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## Soil Surveys Engineering Pty. Limited Specialist in Applied Geotechnics **BOREHOLE RECORD SHEET Location Number: BH 323** Milton: ph +61 7 3369 6000 brisbane@soilsurveys.com.au Gold Coast: ph +61 7 5500 0465 goldcoast@soilsurvevs.com.au Project Number: 110-12936 Northern Rivers: ph +61 7 5523 4577 northernrivers@soilsurveys.com.au Mackay: ph +61 7 4942 2907 mackay@soilsurveys.com.au Project Name: Cross River Rail SOIL SURVEYS Location: Brisbane Client: AECOM Easting: 502490 Northing: 6957511 RL: 7.36 m Date: 09/02/2012 Page: 1 OF 4 Logger: SO/DT Operator: SO Machine: Scout 2 Drilling Method Defect Strength Rec (%) Samples and Spacing Depth Description Weathering Estimated Remarks **BITUMEN** 0.30 FILL Clayey Sandy GRAVEL (GP) Dense, fine sized, grey and orange, fine to coarse grained sand, low plasticity fines, moist. CLAY (CH) Stiff, high plasticity, brown and grey, 1.0 <u>6.</u>0 Defects - 1.54m : F,60°,P,R,O,0 Comments: 1) Groundwater not observed. 2) Borehole grouted on completion. U50 SPT Approved: Disturbed Sample Date: Water First Noted Water Steady Level

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SOIL SURVEYS

eering Pty. Limited BOREHOLE RECORD SHEET

chnics
Location Number: BH 323

Project Number: 110-12936 Project Name: Cross River Rail

Location: Brisbane Client: AECOM

Easting: 502490 Northing: 6957511 RL: 7.36 m Client: AECOM
Logger: SO/DT Operator: SO Machine: Scout 2 Date: 09/02/2012

Logger: SO	D/DT Operato	r: SO	Machine: Scout 2 Date:	09/02/2012	2				Page: 2 OF 4
TC WB NMLC Casing	Depth	Graphic	Description	Weatherir	Strength Estimated RSI/W W MS S VS ES	Defect Spacing	Rec (%)	RQD	Samples and Remarks
			Sandy CLAY (CH) Medium dense to dense, he plasticity, brown grey and yellow, fine to medigrained sand, moist.						SPT 4, 7, 8 N=15
			Clayey Sandy GRAVEL (GP) Very dense, fine medium size, brown yellow and purple grey, f to coarse grained sand, low to medium plastifines, moist.	ne					SPT - 16, 30/140mm N=R - 
5.75		00000000000000000000000000000000000000	Clayey Sandy GRAVEL (GP) Medium dense, to medium size, brown yellow and purple grefine to coarse grained sand, low to medium plasticity fines, with bands of gravelly sandy omoist.	′,					SPT 5, 6, 9 N=15
		0,00,000,000,000,000,000,000,000,000,0							SPT 7, 4, 19 N=23
	<u>- 16</u> .0 - - - - - - - - - - - - - - - - - - -		Clayey Sandy GRAVEL (GP) Very dense, fine medium size, brown yellow and purple grey, for to coarse grained sand, low to medium plastifines, moist.	ne					SPT 30/120mm N=R -
			SANDSTONE, medium grained, pale grey sta orange brown, granular, very thinly bedded to thinly bedded, closely spaced fractures.				100	60	17.49 m; J, <b>35°</b> , P, R, O, Z 17.60 m; Dl, <b>5°</b> , P, S, O, Z 17.70 m; J, <b>65°</b> , P, R, O, Z 17.80 m; Dl, <b>9°</b> , S, R, O, Z 17.80 m; J, <b>38°</b> , P, R, O, L 18.13 m; Dl, <b>5°</b> , P, R, O, Z 18.29 m; Dl, <b>2°</b> , P, R, O, Z
Comments 1) Groundwa completion.			Interlaminated MUDSTONE and SILTSTONE fine grained, alternating dark grey and light g thinly laminated, extremely closely spaced to moderately widely spaced fractures. Trace of sandstone laminae.	ey,	R		98	43	18.77 m; J, <b>50°</b> , P, R, O, Z
Comments 1) Groundwa completion.	20.0 :: ater not observed. 2	) Boreho	G. C. Clay seam D. Discontinuous P. Polished F. Filler F. Foliation P. Flamar R. Rough N. Clet H. Schistosity S. Subplanar S. Smooth O. Ope	F Iron Oxide  K - Calcite  L - Limonite	Weathering Gra RS - Residual So XW - Extremely weath SW - Slightly weath FR - Fresh Rock Strengt	il hered hered ered	ample U5	0	18.33-20.81 m; B, <b>0 - 3°</b> , P, S, O, Z
1	t Noted _ <b></b> Water St	teady Lev	L - Cleavage I - Stepped V - Very rough S - Scall R - Fracture S - Shear zone T - Corrlact	Q - Quartz S- Secondary mineral U - Unidentified mineral W - Weathered rock X - Carbonaceous Z - Clean	VW - Very weak W - Weak MS - Medium stron S - Strong VS - Very strong FS - Extremely strong	ng Dis	SP sturbe Sampl	d 📕	Approved: Date:

