





Borehole No. **R17-BH16**  
 Sheet 2 of 6  
 Project No. **GEOTLCOV24303AC**  
 Date started: **20.6.2011**  
 Date completed: **21.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

## Engineering Log - Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model and mounting: Hydrapower Scout Truck Easting: slope: -75° R.L. Surface: 3.30  
 hole diameter: 100 mm Northing bearing: 177.5° datum: AHD

drilling information				material substance								
method	penetration 1 2 3	support water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
WB		C					SP	<b>SAND:</b> Coarse grained, grey, brown, trace of clay. <i>(continued)</i>	W			
					-5		SC	<b>Clayey SAND:</b> Medium to coarse sand, pale grey, red, brown, high plasticity clay.				
					-9							
					-6							
					-10							
					-7							
					-11		SP	<b>SAND:</b> Coarse grained, grey, pale grey, trace of clay.				RESIDUAL SOIL
					-8							
					-12							
					-13							
					-10			<b>SANDSTONE:</b> Extremely weathered, coarse grained, pale grey to red brown, estimated to be low strength. Remoulds to a sand. 13.45m - Highly weathered.				WEATHERED BEDROCK
					-14			Borehole R17-BH16 continued as cored hole				
					-11							
					-12							
					-16							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4  no resistance ranging to refusal <b>water</b>  10/1/98 water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
--	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH17**  
 Sheet 1 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **16.6.2011**  
 Date completed: **16.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

# Engineering Log - Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model and mounting: Edson 3000 Truck Easting: slope: -90° R.L. Surface: 3.2  
 hole diameter: 100 mm Northing bearing: N/A datum: AHD

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 penetro- meter kPa 100 200 300 400	structure and additional observations
ADT		C		3				<b>FILL: BRICK PAVERS:</b> Brown, 0.08m <b>FILL: Clayey Gravelly SAND:</b> Medium to coarse grained, brown, grey, fine gravel, medium plasticity clay.	D			FILL
			SPT 6,7,4 N*=11		1			<b>FILL: SAND:</b> Coarse grained, grey, brown, yellow, red mottled, with some fine sandstone gravel, trace of clay.				
					2							
					1			<b>FILL: Silty CLAY:</b> Low plasticity, black, with some organic material, trace of sand and fine gravel.	W			
			SPT 2,0,0 N*=0		3			3.10m - With some sand.				
					0							
					4		CH	<b>CLAY:</b> High plasticity, red, brown, grey, trace of fine grained ironstone gravel.	M	St-VSt		ALLUVIUM
			SPT 2,3,5 N*=8		-1							
					5							
					-2		CH	<b>CLAY:</b> High plasticity, grey, red, brown, yellow, with some coarse sand, trace of fine to medium grained sandstone and ironstone gravel.		St-VSt		
			SPT 2,5,6 N*=11		6							
					-3		CL	<b>Gravelly CLAY:</b> Low plasticity, brown, grey, red, fine angular sandstone and ironstone gravel.	W			
					7		CH	<b>CLAY:</b> High plasticity, pale grey, red brown mottled, trace of sand.				
			SPT 4,7,8 N*=15		-4							
					8							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
--	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH17**  
 Sheet 2 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **16.6.2011**  
 Date completed: **16.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

# Engineering Log - Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model and mounting: Edson 3000 Truck Easting: slope: -90° R.L. Surface: 3.2  
 hole diameter: 100 mm Northing bearing: N/A datum: AHD

drilling information					material substance							
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
	1 2 3				RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
ADT		C			-5		CH	<b>CLAY:</b> High plasticity, pale grey, red brown mottled, trace of sand. <i>(continued)</i> 8.10m - With some coarse sand.	W	St-VSt		RESIDUAL SOIL
				SPT 4,12,10 N*=22	9		SC	<b>Clayey SAND:</b> Coarse grained, pale grey, grey.		MD		
					-6		CH	<b>Sandy CLAY:</b> High plasticity clay, grey, pale grey, coarse sand.		St-VSt	*	
					10						*	WEATHERED BEDROCK
				SPT 4,16 N*=R	-7			<b>SANDSTONE:</b> Extremely weathered, coarse grained, pale grey, remoulds to a sandy clay. 10.30m - Highly weathered.			*	
					11			Borehole R17-BH17 continued as cored hole				
					-8							
					12							
					-9							
					13							
					-10							
					14							
					-11							
					15							
					-12							
					16							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4  no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
--	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

# Engineering Log - Borehole

 Client: **Infrastructure NSW**

 Date started: **3.6.2011**

Principal:

 Date completed: **3.6.2011**

 Project: **SICEEP**

 Logged by: **RH**

 Borehole Location: **Darling Drive, Haymarket, NSW**

 Checked by: **SS**

drill model and mounting:	Ausroc 4000 Truck	Easting:	slope:	-90°	R.L. Surface:	3.5
hole diameter:	100 mm	Northing:	bearing:	N/A	datum:	AHD

drilling information				material substance			
method	penetration	support	notes	depth	classification	material	structure and observations
1 2 3			samples, tests, etc	metres	symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.	
DT		C		3		ASPHALT CONCRETE	PAVEMENT
ADT				1		FILL: Sandy SILT: Low plasticity, pale brown, fine to medium grained sand with some clay. FILL: Clayey SAND: Fine to coarse grained, dark brown and black with red brown mottles, some pale brown sand pockets, fine to coarse grained sandstone and fine grained ironstone gravels throughout, trace of glass and wire refuse.	FILL
			SPT 8,5,4 N*=9	2			
				2			
				1		2.5m - Increasing clay content.	
			SPT 4,3,3 N*=6	3			
				0			
				4	SW	SAND: Fine to coarse grained, grey, trace of silt.	ALLUVIUM
			SPT 1,1,0 N*=1	-1			
				5	SC	Clayey SAND: Fine to medium to coarse grained, dark brown, low to medium plasticity clay.	
				6	SC	Clayey SAND: Fine to coarse grained, pale grey, clay with some pockets of shells throughout.	5.7m - Distinct organic odour
			SPT 1,2,3 N*=5	6			
				7		SANDSTONE: Extremely weathered, medium to coarse grained, pale yellow and brown, estimated to be very low strength, remoulds to a sand.	WEATHERED BEDROCK
				8			

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet Wp plastic limit WL liquid limit	<b>consistency/density index</b> 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
---	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

# Engineering Log - Borehole

 Client: **Infrastructure NSW**

 Date started: **2.6.2011**

Principal:

 Date completed: **2.6.2011**

 Project: **SICEEP**

 Logged by: **RH**

 Borehole Location: **Darling Drive, Haymarket, NSW**

 Checked by: **SS**

drill model and mounting:	Ausroc 4000 Truck	Easting:	slope:	-90°	R.L. Surface:	3.5
hole diameter:	100 mm	Northing	bearing:	N/A	datum:	AHD

drilling information				material substance							
method	penetration	support	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
	1 2 3			RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
ADV		C		3			ASPHALT: 0.05m CONCRETE: 0.45m				PAVEMENT
			D	1			FILL: <b>Sandy SILT</b> : Low plasticity, pale brown, fine grained sand, with some clay. FILL: <b>Clayey SAND</b> : Fine to medium grained, dark brown, trace of pale brown sand pockets, fine to coarse grained sandstone and fine grained ironstone gravel.	M			FILL
			SPT 9,6,8 N*=14	2							
				2							
			SPT 4,5,10 N*=15	1							
				3							
				0							
			SPT 4,3,2 N*=5	4		SW	<b>SAND</b> : Fine to coarse grained, with some low plasticity fines.		L		ALLUVIUM
				-1							
				5		SC	<b>Clayey SAND</b> : Fine grained, dark brown	W			
			SPT 5,4,3 N*=7	-2		SW	<b>SAND</b> : Medium to coarse grained, pale grey, trace of fines.		L-MD		
				6							
				-3							
			SPT 3,2,5 N*=7	7		SC	<b>Clayey SAND</b> : Fine to coarse grained, pale grey, pale orange brown, with some silt.	M			RESIDUAL SOIL
				-4							
				8							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
--	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH3**  
 Sheet 2 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **2.6.2011**  
 Date completed: **2.6.2011**  
 Logged by: **RH**  
 Checked by: **SS**

# Engineering Log - Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Darling Drive, Haymarket, NSW**

drill model and mounting: Ausroc 4000 Truck Easting: slope: -90° R.L. Surface: 3.5  
 hole diameter: 100 mm Northing bearing: N/A datum: AHD

drilling information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
	1 2 3								soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
ADV		C			-5			SC	<b>SANDSTONE:</b> Extremely to highly weathered, fine to coarse grained, pale orange brown, estimated to be very low to low strength. Borehole R17-BH3 continued as cored hole	M	L-MD		WEATHERED BEDROCK
					-9								
					-6								
					-10								
					-7								
					-11								
					-8								
					-12								
					-13								
					-10								
					-14								
					-11								
					-15								
					-12								
					-16								

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4  no resistance ranging to refusal <b>water</b>  10/1/98 water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH4**  
 Sheet 1 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **6.6.2011**  
 Date completed: **6.6.2011**  
 Logged by: **RH**  
 Checked by: **SS**

# Engineering Log - Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Darling Drive, Haymarket, NSW**

drill model and mounting: Ausroc 4000 Truck Easting: slope: -90° R.L. Surface: 3.3  
 hole diameter: 100 mm Northing bearing: N/A datum: AHD

drilling information				material substance								
method	penetration	support	notes	RL	depth	graphic log	classification	material	moisture	consistency/	pocket	structure and
	1 2 3		samples, tests, etc		metres		symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.	condition	density index	penetro- meter	additional observations
DT		C		3				ASPHALT: Dark grey, 0.04m. CONCRETE: Grey, 0.35m.	D			PAVEMENT
ADV				1				FILL: SAND: Fine to medium grained, pale brown with some low plasticity fines. FILL: Clayey SAND: Fine to medium grained, dark grey/dark brown, low plasticity fines, trace of light brown sand pockets and fine to medium grained sandstone and ironstone gravel.	M			FILL
			SPT 4,5,6 N*=11	2								
				2								
				1								2.3m - Slight hydrocarbon odour.
			SPT 2,2,4 N*=6	3								
				0								
				4				4m - Band of red, partially cemented sand.	W			
			SPT 8,8,5 N*=13	-1			SC	Clayey SAND: Fine to medium grained, grey.		L		ALLUVIUM
				5								
			SPT 5,3,2 N*=5	6				Clayey SAND: Fine to coarse grained, pale grey, with some silt. Trace of bivalves and shell fragments in bands throughout layer.				5.7m - organic odour
				7								
			SPT 8,14,11 N*=25	8				Clayey SAND: Fine to coarse grained, pale grey with red/orange brown mottles, with some silt and fine to medium grained sandstone gravel.		D		RESIDUAL SOIL

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
--	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12





Borehole No. **R17-BH4**  
 Sheet 2 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **6.6.2011**  
 Date completed: **6.6.2011**  
 Logged by: **RH**  
 Checked by: **SS**

# Engineering Log - Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Darling Drive, Haymarket, NSW**

drill model and mounting: Ausroc 4000 Truck Easting: slope: -90° R.L. Surface: 3.3  
 hole diameter: 100 mm Northing bearing: N/A datum: AHD

drilling information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
	1 2 3								soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
ADV		C			-5			SM	<b>Clayey SAND:</b> Fine to coarse grained, pale grey with red/orange brown mottles, with some silt and fine to medium grained sandstone gravel.	W	D		RESIDUAL SOIL
NMLC						9			<b>Silty SAND:</b> Medium to coarse grained, pale grey with orange brown mottles.	M			WEATHERED BEDROCK
						10			Borehole R17-BH4 continued as cored hole				
						11							
						12							
						13							
						14							
						15							
						16							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4  no resistance ranging to refusal <b>water</b>  10/1/98 water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	---	--	---	---

# Engineering Log - Borehole

 Client: **Infrastructure NSW**

 Date started: **14.6.2011**

Principal:

 Date completed: **15.6.2011**

 Project: **SICEEP**





 Logged by: **LJG**

 Borehole Location: **Lackey Street, Haymarket, NSW**

 Checked by: **SS**

drill model and mounting:	Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface:	2.4
hole diameter:	100 mm	Northing	bearing: N/A	datum:	AHD

drilling information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
	1 2 3								soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
ADT		C			2				<b>FILL: BRICK PAVERS:</b> <b>FILL: SAND:</b> Coarse sand, brown, trace of roots. 0.3m - Medium to coarse sand with some clay, trace of gravel. 0.5m - Brown, yellow.	D			FILL
				SPT 8,4,4 N*=8	1				<b>FILL: Clayey SAND:</b> Medium to coarse, brown mottled yellow, medium to high plasticity clay, with some fine gravel. <b>FILL: CLAY:</b> Medium to high plasticity, pale grey, red brown, trace of fine rounded ironstone gravel and sand. (shale fill) 2.0m - Red brown mottled pale grey, grey.				
				SPT 1,2,5 N*=7	0				2.50m - With some fine shale gravel.				
					3				<b>FILL: Sandy CLAY:</b> Low to medium plasticity, pale grey, brown, coarse sand, trace of gravel.	M			
					-1			SM	<b>Silty SAND:</b> Coarse grained, black with some shells.	W	L		ALLUVIUM
								SC	<b>Clayey SAND:</b> Coarse grained, brown, medium plasticity clay, trace of shells and fine gravel.				
				SPT 2,1,2 N*=3	-2			CL-CH	<b>Sandy CLAY:</b> Low to medium plasticity, dark brown to dark grey, fine to medium sand, with some organic fibrous materials.	>Wp	S-F		
					5								
				SPT 2,1,2 N*=3	-3								
					6			SC	<b>Clayey SAND:</b> Coarse grained, dark brown to black, low plasticity clay, trace of fine gravel.		L		5.6m - Organic material in SPT sulphur odour
					-4								
				SPT 7,8,12 N*=20	-5			CH	<b>CLAY:</b> High plasticity, red brown, pale grey, trace of ironstone and sand. 7.20m - Yellow, brown mottled. 7.40m - Pale grey with some fine sand.	>Wp	VSt-H		
					7								
					-5								
					8								

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4  no resistance ranging to refusal <b>water</b>  10/1/98 water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	---	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Borehole

Client: **Infrastructure NSW**

Date started: **14.6.2011**

Principal:

Date completed: **15.6.2011**

Project: **SICEEP**

Logged by: **LJG**

Borehole Location: **Lackey Street, Haymarket, NSW**

Checked by: **SS**

drill model and mounting:	Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface:	2.4
hole diameter:	100 mm	Northing:	bearing: N/A	datum:	AHD

drilling information				material substance					structure and additional observations			
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol		material	moisture condition	consistency/density index
WB	1 2 3	C						CH		>Wp	VSt-H	
				SPT 4,6,6 N*=12	-6			CS	<b>Sandy CLAY:</b> Low to medium plasticity, pale grey, medium sand, with some silt.		St	X
					-7							X
				SPT 7,9,13 N*=22	-8			CH	<b>CLAY:</b> High plasticity, dark grey, trace of silt.		VSt-H	X
					-9							X
				SPT 4,3,2 N*=5	-10			SC	<b>Clayey SAND:</b> Medium to coarse, brown, grey, trace of gravel.	W	L-MD	X
					-11				13.0m - Fine to coarse, dark grey, grey, trace of organics.			X
				SPT 4,7,14 N*=21	-12			CL	<b>Silty CLAY:</b> Low plasticity, dark brown, black, with some organic material (wood), very light.	>Wp	St	X
				SPT 3,5,9 N*=14	-13			SC	<b>Clayey SAND:</b> Coarse grained, pale grey, dark grey, low plasticity clay, trace of silt.	W	L-MD	X
					-14							X
					-15							X
					-16							X
WEATHERED BEDROCK												

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH5**  
 Sheet 3 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **14.6.2011**  
 Date completed: **15.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

# Engineering Log - Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Lackey Street, Haymarket, NSW**

drill model and mounting: Ausroc 4000 Truck Easting: slope: -90° R.L. Surface: 2.4  
 hole diameter: 100 mm Northing bearing: N/A datum: AHD

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 penetro- meter kPa 100 200 300 400	structure and additional observations
WB					-14			<b>SANDSTONE:</b> Extremely weathered, pale grey, brown, coarse grained, estimated to be very low strength, remoulds to SAND. <i>(continued)</i> Borehole R17-BH5 continued as cored hole				
					17							
					-15							
					18							
					-16							
					19							
					-17							
					20							
					-18							
					21							
					-19							
					22							
					-20							
					23							
					-21							
					24							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
--	--	--	---	---

# Engineering Log - Borehole

 Client: **Infrastructure NSW**

 Date started: **9.6.2011**

Principal:

 Date completed: **9.6.2011**

 Project: **SICEEP**

 Logged by: **LJG**

 Borehole Location: **Back of House of Sydney Entertainment Centre**

 Checked by: **SS**

drill model and mounting:	Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface:	2.6
hole diameter:	100 mm	Northing	bearing: N/A	datum:	AHD

drilling information				material substance							
method	penetration	support	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	structure and additional observations
1 2 3				RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400 kPa	
ADT		C		2			<b>FILL: ASPHALT:</b> Dark grey, 0.02m <b>FILL: GRAVEL:</b> Medium to coarse, subangular to subrounded, black, grey, trace of sand and clay.	D			PAVEMENT
DT				1			<b>FILL: CONCRETE:</b> Grey, 0.08m <b>FILL: GRAVEL:</b> Medium to coarse grained, angular to subangular, grey-brown, trace of fine gravel and sand.	D			FILL
ADT			SPT 2,3,3 N*=6	1			<b>FILL: CONCRETE:</b> Grey, 0.16m <b>FILL: GRAVEL:</b> Medium to coarse grained, angular to subrounded, trace of fine gravel and cobbles. <b>FILL: SANDSTONE BOULDER:</b> Coarse grained, yellow/orange, rounded.	<Wp			
				2			<b>FILL: CLAY:</b> High plasticity, mottled, red-brown, pale-grey, and grey, trace of fine gravel, ironstone and shale. (shale fill) 1.80m - Grey, with some fine shale angular gravel.	M			
				0			<b>FILL: SAND:</b> Coarse grained, grey-brown, trace of silt and rubber.	W			
			SPT 5,2,2 N*=4	3							
				4							
				5		SC	<b>Clayey SAND:</b> Coarse grained, brown-grey, low plasticity clay.		F		ALLUVIUM
			SPT 0,2,3 N*=5	2		CL	<b>Sandy CLAY:</b> Low plasticity, brown-black, coarse sand, trace of silt.				
				5		CL	<b>CLAY:</b> Low to medium plasticity, red-brown, with some fine sand.				
				3		CH	<b>Sandy CLAY:</b> High plasticity, red, brown, pale grey, medium to coarse sand.		St		
				6		SC	<b>Clayey SAND:</b> Coarse grained, pale grey, red-brown, medium plasticity clay.		L-MD		
			SPT 5,3,5 N*=8	4		CL	<b>Sandy CLAY:</b> Low to medium plasticity, pale grey.		St	X	
				7		CH	<b>CLAY:</b> High plasticity, red-brown, pale grey, micaceous.		VSt	X	
				5		CL-CH	<b>Sandy CLAY:</b> Medium to high plasticity, grey, pale grey, coarse grained sand.			X	
				8							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Borehole

Client: **Infrastructure NSW**

Date started: **9.6.2011**

Principal:

Date completed: **9.6.2011**

Project: **SICEEP**

Logged by: **LJG**

Borehole Location: **Back of House of Sydney Entertainment Centre**

Checked by: **SS**

drill model and mounting:	Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface:	2.6
hole diameter:	100 mm	Northing	bearing: N/A	datum:	AHD

drilling information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
1	2	3							soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
W		C		U <sub>50</sub>				CL-CH	<b>Sandy CLAY:</b> Medium to high plasticity, grey, pale grey, coarse grained sand. <i>(continued)</i>	W	VSt		
				SPT 0,4,5 N*=9	-6	9		SC	<b>Clayey SAND:</b> Medium to coarse grained, grey, pale grey.		MD		
				SPT 5,6,9 N*=15	-7	10		CH	<b>CLAY:</b> High plasticity, red-brown, pale grey, grey, trace of coarse sand and fine grained.		VSt-H	X	
				SPT 5,6,7 N*=13	-8	11		CH	<b>Silty CLAY:</b> High plasticity, dark grey, brown, black, micaceous.		VSt-H	X	
				SPT 5,8,10 N*=18	-9	12		SP	<b>SAND:</b> Coarse grained, grey, dark grey, with some clay.		MD	X	
				SPT 0,5,7 N*=12	-10	13			14m - Dark grey, black, trace of organics.				
				SPT 9,R N*=R	-11	14			15m - With some silt and organic material.				RESIDUAL SOIL?
					-12	15			<b>SANDSTONE:</b> Extremely weathered, coarse grained, black, dark grey, estimated low strength, with some organic matter.				WEATHERED BEDROCK
					-13	16							

<b>method</b> 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	<b>support</b> M mud C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>Notes on Refusals</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

# Engineering Log - Borehole

 Client: **Infrastructure NSW**

 Date started: **15.6.2011**

Principal:

 Date completed: **17.6.2011**

 Project: **SICEEP**





 Logged by: **RC**

 Borehole Location: **Back of House of Sydney Entertainment Centre**

 Checked by: **SS**

drill model and mounting:	Hydrapower Scout Truck	Easting:	slope:	-60°	R.L. Surface:	2.6
hole diameter:	100 mm	Northing	bearing:	213.5°	datum:	AHD

drilling information				material substance								
method	penetration	support	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
	1 2 3							soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
ADT		C			2			<b>FILL: ASPHALT:</b> Dark grey, 70mm, overlying medium to coarse grained, brown-dark grey sandy gravel.	D			PAVEMENT
					1			<b>FILL: Gravelly SAND:</b> Fine to medium grained, brown, fine to coarse gravel, trace of clay.				FILL
		D										
					1			<b>FILL: Gravelly CLAY:</b> Low plasticity, brown, orange-brown.	<Wp			
		D			2				>Wp			
					0							
					3							
					4		CL	<b>Silty CLAY:</b> Low plasticity, dark grey, grey, trace of white shells.		S		ALLUVIUM
					4		SP	<b>SAND:</b> Medium grained, grey, with some clay.	W	L		
		C			1		CH	<b>SILTY CLAY:</b> High plasticity, grey, trace of shells and plant fibres with some sandy bands.	>Wp	F		
		U <sub>50</sub>			5							
					6							
					7							
					8							
								6.5m - Becoming mottled brown and pale grey.				

