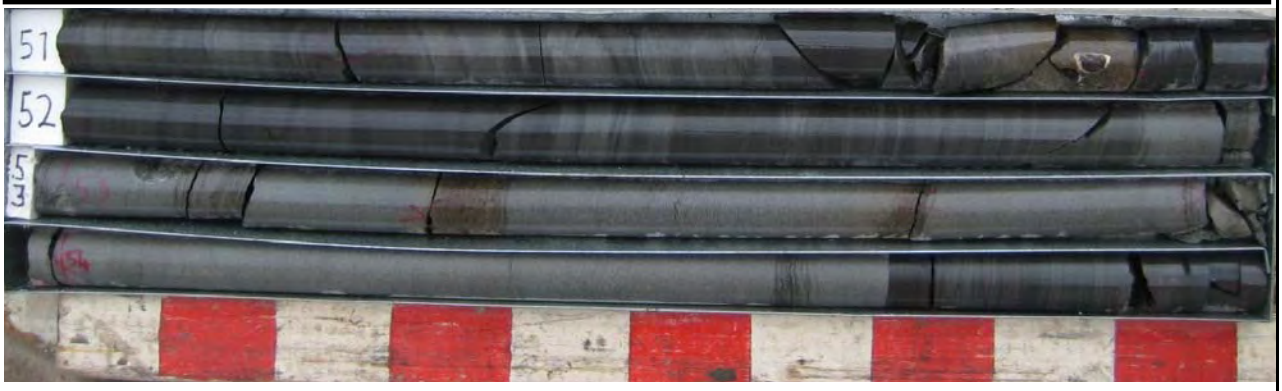
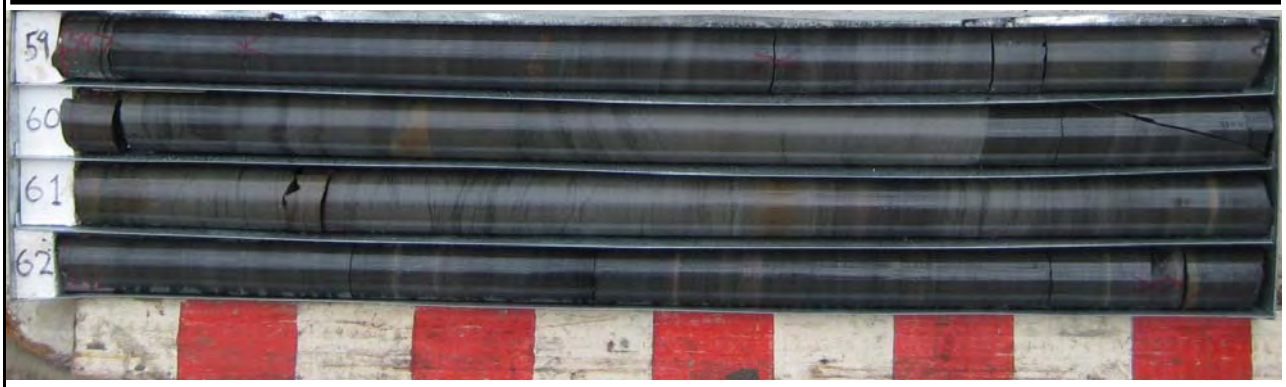
GEOTWARA20576AB BOREHOLE : BH22 51.00m to 55.00m
Box 10 of 20



GEOTWARA20576AB BOREHOLE : BH22 55.00m to 59.00m
Box 11 of 20

GEOTWARA20576AB BOREHOLE : BH22 59.00m to 63.00m
Box 12 of 20

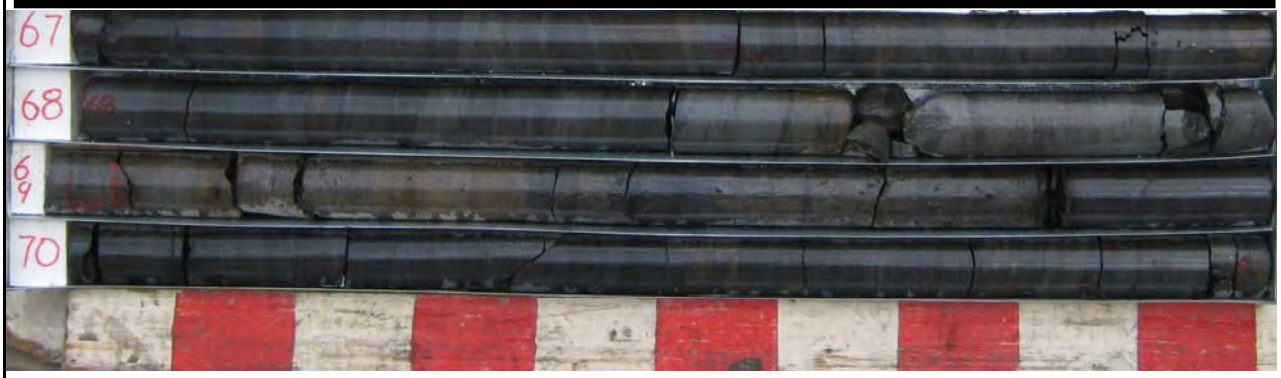


drawn	GDT	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	APP CORPORATION PTY LTD
approved	ABL		project:	PROPOSED HMRI BUILDINGS JOHN HUNTER HOSPITAL, NEW LAMBTON
date	12/05/2009		title:	PHOTOGRAPHS OF CORE, BH22 (51.0m to 63.0m)
scale	N/A		project no: GEOTWARA20576AB	figure no: BH 22
original size	A4			

F:\GEOTECHNICS\JOB FILES\WARA 20500 - 20599\WARA20576AB\Photos\Core Box Photos\[GEOTWARA20576AB BH22 10 - 12.xlsx]A4 Portrait Figure

GEOTWARA20576AB BOREHOLE : BH22 63.00m to 67.00m
Box 13 of 20

GEOTWARA20576AB BOREHOLE : BH22 67.00m to 71.00m
Box 14 of 20



GEOTWARA20576AB BOREHOLE : BH22 71.00m to 75.00m
Box 15 of 20

drawn	GDT	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	APP CORPORATION PTY LTD
approved	ABL		project:	PROPOSED HMRI BUILDINGS JOHN HUNTER HOSPITAL, NEW LAMBTON
date	12/05/2009		title:	PHOTOGRAPHS OF CORE, BH22 (63.0m to 75.0m)
scale	N/A		project no: GEOTWARA20576AB	figure no: BH 22
original size	A4			

F:\GEOTECHNICS\JOB FILES\WARA 20500 - 20599\WARA20576AB\Photos\Core Box Photos\[GEOTWARA20576AB BH22 13 - 15.xlsx]A4 Portrait Figure

GEOTWARA20576AB BOREHOLE : BH22 75.00m to 79.00m
Box 16 of 20

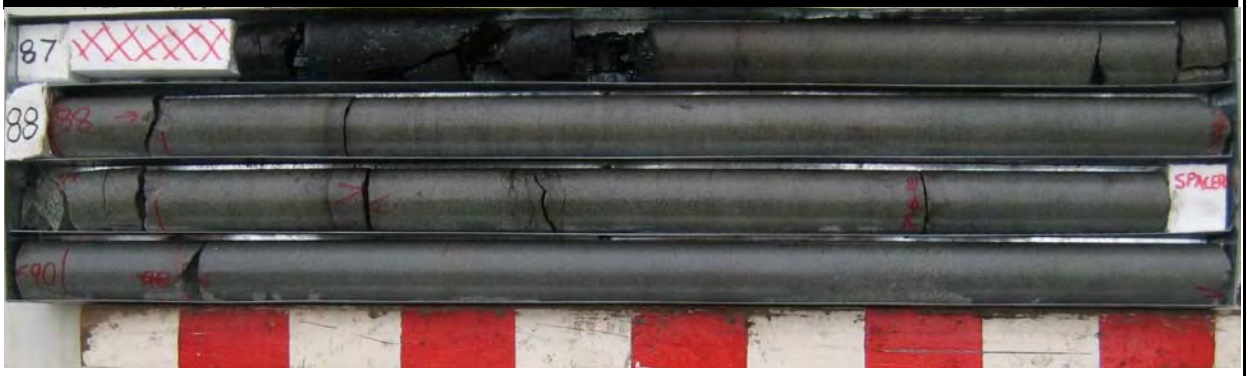
GEOTWARA20576AB BOREHOLE : BH22 79.00m to 73.00m
Box 17 of 20

GEOTWARA20576AB BOREHOLE : BH22 83.00m to 87.00m
Box 18 of 20

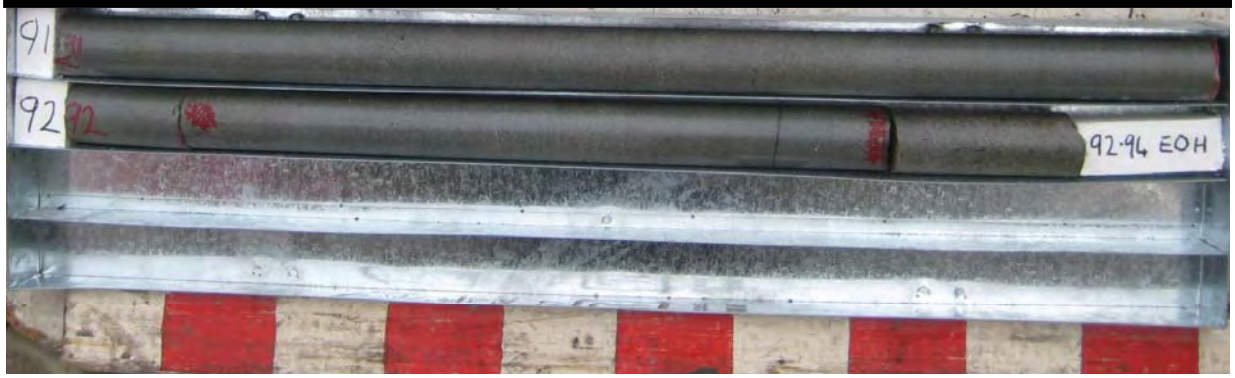
drawn	GDT	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	APP CORPORATION PTY LTD
approved	ABL		project:	PROPOSED HMRI BUILDINGS JOHN HUNTER HOSPITAL, NEW LAMBTON
date	12/05/2009		title:	PHOTOGRAPHS OF CORE, BH22 (75.0m to 87.0m)
scale	N/A		project no: GEOTWARA20576AB	figure no: BH 22
original size	A4			

F:\GEOTECHNICS\JOB FILES\WARA 20500 - 20599\WARA20576AB\Photos\Core Box Photos\[GEOTWARA20576AB BH22 16 - 18.xlsx]A4 Portrait Figure

GEOTWARA20576AB BOREHOLE : BH22 87.00m to 91.00m
Box 19 of 20



GEOTWARA20576AB BOREHOLE : BH22 91.00m to 92.94m
Box 20 of 20



drawn	GDT	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	APP CORPORATION PTY LTD
approved	ABL		project:	PROPOSED HMRI BUILDINGS JOHN HUNTER HOSPITAL, NEW LAMBTON
date	12/05/2009		title:	PHOTOGRAPHS OF CORE, BH22 (87.0m to 92.9m)
scale	N/A		project no: GEOTWARA20576AB	figure no: BH22
original size	A4			

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH 23**
Sheet	1 of 3
Project No:	**GEOTWARA20576AB**
Date started:	**20.4.2009**
Date completed:	**17.4.2009**
Logged by:	**GDT**
Checked by:	

Client: ***APP CORPORATION***

Principal:

Project: ***PROPOSED HMRI BUILDINGS, JOHN HUNTER HOSPITAL***

Borehole Location: ***JOHN HUNTER HOSPITAL***

drill model and mounting: Jackroo Trailer | Easting: 377829.86 | slope: -90° | R.L. Surface: 73.23

hole diameter: 100 mm | Northing 6356804.89 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
HA		N			73			CL	**TOPSOIL:** Gravelly Sandy CLAY, low plasticity, dark brown.	W	VS		TOPSOIL
								CL	**CLAY:** low plasticity, grey, trace of sand.	M	S	x	
						1							
					72			CL	**CLAY:** high plasticity, grey, some subrounded gravel, and fine to medium grained sand.	D	F		RESIDUAL
								CL	**CLAY:** high plasticity, dark brown, mottled red, high carbonaceous.		St		WEATHERED COAL LAYER
				SPT 4,10,14 N*=24				CL	**Sandy CLAY:** low plasticity, pale grey - yellow, fine sand.				
						2							
					71				**SANDSTONE:** fine to coarse grained, pale yellow with alternating hard and soft bands, low plasticity clay.		H		HIGHLY WEATHERED ROCK
				SPT 10 N*=R		3							SPT Refusal, bouncing on bottom
					70								
									Becomes yellow				
						4							
					69								
				SPT 15 N*=R									SPT refusal, bouncing on bottom
						5							
					68								
						6							
				SPT 15 N*=R	67								SPT refusal, bouncng on bottom
						7							
					66								
						8			Borehole BH 23 continued as cored hole				

