

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 27

Page No: 3 of 3

Date: 11-12 June 2003

Ground Surface Level: RL 1.3m*

Depth (m)	Description	RL (m)	Lithology	Sample/Test Type	Sample/Test Depth (m)	Test Results
19	SAND (SP) - medium dense, grey, medium to coarse sand, trace of organic matter and clayey silt	-17.0		S	18.0	6,8,16 N=24
					18.45	
20	SANDY CLAYEY SILT (MH) - firm, dark grey	-18.0				
	SAND (SP) - medium dense, grey, medium to coarse sand, with shells	-19.0				
21	SANDY CLAYEY SILT (MH) AND SAND (SP) - interbedded bands of firm dark grey fine grained sandy clayey silt and loose grey medium to coarse sand, trace of shells	-20.0		S	21.0	2,3,3 N=6 pp=80-90
					21.45	
22	GRAVEL (GW) AND COBBLES - dense, grey and brown	-21.0				
23		-22.0				
24		-23.0		(S)	24.3	16,18,19 N=37
					24.75	
25	End of Bore at 24.75 m Due to Drilling Refusal in Gravel/Cobbles	-24.0				
26		-25.0				
27						

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, then wash bore with mud circulation

Groundwater: Groundwater measured at 1.5m depth during drilling

Remarks: * Interpolated from PMM Contour and Detail Surver, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd
Project: Portside Wharf - The Brisbane Cruise Terminal
Location: Harbour Road, Hamilton
Project No: 03900

BORE 30

Page No: 1 of 4
Date: 13-18 June 2003
Ground Surface Level: RL 3.4m*

Depth (m)	Description	RL (m)	Lithology	Sample/Test Type	Sample/Test Depth (m)	Test Results
0	FILL - asphalt seal over light brown sandy fine to medium gravel (roadbase) - orange-brown, gravelly fine to coarse sand ('deco') - boulder/concrete	3.4				
1	- dark brown, fine to coarse sand and fine gravel	2.0				
2	SAND (SW) - loose, light brown, moist (possible fill)	1.0				
3	- loose, grey, with silt/clay, wet	0.0		S	3.0 3.45	2,4,3 N=7
4	CLAYEY SAND (SP) AND CLAYEY SILT (MH) - interbedded bands of very loose, grey and dark grey medium to coarse sand, and soft dark grey clayey silt, trace of shells	-1.0				
5		-2.0				
6	CLAYEY SILT (MH) - soft, dark grey	-3.0		S	6.0 6.45	2,1,2 N=3 pp=50-60
7	CLAYEY SAND (SP) - very loose, grey and brown, medium to coarse sand, with soft dark grey clayey silt lenses	-4.0				
8	SAND (SP) AND GRAVEL (GP) - loose, grey and brown, medium to coarse sand and fine gravel, with soft clayey silt bands	-5.0				
9						

D Disturbed Sample	E Environmental Sample	C NMLC Coring
B Bulk Sample	S Standard Penetrometer Test (SPT)	Is(50) Point Load Test Result (MPa)
U Undisturbed Tube (50mm diameter)	HB SPT Hammer Bouncing	(d) Diametral Point Load Strength Test
pp Pocket Penetrometer Test (kPa)	() No Sample Recovery	(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 0.8m (auger refusal), then wash bore with mud circulation

Groundwater: No free groundwater encountered during drilling

Remarks: * Interpolated from PMM Contour and Detail Survey, Drawing Nos. 6121-04-01B,02B,03B,04B. Groundwater monitoring bore installed

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 30

Page No: 2 of 4

Date: 13-18 June 2003

Ground Surface Level: RL 3.4m*

Depth (m)	Description	RL (m)	Lithology	Sample/Test Type	Sample/Test Depth (m)	Test Results
9.0	SAND (SP) AND GRAVEL (GP) - loose, grey and brown, medium to coarse sand and fine gravel, with soft clayey silt bands	-6.0		S	9.0	2,1,2 N=3
9.45					9.45	
10.0						
11.0	CLAYEY SILT (MH) - soft, dark grey	-7.0				
12.0	CLAYEY SAND (SC) - loose, grey, medium to coarse sand, with fine gravel	-8.0				
12.0	SAND (SP) - loose, grey-brown, medium to coarse sand, with shells and fine gravel, with medium to coarse gravel bands	-9.0		S	12.0	8,3,5 N=8
12.45					12.45	
13.0						
14.0	CLAYEY SILT (MH) - firm, dark grey, with shells, fine to coarse sand bands in places	-11.0				
15.0					15.0	
15.4	CLAYEY SAND (SC) AND CLAYEY SILT (MH) - loose grey medium to coarse sand and soft dark grey clayey silt, with shells	-12.0		U	15.4	
16.0						
17.0						
18.0	CLAYEY SAND (SC) - medium dense, grey-brown, fine to coarse sand, with shells	-14.0				

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 0.8m (auger refusal), then wash bore with mud circulation

Groundwater: No free groundwater encountered during drilling

Remarks: * Interpolated from PMM Contour and Detail Survey, Drawing Nos. 6121-04-01B,02B,03B,04B. Groundwater monitoring bore installed

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 30

Page No: 3 of 4

Date: 13-18 June 2003

Ground Surface Level: RL 3.4m*

Depth (m)	Description	RL (m)	Lithology	Sample/Test Type	Sample/Test Depth (m)	Test Results
19	SAND (SP) - medium dense, grey, medium to coarse sand, with fine gravel and trace of medium to coarse gravel, interbedded with soft, dark grey clayey silt bands/lenses, with shells	-15.0		S	18.0 18.45	5,6,8 N=14
20		-16.0				
21		-17.0				
22	CLAYEY SILT (MH) - stiff, dark grey, with medium to coarse sand and shells	-18.0		S	21.0 21.45	9,7,4 N=11
23	SAND (SP) - medium dense, grey, medium to coarse sand	-19.0				
24	CLAYEY SILT (MH) - firm, dark grey, trace of shells	-20.0				
25	SAND (SP) AND GRAVEL (GP) - loose to medium dense, grey, medium to coarse sand and fine to medium gravel, with coarse gravel	-21.0		S	24.0 24.45	0,2,2 N=4 pp=70-110
26	SAND (SP) - loose, grey, medium to coarse sand	-22.0				
27		-23.0				

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 0.8m (auger refusal), then wash bore with mud circulation

Groundwater: No free groundwater encountered during drilling

Remarks: * Interpolated from PMM Contour and Detail Survey, Drawing Nos. 6121-04-01B,02B,03B,04B. Groundwater monitoring bore installed

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 30

Page No: 4 of 4

Date: 13-18 June 2003

Ground Surface Level: RL 3.4m*

Depth (m)	Description	RL (m)	Lithology	Sample/Test Type	Sample/Test Depth (m)	Test Results
	CLAYEY GRAVEL (GC) - dense, grey, fine to coarse gravel, with firm, dark grey silty clay lenses	-24.0		S	27.0	2,21,15 N=36
28				27.45		
	GRAVEL (GW) - dense, grey and brown - with cobbles	-25.0				
29		-26.0				
30	End of Bore at 30 m Due to Significant Bore Sidewall Collapse in Gravels/Cobbles	-27.0				
31		-28.0				
32		-29.0				
33		-30.0				
34		-31.0				
35		-32.0				
36						

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 0.8m (auger refusal), then wash bore with mud circulation

Groundwater: No free groundwater encountered during drilling

Remarks: * Interpolated from PMM Contour and Detail Survey, Drawing Nos. 6121-04-01B,02B,03B,04B. Groundwater monitoring bore installed

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 31

Page No: 1 of 4

Date: 4 and 5 June 2003

Ground Surface Level: RL 3.4m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery	Test Results
0	FILL - asphalt slab over light orange-brown, gravelly, fine to coarse sand, "deco", moist	3.4								
1	- brown, clay, fine to coarse sand and fine to coarse gravel, with cobbles, moist									
2	- grey, with cobbles and boulders/high strength rock fragments	2.0								
3	SAND (SW) - medium dense, grey-brown, fine to coarse sand, with silt/clay nodules and shells	1.0								
4	SAND (SP) - loose, grey, medium to coarse sand, with fine gravel, interbedded with soft, dark grey silt/clay bands up to 200mm thick, trace of shells	0.0				S	3.0			4,6,5 N=11
5							3.45			
6		-1.0								
7		-2.0								
8	SILTY CLAYEY SAND (SM/SC) - loose, grey, medium to coarse sand, with fine gravel and soft clayey silt bands, medium gravel in places	-3.0				S	6.0			1,1,6 N=7
9		-4.0					6.45			
		-5.0								

