

Appendix 4

Borehole Logs June 2013
CPT Plots June 2013
Borehole logs 2014
Borehole Logs 2003



Borehole 1A

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 9.69 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 200 mm								
SILT; clayey; slightly sandy; very stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL	Fill	0.5		6.2 m (from CPT)				
stiff		1.0						
		1.5			83			
ORGANIC SILT; saturated; dark brown		2.0						
SILT; firm; saturated; slightly cohesive; light brown some dark brown organic mottles FILL	Organics	2.5						
		3.0		27				
ORGANIC SILT; slightly sandy; soft; saturated; dark brown	Organics	3.5						
		4.0						
logs and decayed wood		4.5						
		4.7						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 1A

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 9.69 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)			
						50	100	150	
continues as organic silts	Organics K K K K K K K K	4.8		6.2 m					
		5.0							
		5.5				51			
		6.0				4	X		
silt; stiff; saturated; slightly cohesive; sensitive; light grey (alluvial soils) becomes light brown grey becomes slightly sandy; rare fine roots End of borehole 6.0 m									
		6.5							
		7.0							
		7.5							
		8.0							
		8.5							
		9.0							
		9.4							

EXCAVATION METHOD: HQ Coring; Tractor Rig



Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.76 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 100 mm		0.0 - 0.1						
SILT; clayey; slightly sandy; hard; moist; moderately plastic; orange brown; dark brown and light grey mottles FILL		0.1 - 3.5		6.8 m (from CPT)				
SILT; slightly sandy; hard; moist; friable; light grey FILL		3.5 - 3.8						
SILT; slightly sandy; stiff; wet; slightly cohesive; mixed light grey, orange, yellow and dark brown FILL		3.8 - 4.0						
SAND (m-c) gravelly; silty; pumiceous; medium dense; saturated; light green grey FILL		4.0 - 4.5						
SAMPLE LOST; FILL		4.5 - 4.7						
SILT; slightly sandy; very stiff; wet; slightly cohesive; light brown grey; some fine roots; traces of organics		4.7 - 4.8			154			
EXCAVATION METHOD: HQ Coring; Tractor Rig								



Borehole 1B

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.76 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)			
						50	100	150	
becomes soft End of borehole 6.0 m	x x x x	4.8		6.8 m					
	x x x x	5.0							
	x x x x	5.2							
	x x x x	5.4							
	x x x x	5.6							
	x x x x	5.8							
	x x x x	6.0				24			
			6.2						
			6.4						
			6.6						
			6.8						
			7.0						
		7.2							
		7.4							
		7.6							
		7.8							
		8.0							
		8.2							
		8.4							
		8.6							
		8.8							
		9.0							
		9.2							
		9.4							

EXCAVATION METHOD: HQ Coring; Tractor Rig



Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 8.50 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 300 mm	Fill [Symbol]	0.5		5.1 m (from CPT)	utp			
SILT; clayey; slightly sandy; hard; moist; moderately plastic; orange brown; dark brown and light grey mottles FILL								
SAMPLE LOST suspect ORGANIC SILT; soft; saturated; dark brown		1.0						
ORGANIC SILT; very soft; saturated; dark brown contains some wood; poor recovery	Organics [Symbol]	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
SAMPLE LOST suspect ORGANIC SILT; soft; saturated; dark brown		4.7						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 2A

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 8.50 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
		4.8						
		5.0						
		5.5		5.1 m				
ORGANIC SILT; very soft; saturated; dark brown	Organics	6.0						
hit a log		6.5						
		7.0						
SAND (f-c); loose; saturated; grey		7.5						
End of borehole 7.5 m		8.0						
		8.5						
		9.0						
		9.4						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 9.44 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 100 mm		0.0 - 0.1						
SILT; clayey; slightly sandy; very stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL		0.1 - 3.5		4.4 m (from CPT)				
TOPSOIL 100 mm		3.5 - 3.6						
SILT; clayey; very stiff; moist; moderately plastic; orange brown FILL		3.6 - 3.9						
SILT; stiff; wet; slightly cohesive; light grey FILL		3.9 - 4.0						
SAND (f-m) silty; loose; saturated; brown FILL		4.0 - 4.1						
GRAVEL (f-m); loose; wet; pumiceous; lt. grey FILL		4.1 - 4.2						
SILT; slightly sandy; soft; sensitive; saturated; slightly cohesive; light yellow grey orange, yellow and pink mottles FILL		4.2 - 4.5						
		4.5 - 4.7			83			
					95			
					15			