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit
*bit shown by suffix e.g.	ADT

support: M mud, C casing, N nil

penetration: 1 2 3 4 — no resistance ranging to refusal

water: 10/1/98 water level on date shown; water inflow; water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH 23**
Sheet 2 of 3
Project No: **GEOTWARA20576AB**

Client: **APP CORPORATION**
Date started: **20.4.2009**
Principal:
Date completed: **17.4.2009**
Project: **PROPOSED HMRI BUILDINGS, JOHN HUNTER HOSPITAL**
Logged by: **GDT**
Borehole Location: **JOHN HUNTER HOSPITAL**
Checked by:

drill model & mounting: Jackroo Trailer | Easting: 377829.86 | slope: -90° | R.L. Surface: 73.23
hole diameter: 100 mm | Drilling fluid: Water | Northing: 6356804.89 | bearing: | datum:

drilling information					material substance					rock mass defects		
method	core-lift	water	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering / alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness (particular / general)
			73	0								
				1								
			72									
				2								
			71									
				3								
			70									
				4								
			69									
				5								
			68									
				6								
			67									
				7								
			66									
						Continued from non-cored borehole						
				8		**Gravelly CLAY:** high plasticity, pale yellow - brown, sunrounded gravel.	XW / MW			53		

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH 23**
Sheet 3 of 3
Project No: **GEOTWARA20576AB**

Client: **APP CORPORATION**
Date started: **20.4.2009**
Principal:
Date completed: **17.4.2009**
Project: **PROPOSED HMRI BUILDINGS, JOHN HUNTER HOSPITAL**
Logged by: **GDT**
Borehole Location: **JOHN HUNTER HOSPITAL**
Checked by:

drill model & mounting: Jackroo Trailer | Easting: 377829.86 | slope: -90° | R.L. Surface: 73.23
hole diameter: 100 mm Drilling fluid: Water | Northing: 6356804.89 | bearing: | datum:

drilling information					material substance					rock mass defects		
method	core-lift	water	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength VL L M H VH EH	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
			65	9		**SANDSTONE:** fine to coarse grained, orange brown, mottled grey. *(continued)*	MW		D 4 A 3.4	53		JT, 60°, PL, SO, iron stain JT, 40°, CU, SO, VN iron stain JT, 12°, PL, RO, VN, iron stain JT, 75°, IR, RO, VN, iron stain SM, 5°, PL, SO, clay, 10mm JT, 85°, CU, RO, VN, iron stain
			64	10		**COAL:** dull, bright banded, highly to extremely cleated.	FR			51		Extremely cleated coal, 800mm
			63			**SILTSTONE:** brown, grey.	HW					SM, 0°, PL, SO, CO, coal, 15mm
			62	11		**SANDSTONE:** fine to medium grained, grey with some siltstone laminations.	SW		D 0.3 A 0.2	100		JT, 38°, PL, SO, closed.
			61	12					D 0.6 A 0.6			
			60	13		BH 23 terminated at 12.4m						
			59	14								
			58	15								
				16								

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
water pressure test result (lugeons) for depth interval shown (25)

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

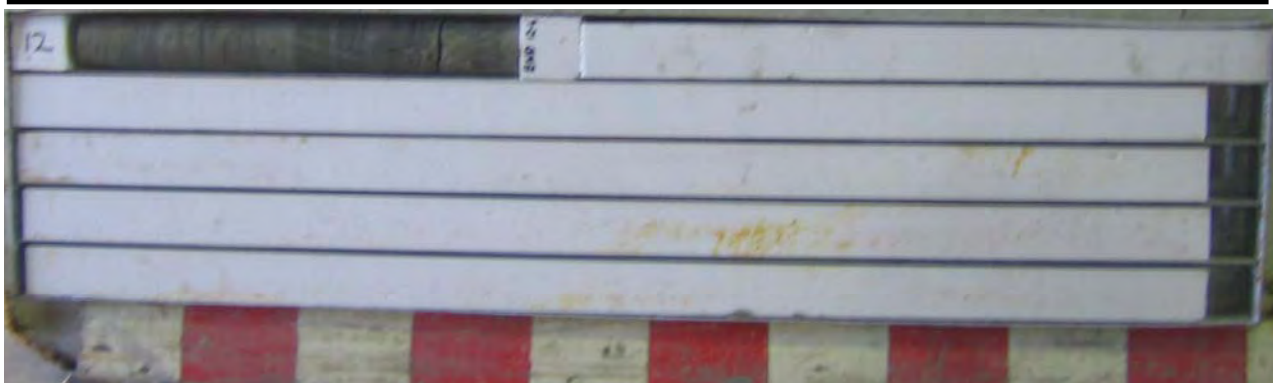
planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

GEOTWARA20576AB BOREHOLE : BH23 7.6m to 12.0m
Box 1 of 2

GEOTWARA20576AB BOREHOLE : BH23 12.0m to 12.4m
Box 2 of 2



drawn	GDT	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	APP CORPORATION PTY LTD
approved	ABL		project:	PROPOSED HMRI BUILDINGS JOHN HUNTER HOSPITAL, NEW LAMBTON
date	12/05/2009		title:	PHOTOGRAPHS OF CORE, BH23 (7.6m to 12.4m)
scale	N/A		project no: GEOTWARA20576AB	figure no: BH 23
original size	A4			

F:\GEOTECHNICS\JOB FILES\WARA 20500 - 20599\WARA20576AB\Photos\Core Box Photos\[GEOTWARA20576AB BH23.xlsx]A4 Portrait Figure

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH 24**

Sheet 1 of 2

Project No: **GEOTWARA20576AB**

Client: ***APP CORPORATION***

Date started: ***21.4.2009***

Principal:

Date completed: ***21.4.2009***

Project: ***PROPOSED HMRI BUILDINGS, JOHN HUNTER HOSPITAL***

Logged by: ***GDT***

Borehole Location: ***JOHN HUNTER HOSPITAL***

Checked by:

drill model and mounting: Jackroo Trailer | Easting: 377853.03 | slope: -90° | R.L. Surface: 70.22

hole diameter: 100 mm | Northing 6356890.43 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
		N			70			CH	**TOPSOIL:** Gravelly Sandy CLAY, high plasticity, dark brown, fine to coarse grained sand, fine gravel.	W	VS		TOPSOIL
								CH	**Gravelly CLAY:** high plasticity, yellow - brown, angular to subrounded gravel.	M	F		RESIDUAL
					69	1		GP	**Clayey GRAVEL:** sub rounded to angular, fine to coarse grained, yellow with high plasticity clay. Becomes pale grey at 1m.		D		HIGHLY WEATHERED SANDSTONE
					68	2			Borehole BH 24 continued as cored hole				
					67	3							
					66	4							
					65	5							
					64	6							
					63	7							
						8							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit
*bit shown by suffix e.g.	ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description
based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH 24**
Sheet 2 of 2
Project No: **GEOTWARA20576AB**

Client: **APP CORPORATION**
Date started: **21.4.2009**
Principal:
Date completed: **21.4.2009**
Project: **PROPOSED HMRI BUILDINGS, JOHN HUNTER HOSPITAL**
Logged by: **GDT**
Borehole Location: **JOHN HUNTER HOSPITAL**
Checked by:

drill model & mounting: Jackroo Trailer | Easting: 377853.03 | slope: -90° | R.L. Surface: 70.22
hole diameter: 100 mm Drilling fluid: Water | Northing: 6356890.43 | bearing: | datum:

drilling information					material substance					rock mass defects		
method	core-lift	water	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness (particular / general)
			70	1								
			69			Continued from non-cored borehole						
				2		**Gravelly CLAY:** high plasticity, yellow with subrounded gravel.	XW					JT, 80°, PL, O, VN, iron stain
						SILTSTONE: pale brown, mottled orange and yellow, slightly laminated.	HW					
			68						D A 2.2 0.5	97		SM, 25°, IR, RO, CO, clay and rock fragments
				3		**SANDSTONE:** fine to medium grained, pale grey mottled yellow and orange brown.	MW					JT, 45°, IR, RO, SN, iron
												PT, 10°, IR, RO, SN, iron
			67									
				4		**SILTSTONE:** pale grey, trace of fine sand with sandstone bands, <20mm thick.	FR			95		JT, 80°, IR, RO, SN, iron
												PT, 10°, PL, SO, SN, iron
												PT, 10°, PL, SO, SN, iron
												JT, 90°, IR, RO, CN, iorn 60mm long
			66						D A 3.8 0.1			JT, 45°, IR, RO, SN, iron
				5						92		JT, 45°, IR, RO, SN, iron
												SM, 0°, PL, SO, CLAY, VSt, 60MM
												JT, 90°, PL, CO, iron stained, 100mm long
			65			**SANDSTONE:** fine to coarse grained, pale grey mottled orange.			D A 0.1 2.8			
				6		BH 24 terminated at 5.73m						
			64									
				7								
			63									
				8								

CORED BOREHOLE ALL LOGS.GPJ COFFEY.GDT 6.3.09

Form GEO 5.5 Issue 3 Rev. 3

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

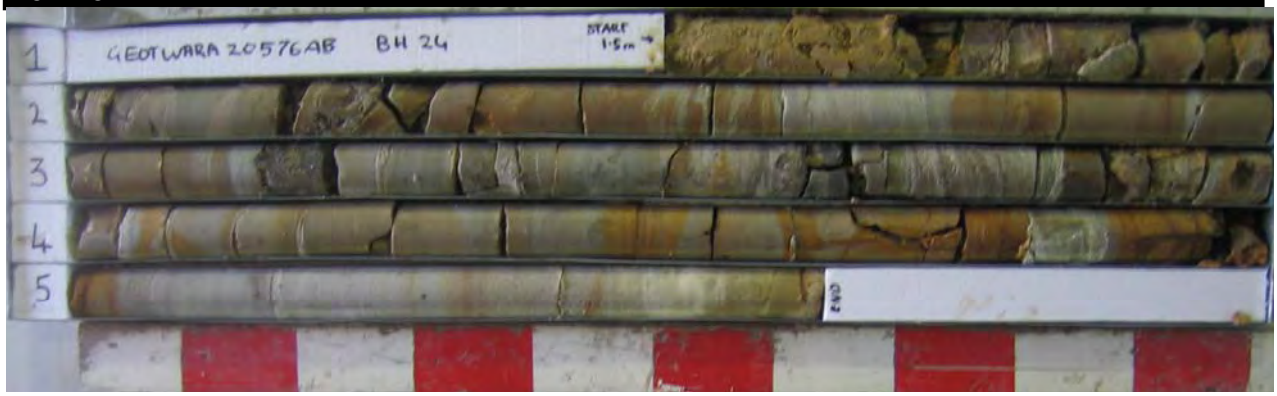
defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

GEOTWARA20576AB **BOREHOLE : BH24 1.5m to 5.73m**
Box 1 of 1



drawn	GDT	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	APP CORPORATION PTY LTD
approved	ABL		project:	PROPOSED HMRI BUILDINGS JOHN HUNTER HOSPITAL, NEW LAMBTON
date	12/05/2009		title:	PHOTOGRAPHS OF CORE, BH24 (1.5m to 5.7m)
scale	N/A		project no: GEOTWARA20576AB	figure no: BH 24
original size	A4			

F:\GEOTECHNICS\JOB FILES\WARA 20500 - 20599\WARA20576AB\Photos\Core Box Photos\[GEOTWARA20576AB BH24.xlsx]A4 Portrait Figure