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, wash bore with mud circulation to 26.25m, then NMLC

Groundwater: Free groundwater encountered at 3.0m during drilling

Remarks: * Interpolated from PMM Contour and Detail Surver, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 31

Page No: 2 of 4

Date: 4 and 5 June 2003

Ground Surface Level: RL 3.4m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery	Test Results
10	SILTY CLAYEY SAND (SM/SC) - loose, grey, medium to coarse sand, with fine gravel and soft clayey silt bands, medium gravel in places	-6.0				S	9.0			1,2,1 N=3
		-7.0					9.45			
11		-8.0								
12		-9.0				S	12.0			3,4,4 N=8
		-10.0					12.45			
13	CLAYEY SILT (MH) - firm, dark grey									
	CLAYEY GRAVEL (GC)									
14	CLAYEY SILT (MI) - stiff, brown, with fine to medium sand									
15		-11.0								
		-12.0				U	15.0			
16		-13.0					15.4			pp=170-260
17	- very stiff	-14.0								
18										

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, wash bore with mud circulation to 26.25m, then NMLC

Groundwater: Free groundwater encountered at 3.0m during drilling

Remarks: * Interpolated from PMM Contour and Detail Surver, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 31

Page No: 3 of 4

Date: 4 and 5 June 2003

Ground Surface Level: RL 3.4m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery	Test Results
19	CLAYEY SILT (MI) - very stiff, brown, with fine to medium sand	-15.0				S	18.0			5,8,10 N=18 pp=320-360
							18.45			
20	SANDY CLAYEY SILT (MI) - stiff, brown, fine to medium sand	-16.0								
		-17.0								
21	CLAYEY SILT (MH) - firm, dark grey	-18.0				S	21.0			4,7,6 N=13
		-19.0					21.45			
23	SANDY CLAY (CI) - very stiff, mottled grey and brown, fine to coarse sand	-20.0								
24		-21.0				S	24.0			7,8,20/70mm (HB)
		-22.0					24.37			
25	SAND (SP) AND GRAVEL (GW) - dense, grey and brown, medium to coarse sand, fine to coarse gravel, with clay and cobbles	-23.0								
26	SANDSTONE (DW) - low strength, brown, medium to coarse grained					C	26.25		100%	RQD=100%
27										

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, wash bore with mud circulation to 26.25m, then NMLC

Groundwater: Free groundwater encountered at 3.0m during drilling

Remarks: * Interpolated from PMM Contour and Detail Surver, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 31

Page No: 4 of 4

Date: 4 and 5 June 2003

Ground Surface Level: RL 3.4m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery	Test Results
28	SANDSTONE (XW) - extremely low to very low strength, brown, fine to coarse grained, with clayey bands	-24.0			0.9	C	27.35		25%	RQD=0%
							27.95			
							28.25			
29	SANDSTONE (DW) - low strength, grey, fine to coarse grained	-25.0				C			110%	RQD=90%
							29.35		66%	RQD=0%
					5	C	29.65		13%	RQD=0%
30	SANDSTONE (XW) - extremely low to very low strength, grey, with low strength bands	-26.0					30.05			
						C			19%	RQD=0%
31	SANDSTONE AND MUDSTONE (XW) - extremely low to very low strength, interbedded bands of light grey sandstone and dark brown mudstone, some coal bands	-27.0								
							31.35			
	End of Bore at 31.35 m	-28.0								
32		-29.0								
33		-30.0								
34		-31.0								
35		-32.0								
36										

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, wash bore with mud circulation to 26.25m, then NMLC

Groundwater: Free groundwater encountered at 3.0m during drilling

Remarks: * Interpolated from PMM Contour and Detail Surver, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 32

Page No: 1 of 4

Date: 30 May and 2 June 2003

Ground Surface Level: RL 2.9m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery	Test Results
0	FILL - asphalt seal over light brown, cobbles, fine to coarse gravel and fine to coarse sand, dry to moist	2.9								
1	- brown, medium to coarse sand, with fine sand and fine gravel, dry	2.0								
2	SAND (SW) - medium dense, brown, fine to coarse sand, moist (possible fill) - becoming wet	1.0								
3		0.0				S	3.0			5,9,14 N=23
							3.45			
4	CLAYEY SILTY SAND (SM/SC) - loose, dark grey, fine to coarse sand, trace of shells	-1.0								
5		-2.0								
6	CLAYEY SILT (MH) - soft, dark grey	-3.0								
						U,D	6.0			
							6.4			pp=30-40
7	SILTY SAND (SM) AND CLAYEY SILT (MH) - interbedded bands of loose, dark grey, fine to coarse sand and soft, dark grey, clayey silt, trace of organic matter	-4.0								
8	SAND (SP) AND GRAVEL (GP) - medium dense, grey and brown, medium to coarse sand and fine gravel, with dark grey silty/clayey zones	-5.0								
9		-6.0								

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, wash bore with mud circulation to 28.5m, then NMLC

Groundwater: Free groundwater encountered at 2.6m during drilling

Remarks: * Interpolated from PMM Contour and Detail Survey, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 32

Page No: 2 of 4

Date: 30 May and 2 June 2003

Ground Surface Level: RL 2.9m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery	Test Results
10	SAND (SP) AND GRAVEL (GP) - medium dense, grey and brown, medium to coarse sand and fine gravel, with dark grey silty/clayey zones	-7.0				(S)	9.0			4,6,6 N=12
							9.45			
11		-8.0								
12		-9.0				S	12.0			7,6,6 N=12
13	GRAVEL (GW) AND SAND (SW) - medium dense, brown and grey, fine to coarse gravel and fine to coarse sand, with silty/clayey zones/bands	-10.0					12.45			
14		-11.0								
15	SANDY CLAYEY SILT (MH) - firm, dark grey, fine to medium sand	-12.0								
	SILTY SAND (SM) - medium dense, grey, fine to coarse sand	-13.0				S	15.0			0,1,6 N=7
16	SANDY CLAYEY SILT (MH) - firm, dark grey, fine to medium sand	-14.0					15.45			pp=90-140
17	SILTY SAND (SM) - medium dense, grey, fine to coarse sand, with shells and clay/silt bands in places	-15.0								
18										

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)

E Environmental Sample
S Standard Penetrometer Test (SPT)
HB SPT Hammer Bouncing
() No Sample Recovery

C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, wash bore with mud circulation to 28.5m, then NMLC

Groundwater: Free groundwater encountered at 2.6m during drilling

Remarks: * Interpolated from PMM Contour and Detail Survey, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 32

Page No: 3 of 4

Date: 30 May and 2 June 2003

Ground Surface Level: RL 2.9m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery	Test Results
19	SILTY SAND (SM) - medium dense, grey, fine to coarse sand, with shells and clay/silt bands in places	-16.0				S	18.0			6,8,6 N=14
20		-17.0					18.45			
21	CLAYEY SILT (MH) - firm, dark grey	-18.0				S	21.0			0,2,3 N=5 pp=80-90
22		-19.0					21.45			
24		-21.0				U	24.0			
25		-22.0					24.4			
26	GRAVEL AND COBBLES (GW) - dense, brown and grey, with sand	-23.0								pp=100
27		-24.0								

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, wash bore with mud circulation to 28.5m, then NMLC

Groundwater: Free groundwater encountered at 2.6m during drilling

Remarks: * Interpolated from PMM Contour and Detail Survey, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Portside Wharf (Qld) Pty Ltd

Project: Portside Wharf - The Brisbane Cruise Terminal

Location: Harbour Road, Hamilton

Project No: 03900

BORE 32

Page No: 4 of 4

Date: 30 May and 2 June 2003

Ground Surface Level: RL 2.9m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery	Test Results
28	GRAVEL AND COBBLES (GW) - dense, brown and grey, with sand					S	27.0			22,16,15 N=31
							27.45			
29	SANDSTONE (DW) - very low strength, pale grey, medium to coarse grained, with conglomeritic bands	-25.0					28.5			
					0	C	29.4		100%	RQD=100%
30	SANDSTONE (XW) - extremely low strength, grey	-26.0								
	SANDSTONE (DW) - very low strength, grey, fine to coarse sand and fine gravel	-27.0			0.8	C			100%	RQD=100%
31	- low strength, pale grey, medium to coarse grained	-28.0			3	C	31.0		100%	RQD=100%
32	- very low to low strength, grey and pale grey, medium to coarse grained, with conglomeritic bands, clay coating in defects	-29.0			5	C	32.55		100%	RQD=100%
33	- low strength, grey, medium to coarse sand and fine gravel	-30.0			0	C	33.5		100%	RQD=100%
	End of Bore at 33.5 m	-31.0								
34		-32.0								
35		-33.0								
36										