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole **2B**

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 9.44 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
becomes clayey end of clayey	Fill 	4.8 5.0 5.5						
SAND (m-c) silty; loose; saturated; grey		6.0			30			
End of borehole 6.0 m		6.5 7.0 7.5 8.0 8.5 9.0 9.4						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 3A

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.44 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
	Organics	4.8						
		5.0						
SILT; slightly sandy; soft; saturated; slightly cohesive; ensitive; light grey; rare traces of fine organics		5.5						
		6.0			6	X		
		6.5						
		7.0						
		7.5						
		8.0						
		8.5						
		9.0						
		9.4						
	End of borehole 6.0 m							

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 3A

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.49 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)			
						50	100	150	
TOPSOIL	[Soil Symbol: Diagonal lines]	0.0 - 0.5		4.3 m (from CPT)					
SILT; clayey; slightly sandy; stiff; very moist; mod. plastic; range brown; dark brown and light grey mottles FILL									
TOPSOIL	[Soil Symbol: Diagonal lines]	0.5 - 1.0		4.3 m (from CPT)					
SILT; clayey; slightly sandy; stiff; very moist; mod. plastic; orange brown; dark brown and light grey mottles FILL									
	[Soil Symbol: X's]	1.0 - 1.5		4.3 m (from CPT)					
		1.5 - 2.0				50			
		2.0 - 2.5							
		2.5 - 3.0							
ORGANIC SILT; slightly sandy; stiff; very moist; dark brown	[Soil Symbol: Diagonal lines]	3.0 - 3.5		4.3 m (from CPT)					
		3.5 - 4.0				92			
PEAT; fibrous; wet; dark brown	[Soil Symbol: Diagonal lines]	4.0 - 4.5		4.3 m (from CPT)					
		4.5 - 4.7							
		4.7 - 4.8							

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 3B

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.74 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 100 mm								
SILT; clayey; slightly sandy; very stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL	FILL	0.5		5.3 m (from CPT)				
hard		1.0						
		1.5			200+			>
		2.0						
		2.5						
SAMPLE LOST		3.0						
SILT; slightly sandy; firm; saturated; sensitive; slightly cohesive; light yellow brown grey		3.5						
		4.0						
		4.5			9	X		
		4.7						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole **3B**

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.74 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
becomes light grey becomes very soft	x x x	4.8		5.3 m	4			
	x x x	5.0						
	x x x							
	x x x							
	x x x	5.5						
	x x x							
	x x x							
	x x x							
	x x x							
	x x x	6.0						x
End of borehole 6.0 m		6.5						
		7.0						
		7.5						
		8.0						
		8.5						
	9.0							
	9.4							

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 4A

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.50 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 1.0 m		0.0 - 1.0						
SILT; clayey; slightly sandy; stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL		1.0 - 3.0		not recorded	53			
becomes very stiff		3.0 - 4.0			178			
PEAT; fibrous; wet; dark brown		4.0 - 4.5						
SAMPLE LOST		4.5 - 4.7			24			

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 4A

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.50 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
SAMPLE LOST		4.8						
		5.0						
		5.5						
		6.0						
PEAT; fibrous; saturated; some wood; dark brown	Organics	6.5						
		7.0						
		7.5						
		8.0						
SAND (f-m); loose; saturated; light grey		8.5						
		9.0						
End of borehole 9.0 m								
		9.4						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 4B

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.93 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 100 mm								
SILT; clayey; slightly sandy; very stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL	FILL	0.5		6.2 m (from CPT)				
		1.0						
		1.5			134			
		2.0						
		2.5						
		3.0			160			
		3.5						
		4.0						
		4.5			6	X		
		4.7						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 4B

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 9.93 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
	Fill	4.8						
		5.0						
ORGANIC SILT; mixed with SILT; sandy soft; saturated; black	Organics			6.2 m				
SILT; sandy; soft; saturated; slightly cohesive; light grey ALLUVIUM		5.5						
SILT; clayey; very slightly sandy; soft; saturated; low plasticity; brown; some fine roots								
End of borehole 6.0 m		6.0		18				
		6.5						
		7.0						
		7.5						
		8.0						
		8.5						
		9.0						
		9.4						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 5