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4  no resistance ranging to refusal <b>water</b>  10/1/98 water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Borehole

Client: **Infrastructure NSW**

Date started: **15.6.2011**

Principal:

Date completed: **17.6.2011**

Project: **SICEEP**





Logged by: **RC**

Borehole Location: **Back of House of Sydney Entertainment Centre**

Checked by: **SS**

drill model and mounting:	Hydrapower Scout Truck	Easting:	slope: -60°	R.L. Surface:	2.6
hole diameter:	100 mm	Northing:	bearing: 213.5°	datum:	AHD

drilling information				material substance								
method	penetration 1 2 3	support water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetro- meter kPa 100 200 300 400	structure and additional observations
WRR		C					CH		>Wp	F		
					-5		CH	<b>CLAY:</b> High plasticity, red brown, orange brown, pale grey, with some fine grained sand.				
					-6		SC	<b>Clayey SAND:</b> Medium to coarse grained, grey, with bands of clay.				
					-7							
					-8							
					-9							
			D		-10							
					-11							
					-12							
					-13							
					-14							
					-15							
					-16			<b>SANDSTONE:</b> Medium to coarse grained, pale grey to white, extremely weathered to highly weathered.				<b>WEATHERED BEDROCK</b>

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4  no resistance ranging to refusal <b>water</b>  10/1/98 water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system  <b>moisture</b> D dry M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
--	--	--	---	---

BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

# Engineering Log - Borehole

 Client: **Infrastructure NSW**

 Date started: **15.6.2011**

Principal:

 Date completed: **17.6.2011**

 Project: **SICEEP**

 Logged by: **RC**

 Borehole Location: **Back of House of Sydney Entertainment Centre**

 Checked by: **SS**

drill model and mounting:	Hydrapower Scout Truck	Easting:	slope:	-60°	R.L. Surface:	2.6
hole diameter:	100 mm	Northing:	bearing:	213.5°	datum:	AHD

drilling information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	structure and additional observations
	1 2 3								soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
WRR		C							<b>SANDSTONE:</b> Medium to coarse grained, pale grey to white, extremely weathered to highly weathered. <i>(continued)</i>				
									Borehole R17-BH7 continued as cored hole				
						-12							
						17							
						-13							
						18							
						-14							
						19							
						-15							
						20							
						-16							
						21							
						-17							
						22							
						-18							
						23							
						-18							
						24							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4  no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
--	--	--	---	---

# Engineering Log - Borehole

 Client: **Infrastructure NSW**

 Date started: **14.6.2011**

Principal:

 Date completed: **14.6.2011**

 Project: **SICEEP**

 Logged by: **RC**

 Borehole Location: **Back of House of Sydney Entertainment Centre**

 Checked by: **SS**

drill model and mounting:	Hydrapower Scout Truck	Easting:	slope:	-90°	R.L. Surface:	2.5
hole diameter:	100 mm	Northing:	bearing:	N/A	datum:	AHD

drilling information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	structure and additional observations
	1 2 3								soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400 kPa	
ADT		C			2				FILL: ASPHALT: Dark grey, 70mm thickness sandy gravel: medium grained, grey sand, fine grained, grey gravel FILL: SAND: Fine to medium grained, dark brown, with some clay and fine gravel. FILL: ASPHALT: Dark grey, 250mm. FILL: CONCRETE: Pale grey, 410mm. 1m - With some dark grey gravel aggregate and steel. VOID:	D M D			PAVEMENT
NMLC			▲		1								1m - TC Bit Refusal
			▲		0								
					3				Borehole R17-BH8 terminated at 3m				BH8 was terminated at 3m, due to obstructions.
					-1								
					4								
					-2								
					5								
					-3								
					6								
					-4								
					7								
					-5								
					8								


<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b> 1 2 3 4 no resistance ranging to refusal <b>water</b> 10/1/98 water level on date shown water inflow water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	--	--	---	---





Borehole No. **R17-BH9**  
 Sheet 1 of 1  
 Project No. **GEOTLCOV24303AC**  
 Date started: **15.6.2011**  
 Date completed: **15.6.2011**  
 Logged by: **RC**  
 Checked by: **SS**

# Engineering Log - Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Back of House of Sydney Entertainment Centre**

drill model and mounting: Hydrapower Scout Truck Easting: slope: -90° R.L. Surface: 2.75  
 hole diameter: 100 mm Northing bearing: N/A datum: AHD

drilling information				material substance											
method	penetration			support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
	1	2	3								soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
ADT				Not Observed			2	1			<b>FILL: ASPHALT:</b> Dark grey 70mm, overlying sandy gravel, medium grained, brown sand, dark grey gravel. <b>FILL: SAND:</b> Medium to coarse grained, yellow, with some fine to coarse sandstone gravel. 0.60m - Becoming brown, with some coarse dolerite gravel. <b>FILL: ASPHALT:</b> Grey, 150mm <b>FILL: CONCRETE:</b> Pale grey, 50mm. Borehole R17-BH9 terminated at 0.85m	D			PAVEMENT SUB BASE FILL PREVIOUS PAVEMENT BH9 was terminated at shallow depth due to obstructions after many attempts.
								1							
								1							
								2							
								3							
								4							
								5							
								6							
								7							
								8							

<b>method</b> 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	<b>support</b> M mud N nil C casing <b>penetration</b>  1 no resistance ranging to refusal 2 3 4 <b>water</b>  10/1/98 water level on date shown  water inflow  water outflow	<b>notes, samples, tests</b> U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> 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	<b>classification symbols and soil description</b> based on unified classification system <b>moisture</b> D dry M moist W wet W <sub>p</sub> plastic limit W <sub>L</sub> liquid limit	<b>consistency/density index</b> 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
---	---	--	---	---

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **7.6.2011**

Principal:

Date completed: **7.6.2011**

Project: **SICEEP**

Logged by: **LJG**

Borehole Location: **Darling Drive, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Hydrapower Scout Truck	Easting:	slope: -90°	R.L. Surface: 3.75
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
		datum: AHD	

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D-axial	A-axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components							
					Continued from non-cored borehole							
NMLC				4	SANDSTONE: Coarse grained, pale grey, mottled orange, yellow and red, distinctly bedded at 15°, with some fine rounded gravel inclusions, trace of black carbonaceous flecks, ironstained and micaceous.	MW		0.03	0.17			PT, 0°, PL, RO, CN
				8		SW		0.34	0.38			
				9	9.20m Heavily iron stained.	MW		0.57	0.79			PT, 10°, PL, RO, CO, Clay
				10								
				11	11.25m Moderately iron stained.	MW/SW		1.45				CS, 5°, PL, RO, CN JT, 10°-20°, IR, RO, SN PT/JT, 10°-20°, PL-IR, RO, CN
				12		SW		1.72				
				13	12.76m Heavily iron stained.	MW		1.02	1.83			SM, 0°, PL, Clay filled, 10mm, 200pp PT, 20°, PL, RO, CN, 20mm
				14		SW		1.27	1.61			
				15	14.25m Moderately iron stained.	SW						PT, 15°, PL, Closed
						MW/SW						

All defects are: PT, 5°-15°, PL, RO, CN unless noted otherwise.

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **7.6.2011**

Principal:

Date completed: **7.6.2011**

Project: **SICEEP**

Logged by: **LJG**

Borehole Location: **Darling Drive, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -90° R.L. Surface: 3.75  
hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	particular general
NMLC				-12	15.25m with some black carbonaceous (coal) layers 10mm thick.	FR					JT, 45°, PL, RO, CN PT, 0°, PL, SO, Clay VN
				16	<b>SANDSTONE:</b> Medium to coarse grained, grey, massive, with some black carbonaceous flecks. <b>SHALE:</b> Grey, thinly laminated at 0°.				D A 1.03 1.08	96	SM, 0°, PL, Clay filled, 10mm, 280pp
				-13	<b>SANDSTONE:</b> Medium grained, grey, massive, with some black carbonaceous flecks, distinctly crossbedded at 15°.				D A 0.83 1.17		
				-14	17.5m Fine grained. 17.73m Medium grained.						
				-15	18.7m with some black carbonaceous laminations.				D A 0.81 0.4	96	
				-16	<b>SANDSTONE:</b> Medium to coarse grained, grey, massive, with some black carbonaceous flecks.						
				-17	<b>SANDSTONE:</b> Medium to coarse grained, pale grey to grey, distinctly bedded at 10°-15°. 20.14m Coarse grained. 20.25m Indistinctly crossbedded at 10°, micaceous and black flecks.				D A 1.31 1.49		PT, 0°, PL, SO-RO, Clay, UN PT, 10°, PL, RO, Fe SN PT, 10°, PL, RO, Fe SN PT, 10°-15°, PL-IR, RO, Fe SN PT, 10°-15°, PL-IR, RO, Fe SN PT, 10°-15°, PL-IR, RO, Fe SN
				-18						96	
				-19	A water standpipe was installed. R17-BH1 terminated at 22m						
				23							

All defects are: PT, 5°-15°, PL, RO, CN unless noted otherwise.

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--	--



Borehole No. **R17-BH10**  
 Sheet 4 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **1.6.2011**  
 Date completed: **10.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Little Pier Street, Haymarket, NSW**

drill model & mounting: Ausroc 4000 Truck Easting: slope: -90° R.L. Surface: 3  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- A- axial	defect spacing mm	defect description	
NMLC					rock type; grain characteristics, colour, structure, minor components		VL L M H EH			RQD % 30 100 300 1000 3000	particular	general
			-14	17	15.90m - Moderately iron stained. <b>SANDSTONE:</b> Medium to coarse grained, grey mottled, red, orange, yellow, brown, indistinctly bedded at 10°-20°, with some fine gravel inclusions and black carbon flecks. (continued) 16m - Becoming pale grey with grey laminations.	SW		2.67 2.67		32	PT X 2 30°, PL, RO, CN Wedge PT/JT, 45°, PL, RO, CN JT, 50°, PL, RO, FeSN JT, 50°, PL, RO, FeSN	All defects are: PT, 10°-20°, PL RO, CN unless noted
			-15	18	17.50m - Distinctly bedded at 10°	FR		2.08 2.07		88	PT, 0°, PL, RO, CN PT, 0°, PL, RO, CN PT, 0°, PL, RO, CN PT, 35°, PL, RO, CN, 30mm Wedge 40°-45°, 80mm	
			-16	19	R17-BH10 terminated at 18.94m			1.99 1.77				
			-17	20								
			-18	21								
			-19	22								
			-20	23								
			-21	24								

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **1.6.2011**

Principal:

Date completed: **1.6.2011**

Project: **SICEEP**

Logged by: **RH**

Borehole Location: **Sydney Entertainment Centre, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 2.9
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	type, inclination, planarity, roughness, coating, thickness
					Continued from non-cored borehole						particular
											general
NMLC					<b>NO CORE:</b> 0.30m					25	
				-6	<b>SANDSTONE:</b> Medium to coarse grained, red brown, indistinct laminations at 5°-15°. 8.7m colour change to orange brown	MW		D A	0.39 0.37		JT, 80°, PL, RO, CN
				-7	9.8m colour change to pale grey and orange	SW				97	
				-8	<b>SHALE:</b> Pale grey, with distinct dark grey laminations at 10°-15°	FR		D A	0.16 0.33		SM, 0°-10°, clay filled, 70mm
				-9	<b>SANDSTONE:</b> Coarse grained, pale grey and orange, indistinct laminations at 5°-15°.	SW		D A	0.03 0		PT, 5°, CU, RO, CN
				-10	<b>NO CORE:</b> 0.14m						PT, 5°-10°, PL, RO, Clay CO (1mm)
				-11	<b>SANDSTONE:</b> Coarse grained, pale grey and orange, indistinct laminations at 5°-15°. 12.7m becoming fine grained	SW		D	0.47		JT, 85°, PL, RO, CN
				-12	13.3m becoming massively bedded	FR		D	0.43		SM, 5°-15°, clay filled, 80mm
				-13	14.6m sandstone becoming indistinctly laminated with some iron staining	MW/SW		D A	2.15 1.14		SM, 10°-20°, clay filled, 30mm
				-14	15.45m laminations becoming increasingly distinct	SW/FR		D A	0.56 0.92		SM, 10°, clay filled, 70mm
				-15				A	1.46		JT, 25°, PL, RO, CN
				-16	R17-BH11 terminated at 15.9m						SM, 0°-5°, clay filled, 30mm
											JT, 85°, PL, RO, FeSN
											PT, 5°, PL, RO, FeSN
											PT, 5°, PL, RO, FeSN
											PT, 5°-10°, PL, RO, CN
											PT, 5°-10°, PL, RO, CN

All defects are: JT, 0°-15°, PL, RO, CN, unless noted otherwise

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH12**  
 Sheet 2 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **10.6.2011**  
 Date completed: **10.6.2011**  
 Logged by: **RC**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Sydney Entertainment Centre, Haymarket, NSW**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -90° R.L. Surface: 2.8  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components						type, inclination, planarity, roughness, coating, thickness
					Continued from non-cored borehole						particular
											general
NMLC				9	SANDSTONE: Medium to coarse grained, orange-brown mottled, dark red and pale grey, indistinctly cross bedded at 15°-20°.	HW			D 1.02 A 0.41	87	PT, 15°, PL, RO, CO, clayey sand, 3mm
				10	SANDSTONE: Medium to coarse grained, orange-brown, mottled red and pale grey, indistinctly cross bedded at 5°-50°, with some fine shale and quartz gravel inclusions.	MW			D 1.25 A 1.26		SM, 10°, PL, RO, clayey sand, 45mm
				11							
				12	11.7m - 12.4m - Dark orange-brown iron indurated zone around defects (700mm)	HW			D 2.66 A 3.16		JT, 35°, PL, RO, VN, black material
				13		MW				85	PT, 25°, UN, RO, CO, Clay, 1mm PT, 10°, PL, VR, CO, Clay, 1mm
				14		MW-HW					PT, 20°, PL, RO, CO, XW, 2mm PT, 5°, PL, RO, CO, XW, 3mm JT, 60°, PL, RO, SN, discontinuous
				15	SANDSTONE: Medium to coarse grained, pale grey, distinctly bedded at 5°-25°.	SW			D 2.43 A 2.87	88	14.53m - 14.64m - closely spaced partings 11mm JT, 30°, PL, RO, SN, discontinuous
				16		FR					

Unless noted, defects are: PT, 5°-25°, PL, RO, SN



<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--










Borehole No. **R17-BH12**  
 Sheet 3 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **10.6.2011**  
 Date completed: **10.6.2011**  
 Logged by: **RC**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Sydney Entertainment Centre, Haymarket, NSW**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -90° R.L. Surface: 2.8  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

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	Is <sub>(50)</sub> MPa D- diam- etral A- axial	RQD %	defect spacing mm	defect description type, inclination, planarity, roughness, coating, thickness	
								VL L M H VH EH		30 100 300 1000 3000		particular	general
NMLC			-14	17		<b>SANDSTONE:</b> Medium to coarse grained, pale grey, distinctly bedded at 5°-25°. (continued)	FR		D 2.48 A 2.14	88		JT, 60°, PL, RO, CN	Unless noted, defects are: PT, 25°, PL, RO, CN
			-15	18					D 2.49 A 1.98	100		PT, 5°, PL, RO, CN PT, 20°, PL, RO, CO, XW, 2mm	
			-16	19		R17-BH12 terminated at 18m							
			-17	20									
			-18	21									
			-19	22									
			-20	23									
			-21	24									

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b>  casing used  barrel withdrawn <b>graphic log/core recovery</b>  core recovered  no core recovered	<b>water</b>  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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	--	---	--	--

Borehole No. **R17-BH13**  
 Sheet 3 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **9.6.2011**  
 Date completed: **9.6.2011**  
 Logged by: **RC**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Sydney Entertainment Centre, Haymarket, NSW**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -90° R.L. Surface: 3.15  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components						type, inclination, planarity, roughness, coating, thickness
			-5	9							
			-6	10							
			-7		Continued from non-cored borehole						
			-7		NO CORE: 0.70m						
		Full water return	-8	11	SANDSTONE: Medium to coarse grained, pale grey mottled orange-brown, indistinctly bedded at 5°-15°	XW SW					pp= 100kPa PT, 10°, PL, RO, UN, Clay JT, 80°, PL, RO, VN, Clay PT, 20°, PL, RO, VN, Clay JT, 30°, PL, RO, VN, Clay JT, 80°, UN, RO, VN, Clay JT, 75, PL, RO, VN, Clay SM, 35°, PL, RO, Clay, 50mm, 50kPa JT, 80°, UN, RO, SN
			-9	12	12.40m to 13.0m - Distinctly bedded	SW-MW			D A 1.38 2.01		JT, 75°, PL, RO, CN JT, 85°, PL, RO, VN PT, 15°, PL, RO, SN JT, 80°, UN, RO, VN PT, 15°, PL, RO, CO, Sandy Clay, 2mm
			-10	13					D A 1.04 1.18	47	PT, 15°, PL, RO, SN PT, 15°, PL, RO, SN SM, 10°, PL, RO, Sandy Clay, 12mm, pp = 20kPa
			-11	14	14.43m to 14.50m - with some fine grained quartz gravel				D A 1.53 2.25		PT, 5°, PL, RO, SN JT, 85°, UN, RO, SN JT, 65°-85°, CU, RO, SN PT, 5°, PL, RO, SN PT, 10°, PL, RO, SN PT, 10°, PL, RO, CO, Sandy Clay, 1mm PT, 15°, IR, VR, CO, fine gravel
			-12	15	R17-BH13 terminated at 14.7m						
			-16	16							

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting AD seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH14**  
 Sheet 2 of 2  
 Project No. **GEOTLCOV24303AC**  
 Date started: **17.6.2011**  
 Date completed: **17.6.2011**  
 Logged by: **RC**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -90° R.L. Surface: 3.3  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects					
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is(50) MPa	D- diam- etral A- axial	RQD %	defect spacing mm	defect description	
					Continued from non-cored borehole		VL L M H VH EH			30 100 300 1000 3000		particular general	
			-4		<b>SANDSTONE:</b> Medium to coarse grained, orange brown, red, pale grey, indistinctly cross bedded at 20°.	MW-HW		0.42 0.33		86		PT, 20°, PL, RO, VN, Clay	
			8										PT, 20°, PL, RO, SN PT, 20°, PL, RO, VN, Clay PT, 15°, PL, RO, SN
			-5				MW						SM, 10°, PL, RO, Clay, 6mm SM, 20°, PL, RO, Clay, 5mm PT, 15°, PL, RO, SN PT, 25°, PL, RO, SN
			9						0.62 1.09		86		PT, 20°, PL, RO, SN PT, 20°, PL, RO, VN
			-6										PT, 25°, PL, RO, VN PT, 20°, PL, RO, CO, Clay, XW, 4mm
			10										PT, 20°, PL, RO, SN PT, 20°, PL, RO, SN PT, 20°, PL, RO, VN PT, 20°, PL, RO, VN
			-7						1.41 1.24				SM, 5°, PL, RO, Clay, 3mm JT, 78°, PL, RO, SN
			11										PT, 10°, PL, RO, VN PT, 10°, PL, RO, VN PT, 5°, IR, RO, VN
			-8								96		PT, 30°, PL, RO, SN
			12						1.75 1.94				PT, 15°, PL, RO, SN
			-9			12.50m - Trace of fine grained quartz gravel.							
			13			<b>SANDSTONE:</b> Medium to coarse grained, pale grey, distinctly bedded at 20°.	SW						PT, 15°, CU, RO, CN PT, 20°, CU, RO, VN, carbonaceous material
			-10				FR		0.77 1.09		85		SM, 10°, PL, RO, Clay, 45mm pp = 180kPa JT, 15°, PL, RO, SN PT, 10°, PL, RO, CN PT, 15°, PL, RO, VN SM, 30°, PL, RO, XW, 30mm
			14		13.40m to 13.50m - With some fine grained, quartz gravel.								
			-11		13.95m - With some fine grained, shale gravel.								
			15		<b>SANDSTONE:</b> Medium grained, pale grey, massive, with some carbonaceous flecks.							JT, 25°, PL, RO, CN JT, 10°, IR, RO, CN JT, 10°, PL, RO, CN	
					R17-BH14 terminated at 15m			1.03 0.93					