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**BH 25**
Sheet	1 of 2
Project No:	**GEOTWARA20576AB**
Client:	**APP CORPORATION**
Date started:	**23.4.2009**
Principal:	
Date completed:	**23.4.2009**
Project:	**PROPOSED HMRI BUILDINGS, JOHN HUNTER HOSPITAL**
Logged by:	**GDT**
Borehole Location:	**JOHN HUNTER HOSPITAL**
Checked by:	

drill model and mounting: Jackroo Trailer | Easting: 377877.98 | slope: -90° | R.L. Surface: 70.10

hole diameter: 100 mm | Northing 6356869.54 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
		N			70			CL	**TOPSOIL:** CLAY, low plasticity, dark brown, highly organic.	W / M	VS		TOPSOIL
								CH	**CLAY:** high plasticity, brown, mottled orange and yellow, trace of coarse grained sand.		S		RESIDUAL
					69	1		CH	**CLAY:** high plasticity, pale yellow, grey, trace of fine sand.		VSt		
									Borehole BH 25 continued as cored hole				
					68	2							
					67	3							
					66	4							
					65	5							
					64	6							
					63	7							
						8							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

penetration 1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH 25**
Sheet 2 of 2
Project No: **GEOTWARA20576AB**

Client: **APP CORPORATION**
Date started: **23.4.2009**
Principal:
Date completed: **23.4.2009**
Project: **PROPOSED HMRI BUILDINGS, JOHN HUNTER HOSPITAL**
Logged by: **GDT**
Borehole Location: **JOHN HUNTER HOSPITAL**
Checked by:

drill model & mounting: Jackroo Trailer | Easting: 377877.98 | slope: -90° | R.L. Surface: 70.10
hole diameter: 100 mm | Drilling fluid: | Northing: 6356869.54 | bearing: | datum:

drilling information					material substance					rock mass defects		
method	core-lift	water	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering / alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa (D- diametral, A- axial)	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness (particular / general)
			70									
				1		Continued from non-cored borehole						
			69			**CLAY:** high plasticity, brown, with subrounded gravel and rare tree roots.	XW					Hard soil, 290mm
						TUFF: fine to medium grained, orange - grey.	DW		D 0.2 A 1			PT, 0°, PL, SO, CO, clay JT, 88°, IR, RO, CO, carbonaceous clay, 50mm
			68	2						75		SM, 10°, PL, SO, CO, clay
												JT, 90°, IR, RO, VN, carbonaceous clay
						Becomes yellow grey mottled brown, orange and grey						JT, 15°, IR, RO, CN JT, 20°, IR, RO, CN
			67	3		becomes highly fractured, 400mm						Highly fractured rock 400mm thickness
												SM, 40°, IR, RO, CN, clay, 3mm SM, 40°, IR, RO, SN, clay, 3mm JT, 72°, IR, RO, SU, iron
			66	4						43		
						COAL: dull, black, highly cleated with rare clay bands.						
			65	5		**NO CORE:**						
						Carbonaceous MUDSTONE: dark brown to black, with some coal bands.	FR					PT, 0°, PL, SO, CN
						SILTSTONE: grey, trace of carbonaceous laminations.						
			64	6		**Interbedded SANDSTONE and SILTSTONE:** fine to medium grained sand, dark to grey.			D 0.3 A 0.99	100		
												JT, 43°, PL, SO, CN
			63	7								JT, 52°, IR, RO, CN
						BH 25 terminated at 7.2m						
				8								

method
DT diatube; AS auger screwing; AD auger drilling; RR roller/tricone; CB claw or blade bit; NMLC NMLC core; NQ, HQ, PQ wireline core

core-lift
casing used; barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material; no core recovered

water
10/1/98 water level on date shown; water inflow; partial drill fluid loss; complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh; SW slightly weathered; MW moderately weathered; HW highly weathered; XW extremely weathered; DW distinctly weathered (covers MW and HW)

strength
VL very low; L low; M medium; H high; VH very high; EH extremely high

defect type
JT joint; PT parting; SM seam; SZ sheared zone; SS sheared surface; CS crushed seam

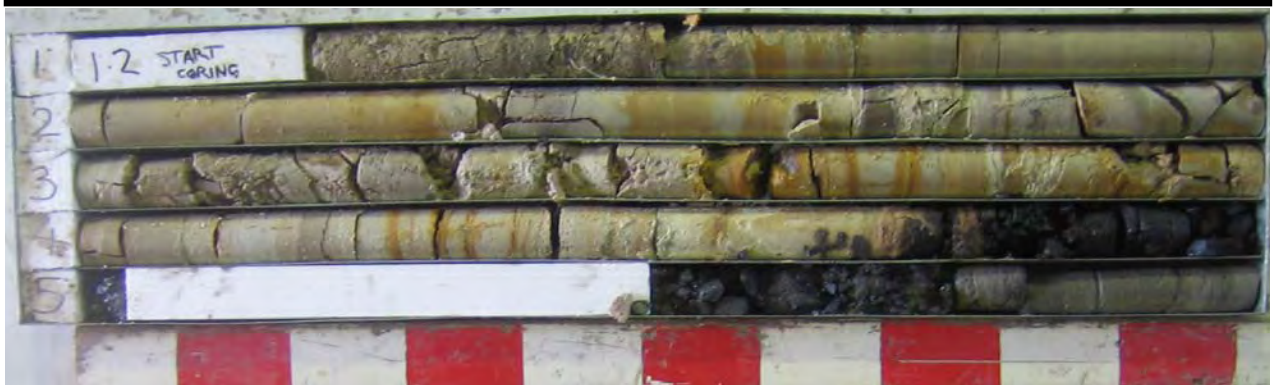
planarity
PL planar; CU curved; UN undulating; ST stepped; IR irregular

roughness
VR very rough; RO rough; SO smooth; SL slickensided

coating
CN clean; SN stained; VN veneer; CO coating

CORED BOREHOLE ALL LOGS.GPJ COFFEY.GDT 6.3.09
Form GEO 5.5 Issue 3 Rev. 3

GEOTWARA20576AB **BOREHOLE : BH25 1.2m to 6.0m**
Box 1 of 2



GEOTWARA20576AB **BOREHOLE : BH25 6.0m to 7.2m**
Box 2 of 2

drawn	GDT	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	APP CORPORATION PTY LTD
approved	ABL		project:	PROPOSED HMRI BUILDINGS JOHN HUNTER HOSPITAL, NEW LAMBTON
date	12/05/2009		title:	PHOTOGRAPHS OF CORE, BH25 (1.2m to 7.2m)
scale	N/A		project no: GEOTWARA20576AB	figure no: BH 25
original size	A4			

F:\GEOTECHNICS\JOB FILES\WARA 20500 - 20599\WARA20576AB\Photos\Core Box Photos\[GEOTWARA20576AB BH25.xlsx]A4 Portrait Figure

Appendix B

Results of Laboratory Testing

Warabrook, Newcastle Laboratory

Coffey Information Pty Ltd
ABN 92 114 364 046
Lot 101, 19 Warabrook Boulevard
Warabrook NSW 2304

Telephone: +61 2 4016 2300
Facsimile: +61 2 4016 2380

coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Report No: CBR:WARA09S-02578
Issue No: 1

California Bearing Ratio

Client:	Coffey Geotechnics (Warabrook) 19 Warabrook Boulevard Warabrook NSW 2304
Principal:	APP Corporation
Project No.:	INFOWARA00308AA
Project Name:	GEOTWARA20576AB - John Hunter Hospital
Lot No.:	TP4 @ 0.2 - 0.4m **TRN:**

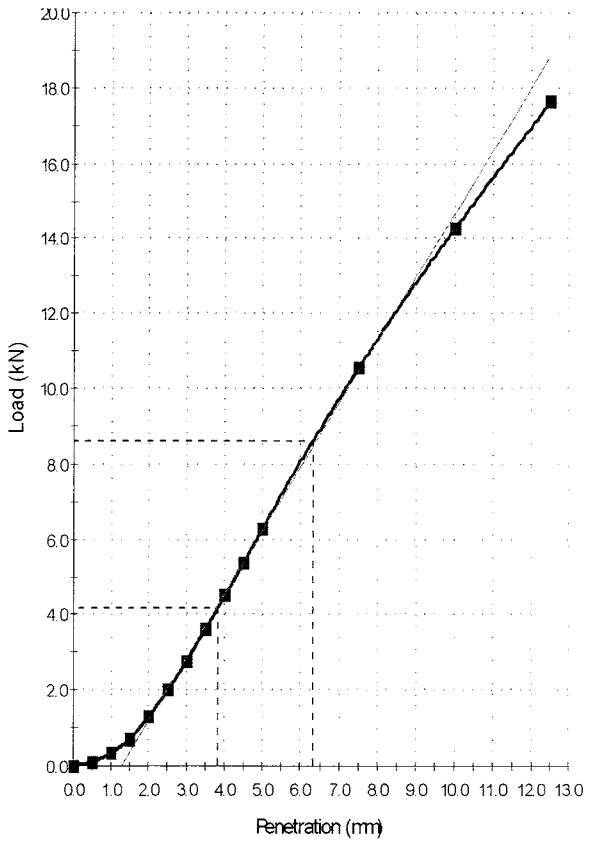
NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Shayne McKenzie
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 11/05/2009

Sample Details

Sample ID:	WARA09S-02578	**Sampling Method:**	Submitted by client
Field ID:	00001	**Material:**	Existing Ground
Date Sampled:	9/04/2009	**Source:**	On-site
Date Submitted:	30/04/2009	**Specification:**	No Specification
Project Location:	New Lambton, NSW		
Sample Location:	TP4 @ 0.2 - 0.4m		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR (%):	**45**
CBR at 2.5 (%):	30
CBR at 5.0 (%):	45
Maximum Dry Density (t/m³):	2.01
Optimum Moisture Content (%):	11.6
Dry Density before soaking (t/m³):	2.02
Density Ratio before soaking (%):	101
Moisture Content before soaking (%):	10.9
Moisture Ratio before soaking (%):	94
Dry Density after soaking (t/m³):	2.02
Density Ratio after soaking (%):	101
Swell (%):	0.0
Moisture Content of top 30mm (%):	11.8
Moisture Content of remaining depth (%):	11.0
Compactive Effort:	Standard
Surcharge Mass (kg):	6.75
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	4.4

Comments

FMC = 8.1%

Warabrook, Newcastle Laboratory

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coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Report No: CBR:WARA09S-02579
Issue No: 1

California Bearing Ratio

Client:	Coffey Geotechnics (Warabrook) 19 Warabrook Boulevard Warabrook NSW 2304
Principal:	APP Corporation
Project No.:	INFOWARA00308AA
Project Name:	GEOTWARA20576AB - John Hunter Hospital
Lot No.:	TP5 @ 0.25 - 0.5m **TRN:**

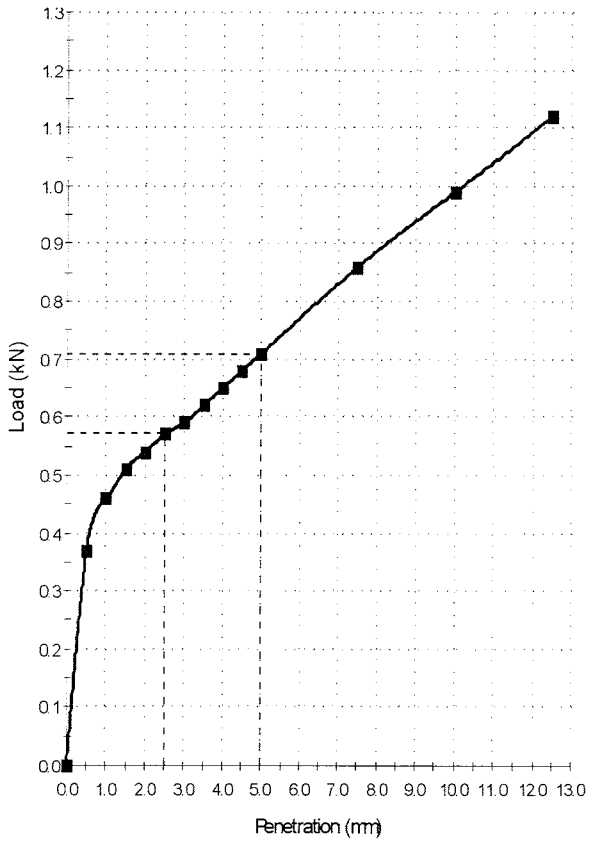
NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Shayne McKenzie
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 11/05/2009

