pa West Urbanisation

Sheet: 2 of 5

Job No. 16944

Date Excavated: W. 14/5/03

RL Ground:

Logged By: MAA

Description of Soil	Soil Symbol	Depth (m)	SPT	CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SPT 450 : Very clayey cohesive pale RECOVERY brown yellow silt, very stiff, moist	x x	0-1	1	100%			
	x x	1-3	3				
brown orange	x x	3-5	5	100%			
	x x	5-6	6				
SPT 450 : very clayey, moderately RECOVERY cohesive, pale brown yellow silt	x x	6-7	7	100%			
	x x	7-8	8				
	x	8-9	9	100%			
	x	9-10	10				
clayey pale brown yellow silt cream silt some sand, stiff	x x	10-11	11	100%			
	x	11-12	12				
	x x	12-13	13	100%			
	x	13-14	14				
	x	14-15	15	100%			
	x	15-16	16				

EXCAVATION METHOD: 75 mm Ø MACHINE AUGER Et HOLLOW SPT



Borehole No. MB 36

Site:

Pyes Pa West Urbanisation

Shoot: 3 Of: 5

Job No. 16944

Date Excavated: W. 14/5/03
T. 15/5/03

RL Ground:

Logged By: MAt

Description of Soil	Soil Symbol	Depth (m)	SPT	CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SPT 450 RECOVERY pumiceous silt cream sand, medium Dense		0-2	2	100%			
SPT 450 RECOVERY pumice sand, cream, medium Dense		2-3	2	100%			
pumice sand: very silty, non cohesive cream, medium Dense, slightly moist		3-10	3	100%			
SPT 450 RECOVERY Dry sand pale cream pumice sand Dense		10-12	2	100%			
14/5/03 15/5/03 cream pumice sand Dense, slightly moist		12-13	4 5	100%			

EXCAVATION METHOD: 75mm ϕ MACHINE ANGER & HOLLOW SPT



Borehole No. MB 36

Site:

Pyes Pa West Urbanisation

Sheet: 4 of 5

Job No. 16944

Date Excavated: TH 15/5/03

RL Ground:

Logged By: MAA

Description of Soil	Soil Symbol	Depth (m)	SPT	CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SPT 450 : Cream pumice sand, Dense RECOVERY Dry Dry		2 3 5	N=8	100%			
SPT 450 : Cream pumice sand, Dense RECOVERY Dry		15.0 15.5	N=8	100%			
fine grained cream pumice sand, Dense, dry : Core in Excellent condition		16.0					
SPT 450 : Cream grey pumice sand, Dense RECOVERY Dry		16.5 17.0	N=25	100%			
fine grained pale grey pumice sand, Dense Dry		17.5 18.0					

EXCAVATION METHOD: 75mm Ø MACHINE AUGER Et HOWA SPT



Borehole No. MB 36

Site: Pyes Pa West Urbanisation

Sheet: 5 of 5

Job No. 16344

Date Excavated: 15/5/03

RL Ground:

Logged By: MH

Description of Soil	Soil Symbol	Depth (m)	SPT	CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SPT 450 : Pale grey pumice sand RECOVERY Dense Dry		0-18	18	100			
		18-19.5	18-35	60%			
		19.5-20.0	11	100%			
SPT 320mm : Pumice sands pale grey RECOVERY Dense		20.0-20.0	29 3/20mm				
EOB@ 20.0m : TARGET DEPTH							

EXCAVATION METHOD: 75mm ϕ MACHINE AUGER ET HOLLOW SPT



Borehole No. MB 37

Site: Pyes Pa West Urbanisation

Sheet: 1 of 5

Job No. 16944 Date Excavated: TH 15/5/03 RL Ground:

Logged By: MT

Description of Soil	Soil Symbol	Depth (m)	SPT	CROWN DIALS	CORE RECOVERY	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL	Uu	0.0 - 0.1						
SILT: Very clayey, moderately cohesive brown yellow, very stiff	X	0.1 - 0.5						
	X	0.5 - 1.0						
	X	1.0 - 1.5	2					
	X	1.5 - 2.0						
	X	2.0 - 2.5						
	X	2.5 - 3.0						
	X	3.0 - 3.5						
	X	3.5 - 4.0						
	X	4.0 - 4.5						
	X	4.5 - 5.0						
	X	5.0 - 5.5						
	X	5.5 - 6.0						
	X	6.0 - 6.5						
	X	6.5 - 7.0						
	X	7.0 - 7.5						
	X	7.5 - 8.0						
	X	8.0 - 8.5						
	X	8.5 - 9.0						
	X	9.0 - 9.5						
	X	9.5 - 10.0						
	X	10.0 - 10.5						
	X	10.5 - 11.0						
	X	11.0 - 11.5						
	X	11.5 - 12.0						
	X	12.0 - 12.5						
	X	12.5 - 13.0						
	X	13.0 - 13.5						
	X	13.5 - 14.0						
	X	14.0 - 14.5						
	X	14.5 - 15.0						
	X	15.0 - 15.5						
	X	15.5 - 16.0						
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	X	18.0 - 18.5						
	X	18.5 - 19.0						
	X	19.0 - 19.5						
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	X	23.0 - 23.5						
	X	23.5 - 24.0						
	X	24.0 - 24.5						
	X	24.5 - 25.0						
	X	25.0 - 25.5						
	X	25.5 - 26.0						
	X	26.0 - 26.5						
	X	26.5 - 27.0						
	X	27.0 - 27.5						
	X	27.5 - 28.0						
	X	28.0 - 28.5						
	X	28.5 - 29.0						
	X	29.0 - 29.5						
	X	29.5 - 30.0						
	X	30.0 - 30.5						
	X	30.5 - 31.0						
	X	31.0 - 31.5						
	X	31.5 - 32.0						
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	X	35.5 - 36.0						
	X	36.0 - 36.5						
	X	36.5 - 37.0						
	X	37.0 - 37.5						
	X	37.5 - 38.0						
	X	38.0 - 38.5						
	X	38.5 - 39.0						
	X	39.0 - 39.5						
	X	39.5 - 40.0						
	X	40.0 - 40.5						
	X	40.5 - 41.0						
	X	41.0 - 41.5						
	X	41.5 - 42.0						
	X	42.0 - 42.5						
	X	42.5 - 43.0						
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	X	44.5 - 45.0						
	X	45.0 - 45.5						
	X	45.5 - 46.0						
	X	46.0 - 46.5						
	X	46.5 - 47.0						
	X	47.0 - 47.5						
	X	47.5 - 48.0						
	X	48.0 - 48.5						
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	X	49.0 - 49.5						
	X	49.5 - 50.0						
	X	50.0 - 50.5						
	X	50.5 - 51.0						
	X	51.0 - 51.5						
	X	51.5 - 52.0						
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	X	55.5 - 56.0						
	X	56.0 - 56.5						
	X	56.5 - 57.0						
	X	57.0 - 57.5						
	X	57.5 - 58.0						
	X	58.0 - 58.5						
	X	58.5 - 59.0						
	X	59.0 - 59.5						
	X	59.5 - 60.0						
	X	60.0 - 60.5						
	X	60.5 - 61.0						
	X	61.0 - 61.5						
	X	61.5 - 62.0						
	X	62.0 - 62.5						
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	X	63.5 - 64.0						
	X	64.0 - 64.5						
	X	64.5 - 65.0						
	X	65.0 - 65.5						
	X	65.5 - 66.0						
	X	66.0 - 66.5						
	X	66.5 - 67.0						
	X	67.0 - 67.5						
	X	67.5 - 68.0						
	X	68.0 - 68.5						
	X	68.5 - 69.0						
	X	69.0 - 69.5						
	X	69.5 - 70.0						
	X	70.0 - 70.5						
	X	70.5 - 71.0						
	X	71.0 - 71.5						
	X	71.5 - 72.0						
	X	72.0 - 72.5						
	X	72.5 - 73.0						
	X	73.0 - 73.5						
	X	73.5 - 74.0						
	X	74.0 - 74.5						
	X	74.5 - 75.0						
	X	75.0 - 75.5						
	X	75.5 - 76.0						
	X	76.0 - 76.5						
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	X	77.5 - 78.0						
	X	78.0 - 78.5						
	X	78.5 - 79.0						
	X	79.0 - 79.5						
	X	79.5 - 80.0						
	X	80.0 - 80.5						
	X	80.5 - 81.0						
	X	81.0 - 81.5						
	X	81.5 - 82.0						
	X	82.0 - 82.5						
	X	82.5 - 83.0						
	X	83.0 - 83.5						
	X	83.5 - 84.0						
	X	84.0 - 84.5						
	X	84.5 - 85.0						
	X	85.0 - 85.5						
	X	85.5 - 86.0						
	X	86.0 - 86.5						
	X	86.5 - 87.0						
	X	87.0 - 87.5						
	X	87.5 - 88.0						
	X	88.0 - 88.5						
	X	88.5 - 89.0						
	X	89.0 - 89.5						
	X	89.5 - 90.0						
	X	90.0 - 90.5						
	X	90.5 - 91.0						
	X	91.0 - 91.5						
	X	91.5 - 92.0						
	X	92.0 - 92.5						
	X	92.5 - 93.0						
</								