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH15**  
 Sheet 3 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **21.6.2011**  
 Date completed: **21.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model & mounting: Ausroc 4000 Truck Easting: slope: -90° R.L. Surface: 3.2  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	type, inclination, planarity, roughness, coating, thickness
					Continued from non-cored borehole						particular general
NMLC		Not monitored		9	SANDSTONE: Medium to coarse grained, pale to red brown, pale grey, indistinctly bedded at 20°, with some dark grey laminations and black carbonaceous flecks.	MW			D A 1.05 0.96		PT, 10°, PL, VR, CN PT, 10°, PL, VR, CN PT, 5°, CU, RO, CN PT, 15°, PL, RO, CO / Clayey sand x2 JT, 30°, IR-CU, VR, CN x2 JT, 30°, IR-CU, VR, CN PT, 0°, PL, RO, CO, Sand JT, 48°, PL, RO, CN JT, 5°, CU, RO, SN, Iron JT, 15°, PL, RO, SN, Iron PT, 0°, PL, RO, SN, Iron JT, 44°, PL, RO, SN, Iron SM, 5°, PL, RO, Clayey sand JT, 25°, IR, RO, CN JT, 60°, PL-UN, VR-RO, SN Iron
				10		SW			D A 1.08 0.66	66	PT, 0°, IR, RO, CN PT, 15°, PL, RO, CO, Iron PT, 5°, PL, RO, CN JT, 48°, PL, RO, SN, Iron PT, 0°, PL, RO, CO-Clay PT, 4°, PL, RO, CO, Clay
				11	SANDSTONE: Medium to coarse grained, pale grey to orange white, massive, with some black flecks and fine quartz gravel.	FR			D A 2.04 2.05	87	
				12					D A 1.42 1.66		
				13	SANDSTONE: Medium to coarse grained, pale grey to orange white, distinctly bedded at 0°-10°, with some dark grey laminations and black carbonaceous flecks.					100	
				14	SANDSTONE: Medium to coarse grained, pale grey to orange white, massive, with some black carbonaceous flecks.				D A 1.15 1		
				15	R17-BH15 terminated at 15.45m						
				16							

All joints are: PT, 0°-20°, PL, ROK, CN, unless noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH16**  
 Sheet 3 of 6  
 Project No. **GEOTLCOV24303AC**  
 Date started: **20.6.2011**  
 Date completed: **21.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -75° R.L. Surface: 3.30  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: 177.5° datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- A- axial	defect spacing mm	defect description	
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	type, inclination, planarity, roughness, coating, thickness	
					Continued from non-cored borehole						particular	general
NQ				14	SANDSTONE: Coarse grained, pale grey, pale brown, indistinctly bedded at 20°-30°.	FR			D 0.3 A 0.52		JT, 50°, PL, RO, CN	
				15							JT, 90°, PL, RO, CN, 260mm	
				16	NO CORE: 0.27m						JT, 90°, PL, RO, CN, 210mm Multiple PT, 110mm	
				17	SANDSTONE: Coarse grained, pale grey, pale brown, indistinctly bedded at 20°-30°.	FR			D 0.26 A 0.69		JT, 85°, PL, RO, CN, 340mm SM, 10°, PL, Sand & Clay filled JT, 75°, PL, RO, CN, 30mm PT PT, 15°, PL, RO, Clay CO	
				18	18.35m - Distinctly bedded at 15°-25°, with some black carbonaceous flecks and laminations, trace of fine gravel inclusions.				D 1.55 A 1.76		JT, 65°, PL, RO, CN JT, 65°, PL, RO, CN PT, 45°, IR, RO, Black carbonaceous SN	
				19							JT, 60°, PL, RO, SN	
				20					D 2.73 A 2.53		PT, 25°, PL, RO, CN, 10mm JT, 45°, PL, RO, Fe SN, 50mm PT, 20°, PL, RO, CN, 10mm JT, 75°, PL, RO, Fe SN, 70mm	
				21	21.03m - Bedded at 20°-35°.				D 2.71 A 2.3		PT, 30°, PL, RO, CN, 20mm PT, 30°, PL, RO, CN, 20mm PT, 30°, PL, RO, CN, 30mm PT, 40°, PL, VR, Fe SN, 40mm JT, 0°, PL, VR, CN	
					21.39m to 21.44m - Slightly iron stained.	SW						
					21.45m - With some fine gravel inclusions.	FR						

All defects are: PT, 10°-20°, PL, RO, CN unless noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH16**  
 Sheet 4 of 6  
 Project No. **GEOTLCOV24303AC**  
 Date started: **20.6.2011**  
 Date completed: **21.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -75° R.L. Surface: 3.30  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: 177.5° datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	particular general
NQ			-18	22	21.63m - Bedded at 10°-25°. 21.70m - Indistinctly bedded to massive. <b>SANDSTONE:</b> Coarse grained, pale grey, pale brown, indistinctly bedded at 20°-30°. (continued)	FR					JT, 0°, PL, VR, CN JT, 0°, PL, VR, CN
			-19	23	22.51m - Distinctly bedded at 10°. 22.90m - fine to medium grained, distinctly bedded at 15°.				D A 2.79 2.16	76	CS, 5°, PL, RO, Clay filled JT, 85°, PL-IR, RO, CN, 450mm/PT XW SM, Clay & sand filled, 40mm
			-20	24	<b>SANDSTONE:</b> Coarse grained, pale grey, grey with dark grey laminations, indistinctly bedded at 20°-25°, with some black carbonaceous flecks and some staining.				D A 2.07 2.11		SM, 0°, PL, RO, Clay filled, 10mm
			-21	25	24.90m - Indistinctly bedded 10°-25°. 25.20m - Distinctly bedded 15° 25.28m - Pale grey with some dark grey laminations bedded at 25°.					83	SM, 20°, PL, RO, Clay CO, 10mm
			-22	26	26.05m - Distinctly bedded 15°-20°.				D A 1.7 1.67		Highly fractured zone 40mm
			-23	27							PT x2 10mm
			-24	28	<b>SANDSTONE:</b> Coarse grained, pale grey, with some dark grey laminations, indistinctly cross bedded at 10°-20°, with some black carbonaceous flecks, micaceous.				D A 2.07 2.13		JT, 85°, PL, RO, CN, 160mm
			-25	29	29m - With some spotted staining.				D A 2.55 2.84		

All defects are: PT, 10°-20°, PL, RO, CN unless noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH16**  
 Sheet 5 of 6  
 Project No. **GEOTLCOV24303AC**  
 Date started: **20.6.2011**  
 Date completed: **21.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -75° R.L. Surface: 3.30  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: 177.5° datum: AHD

drilling information				material substance				rock mass defects					
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description	particular	general
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			RQD %	type, inclination, planarity, roughness, coating, thickness		
NQ				30	NO CORE: 0.05m	FR				92			
				-26	SANDSTONE: Medium to coarse grained, pale grey, grey, distinctly bedded at 10°, with some black carbonaceous flecks and laminations trace of voids.	FR							
				31	SANDSTONE: Coarse grained, grey, massive with some fine gravel inclusions and black carbonaceous flecks and voids. 30.60m - Distinctly bedded 10°, medium to coarse grained. 30.93m - Indistinctly bedded to massive. 31.10m - Coarse grained, with some fine gravel inclusions 150mm 31.30m - Distinctly laminated 15°-25°, medium to coarse grained.				D A 2.75 2.88	90			
				-27									
				32									
				-28									
				33	32.50m - With some black carbonaceous laminations and fine gravel inclusions 100mm 32.70m - Distinctly cross bedded 10°-30°.				D A 4.65 1.38		PT, 30°, PL, RO-VR, BI-SN PT, 25°, PL, RO, CN PT x3, 40mm JT, 70°, PL, RO, CN, 90mm		
				-29									
				34					D A 3.17 2.7		JT, 45°, PL, SO-RO, CN, 10mm PT x2/JT, 90°, PL, RO, CN, 30mm		
				-30									
				35	34.97m - Coarse grained, indistinctly bedded 10°-20°, with some fine gravel inclusions black flecks and laminations.				D A 4.69 1.34		JT, 55°, PL, RO, CN		
				-31									
				36							PT, 15°, CU, RO, CN		
				-32							JT, 75°, PL, RO, CN, 130mm		
				37						40	Multiple PT, 210mm / JT, 90°, PL, RO, CN, 210mm		
				-33	SANDSTONE: Fine to medium grained, grey to dark grey, indistinct/altered bedding to massive, with some black carbonaceous flecks.	HA			D A 0.8 0.75		JT, 35°, PL, RO, CN, 30mm JT, 80°, PL, CU, RO, CN, 120mm		

All defects are: PT, 10°-20°, PL, RO, CN unless noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH16**  
 Sheet 6 of 6  
 Project No. **GEOTLCOV24303AC**  
 Date started: **20.6.2011**  
 Date completed: **21.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

# Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -75° R.L. Surface: 3.30  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: 177.5° datum: AHD

drilling information				material substance				rock mass defects					
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	RQD %	defect spacing mm	defect description	
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000		particular	general
NQ				38	<b>DOLERITE:</b> Fine to medium grained, grey, mottled green, massive, possible bedding.	FR			D	40		HFZ of PT & JT, PL, RO-SL, 10°-90°	
				39	NO CORE: 0.38m							JT, 60°, PL, RO, CN JT, 70°, PL, RO, CN JT, 40°, PL, RO, VN JT, 70°, PL, RO, CN	
				40	<b>DOLERITE:</b> Fine to medium grained, grey, mottled green, massive.	FR				0		JT, 80°, PL, RO, VN JT, 80°, PL, RO, VN JT, 80°, PL, RO, VN JT, 80°, PL, RO, CN 39.87m to 40.0m - Highly fractured rock	
				41	R17-BH16 terminated at 40.5m	FR-HA			D A	11.9 4.54		JT, 80°, PL, RO, CN JT, 80°, PL, RO, VN JT, 60°, PL, RO, VN JT, 10°, IR, SO, CN	
				42									
				43									
				44									
				45									

Unless noted, defects are: JT, 30°-45°, PL, RO, CN-VN

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH17**  
 Sheet 3 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **16.6.2011**  
 Date completed: **16.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model & mounting: Edson 3000 Truck Easting: slope: -90° R.L. Surface: 3.2  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is(50) MPa	D- diam- A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	particular
					Continued from non-cored borehole						general
NMLC				11	<b>NO CORE:</b> 0.30m						
				-8	<b>SANDSTONE:</b> Coarse grained, pale grey, with some darker grey laminations, indistinctly bedded at 10°-25°, with some black carbonaceous flecks.	FR			D 0.42 A 0.39	13	XW, SM, Sand filled, multiple PT, 250mm PT, 10°, PL, RO, VN PT, 20°, PL, RO, Clay, VN PT, 10°, PL, RO, VN PT, 20°, PL, RO, VN PT, 10°, PL, RO, VN PT, 10°, PL, RO, VN PT, 10°, PL, RO, VN SM, Clay and fine gravel filled 10mm PT, 15°, PL, RO, VN PT, 10°, PL, RO, VN
	Not monitored			12	11.89m - Fine grained rounded gravel inclusions. <b>NO CORE:</b> 0.05m <b>SANDSTONE:</b> Coarse grained, pale grey, bedded at 10°-20°, with some black carbonaceous flecks. 12.50m - Slightly iron stained yellow, red, orange.	FR SW					
				-9							
				-10					D 1.51 A 1.38	85	Wedge, 15°-25°, PL, RO, CN
				-11					D 2.64 A 2.08		
				-12					D 1.23 A 2.19		PT, 25°, PL, RO, VN-CN
				-13	15.30m - Indistinctly bedded 20°-30°. 15.50m - Indistinctly cross-bedded 40°. 15.56m - Indistinctly bedded 10°-20°. 15.75m - Thinly laminated 0°-10°. 15.87m - Indistinctly bedded 10°-25°.	SW-FR					
				-14	16.40m - Heavily iron stained.	MW-SW			D 1.02 A 0.97	79	PT, 10°, PL, RO, SN JT, 5°, PL, RO, SN HFZ 50mm JT, 85°, PL, RO, SN, 200mm PT, 10°, PL, RO, SN PT, 10°, PL, RO, SN PT, 10°, PL, RO, SN PT, 25°, PL, RO, SN PT, 15°, PL, RO, SN PTx2, 15°, PL, RO, SN, 10mm PT, 25°, PL, RO, black carbonaceous SN
				-15	16.80m - Slightly iron stained. 16.96m - Heavily iron stained, medium grained. 17.05m - Slightly iron stained, coarse grained. <b>NO CORE:</b> 0.05m <b>SANDSTONE:</b> Coarse grained, pale grey (stained red orange brown to 17.58m), with some black and dark grey laminations. Indistinctly bedded at 10°-30°, with some black carbonaceous flecks and some fine gravel inclusions.	SW FR			D 2.67 A 2.17	86	

All defects are PT, 10°-25°, PL, RO, CN unless noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **R17-BH17**  
 Sheet 4 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **16.6.2011**  
 Date completed: **16.6.2011**  
 Logged by: **LJG**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Harbour Street, Haymarket, NSW**

drill model & mounting: Edson 3000 Truck Easting: slope: -90° R.L. Surface: 3.2  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	RQD %	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000		type, inclination, planarity, roughness, coating, thickness
												particular general
NMLC			-16	19	<b>SANDSTONE:</b> Coarse grained, pale grey (stained red orange brown to 17.58m), with some black and dark grey laminations. Indistinctly bedded at 10°-30°, with some black carbonaceous flecks and some fine gravel inclusions. <i>(continued)</i> 19.20m - Heavily iron stained 40mm	FR				96		SM, 0°, PL, RO, Fe SN Clay CO 10mm
			-17	20	19.95m - Trace of coal				D A 3.36 3.28			PT, 10°, PL, RO, SN, Black PT, 10°, PL, VR, SN Black
			-18	21	<b>NO CORE:</b> 0.10m <b>SANDSTONE:</b> Medium grained, grey, indistinctly bedded 10°, with black carbonaceous flecks.	FR						PT, 0°, PL, RO, CN
			-18	21	<b>SANDSTONE:</b> Coarse grained, pale grey, with grey laminations indistinctly bedded at 20°, black carbonaceous flecks.				D A 2.13 1.94	100		PT, 0°, PL, RO, CN
			-19	22	R17-BH17 terminated at 22m							
			-20	23								
			-21	24								
			-22	25								
			-23	26								

All defects are PT, 10°-25°, PL, RO, CN unless noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **3.6.2011**

Principal:

Date completed: **3.6.2011**

Project: **SICEEP**

Logged by: **RH**

Borehole Location: **Darling Drive, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 3.5
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description	
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	type, inclination, planarity, roughness, coating, thickness	
					Continued from non-cored borehole						particular	general
			-5	9	<b>SANDSTONE:</b> Medium to coarse grained, orange-brown, distinct laminations at 0° to 10°. 8.06m - Colour change to pale grey and pale orange brown.	HW MW			D A 0.35 0.4	47	PT, 10°, PL, CO, clayey sand infill, 1mm	
			-6	10	9.0m - Colour change to pale orange brown with dark pink/red banding.					84	JT, 30°, PL, RO, CN	
			-7	11							CS, 10mm	
			-8	12		HW			D A 1.08 0.79		JT, 45°, PL, RO, CN	
			-9	13	<b>SANDSTONE:</b> Medium grained, pale grey with some dark grey. Distinct cross laminations in places. Some shale inclusions between bedding planes. <b>SHALE:</b> Dark grey, distinct fine laminations at 0° to 5°, can be remoulded into clay in places. <b>NO CORE:</b> 0.05m	FR			A 1.07	50	PT, 10°, PL, Fe SN, RO PT, 0°-5°, PL, shale infill, 1mm SM, 0°-15°, UN, 150mm, Shale SM, 0°-10°, UN, 1mm - 100mm, Shale CS Shale	
			-10	14	<b>SHALE:</b> Dark grey, distinct fine laminations at 0° to 5°, can be remoulded into clay in places. <b>NO CORE:</b> 0.09m	FR			A 0.12		12.94m to 13m - Zone of PT, 0°-5°, PL, CN, RO	
			-11	15	<b>SHALE:</b> Dark grey, distinct fine laminations at 0° to 5°, can be remoulded into clay in places. <b>SANDSTONE:</b> Fine grained, grey with dark grey bands. Distinct laminations at 0° to 5°, 1mm to 3mm shale bands in bedding planes. <b>SANDSTONE:</b> Medium to coarse grained, pale grey with distinct laminations at 5° to 15°.	FR			D A 0.14 0.13	49	13.09m to 13.27m - Zone of PT, 0°-5°, PL, CN, RO	
			-12	16						96		

All defects are: PT, 0°-15°, PL, RO, CN unless otherwise noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **3.6.2011**

Principal:

Date completed: **3.6.2011**

Project: **SICEEP**

Logged by: **RH**

Borehole Location: **Darling Drive, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 3.5
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

drilling information				material substance				rock mass defects					
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D-axial	A-axial	RQD %	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL, L, M, H, VH, EH				30, 100, 300, 1000, 3000		particular, general
			-13	17	<b>SANDSTONE:</b> Medium to coarse grained, pale grey with distinct laminations at 5° to 15°. (continued)	FR			D 0.62	A 0.45	96		JT, 45°, PL, RO, CN
			-14	18	<b>NO CORE:</b> 0.08m <b>SANDSTONE:</b> Medium to coarse grained, pale grey with distinct laminations at 5° to 15°.				D 0.64	A 0.57			JT, 75°, PL, RO, CN
			-15	19	18.60m - Black, carbonaceous particles evident within sandstone.						94		
			-16	20	19.37m - Colour change to a very pale grey/white with pale grey laminations.				D 1.72	A 1.29			
			-17	21	<b>NO CORE:</b> 0.10m <b>SANDSTONE:</b> Medium to coarse grained, pale grey with distinct laminations at 5° to 15°.				D 1.16		88		
			-18	22	R17-BH2 terminated at 22m				D 1.32	A 1.32			
			-19	23									
			-20	24									

All defects are: PT, 0°-15°, PL, RO, CN unless otherwise noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	--	---	--	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **2.6.2011**

Principal:

Date completed: **2.6.2011**

Project: **SICEEP**

Logged by: **RH**

Borehole Location: **Darling Drive, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 3.5
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
		datum: AHD	