Sample Details

Sample ID:	WARA09S-02579	**Sampling Method:**	Submitted by client
Field ID:	00002	**Material:**	Existing Ground
Date Sampled:	9/04/2009	**Source:**	On-site
Date Submitted:	30/04/2009	**Specification:**	No Specification
Project Location:	New Lambton, NSW		
Sample Location:	TP5 @ 0.25 - 0.5m		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR (%):	**4.5**
CBR at 2.5 (%):	4.5
CBR at 5.0 (%):	3.5
Maximum Dry Density (t/m³):	1.58
Optimum Moisture Content (%):	22.8
Dry Density before soaking (t/m³):	1.58
Density Ratio before soaking (%):	100
Moisture Content before soaking (%):	22.3
Moisture Ratio before soaking (%):	98
Dry Density after soaking (t/m³):	1.53
Density Ratio after soaking (%):	97
Swell (%):	3.5
Moisture Content of top 30mm (%):	33.2
Moisture Content of remaining depth (%):	25.5
Compactive Effort:	Standard
Surcharge Mass (kg):	6.75
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	0.0

Comments

FMC = 23.2%

Warabrook, Newcastle Laboratory

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coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Report No: CBR:WARA09S-02580
Issue No: 1

California Bearing Ratio

Client:	Coffey Geotechnics (Warabrook) 19 Warabrook Boulevard Warabrook NSW 2304
Principal:	APP Corporation
Project No.:	INFOWARA00308AA
Project Name:	GEOTWARA20576AB - John Hunter Hospital
Lot No.:	TP6 @ 0.25 - 0.5mm **TRN:**

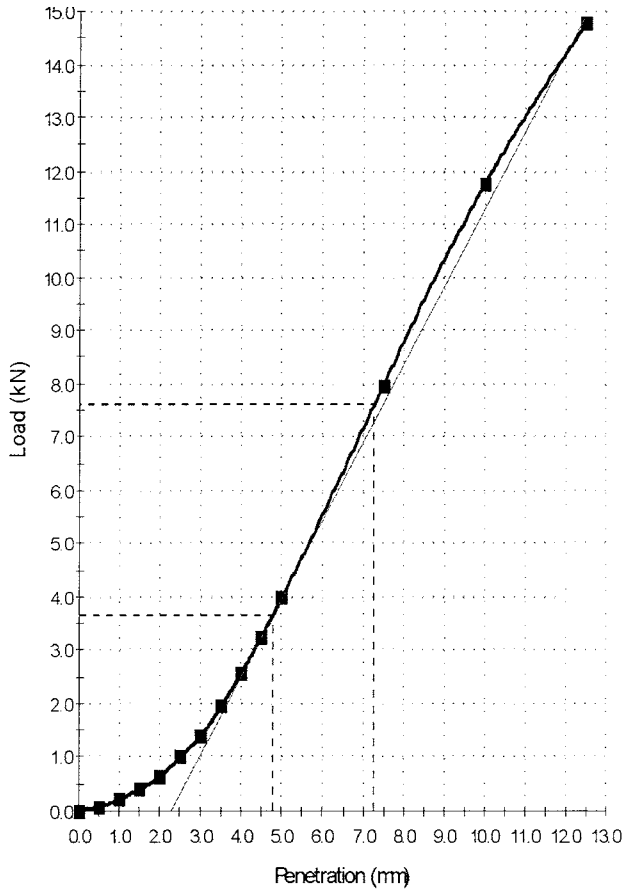
NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Shayne McKenzie
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 11/05/2009

Sample Details

Sample ID:	WARA09S-02580	**Sampling Method:**	Submitted by client
Field ID:	00003	**Material:**	Existing Ground
Date Sampled:	9/04/2009	**Source:**	On-site
Date Submitted:	30/04/2009	**Specification:**	No Specification
Project Location:	New Lambton, NSW		
Sample Location:	TP6 @ 0.3 - 0.5m		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR (%):	**40**
CBR at 2.5 (%):	30
CBR at 5.0 (%):	40
Maximum Dry Density (t/m³):	2.02
Optimum Moisture Content (%):	11.6
Dry Density before soaking (t/m³):	2.02
Density Ratio before soaking (%):	100
Moisture Content before soaking (%):	11.4
Moisture Ratio before soaking (%):	98
Dry Density after soaking (t/m³):	2.01
Density Ratio after soaking (%):	100
Swell (%):	0.5
Moisture Content of top 30mm (%):	12.2
Moisture Content of remaining depth (%):	11.4
Compactive Effort:	Standard
Surcharge Mass (kg):	6.75
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	4.0

Comments

FMC = 10.0%

Warabrook, Newcastle Laboratory

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coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Report No: CBR:WARA09S-02581
Issue No: 1

California Bearing Ratio

Client:	Coffey Geotechnics (Warabrook) 19 Warabrook Boulevard Warabrook NSW 2304
Principal:	APP Corporation
Project No.:	INFOWARA00308AA
Project Name:	GEOTWARA20576AB - John Hunter Hospital
Lot No.:	TP9 @ 0.2 - 0.4m **TRN:**

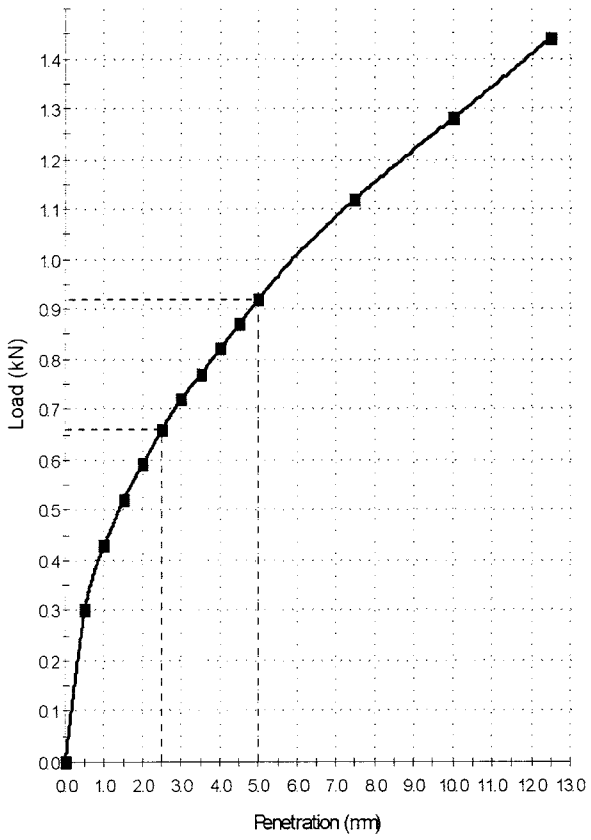
NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Shayne McKenzie
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 11/05/2009

Sample Details

Sample ID:	WARA09S-02581	**Sampling Method:**	AS1141.3.1 Clause 6.9.2 by Client
Field ID:	00004	**Material:**	Existing Ground
Date Sampled:	9/04/2009	**Source:**	On-site
Date Submitted:	30/04/2009	**Specification:**	No Specification
Project Location:	New Lambton, NSW		
Sample Location:	TP9 @ 0.2 - 0.4m		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR (%):	**5.0**
CBR at 2.5 (%):	5.0
CBR at 5.0 (%):	4.5
Maximum Dry Density (t/m³):	1.43
Optimum Moisture Content (%):	29.7
Dry Density before soaking (t/m³):	1.43
Density Ratio before soaking (%):	100
Moisture Content before soaking (%):	29.3
Moisture Ratio before soaking (%):	99
Dry Density after soaking (t/m³):	1.40
Density Ratio after soaking (%):	98
Swell (%):	2.0
Moisture Content of top 30mm (%):	37.6
Moisture Content of remaining depth (%):	29.7
Compactive Effort:	Standard
Surcharge Mass (kg):	6.75
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	0.0

Comments

FMC: 32.9%

Warabrook, Newcastle Laboratory

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coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Report No: CBR:WARA09S-02582
Issue No: 1

California Bearing Ratio

Client:	Coffey Geotechnics (Warabrook) 19 Warabrook Boulevard Warabrook NSW 2304
Principal:	APP Corporation
Project No.:	INFOWARA00308AA
Project Name:	GEOTWARA20576AB - John Hunter Hospital
Lot No.:	TP10 @ 0.8 - 1.0m **TRN:**

NATA
WORLD RECOGNISED ACCREDITATION

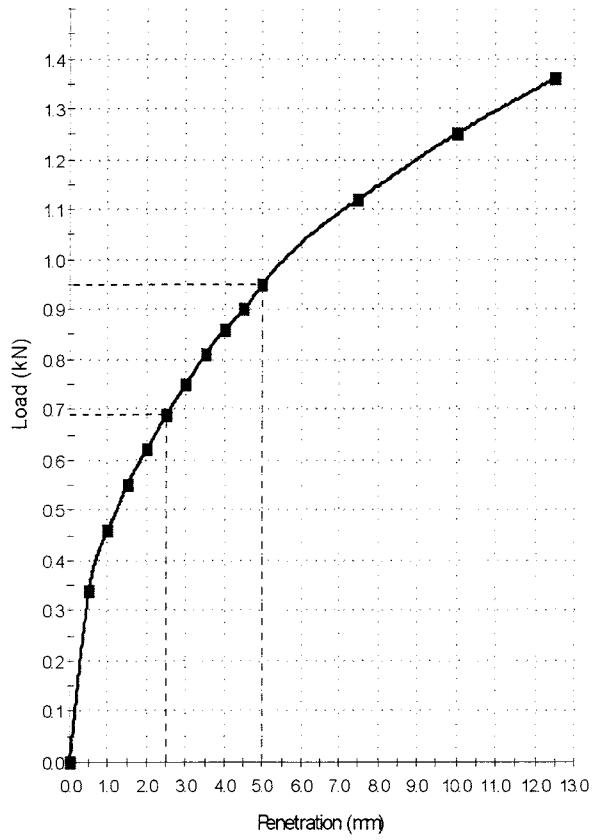
This document is issued in accordance with NATAs accreditation requirements. Accredited for compliance with ISO/IEC 17025.

Approved Signatory: Shayne McKenzie
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 11/05/2009

Sample Details

Sample ID:	WARA09S-02582	**Sampling Method:**	Submitted by client
Field ID:	00005	**Material:**	Existing Ground
Date Sampled:	9/04/2009	**Source:**	On-site
Date Submitted:	30/04/2009	**Specification:**	No Specification
Project Location:	New Lambton, NSW		
Sample Location:	TP10 0.8 - 1.0m		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR (%):	**5**
CBR at 2.5 (%):	5
CBR at 5.0 (%):	5.0
Maximum Dry Density (t/m³):	1.55
Optimum Moisture Content (%):	30.4
Dry Density before soaking (t/m³):	1.56
Density Ratio before soaking (%):	101
Moisture Content before soaking (%):	27.7
Moisture Ratio before soaking (%):	91
Dry Density after soaking (t/m³):	1.54
Density Ratio after soaking (%):	99
Swell (%):	1.5
Moisture Content of top 30mm (%):	34.4
Moisture Content of remaining depth (%):	30.5
Compactive Effort:	Standard
Surcharge Mass (kg):	6.75
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	0.0

Comments

FMC: 30.1%

Warabrook, Newcastle Laboratory

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coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Report No: CBR:WARA09S-02583
Issue No: 1

California Bearing Ratio

Client:	Coffey Geotechnics (Warabrook) 19 Warabrook Boulevard Warabrook NSW 2304
Principal:	APP Corporation
Project No.:	INFOWARA00308AA
Project Name:	GEOTWARA20576AB - John Hunter Hospital
Lot No.:	TP13 @ 0.2 - 0.4m **TRN:**

NATA
WORLD RECOGNISED ACCREDITATION

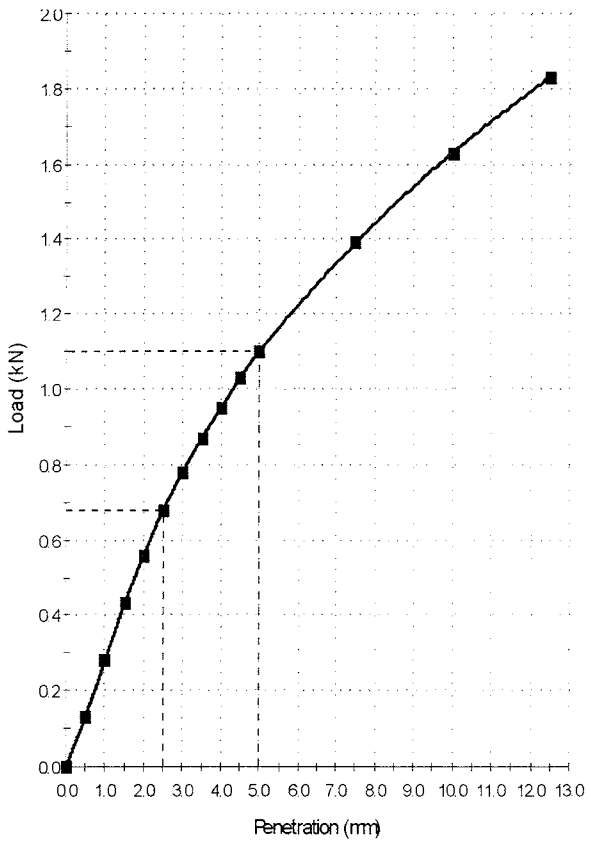
This document is issued in accordance with NATAs accreditation requirements. Accredited for compliance with ISO/IEC 17025.