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SOIL SURVEYS

Easting: 502490

Northing: 6957511 RL: 7.36 m

### **BOREHOLE RECORD SHEET**

**Location Number: BH 323** 

Project Number: 110-12936 Project Name: Cross River Rail

Location: Brisbane Client: AECOM

Logger: Se		-	Machine:	Scout 2	Date: 09/02						Page: 3 OF 4
Drilling Method  NMRC Casing		Graphic		Description		Weathering	Strength Estimated RS /w  w  w  s  s  vs  ES	Defect Spacing	Rec (%)	RQD	Samples and Remarks
	-		fine grained, a thinly laminate moderately wid	MUDSTONE and S Iternating dark grey a d, extremely closely dely spaced fractures	and light grey, spaced to	FR	111		98	43	-
			Interlaminated	siltstone and SA					100	69	21.25 m; B, 55°, P, S, O, Z  21.50 m; B, 79°, P, S, O, Z  21.53 m; Dl, 1°, P, S, O, Z  21.67 m; Dl, 1°, P, S, O, Z  21.80 m; Dl, 1°, P, S, O, Z  21.95 m; B, 8°, P, S, O, Z  22.06 m; Dl, 2°, P, S, O, Z  22.15 m; J, 19°, S, R, O, W  22.22 m; B, 21°, P, S, O, Z
Developed by Datgel	22.67 - 23.0 		granular, thinly spaced fracture Interlaminated fine grained, a thinly laminate	MUDSTONE and S Iternating dark grey a d, very closely space dely spaced fractures	ILTSTONE, and light grey, ed to				99	57	22.7 m; B, 22°, P, S, O, Z 22.36 m; J, 82°, U, R, O, Z 22.51 m; B, 13°, P, S, O, Z
DG 111-172936 NEW.GPJ < <drawingfile>&gt; 21/05/2012 14:34 8.30.002 Developed by Datge</drawingfile>	25.63 - 26.0 - 26.16 - 27.0	000000000000000000000000000000000000000	fine grained, p granular, thinly spaced fractur CONGLOMER speckled grey spaced to mod Clast are fine t sandstone, phy thinly bedded, Clast supporte	ATE, coarse grained and dark grey, grand lerately widely space o medium gravel siz yllite, siltstone and q medium grained sar	k grey, ited, closely  d, pale grey ilar, closely d fractures. e of tuff, uartzite. Trace				100	100	
OU LIBRARY 2012-05.GLB Log SOIL, SURVEY, BOREHOLE, LOG 111-12936 NEW CD CO TO	- 28.0 								100	95	26.66-31.89 m; Dl, 1 - 11°, S, R, O, Z
S cómpletion.	•	,		Denth (m) Type Din (den) Planarity	n:F,60°,P,R,O,C  Roughress Aerohave Infill  Roughress Colored Colory  Political File Filed Filed Colored  R-Rough N-Cean K-Caclet  V-Veryrough S-Stain O-Guart  V-Westh  V-Cean K-Caclet  V-Westh  V-Cean K-Caclet  V-Westh	ide e ary mineral teled more	Weathering Grand RS - Residual Sc RS - Residual Sc W - Extremely weath W- Distinctly weath FR - Fresh Rock Streng W- Very weak W - Weak MS - Medium strong S - Strong VS - Very strong S - Extremely S - Extr	hered hered hered ered th	U5 SP sturbe Sampl	0 <b> </b>	Approved: Date:

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SOIL SURVEYS

Easting: 502490

Northing: 6957511 RL: 7.36 m

### **BOREHOLE RECORD SHEET**

**Location Number: BH 323** 

Project Number: 110-12936 Project Name: Cross River Rail

Location: Brisbane Client: AECOM

Logger: S	O/DT Operato	-	Machine: Scout 2 Date: 09/	02/2012	?				Page: 4 OF 4
Drilling Method	Depth	Graphic	Description	Weatherin	Strength  Strength  Estimated  RS   W   W   MS   S   VS   ES	Defect Spacing	Rec (%)	RQD	Samples and Remarks
			CONGLOMERATE, coarse grained, pale grey speckled grey and dark grey, granular, closely spaced to moderately widely spaced fractures. Clast are fine to medium gravel size of tuff, sandstone, phyllite, siltstone and quartzite. Trace thinly bedded, medium grained sandstone bands Clast supported. (continued)	FR			100	95	
	33.0	000000000000000000000000000000000000000	CONGLOMERATE, coarse grained, pale grey speckled grey and dark grey, granular, closely spaced fractures. Clasts are medium gravel to cobble sized of chert, siltstone, quartzite, sandstone and tuff, clast supported by sandy matrix.		KM M KM		100	77	32.20 m; Dl, 40°, P, S, O, Z 32.30 m; Dl, 55°, U, R, O, Z 32.34 m; Dl, 60°, S, R, O, Z 32.41 m; Dl, 20°, P, S, O, Z 32.60 m; Dl, 35°, U, S, O, Z 32.70 m; Dl, 15°, O, Z  33.45 m; Dl, 50°, P, R, O, Z  33.74 m; J, 40°, P, R, O, Z  32.87-35.00 m; Dl, 5 - 11°, S, — R, O, Z
covoc peveloped by badge	<u>-</u> 	000000000000000000000000000000000000000	spaced to moderately widely spaced fractures. Clast are fine to medium gravel size of tuff,						R, O, Z
SONVEL DORENOLE DOG 11 1/2830 NEWOTO A COLAMINY INCA E 1002/01 E 14:34 GA	- 36.0 - 37.0 - 38.0		BOREHOLE BH 323 TERMINATED AT 35.00 m						
Comment 1) Groundw completion.	39.0 - 39.0 - 40.0 s: atter not observed. 2		C. Clay seam D. Discontinuous P. Foliard F. Filled FIn-In-In-In-In-In-In-In-In-In-In-In-In-	n Oxide alcite nonite sartz condary mineral identified mineral /eathered rock arbonaceous	Weathering Gra  XX F. Residual 50  XX Extremely weath  XX F. Festin  XX F. Festin  XX F. Festin  XX F. Festin  XX F. Westin  XX F. Westin  XX F. Westin  XX F. Very etrop  XX F. Very etrop  XX F. Serionally strop  XX F. Extremely	llered ered ered ered ered ered ered ere	U5 SP sturbe	50 T	Approved:



#### **IN-SITU PACKER PERMEABILITY TEST RESULT**

PROJECT:CRRBH No.:323Packer type:DoublePROJECT No.:110-12936Test No.:1Packer pressure:2500kPa

**Date:** 9/02/2012 Gauge pressures measured in: kPa
Tested by: CS

Vertical depth to: Top of test section (m):

Top of test section (m):	30.00
Base of test section (m):	31.50
Centre of test section(m):	30.75
Base of casing (m):	29.00
Ground water (m)	NR