Borehole No. MB 37

Site:

Pyas Pa West Urbanisation

Sheet: 2 of 5

Job No. 16944

Date Excavated: TH 15/5/03

RL Ground:

Logged By: MH

Description of Soil	Soil Symbol	Depth (m)	SPT	CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SPT USO : Very clayey, cohesive brown RECOVERY orange silt, very stiff, slightly moist	x x	1 3 4	1 3 4	100%			
becomes pale brown	x x	5.0					
cream silt	x x	5.5					
SPT USO : Sandy cream silt, non cohesive RECOVERY medium dense, dry	x x	6.0 6.5	1 4	100%			
SAND: fine grained, silty, non cohesive cream, dense dry	x x	7.0					
SPT USO : Cream pumice sands, dense RECOVERY Dry	x x	7.5 8.0	3 4	100%			
Very silty, brown grey slightly moist	x x	8.5 9.0	4	100%			

EXCAVATION METHOD: 75mm ϕ MACHINE AUGER + HOLLOW SPT



Borehole No. MB 37

Site: Pyes Pa West Urbanisation

Sheet: 3 of 5

Job No. 16 544

Date Excavated: TH 15/5/03

RL Ground:

Logged By: MAA

Description of Soil	Soil Symbol	Depth (m)	N	Undrained Shear Strength (kPa)		
				50	100	150
SPT 450 RECOVERY : Fine grained, cream pumice sand, Dense, Dry	[Symbol]	3	N=14			
		6				
		8				
		9.5				
		10				
Brown grey	[Symbol]	10.5	N=22			
		13				
		14				
		15				
		17.5				
SPT 450 RECOVERY : very silty sand, brown grey, Dense, Dry	[Symbol]	20	N=14			
		21				
		22				
		25				
		30				
SPT 450 RECOVERY : Very silty sand, brown grey, Dense, Dry	[Symbol]	35	N=14			
		37				
		38				
		40				
		45				

EXCAVATION METHOD: 75 mm Ø MACHINE AUGER & HOLLOW SPT



STRATFORD & LIPSON

Borehole No. MB 37

Site:

Pyes Pa West Urbanisation

Sheet: 4 of 5

Job No. 16944

Date Excavated: TH. 15/5/03

RL Ground:

Logged By: Mtt.