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- A- axial	defect spacing mm	defect description
						rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	particular general
NMLC				9		Continued from non-cored borehole						
				9		<b>NO CORE:</b> 0.18m						
				9		<b>SANDSTONE:</b> Medium to coarse grained, pale orange-brown, indistinct laminations.	HW/MW			D A 0.16 0.17	27	8.68m - 8.82m - Highly fractured zone of PTs/Sand SMs 8.94m - 9.00m - SM, 0°-5°, 60mm, sand JT, 0°-5°, CU, RO, CN
				10		<b>NO CORE:</b> 0.20m				A 0.15		SM, 0°-5°, 30mm, Clayey sand
				10		<b>SANDSTONE:</b> Medium to coarse grained, pale orange-brown, indistinct laminations.					38	9.8m - 9.9m - SM, 0°-10°, 100mm, Sand JT, 85°, PL, RO, CN 10.23m - 10.24m - Clay, SM, 5°, 10mm JT, 60°, PL, RO, CN JT, 40°, PL, RO, CN JT, 40°, PL, RO, CN JT, 40°, PL, RO, CN
				11		10.37m - Pinkish-red banding 2mm to 150mm wide along laminations.				D A 0.37 0.61		JT, 5°-10°, CU, RO, CN
				11		<b>NO CORE:</b> 0.23m						11.13m - 1.19m - SM, 5°-15°, 60mm, Clay JT, 0°-5°, PL, RO, CN JT, 30°, PL, RO, CN
				12		<b>SANDSTONE:</b> Medium to coarse grained, pale orange-brown, indistinct laminations. 11.2m - Colour change to pale grey and pale orange brown with distinct laminations.				D A 0.77 1	33	11.68m - 11.88m - Zone of JT, 40°-45°, PR, RO, CN 11.95m - 11.96m - SM, 10°, 10mm, Clay JT, 80°, PL, RO, CN
				12		11.83m - 12.95m - Band of pinkish-red ironstaining.						Zone of JT, 40°-90°
				13		<b>NO CORE:</b> 0.16m						
				13		<b>SANDSTONE:</b> Medium to coarse grained, pale orange-brown, indistinct laminations.	HW/XW			A 0.08	40	JT, 60°, PL, Clay Infill, 1mm 13.2m - 13.85m - Zone of clayey sand SM
				14		13.8m - 14.38m - Fine to medium grained quartz gravel within sandstone.					28	JT, CU, RO, Fe SN 14.08m - 14.12m - Fe SN, sandy clay SM, 40°, 40mm 14.24m - 14.26m - Sandy clay SM, 35°, 20mm Sandy clay SM, 40°, 1mm 14.40m - 14.43m - SM, 10°, 30mm 14.47m - 14.52m - Zone of PT & JT 14.49m - 14.52m - SM, 40°, Clay infill, 3mm 14.54m - 15.00m - Zone of JT, 0°-90°
				15			MW/SW			D 0.19		
				15						D A 0.64 0.41	55	
				16			MW/HW					
				16								16.0m - 16.18m - Sand SM, 40°, 180mm JT, CU, RO, CN
				17						D A 0.64 0.41	46	JT, CU, RO, CN

All defects are: PT, 0°-10°, PL, RO, CN unless otherwise noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--	--

Borehole No. **R17-BH3**  
 Sheet 4 of 4  
 Project No: **GEOTLCOV24303AC**  
 Date started: **2.6.2011**  
 Date completed: **2.6.2011**  
 Logged by: **RH**  
 Checked by: **SS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **Darling Drive, Haymarket, NSW**

drill model & mounting: Ausroc 4000 Truck Easting: slope: -90° R.L. Surface: 3.5  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects					
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- A- axial	defect spacing mm	defect description	
						rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	particular	general
NMLC				17		16.85m - Sandstone paler and more coarse grained. <b>NO CORE: 0.14m</b> <b>SANDSTONE:</b> Medium to coarse grained, pale orange-brown, indistinct laminations.	MW/HW SW		0.47 0.3		46	JT, 40°, PL, RO, CN JT, 35°, PL, RO, CN 16.74m - 16.78m - SM, 0°-10°, 40mm, Sand JT, 90°, PL, RO, CN JT, 45°, PL, RO, CN	
				18					D A 0.54 1.45		70	PT, 0°-5°, CO, Clay, 1mm PT, 10°, PL, RO, Fe SN	
				19		<b>NO CORE: 0.20m</b>	MW/HW		D A 0.39 0.66			18.69m - 18.77m - Zone of PT, 0°-15°, PL, RO SM, 10°, Clay infill, 1mm JT, 85°, CU, RO, CN 19m - 19.1m - SM, 100mm, Sand 19.16m - 19.35m - Zone of coarse grained sand SM	
				20		<b>SANDSTONE:</b> Medium to coarse grained, pale orange-brown, indistinct laminations. 19.55m - 19.68m - Heavily ironstained band <b>SHALE:</b> Dark grey, fine distinct laminations at 0°-15°. <b>NO CORE: 0.04m</b> <b>SHALE:</b> Dark grey, fine distinct laminations at 0°-15°.	HW FR		A 0.33		45	JT, 45°, PL, RO, CN PT, 5°, PL, RO, Clay CO	
				21		<b>SANDSTONE:</b> Pale grey with some bands of distinct laminations at 5°-15°.			D A 0.25 0.46			JT, 35°, PL, RO, CN JT, 40°, PL, RO, CN JT, 35°, PL, RO, CN JT, 45°, PL, RO, CN JT, 60°, PL, RO, CN	
				22		R17-BH3 terminated at 22m			A 0.2				
				23									
				24									
				25									

All defects are: PT, 0°-10°, PL, RO, CN unless otherwise noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	--	---	--	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **6.6.2011**

Principal:

Date completed: **6.6.2011**

Project: **SICEEP**

Logged by: **RH**

Borehole Location: **Darling Drive, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 3.3
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is(50) MPa	D- diam- etral A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components						type, inclination, planarity, roughness, coating, thickness
					Continued from non-cored borehole						particular
											general
NMLC				9	SANDSTONE: Medium to coarse grained, pale grey and orange brown, with some pale pink and orange banding. Distinct laminations at 0°-15°, with some cross laminations evident in places.	SW			D A		
				10		MW			0.99 1.16		
				11	12.22m - Colour change to pale grey with dark grey laminations.				D A		
				12		SW			1.59 1.36		
				13	14.4m - Laminations becoming indistinct.				D A		
				14		FR			0.94 1.2		
				15	14.7m - Trace of rounded white quartz and rounded lithic fine to medium grained gravel.				D A		
				16		SW			1.52 1.49		
				17	SANDSTONE: Coarse grained, pale orange-brown and pale pink, indistinct lamations, trace of fine grained white quartz and grey lithic, rounded gravel.				D A		
				18		MW			1.13 1.15		
				19					D A		
				20					1.33 1.86		
				21					D A		
				22					1.7		
				23					D A		
				24					1.7		
				25					D A		
				26					D A		
				27					D A		
				28					D A		
				29					D A		
				30					D A		
				31					D A		
				32					D A		
				33					D A		
				34					D A		
				35					D A		
				36					D A		
				37					D A		
				38					D A		
				39					D A		
				40					D A		
				41					D A		
				42					D A		
				43					D A		
				44					D A		
				45					D A		
				46					D A		
				47					D A		
				48					D A		
				49					D A		
				50					D A		
				51					D A		
				52					D A		
				53					D A		
				54					D A		
				55					D A		
				56					D A		
				57					D A		
				58					D A		
				59					D A		
				60					D A		
				61					D A		
				62					D A		
				63					D A		
				64					D A		
				65					D A		
				66					D A		
				67					D A		
				68					D A		
				69					D A		
				70					D A		
				71					D A		
				72					D A		
				73					D A		
				74					D A		
				75					D A		
				76					D A		
				77					D A		
				78					D A		
				79					D A		
				80					D A		
				81					D A		
				82					D A		
				83					D A		
				84					D A		
				85					D A		
				86					D A		
				87					D A		
				88					D A		
				89					D A		
				90					D A		
				91					D A		
				92					D A		
				93					D A		
				94					D A		
				95					D A		
				96					D A		
				97					D A		
				98					D A		
				99					D A		
				100					D A		

General defects are: PT, 0°-15°, PL, RO, CN

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **6.6.2011**

Principal:

Date completed: **6.6.2011**

Project: **SICEEP**

Logged by: **RH**

Borehole Location: **Darling Drive, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 3.3
hole diameter: 100 mm Drilling fluid:	Northing:	bearing: N/A	datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	RQD %	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000		particular
NMLC				17	<b>SANDSTONE:</b> Coarse grained, pale orange-brown and pale pink, indistinct lamations, trace of fine grained white quartz and grey lithic, rounded gravel. <i>(continued)</i>	MW				95		JT, 85°, PL, RO, CN
				17.35m	Coarsening of sandstone (dominated by coarse grained sand and fine grained quartz gravel).			1.08	2.03			Clay SM, 0°-10°, PL, 30mm
				17.60m	Fining of sandstone (medium to coarse grained no gravels)							JT, 85°, PL, RO, FeSN
				18.30m	Laminations becoming distinct.	SW		1.38	1.13			
				19						77		Zone of PT, 0°-15°, PL, RO, CN approx 40mm spacing
				20								
				20.80m	Colour change to pale grey with dark grey laminations.	FR		2.17	3.47			
				21				1.75	1.48	87		PT, 0°-10°, UN, RO, CN Clay SM, 0°-10°, PL, 30mm
				22								
				23	<b>SHALE:</b> Dark grey, distinct laminations at 0°-10°.							
				24	R17-BH4 terminated at 21.98m							
				25								

General defects are: PT, 0°-15°, PL, RO, CN

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **14.6.2011**

Principal:

Date completed: **15.6.2011**

Project: **SICEEP**

Logged by: **LJG**

Borehole Location: **Lackey Street, Haymarket, NSW**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 2.4
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components						type, inclination, planarity, roughness, coating, thickness
					Continued from non-cored borehole						particular
											general
NMLC			-14		<b>SANDSTONE:</b> Coarse grained, pale grey, with dark grey laminations, distinctly bedded at 5°-15°, with some black carbonaceous flecks. At 16.85m - Indistinctly bedded at 10°-30°	SW FR		0.76	0.31		JT, 80°, PL, RO, CN-VN, 80mm
			-17								
	Not monitored		-15		18.80m - Indistinctly bedded at 30°						PT, 15°, PL, RO, CN JT, 70°, PL, RO, CN, 60mm PT, 15°, PL, RO, CN PT, 15°, PL, RO, CN 10mm
			-18								
			-16		18.80m - Indistinctly bedded at 30°						PT, 10°, PL, RO, VN
			-19								
			-17		18.80m - Indistinctly bedded at 30°						PT, 10°-20°, PL-IR, RO, CN, 10mm
			-20								
			-18		18.80m - Indistinctly bedded at 30°						10mm
			-21								
			-19		<b>Interbedded SANDSTONE and SHALE:</b> Medium to coarse grained, grey sandstone with indistinct laminations at 0°-15°. Dark-grey shale with distinct laminations at 0°-15°.						JT, 85°-90°, PL, RO, CN, VN, >10mm HFZ, 100mm SM, Clay and Gravel filled, 50mm SM, Sand filled, 100mm PT, 0°, PL, RO, CN
			-22		<b>SANDSTONE:</b> Medium to coarse grained, pale grey to grey with indistinct laminations at 10°.						JT, 90°, PL, RO, CN, 90mm
			-20		R17-BH5 terminated at 22.35m						PT, 10°, IR, RO, CN PT, 10°, IR, RO, CN
			-23								
			-24								

All defects are PT, 10°-30°, PL, RO, CN unless noted otherwise.

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **9.6.2011**

Principal:

Date completed: **9.6.2011**

Project: **SICEEP**

Logged by: **LJG**

Borehole Location: **Back of House of Sydney Entertainment Centre**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 2.6
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

drilling information				material substance						rock mass defects				
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral	A- axial	RQD %	defect spacing mm	defect description
						rock type; grain characteristics, colour, structure, minor components								type, inclination, planarity, roughness, coating, thickness
						Continued from non-cored borehole								particular
														general
NMLC		Not monitored		16		<b>NO CORE:</b> 0.10m	MW FR		D 2.7	A 2.39				Highly fractured zone 30mm
				17		<b>SANDSTONE:</b> Coarse grained, pale grey to grey, indistinctly bedded at 10°-15°, with some black carbonaceous flecks and laminations and fine gravel inclusions. 15.95m to 16.05m - Ironstained.						26		16.40m - 17.33m - Multiple vertical 75°-90° JT, PL-CU, RO, CN HFZ 50mm HFZ of multiple PT, 15°, PL, RO, CN SM, 10°, Clay and sand filled 10mm JT, 45°, PL, RO, CN HFZ 110mm PT x2 10mm PT, CS, JT, 50mm 10°-90°, PL, RO, CN JT, 45°, CU, RO, CN, 80mm JT, 80°, PL, RO, CN, 250mm Multiple at 200mm
				18					D 1.53	A 0.74				PT/JT, 80°, PL, RO, CN, 80mm PT/JT, 90°, PL, RO, CN, 90mm PT/JT, 75°, PL, RO, CN, 80mm PT/JT, 45°, PL, RO, CN HFZ of multiple JT and PT
				19		<b>NO CORE:</b> 0.20m	FR							HFZ of multiple JT and PT
				20		<b>SANDSTONE:</b> Coarse grained, pale grey, indistinctly bedded at 30°, with some black carbonaceous flecks and laminations, micaceous.	FR							JT, 85, PL, RO, CN, 190mm PT/JT, 90°, PL, RO, CN Highly fractured zone of multiple PT/JT
				21		<b>SHALE:</b> Black, thinly laminated at 0°, with some sandstone gravel inclusions. <b>NO CORE:</b> 0.25m	FR		D 1.15	A 1.37				XW, SM, Silt/clay filled 100mm Highly fractured zone of multiple JT/PT, 590mm
				22		<b>SANDSTONE:</b> Coarse grained, pale grey, distinctly bedded at 0°-10°, with some black carbonaceous laminations and flecks. 21.27m - Massive.								JT, 80°, PL, RO, CN, 240mm PT/JT, 90°, PL, Closed, 180mm JT, 50°, PL, RO, CN PT, 30°, PL, RO, Clay, CO HFZ 40mm PT, 30°, PL, RO, CN JT, 80°, PL-CU, RO, CN PT, 35°, PL, RO, CN JT
				23		21.70m - Indistinctly bedded at 10°.			D 1.29	A 1.57				PT, 15°, PL, RO, Black CO - coal/carbonaceous material CS, 10°, PL, Gravel filled
				24		<b>SANDSTONE:</b> Coarse grained, grey, pale grey, brown, distinctly bedded at 30°, with some black carbonaceous laminations and flecks, micaceous, trace of voids.								PT/JT, 30°, PL, RO, CN-UN
				25					D 1.48	A 1.2				PT x2, 10°, PL, RO, CN

All defects are: PT, 10°-30°, PL, RO, CN unless otherwise noted

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **9.6.2011**

Principal:

Date completed: **9.6.2011**

Project: **SICEEP**

Logged by: **LJG**

Borehole Location: **Back of House of Sydney Entertainment Centre**

Checked by: **SS**

drill model & mounting: Ausroc 4000 Truck	Easting:	slope: -90°	R.L. Surface: 2.6
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

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	Is <sub>(50)</sub> MPa D- diam- etral A- axial	RQD %	defect spacing mm	defect description	
								VL L M H VH EH		30 100 300 1000 3000		particular	general
NMLC	▲		-22	24	[Dotted pattern]	<b>SANDSTONE:</b> Medium to coarse grained, grey with brown, black and dark grey laminations, distinctly bedded at 10°-20°, with black carbonaceous flecks and laminations, micaceous. <i>(continued)</i>	FR			85		PTx2, 10°, PL, RO, CN	
			-25	25		R17-BH6 terminated at 24.94m			D 0.27 A 0.22			PT, 5°, PL, RO, CN Multiple JT, 160mm infilled with clay 45°-75° PT, 10°, PL, RO, VN	
			-23	26									
			-24	27									
			-25	28									
			-26	29									
			-27	30									
			-28	31									
			-29										

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **15.6.2011**

Principal:

Date completed: **17.6.2011**

Project: **SICEEP**

Logged by: **RC**

Borehole Location: **Back of House of Sydney Entertainment Centre**

Checked by: **SS**

drill model & mounting: Hydrapower Scout Truck	Easting:	slope: -60°	R.L. Surface: 2.6
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: 213.5°
		datum: AHD	

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- A- axial	defect spacing mm	defect description
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	type, inclination, planarity, roughness, coating, thickness
					Continued from non-cored borehole						particular
											general
NQ		No mud used	-12	17	SANDSTONE: Coarse grained, pale brown, indistinctly bedded at 20°-40°.	HW/MW			D A 1.32 1.79		PT, 15°, PL, RO, SN PT, 20°, PL, RO, SN PT, 30°, PL, RO, SN PT, 25°, PL, RO, SN
			-13	18	16.90m - Red band, 200mm	SW					PT, 30°, PL, RO, SN
			-14	19							PT, 20°, PL, RO, VN, Clay PT, 30°, PL, RO, VN, Clay
			-15	20	NO CORE: 0.40m				D A 1.56 2.2		PT, 5°, PL, RO, SN PT, 5°, PL, RO, VN, Clay JT, 60°, UN, RO, VN, Clay PT, 15°, PL, RO, VN, Clay
			-16	21	SANDSTONE: Medium grained, pale grey, indistinctly bedded at 10°-30°.	FR			D A 0.52 0.41		PT, 15°, PL, RO, VN clay
			-17	22	NO CORE: 0.10m						PT, 10°, PL, RO, SN JT, 70°, PL, RO, SN
			-18	23	SHALE AND LAMINATE: Dark grey, grey.	FR			D A 1.33 1.4		JT, 0°, IR, RO, SN
			-19	24	SANDSTONE: Medium grained, pale grey, massive contact angle = 20°.				D A 0.17 0.41		PT, 20°, UN, RO, CN
			-20	25	SANDSTONE: Medium grained, pale grey, distinctly bedded at 40°.				D A 1.58 1.91		SM, 20°, PL, RO, Clay, 10mm PT, 10°, PL, RO, SN SM, 25°, PL, RO, Clay, 35mm JT, 45°, PL, RO, VN SM, 25°, IR, RO, Clay, 40mm PT, 20°, PL, RO, VN SM, 20°, PL, RO, Clay, 50mm
			-21	26					D A 1.8 1.69		JT, 70°, PL, RO, CN, Sand, 20mm

Unless noted defects are: PT, 10°-40°, PL, RO, CN

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12



## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **15.6.2011**

Principal:

Date completed: **17.6.2011**

Project: **SICEEP**

Logged by: **RC**

Borehole Location: **Back of House of Sydney Entertainment Centre**

Checked by: **SS**

drill model & mounting: Hydrapower Scout Truck Easting: slope: -60° R.L. Surface: 2.6  
hole diameter: 100 mm Drilling fluid: Northing: bearing: 213.5° datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description	
				graphic log core recovery	rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			RQD %	particular	general
NQ			-26	33	<b>DOLERITE:</b> Coarse grained, dark grey, speckled green. (continued)	SA MA					JT, 20°, PL, RO, VN JT, 45°, PL, RO, VN, Calcium	
					From 32.95, with bands of pale brown, pale grey.						32.65m - 33.03m - Highly fractured rock	
			-27	34	33.65m - Becoming pale grey, pale brown bands of dark grey.						JT, 20°-40°, PL, RO, VN JT, 55°, PL, RO, CN JT, 55°, PL, RO, CN JT, 60°, PL, RO, VN JT, 30°, PL, RO, VN JT, 40°, PL, RO, VN	
					33.80m - 33.94m - Highly fractured rock						33.80m - 33.94m - Highly fractured rock	
			-28	35	<b>NO CORE:</b> 0.90m						JT, 30°, PL, RO, VN JT, 30°, PL, RO, VN	
											34.20m - 35.10m - Highly fractured rock	
			-29	36	<b>DOLERITE:</b> Pale grey	HA						
											SM, 30°, IR, RO, Clay, 20mm	
			-30	37	37m - Interface angle = 60°	XA						
					<b>SANDSTONE:</b> Medium grained, dark grey to black, distinctly bedded at 40°.	FR						
			-31	38							JT, 70°, PL, RO, SN JT, 80°, PL, RO, SN	
											JT, 70°, PL, RO, SN SM, 20°, PL, RO, XA, 10mm JT, 65°, PL, RO, CO Clay, 5mm JT, 30°, PL, RO, SN JT, 30°, PL, VR, CN	
			-32	39	<b>NO CORE:</b> 0.35m							
					<b>SANDSTONE:</b> Medium to coarse grained, pale grey, grey, indistinctly bedded at 40°.	FR						
											JT, 30°, PL, VR, CN	
				40	R17-BH7 terminated at 40m							

Unless noted defects are: JT, 10°-40°, PL, RO, CN

Unless noted defects are: PT, 40°, PL, RO, SN

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **14.6.2011**

Principal:

Date completed: **14.6.2011**





Project: **SICEEP**










Logged by: **RC**

Borehole Location: **Back of House of Sydney Entertainment Centre**

Checked by: **SS**

drill model & mounting: Hydrapower Scout Truck	Easting:	slope: -90°	R.L. Surface: 2.5
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

drilling information				material substance					rock mass defects				
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description	
						rock type; grain characteristics, colour, structure, minor components						particular	general
								VL L M H VH EH			30 100 300 1000 3000		
ADT				2		<b>FILL: ASPHALT:</b> Dark grey, 70mm thickness sandy gravel: medium grained, grey sand, fine grained, grey gravel							
				1		<b>FILL: SAND:</b> Fine to medium grained, dark brown, with some clay and fine gravel.							
				1		<b>FILL: ASPHALT:</b> Dark grey, 250mm.							
NMLC				1		<b>FILL: CONCRETE:</b> Pale grey, 410mm. 1m - With some dark grey gravel aggregate and steel.							
				0		<b>VOID:</b>							
				3		R17-BH8 terminated at 3m							
				-1									
				4									
				-2									
				5									
				-3									
				6									
				-4									
				7									
				-5									
				8									