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)

E Environmental Sample
S Standard Penetrometer Test (SPT)
HB SPT Hammer Bouncing
() No Sample Recovery

C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Jacro 350

Drilling Method: Auger to 3.0m, wash bore with mud circulation to 28.5m, then NMLC

Groundwater: Free groundwater encountered at 2.6m during drilling

Remarks: * Interpolated from PMM Contour and Detail Survey, Drawing Nos. 6121-04-01B,02B,03B,04B

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Developments Australia Pty Ltd

Project: DPI & F Portside

Location: 19 Hercules Street, Hamilton

Project No: 03900G

BORE B24

Page No: 1 of 1

Date: 23 September 2006

Ground Surface Level: RL 3.04m*

Depth (m)	Description	RL (m)	Lithology	ASS Samples	ASS Sample Depth (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	SAND - black, fine grained topsoil, humic matter	3.0		1	0.0	E	0.0	B24A	
	FILL - brown, medium grained sand			2	0.25		0.1		
	- coarse sand, with trace of grey ash			3	0.5	E	0.4	B24B	
	- moist			4	0.75		0.5		
1		2.0		5	1.0	E	0.9	B24C	
				6	1.25		1.0		
				7	1.5				
				8	1.75				
2	- wet	1.0		9	2.0	E	2.0	B24D	
				10	2.25		2.2		
	End of Bore at 2.4 m				2.4				
3		0.0							
4		-1.0							
5		-2.0							
6		-3.0							

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: 6610 D7 Geoprobe

Drilling Method: Pushtube

Groundwater: No free groundwater encountered during drilling

Remarks: * Interpolated from unreferenced plan provided by Multiplex Developments Australia Pty Ltd

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Developments Australia Pty Ltd

Project: DPI & F Portside

Location: 19 Hercules Street, Hamilton

Project No: 03900G

BORE B25

Page No: 1 of 1

Date: 23 September 2006

Ground Surface Level: RL 3.04m*

Depth (m)	Description	RL (m)	Lithology	ASS Samples	ASS Sample Depth (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	SAND	3.0					0.0	B25A	
	FILL					E	0.1		
	- brown, medium grained sand			1	0.25				
	- coarse sand, with trace of grey ash			2	0.5				
	- moist								
1					1.0		1.0	B25B	
				3	1.2	E	1.3		
					1.5				
2	- wet			4	2.0	E	1.8	B25C	
					2.25		2.0		
				5	2.4		2.4	B25D	
					2.5	E	2.4		
				6	2.6		2.6		
					2.75				
				7	2.8				
3				8	3.0				
					3.2				
				9	3.5				
				10	3.6				
				11	3.75				
4				12	4.0				
				13	4.25				
				14	4.5				
				15	4.75				
5					5.0				
				16	5.25				
				17	5.5				
				18	5.75				
6	End of Bore at 6 m			19	6.0				

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: 6610 D7 Geoprobe

Drilling Method: Pushtube

Groundwater: Free groundwater encountered at 3.0m depth

Remarks: * Interpolated from unreferenced plan provided by Multiplex Developments Australia Pty Ltd. Loose sands running into hole at 4.0m depth

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Developments Australia Pty Ltd

Project: DPI & F Portside

Location: 19 Hercules Street, Hamilton

Project No: 03900G

BORE B26

Page No: 1 of 1

Date: 23 September 2006

Ground Surface Level: RL 3.04m*

Depth (m)	Description	RL (m)	Lithology	ASS Samples	ASS Sample Depth (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	CLAY - grey, moderate plasticity	3.0				E	0.05 0.15	B26A	
	FILL - black, medium grained sand, with ash, slightly moist			2	0.25				
	- brown, coarse sand, with shell fragments			3	0.5	E	0.5	B26B	
				4	0.75		0.7		
1					1.0				
				6	1.25				
					1.5	E	1.5	B26C	
					1.75		1.7		
2				8	2.0				
				9	2.25	E	2.2	B26D	
	- fine grained sand, moist						2.4		
					2.75				
3	- fine grained clayey sand			12	3.0				
	- brown, medium grained sand, wet			13	3.25				
				14	3.5				
				15	3.75				
4				16	4.0				
	SAND - loose, brown, coarse grained, wet			17	4.25				
				18	4.5				
				19	4.75				
5				20	5.0				
				21	5.25				
	End of Bore at 5.25 m								
6									

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: 6610 D7 Geoprobe

Drilling Method: Pushtube

Groundwater: No free groundwater encountered during drilling

Remarks: * Interpolated from unreferenced plan provided by Multiplex Developments Australia Pty Ltd

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Developments Australia Pty Ltd

Project: DPI & F Portside

Location: 19 Hercules Street, Hamilton

Project No: 03900G

BORE B27

Page No: 1 of 1

Date: 23 September 2006

Ground Surface Level: RL 3.04m*

Depth (m)	Description	RL (m)	Lithology	ASS Samples	ASS Sample Depth (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	CLAY - grey, moderate plasticity	3.0				E	0.05	B27A	
							0.15		
	FILL - medium grained sand, slightly moist					E	0.4	B27B	
	- brown, coarse sand						0.5		
1				4	0.75				
				5	1.0				
				6	1.25	E	1.2	B27C	
					1.5		1.4	D1 D2	
2					2.5				
				11	2.75				
3	- medium grained sand, minor clay, moist			12	3.0				
				13	3.25				
				14	3.5				
				15	3.75				
4	- fine grained sand, wet			16	4.0				
				17	4.25				
				18	4.5				
5	SAND - loose, brown, coarse grained, wet			19	4.75				
				20	5.0				
				21	5.25				
				22	5.5				
				23	5.65				
				24	5.8				
6	End of Bore at 5.8 m								

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: 6610 D7 Geoprobe

Drilling Method: Pushtube

Groundwater: No free groundwater encountered during drilling

Remarks: * Interpolated from unreferenced plan provided by Multiplex Developments Australia Pty Ltd. Sands running into hole at 5.75m depth

BORE REPORT

**BUTLER
PARTNERS**

Client: Multiplex Developments Australia Pty Ltd

Project: Proposed Extension to Portside Wharf

Location: 5 Hercules Street, Hamilton

Project No: 03900G

BORE BPB-13

Page No: 1 of 1

Date: 5 September 2006

Ground Surface Level: RL 2.99m*

Depth (m)	Description	RL (m)	Lithology	ASS Samples	ASS Sample Depth (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	CONCRETE - 120mm thick pavement	3.0		1	0.0				
	FILL - brown, coarse sand, occasional gravel, slightly moist			2	0.25	E	0.25	BP-13A	
	- brown, coarse sand, slightly moist			3	0.5	E	0.5	BP-13B	
	- brown, coarse sand, occasional gravel, slightly moist			4	0.75				
1		2.0		5	1.0	E	0.9	BP-13C	
				6	1.25		1.0		
				7	1.5				
				8	1.75				
2	- brown, coarse sand, slightly moist	1.0		9	2.0	E	1.9	BP-13D	
				10	2.25		2.0		
				11	2.5				
				12	2.75				
3		0.0		13	3.0	E	2.9	BP-13E	
	CLAY - grey, with coarse sand, medium plasticity, moist			14	3.25		3.0		
	SAND - pale brown, coarse sand, occasional high plasticity clay lenses			15	3.5	E	3.2	BP-13F	
				16	3.75		3.5		
4		-1.0		17	4.0				
				18	4.25				
				19	4.5				
				20	4.75				
5		-2.0		21	5.0				
				22	5.25				
				23	5.5				
				24	5.75				
6		-3.0		25	6.0		6.0	BP-13G	
				26	6.25	E			
					6.5		6.5		
End of Bore at 6.5 m									

D Disturbed Sample

B Bulk Sample

U Undisturbed Tube (50mm diameter)

pp Pocket Penetrometer Test (kPa)

E Environmental Sample

S Standard Penetrometer Test (SPT)

HB SPT Hammer Bouncing

() No Sample Recovery

C NMLC Coring

Is(50) Point Load Test Result (MPa)

(d) Diametral Point Load Strength Test

(a) Axial Point Load Strength Test

Rig: Hand equipment

Drilling Method: Auger

Groundwater: No free groundwater encountered during auger drilling

Remarks: * Approximate ground surface level interpolated from unreferenced plan provided by Multiplex Developments Australia Pty Ltd

Notes on Description and Classification of Soil

The methods of description and classification of soils used in this report are generally based on Australian Standard AS1726-1993 "Geotechnical Site Investigations".