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 10.2 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 100 mm		0.0 - 0.1						
SILT; clayey; slightly sandy; very stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL		0.1 - 1.5		not recorded				
TOPSOIL		1.5 - 1.6			89			
SILT; clayey; slightly sandy; stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL		1.6 - 3.0						
SILT; slightly sandy; very stiff; wet; friable; light brown grey orange brown and dark brown mottles FILL		3.0 - 3.5			169			
SAMPLE LOST		3.5 - 4.5						
SILT; slightly sandy; soft; saturated; non cohesive; light grey FILL		4.5 - 4.7						

Fill

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 6

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 10.0 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 100 mm		0.0 - 0.1						
SILT; clayey; slightly sandy; very stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL		0.1 - 3.9		not recorded	193			
stiff		3.0 - 3.9			89			
SILT; very stiff; wet; slightly cohesive; light grey FILL		3.9 - 4.0						
ORGANIC SILT; slightly sandy; dark grey		4.0 - 4.1						
SAMPLE LOST FILL		4.1 - 4.5						
SILT; slightly sandy; soft; saturated; sl. cohesive; sensitive; light grey; orange brown, yellow and brown mottles FILL		4.5 - 4.7						
EXCAVATION METHOD: HQ Coring; Tractor Rig								



Borehole 6

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 24/6/2013

RL 10.0 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
FILL	[Diagonal hatching symbol]	4.8						
		5.0						
		5.5						
		6.0				6	X	
		6.5						
		7.0						
		7.5						
		8.0						
		8.5						
		9.0						
		9.4						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 9.8 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 50 mm	KL							
SILT; stiff; wet; slightly cohesive; light grey	XX	0.5						
becomes slightly sandy 30 mm mense of SAND (f-m) continues slightly sandy; black speckles	XX	1.0						
yellow green mottles becomes sandy	XX	1.5			24			
end of sandy	XX	2.0						
SILT; sandy; firm; wet; slightly cohesive; yellow green	XX	3.0			36			
SILT; stiff; saturated; sensitive; slightly cohesive; dilatent; light yellow grey	XX	3.5						
SAND (f-m) silty; medium dense; saturated; grey	XX	4.0						
SILT; stiff; saturated; sensitive; slightly cohesive; dilatent; light yellow grey	XX	4.5			140			
SAND (m-c) gravelly; medium dense; saturated; grey	OO	4.7						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 7

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 9.8 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
becomes yellow green	•••••	4.8						
		5.0						
becomes grey	•••••	5.5						
		6.0						
End of borehole 6.0 m	•••••	6.5						
		7.0						
		7.5						
		8.0						
		8.5						
		9.0						
		9.4						

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 8

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 1 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 10.0 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
TOPSOIL 50 mm	[Symbol: Diagonal lines and 'x' marks]	0.0 - 0.05						
SILT; clayey; slightly sandy; very stiff; moist; moderately plastic; orange brown dark brown and light grey mottles FILL		0.05 - 3.5						
hard	[Symbol: Diagonal lines and 'x' marks]	3.5 - 4.7			149			
ORGANIC SILT; slightly sandy; black	[Symbol: 'x' marks]	4.7 - 4.75						
SILT; firm; wet; slightly cohesive; light grey		4.75 - 4.8						
some dark brown mottles	[Symbol: 'x' marks]	4.8 - 4.85						
poor recovery	[Symbol: 'x' marks]	4.85 - 4.9			30			

EXCAVATION METHOD: HQ Coring; Tractor Rig



Borehole 8

Site: The Lakes (2012) Ltd; The Lakes Subdivision, Stage 2H

Sheet: 2 Of: 2

Job No. 20533

Date Excavated: 25/6/2013

RL 10.0 m Moturiki Datum

Logged By: N.I.

Description of Soil	Soil Symbol	Depth (m)	SPT	Groundwater	Undrained Shear Strength (kPa)	Undrained Shear Strength (kPa)		
						50	100	150
	x x x	4.8						
	x x x	5.0						
^ILT; sandy; firm; saturated; slightly cohesive; sensitive; light grey; yellow and dark brown mottles ALLUVIUM	x x x	5.5						
	x x x							
	x x x							
	x x x	6.0						
End of borehole 6.0 m		6.5						
		7.0						
		7.5						
		8.0						
		8.5						
	9.0							
		9.4						

EXCAVATION METHOD: HQ Coring; Tractor Rig