Approved Signatory: Shayne McKenzie
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 11/05/2009

Sample Details

Sample ID:	WARA09S-02583	**Sampling Method:**	Submitted by client
Field ID:	00006	**Material:**	Existing Ground
Date Sampled:	9/04/2009	**Source:**	On-site
Date Submitted:	30/04/2009	**Specification:**	No Specification
Project Location:	New Lambton, NSW		
Sample Location:	TP13 @ 0.2 - 0.4m		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR (%):	**6**
CBR at 2.5 (%):	5
CBR at 5.0 (%):	6
Maximum Dry Density (t/m³):	1.69
Optimum Moisture Content (%):	17.4
Dry Density before soaking (t/m³):	1.70
Density Ratio before soaking (%):	101
Moisture Content before soaking (%):	17.3
Moisture Ratio before soaking (%):	99
Dry Density after soaking (t/m³):	1.68
Density Ratio after soaking (%):	99
Swell (%):	1.0
Moisture Content of top 30mm (%):	23.3
Moisture Content of remaining depth (%):	20.3
Compactive Effort:	Standard
Surcharge Mass (kg):	6.75
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	0.0

Comments

FMC = 16.7%

Appendix C

Pavement Thickness Design Summary

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Coffey Geotechnics Pty Ltd ABN 93 056 929 483
19 Warabrook Boulevard Warabrook NSW 2304 Australia
T (+61) (2) 4016 2300 F (+61) (2) 4016 2380 coffey.com

pavement thickness design summary

client :	APP	job no :	GEOTWARA20576AB
principal :	HUNTER MEDICAL RESEARCH INSTITUTE	laboratory :	WARABROOK
project:	PROPOSED HMRI BUILDINGS	report date :	11/05/2009
location :	JOHN HUNTER HOSPITAL	designed by :	GDT
council :	NEWCASTLE CITY COUNCIL	checked by :	

road name or type:		CAR PARK ACCESS	LOCAL ACCESS		
chainage interval:	(m)	-	-		
design traffic loading:	(ESA)	1×10^5	5×10^5		
wearing course thickness:	(mm)	30	40		
basecourse thickness:	(mm)	100	100		
sub-base thickness:	(mm)	240	280		
select thickness:	(mm)	-	-		
total thickness:	(mm)	370	420		
CBR used for design:	(%)	4.5	4.5		

design traffic loading:

Design traffic loading is the number of equivalent standard axles (ESA) in the design lane during the design period. For definitions, refer Appendix 1.1 'Pavement Design' AUSTROADS. Refer covering letter/report.

material quality:

wearing course:	*Conforming to council requirements*
basecourse:	*Conforming to ARRB Special Report No 41*
sub-base:	*Conforming to ARRB Special Report No 41*
select:	

Note: Recommended materials types may vary from those of job specification or statutory authority. Refer covering letter/report.

compaction requirements:

wearing course :		*Conforming to council requirements*
basecourse :	upper:	*98% Modified*
	lower:	
sub-base :		*95% Modified*
select :		*100% Standard*
subgrade :		*100% Standard*
fill below:		*95% Standard*

Modified: Minimum required dry density ratio, AS1289 5.4.1-2007, calculated using field dry density determined by AS1289 5.3.1-2004 or equivalent and the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.

Standard: As above, but maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.

Density Index: Minimum required Density Index AS1289 5.6.1-1998, calculated using field dry density determined by AS1289 5.3.1-2004 or equivalent and laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent.

Note : Recommendations for compaction may vary from those of job specification or statutory authority. Refer covering letter/report.

Drainage: The design assumes the provision of adequate surface and subsurface drainage of the pavement and adjacent areas. Refer covering letter/report.

Appendix D

Engineering Logs from Previous Investigations

Coffey Partners International Pty. Ltd.
ACN 003 692 019

engineering log - excavation

COFFEY

pit no TP 6

sheet 1 of 1

office job no: N6126/1

client:	HUNTER AREA HEALTH SERVICE	pit commenced:	15-04-97
principal:		pit completed:	15-04-97
project:	JOHN HUNTER HOSPITAL PSYCHIATRIC FACILITY	logged by:	JEL
pit location:	374690.7mE 6355830.8mN	checked by:	
equipment type and model:	Case 580E Extendahoe	R.L.Surface:	74.8 m
excavation dimensions:	2.0 m long 0.45 m wide	orientation:	datum: AHD

method	penetration 1 2 3 4	support	water	samples, tests, etc	R.L.	depth metres	graphic log	classification SYMBOL	material: soil type: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
BH		NIL	D					SM	SILTY SAND: fine to medium grained, light grey-brown, trace of gravel fine grained.	D			SLOPEWASH
								CH	SANDY CLAY: high plasticity, grey-orange-brown, sand fine to coarse grained.	M =Wp	VSt		RESIDUAL
				Bs									
					74								
						1			With depth grading into extremely weathered rock.				
									SILTSTONE: fine grained, grey, with orange, staining, with some interbedded claystone.	M	H		EW ROCK
					73								
						2			With some carbonaceous staining from 2.0m to 2.2m.				
									Pit TP 6 Terminated at 2.40 m				
					72								
						3							
					71								
						4							

B3 VERSION COFEXCA M01 12 : 4 54 20 / 5/97

METHOD
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R bulldozer ripper
- E excavator
- HA hand auger
- HT hand tools

SUPPORT
- SH shoring SC shotcrete
- Nil no support
- RB rockbolts

PENETRATION

1 2 3 4 — little resistance ranging to very slow progress

WATER
- D none observed
- ✱ not measured
- water level
- water outflow
- water inflow

SAMPLES, TESTS, ETC
- U undisturbed sample (mm)
- D disturbed sample
- Bs bulk sample
- E environmental sample
- VS vane shear
- DP dynamic penetrometer
- FD field density
- WS water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

based on unified classification system

MOISTURE
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Coffey Partners International Pty. Ltd.
ACN 003 692 019

engineering log - excavation

COFFEY

pit no: TP 5
sheet 1 of 1

office job no: N6126/1

client:	HUNTER AREA HEALTH SERVICE	pit commenced:	15-04-97
principal:		pit completed:	15-04-97
project:	JOHN HUNTER HOSPITAL PSYCHIATRIC FACILITY	logged by:	JEL
pit location:	374756.8mE 6355802.3mN	checked by:	BL
equipment type and model:	Case 580E Extendahoe	R.L.Surface:	67.2 m
excavation dimensions:	2.0 m long 0.45 m wide	orientation:	datum: AHD

method	penetration 1 2 3 4	support	water	samples, tests, etc	R.L.	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
BH		Nil	D		67			SP	SAND: fine to coarse grained, brown.	M			SLOPEWASH / COLLUVIUM
								SC	SILTY CLAYEY SAND: fine to medium grained, dark grey, clay medium plasticity.				
								SC	CLAYEY SAND: fine to medium grained, grey-orange-brown, clay medium plasticity.				RESIDUAL
								CH	SANDY CLAY: high plasticity, grey-orange-brown, sand fine to coarse grained.	M >Wp	VSt		
					66	1			Grading into extremely weathered rock with depth.	M =Wp			
									SILTY SANDSTONE: fine to medium grained, light grey-orange.	M	H		EW ROCK
					65	2			Pit TP 5 Terminated at 1.90 m Close to practical refusal of backhoe.				
					64	3							
						4							

METHOD
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R bulldozer ripper
E excavator
HA hand auger
HT hand tools

SUPPORT
SH shoring SC shotcrete
Nil no support
RB rockbolts

PENETRATION
1 2 3 4
1 little resistance
4 ranging to very slow progress

WATER
D none observed
* not measured
water level
water outflow
water inflow

SAMPLES, TESTS, ETC
U undisturbed sample (mm)
D disturbed sample
Bs bulk sample
E environmental sample
VS vane shear
DP dynamic penetrometer
FD field density
WS water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

CONSISTENCY/DENSITY INDEX

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Coffey Partners International Pty. Ltd.
ACN 003 692 019

engineering log - excavation

COFFEY

pit no TP 4
sheet 1 of 1

office job no: N6126/1

client:	HUNTER AREA HEALTH SERVICE	pit commenced:	15-04-97
principal:		pit completed:	15-04-97
project:	JOHN HUNTER HOSPITAL PSYCHIATRIC FACILITY	logged by:	JEL
pit location:	374743.8mE 6355814.7mN	checked by:	
equipment type and model:	Case 580E Extendahoe	R.L.Surface:	64.1 m
excavation dimensions:	2.0 m long 0.45 m wide	orientation:	datum: AHD

method	penetration 1 2 3 4	support	water	samples, tests, etc	R.L.	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
BH		Nil	D		64			SP	SAND: fine to coarse grained, brown, root affected.	M			SLOPEWASH / COLLUVIUM
								SC	GRAVELLY CLAYEY SAND: fine to coarse grained, grey to dark grey, clay medium plasticity, gravel fine to medium grained.				
					63	1		CI	SANDY CLAY: medium plasticity, grey-orange-brown, sand fine to coarse grained, with some rock fragments. Grading into extremely weathered rock with depth.	M =Wp	VSt		RESIDUAL
									CLAYSTONE: light grey, with some interbedded siltstone and large sandstone rock fragments.	M	H		EW ROCK (excavating as a soil)
					62	2			Pit TP 4 Terminated at 1.80 m				
					61	3							
						4							

METHOD
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R bulldozer ripper
- E excavator
- HA hand auger
- HT hand tools

SUPPORT
- SH shoring SC shotcrete
- Nil no support
- RB rockbolts

PENETRATION
1 2 3 4 — little resistance ranging to very slow progress

WATER
- D none observed
- ✱ not measured
- water level
- water outflow
- water inflow

SAMPLES, TESTS, ETC
- U undisturbed sample (mm)
- D disturbed sample
- Bs bulk sample
- E environmental sample
- VS vane shear
- DP dynamic penetrometer
- FD field density
- WS water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

CONSISTENCY/DENSITY INDEX
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

Coffey Partners International Pty. Ltd.
ACN 003 692 019

engineering log - cored borehole

COFFEY

borehole no: BH 7
sheet 3 of 3

office job no: N6126/1

client:	HUNTER AREA HEALTH SERVICE	hole commenced:	15-04-97
principal:		hole completed:	15-04-97
project:	JOHN HUNTER HOSPITAL PSYCHIATRIC FACILITY	logged by:	JEL
borehole location:	374686.5mE 6355829.2mN	checked by:	
drill model and mounting:	Gemco HS7 Trailer	slope: -90 DEG	R.L.Surface: 75.5 m
barrel type and length:	NMLC 3.0m fluid: Water	bearing:	datum: AHD

drilling information					rock substance					rock mass defects		
method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
NMLC			67			NO CORE: EW COAL indicated from cuttings.	EW					
						CLAYSTONE: light grey-brown, with some siltstone lenses.						PT 0-5deg: IR RO CN JT 50deg: IR RO CN
			66	9		Borehole BH 7 Terminated at 8.70 m						
			65	10								
			64	11								
			63	12								
			62	13								
			61	14								
			60	15								
				16								

General Defect Description:

METHOD
- DT diatube
- AS auger screwing
- AD auger drilling
- RR roller/tricone
- NMLC core drilling
- NQ, HQ, PQ core drilling
- casing used
- barrel withdrawn