Description of Soil	Soil Symbol	Depth (m)	SPT	GROUNDWATER	CORE RECOVERY	Undrained Shear Strength (kPa)		
						50	100	150
SPT 450 : SAND : Very Sultry, Brown RECOVERY grey, Dense, Dry		3 4 6	N=10		100%			
puccinons cream silt	X X	15.0						
SPT 450 RECOVERY Brown grey sultry sand medium Dense		3 4 4	N=8					
SILT : Very sandy, cream, medium Dense, sensitive, Dilatent	X X	15.5						
	X	16.0			100%			
SPT fell out	X X	16.5						
		1 4	N=5		NIL			
	X	17.0						
	X X	17.5						
clayey, slightly cohesive cream, stiff, sensitive, Dilatent		18.0			20%			

EXCAVATION METHOD: 75 mm ϕ MACHINE AUGER + hollow SPT



Borehole Log. MB37

Site: Pyes Pa West Urbanisation

Sheet: 5 of 5

Job No. 16944 Date Excavated: TH 15/5/03 RL Ground:

Logged By: NAB

Description of Soil	Soil Symbol	Depth (m)	SPT	Undrained Shear Strength (kPa)		
				50	100	150
SPT USO : SILT: clayey, cohesive, cream RECOVERY banded orange, very stiff	XX	3	3			
	X	4	4			
slightly cohesive, pale brown yellow	X	5	5			
	XX	15				
EUR @ 20.5m : TARGET DEPTH	X	20.0	1			
		20.5	3			

EXCAVATION METHOD: 75 mm ϕ MACHINE AUGER + HOLLOW SPT



SMITHSONIAN & LINDSAY

Borehole Log. MB 38

Site:

Pyes Pa West Urbanisation

Sheet: 1 of 6

Job No. 16944

Date Excavated: F. 16/5/03

RL Ground:

Logged By: Mtt.

Description of Soil	Soil Symbol	Depth (m)	SPT	GROUNDWATER CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SILT: Very clayey, moderately cohesive brown yellow, stiff, slightly moist	x x	0-0.5					
SPT 300 : Very clayey, cohesive RECOVERY brown yellow silt, very stiff, slightly moist	x	0.5-1.0	2 4 5 N=9	100%			
clayey, cohesive silt brown yellow	x x	1.0-1.5					
silty cream sand	x	1.5-2.0		100%			
SPT 450 RECOVERY silty pale yellow sand, medium dense Dry	x x x	2.0-2.5	1 3 3 N=6				
SILT: clayey pale yellow SAND: pale grey, loose	x x	2.5-3.0					
SILT: Very clayey, cohesive, dark brown orange, stiff, moist	x x	3.0-3.5		100%			
See sheet 5 for groundwater level noted during drilling	x x	3.5-4.0					

EXCAVATION METHOD: 75 mm ϕ MACHINE AUGER + HOLLOW SPT



Borehole Log: MB 38

Site:

Pyes Pa West Urbanisation

Sheet: 2 of 6

Job No. 16944

Date Excavated: F. 16/5/03

RL Ground:

Logged By: MAA

Description of Soil	Soil Symbol	Depth (m)	SPT	CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SPT 450 : very clayey, cohesive, Dark brown orange silt, hard slightly moist RECOVERY	X X	5	5				
		14					
		20	N=34				
		50		100%			
cohesive brown orange silt, very stiff, moist	X	55					
	X X	60					
	X	62					
SPT 450 : very clayey, cohesive pale brown orange silt, very stiff RECOVERY	X	62	2				
	X	64	N=4				
	X X	65		100%			
very clayey, some sand moderately cohesive, brown orange, stiff, moist	X X	70					
	X	75					
SPT 450 : very clayey, cohesive silt brown yellow, stiff, slightly moist RECOVERY	X X	75	1				
	X	80	2				
	X	80	3	N=5			
Dark brown yellow	X	85		100%			
	X	90					
SILT: Pannicous, clayey, slightly cohesive, cream, stiff	X	90					