Soil description is based on an assessment of disturbed samples, as recovered from bores and excavations, or from undisturbed materials as seen in excavations and exposures or in undisturbed samples. Descriptions given on report sheets are an interpretation of the conditions encountered at the time of investigation.

In the case of cone or piezocone penetrometer tests, actual soil samples are not recovered and soil description is inferred based on published correlations, past experience and comparison with bore and/or test pit data (if available).

Soil classification is based on the particle size distribution of the soil and the plasticity of the portion of the material finer than 0.425mm. The description of particle size distribution and plasticity is based on the results of visual field estimation, laboratory testing or both. When assessed in the field, the properties of the soil are estimated; precise description will always require laboratory testing to define soil properties.

Where soil can be clearly identified as FILL this will be noted as the main soil type followed by a description of the composition of the fill (eg. FILL – yellow-brown, fine to coarse grained gravelly clay fill with concrete rubble). If the soil is assessed as possibly being fill this will be noted as an additional observation.

Soils are generally described using the following sequence of terms. In certain instances, not all of the terms will be included in the soil description.

MAIN SOIL TYPE (CLASSIFICATION GROUP SYMBOL)

- strength/density, colour, structure/grain size, secondary and minor components, additional observations

Information on the definition of descriptive and classification terms follows.

SOIL TYPE and CLASSIFICATION GROUP SYMBOLS

	Major Divisions	Particle Size	Classification Group Symbol	Typical Names
COARSE GRAINED SOILS (more than half of material is larger than 0.075 mm)	BOULDERS	> 200mm		
	COBBLES	63 – 200mm		
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	Coarse: 20 – 63 mm Medium: 6 – 20 mm Fine: 2.36 – 6 mm	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels.
			GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than 2.36mm)	Coarse: 0.6 – 2.36 mm Medium: 0.2 – 0.6 mm Fine: 0.075 – 0.2 mm	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands.
			SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (more than half of material is smaller than 0.075 mm)	SILTS & CLAYS (liquid limit <50 %)		ML	Inorganic silts and very fine sands, silty/clayey fine sands or clayey silts with low plasticity.
			CL and CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS & CLAYS (liquid limit >50 %)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils.
			CH	Inorganic clays of high plasticity.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Notes on Description and Classification of Soil

DESCRIPTIVE TERMS FOR MATERIAL PROPORTIONS

Coarse Grained Soils		Fine Grained Soils	
% Fines	Modifier	% Coarse	Modifier
< 5	Omit, or use 'trace'	< 15	Omit, or use trace.
5 – 12	Describe as 'with clay/silt' as applicable.	15 – 30	Describe as 'with sand/gravel' as applicable.
> 12	Prefix soil as 'silty/clayey' as applicable	> 30	Prefix soil as 'sandy/gravelly' as applicable.

STRENGTH TERMS – COHESIVE SOILS

Strength Term	Undrained Shear Strength	Field Guide to Strength
Very soft	< 12 kPa	Exudes between the fingers when squeezed in hand.
Soft	12 – 25 kPa	Can be moulded by light finger pressure.
Firm	25 – 50 kPa	Can be moulded by strong finger pressure.
Stiff	50 – 100 kPa	Cannot be moulded by fingers, can be indented by thumb.
Very stiff	100 – 200 kPa	Can be indented by thumb nail.
Hard	> 200 kPa	Can be indented with difficulty by thumb nail.

DENSITY TERMS – NON COHESIVE SOILS

Density Term	Density Index	SPT "N"	CPT Cone Resistance
Very loose	< 15 %	0 – 5	0 – 2 MPa
Loose	15 – 35 %	5 – 10	2 – 5 MPa
Medium dense	35 – 65 %	10 – 30	5 – 15 MPa
Dense	65 – 85 %	30 – 50	15 – 25 MPa
Very dense	> 85 %	> 50	> 25 MPa

COLOUR

The colour of a soil will generally be described in a 'moist' condition using simple colour terms (eg. black, grey, red, brown etc.) modified as necessary by "pale", "dark", "light" or "mottled". Borderline colours will be described as a combination of colours (eg. grey-brown).

EXAMPLE

eg: CLAYEY SAND (SC) – medium dense, grey-brown, fine to medium grained with silt.

Indicates a medium dense, grey-brown, fine to medium grained clayey sand with silt.

APPENDIX B

FIELD SCREENING TEST RESULTS

Summary of Field pH Screening Test Results

Test No.	Sample Depth (m)	Material Type	Reaction	pH _F	pH _{FOX}	Screening Test Indicators		
						Moderate or strong reaction with peroxide	pH _F - pH _{FOX} >1	pH _{FOX} <3
1	1.0	Sand	None	7.5	5.2		✓	
1	2.3	Sand	None	7.4	6.1		✓	
2	0.8	Sand	None	7.7	5.9		✓	
2	1.5	Sand	None	8.5	6.0		✓	
3	0.9	Sand	Strong	7.0	6.2	✓		
3	1.4	Sand	Weak to Moderate	6.9	4.4		✓	
4	3.5	Sand	None	8.1	5.7		✓	
5	1.0	Gravel (Fill)	None	6.8	4.9		✓	
5	2.0	Sand	None	7.8	5.7		✓	
5	3.0	Sand	None	7.3	5.3		✓	
6	1.0	Sand (Fill)	None	7.7	6.8			
6	2.0	Sand	None	7.6	5.5		✓	
6	3.0	Sand	None	7.9	5.7		✓	
7	1.0	Sand (Fill)	Strong	8.1	7.6	✓	✓	
7	3.0	Sand	None	8.5	6.1		✓	
7	3.7	Sand	None	8.2	5.3		✓	
8	2.9	Sand	Weak to Moderate	7.5	6.5			
9	1.0	Sand, Clay & Gravel (Fill)	None	6.7	3.1		✓	
9	2.3	Sand (Fill)	Strong	8.3	4.3	✓	✓	
9	3.1	Sand	None	7.5	3.5		✓	
10	1.2	Clay (Fill)	None	8.3	5.6		✓	
10	1.9	Sand (Fill)	None	8.3	7.2		✓	
10	3.3	Sand	None	7.1	5.8		✓	
11	1.0	Clay & Gravel (Fill)	None	6.0	3.4		✓	
11	1.7	Sand (Fill)	None	8.3	6.2		✓	
11	2.5	Sand	Strong	8.0	5.4	✓	✓	
11	3.0	Sand	Strong	8.1	5.6	✓	✓	
12	1.0	Rock (Fill)	None	6.8	4.5		✓	
12	3.0	Clayey Sand	None	6.8	4.5		✓	
12	3.5	Clayey Sand	None	8.2	3.5		✓	
13	1.7	Sand	None	7.4	6.4			
13	2.6	Clay	Strong	7.8	3.7	✓	✓	
14	1.0	Sand (Fill)	Strong	7.7	7.3	✓		
14	3.0	Sand	None	8.8	7.7		✓	
15	1.0	Sand (Fill)	None	7.3	6.4			
15	3.0	Sand (Fill)	Weak to Moderate	8.7	6.9		✓	
15	4.0	Clayey Sand	Weak to Moderate	8.5	2.2		✓	✓
16	1.0	Sand (Fill)	Weak to Moderate	8.7	7.9			
16	2.0	Sand (Fill)	None	7.3	6.9			
16	3.0	Sand (Fill)	None	8.0	6.7		✓	
17	3.0	Sand	None	7.4	5.6		✓	

Summary of Field pH Screening Test Results

Test No.	Sample Depth (m)	Material Type	Reaction	pH _F	pH _{FOX}	Screening Test Indicators		
						Moderate or strong reaction with peroxide	pH _F - pH _{FOX} > 1	pH _{FOX} < 3
18	2.1	Sand	None	7.7	6.7			
18	3.3	Sand	None	7.3	5.3		✓	
19	1.0	Sand (Fill)	None	8.4	7.1		✓	
19	2.0	Sand (Fill)	Weak to Moderate	8.5	7.7			
19	3.0	Sand	Weak to Moderate	8.0	6.3		✓	
20	1.0	Gravel & Clay (Fill)	None	8.8	5.8		✓	
20	2.0	Sand	None	8.4	6.3		✓	
20	3.0	Sand	None	5.8	4.4		✓	
22	1.0	Sand (Fill)	None	6.1	5.4			
22	2.0	Sand	None	7.8	5.4		✓	