WATER
- water level
- water inflow
- D none observed
- ¥ not measured
- Drilling Water
- partial loss
- complete loss

POINT LOAD TEST
- D -diametral
- A -axial
- I -irregular

GRAPHIC LOG/CORE LOSS
- core recovered (hatching indicates material)
- no core recovered

WEATHERING
- FR -fresh
- SW -slightly
- MW -moderately
- HW -highly
- EW -extremely

STRENGTH
- EL -extremely low
- VL -very low
- L -low
- M -medium
- H -high
- VH -very high
- EH -extremely high

DEFECTS
- JT -joint
- PT -parting
- SM -seam
- PL -planar
- CV -curved
- IR -irregular
- RO -rough
- SO -smooth
- SL -slickensided

Coffey Partners International Pty. Ltd.
ACN 003 692 019

engineering log - cored borehole

COFFEY

borehole no: BH 7
sheet 2 of 3

office job no: N6126/1

client:	HUNTER AREA HEALTH SERVICE	hole commenced:	15-04-97
principal:		hole completed:	15-04-97
project:	JOHN HUNTER HOSPITAL PSYCHIATRIC FACILITY	logged by:	JEL
borehole location:	374686.5mE 6355829.2mN	checked by:	
drill model and mounting:	Gemco HS7 Trailer	slope: -90 DEG	R.L.Surface: 75.5 m
barrel type and length:	NMLC 3.0m	fluid: Water	bearing: datum: AHD

drilling information					rock substance			rock mass defects		
method	case-lift	water	R.L.	depth metres	graphic log / core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength (EL VL L M H VH EH)	point load test Is(50) MPa	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
		No water observed	75	1		Continued from non-core borehole						
			74	2								
			73									
NMLC			72	3		NO CORE: From 2.7m to 5.4m No Core. Logged from cuttings. Interbedded Siltstone and Claystone with occasional hard lense, grey-orange.	EW					
			71	4								
			70	5		CLAYSTONE: grey-orange-brown, with some siltstone lenses.						SM OC 5.45m to 5.80m.
			69	6		NO CORE:						
			68	7		SILTSTONE: fine grained, dark grey, with some sandstone lenses.	HW		D 0.05 A 0.06			PT 5-10deg. IR RO CN fractured zone 50mm. PT 0-5deg. IR RO CN JT 80deg. IR RO CN JT 70deg. IR RO FE BT 80deg. IR RO FE SM OC 30mm. SM OC 50mm.
				8		COAL: black, decomposed.	EW					

General Defect Description:
5-10deg. IR RO CN

METHOD		WATER		POINT LOAD TEST		WEATHERING		STRENGTH		DEFECTS	
DT	diatube		water level	D -diametral	I -irregular	FR	-fresh	EL	-extremely low	JT	-joint
AS	auger screwing		water inflow	A -axial		SW	-slightly	VL	-very low	PT	-parting
AD	auger drilling	O	none observed	GRAPHIC LOG/CORE LOSS		MW	-moderately	L	-low	SM	-seam
RR	roller/tricone	X	not measured		core recovered (hatching indicates material)	HW	-highly	M	-medium	PL	-planar
NMLC	core drilling		Drilling Water			EW	-extremely	H	-high	CV	-curved
NQ, HQ, PQ	core drilling		partial loss					VH	-very high	IR	-irregular
	casing used		complete loss		no core recovered			EH	-extremely high	RO	-rough
	barrel withdrawn									SO	-smooth
										SL	-slickensided

Coffey Partners International Pty. Ltd.
ACN 003 692 019

engineering log - borehole

borehole no: BH 7
sheet 1 of 3

office job no: N6126/1

client:	HUNTER AREA HEALTH SERVICE	hole commenced:	15-04-97
principal:		hole completed:	15-04-97
project:	JOHN HUNTER HOSPITAL PSYCHIATRIC FACILITY	logged by:	JEL
borehole location:	374686.5mE 6355829.2mN	checked by:	
drill model and mounting:	Gemco HS7 Trailer	slope: -90 DEG	R.L.Surface: 75.5 m
hole diameter:	100mm	bearing:	datum: AHD

method	penetration 1 2 3 4	support	water	samples, tests, etc	R.L.	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
ADV		NIL	D		75	1		SW	SILTY SAND: fine to medium grained, light grey-brown, trace of gravel fine grained,	D			SLOPEWASH
								CH	SANDY CLAY: high plasticity, grey-orange-brown, sand fine to coarse grained,	M =Wp	VSt		RESIDUAL
									With depth grading into extremely weathered rock, occasional hard bands.				V bit refusal at 1.3m.
ADT					74	2			SILTSTONE: fine grained, grey, with orange staining, with some interbedded sandstone and claystone bands.		H		EW ROCK
					73				With some carbonaceous staining 2.0m to 2.2m.				
					72	3			Continued as cored borehole from 2.70 m				
					71	4							
					70	5							
					69	6							
					68	7							
						8							

METHOD
AS auger screwing*
AD auger drilling*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*Bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
Nil no support M mud
C casing
PENETRATION 1 2 3 4
little resistance
ranging to
very slow progress
WATER
* not measured D none observed
water level
water outflow
water inflow

SAMPLES, TESTS, ETC
U undisturbed sample (mm)
D disturbed sample
Bs bulk sample
E environmental sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
VS vane shear
PM pressuremeter
DP dynamic penetrometer
WS water sample
PZ piezometer

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Coffey Partners International Pty. Ltd.
ACN 003 692 019

engineering log - cored borehole

borehole no: BH 4
sheet 2 of 2

office job no: N6126/1

client:	HUNTER AREA HEALTH SERVICE	hole commenced:	14-04-97
principal:		hole completed:	14-04-97
project:	JOHN HUNTER HOSPITAL PSYCHIATRIC FACILITY	logged by:	JEL
borehole location:	374726.1mE 6355777.0mN	checked by:	
drill model and mounting:	Gemco HS7 Trailer	slope: -90 DEG	R.L.Surface: 72.4 m
barrel type and length:	NMLC 3.0m	fluid: Water bearing:	datum: AHD

drilling information					rock substance						rock mass defects		
method	case-lift	water	R.L.	depth metres	graphic log core loss	substance description rock type: grain characteristics colour, structure, minor components	weathering	Est. Strength EL VL L M H VH EH	point load test Is(50) MPa	RQD %	defect spacing mm 30 100 300 1000 3000	defect description type, inclination planarity, roughness, coating, thickness unless otherwise noted defects follow general description below
			72	1		Continued from non-core borehole						
NMLC		No water observed	71	2		NO CORE: CLAYSTONE: light grey, orange-brown, indistinct bedding. NO CORE: SILTSTONE: fine grained, light grey-brown, with some interbedded claystone. CLAYSTONE: dark brown, carbonaceous EW coal. CLAYSTONE: grey-orange-brown. CLAYSTONE: dark brown-black, carbonaceous EW coal. CLAYSTONE: light grey.	EW				Highly fractured and decomposed from 1.0m to 3.4m.
			70	3		NO CORE: CLAYSTONE: dark brown-black, carbonaceous EW coal. SILTSTONE: fine grained, light grey-brown. SANDY SILTSTONE: fine grained, grey-brown, with some interbedded claystone.					PT 0-5deg. IR SO CN JT 80deg. IR RO CN PT 0-5deg. PL RO CN Fractured zone 50mm thick. JT 70deg. IR RO CN Fractured zone 100mm thick. JT 80 deg. IR RO CN PT 0-5deg. PL RO CN PT 0-5deg. PL RO CN PT 0-5deg. PL RO CN SM DC 10mm thick
			69	4								
			68	5		NO CORE: SILTSTONE: fine grained, grey, fractured. SANDY SILTSTONE: fine grained, light grey, with some interbedded claystone.					Decomposed fractured from 4.6m to 5.5m. SM DC 50mm thick.
			67	6		SILTY SANDSTONE: fine to medium grained, light grey, with some orange staining.	HW		D 0.05 A 0.06 D 0.06 A 0.09		PT 0-5deg. PL RO CN PT 0-5deg. IR RO CN PT 0-5deg. IR RO CN PT 0-5deg. IR RO CN PT 0-5deg. 5mm IR RO CL
			66	7		Borehole BH 4 Terminated at 6.60 m						
			65	8								

General Defect Description:

METHOD		WATER		POINT LOAD TEST		WEATHERING		STRENGTH		DEFECTS	
DT	diatube	▽	water level	D -diametral	I -irregular	FR	-fresh	EL	-extremely low	JT	-joint
AS	auger screwing	▷	water inflow	A -axial		SW	-slightly	VL	-very low	PT	-parting
AD	auger drilling	O	none observed	GRAPHIC LOG/CORE LOSS		MW	-moderately	L	-low	SM	-seam
RR	roller/tricone	*	not measured		core recovered (hatching indicates material)	HW	-highly	M	-medium	PL	-planar
NMLC	core drilling	◁	Drilling Water partial loss			EW	-extremely	H	-high	CV	-curved
NQ, HQ, PQ	core drilling	◁	complete loss		no core recovered			VH	-very high	IR	-irregular
	casing used							EH	-extremely high	RO	-rough
	barrel withdrawn									SO	-smooth
										SL	-slickensided

Coffey Partners International Pty. Ltd.
ACN 003 692 019

engineering log - borehole

borehole no: BH 4
sheet 1 of 2

office job no: N6126/1

client:	HUNTER AREA HEALTH SERVICE	hole commenced:	14-04-97
principal:		hole completed:	14-04-97
project:	JOHN HUNTER HOSPITAL PSYCHIATRIC FACILITY	logged by:	JEL
borehole location:	374726.1mE 6355777.0mN	checked by:	
drill model and mounting:	Gemco HS7 Trailer	slope: -90 DEG	R.L.Surface: 72.4 m
hole diameter:	100mm	bearing:	datum: AHD

method	penetration 1 2 3 4	support	water	samples, tests, etc	R.L.	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
ADV		NIL	D		72	1		SP	GRAVELLY SAND: fine to medium grained, grey-brown, gravel fine to medium grained,	M			SLOPEWASH
								CI	SANDY CLAY: medium plasticity, grey-orange-brown, sand fine to coarse grained,	M <Wp	VSt		RESIDUAL
													V bit refusal at 0.9m.
									SANDSTONE: fine to medium grained, grey,		H		EW ROCK
									Continued as cored borehole from 1.00 m				
					71	2			TC bit refusal met on rock.				
					70	3							
					69	4							
					68	5							
					67	6							
					66	7							
					65	8							

COFBORE VERSION B3 M01 20 / 5/97 11 :52 :4

METHOD
AS auger screwing*
AD auger drilling*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
*bit shown by suffix
B blank bit
V V bit
T TC bit
e.g. ADT

SUPPORT
Nil no support M mud
C casing

PENETRATION
1 2 3 4
little resistance
ranging to
very slow progress

WATER
* not measured D none observed
water level
water outflow
water inflow

SAMPLES, TESTS, ETC
U undisturbed sample (mm)
D disturbed sample
Bs bulk sample
E environmental sample
N standard penetration test:
N* SPT + sample recovered
Nc SPT with solid cone
VS vane shear
PM pressuremeter
DP dynamic penetrometer
WS water sample
PZ piezometer

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
based on unified classification system

MOISTURE
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

CONSISTENCY/DENSITY INDEX
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Coffey & Partners Pty. Ltd.

engineering log excavation

COFFEY

pit no: 30

sheet 1 of 1

office and job no: NEWCASTLE N1857/5

SINCLAIR KNIGHT & PARTNERS PTY. LTD.
PUBLIC WORKS DEPARTMENT OF NSW.

project: CARPARK EXTENSION & RING ROAD : RANKIN PARK.

pit location: REFER TO DRAWING NO. N1857/5-1

pit commenced: 23.5.85
pit completed: 23.5.85
supervised by: NH
checked by: JPH

equipment type and model: John Deere JD 400

excavation dimensions: 2.0 m long, 0.45 m wide

R.L. surface: 77.5 m

datum: AHD

method	penetration 1 2 3	support	water	notes samples, tests, etc.	R.L. depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics; colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer 100 200 300 400 kPa	structure and additional observations
BH		NIL					SM/ SL	SILTY CLAYEY SAND-dark grey				TOPSOIL, roots, grass
					0.5		CL	SANDY CLAY-medium plasticity grey brown, fine to medium sand.	≥Wp	?St		
							CH	SANDY CLAY-high plasticity grey with orange & brown staining, fine to medium sand some fine to coarse gravel & sandstone cobbles.	≥Wp	St/ VSt		Seepage downhill along old roots. Roots to 50mm dia.
					1.0							
					1.5			MW SHALE-grey, angular fragments, ≈50mm max. bedding.				
					2.0			End of Pit 30 at 1.7m on backhoe refusal.				