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b>  casing used  barrel withdrawn <b>graphic log/core recovery</b>  core recovered  no core recovered	<b>water</b>  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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	--	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

# Engineering Log - Cored Borehole

 Client: **Infrastructure NSW**

 Date started: **15.6.2011**

Principal:

 Date completed: **15.6.2011**


 Project: **SICEEP**











 Logged by: **RC**

 Borehole Location: **Back of House of Sydney Entertainment Centre**

 Checked by: **SS**

drill model & mounting: Hydrapower Scout Truck	Easting:	slope: -90°	R.L. Surface: 2.75
hole diameter: 100 mm	Drilling fluid:	Northing:	bearing: N/A
			datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description
						rock type; grain characteristics, colour, structure, minor components						type, inclination, planarity, roughness, coating, thickness
ADT	Not Observed		2	1		FILL: ASPHALT: Dark grey 70mm, overlying sandy gravel, medium grained, brown sand, dark grey gravel. FILL: SAND: Medium to coarse grained, yellow, with some fine to coarse sandstone gravel. 0.60m - Becoming brown, with some coarse dolerite gravel. FILL: ASPHALT: Grey, 150mm FILL: CONCRETE: Pale grey, 50mm. R17-BH9 terminated at 0.85m						
				1								
				2								
				3								
				4								
				5								
				6								
				7								
				8								

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b>  casing used  barrel withdrawn <b>graphic log/core recovery</b>  core recovered  - graphic symbols indicate material  no core recovered	<b>water</b>  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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

Borehole No. **NBH1**  
 Sheet 2 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **19.4.2012**  
 Date completed: **19.4.2012**  
 Logged by: **JW**  
 Checked by: **DS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: XP60 Ute Easting: 333372 slope: -90° R.L. Surface: 2.85  
 hole diameter: 100 mm Drilling fluid: Northing: 6250503 bearing: N/A datum: AHD

drilling information				material substance				rock mass defects					
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description	
						rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	type, inclination, planarity, roughness, coating, thickness	
												particular	general
		None Observed	2	1									
			1	2									
			0	3									
			-1	4		Continued from non-cored borehole							
NMLC			-2	5		<b>SANDSTONE:</b> Coarse grained, pale brown-dark brown, distinctly bedded at 10°-20°, with some dark grey carbonaceous laminations	MW			D 0.8 A 1.51	82	PT, 15°, PL, RO, CN 4.14m to 4.17m - Fractured Zone, 30mm 4.23m to 4.27m - PT, 20°, PL, RO, CN PT, 0°, PL, RO, CN PT, 10°, PL, VR, CN	
			-3	6		<b>SANDSTONE:</b> Medium to coarse grained, pale brown to orange-brown iron stained, cross bedded at 0°-10°, with some shale breccia.				D 0.72 A 1.69		PT, 0°, PL, RO, FeSN PT, 0°, PL, RO, SN	
			-4	7		<b>SANDSTONE:</b> Medium to coarse grained, pale grey with dark grey carbonaceous laminae, quartz grains. <b>INTERLAMINATED SHALE (70%) AND SANDSTONE (30%):</b> Fine grained, pale grey and dark grey. <b>SHALE:</b> Dark grey.	SW			D 0.66 A 0.21	83	PT, 0°, PL, RO, Clay VN PT, 0°, PL, SO, CN	
			-5	8		<b>SANDSTONE:</b> Fine to medium grained, pale grey, with dark grey carbonaceous	FR			D 0.56 A 0.95		PT, 0°, PL, SO, CN 7.43m to 7.74m - Closely spaced defects PT, 0°, PL, SO, CN, 50mm spacing unless noted SM, Clay, 10mm PT, 0°, PL, SO, Clay VN	

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--	--


CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12











Borehole No. **NBH1**  
 Sheet 3 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **19.4.2012**  
 Date completed: **19.4.2012**  
 Logged by: **JW**  
 Checked by: **DS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: XP60 Ute Easting: 333372 slope: -90° R.L. Surface: 2.85  
 hole diameter: 100 mm Drilling fluid: Northing: 6250503 bearing: N/A datum: AHD

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			Is <sub>(50)</sub> MPa	defect spacing mm			defect description								
								VL	L	M	H	VH	EH	A-axial	D- diam- etral	30	100	300	1000	3000	particular	general	
NMLC			-6	9		laminae and shale breccia bedded at 0°-10°. <b>SANDSTONE:</b> Fine to medium grained, pale grey, with dark grey laminations, indistinctly bedded at 0°-5° ( <i>continued</i> )	FR							D	A	1.22	1.42						
						NBH1 terminated at 8.9m																	
			-7	10																			
			-8	11																			
			-9	12																			
			-10	13																			
			-11	14																			
			-12	15																			
			-13	16																			

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b>  casing used  barrel withdrawn <b>graphic log/core recovery</b>  core recovered  - graphic symbols indicate material  no core recovered	<b>water</b>  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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

Borehole No. **NBH10**  
 Sheet 5 of 5  
 Project No: **GEOTLCOV24303AC**  
 Date started: **30.4.2012**  
 Date completed: **1.5.2012**  
 Logged by: **JW**  
 Checked by: **DS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: XC Drill Track Easting: slope: -90° R.L. Surface: 5.8  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information					material substance					rock mass defects															
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength					defect spacing mm	defect description											
						rock type; grain characteristics, colour, structure, minor components		VL	L	M	H	VH	EH	IS <sub>(50)</sub> MPa	D- diam- etral A- axial	RQD %	30	100	300	1000	3000	particular	general		
			-19	25																					
			-20	26																					
			-21	27																					
			-22	28																					
			-23	29																					
			-24	30																					
			-25	31		Continued from non-cored borehole								D A											
NQ			-25	31		<b>SANDSTONE:</b> Fine grained, pale grey, indistinctly bedded at 0°-5°, with dark grey laminations	FR							1.68 1.88										PT, 0°, PL, RO, CN	
			-26	32										D A											
														1.57 1.91											

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>drilling</b> NBH10 terminated at 31.9m [Symbol] casing used [Symbol] barrel withdrawn <b>graphic log/core recovery</b> [Symbol] core recovered [Symbol] - graphic symbols indicate material [Symbol] no core recovered	<b>water</b> 10/1/98 water level on date shown [Symbol] water inflow [Symbol] partial drill fluid loss [Symbol] complete drill fluid loss [Symbol] water pressure test result (lugeons) for depth interval shown	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular	<b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	--	---	--	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12



## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **27.4.2012**

Principal:

Date completed: **27.4.2012**

Project: **SICEEP**










Logged by: **JW**

Borehole Location: **See Figure 1**

Checked by: **DS**

drill model & mounting: Ausrock 3000 Truck	Easting: 333635	slope: -90°	R.L. Surface: 2.4
hole diameter: 100 mm Drilling fluid:	Northing: 6250073	bearing: N/A	datum: AHD

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					defect spacing mm	defect description								
								VL	L	M	H	VH	EH	IS <sub>(50)</sub> MPa D- diam- etral A- axial	RQD %	30	100	300	1000	3000	particular	general
			-6																			
			-7																			
			-8																			
			-9																			
			-10																			
			-11																			
			-12																			
			-13																			
			-14																			
			-15																			
			-16			Continued from non-cored borehole																
NMLC						<b>SANDSTONE:</b> Fine to medium grained, pale grey, with some iron oxide bands.	HW							D A 0.06 0.05	56							

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b>  casing used  barrel withdrawn <b>graphic log/core recovery</b>  core recovered - graphic symbols indicate material  no core recovered	<b>water</b>  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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

Borehole No. **NBH17**  
 Sheet 4 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **27.4.2012**  
 Date completed: **27.4.2012**  
 Logged by: **JW**  
 Checked by: **DS**

# Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: Ausrock 3000 Truck Easting: 333635 slope: -90° R.L. Surface: 2.4  
 hole diameter: 100 mm Drilling fluid: Northing: 6250073 bearing: N/A datum: AHD

drilling information				material substance				rock mass defects					
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description	
						rock type; grain characteristics, colour, structure, minor components						type, inclination, planarity, roughness, coating, thickness	
												particular	general
NMLC			-14	15.9m to 10.1m	[Dotted pattern]	15.9m to 10.1m - Becoming distinctly bedded at 0°-5° with carbonaceous laminae. <b>SANDSTONE:</b> Fine to medium grained, pale grey, with some iron oxide bands. <i>(continued)</i>	HW				56	PT, 20°, PL, RO, Sand CO JT, 90°, PL, RO, Clay Seam (10mm) in between joints (200mm) PT, 0°, PL, RO, clayey sand CO	
			-15	17	[Dotted pattern]	<b>SANDSTONE:</b> Medium to coarse grained, yellow brown, indistinctly bedded at 0°-5°. <b>NO CORE:</b> 0.3m	HW		D A 0.03 0.04		39	16.83m to 16.93m - PT, 0°, PL, SO, Fe SN	
			-15	18	[Dotted pattern]	<b>SHALE:</b> Dark grey, with some fine sandstone bands and occasional iron staining. <b>SANDSTONE:</b> Fine grained, pale grey, carbonaceous veins. <b>SHALE:</b> Dark grey, disturbed bedding.	MW		D A 0.09 0.11			PT, 0°, PL, RO, Fe SN	
			-16	18	[Dotted pattern]	<b>SANDSTONE:</b> Medium grained, pale grey, massive, with some carbonaceous laminae and iron staining. NBH17 terminated at 18m							
			-17	19									
			-18	20									
			-19	21									
			-20	22									
			-21	23									
			-21	24									

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	--	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **NBH2**  
 Sheet 2 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **1.5.2012**  
 Date completed: **1.5.2012**  
 Logged by: **DB**  
 Checked by: **DS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: XP60 6x6 Ute Easting: slope: -90° R.L. Surface: 2.82  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

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	Is <sub>(50)</sub> MPa D- diam- etral A- axial	RQD %	defect spacing mm	defect description type, inclination, planarity, roughness, coating, thickness	
								VL L M H VH EH		30 100 300 1000 3000		particular	general
			2	1									
			1	2									
		▶	0	3									
			-1	4									
			-2	5		Continued from non-cored borehole							
RR			-2	5		<b>SANDSTONE:</b> Fine to coarse grained, orange brown to pale grey, iron stained, indistinctly bedded at 0°-5°.	MW		D A 1.02 1.15	100			
			-3	6					D A 1.59 1.27	93		PT, 0°-5°, IR, RO, CN	
			-4	7					D A 0.75 0.74	90		PT, 5°, IR, VR, SN iron	
			-4	7								PT, 0°, PL, RO, SN iron	
			-4	7								PT, 5°, CU, VR, SN iron	
			-4	7								PT, 0°, CU, VR, SN iron	
			-5	8		<b>SANDSTONE:</b> Fine to medium grained, pale grey, indistinctly bedded at 0°-5°, with some dark grey laminations.	FR		D A 0.86 0.93	100		PT, 5°, PL RO, CN PT, 5°, PL, RO, CN 7.40m to 7.45m - SM, 0°, PL, Clay (10mm) SM, 0°, PL, sandy clay (30mm)	

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **NBH2**  
 Sheet 3 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **1.5.2012**  
 Date completed: **1.5.2012**  
 Logged by: **DB**  
 Checked by: **DS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: XP60 6x6 Ute Easting: slope: -90° R.L. Surface: 2.82  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects			
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	defect spacing mm	defect description
						rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH	D- diam- etral A- axial	RQD %	type, inclination, planarity, roughness, coating, thickness
										30 100 300 1000 3000	particular general
RR			-6	9		<b>SANDSTONE:</b> Fine to medium grained, pale grey, indistinctly bedded at 0°-5°, with some dark grey laminations. <i>(continued)</i>	FR			100	
						NBH2 terminated at 9.25m					
			-7	10							
			-8	11							
			-9	12							
			-10	13							
			-11	14							
			-12	15							
			-13	16							

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--










Borehole No. **NBH28**  
 Sheet 3 of 4  
 Project No. **GEOTLCOV24303AC**  
 Date started: **20.4.2012**  
 Date completed: **23.4.2012**  
 Logged by: **JW**  
 Checked by: **DS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: Ausrock 3000 Truck Easting: 333703 slope: -90° R.L. Surface: 2.3  
 hole diameter: 100 mm Drilling fluid: Northing: 6250005 bearing: N/A datum: AHD

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	Is <sub>(50)</sub> MPa D- diam- A- axial	RQD %	defect spacing mm	defect description type, inclination, planarity, roughness, coating, thickness	
								VL L M H VH EH		30 100 300 1000 3000		particular	general
				-6									
				-7									
				-8									
				-9									
				-10									
				-11									
				-12									
				-13									
				-14									
				-15									
				-16									
						Continued from non-cored borehole							
NMLC						<b>SANDSTONE:</b> Medium to coarse grained, mottled yellow brown, red brown, off-white, distinctly bedded at 10°-20°	MW		D A 0.85 0.97	67		PT, 20°, PL, RO, CN PT, 20°, PL, RO, CN PT, 20°, PL, RO, CN	

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b>  casing used  barrel withdrawn <b>graphic log/core recovery</b>  core recovered - graphic symbols indicate material  no core recovered	<b>water</b>  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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**

Date started: **20.4.2012**

Principal:

Date completed: **23.4.2012**

Project: **SICEEP**

Logged by: **JW**

Borehole Location: **See Figure 1**

Checked by: **DS**

drill model & mounting: Ausrock 3000 Truck	Easting: 333703	slope: -90°	R.L. Surface: 2.3
hole diameter: 100 mm Drilling fluid:	Northing: 6250005	bearing: N/A	datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description	
					rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH			30 100 300 1000 3000	particular general	
NMLC			-14		SANDSTONE: Medium grained, pale grey with dark grey laminations, indistinctly bedded at 0°-5°, with some coarse grained quartz bands	MW				67	PT, 10°, PL, RO, CN	
			17	FR				D 0.28 A 0.55			PT, 0°, IR, RO, Sand CO 16.85m to 17.08m - Vertical Fracture, JT, 80°, PL, RO, Clay VN	
			-15		SANDSTONE: Medium to coarse grained, red-brown, orange and pale grey, iron stained, with dark grey shale laminations, distinctly bedded at 20°	SW				91	PT, 20°, PL, RO, CN PT, 20°, PL, RO, CN 17.38m to 17.6m - Vertical Fracture, JT, 5°, PL, RO, Sand CO	
			18	SW-FR				D 0.71 A 0.56			PT, 0°, PL, RO, Clay, CO	
			-16		18.5m - Becoming pale grey with slight iron staining					91	PT, 5°, PL, SO, Clay, CO PT, 20°, PL, SO, Clay, VN	
			19					D 0.63 A 0.62			PT, 20°, PL, RO, CN PT, 20°, PL, RO, CN PT, 25°, PL, RO, Clay CO	
			-17		SANDSTONE: Medium to coarse grained, pale grey with dark grey shale laminations, distinctly bedded at 0°-20°	FR				91	PT, 20°, PL, RO, CN PT, 20°, PL, RO, CN 19.54m to 19.65m - Vertical Fracture, JT, 70°, PL, RO, CN	
			20					D 2.62 A 2.48			PT, 0°, UN, RO, CN JT, 40°, IR, RO, CN	
			-18		Grouted to surface finish with concrete plug NBH28 terminated at 20.6m					91		
			21					D 1.73 A 2.06				
			-19									
			22									
			-20									
			23									
			-21									
			24									

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **NBH3**  
 Sheet 4 of 5  
 Project No. **GEOTLCOV24303AC**  
 Date started: **4.5.2012**  
 Date completed: **4.5.2012**  
 Logged by: **JW**  
 Checked by: **DS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: Mobile Drill B80 Truck Easting: 333487 slope: -90° R.L. Surface: 3.5  
 hole diameter: 100 mm Drilling fluid: Northing: 6250411 bearing: N/A datum: AHD

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	Is <sub>(50)</sub> MPa D- diam- etral A- axial	RQD %	defect spacing mm	defect description type, inclination, planarity, roughness, coating, thickness	
								VL L M H VH EH		30 100 300 1000 3000		particular	general
			-13	17									
			-14	18									
			-15	19									
			-16	20									
			-17	21									
			-18	22									
			-19	23		SANDSTONE: Medium to coarse grained, pale grey with iron staining, indistinctly bedded at 15°	MW-SW		0.2 0.41			PT, 15°, PL, SO, Silt CO PT, 20°, PL, RO, CN	
			-20	24		SANDSTONE: Medium to coarse grained, pale grey, indistinctly bedded at 0°-20°, with dark grey laminations . 23.1m to 23.35m - Iron stained	FR		1.16 1.35			22.66m to 22.84m - XW Seam, Sandy Clay, high plasticity, grey, 180mm CS, Clayey Sand, fine grained, black/pale orange, 10mm PT, 0°, PL, SO, Silt CO CS, Clayey Sand, fine grained, dark grey, 10mm PT, 10°, PL, RO, Fe SN	

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

Borehole No. **NBH3**  
 Sheet 5 of 5  
 Project No. **GEOTLCOV24303AC**  
 Date started: **4.5.2012**  
 Date completed: **4.5.2012**  
 Logged by: **JW**  
 Checked by: **DS**

# Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: Mobile Drill B80 Truck Easting: 333487 slope: -90° R.L. Surface: 3.5  
 hole diameter: 100 mm Drilling fluid: Northing: 6250411 bearing: N/A datum: AHD

drilling information				material substance				rock mass defects					
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	RQD %	defect spacing mm	defect description
						rock type; grain characteristics, colour, structure, minor components		VL L M H VH EH				30 100 300 1000 3000	particular general
NMLC			-21	25		<b>SANDSTONE:</b> Medium to coarse grained, pale grey, indistinctly bedded at 0°-20°, with dark grey laminations . (continued)	FR		1.85 1.82	D A	84		CS, Gravelly Sand, fine grained, grey, gravel is fine, 10mm PT, 0°, PL, RO, CN PT, 0°, PL, RO, CN PT, 15°, PL, RO, CN
			-22	26		NBH3 terminated at 25.1m			2.03 2.14	D A			
			-23	27									
			-24	28									
			-25	29									
			-26	30									
			-27	31									
			-28	32									

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b> casing used barrel withdrawn <b>graphic log/core recovery</b> core recovered - graphic symbols indicate material no core recovered	<b>water</b> 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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	---	---	--	--










Borehole No. **NBH8**  
 Sheet 3 of 3  
 Project No. **GEOTLCOV24303AC**  
 Date started: **27.4.2012**  
 Date completed: **27.4.2012**  
 Logged by: **DB**  
 Checked by: **DS**

## Engineering Log - Cored Borehole

Client: **Infrastructure NSW**  
 Principal:  
 Project: **SICEEP**  
 Borehole Location: **See Figure 1**

drill model & mounting: Mobile Drill Truck Easting: slope: -90° R.L. Surface: 3.4  
 hole diameter: 100 mm Drilling fluid: Northing: bearing: N/A datum: AHD

drilling information				material substance				rock mass defects				
method	core-lift	water	RL	depth metres	graphic log core recovery	material	weathering alteration	estimated strength	Is <sub>(50)</sub> MPa	D- diam- etral A- axial	defect spacing mm	defect description
						rock type; grain characteristics, colour, structure, minor components						type, inclination, planarity, roughness, coating, thickness
			-5	9								
			-6	10								
			-7									
			-8	11		Continued from non-cored borehole						
			-9	12		<b>SANDSTONE:</b> Fine to medium grained, orange-brown to red-brown, iron stained through substance, indistinctly cross-bedded at 5°-20°.	MW		1.17 1.31			PT, 5°, PL, RO, CN PT, 5°, PL, RO, CN PT, 30°, PL, RO, CN PT, 5°, PL, RO, CN SM, 0°, PL, Sandy clay, 10mm
			-10	13		<b>SANDSTONE:</b> Fine to medium grained, pale grey, indistinctly cross bedded at 0°-5°.	SW		0.86 0.81		77	PT, 12°, PL, RO, CN PT, 5°, PL, VR, CN SZ, 0°, IR, VR, CO-Sand, 30mm JT, 60°, PL, RO, CN JT, 75°, PL, VR, CO-Clay, 10mm thick
			-11				FR		0.86 0.86			
			-12			NBH8 terminated at 13.07m						
			-13									
			-14									
			-15									
			-16									

<b>method</b> DT diatube AS auger screwing AD auger drilling RR roller/tricone CB claw or blade bit NMLC NMLC core NQ, HQ, PQ wireline core	<b>core-lift</b>  casing used  barrel withdrawn <b>graphic log/core recovery</b>  core recovered  no core recovered	<b>water</b>  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	<b>weathering</b> FR fresh SW slightly weathered MW moderately weathered HW highly weathered XW extremely weathered DW distinctly weathered (covers MW and HW) <b>strength</b> VL very low L low M medium H high VH very high EH extremely high	<b>defect type</b> JT joint PT parting SM seam SZ sheared zone SS sheared surface CS crushed seam <b>planarity</b> PL planar CU curved UN undulating ST stepped IR irregular <b>roughness</b> VR very rough RO rough SO smooth SL slickensided <b>coating</b> CN clean SN stained VN veneer CO coating
--	--	---	--	--