Summary of Field pH Screening Test Results

Bore No.	Sample Depth (m)	Material Type	Reaction	pH _F	pH _{FOX}	Screening Test Indicators		
						Moderate or strong reaction with peroxide	pH _F - pH _{FOX} >1	pH _{FOX} <3
14	4.0-4.5	Sand	Weak	8.8	5.4		✓	
	4.5-5.0	Sand	Weak	8.9	4.8		✓	
	5.0-5.5	Sand	Moderate	9.1	3.9		✓	
	5.5-6.0	Sand (SSL)	Very Strong	9.4	2.2	✓	✓	✓
19	3.0-3.45	Sand	Very Weak	9.1	6.2		✓	
	3.45-4.0	Sand	Very Weak	8.4	6.2		✓	
	4.0-4.5	Sand	Weak	8.5	5.7		✓	
	4.5-5.0	Sand	Very Weak	8.9	5.8		✓	
	5.0-5.5	Sand (SCL)	Very Strong	9.3	2.6	✓	✓	✓
	5.5-6.0	Sand (SCL)	Very Strong	9.4	2.5	✓	✓	✓
22	3.0-3.45	Sand (SCL)	Weak	6.6	4.9		✓	
	3.45-4.0	Sand (SCL)	Weak	5.6	4.6		✓	
	4.0-4.5	Sand (SCL)	Weak	4.9	3.8		✓	
	4.5-5.0	Sand (SCL)	Weak	4.7	3.0		✓	✓
	5.0-5.5	Sand (SCL)	Very Strong	6.8	2.4	✓	✓	✓
	5.5-6.0	Sand (SCL)	Weak	6.9	1.7		✓	✓
26	3.0-3.45	Sand	Weak	8.1	5.7		✓	
	3.45-4.0	Sand	Weak	9.4	5.0		✓	
	4.0-4.5	Sand	Weak	8.9	6.0		✓	
	4.5-5.0	Sand	Weak	8.7	1.7		✓	✓
	5.0-5.5	Sand	Weak	8.6	1.7		✓	✓
	5.5-6.0	Sand	Weak	8.7	5.7		✓	
27	2.0-2.5	Sand	Weak	8.8	4.4		✓	
	3.0-3.45	Sand	Moderate	8.4	2.4		✓	✓
	3.45-4.0	Sand	Weak	8.6	2.1		✓	✓
	4.0-4.5	Sand	Very Strong	8.0	2.3	✓	✓	✓
	4.5-5.0	Sand	Very Strong	8.1	1.9	✓	✓	✓
	5.0-5.5	Sand & Gravel (SGL)	Weak	7.9	1.9		✓	✓
	5.5-6.0	Sand & Gravel (SGL)	Weak	7.9	2.1		✓	✓
30	3.0-3.45	Sand (SCL)	Very Strong	8.0	3.9	✓	✓	
	3.45-4.0	Clayey Sand & Clayey Silt	Very Strong	7.0	2.6	✓	✓	✓
	4.0-4.5	Clayey Sand & Clayey Silt	strong	6.7	2.5	✓	✓	✓
	4.5-5.0	Clayey Sand & Clayey Silt	Moderate	7.7	2.0		✓	✓
	5.0-5.5	Clayey Sand & Clayey Silt	Moderate	8.4	2.2		✓	✓
	5.5-6.0	Clayey Sand & Clayey Silt	Very Strong	8.6	2.6	✓	✓	✓

Bore No.	Sample Depth (m)	Material Type	Reaction	pH _F	pH _{FOX}	Screening Test Indicators		
						Moderate or strong reaction with peroxide	pH _F - pH _{FOX} >1	pH _{FOX} <3
31	3.0-3.45	Sand (SCL)	Very Strong	8.5	7.6	✓		
	3.45-4.0	Sand (SCL)	Weak	8.5	6.9		✓	
	4.0-4.5	Sand (SCL)	Very Strong	8.7	7.0	✓	✓	
	4.5-5.0	Sand (SCL)	Very Strong	8.4	6.8	✓	✓	
	5.0-5.5	Sand (SCL)	Very Strong	8.5	6.7	✓	✓	
	5.5-6.0	Sand (SCL)	Very Strong	8.3	7.1	✓	✓	
32	3.0-3.45	Sand	Weak	6.7	5.8			
	3.45-4.0	Sand	Very Strong	7.7	2.7	✓	✓	✓
	4.0-4.5	Clayey Silty Sand	Weak	7.3	3.9		✓	
	5.0-5.5	Clayey Silty Sand	Very Strong	8.3	2.9	✓	✓	✓
	5.5-6.0	Clayey Silt	Very Strong	8.6	2.9	✓	✓	✓

NOTE: SGL – Sand and gravel with silty/ clay lenses, SCL – Sand with silt/ clay lenses, SSL – Sand with sandy silt lenses

Summary of Field pH Screening Test Results

Bore No.	Depth (m)	Material Type	Reaction	pH _F	pH _{Fox}	Screening Test Indicators		
						Moderate or strong reaction with peroxide	pH _F - pH _{Fox} > 1	pH _{Fox} < 3
BPB-13	0.0-0.25	Fill - Sand	Very Weak	8.8	5.9		✓	
	0.25-0.5	Fill - Sand	Very Weak	8.4	5.7		✓	
	0.5-0.75	Fill - Sand	Very Weak	8.1	5.5		✓	
	0.75-1.0	Fill - Sand	Very Weak	8.1	5.6		✓	
	1.0-1.25	Fill - Sand	Very Weak	7.9	5.7		✓	
	1.25-1.5	Fill - Sand	Very Weak	7.8	5.5		✓	
	1.5-1.75	Fill - Sand	Very Weak	7.9	5.7		✓	
	1.75-2.0	Fill - Sand	Very Weak	7.9	5.6		✓	
	2.0-2.25	Fill - Sand	Very Weak	7.8	5.4		✓	
	2.25-2.5	Fill - Sand	Very Weak	7.7	5.5		✓	
	2.5-2.75	Fill - Sand	Very Weak	7.7	5.5		✓	
	2.75-3.0	Fill - Sand	Very Weak	7.5	5.4		✓	
	3.0-3.25	Fill - Sand	Very Weak	6.7	2.0		✓	✓
	3.25-3.5	Clay	Very Strong	5.0	3.1	✓	✓	
	3.5-3.75	Fill - Sand	Weak	5.8	3.3		✓	
	3.75-4.0	Fill - Sand	Weak	6.6	4.1		✓	
	4.0-4.25	Fill - Sand	Weak	6.6	5.0		✓	
	4.25-4.5	Fill - Sand	Weak	6.7	5.0		✓	
	4.5-4.75	Fill - Sand	Weak	6.9	1.7		✓	✓
	4.75-5.0	Fill - Sand	Weak	7.2	4.9		✓	
	5.0-5.25	Fill - Sand	Weak	7.3	5.1		✓	
	5.25-5.5	Fill - Sand	Weak	7.8	5.3		✓	
	5.5-5.75	Fill - Sand	Weak	8.7	5.1		✓	
	5.75-6.0	Fill - Sand	Weak	8.6	2.7		✓	✓
	6.0-6.25	Fill - Sand	Weak	8.5	5.3		✓	
	6.25-6.5	Fill - Sand	Weak	8.9	2.9		✓	✓
B24	0.0-0.25	Fill - Sand	Very Weak	7.9	5.7		✓	
	0.25-0.5	Fill - Sand	Very Weak	7.8	5.5		✓	
	0.5-0.75	Fill - Sand	Very Weak	8.5	6.0		✓	
	0.75-1.0	Fill - Sand	Very Weak	8.1	6.0		✓	
	1.0-1.25	Fill - Sand	Very Weak	8.6	6.1		✓	
	1.25-1.5	Fill - Sand	Very Weak	7.8	6.1		✓	
	1.5-1.75	Fill - Sand	Very Weak	7.9	6.8		✓	
	1.75-2.0	Fill - Sand	Very Weak	8.2	6.5		✓	
	2.0-2.25	Fill - Sand	Very Weak	8.1	6.4		✓	
	2.25-2.4	Fill - Sand	Strong	7.9	4.9	✓	✓	