OLDER ASHES

TANANGI BESS HAMILTON

MATINA

EXCAVATION METHOD: 75 mm φ MACHINE AWGER + HOLLOW SPT



Borehole Log. MB 38

Site:

Pyes Pa West Urbanisation

Sheet: 3 of 6

Job No. 16544

Date Excavated: F. 16/5/03

RL Ground:

Logged By:

Description of Soil	Soil Symbol	Depth (m)	SPT	CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SPT 450 RECOVERY clayey moderately cohesive grey cream silt, stiff medium Dense, moist	X X	1-3	N=5	100%			
SILT: clayey, some sand, slightly cohesive, cream, stiff, slightly moist	X	95					
SPT 450 RECOVERY clayey cream silt SAND: cream, medium Dense	X X	95-110	N=6	100%			
SILT: very clayey, moderately cohesive Dark brown grey, very stiff, moist	X X	110					
pumice SAND	X	115		100%			
SPT 650 RECOVERY pumice sand, silty cream grey, Dense, Dry	X X	120-125	N=10	100%			
pumice sand, very silty, pale grey	X X	125					
		130		100%			
		135					

EXCAVATION METHOD: 75 mm ϕ MACHINE AUGER et Hollow SPT.



Borehole Log. MB 38

Site:

Pyes Pa West Urbanisation

Sheet: 4 of 6

Job No. 16944

Date Excavated: 16/5/03

RL Ground:

Logged By: MAA

Description of Soil	Soil Symbol	Depth (m)	SPT	CORE RECOVERY	Undrained Shear Strength (kPa)		
					50	100	150
SPT 450 RECOVERY pale sandy grey silt	xx	13	5				
pumice cream sand, Dense Dry	xx	7	7				
		6	13				
SILT: Very sandy, slightly cohesive pale brown grey, Dense, very slightly moist	xx	14.0					
	x	14.5		100%			
	xx	15.0	5				
SPT 450 RECOVERY pale grey silt	xx	6	6				
cream silty sand		15.5	14				
SAND: Very silty, pale brown grey Dense		16.0		100%			
		16.5	4				
SPT 450 RECOVERY Very silty cream grey sand, Dense, Dry		7	7				
		17.0	15				
SAND: Very silty, cream grey, Dense slightly moist		17.5		100%			
		18.0					

EXCAVATION METHOD: 75mm Ø MACHINE AUGER + HOLLOW SPT



Borehole Log. MB 38

Site:

Pyes Pa West Urbanisation

Sheet: 5 of 6

Job No. 16944

Date Excavated: F. 16/5/03

RL Ground:

Logged By: MA

Description of Soil	Soil Symbol	Depth (m)	SPT	GROUNDWATER	CORE RECOVERY	Undrained Shear Strength (kPa)		
						50	100	150
SPT 450 RECOVERY : Very Sandy cream grey silt Dense, Dilatent	XX	0-1	1					
		1-3	3					
		3-6	6	N=9				
puccious sandy silt, slightly cohesive, cream grey, Dense sensitive, Dilatent	X	6-18.5			100%			
	XX	18.5-19.0						
SPT 650 RECOVERY : cream puccious silt pale yellow sand	X	19.0-19.5						
	XX	19.5-20.0	6					
		20.0-20.5	8					
SILT : Very sandy, grey cream, Dense	XX	20.5-21.0	7	N=15				
		21.0-22.5			100%			
RODS WET @ 20.5m →		22.5-23.0						
pumice SAND	XX	23.0-24.0						
SPT 450 RECOVERY : very silty cream pumice sand, Dense / compact		24.0-24.5	3					
		24.5-25.0	4					
		25.0-26.0	6	N=10				
pumice sand, very silty, cream Dense, sensitive, Dilatent		26.0-27.5			100%			
		27.5-28.5						
slightly Dilatent		28.5-29.5						

EXCAVATION METHOD: 75mm φ MACHINE AUGER + HOLLOW SPT