CORED BOREHOLE GINTGEOTLCOV24303AC\_COMBINED WITH AA GINT.GPJ COFFEY.GDT 5.15.12

# Appendix B Laboratory Data

**Acid Sulfate Soil Assessment and Preliminary Management Plan  
Haymarket Precinct, Darling Harbour, Sydney NSW**

Parameter	Units	LOR	SE100700.001	SE100700.002	SE100700.003	SE100700.004	SE100700.005
Sample Number			SE100700.001	SE100700.002	SE100700.003	SE100700.004	SE100700.005
Sample Matrix			Soil	Soil	Soil	Soil	Soil
Sample Date			07 Jun 2011	07 Jun 2011	07 Jun 2011	07 Jun 2011	07 Jun 2011
Sample Name			BH1 1.0	BH1 3.0	AS01 3.0	AS01 5.5	AS01 1.0

Full 8270 SVOC in Soil Method: AN420 (continued)

Other SVOCs

Parameter	Units	LOR	SE100700.001	SE100700.002	SE100700.003	SE100700.004	SE100700.005
Methyl methanesulfonate	mg/kg	1	-	<1	-	-	-
Ethyl methanesulfonate	mg/kg	1	-	<1	-	-	-
Dibenzofuran	mg/kg	0.5	-	<0.5	-	-	-
Benzyl alcohol	mg/kg	1	-	<1	-	-	-
Safrole	mg/kg	0.5	-	<0.5	-	-	-
Isosafrole Isomer 1	mg/kg	1	-	<1	-	-	-
Isosafrole Isomer 2	mg/kg	1	-	<1	-	-	-
1,4-naphthoquinone	mg/kg	0.5	-	<0.5	-	-	-
Thionazin	mg/kg	1	-	<1	-	-	-

Speciated Routine Phenols

Parameter	Units	LOR	SE100700.001	SE100700.002	SE100700.003	SE100700.004	SE100700.005
3/4-methyl phenol (m/p-cresol)	mg/kg	1	-	<1	-	-	-
2-methyl phenol (o-cresol)	mg/kg	0.5	-	<0.5	-	-	-
2,6-dichlorophenol	mg/kg	0.5	-	<0.5	-	-	-
2,3,4,6 and 2,3,5,6-tetrachlorophenol	mg/kg	1	-	<1	-	-	-
2,4,5-trichlorophenol	mg/kg	0.5	-	<0.5	-	-	-
4-chloro-3-methylphenol	mg/kg	1	-	<1	-	-	-
2-chlorophenol	mg/kg	0.5	-	<0.5	-	-	-
2,4-dichlorophenol	mg/kg	0.5	-	<0.5	-	-	-
2,4-dimethyl phenol	mg/kg	0.5	-	<0.5	-	-	-
2-nitrophenol	mg/kg	0.5	-	<0.5	-	-	-
Phenol	mg/kg	0.5	-	<0.5	-	-	-
2,4,6-trichlorophenol	mg/kg	0.5	-	<0.5	-	-	-
Pentachlorophenol	mg/kg	0.5	-	<0.5	-	-	-
4-nitrophenol	mg/kg	0.5	-	<0.5	-	-	-

Surrogates

Parameter	Units	LOR	SE100700.001	SE100700.002	SE100700.003	SE100700.004	SE100700.005
d5-phenol (Surrogate)	%	-	-	106	-	-	-
d5-nitrobenzene (Surrogate)	%	-	-	113	-	-	-
2-fluorobiphenyl (Surrogate)	%	-	-	128	-	-	-
2,4,6-tribromophenol (Surrogate)	%	-	-	128	-	-	-
d14-p-terphenyl (Surrogate)	%	-	-	128	-	-	-

Field pH for Acid Sulphate Soil Method: AN104

Parameter	Units	LOR	SE100700.001	SE100700.002	SE100700.003	SE100700.004	SE100700.005
PHf	pH Units	-	-	-	8.0	8.3	-
PHox	pH Units	-	-	-	2.9	4.0	-
Reaction*	No unit	-	-	-	XXX	X	-
pH Difference*	pH Units	-10	-	-	5.1	4.3	-

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Parameter	Units	LOR	SE100700.001	SE100700.002	SE100700.003	SE100700.004	SE100700.005
Arsenic, As	mg/kg	3	3	9	-	-	-
Cadmium, Cd	mg/kg	0.3	0.3	<0.3	-	-	-
Chromium, Cr	mg/kg	0.3	9.0	16	-	-	-
Copper, Cu	mg/kg	0.5	13	21	-	-	-
Lead, Pb	mg/kg	1	15	25	-	-	-
Nickel, Ni	mg/kg	0.5	7.7	3.6	-	-	-
Zinc, Zn	mg/kg	0.5	30	25	-	-	-



ANALYTICAL REPORT

SE100700 R0

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
Sample Number			SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
Sample Matrix			Soil	Soil	Soil	Soil	Soil
Sample Date			07 Jun 2011	09 Jun 2011	09 Jun 2011	09 Jun 2011	09 Jun 2011
Sample Name			AS01 3.0	BH13 1.0	BH13 1.5	BH13 2.0	BH 13 2.5

Full B270 SVOC in Soil Method: AN420 (continued)

Surrogates

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
d5-phenol (Surrogate)	%	-	-	-	-	-	-
d5-nitrobenzene (Surrogate)	%	-	-	-	-	-	-
2-fluorobiphenyl (Surrogate)	%	-	-	-	-	-	-
2,4,6-tribromophenol (Surrogate)	%	-	-	-	-	-	-
d14-p-terphenyl (Surrogate)	%	-	-	-	-	-	-

Field pH for Acid Sulphate Soil Method: AN104

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
PHf	pH Units	-	-	-	-	8.1	-
PHfox	pH Units	-	-	-	-	8.3	-
Reaction*	No unit	-	-	-	-	X	-
pH Difference*	pH Units	-10	-	-	-	1.7	-

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
Arsenic, As	mg/kg	3	-	-	10	-	-
Cadmium, Cd	mg/kg	0.3	-	-	0.8	-	-
Chromium, Cr	mg/kg	0.3	-	-	8.3	-	-
Copper, Cu	mg/kg	0.5	-	-	70	-	-
Lead, Pb	mg/kg	1	-	-	140	-	-
Nickel, Ni	mg/kg	0.5	-	-	6.2	-	-
Zinc, Zn	mg/kg	0.5	-	-	730	-	-

Mercury in Soil Method: AN312

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
Mercury	mg/kg	0.05	-	-	0.45	-	-

Fibre Identification in soil Method: AN602

FibreID

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
Asbestos Detected	No unit	-	No	No	Yes	-	Yes

Moisture Content Method: AN234

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
% Moisture	%	0.5	-	-	15	18	-

Volatile Petroleum Hydrocarbons in Water Method: AN433/AN434

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
TRH C6-C9	mg/L	0.04	-	-	-	-	-
Benzene	µg/L	0.5	-	-	-	-	-
Toluene	µg/L	0.5	-	-	-	-	-
Ethylbenzene	µg/L	0.5	-	-	-	-	-
m/p-xylene	µg/L	1	-	-	-	-	-
o-xylene	µg/L	0.5	-	-	-	-	-
Total BTEX*	µg/L	3	-	-	-	-	-
Total Xylenes*	µg/L	1.5	-	-	-	-	-

Surrogates

Parameter	Units	LOR	SE100700.006	SE100700.007	SE100700.008	SE100700.009	SE100700.010
Trifluorotoluene (Surrogate)	%	-	-	-	-	-	-
Dibromofluoromethane (Surrogate)	%	-	-	-	-	-	-
d4-1,2-dichloroethane (Surrogate)	%	-	-	-	-	-	-
d8-toluene (Surrogate)	%	-	-	-	-	-	-
Bromofluorobenzene (Surrogate)	%	-	-	-	-	-	-

Parameter	Units	LOR	SE100700.011	SE100700.012	SE100700.013	SE100700.014	SE100700.015
Sample Number			SE100700.011	SE100700.012	SE100700.013	SE100700.014	SE100700.015
Sample Matrix			Soil	Soil	Soil	Soil	Soil
Sample Date			09 Jun 2011	09 Jun 2011	09 Jun 2011	09 Jun 2011	09 Jun 2011
Sample Name			BH13 4.0	BH13 5.5	BH6 2.0	BH6 2.5	BH6 4.0

Full 8270 SVOC in Soil Method: AN420 (continued)

Other SVOCs

Parameter	Units	LOR	SE100700.011	SE100700.012	SE100700.013	SE100700.014	SE100700.015
Methyl methanesulfonate	mg/kg	1	-	-	-	-	-
Ethyl methanesulfonate	mg/kg	1	-	-	-	-	-
Dibenzofuran	mg/kg	0.5	-	-	-	-	-
Benzyl alcohol	mg/kg	1	-	-	-	-	-
Safrole	mg/kg	0.5	-	-	-	-	-
Isosafrole Isomer 1	mg/kg	1	-	-	-	-	-
Isosafrole Isomer 2	mg/kg	1	-	-	-	-	-
1,4-naphthoquinone	mg/kg	0.5	-	-	-	-	-
Thionazin	mg/kg	1	-	-	-	-	-

Speciated Routine Phenols

Parameter	Units	LOR	SE100700.011	SE100700.012	SE100700.013	SE100700.014	SE100700.015
3/4-methyl phenol (m/p-cresol)	mg/kg	1	-	-	-	-	-
2-methyl phenol (o-cresol)	mg/kg	0.5	-	-	-	-	-
2,6-dichlorophenol	mg/kg	0.5	-	-	-	-	-
2,3,4,6 and 2,3,5,6-tetrachlorophenol	mg/kg	1	-	-	-	-	-
2,4,5-trichlorophenol	mg/kg	0.5	-	-	-	-	-
4-chloro-3-methylphenol	mg/kg	1	-	-	-	-	-
2-chlorophenol	mg/kg	0.5	-	-	-	-	-
2,4-dichlorophenol	mg/kg	0.5	-	-	-	-	-
2,4-dimethyl phenol	mg/kg	0.5	-	-	-	-	-
2-nitrophenol	mg/kg	0.5	-	-	-	-	-
Phenol	mg/kg	0.5	-	-	-	-	-
2,4,6-trichlorophenol	mg/kg	0.5	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5	-	-	-	-	-
4-nitrophenol	mg/kg	0.5	-	-	-	-	-

Surrogates

Parameter	Units	LOR	SE100700.011	SE100700.012	SE100700.013	SE100700.014	SE100700.015
d5-phenol (Surrogate)	%	-	-	-	-	-	-
d5-nitrobenzene (Surrogate)	%	-	-	-	-	-	-
2-fluorobiphenyl (Surrogate)	%	-	-	-	-	-	-
2,4,6-tribromophenol (Surrogate)	%	-	-	-	-	-	-
d14-p-terphenyl (Surrogate)	%	-	-	-	-	-	-

Field pH for Acid Sulphate Soil Method: AN104

Parameter	Units	LOR	SE100700.011	SE100700.012	SE100700.013	SE100700.014	SE100700.015
PHf	pH Units	-	-	8.3	7.6	-	-
PHfox	pH Units	-	-	3.4	5.1	-	-
Reaction*	No unit	-	-	XXX	X	-	-
pH Difference*	pH Units	-10	-	4.9	2.5	-	-

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Parameter	Units	LOR	SE100700.011	SE100700.012	SE100700.013	SE100700.014	SE100700.015
Arsenic, As	mg/kg	3	180	-	8	-	-
Cadmium, Cd	mg/kg	0.3	<0.3	-	<0.3	-	-
Chromium, Cr	mg/kg	0.3	17	-	6.4	-	-
Copper, Cu	mg/kg	0.5	11	-	9.3	-	-
Lead, Pb	mg/kg	1	49	-	15	-	-
Nickel, Ni	mg/kg	0.5	11	-	1.2	-	-
Zinc, Zn	mg/kg	0.5	18	-	12	-	-



ANALYTICAL REPORT

SE100700 R0

Sample Number	SE100700.016	SE100700.017	SE100700.018	SE100700.019	SE100700.020
Sample Matrix	Soil	Soil	Soil	Water	Soil
Sample Date	09 Jun 2011	09 Jun 2011	09 Jun 2011	09 Jun 2011	10 Jun 2011
Sample Name	BH6 6.0	BH6 9.5	BH6 14.0	QC08	BH10 1.1-1.3

Parameter	Units	LOR					
-----------	-------	-----	--	--	--	--	--

Full 8270 SVOC in Soil Method: AN420 (continued)

Surrogates

Surrogate	Units	LOR					
d5-phenol (Surrogate)	%	-	-	-	-	-	-
d5-nitrobenzene (Surrogate)	%	-	-	-	-	-	-
2-fluorobiphenyl (Surrogate)	%	-	-	-	-	-	-
2,4,6-tribromophenol (Surrogate)	%	-	-	-	-	-	-
d14-p-terphenyl (Surrogate)	%	-	-	-	-	-	-

Field pH for Acid Sulphate Soil Method: AN104

PHI	pH Units	-	7.2	5.8	-	-	-
PHfox	pH Units	-	5.9	5.1	-	-	-
Reaction*	No unit	-	XXX	XXX	-	-	-
pH Difference*	pH Units	-10	1.4	0.7	-	-	-

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Element	mg/kg	3	25	-	3	-	4
Arsenic, As	mg/kg	3	25	-	3	-	4
Cadmium, Cd	mg/kg	0.3	0.8	-	<0.3	-	<0.3
Chromium, Cr	mg/kg	0.3	13	-	13	-	11
Copper, Cu	mg/kg	0.5	1.2	-	16	-	44
Lead, Pb	mg/kg	1	12	-	12	-	260
Nickel, Ni	mg/kg	0.5	1.3	-	13	-	7.7
Zinc, Zn	mg/kg	0.5	7.9	-	22	-	72

Mercury in Soil Method: AN312

Mercury	mg/kg	0.05	<0.05	-	<0.05	-	0.13
Mercury	mg/kg	0.05	<0.05	-	<0.05	-	0.13

Fibre Identification in soil Method: AN602

FibreID

Asbestos Detected	No unit	-	-	-	-	-	No
Asbestos Detected	No unit	-	-	-	-	-	No

Moisture Content Method: AN234

% Moisture	%	0.5	18	24	21	-	8.9
% Moisture	%	0.5	18	24	21	-	8.9

Volatile Petroleum Hydrocarbons in Water Method: AN433/AN434

Parameter	mg/L	0.04	-	-	-	<0.04	-
TRH C6-C9	mg/L	0.04	-	-	-	<0.04	-
Benzene	µg/L	0.5	-	-	-	<0.5	-
Toluene	µg/L	0.5	-	-	-	<0.5	-
Ethylbenzene	µg/L	0.5	-	-	-	<0.5	-
m/p-xylene	µg/L	1	-	-	-	<1	-
o-xylene	µg/L	0.5	-	-	-	<0.5	-
Total BTEX*	µg/L	3	-	-	-	<3	-
Total Xylenes*	µg/L	1.5	-	-	-	<2.1	-

Surrogates

Surrogate	%	-	-	-	-	78	-
Trifluorotoluene (Surrogate)	%	-	-	-	-	78	-
Dibromofluoromethane (Surrogate)	%	-	-	-	-	-	-
d4-1,2-dichloroethane (Surrogate)	%	-	-	-	-	-	-
d8-toluene (Surrogate)	%	-	-	-	-	-	-
Bromofluorobenzene (Surrogate)	%	-	-	-	-	-	-

Sample Number	SE100700.021	SE100700.022	SE100700.023	SE100700.024	SE100700.025
Sample Matrix	Soil	Soil	Soil	Soil	Soil
Sample Date	10 Jun 2011	10 Jun 2011	10 Jun 2011	10 Jun 2011	10 Jun 2011
Sample Name	BH10 2.0	BH10 3.0	BH10 4.0	BH10 8.0	BH12 0.5

Parameter: Units LOR

Full B270 SVOC in Soil Method: AN420 (continued)

Other SVOCs

Compound	mg/kg	1	-	-	-	-	-
Methyl methanesulfonate	mg/kg	1	-	-	-	-	-
Ethyl methanesulfonate	mg/kg	1	-	-	-	-	-
Dibenzofuran	mg/kg	0.5	-	-	-	-	-
Benzyl alcohol	mg/kg	1	-	-	-	-	-
Safrole	mg/kg	0.5	-	-	-	-	-
Isosafrole Isomer 1	mg/kg	1	-	-	-	-	-
Isosafrole Isomer 2	mg/kg	1	-	-	-	-	-
1,4-naphthoquinone	mg/kg	0.5	-	-	-	-	-
Thionazin	mg/kg	1	-	-	-	-	-

Speciated Routine Phenols

Compound	mg/kg	1	-	-	-	-	-
3/4-methyl phenol (m/p-cresol)	mg/kg	1	-	-	-	-	-
2-methyl phenol (o-cresol)	mg/kg	0.5	-	-	-	-	-
2,6-dichlorophenol	mg/kg	0.5	-	-	-	-	-
2,3,4,6 and 2,3,5,6-tetrachlorophenol	mg/kg	1	-	-	-	-	-
2,4,6-trichlorophenol	mg/kg	0.5	-	-	-	-	-
4-chloro-3-methylphenol	mg/kg	1	-	-	-	-	-
2-chlorophenol	mg/kg	0.5	-	-	-	-	-
2,4-dichlorophenol	mg/kg	0.5	-	-	-	-	-
2,4-dimethyl phenol	mg/kg	0.5	-	-	-	-	-
2-nitrophenol	mg/kg	0.5	-	-	-	-	-
Phenol	mg/kg	0.5	-	-	-	-	-
2,4,6-trichlorophenol	mg/kg	0.5	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5	-	-	-	-	-
4-nitrophenol	mg/kg	0.5	-	-	-	-	-

Surrogates

Compound	%	-	-	-	-	-	-
d5-phenol (Surrogate)	%	-	-	-	-	-	-
d5-nitrobenzene (Surrogate)	%	-	-	-	-	-	-
2-fluorobiphenyl (Surrogate)	%	-	-	-	-	-	-
2,4,6-tribromophenol (Surrogate)	%	-	-	-	-	-	-
d14-p-terphenyl (Surrogate)	%	-	-	-	-	-	-

Field pH for Acid Sulphate Soil Method: AN104

Parameter	pH Units	-	-	6.8	-	6.7	-
PHf	pH Units	-	-	6.8	-	6.7	-
PHox	pH Units	-	-	6.5	-	4.9	-
Reaction*	No unit	-	-	X	-	X	-
pH Difference*	pH Units	-10	-	0.3	-	1.0	-

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Element	mg/kg	3	-	8	4	-	5
Arsenic, As	mg/kg	3	-	8	4	-	5
Cadmium, Cd	mg/kg	0.3	-	<0.3	<0.3	-	<0.3
Chromium, Cr	mg/kg	0.3	-	13	13	-	13
Copper, Cu	mg/kg	0.5	-	4.9	35	-	13
Lead, Pb	mg/kg	1	-	19	160	-	34
Nickel, Ni	mg/kg	0.5	-	1.2	4.7	-	9.3
Zinc, Zn	mg/kg	0.5	-	18	110	-	83



ANALYTICAL REPORT

SE100700 R0

Parameter	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
Sample Number			SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
Sample Matrix			Soil	Soil	Soil	Soil	Soil
Sample Date			10 Jun 2011	10 Jun 2011	10 Jun 2011	10 Jun 2011	10 Jun 2011
Sample Name			BH12 1.0	BH12 1.5	BH12 2.0	BH12 3.0	BH12 4.5

Full 8270 SVOC in Soil Method: AN420 (continued)

Surrogates

Surrogate	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
d5-phenol (Surrogate)	%	-	-	85	-	-	-
d5-nitrobenzene (Surrogate)	%	-	-	88	-	-	-
2-fluorobiphenyl (Surrogate)	%	-	-	108	-	-	-
2,4,6-tribromophenol (Surrogate)	%	-	-	101	-	-	-
d14-p-terphenyl (Surrogate)	%	-	-	108	-	-	-

Field pH for Acid Sulphate Soil Method: AN104

Parameter	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
PHf	pH Units	-	-	-	-	6.2	7.9
PHfox	pH Units	-	-	-	-	4.2	2.7
Reaction*	No unit	-	-	-	-	X	XXXX
pH Difference*	pH Units	-10	-	-	-	2.1	5.2