Summary of Field pH Screening Test Results

Bore No.	Depth (m)	Material Type	Reaction	pH _F	pH _{FOX}	Screening Test Indicators		
						Moderate or strong reaction with peroxide	pH _F - pH _{FOX} > 1	pH _{FOX} < 3
B25	0.25-0.5	Fill - Sand	Weak	7.1	5.3		✓	
	0.75-1.0	Fill - Sand	Weak	7.2	5.8		✓	
	1.25-1.5	Fill - Sand	Weak	7.1	5.8		✓	
	2.0-2.25	Fill - Sand	Weak	7.0	5.8		✓	
	2.4-2.5	Fill - Sand	Weak	7.1	5.9		✓	
	2.6-2.75	Fill - Sand	Very Strong	7.9	6.8	✓	✓	
	2.8-3.0	Fill - Sand	Very Weak	8.1	6.0		✓	
	3.0-3.2	Fill - Sand	Very Weak	8.6	6.1		✓	
	3.2-3.5	Fill - Sand	Very Weak	8.5	6.0		✓	
	3.5-3.6	Fill - Sand	Very Weak	7.8	5.9		✓	
	3.6-3.75	Fill - Sand	Very Weak	7.7	5.9		✓	
	3.75-4.0	Fill - Sand	Very Weak	7.4	5.9		✓	
	4.0-4.25	Fill - Sand	Very Weak	7.3	5.8		✓	
	4.5-4.75	Fill - Sand	Very Weak	6.9	5.9		✓	
	5.0-5.25	Fill - Sand	Very Weak	7.0	5.6		✓	
	5.25-5.5	Fill - Sand	Very Weak	7.2	5.6		✓	
	5.5-5.8	Fill - Sand	Very Weak	7.2	5.7		✓	
	5.8-6.0	Fill - Sand	Very Weak	7.1	5.6		✓	
B26	0.25-0.5	Fill - Sand	Weak	5.7	4.7		✓	
	0.5-0.75	Fill - Sand	Weak	6.7	6.1			
	0.75-1.0	Fill - Sand	Weak	6.9	5.9		✓	
	1.0-1.25	Fill - Sand	Very Weak	7.0	6.0		✓	
	1.5-1.75	Fill - Sand	Very Weak	7.0	5.9		✓	
	1.75-2.0	Fill - Sand	Very Weak	7.0	5.9		✓	
	2.0-2.25	Fill - Sand	Very Weak	6.9	5.9		✓	
	2.75-3.0	Fill - Sand	Very Weak	6.8	5.9			
	3.0-3.25	Fill - Sand	Very Weak	6.7	5.9			
	3.25-3.5	Fill - Sand	Very Weak	5.8	2.0		✓	✓
	3.5-3.75	Fill - Sand	Very Weak	6.1	5.6			
	3.75-4.0	Fill - Sand	Very Weak	6.2	5.9			
	4.0-4.25	Fill - Sand	Very Weak	6.4	5.9			
	4.25-4.5	Fill - Sand	Very Weak	6.6	5.9			
	4.5-4.75	Fill - Sand	Very Weak	6.6	5.9			
	4.75-5.0	Fill - Sand	Very Weak	6.8	5.4		✓	
	5.0-5.25	Fill - Sand	Very Weak	6.6	5.4		✓	

Summary of Field pH Screening Test Results

Bore No.	Depth (m)	Material Type	Reaction	pH _F	pH _{FOX}	Screening Test Indicators		
						Moderate or strong reaction with peroxide	pH _F - pH _{FOX} > 1	pH _{FOX} < 3
B27	0.75-1.0	Fill - Sand	Very Weak	7.0	5.4		✓	
	1.0-1.25	Fill - Sand	Very Weak	7.1	5.9		✓	
	1.25-1.5	Fill - Sand	Very Strong	6.9	6.0	✓		
	2.5-2.75	Fill - Sand	Very Weak	7.3	6.0		✓	
	2.75-3.0	Fill - Sand	Very Weak	7.5	5.9		✓	
	3.0-3.25	Fill - Sand	Very Weak	7.3	6.4			
	3.25-3.5	Fill - Sand	Very Weak	7.3	6.0		✓	
	3.5-3.75	Fill - Sand	Very Weak	7.1	6.1		✓	
	3.75-4.0	Fill - Sand	Very Weak	7.3	6.2		✓	
	4.0-4.25	Fill - Sand	Very Weak	7.3	6.0		✓	
	4.25-4.5	Fill - Sand	Very Weak	7.3	6.0		✓	
	4.5-4.75	Fill - Sand	Very Weak	7.5	6.0		✓	
	4.75-5.0	Fill - Sand	Very Weak	7.0	6.0		✓	
	5.0-5.25	Fill - Sand	Very Weak	7.0	6.0		✓	
	5.25-5.5	Fill - Sand	Very Weak	7.0	5.9		✓	
	5.5-5.8	Fill - Sand	Very Weak	6.9	5.9		✓	
	5.75-6.0	Fill - Sand	Very Weak	7.3	2.9		✓	✓

APPENDIX C

LABORATORY REPORTS



CERTIFICATE OF ANALYSIS

CONTACT: MS O'BATTEN
CLIENT: BUTLER PARTNERS PTY LTD
ADDRESS: P.O. BOX 2267
FORTITUDE VALLEY QLD 4006
ORDER No: CB12
PROJECT: 03900

BATCH: EB56280
SUB BATCH: 0
LABORATORY: BRISBANE
DATE RECEIVED: 27/06/2003
DATE COMPLETED: 03/07/2003
SAMPLE TYPE: SOIL
No. of SAMPLES: 7

COMMENTS

Results apply to sample(s) as submitted. POCA's as per method of Aherm
et al (1998). Results expressed as mole H⁺/tonne.

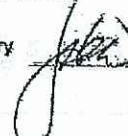
NOTES

This is the Final Report and supersedes any preliminary reports with this batch number.
All pages of this report have been checked and approved for release.

ISSUING LABORATORY: BRISBANE

Address
62 Shand Street
Stafford QLD 4053
Australia

Phone: 61-7-3243 7222
Fax: 61-7-3243 7218
Email: michael.heery@alsenviro.com

Signatory 

LABORATORIES

AUSTRALASIA

Brisbane
Melbourne
Sydney
Newcastle
Auckland
Hong Kong
Singapore
Kuala Lumpur
Bogor
Mumbai

AMERICAS

Vancouver
Santiago
Antofagasta
Lima

This Laboratory is accredited by the National
Association of Testing Authorities Australia. The
test(s) reported herein have been performed in
accordance with its terms of accreditation. This
document shall not be reproduced except in full.



NATA Accredited Laboratory Number 825

Site: BRISBANE

Australian Laboratory Services Pty Ltd (ABN 64 009 936 029)

Page 1 of 3

A Campbell Brothers Limited Company

Batch: EB56280
 Sub Batch: 0
 Date of Issue: 03/07/2003
 Client: BUTLER PARTNERS PTY LTD
 Client Reference: 03900

CERTIFICATE OF ANALYSIS



METHOD	ANALYSIS DESCRIPTION	SAMPLE IDENTIFICATION									
		Laboratory I.D.		Date Sampled		1		2		3	
		UNIT		LOR		25/06/2003		25/06/2003		25/06/2003	
EA-002	pH after Oxidation			0.1		3.0-3.5	3.0	3.5-4.0	3.0	4.5-5.0	4.5-5.0
EA-022	Ca (Acid Reacted)	%		0.21		0.21	0.21	0.21	0.21	0.21	0.21
EA-022	Ca (KCl)	%		0.11		0.11	0.11	0.11	0.11	0.11	0.11
EA-022	Ca (Peroxide)	%		0.32		0.32	0.32	0.32	0.32	0.32	0.32
EA-022	Mg (Acid Reacted)	%		0.02		0.02	0.02	0.02	0.02	0.02	0.02
EA-022	Mg (KCl)	%		0.02		0.02	0.02	0.02	0.02	0.02	0.02
EA-022	Mg (Peroxide)	%		0.04		0.04	0.04	0.04	0.04	0.04	0.04
EA-022	Na (Acid Reacted)	%		0.02		0.02	0.02	0.02	0.02	0.02	0.02
EA-022	Na (KCl)	%		0.02		0.02	0.02	0.02	0.02	0.02	0.02
EA-022	Na (Peroxide)	%		0.02		0.02	0.02	0.02	0.02	0.02	0.02
EA-022	S (KCl)	%		0.23		0.23	0.23	0.23	0.23	0.23	0.23
EA-022	S (Peroxide)	%		0.22		0.22	0.22	0.22	0.22	0.22	0.22
EA-022	S (Pos)	%		0.22		0.22	0.22	0.22	0.22	0.22	0.22
EA-022	TAA	mg/L		2		2	2	2	2	2	2
EA-022	TPA	mg/L		2		2	2	2	2	2	2
EA-022	TSA	mg/L		2		2	2	2	2	2	2
EA-022	pH (KCl)			0.1		0.1	0.1	0.1	0.1	0.1	0.1

