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SOIL SURVEYS

Easting: 503249

Northing: 6960895 RL: -9.05 m

BOREHOLE RECORD SHEET

Location Number: BH 309

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

Location: Brisbane Client: AECOM

L	ogger: C	S/DT Oper	rator: SO	Machine:	Scout 2	Date: 30/1	1/2011					Page: 1 OF 5
	lling Method		Graphic		Description		Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
1	WB RR NMLC		<u>5</u>	SAND (SD) Lo	ose, fine to medium	grained		RSVW W MS S VSE	20 60 200 600	Re	~	Remarks
		E		SAND (SF) LO	ose, lille to medium	granieu.						<u>-</u>
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JG 111		7	7.70]					
) IE LC		<u> </u>	000000000000000000000000000000000000000	Sandy GRAVE grained, grey b	L (GP) Dense, fine brown and red.	to coarse						_=
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BRAR	comment	•	0000		Defects - 1 54	n : F,60°,P,R,O,C	<u> </u>	Veathering Gr	ades S	ample	s	_
1 1 T			e - all depths	measured from od used was NQ3 pletion.	Depth (m) Type Dip (deg) Planarity B - Bedding C - Curvilinear C - Clay seam F - Foliation H - Schistricity P - Planar	Roughness Aperature Infill L Slickensides C - Closed C - Clay S P - Polished F - Filled F - Iron On R - Rough N - Clean K - Calcit S - Smooth O - Open L - Limon V - Very rough S - Stain Q - Quart S - Secon	X	(W - Extremely weal	thered hered	U5		
IRVEY:	ot NMLC.	3) Borehole grou	ited on com	pletion.	C - Clay seam D - Discontinuor F - Floriation P - Planar P - Planar L - Cleavage R - Fracture S - Shear zone T - Cortact	R - Rough R - Filled F - Iron Or R - Rough N - Clean K - Calcite S - Smooth O - Open L - Limoni V - Very rough S - Stain Q - Quartz	oide e ite z dary mineral ntified mineral thered rock	SW - Slightly weath FR - Fresh Rock Streng VW - Very weal	th	SP	=	
- 4	_ Water Ein	st Noted _ War	ter Steady I o	vel	S - Shear zone T - Contact V - Vein Z - Decomposed Zone	U - Unide W - Weat X - Carbo Z - Clean	ntified mineral	W - Weak MS - Medium stro S - Strong VS - Very strong	ong Di	sturbe Sample	⋴▐▋	Approved: Date:
ഗ	- vvat€i Fli	or inoren 🛖 Mg	ioi Oicauy Le	Y-O1	DI - Drilling Induced break			FS - Extremely str	000	υαπιβί	L	2410.

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SOIL SURVEYS

Logger: CS/DT

Easting: 503249

Northing: 6960895

Operator: SO

Machine: Scout 2

RL: -9.05 m

BOREHOLE RECORD SHEET

Page: 2 OF 5

Location Number: BH 309

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

Location: Brisbane Client: AECOM

Date: 30/11/2011

		Widomilo.							rage. 2 Or 3
			Description	Weathering			Rec (%)	RQD	Samples and Remarks
Dilling MW STAD 4-37 8-30.002 Developed by barget STAD 52 8-30.002 Developed by barge	Depth Signature of the second	Sandy GRAVEL (grey brown and respectively) Sandy GRAVEL (grained, grey brown) QUARTZITE Sandy GRAVEL (grey and brown, for grey and	(GC) Dense, fine to coarse size,		Estimated Reliable (1997)	1111	Rec (%)		Samples and
The Arty 2012 5 33,002 Survey Boreshole Log 111-12338 New Spir Committee Survey 8 30,002 Developed by Dailed of Each Survey Boreshole Log 111-1233 New Spir Survey Boreshole L	19.50 19.50 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	CONGLOMERAT grey.	Defects - 1.54m : F,60°,P,R,O,C Defects - 1.54m : F,60°,P,R,O,C Defec	y [Oxide cite onite artz		ades Salued	U5	0	
r I	irst Noted Water Steady	evel	S - Shear zone U - Uni T - Contact W - W	dentified mineral eathered rock bonaceous	W - Weak MS - Medium stroi S - Strong VS - Very strong ES - Extremely stro	Dis	sturbe Sampl	d F	Approved: Date:

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SOIL SURVEYS

Easting: 503249

Northing: 6960895 RL: -9.05 m

Machine: Scout 2 Lagger: CC/DT Operator: CO

Location Number: BH 309

BOREHOLE RECORD SHEET

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

Location: Brisbane Client: AECOM

Date: 30/11/2011

Logger: 0	CS/DT	Operato	r: SO	Machine:	Scout 2	Date: 30/1	1/2011							Page: 3 OF 5	
Drilling Method	_	Depth	Graphic		Description		Weathering	Esti	ength imated MS s VS E	Sp	efect acing	Ιĕ	RQD	Samples and Remarks	
		20.60		grey. (continuea	ATE (DW) Weak, d)	, light grey and					 				
	_ _ <u>2</u> 1.0	20.82	0 0 0 0 0 0 0 0 0 0 0 0	grey white spec		se grained, pale granular, medium ctures. Clasts are	SW					109	97	. 20.68 m; J, 65° , C, R, O, Z	=
			0 0 0 0 0 0 0 0 0 0 0 0	fine size gravel, sandstone and		phyllite, ported.								21.08 m; DI, 1°, P, R, O, Z 21.28m, Is50 = 1.59 MPa 21.22 m; J, 30° , P, R, O, Z 21.38 m; DI, 5° , U, R, O, Z	
	<u> </u>)	000000	white speckled or bedded, closely are medium size	dark grey, granul to widely spaced e gravel, sub-rou	lar, very thickly d fractures. Clasts inded of siltstone,								21.66 m; DI, 5° , U, R, O, Z	
			$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	with fine sandst	one and quartz. (tone lenses from	Clast supported 23.25m to	SW - FR							22.435m, ls50 = 2.82 MPa	
	<u> </u>)	000000000000000000000000000000000000000									100	100	22.73 m; DI, 20°, T, R, O, Z	
			00000											23.13 m; J, 10° , P, R, O, Z 23.26m, ls50 = 0.77 MPa 23.27 m; B, 15° , P, S, O, Z	
	<u>24.0</u>)							₩ i i ₩ i i ₩ i i	i I I					
csDrawing-ile>> z1705/2012 14:32 8:30.002 Developed by Dadge		24.61	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0											24.35m, ls50 = 0.67 MPa 24.41 m; DI, 10° , S, R, O, Z	
.uoz Develo	_ 25.0 		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	white speckled bedded, modera	ATE, coarse grain dark grey, granu ately widely spac	lar, very thickly ed fractures.									=
2 14.3z o.or			000000	siltstone, phyllite supported, with	size gravel, sub-r e, sandstone and medium size gra 0m	d quartz. Clast								25.19 m; J, 13° , S, R, O, Z 25.35m, ls50 = 1.57 MPa	
27/09/20	<u> </u>		$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	CONGLOMERA white speckled	ATE, coarse grain	lar, very thickly	FR					99	93	25.81 m; J, 20°, P, R, O, Z	
No aming File		26.75		medium size gra	spaced fractures avel, sub-rounde one and quartz.	d of siltstone,								26.43m, Is50 = 1.31 MPa	\exists
W.G.W.	<u>- 2</u> 7.0	١	0000	white speckled	ATE, coarse grain dark grey, granu or spaced fracture	lar, very thickly								26.90 m; Dl, 15° , P, R, O, Z 27.10 m; J, 50° , S, R, O, Z	\exists
000271-11-12		27.77		coarse size grav phyllite, sandsto	vel, sub-rounded one and quartz. (medium grained,	of siltstone, Clast supported.					 			27.34m, Is50 = 2.75 MPa 27.48m, Is50 = 1.92 MPa 27.41 m; DI, 45° , C, R, O, Z	=
SOL, SORVEY BUREHOLE, LUG 111-123-38 N	<u>-</u> 28.0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	granular, mediu spaced fracture clasts.	um bedded, modes, with trace med	erately widely dium size gravel								27.77 m; DI, 5° , P, R, O, Z 28.215m, ls50 = 2.34 MPa	=
2				white speckled bedded, modera	ATE, coarse grain dark grey, granul ately widely space	lar, very thickly ed fractures.					 	100	91	28.15 m; J, 15° , U, V, O, Z 28.47 m; DI, 5° , S, R, O, Z	=
	<u>2</u> 9.0				ium size gravel, s e, sandstone and									29.14 m; DI, 7° , U, R, O, Z	=
20 12-03:0FB			000000000000000000000000000000000000000											29.48 m; J, 10° , P, R, O, Z 29.68m, Is50 = 0.57 MPa	=======================================
Commen 1) Ver bed le 1) not NMLC.			0000		<u> </u>	.54m : F,60°,P,R,O,C		RS - F XW - Extre	ering Gr Residual S emely wea	ioil ithered		Sampl	es _	29.86 m; DI, 7° , U, R, O, Z	
	evel. 2) No 3) Boreh	ig barge - a ote: the cori ole grouted	ng meth on com	s measured from nod used was NQ3 pletion.	B - Bedding C - Curvili C - Clay seam F - Foliation H - Schistosity J - Joint L - Cleavage R - Fracture S - Shear zone T - Contact	near L - Slickensides C - Closed C - Clay ntinuous P - Polished F - Filled F - Iron Ox R - Rough F - Clain K - Calcite page S - Smooth O - Chen L - I mont	ide te Jary mineral hered mok	SW - Slig FF Rock VW - W MS - M	tinctlý weath ghtly weath R - Fresh A Streng - Very wea I - Weak Medium stro - Strong	nered g th ik	L	U: Sf isturb	_	Approved:	
<u> </u>	rst Noted	<u>▼</u> Water S	teady Le	vel	V - Vein Z - Decomposed Zone DI - Drilling Induced break	Z - Clean		VS -	- Strong Very stron tremely str	ig rong		Samp		Date:	