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Element	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
Arsenic, As	mg/kg	3	<3	6	6	8	-
Cadmium, Cd	mg/kg	0.3	<0.3	0.4	<0.3	<0.3	-
Chromium, Cr	mg/kg	0.3	13	14	11	16	-
Copper, Cu	mg/kg	0.5	39	36	3.8	5.1	-
Lead, Pb	mg/kg	1	31	240	24	13	-
Nickel, Ni	mg/kg	0.5	13	7.8	1.0	1.7	-
Zinc, Zn	mg/kg	0.5	64	92	380	620	-

Mercury in Soil Method: AN312

Element	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
Mercury	mg/kg	0.05	0.11	0.19	<0.05	<0.05	-

Fibre Identification in soil Method: AN602

FibreID

Parameter	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
Asbestos Detected	No unit	-	-	No	-	-	-

Moisture Content Method: AN234

Parameter	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
% Moisture	%	0.5	5.5	11	20	18	21

Volatile Petroleum Hydrocarbons in Water Method: AN433/AN434

Parameter	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
TRH C6-C9	mg/L	0.04	-	-	-	-	-
Benzene	µg/L	0.5	-	-	-	-	-
Toluene	µg/L	0.5	-	-	-	-	-
Ethylbenzene	µg/L	0.5	-	-	-	-	-
m/p-xylene	µg/L	1	-	-	-	-	-
o-xylene	µg/L	0.5	-	-	-	-	-
Total BTEX*	µg/L	3	-	-	-	-	-
Total Xylenes*	µg/L	1.5	-	-	-	-	-

Surrogates

Surrogate	Units	LOR	SE100700.025	SE100700.027	SE100700.028	SE100700.029	SE100700.030
Trifluorotoluene (Surrogate)	%	-	-	-	-	-	-
Dibromofluoromethane (Surrogate)	%	-	-	-	-	-	-
d4-1,2-dichloroethane (Surrogate)	%	-	-	-	-	-	-
d8-toluene (Surrogate)	%	-	-	-	-	-	-
Bromofluorobenzene (Surrogate)	%	-	-	-	-	-	-



ANALYTICAL REPORT

SE100711 R0

Sample Number	SE100711.001	SE100711.002	SE100711.003	SE100711.004
Sample Matrix	Soil	Soil	Soil	Water
Sample Depth	2.5	5.5	-	-
Sample Date	17 Jun 2011	17 Jun 2011	17 Jun 2011	17 Jun 2011
Sample Name	BH14_2.5	BH14_5.5	QC	TB
Parameter	Units	LOR		

Field pH for Acid Sulphate Soil Method: AN104

PHf	pH Units	-	10.7	8.1	-	-
PHfox	pH Units	-	8.0	6.8	-	-
Reaction*	No unit	-	XXXX	XX	-	-
pH Difference*	pH Units	-10	2.7	1.3	-	-

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Arsenic, As	mg/kg	3	7	6	6	-
Cadmium, Cd	mg/kg	0.3	0.5	0.5	<0.3	-
Chromium, Cr	mg/kg	0.3	18	14	14	-
Copper, Cu	mg/kg	0.5	120	9.4	36	-
Lead, Pb	mg/kg	1	170	19	38	-
Nickel, Ni	mg/kg	0.5	14	6.8	12	-
Zinc, Zn	mg/kg	0.5	340	130	94	-

Mercury in Soil Method: AN312

Mercury	mg/kg	0.05	1.0	0.08	0.08	-
---------	-------	------	-----	------	------	---

Fibre Identification in soil Method: AN602

FibreID

Asbestos Detected	No unit	-	No	-	-	-
-------------------	---------	---	----	---	---	---

Volatile Petroleum Hydrocarbons in Water Method: AN433/AN434

Benzene	µg/L	0.5	-	-	-	<0.5
Toluene	µg/L	0.5	-	-	-	<0.5
Ethylbenzene	µg/L	0.5	-	-	-	<0.5
m/p-xylene	µg/L	1	-	-	-	<1
o-xylene	µg/L	0.5	-	-	-	<0.5
Total BTEX*	µg/L	3	-	-	-	<3
Total Xylenes*	µg/L	1.5	-	-	-	<1.5

Surrogates

Trifluorotoluene (Surrogate)	%	-	-	-	-	78
Dibromofluoromethane (Surrogate)	%	-	-	-	-	-
d4-1,2-dichloroethane (Surrogate)	%	-	-	-	-	-
d8-toluene (Surrogate)	%	-	-	-	-	-
Bromofluorobenzene (Surrogate)	%	-	-	-	-	-

Moisture Content Method: AN234

% Moisture	%	0.5	25	24	23	-
------------	---	-----	----	----	----	---



ANALYTICAL REPORT

SE100735 R0

Sample Number	SE100735.001	SE100735.002	SE100735.003	SE100735.004	SE100735.005
Sample Matrix	Soil	Soil	Soil	Soil	Soil
Sample Date	14 Jun 2011	14 Jun 2011	14 Jun 2011	15 Jun 2011	15 Jun 2011
Sample Name	BH5_1.6-1.6	BH5_2.5-2.6	BH5_4-4.1	BH5_8.5m	BH5_14.5m

Parameter Units LOR  
 Volatile Petroleum Hydrocarbons in Soil Method: AN433/AN434 (continued)  
 Surrogates

Parameter	Units	LOR	SE100735.001	SE100735.002	SE100735.003	SE100735.004	SE100735.005
Trifluorotoluene (Surrogate)	%	-	101	-	103	-	-
Dibromofluoromethane (Surrogate)	%	-	-	-	-	-	-
d4-1,2-dichloroethane (Surrogate)	%	-	-	-	-	-	-
d8-toluene (Surrogate)	%	-	-	-	-	-	-
Bromofluorobenzene (Surrogate)	%	-	-	-	-	-	-

TRH (Total Recoverable Hydrocarbons) in Soil Method: AN403

Parameter	Units	LOR	SE100735.001	SE100735.002	SE100735.003	SE100735.004	SE100735.005
TRH C10-C14	mg/kg	20	<20	-	<20	-	-
TRH C15-C28	mg/kg	50	<50	-	<50	-	-
TRH C29-C36	mg/kg	50	<50	-	<50	-	-

Surrogates

TRH (Surrogate)	%	-	-	-	-	-	-
-----------------	---	---	---	---	---	---	---

PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420

Parameter	Units	LOR	SE100735.001	SE100735.002	SE100735.003	SE100735.004	SE100735.005
Naphthalene	mg/kg	0.1	<0.1	-	<0.1	-	-
Acenaphthylene	mg/kg	0.1	<0.1	-	<0.1	-	-
Acenaphthene	mg/kg	0.1	<0.1	-	<0.1	-	-
Fluorene	mg/kg	0.1	<0.1	-	<0.1	-	-
Phenanthrene	mg/kg	0.1	0.2	-	<0.1	-	-
Anthracene	mg/kg	0.1	0.1	-	<0.1	-	-
Fluoranthene	mg/kg	0.1	0.5	-	<0.1	-	-
Pyrene	mg/kg	0.1	0.5	-	<0.1	-	-
Benzo(a)anthracene	mg/kg	0.1	0.2	-	<0.1	-	-
Chrysene	mg/kg	0.1	0.2	-	<0.1	-	-
Benzo(b)fluoranthene	mg/kg	0.1	0.5	-	<0.1	-	-
Benzo(k)fluoranthene	mg/kg	0.1	0.4	-	<0.1	-	-
Benzo(a)pyrene	mg/kg	0.05	0.24	-	<0.05	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.1	-	<0.1	-	-
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1	-	<0.1	-	-
Benzo(ghi)perylene	mg/kg	0.1	0.1	-	<0.1	-	-
Total PAH	mg/kg	1.75	2.2	-	<1.81	-	-

Surrogates

d5-nitrobenzene (Surrogate)	%	-	112	-	113	-	-
2-fluorobiphenyl (Surrogate)	%	-	109	-	108	-	-
d14-p-terphenyl (Surrogate)	%	-	83	-	84	-	-

Field pH for Acid Sulphate Soil Method: AN104

Parameter	Units	LOR	SE100735.001	SE100735.002	SE100735.003	SE100735.004	SE100735.005
pHf	pH Units	-	-	-	-	8.3	8.2
pHox	pH Units	-	-	-	-	2.3	8.9
Reaction*	No unit	-	-	-	-	X	X
pH Difference*	pH Units	-10	-	-	-	6.0	-0.7

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Parameter	Units	LOR	SE100735.001	SE100735.002	SE100735.003	SE100735.004	SE100735.005
Arsenic, As	mg/kg	3	4	-	6	-	-
Cadmium, Cd	mg/kg	0.3	<0.3	-	<0.3	-	-
Chromium, Cr	mg/kg	0.3	9.8	-	11	-	-
Copper, Cu	mg/kg	0.5	26	-	14	-	-
Lead, Pb	mg/kg	1	67	-	37	-	-
Nickel, Ni	mg/kg	0.5	13	-	6.7	-	-
Zinc, Zn	mg/kg	0.5	96	-	25	-	-



ANALYTICAL REPORT

SE100735 R0

Sample Number SE100735-011  
 Sample Matrix Soil  
 Sample Date 16 Jun 2011  
 Sample Name BH17\_8-8.1

Parameter Units LOR

TRH (Total Recoverable Hydrocarbons) in Soil Method: AN403 (continued)

Surrogates

TRH (Surrogate)	%	-	-
-----------------	---	---	---

PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420

Naphthalene	mg/kg	0.1	-
Acenaphthylene	mg/kg	0.1	-
Acenaphthene	mg/kg	0.1	-
Fluorene	mg/kg	0.1	-
Phenanthrene	mg/kg	0.1	-
Anthracene	mg/kg	0.1	-
Fluoranthene	mg/kg	0.1	-
Pyrene	mg/kg	0.1	-
Benzo(a)anthracene	mg/kg	0.1	-
Chrysene	mg/kg	0.1	-
Benzo(b)fluoranthene	mg/kg	0.1	-
Benzo(k)fluoranthene	mg/kg	0.1	-
Benzo(a)pyrene	mg/kg	0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	-
Dibenzo(a,h)anthracene	mg/kg	0.1	-
Benzo(ghi)perylene	mg/kg	0.1	-
Total PAH	mg/kg	1.75	-

Surrogates

d5-nitrobenzene (Surrogate)	%	-	-
2-fluorobiphenyl (Surrogate)	%	-	-
d14-p-terphenyl (Surrogate)	%	-	-

Field pH for Acid Sulphate Soil Method: AN104

PHf	pH Units	-	7.5
PHfox	pH Units	-	3.7
Reaction*	No unit	-	XX
pH Difference*	pH Units	-10	3.8

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Arsenic, As	mg/kg	3	16
Cadmium, Cd	mg/kg	0.3	0.5
Chromium, Cr	mg/kg	0.3	13
Copper, Cu	mg/kg	0.5	8.8
Lead, Pb	mg/kg	1	13
Nickel, Ni	mg/kg	0.5	2.5
Zinc, Zn	mg/kg	0.5	27

Mercury in Soil Method: AN312

Mercury	mg/kg	0.05	<0.05
---------	-------	------	-------

Fibre Identification in soil Method: AN602

FibreID

Asbestos Detected	No unit	-	-
-------------------	---------	---	---

Sample Number	SE100739.001	SE100739.002	SE100739.003	SE100739.004
Sample Matrix	Soil	Soil	Soil	Soil
Sample Date	21 Jun 2011	21 Jun 2011	21 Jun 2011	21 Jun 2011
Sample Name	BH15_(1.0-1.1m)	BH15_(2.5-2.6m)	BH15_(4.0-4.1m)	BH15_(7.5-7.6m)
Parameter	Units	LOR		

Field pH for Acid Sulphate Soil Method: AN104

PHf	pH Units	-	-	-	8.4	7.2
PHfox	pH Units	-	-	-	8.8	8.8
Reaction*	No unit	-	-	-	XX	XX
pH Difference*	pH Units	-10	-	-	1.6	0.3

Metals in Soil by ICPOES from EPA 200.8 Digest (SYDNEY) Method: AN040/AN320

Arsenic, As	mg/kg	3	6	11	-	-
Cadmium, Cd	mg/kg	0.3	<0.3	0.5	-	-
Chromium, Cr	mg/kg	0.3	12	31	-	-
Copper, Cu	mg/kg	0.5	61	79	-	-
Lead, Pb	mg/kg	1	110	300	-	-
Nickel, Ni	mg/kg	0.5	3.7	14	-	-
Zinc, Zn	mg/kg	0.5	100	100	-	-

Mercury in Soil Method: AN312

Mercury	mg/kg	0.05	0.74	2.2	-	-
---------	-------	------	------	-----	---	---

Fibre Identification in soil Method: AN602

FibreID						
Asbestos Detected	No unit	-	No	No	-	-

Moisture Content Method: AN234

% Moisture	%	0.5	16	32	23	16
------------	---	-----	----	----	----	----



**LABORATORY REPORT COVERSHEET**

**Date:** 8 July 2011

**To:** Coffey Geotechnics Pty Ltd  
8/12 Mars Road  
LANE COVE WEST NSW 2266

**Attention:** Cissilla Young

**Your Reference:** SE100700A - GEOTLCOV24303AA - Sydney Convention  
**Laboratory Report No:** CE72860

**Samples Received:** 6/07/2011  
**Samples / Quantity:** 3 Soils

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

**Jon Dicker**  
Manager  
CAIRNS

**Anthony Nilsson**  
Operations Manager  
CAIRNS



This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562 (3146). This report must not be reproduced except in full.

WORLD RECOGNISED  
ACCREDITATION

SGS Australia Pty Ltd  
ABN 44 000 964 278

Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia  
t +61 (0)7 4035 5111 f +61 (0)7 4035 5122

**CLIENT:** Coffey Geotechnics Pty Ltd

**Laboratory Report No:** CE72860

**PROJECT:** SE100700A - GEOTLCOV24303AA - Sydney Convention

**LABORATORY REPORT**

Chromium Suite - Acid Base Accounting Our Reference Your Reference Type of Sample Date Sampled	Units	CE72860-1 BH13_4.0 Soil 9/06/2011	CE72860-2 BH6_9.5 Soil 9/06/2011	CE72860-3 BH12_4.5 Soil 10/06/2011
Date Extracted		6/07/2011	6/07/2011	6/07/2011
Date Analysed		7/07/2011	7/07/2011	7/07/2011
Moisture	% w/w	26	20	7
pH KCl	pH Units	8.0	5.2	9.2
s-TAA pH 6.5	% w/w S	<0.01	0.02	<0.01
TAA pH 6.5	mole H <sup>+</sup> /t	<5	11	<5
Chromium Reducible Sulfur (SCR)	% w/w	0.92	<0.005	0.028
a-Chromium Reducible Sulfur	mole H <sup>+</sup> / t	570	<5	17
S <sub>HCl</sub>	% w/w	NA	NA	NA
S <sub>KCl</sub>	% w/w	NA	NA	NA
S <sub>NAS</sub>	% w/w	NA	NA	NA
Acid Neutralisation Capacity ANCBT	% CaCO <sub>3</sub>	0.8	NA	NA
s-ANCBT	% w/w S	0.26	NA	NA
a-ANCBT	mole H <sup>+</sup> / t	160	NA	NA
s-Net Acidity	% w/w S	0.74	0.02	0.03
a-Net Acidity	mole H <sup>+</sup> /t	460	12	16
Liming Rate	kg CaCO <sub>3</sub> /tonne	35	NA	NA
Verification s-Net Acidity	% w/w S	0.74	NA	NA
a-Net Acidity without ANC	mole H <sup>+</sup> /t	570	12	16
Liming Rate without ANC	kg CaCO <sub>3</sub> /tonne	43	NA	NA



**CLIENT:** Coffey Geotechnics Pty Ltd

**Laboratory Report No:** CE72860

**PROJECT:** SE100700A - GEOTLCOV24303AA - Sydney Convention

**LABORATORY REPORT**

TEST PARAMETERS	UNITS	LOR	METHOD
<b>Chromium Suite - Acid Base Accounting</b>			
Date Extracted			
Date Analysed			
Moisture	% w/w	0.1	AN002 RL2A1
pH KCl	pH Units	0.1	AS4969.2 / AN219
s-TAA pH 6.5	% w/w S	0.01	AS4969.2 / AN219
TAA pH 6.5	mole H <sup>+</sup> /t	5	AS4969.2 / AN219
Chromium Reducible Sulfur (SCR)	% w/w	0.005	AS4969.7
a-Chromium Reducible Sulfur	mole H <sup>+</sup> / t	5	AS4969.7
SHCl	% w/w	0.005	AS4969.8 / AN014
S KCl	% w/w	0.005	AS4969.4
S NAS	% w/w	0.005	AS4969.11
Acid Neutralisation Capacity ANCBT	% CaCO <sub>3</sub>	0.1	AN214
s-ANCBT	% w/w S	0.01	AS4969.13 / AN214
a-ANCBT	mole H <sup>+</sup> / t	5	AS4969.13 / AN214
s-Net Acidity	% w/w S	0.01	Calculation
a-Net Acidity	mole H <sup>+</sup> /t	5	Calculation
Liming Rate	kg CaCO <sub>3</sub> /tonne	0.1	AS4969.14 / AN220
Verification s-Net Acidity	% w/w S		Calculation
a-Net Acidity without ANC	mole H <sup>+</sup> /t	5	Calculation
Liming Rate without ANC	kg CaCO <sub>3</sub> /tonne	0.1	ASSMAC_23H

**CLIENT:** Coffey Geotechnics Pty Ltd

**Laboratory Report No:** CE72860

**PROJECT:** SE100700A - GEOTLCOV24303AA - Sydney Convention

**LABORATORY REPORT**

QUALITY CONTROL	UNITS	Blank	Duplicate Sm#	Duplicate Sample  Duplicate	Spike	CMS Recovery
Date Extracted		-	CE72860-1	6/07/2011    6/07/2011	Batch Spike	-
Date Analysed		-	CE72860-1	7/07/2011    7/07/2011	Batch Spike	-
Moisture	% w/w	-	CE72860-1	26    [NT]	Batch Spike	-
pH KCl	pH Units	5.8	CE72860-1	8.0    8.1    RPD: 1	Batch Spike	-
s-TAA pH 6.5	% w/w S	-	CE72860-1	<0.01    <0.01	Batch Spike	-
TAA pH 6.5	mole H <sup>+</sup> /t	-	CE72860-1	<5    <5	Batch Spike	93%
Chromium Reducible Sulfur (SCR)	% w/w	-	CE72860-1	0.92    0.86    RPD: 7	Batch Spike	105%
a-Chromium Reducible Sulfur	mole H <sup>+</sup> / t	-	CE72860-1	570    540    RPD: 5	Batch Spike	-
S <sub>HCl</sub>	% w/w	-	CE72860-1	NA    NA	Batch Spike	-
S <sub>KCl</sub>	% w/w	-	CE72860-1	NA    NA	Batch Spike	-
S <sub>NAS</sub>	% w/w	-	CE72860-1	NA    NA	Batch Spike	-
Acid Neutralisation Capacity ANCBT	% CaCO <sub>3</sub>	-	CE72860-1	0.8    0.94    RPD: 16	Batch Spike	-
s-ANCBT	% w/w S	-	CE72860-1	0.26    0.30    RPD: 14	Batch Spike	-
a-ANCBT	mole H <sup>+</sup> / t	-	CE72860-1	160    190    RPD: 17	Batch Spike	-
s-Net Acidity	% w/w S	-	CE72860-1	0.74    0.66    RPD: 11	Batch Spike	-
a-Net Acidity	mole H <sup>+</sup> /t	-	CE72860-1	460    410    RPD: 11	Batch Spike	-
Liming Rate	kg CaCO <sub>3</sub> /tonne	-	CE72860-1	35    31    RPD: 12	Batch Spike	-
Verification s-Net Acidity	% w/w S	-	CE72860-1	0.74    0.66    RPD: 11	Batch Spike	-
a-Net Acidity without ANC	mole H <sup>+</sup> /t	-	CE72860-1	570    530    RPD: 7	Batch Spike	-
Liming Rate without ANC	kg CaCO <sub>3</sub> /tonne	-	CE72860-1	43    40    RPD: 7	Batch Spike	-

**CLIENT:** Coffey Geotechnics Pty Ltd

**Laboratory Report No:** CE72860

**PROJECT:** SE100700A - GEOTLCOV24303AA - Sydney Convention

## LABORATORY REPORT

### NOTES:

LOR - Limit of Reporting.

The significance of all reported results are defined by their analytical limit of reporting.

Liming rate calculated using a Fineness factor of 1.5 (which is equivalent to finely divided Ag Lime <0.5mm) and Neutralising Value (NV) of 100%

If using Liming Material <100% NV, then Liming Rate can be adjusted as follows:

Actual Liming Rate equals Calculated Liming Rate times 100 divided by NV of actual Liming Material

Bulk Density of Material of 1g/cm<sup>3</sup> assumed.