Batch:

EB56280

Sub-Batch:

0

Date of Issue:

03/07/2003

Client:

BUTLER PARTNERS PTY LTD

Client Reference:

03900

QUALITY CONTROL REPORT



METHOD		ANALYSIS DESCRIPTION		UNIT		LOR		SAMPLE IDENTIFICATION									
								Laboratory ID:	280	Date Sampled	27/06/2003	Method	Blank 1	CHECKS AND SPIKES			
EA-002		pH after Oxidation															
EA-022		Ca (Acid Reacted)		%		0.1											
EA-022		Ca (KCl)		%		0.02											
EA-022		Ca (Peroxide)		%		0.02											
EA-022		Mg (Acid Reacted)		%		0.02											
EA-022		Mg (KCl)		%		0.02											
EA-022		Mg (Peroxide)		%		0.02											
EA-022		Na (Acid Reacted)		%		0.02											
EA-022		Na (KCl)		%		0.02											
EA-022		Na (Peroxide)		%		0.02											
EA-022		S (KCl)		%		0.02											
EA-022		S (Peroxide)		%		0.02											
EA-022		S (Pos)		%		0.02											
EA-022		TAA		mole/tonne		2											
EA-022		TPA		mole/tonne		2											
EA-022		TSA		mole/tonne		2											
EA-022		pH (KCl)				0.1											

ALS Environmental

Australian Laboratory Services Pty Ltd (ABN 84 009 936 029)

ALS Environmental



CERTIFICATE OF ANALYSIS

CONTACT: MR R JACOBSEN
CLIENT: BUTLER PARTNERS PTY LTD
ADDRESS: P O BOX 2267
FORTITUDE VALLEY QLD 4006
ORDER No.: RJ37
PROJECT: 03900

BATCH: EB55137
SUB BATCH: 0
LABORATORY: BRISBANE
DATE RECEIVED: 16/05/2003
DATE COMPLETED: 20/05/2003
SAMPLE TYPE: SOIL
No. of SAMPLES: 3

COMMENTS

Results apply to sample(s) as submitted. POCAS as per method of Ahern et al (1998). Results expressed as mole H⁺/tonne.

NOTES

This is the Final Report and supersedes any preliminary reports with this batch number. All pages of this report have been checked and approved for release.

ISSUING LABORATORY: BRISBANE

Address
32 Shand Street
Stafford QLD 4053
Australia

Phone: 61-7-3243 7222
Fax: 61-7-3243 7218
Email: geoff.lecornu@alsenviro.com

Signatory

K. M. M. M.

LABORATORIES

AUSTRALASIA

Brisbane
Melbourne
Sydney
Newcastle
Auckland

Hong Kong
Singapore
Kuala Lumpur
Bogor
Mumbai

AMERICAS

Vancouver
Santiago
Antofagasta
Lima

This Laboratory is accredited by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of accreditation. This document shall not be reproduced except in full.



NATA Accredited Laboratory Number 825

Batch:

FB55137

Sub Batch:

0

Date of Issue:

20/05/2003

Client:

BUTLER PARTNERS PTY LTD

Client Reference:

03900

CERTIFICATE OF ANALYSIS



METHOD		ANALYSIS DESCRIPTION		SAMPLE IDENTIFICATION					
		UNIT	LOR	1	2	3	4	5	6
EA-002	pH after Oxidation		0.1	15/05/2003	15/05/2003	15/05/2003			
EA-022	Ca (Acid Reacted)	%	0.02	03900 9/8	03900	03900			
EA-022	Ca (KCl)	%	0.02	(G-8)	154.0m	134(B-S)			
EA-022	Ca (Peroxide)	%	0.02						
EA-022	Mg (Acid Reacted)	%	0.02						
EA-022	Mg (KCl)	%	0.02						
EA-022	Mg (Peroxide)	%	0.02						
EA-022	Na (Acid Reacted)	%	0.02						
EA-022	Na (KCl)	%	0.02						
EA-022	Na (Peroxide)	%	0.02						
EA-022	S (KCl)	%	0.02						
EA-022	S (Peroxide)	%	0.02						
EA-022	S (Pos)	%	0.02						
EA-022	TAA	mole/tonne	2						
EA-022	TPA	mole/tonne	2						
EA-022	TSA	mole/tonne	2						
EA-022	pH (KCl)		0.1	5.8	6.8	7.4			

ALS Environmental

Australian Laboratory Services Pty Ltd (ABN 84 003 936 029)

Page 2 of 3

Batch: EB56137

Sub Batch: 0

Date of Issue: 20/05/2003

Client: BUTLER PARTNERS PTY LTD

Client Reference: 03900

QUALITY CONTROL REPORT



METHOD		ANALYSIS DESCRIPTION		UNIT	LOR	SAMPLE IDENTIFICATION											
						Laboratory I.D.	200										
						Date Sampled	16/05/2003										
						Method	Blank 1										
								CHECKS AND SPIKES									
EA-002		pH after Oxidation				0.1											
EA-022		Ca (Acid Reacted)		%		<0.02											
EA-022		Ca (KCl)		%		<0.02											
EA-022		Ca (Peroxide)		%		<0.02											
EA-022		Mg (Acid Reacted)		%		<0.02											
EA-022		Mg (KCl)		%		<0.02											
EA-022		Mg (Peroxide)		%		<0.02											
EA-022		Na (Acid Reacted)		%		<0.02											
EA-022		Na (KCl)		%		<0.02											
EA-022		Na (Peroxide)		%		<0.02											
EA-022		S (KCl)		%		<0.02											
EA-022		S (Peroxide)		%		<0.02											
EA-022		S (Pos)		%		<0.02											
EA-022		TAA		mole/tonne		2											
EA-022		TPA		mole/tonne		2											
EA-022		TSA		mole/tonne		2											
EA-022		pH (KCl)				0.1											

CERTIFICATE OF ANALYSIS

Client	: BUTLER PARTNERS PTY LTD	Laboratory	: ALS Environmental Brisbane	Page	: 1 of 6
Contact	: MR ST JOHN HERBERT	Contact	: Michael Heery	Work Order	: EB0609621
Address	: P O BOX 2267 FORTITUDE VALLEY BC QLD AUSTRALIA 4006	Address	: 32 Shand Street Stafford QLD Australia 4053		
E-mail	: stjherbert@butlerpartners.com.au	E-mail	: services.brisbane@alsenviro.com		
Telephone	: 07 3852 3800	Telephone	: +61 (07) 3243 7222		
Facsimile	: 07 3852 3808	Facsimile	: +61 (07) 3243 7259		
Project	: 03900H	Quote number	: BN/217/06		
Order number	: SH			Date received	: 27 Sep 2006
C-O-C number	: - Not provided -			Date issued	: 11 Oct 2006
Site	: - Not provided -			No. of samples	: 12
				Received	: 12
				Analysed	: 12

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory
825

This document is issued in
accordance with NATA's
accreditation requirements.

Accredited for compliance with
ISO/IEC 17025.



WORLD RECOGNISED
ACCREDITATION

This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signature

Cass Sealby

Position

Senior Chemist - Acid Sulphate Soils

Department
Inorganics - NATA 825 (818 - Brisbane)

Page Number : 2 of 6
Client : BUTLER PARTNERS PTY LTD
Work Order : EB0609621

Comments

This report for the ALSE reference EB0609621 supersedes any previous reports with this reference. Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

- Analytical Results for Samples Submitted
- Surrogate Recovery Data

The analytical procedures used by ALS Environmental have been developed from established internationally-recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported herein. Reference methods from which ALSE methods are based are provided in parenthesis.