key

method
- N natural exposure
- E existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper

support
- T timbering

penetration 1 2 3 — no resistance ranging to refusal

water
- 10 Jan 78 water level on date shown
- water outflow
- water inflow

notes
- samples and tests
- U50 undisturbed sample 50 mm diameter
- D disturbed sample
- N standard penetration test: figure = result
- N* SPT + sample
- Nc cone penetrometer

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet

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

T83-003

Coffey & Partners Pty. Ltd.

engineering log excavation

COFFEY

pit no: 29

sheet 1 of 1

office and job no: NEWCASTLE N1857/5

SINCLAIR KNIGHT & PARTNERS PTY. LTD.
PUBLIC WORKS DEPARTMENT OF NSW.

project: CARPARK EXTENSION & RING ROAD : RANKIN PARK.

pit location: REFER TO DRAWING NO. N1857/5-1

pit commenced: 23.5.85
pit completed: 23.5.85
supervised by: NH
checked by: JPH

equipment type and model: John Deere JD 400

excavation dimensions: 2.0 m long, 0.45 m wide

R.L. surface: 78.3 m

datum: AHD

method	penetration 1 2 3	support	water	notes samples, tests, etc.	R.L. / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics; colour, secondary and minor components	moisture condition	consistency / density index	hand penetrometer 100 200 300 400 kPa	structure and additional observations
							CL/CH	SANDY SILTY CLAY-dark grey.				TOPSOIL, grass, roots
BH		NIL	NONE ENCOUNTERED		0.5		CH	SANDY CLAY-high plasticity, grey, orange & brown, fine to medium sand. becoming sandier.	>Wp	St	x	Fine roots.
					1.0			HW/MW SANDSTONE-fine to medium grained, grey & orange staining, clay filled joints	M		x	
					1.5			End of Pit 29 at 1.0m on backhoe refusal.				
					2.0							

key

method

N	natural exposure
E	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper

support
T timbering

penetration 1 2 3 — no resistance ranging to refusal

water
10 Jan 78 water level on date shown
water outflow
water inflow

notes

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test: figure = result
N*	SPT + sample
Nc	cone penetrometer

classification symbols and soil description
based on unified classification system

moisture

D	dry
M	moist
W	wet

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

T83-003

Coffey & Partners Pty. Ltd.

engineering log excavation

COFFEY

pit no: 34

sheet 1 of 1

office and job no: NEWCASTLE N1857/5

SINCLAIR KNIGHT & PARTNERS PTY. LTD.
PUBLIC WORKS DEPARTMENT OF NSW.

project: CARPARK EXTENSION & RING ROAD : RANKIN PARK.

pit location: REFER TO DRAWING NO. N1857/5-1

pit commenced: 23.5.85
pit completed: 23.5.85
supervised by: NH
checked by: JPH

equipment type and model: John Deere JD 400

excavation dimensions: 2.5 m long, 0.45 m wide

R.L. surface: 77 m
datum: AHD

method	penetration 1 2 3	support	water	notes samples, tests, etc.	R.L. depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency/ density index	hand penetrometer 100 200 300 400 kPa	structure and additional observations
							SM/ SC	SILTY CLAYEY SAND-dark grey				TOPSOIL, grass & roots.
BH		NIL	NONE ENCOUNTERED		0.5		CL/ CH	SANDY CLAY-medium to high plasticity, grey brown, fine to medium sand.	> Wp	VSt	×	very sandy
										St	×	
							CH	SANDY CLAY-high plasticity, grey with orange staining.	> Wp	St	×	
					1.0			HW/MW SANDSTONE-fine to medium grained, grey with & red staining, clay filled joints.				
					1.5			End of Pit 34 at 1.2m.				
					2.0							

key

method

N	natural exposure
E	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper

support
T timbering

penetration 1 2 3 — no resistance ranging to refusal

water
10 Jan 78 water level on date shown
water outflow
water inflow

notes

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test: figure = result
N*	SPT + sample
Nc	cone penetrometer

classification symbols and soil description
based on unified classification system

moisture

D	dry
M	moist
W	wet

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

T83-003

Coffey & Partners Pty. Ltd.

engineering log borehole

COFFEY

borehole no: 6

sheet 1 of 9

office and job no: NEWCASTLE, N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

hole commenced: 25 August 1983
hole completed: 2 September 1983
supervised by: AML
checked by: PJNP

project: PROPOSED GREATER NEWCASTLE HOSPITAL
borehole location: RANKIN PARK NEWCASTLE

drill model and mounting: Mobile Drill B40L
hole diameter: 3 7/8" mm
slope: 90 deg.
bearing: – deg.
R.L. surface: ≃ 95.4 m
datum:

method	penetration 1 2 3	support	water	notes samples, tests, etc.	R.L. depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency, density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
ADT							SM	TOPSOIL – SILTY SAND, fine grained.	M			
								SANDSTONE, fine grained, white becoming yellow/brown – highly weathered.				
					2			CONGLOMERATE, fine to medium sand & some coarse, with fine to medium gravel, yellow/brown, highly weathered, becoming white/brown & moderately weathered.				
HAMMER DRILL					4							
					6			SILTSTONE & SANDSTONE, fine grained, grey.				
					8			As above, highly weathered, yellow/brown.				
								SANDSTONE, fine grained, grey & brown, with siltstone bands.				
					10							
					12			Some coarse sandstone/conglomerate with fine to medium rounded gravel.				
								CONGLOMERATE, grey/brown to brown, and SANDSTONE, fine to medium grained, brown to yellow/brown.				
					14							
					16							very easy penetration

key

method
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
*bit shown by suffix:
B – blank bit
V – "V" bit
T – TC bit
e.g. ADT

support C casing, M mud

penetration 1 2 3 — no resistance ranging to refusal

water
10 Jan 78 water level on date shown
water inflow
water outflow

notes — samples and tests
U50 — undisturbed sample 50 mm diameter
D — disturbed sample
N — standard penetration test: figure = result
N* — SPT + sample
Nc — cone penetrometer

classification symbols and soil description based on unified classification system

moisture
D — dry
M — moist
W — wet

consistency/density index

VS	–	very soft
S	–	soft
F	–	firm
St	–	stiff
VSt	–	very stiff
H	–	hard
Fb	–	friable
VL	–	very loose
L	–	loose
MD	–	medium dense
D	–	dense
VD	–	very dense

T81-001

Coffey & Partners Pty. Ltd.

engineering log borehole

COFFEY

borehole no: 6

sheet 2 of 9

office and job no: NEWCASTLE,N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

hole commenced: 25 August 1983
hole completed: 2 September 1983

project: PROPOSED GREATER NEWCASTLE HOSPITAL
supervised by: AML

borehole location: RANKIN PARK NEWCASTLE
checked by: PJNP

drill model and mounting: Mobile Drill B40L
slope: 90 deg.
R.L. surface: ≃ 95.4 m

hole diameter: 3 7/8" mm
bearing: – deg.
datum:

method	penetration 1 2 3	support	water	notes samples, tests, etc.	R.L. depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency, density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
HAMMER DRILL W TC					16			CONGLOMERATE & SANDSTONE, as above.				very easy penetration
					18							
					20							
					22							
					24			SILTSTONE, grey.				
					26			SANDSTONE, fine to medium grained, grey & CONGLOMERATE grey with rare coal bands.				
					28							
					30							
					32			CLAYSTONE, see below.				

key

method

AS	auger screwing*
AD	auger drilling*
R	roller/tricone
W	washbore
CT	cable tool

*bit shown by suffix:
B – blank bit
V – "V" bit
T – TC bit
e.g. ADT

support: C casing, M mud

penetration: 1 2 3 — no resistance ranging to refusal

water: 10 Jan 78 water level on date shown; water inflow; water outflow

notes — samples and tests

U50	undisturbed sample 50 mm diameter
D	disturbed sample
N	standard penetration test: figure = result
N*	SPT + sample
Nc	cone penetrometer

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet

consistency/density index

VS	–	very soft
S	–	soft
F	–	firm
St	–	stiff
VSt	–	very stiff
H	–	hard
Fb	–	friable
VL	–	very loose
L	–	loose
MD	–	medium dense
D	–	dense
VD	–	very dense

T81-001

Coffey & Partners Pty. Ltd.

engineering log borehole

COFFEY

borehole no: 6

sheet 3 of 9

office and job no: NEWCASTLE,N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

hole commenced: 25 August 1983
hole completed: 2 September 1983
supervised by: AML
checked by: PJNP

project: PROPOSED GREATER NEWCASTLE HOSPITAL
borehole location: RANKIN PARK NEWCASTLE

drill model and mounting: Mobile Drill B40L
hole diameter: 3 7/8"mm
slope: 90 deg.
bearing: – deg.
R.L. surface: ≃ 95.4 m
datum:

method	penetration 1 2 3	support	water	notes samples, tests, etc.	R.L. depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency, density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
W TC					32			CLAYSTONE,grey/white,trace of coal.				
					34			COAL,black.				
					36							
					38			CLAYSTONE,grey/white.				
								SANDSTONE,fine to medium grained,grey.				
					40							
					42							
					44							Blade bit refusal at 44.21m.
HAMMER DRILL								TUFF,grey.				Very hard drilling & poor sample recovery
								? ?				
					46			SANDSTONE,fine grained,grey				
								COAL,black.				
								SILTSTONE & SANDSTONE,fine grained,grey,becoming SANDSTONE.				
					48							

key

method
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
*bit shown by suffix:
8 – blank bit
V – "V" bit
T – TC bit
e.g. ADT

support
C casing
M mud

penetration
1 2 3
no resistance ranging to refusal

water
10 Jan 78 water level on date shown
water inflow
water outflow

notes – samples and tests
U50 – undisturbed sample 50 mm diameter
D – disturbed sample
N – standard penetration test: figure = result
N* – SPT + sample
Nc – cone penetrometer

classification symbols and soil description
based on unified classification system

moisture
D – dry
M – moist
W – wet

consistency/density index

VS	–	very soft
S	–	soft
F	–	firm
St	–	stiff
VSt	–	very stiff
H	–	hard
Fb	–	friable
VL	–	very loose
L	–	loose
MD	–	medium dense
D	–	dense
VD	–	very dense

T81-001

Coffey & Partners Pty. Ltd.

engineering log borehole

COFFEY

borehole no: 6

sheet 4 of 9

office and job no: NEWCASTLE, N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

hole commenced: 25 August 1983
hole completed: 2 September 1983

project: PROPOSED GREATER NEWCASTLE HOSPITAL
borehole location: RANKIN PARK NEWCASTLE

supervised by: AML
checked by: PJNP

drill model and mounting: Mobile Drill B40L
hole diameter: 3 7/8" mm

slope: 90 deg.
bearing: – deg.

R.L. surface: ≃ 95.4 m
datum:

method	penetration 1 2 3	support	water	notes samples, tests, etc.	R.L. depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency, density index	hand penetrometer kPa 100 200 300 400	structure and additional observations
HD					48			SANDSTONE, as above.				
W TC					50			SANDSTONE, medium grained, dark grey, becoming medium to coarse with some fine to medium rounded gravel.				
					52			SANDSTONE/CONGLOMERATE, as above, carbonaceous traces.				
								SANDSTONE, fine grained, some siltstone, grey, coal traces.				Poor cutting return
					54							jointed/ fractured? fast drill penetration
					56			CONGLOMERATE, grey/green, with bands of medium to coarse sandstone, grey.				
					58							
								TUFF?				hand drilling – poor recovery
					60			SANDSTONE, fine to medium grained grey/green. SILTSTONE BAND.				
					62			(SANDSTONE)/CONGLOMERATE, as above.				
					64			SANDSTONE, see below.				

key

method
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
*bit shown by suffix:
B – blank bit
V – "V" bit
T – TC bit
e.g. ADT

support C casing, M mud

penetration 1 2 3 — no resistance ranging to refusal

water
10 Jan 78 water level on date shown
water inflow
water outflow

notes — samples and tests
U50 — undisturbed sample 50 mm diameter
D — disturbed sample
N — standard penetration test: figure = result
N* — SPT + sample
Nc — cone penetrometer

classification symbols and soil description based on unified classification system

moisture
D — dry
M — moist
W — wet

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

T81-001

Coffey & Partners Pty. Ltd.

engineering log borehole

COFFEY

borehole no: 6

sheet 5 of 9

office and job no: NEWCASTLE,N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

hole commenced: 25 August 1983
hole completed: 2 September 1983

project: PROPOSED GREATER NEWCASTLE HOSPITAL
borehole location: RANKIN PARK NEWCASTLE

supervised by: AML
checked by: PJNP

drill model and mounting: Mobile Drill B40L
hole diameter: 3 7/8" mm

slope: 90 deg.
bearing: – deg.