If Bulk Density differs from 1g/cm<sup>3</sup> then Liming rate can be adjusted as follows:

Actual Liming Rate equals Calculated Liming Rate times Actual Bulk Density

Geneva Legal Comment

This document is issued by the Company subject to its General Conditions of Service ([www.sgs.com/terms\\_and\\_conditions.htm](http://www.sgs.com/terms_and_conditions.htm)).

Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

This document is to be treated as an original within the meaning of UCP 600. Any holder of this document is advised that information

contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instructions, if any.

The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their

rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or

appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

ISO 17025

Unless otherwise stated the results shown in this test report only refer to the sample(s) tested and such sample(s) are only retained for 60 days only. This document cannot be reproduced except in full, without prior approval of the Company.

**Analysis Date: Between 6/07/11 and 8/07/11**

### Disclaimer:

SGS and the authors have prepared this document in good faith, consulting with Ahern CR, McElnea AE, Sullivan LA (2004)

*Acid Sulphate Soils Laboratory Methods Guidelines,*

Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Qld Aust.

While this is done exercising all due care and attention, no representation or warranty, expressed or implied is made as to the accuracy, completeness or fitness of the document in respect of any user's circumstances.

Users of the results or data should seek appropriate expert advice where necessary in relation to their particular situation or circumstances.

Any representation, statement, opinion or advice, expressed or implied on this publication

is made in good faith and on the basis that SGS, its agents and employees are not liable

to any person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above.

SGS Terms and Conditions are available from [www.au.sgs.com](http://www.au.sgs.com)

Page 5 of 5



This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562 (3146). This report must not be reproduced except in full.



**LABORATORY REPORT COVERSHEET**

**Date:** 8 July 2011

**To:** Coffey Geotechnics Pty Ltd  
8/12 Mars Road  
LANE COVE WEST NSW 2266

**Attention:** Cissillia Young

**Your Reference:** SE100711A - GEOTLCOV24303AA - Sydney Entertainment  
**Laboratory Report No:** CE72861

**Samples Received:** 6/07/2011  
**Samples / Quantity:** 1 Soil

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

**Jon Dicker**  
Manager  
CAIRNS

**Anthony Nilsson**  
Operations Manager  
CAIRNS



This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562 (3146). This report must not be reproduced except in full.

WORLD RECOGNISED  
ACCREDITATION

SGS Australia Pty Ltd  
ABN 44 000 964 278

Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia  
t +61 (0)7 4035 5111 f +61 (0)7 4035 5122

**CLIENT:** Coffey Geotechnics Pty Ltd

**Laboratory Report No:** CE72861

**PROJECT:** SE100711A - GEOTLCOV24303AA - Sydney Entertainment

**LABORATORY REPORT**

Chromium Suite - Acid Base Accounting Our Reference Your Reference Type of Sample Date Sampled	Units	CE72861-1 BH14_2.5 Soil 17/06/2011
Date Extracted		6/07/2011
Date Analysed		7/07/2011
Moisture	% w/w	19
pH KCl	pH Units	8.6
s-TAA pH 6.5	% w/w S	<0.01
TAA pH 6.5	mole H <sup>+</sup> /t	<5
Chromium Reducible Sulfur (SCR)	% w/w	0.013
a-Chromium Reducible Sulfur	mole H <sup>+</sup> / t	8.0
S HCl	% w/w	NA
S KCl	% w/w	NA
S NAS	% w/w	NA
Acid Neutralisation Capacity ANCBT	% CaCO <sub>3</sub>	NA
s-ANCBT	% w/w S	NA
a-ANCBT	mole H <sup>+</sup> / t	NA
s-Net Acidity	% w/w S	0.01
a-Net Acidity	mole H <sup>+</sup> /t	6.7
Liming Rate	kg CaCO <sub>3</sub> /tonne	NA
Verification s-Net Acidity	% w/w S	NA
a-Net Acidity without ANC	mole H <sup>+</sup> /t	6.7
Liming Rate without ANC	kg CaCO <sub>3</sub> /tonne	NA

**CLIENT:** Coffey Geotechnics Pty Ltd

**Laboratory Report No:** CE72861

**PROJECT:** SE100711A - GEOTLCOV24303AA - Sydney Entertainment

**LABORATORY REPORT**

TEST PARAMETERS	UNITS	LOR	METHOD
<b>Chromium Suite - Acid Base Accounting</b>			
Date Extracted			
Date Analysed			
Moisture	% w/w	0.1	AN002 RL2A1
pH KCl	pH Units	0.1	AS4969.2 / AN219
s-TAA pH 6.5	% w/w S	0.01	AS4969.2 / AN219
TAA pH 6.5	mole H <sup>+</sup> /t	5	AS4969.2 / AN219
Chromium Reducible Sulfur (SCR)	% w/w	0.005	AS4969.7
a-Chromium Reducible Sulfur	mole H <sup>+</sup> / t	5	AS4969.7
SHCl	% w/w	0.005	AS4969.8 / AN014
S KCl	% w/w	0.005	AS4969.4
S NAS	% w/w	0.005	AS4969.11
Acid Neutralisation Capacity ANCBT	% CaCO <sub>3</sub>	0.1	AN214
s-ANCBT	% w/w S	0.01	AS4969.13 / AN214
a-ANCBT	mole H <sup>+</sup> / t	5	AS4969.13 / AN214
s-Net Acidity	% w/w S	0.01	Calculation
a-Net Acidity	mole H <sup>+</sup> /t	5	Calculation
Liming Rate	kg CaCO <sub>3</sub> /tonne	0.1	AS4969.14 / AN220
Verification s-Net Acidity	% w/w S		Calculation
a-Net Acidity without ANC	mole H <sup>+</sup> /t	5	Calculation
Liming Rate without ANC	kg CaCO <sub>3</sub> /tonne	0.1	ASSMAC_23H

**CLIENT:** Coffey Geotechnics Pty Ltd

**Laboratory Report No:** CE72861

**PROJECT:** SE100711A - GEOTLCOV24303AA - Sydney Entertainment

## LABORATORY REPORT

### NOTES:

LOR - Limit of Reporting.

The significance of all reported results are defined by their analytical limit of reporting.

Liming rate calculated using a Fineness factor of 1.5 (which is equivalent to finely divided Ag Lime <0.5mm) and Neutralising Value (NV) of 100%

If using Liming Material <100% NV, then Liming Rate can be adjusted as follows:

Actual Liming Rate equals Calculated Liming Rate times 100 divided by NV of actual Liming Material

Bulk Density of Material of 1g/cm<sup>3</sup> assumed.

If Bulk Density differs from 1g/cm<sup>3</sup> then Liming rate can be adjusted as follows:

Actual Liming Rate equals Calculated Liming Rate times Actual Bulk Density

Geneva Legal Comment

This document is issued by the Company subject to its General Conditions of Service ([www.sgs.com/terms\\_and\\_conditions.htm](http://www.sgs.com/terms_and_conditions.htm)).

Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

This document is to be treated as an original within the meaning of UCP 600. Any holder of this document is advised that information

contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instructions, if any.

The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their

rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or

appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

ISO 17025

Unless otherwise stated the results shown in this test report only refer to the sample(s) tested and such sample(s) are only retained for 60 days only. This document cannot be reproduced except in full, without prior approval of the Company.

**Analysis Date: Between 6/07/11 and 8/07/11**

### Disclaimer:

SGS and the authors have prepared this document in good faith, consulting with Ahern CR, McElnea AE, Sullivan LA (2004)

*Acid Sulphate Soils Laboratory Methods Guidelines,*

Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Qld Aust.

While this is done exercising all due care and attention, no representation or warranty, expressed or implied is made as to the accuracy, completeness or fitness of the document in respect of any user's circumstances.

Users of the results or data should seek appropriate expert advice where necessary in relation to their particular situation or circumstances.

Any representation, statement, opinion or advice, expressed or implied on this publication

is made in good faith and on the basis that SGS, its agents and employees are not liable

to any person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above.

SGS Terms and Conditions are available from [www.au.sgs.com](http://www.au.sgs.com)

Page 4 of 4



This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562 (3146). This report must not be reproduced except in full.



**LABORATORY REPORT COVERSHEET**

**Date:** 8 July 2011

**To:** Coffey Geotechnics Pty Ltd  
8/12 Mars Road  
LANE COVE WEST NSW 2266

**Attention:** Cissillia Young

**Your Reference:** SE100735A - GEOTLCOV24303AA - SMCEC  
**Laboratory Report No:** CE72862

**Samples Received:** 6/07/2011  
**Samples / Quantity:** 2 Soils

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

**Jon Dicker**  
Manager  
CAIRNS

**Anthony Nilsson**  
Operations Manager  
CAIRNS



This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562 (3146). This report must not be reproduced except in full.

**CLIENT:** Coffey Geotechnics Pty Ltd  
**PROJECT:** SE100735A - GEOTLCOV24303AA - SMCEC

**Laboratory Report No:** CE72862

**LABORATORY REPORT**

Chromium Suite - Acid Base Accounting Our Reference Your Reference Type of Sample Date Sampled	Units	CE72862-1 BH5_8.5 Soil 15/06/2011	CE72862-2 BH17_5.0-5.1 Soil 16/06/2011
Date Extracted		6/07/2011	6/07/2011
Date Analysed		7/07/2011	7/07/2011
Moisture	% w/w	17	19
pH KCl	pH Units	7.5	7.3
s-TAA pH 6.5	% w/w S	<0.01	<0.01
TAA pH 6.5	mole H <sup>+</sup> /t	<5	<5
Chromium Reducible Sulfur (SCR)	% w/w	<0.005	0.066
a-Chromium Reducible Sulfur	mole H <sup>+</sup> / t	<5	41
S <sub>HCl</sub>	% w/w	NA	NA
S <sub>KCl</sub>	% w/w	NA	NA
S <sub>NAS</sub>	% w/w	NA	NA
Acid Neutralisation Capacity ANCBT	% CaCO <sub>3</sub>	NA	0.2
s-ANCBT	% w/w S	NA	0.06
a-ANCBT	mole H <sup>+</sup> / t	NA	37
s-Net Acidity	% w/w S	<0.01	0.02
a-Net Acidity	mole H <sup>+</sup> /t	<5	15
Liming Rate	kg CaCO <sub>3</sub> /tonne	NA	NA
Verification s-Net Acidity	% w/w S	NA	0.03
a-Net Acidity without ANC	mole H <sup>+</sup> /t	<5	40
Liming Rate without ANC	kg CaCO <sub>3</sub> /tonne	NA	3.0

**CLIENT:** Coffey Geotechnics Pty Ltd

**Laboratory Report No:** CE72862

**PROJECT:** SE100735A - GEOTLCOV24303AA - SMCEC

**LABORATORY REPORT**

TEST PARAMETERS	UNITS	LOR	METHOD
<b>Chromium Suite - Acid Base Accounting</b>			
Date Extracted			
Date Analysed			
Moisture	% w/w	0.1	AN002 RL2A1
pH KCl	pH Units	0.1	AS4969.2 / AN219
s-TAA pH 6.5	% w/w S	0.01	AS4969.2 / AN219
TAA pH 6.5	mole H <sup>+</sup> /t	5	AS4969.2 / AN219
Chromium Reducible Sulfur (SCR)	% w/w	0.005	AS4969.7
a-Chromium Reducible Sulfur	mole H <sup>+</sup> / t	5	AS4969.7
SHCl	% w/w	0.005	AS4969.8 / AN014
S KCl	% w/w	0.005	AS4969.4
S NAS	% w/w	0.005	AS4969.11
Acid Neutralisation Capacity ANCBT	% CaCO <sub>3</sub>	0.1	AN214
s-ANCBT	% w/w S	0.01	AS4969.13 / AN214
a-ANCBT	mole H <sup>+</sup> / t	5	AS4969.13 / AN214
s-Net Acidity	% w/w S	0.01	Calculation
a-Net Acidity	mole H <sup>+</sup> /t	5	Calculation
Liming Rate	kg CaCO <sub>3</sub> /tonne	0.1	AS4969.14 / AN220
Verification s-Net Acidity	% w/w S		Calculation
a-Net Acidity without ANC	mole H <sup>+</sup> /t	5	Calculation
Liming Rate without ANC	kg CaCO <sub>3</sub> /tonne	0.1	ASSMAC_23H

**CLIENT:** Coffey Geotechnics Pty Ltd  
**PROJECT:** SE100735A - GEOTLCOV24303AA - SMCEC

**Laboratory Report No:** CE72862

## LABORATORY REPORT

### NOTES:

LOR - Limit of Reporting.

The significance of all reported results are defined by their analytical limit of reporting.

Liming rate calculated using a Fineness factor of 1.5 (which is equivalent to finely divided Ag Lime <0.5mm) and Neutralising Value (NV) of 100%

If using Liming Material <100% NV, then Liming Rate can be adjusted as follows:

Actual Liming Rate equals Calculated Liming Rate times 100 divided by NV of actual Liming Material

Bulk Density of Material of 1g/cm<sup>3</sup> assumed.

If Bulk Density differs from 1g/cm<sup>3</sup> then Liming rate can be adjusted as follows:

Actual Liming Rate equals Calculated Liming Rate times Actual Bulk Density

Geneva Legal Comment

This document is issued by the Company subject to its General Conditions of Service ([www.sgs.com/terms\\_and\\_conditions.htm](http://www.sgs.com/terms_and_conditions.htm)).

Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

This document is to be treated as an original within the meaning of UCP 600. Any holder of this document is advised that information

contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instructions, if any.

The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their

rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or

appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

ISO 17025

Unless otherwise stated the results shown in this test report only refer to the sample(s) tested and such sample(s) are only retained for 60 days only. This document cannot be reproduced except in full, without prior approval of the Company.

**Analysis Date: Between 6/07/11 and 8/07/11**

### Disclaimer:

SGS and the authors have prepared this document in good faith, consulting with Ahern CR, McElnea AE, Sullivan LA (2004)

*Acid Sulphate Soils Laboratory Methods Guidelines,*

Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Qld Aust.

While this is done exercising all due care and attention, no representation or warranty, expressed or implied is made as to the accuracy, completeness or fitness of the document in respect of any user's circumstances.

Users of the results or data should seek appropriate expert advice where necessary in relation to their particular situation or circumstances.

Any representation, statement, opinion or advice, expressed or implied on this publication is made in good faith and on the basis that SGS, its agents and employees are not liable to any person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above.

SGS Terms and Conditions are available from [www.au.sgs.com](http://www.au.sgs.com)

Page 4 of 4



This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562 (3146). This report must not be reproduced except in full.

# Appendix C

## Information from Dear et al (2002)

**Acid Sulfate Soil Assessment and Preliminary Management Plan  
Haymarket Precinct, Darling Harbour, Sydney NSW**

The guard layer should be employed as a precaution to neutralise acidity that has not been adequately treated during the soil neutralisation process.

The rate of neutralising agent used in the guard layer will depend on the final treatment pile height, existing and potential acidity of the sediments, and the soil texture. The rate may need to be increased where the receiving environmental values warrant higher protection. The rate may also need to be increased to enable a neutralising agent to be incorporated in situations where significant delays occur in drying soils due to soil texture or climatic conditions.

*Note: Reapplication of the guard layer may be necessary under temporary treatment pads, if the guard layer is disturbed or removed with the treated soil.*

### **Soil treatment**

Soils may be neutralised on a temporary treatment pad or alternatively the soils may be neutralised as they are placed permanently. Essentially, treatment of the soils is the same process whether it is performed on a temporary treatment pad, or on a treatment pad in their permanent location. Treating soils on a temporary treatment pad may promote better mixing of the neutralising agent with the soil as the soils and agent may be further mixed as they are moved. However, there is the added expense of double handling of the soil.

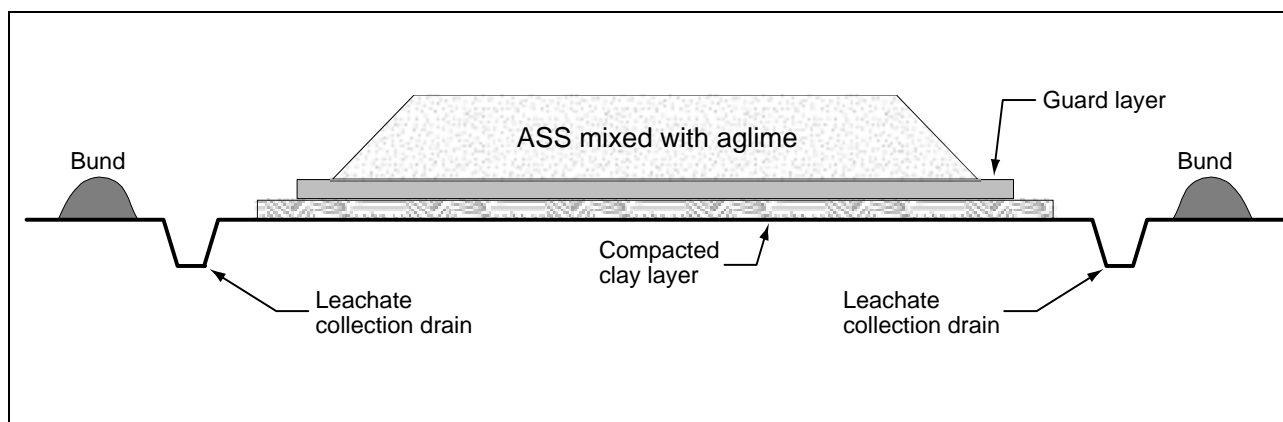
Acid sulfate soil material should be placed on top of the guard layer in 150 to 300 mm thick layers on the treatment pad, to allow drying. The appropriate amount of neutralising agent, including the calculated safety factor should be spread once the ASS are sufficiently dry. The ASS may require reworking several times to achieve adequate mixing of the neutralising agent and/or drying of the soil. The treated layer will require Phase 3 sampling (ie. verification analysis) to confirm whether appropriate amounts of the neutralising agent have been incorporated into the soil, which should be subsequently compacted before treatment of the next layer commences, or when moved to the permanent placement area if initially mixed on temporary treatment pads.

#### **ASS Tip 16 – Depth of soil**

If wet materials are being placed, shrinkage may be allowed for. To allow for shrinkage, layers of greater depth may be initially placed.

Ultimately it is up to the contractor to ensure that they have appropriate equipment to incorporate the neutralising agent to the depth of fill.

Guard layers may need to be applied between each compacted ASS layer as a precaution in environmentally sensitive areas, areas with high levels of sulfides or where soils are difficult to mix.



**Figure 4.** Schematic cross-section of a treatment pad, including a compacted clay layer, guard layer, leachate collection system and containment with bunding.

### 11.1.2 Management considerations

Stockpiling untreated ASS should be minimised by preparing a detailed earthworks strategy that documents the timing of soil volumes to be moved, treatment locations and capacity of those areas to accept materials. Stockpiling may mean double-handling and increased earthmoving costs. It is important to account for risk from wet weather and plan for other contingencies.

#### **Short-term stockpiles**

The recommended maximum time period for which soils can be temporarily stockpiled without treatment is detailed in Table 4.

**Table 4.** Indicative maximum periods for short-term stockpiling of untreated ASS.

<b>Type of Material</b>		<b>Duration of stockpiling</b>	
Texture range (McDonald <i>et al.</i> 1990)	Approx clay content (%)	Days	Hours
<i>Coarse texture</i> Sands to loamy sands	≤5	Overnight	18 hours
<i>Medium texture</i> Sandy loams to light clays	5–40	2½ days	70 hours
<i>Fine texture</i> Medium to heavy clays and silty clays	≥40	5 days	140 hours

At some sites these figures may be too conservative, and in some circumstances not conservative enough (eg. during hot weather some sands may begin to oxidise within a matter of hours). It is recommended that appropriate operational delay times be determined (preferably well prior to the creation of the stockpile) for the specific circumstances. The use of a guard layer under the short-term stockpiles may be warranted under certain circumstances.

The total volume of material that is placed in short-term stockpiles should not exceed 20% of a day's total extraction.

*Note: These timeframes do not apply to monosulfidic black oozes. These materials should not be stockpiled without a risk assessment, and the implementation of strict environmental management protocols.*

#### **Medium-term stockpiles**

Situations where it is necessary to stockpile untreated ASS for moderate periods will need to be justified to the relevant administering agency. Management to reduce the oxidation of sulfides and the collection and treatment of all leachate and runoff water will need to be implemented during the stockpiling period. The maximum time period for which soils can be temporarily stockpiled in the medium-term is listed in Table 5.

**Table 5.** Indicative maximum periods for medium-term stockpiling of untreated ASS.

<b>Type of Material</b>		<b>Duration of stockpiling</b>	
Texture range (McDonald <i>et al.</i> 1990)	Approx clay content (%)	Days	Weeks
<i>Coarse texture</i> Sands to loamy sands	≤5	14 days	2 weeks
<i>Medium texture</i> Sandy loams to light clays	5–40	21 days	3 weeks
<i>Fine texture</i> Medium to heavy clays & silty clays	≥40	28 days	4 weeks