Depth of centre of test section (m)	30.75
Length of test section (m):	1.50

Gauge Height above ground level	0.00
Hole Diameter in test section (mm	75

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1922.0	1922.0	1922.0	1922.0	Flow (I/min)
100	Water Take	0.00	0.00	0.00	0.00	0.000
2nd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1922.8	1922.9	1923.1	1923.5	Flow (I/min)
200	Water Take	0.00	0.10	0.20	0.40	0.047
3rd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1923.5	1923.5	1923.7	1923.9	1733.800
300	Water Take	0.00	0.00	0.20	0.20	0.027
4th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1923.5	1923.5	1923.5	1923.5	Flow (I/min)
200	Water Take	0.00	0.00	0.00	0.00	0.000
5th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading					Flow (I/min)
100	Water Take	0.00	0.00	0.00	0.00	0.000

Period	Flow (q)	Gauge Press	Gauge Press	Friction Loss (m)*		Total Head	Lugeon	Perm.
	(l/min)	(kPa)	(m of water)	Basic	In extra rods	(m)	Value	(m/s)
1st	0.000	100.00	10.220	0.000	0.000	40.970	0.000	0.00E+00
2nd	0.047	200.00	20.440	0.000	0.000	51.190	0.062	5.94E-09
3rd	0.027	300.00	30.660	0.000	0.000	61.410	0.030	2.83E-09
4th	0.000	200.00	20.440	0.000	0.000	51.190	0.000	0.00E+00
5th	0.000	100.00	10.220	0.000	0.000	40.970	0.000	0.00E+00

<sup>\*</sup>Where friction loss is assumed to be negligible.

N.B. Pressure Conversion: 1 bar = 100 kPa = 14.503 psi

Note - zero flow period 4 - test ended

#### **IN-SITU PACKER PERMEABILITY TEST RESULT**

PROJECT:CRRBH No.:323Packer type:DoublePROJECT No.:110-12936Test No.:2Packer pressure:2500kPa

**Date:** 9/02/2012 Gauge pressures measured in: kPa Tested by: CS

Vertical depth to:

Top of test section (m):	21.00
Base of test section (m):	22.50
Centre of test section(m):	21.75
Base of casing (m):	20.00
Ground water (m)	NR

Depth of centre	e of test section (m)	21.75
Length of test	section (m):	1.50

Gauge Height above ground level	0.00
Hole Diameter in test section (mm	75

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1931.0	1931.6	1933.4	1935.3	Flow (I/min)
100	Water Take	0.00	0.60	1.80	1.90	0.287
2nd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1936.5	1938.0	1940.0	1941.6	Flow (I/min)
200	Water Take	0.00	1.50	2.00	1.60	0.340
3rd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1942.6	1946.8	1948.0	1949.9	1733.800
300	Water Take	0.00	4.20	1.20	1.90	0.487
4th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1948.2	1948.8	1949.1	1949.6	Flow (I/min)
200	Water Take	0.00	0.60	0.30	0.50	0.093
5th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	1948.2	1948.2	1948.3	1948.3	Flow (I/min)
100	Water Take	0.00	0.00	0.10	0.00	0.007

Period	Flow (q)	Gauge Press	Gauge Press	Friction Loss (m)*		Total Head	Lugeon	Perm.
	(l/min)	(kPa)	(m of water)	Basic	In extra rods	(m)	Value	(m/s)
1st	0.287	100.00	10.220	0.000	0.000	31.970	0.611	5.84E-08
2nd	0.340	200.00	20.440	0.000	0.000	42.190	0.549	5.25E-08
3rd	0.487	300.00	30.660	0.000	0.000	52.410	0.632	6.05E-08
4th	0.093	200.00	20.440	0.000	0.000	42.190	0.151	1.44E-08
5th	0.007	100.00	10.220	0.000	0.000	31.970	0.014	1.36E-09

<sup>\*</sup>Where friction loss is assumed to be negligible.

N.B. Pressure Conversion: 1 bar = 100 kPa = 14.503 psi