When moisture determination has been performed, results are reported on a dry weight basis. When a reported 'less than' result is higher than the LOR, this may be due to primary sample extracts/digestion dilution and/or insufficient sample amount for analysis. Surrogate Recovery Limits are static and based on USEPA SW846 or ALS-QWI/EN38 (in the absence of specified USEPA limits). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

Specific comments for Work Order EB0609621

Limiting rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to limiting rate in kg/m³ = kg/t x wet bulk density in t/m³. Retained Acidity not required because pH KCl greater than or equal to 4.5



ALS Environmental

Page Number : 3 of 6
 Client : BUTLER PARTNERS PTY LTD
 Work Order : EB0609621

Analytical Results

Analytical Results													
Client Sample ID :		Sample Matrix Type / Description :		B27-1.25		B27-3.25		B27-5.76		B26-1.0		B26-4.75	
Sample Date / Time :		Sample Date / Time :		SOIL		SOIL		SOIL		SOIL		SOIL	
27 Sep 2006		27 Sep 2006		27 Sep 2006		27 Sep 2006		27 Sep 2006		27 Sep 2006		27 Sep 2006	
15:00		15:00		15:00		15:00		15:00		15:00		15:00	
Laboratory Sample ID :		EB0609621-001		EB0609621-002		EB0609621-003		EB0609621-004		EB0609621-005			
Analyte	CAS number	LOR	Units										
EA033-A: Actual Acidity													
pH KCl (23A)		0.1	pH Unit	7.6	7.0	8.7	7.3	6.8					
Titrateable Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2	<2	<2					
sulfidic - Titrateable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02					
EA033-B: Potential Acidity													
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	0.03	<0.02	0.03					
acidic - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	20	<10	<10					
EA033-C: Acid Neutralising Capacity													
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	0.38	0.48	0.42	0.60	0.69					
acidic - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	76	96	84	120	138					
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	0.12	0.15	0.13	0.19	0.22					
EA033-E: Acid Base Accounting													
ANC Fineness Factor		0.5	-	1.5	1.5	1.5	1.5	1.5					
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02					
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	<10					
Limiting Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1					



ALS Environmental

Analytical Results

Analytical Results

Client Sample ID :		Sample Matrix Type / Description :		Sample Date / Time :		Laboratory Sample ID :		
Analyte	CAS number	LOR	Units	B26-3.5 SOIL 27 Sep 2006 15:00 EB0609621-006	B25-1.2 SOIL 27 Sep 2006 15:00 EB0609621-007	B25-2.6 SOIL 27 Sep 2006 15:00 EB0609621-008	B25-5.8 SOIL 27 Sep 2006 15:00 EB0609621-009	BPB13-13 SOIL 27 Sep 2006 15:00 EB0609621-010
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	6.5	6.5	6.7	7.2	5.9
Titration Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2	<2	4
sulfidic - Titration Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	0.03	0.14
acid - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	20	86
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	0.43	0.69	0.45	0.30	----
acid - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	86	138	90	60	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	0.14	0.22	0.14	0.10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	0.14
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	90
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	7



ALS Environmental

Page Number : 5 of 6
 Client : BUTLER PARTNERS PTY LTD
 Work Order : EB0609621

Analytical Results

Analytical Results						
Client Sample ID :		BPB13-19		BPB-24		
Sample Matrix Type / Description :		SOIL		SOIL		
Sample Date / Time :		27 Sep 2006 15:00		27 Sep 2006 15:00		
Laboratory Sample ID :		EB0609621-011		EB0609621-012		
Analyte	CAS number	LOR	Units			
EA033-A: Actual Acidity						
pH KCl (23A)		0.1	pH Unit	6.6	7.3	
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	
EA033-B: Potential Acidity						
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	0.02	
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	15	
EA033-C: Acid Neutralising Capacity						
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	0.45	0.54	
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	90	108	
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	0.14	0.17	
EA033-E: Acid Base Accounting						
ANC Fineness Factor		0.5	-	1.5	1.5	
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	
Limiting Rate		1	kg CaCO3/t	<1	<1	



Surrogate Control Limits

- No surrogates present on this report.

APPENDIX D

ACID SULFATE SOIL MANAGEMENT PLAN

Appendix D - Acid Sulfate Soil Management Plan
Hudson River, New York
Page 1 of 1

Appendix D - Acid Sulfate Soil Management Plan
Hudson River, New York
Page 1 of 1

Appendix D - Acid Sulfate Soil Management Plan
Hudson River, New York
Page 1 of 1

Appendix D - Acid Sulfate Soil Management Plan
Hudson River, New York
Page 1 of 1

Appendix D - Acid Sulfate Soil Management Plan
Hudson River, New York
Page 1 of 1

Portside Wharf – Stage 2 – Buildings 2, 4 & 5 Harbour Road, Hamilton Acid Sulfate Soil Management Plan (ASSMP)

Element	Acid Sulfate Soil Management Plan
Objective/Target	The objective of the ASS Management Plan is to control any potential acid generation from the natural soils and to restrict to an acceptable level any potential on site and off site environmental impacts for site bulk excavation to RL0.6m AHD.
ASS Management Strategy	To mitigate and manage potential environmental impacts associated with ASS during site construction operations. This will be achieved as follows: • The excavation of natural clays and sands interbedded with clay or silt material within the site will be undertaken to a materials handling and management strategy. • Appropriate erosion control measures will be adopted to limit sediment loss due to run-off from within the site. • Monitoring of waters collected within the work site will be carried out with treatment (if necessary) to a level suitable for discharge into external waterways.
Tasks/Actions	The following actions have been carried out prior to the commencement of the construction and earthworks activities: • ASS investigations have been carried out to assess soils to a bulk excavation level of RL0.6m AHD. The natural clays and sands interbedded with silt/clay encountered at the site have been shown to contain levels of oxidisable sulphur, which has the potential to generate acidity, and these soils will require lime treatment for neutralisation. The fill, containing no silt/clay, encountered at the test locations carried out across the site have been shown to have a very low to insignificant actual/potential acidity, and do not require treatment. • During bulk earthworks required liming rates are to be verified by undertaking additional Suspension Peroxide Oxidation – Combined Acidity and Sulfur (SPOCAS) or Chromium Suite analyses. These additional analyses are to be undertaken at a rate of one test per 300m³ of natural spoil from the basement excavation. • The exposed natural soil surface in the excavation base and walls in natural silt/clay material should be lime treated at liming rate of not less than 5kg/square metre. • Lime-treated stockpiled soil shall have sediment fences and/or hay bales placed downslope to intercept any eroded material. Earthen bunds shall be constructed downslope of any filled or stockpile areas to divert run-off/drainage to a temporary retention pond. All retained waters would then be tested before entering the site stormwater system and/or adjacent waterways. • ASS is required to be treated off-site and will be treated under an approved ASSMP for the receiving/treatment facility.

Portside Wharf – Stage 2 – Buildings 2, 4 & 5 Harbour Road, Hamilton Acid Sulfate Soil Management Plan (ASSMP)

Element	Acid Sulfate Soil Management Plan						
Performance Indicators	<u>Retained Water</u> Laboratory testing of retention basin/tank drainage water will be carried out for pH, dissolved oxygen and turbidity. Levels of these parameters considered acceptable are as follows: <table> <tr> <td>pH</td><td>6.5 to 8.5 pH units</td></tr> <tr> <td>Turbidity</td><td><20NTU</td></tr> <tr> <td>Dissolved Oxygen</td><td>>80% saturated</td></tr> </table> Laboratory analysis for the following parameters should also be performed (as per the State Planning Policy 2/02 'Planning and Managing Development involving Acid Sulfate Soils') if the pH <6.5: • Bicarbonate • Chloride • Filtered aluminium • Total and dissolved iron • Calcium • Colour • Magnesium • Carbonate • Dissolved magnesium • Sulfate	pH	6.5 to 8.5 pH units	Turbidity	<20NTU	Dissolved Oxygen	>80% saturated
pH	6.5 to 8.5 pH units						
Turbidity	<20NTU						
Dissolved Oxygen	>80% saturated						
Frequency/Timing	<u>Retained Water</u> When run-off accumulates, water quality in drains or retention basins/tanks will be monitored regularly (frequency based on total volume retained) during the construction period, particularly following substantial rainfall events. Retained water will be sampled, tested and treated to a level acceptable for discharge to external waterways.						
Contingency Plan	If management of ASS is unsuccessful whereby performance targets are not being met as indicated by the validation testing and water quality testing procedures. • The earthworks schedule will be reassessed and action taken to determine the problems causing the breach of standards. • If the problems are related to ineffective implementation of the ASS Management Plan, then the plan will be audited by a person nominated by the superintendent to ensure improved implementation. Monitoring and testing will be increased to ensure compliance with the established standards. • Any significant changes to the Management Plan will be subject to discussions with the relevant regulatory authorities.						
Responsibility	The satisfactory implementation of the ASS Management Plan is the responsibility of the contractor commissioned to undertake the treatment of ASS.						
Reporting	The contractor undertaking the treatment of the ASS shall report to the Principal Contractor on: • The effectiveness of the operating strategies. • Problems in implementing the ASSMP management strategies. • Compliance with testing requirements, run-off control and materials handling. • Effectiveness of any corrective action adopted.						