R.L. surface: ≃ 95.4 m
datum:

method	penetration 1 2 3	support	water	notes samples, tests, etc.	R.L. depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics colour, secondary and minor components	moisture condition	consistency, density index	hand penetrometer 100 200 300 400 kPa	structure and additional observations
WT					64			SANDSTONE,fine grained,grey with rare siltstone bands & coarse sand/gravelly bands becoming fine to medium.				
					66			Carbonaceous band.				
					68							
					70			CONGLOMERATE,grey/green, with thin coal bands at approx. 70m.				
								SANDSTONE,as above.				
					72			Becoming fine grained with increasing silt content.				
					74			Borehole 6 continued on sheet 6 - Engineering Log - Cored Borehole				
					76							
					78							
					80							

key

method
AS auger screwing*
AD auger drilling*
R roller/tricone
W washbore
CT cable tool
*bit shown by suffix:
B — blank bit
V — "V" bit
T — TC bit
e.g. ADT

support C casing M mud

penetration 1 2 3 — no resistance ranging to refusal

water 10 Jan 78 water level on date shown; water inflow; water outflow

notes — samples and tests
U50 — undisturbed sample 50 mm diameter
D — disturbed sample
N — standard penetration test: figure = result
N* — SPT + sample
Nc — cone penetrometer

classification symbols and soil description based on unified classification system

moisture
D — dry
M — moist
W — wet

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

T81-001

engineering log – cored borehole

COFFEY

borehole no: 6

sheet 6 of 9

office and job no: NEWCASTLE, N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

hole commenced: 25 August 1983
hole completed: 2 September 1983

project: PROPOSED GREATER NEWCASTLE HOSPITAL
borehole location: RANKIN PARK NEWCASTLE

supervised by: AML
log checked by: PJNP

drill model and mounting: Mobile Drill B40L slope: 90deg. R.L. surface: ≃ 95.4 m
barrel type and length: TT 3.1m fluid water/mud bearing: –deg. datum:

drilling information				rock substance					rock mass defects	
method	case-lift	water		R.L. depth metres	graphic log core loss	substance description rock type: grain characteristics, colour, structure, minor components	weathering	strength Is (50) EL VL L M H VH EH	defect spacing mm 30 300 3000 3000	defect description thickness, type, inclination, planarity, roughness, coating. particular / general
NQ				72		For log of borehole 0 to 73.27m see Engineering log - borehole				
				74		SILTSTONE, grey becoming black, with coal bands, bedding 0°-20°.	Fr			Defects are partings 0-20°, planar, rough, some striated.
						COAL, black with siltstone bands to 100mm.				
						NO CORE, 0.16m. COAL.				
				76		SILTSTONE, light grey, laminated 0°-5°.				Joint 90°, irregular, polished, striated.
										100mm? CLAY/CRUSH SEAM
						COAL				Zones of very closely spaced partings.
				78		NO CORE, 0.08m.				
						Grading to				Partings & joints 20°, planar, irregular, polished, striated, with associated crushed surfaces to 20mm.
				80		SANDSTONE, fine grained, grey, laminated to thinly bedded 0°-5° & up to 30° in parts.				
						Grading to				
				82		SANDSTONE, medium grained, grey/white, poorly defined bedding 0°-15°.				Joints 20° & 40°, planar rough.
			82.75m 083°/86°							20mm open joint, 30°, planar, rough, clean.
				84						Defects are partings/breaks? 0°-20°, planar, rough, clean.
				86		SANDSTONE, fine to medium grained, grey/white, carbonaceous traces in finer bands.				Water loss on partings.
			WL 87.2m 8/9/83 5/9/83							Joints 70°, planar, smooth, clean.
				88		SILTSTONE, grey.				

key

method: AS auger screwing; AD auger drilling; R roller/tricone; W washbore; NMLC NMLC core drilling

case-lift: casing used; barrel withdrawn

water: 10 Oct 73 water level date shown; water inflow; partial drilling water loss; complete drilling water loss

pressure test: (350) maximum effective pressure in test (kPa)

graphic log/core loss: core recovered (hatching indicates material); no core recovered

weathering: Fr fresh; SW slightly weathered; MW moderately weathered; HW highly weathered; EW extremely weathered

strength (indirect tensile strength): EL extremely low; VL very low; L low; M medium; H high; VH very high; EH extremely high

T78–097

Coffey & Partners Pty. Ltd.

engineering log – cored borehole

COFFEY

borehole no: 6

sheet 7 of 9

office and job no: NEWCASTLE N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

project: PROPOSED GREATER NEWCASTLE HOSPITAL

borehole location: RANKIN PARK, NEWCASTLE

hole commenced: 25 August 1983

hole completed: 2 September 1983

supervised by: AML

log checked by: PJNP

drill model and mounting: Mobile Drill B40L slope: 90 deg.

barrel type and length: TT 3.1 m fluid Mud bearing: deg.

R.L. surface: ≃ 95.4 m

datum:

drilling information				rock substance				rock mass defects	
method	case-lift	water	Borehole Orientation	R.L. depth metres	graphic log core loss	substance description rock type: grain characteristics, colour, structure, minor components	weathering	strength Is (50) EL VL L M H VH EH	defect spacing mm 30 100 300 1000 3000	defect description thickness, type, inclination, planarity, roughness, coating. particular / general
N Q			91.75 m 083°/87°	88		SILTSTONE, grey and dark grey, laminated 0 to 5°.	Fr			10mm Crush Seam 0° 20mm Broken Zone 0° Joints 60°-80° planar (irregular), smooth (rough), clean, becoming 45° to 60°.
				90		SANDSTONE, fine grained, grey, with interbanded SILTSTONE, laminated to thinly bedded 0-5°.				Joints 20°, planar, smooth to rough, clean. 70° fracture irregular
				92		becoming SILTSTONE, dark grey.				
				94		SILTSTONE, black, carbonaceous with minor coaly bands.				30mm Bedding Plane 15mm Crush Seams
				96		SILTSTONE, grey.				
						COAL				
						No core 0.12 m.				Polished partings 0°
				98		SILTSTONE/SANDSTONE, fine grained, interbanded + interlaminated, 0-5°.				20mm Bedding Plane Crush Seam 30mm Broken Zone 0°
				100						1mm CLAY Seam 3° 3mm Crush Seam 0° Joints 60°-80° planar, irregular, rough, polished, striated, clean & CLAY stained.
						No core 0.2 m.				
					Fe	Siderite				
				102		SANDSTONE, fine grained, grey with darker silts laminations 0-5°.	SW			LIMONITE staining on defects. Joint 45°, planar, rough, lim. stained.
				104						

Partings/Breaks ?planar, sm., clean

Defects are

key

method: AS auger screwing; AD auger drilling; R roller/tricone; W washbore; NMLC NMLC core drilling

case-lift: casing used; barrel withdrawn

water: 10 Oct 73 water level date shown; water inflow; partial drilling water loss; complete drilling water loss

pressure test: (350) maximum effective pressure in test (kPa)

graphic log-core loss: core recovered (hatching indicates material); no core recovered

weathering: Fr fresh; SW slightly weathered; MW moderately weathered; HW highly weathered; EW extremely weathered

strength (indirect tensile strength): EL extremely low; VL very low; L low; M medium; H high; VH very high; EH extremely high

T78–097

engineering log – cored borehole

COFFEY

borehole no: 6

sheet 8 of 9

office and job no: NEWCASTLE N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

project: PROPOSED GREATER NEWCASTLE HOSPITAL

borehole location: RANKIN PARK, NEWCASTLE

hole commenced: 25 August 1983

hole completed: 2 September 1983

supervised by: AML

log checked by: PJNP

drill model and mounting: Mobile Drill B40L slope: 90 deg. R.L. surface: ≃ 95.4 m

barrel type and length: TT 3.1 m fluid: Water bearing: deg. datum:

drilling information				rock substance				rock mass defects	
method	case-lift	water	Borehole Orientation	R.L. / depth metres	graphic log / core loss	substance description: rock type: grain characteristics, colour, structure, minor components	weathering	strength Is (50)	defect spacing mm (300, 1000, 3000)	defect description: thickness, type, inclination, planarity, roughness, coating. particular / general
N Q			107.8 m 083°/87°	104		SANDSTONE, fine grained, grey with darker silt & carbonaceous laminae, 0-5°.	SW			10,5mm Broken Zones 0° with CLAY infilling. Joints 20°-60°, planar, irregular, rough, lim. stained, rare CLAY + crshd. ROCK veneer, bleaching of rock on joints.
				106						
				108		As above, becoming grey-white.				Parting 3°, partial Lim. staing.
				110						
				112		SILTSTONE band.				10mm Broken Zone 0°.
				114		SILTSTONE/SANDSTONE, fine grained, grey, interlaminated 0-5°, becoming SILTSTONE.				
				116						
						COAL, black.				WATER inflow in COAL Seam,
				118		No core 1.39 m. Coal cored but not recovered - not mined out?				Defects are joints 45°-90°, planar, irregular, rough, clean.
						BOREHOLE SEAM				
				120		SANDSTONE, fine to med. grained, grey, massive.				

Defects are Partings 0-5°, planar, rough, clean + Lim. stained, rare CLAY stain, some bleachg. of surfaces on some partings.

key

method: AS auger screwing; AD auger drilling; R roller/tricone; W washbore; NMLC NMLC core drilling

case-lift: casing used; barrel withdrawn; water: 10 Oct 73 water level date shown; water inflow; partial drilling water loss; complete drilling water loss

pressure test: (350) maximum effective pressure in test (kPa)

graphic log/core loss: core recovered (hatching indicates material); no core recovered

weathering: Fr fresh; SW slightly weathered; MW moderately weathered; HW highly weathered; EW extremely weathered

strength (indirect tensile strength): EL extremely low; VL very low; L low; M medium; H high; VH very high; EH extremely high

T78–097

engineering log – cored borehole

borehole no: 6
sheet 9 of 9

office and job no: NEWCASTLE N1857/2

SINCLAIR KNIGHT & PARTNERS PTY. LTD.

project: PROPOSED GREATER NEWCASTLE HOSPITAL
borehole location: RANKIN PARK, NEWCASTLE.

hole commenced: 25 August 1983
hole completed: 2 September 1983
supervised by: AML
log checked by: PJNP

drill model and mounting: Mobile Drill B40L slope: 90 deg.
barrel type and length: TT 3.1 m fluid Water bearing: deg.
R.L. surface: ≃ 95.4 m
datum:

drilling information				rock substance					rock mass defects	
method	case-lift	water	R.L. / depth metres	graphic log / core loss	substance description: rock type: grain characteristics, colour, structure, minor components	weathering	strength Is (50)	defect spacing mm (300, 3000)	defect description: thickness, type, inclination, planarity, roughness, coating. particular / general
N Q			120		SANDSTONE, as above.	SW			
					Borehole 6 terminated 121.2 m.				

key

method: AS auger screwing; AD auger drilling; R roller/tricone; W washbore; NMLC NMLC core drilling

case-lift: casing used; barrel withdrawn

water: 10 Oct 73 water level (date shown); water inflow; partial drilling water loss; complete drilling water loss

pressure test: (350) maximum effective pressure in test (kPa)

graphic log/core loss: core recovered (hatching indicates material); no core recovered

weathering: Fr fresh; SW slightly weathered; MW moderately weathered; HW highly weathered; EW extremely weathered

strength (indirect tensile strength): EL extremely low; VL very low; L low; M medium; H high; VH very high; EH extremely high

T78—097