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SOIL SURVEYS

Easting: 503249

Northing: 6960895 RL: -9.05 m

BOREHOLE RECORD SHEET

Location Number: BH 309

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

Location: Brisbane Client: AECOM

Logger: CS/DT Operator	: SO Machine:	Scout 2 Date: 30/	11/2011				Page: 4 OF 5	
Drilling Method Comparison of the comparison	Graphic	Description	Strength Weathering Stimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks	
	CONGLOMER speckled dark of moderately wide medium to coal siltstone, sand fine gravel lens (continued)	ATE, coarse grained, pale grey grey, granular, very thickly bedded dely spaced fractures. Clasts are urse size gravel, sub-rounded of stone and quartz. Clast supported ses from 30.5m to 30.65m.	FR		100	91	30.08 m; J, 15° , S, R, O, Z 30.15 m; Dl, 45° , T, V, O, Z 30.23 m; J, 60° , C, R, O, Z 30.36 m; Dl, 15° , T, R, O, Z 30.46 m; J, 30° , P, R, O, Z 30.86 m; J, 30° , P, R, O, C 30.86 m; J, 30° , P, R, O, C 30.94 m; J, 25° , T, V, O, Z 31.12 m; Dl, 10° , S, V, O, Z	
- 32.0	CONGLOMER construction of the construction of	ATE, coarse grained, pale grey grey, granular, very thickly bedded dely spaced fractures. Clasts are avel, sub-rounded of siltstone, I quartz. Clast supported with some I from 32.1m to 32.64m.			100	86	31.49m, ls50 = 0.43 MPa 31.56 m; J, 15° , D, R, O, Z 31.80 m; J, 22° , C, R, O, Z 32.03 m; J, 12° , S, S, O, Z 32.33 m; B, 25° , P, R, C, Z 32.44 m; DI, 6° , S, R, O, Z	
32.86 3 - 33.0 - 33.0	SANDSTONE, granular, mediu spaced fracture stringers at 32. Interlaminated fine grained, al	SILTSTONE and SANDSTONE, Iternating pale grey and dark grey,					32.58m, Is50 = 0.51 MPa 32.64 m; J, 14°, U, R, O, Z 32.66 m; T, 50°, P, R, C, Z 33.42 m; J, 10°, P, R, O, Z	
- 34.0 - 34.0 		laminated, moderately widely es, trace of coal stringers.			100	100	33.85 m; V, 5°, P, R, C, Coal 33.86 m; T, 6°, U, R, O, Z 34.21 m; B, 3°, P, S, O, Z 34.49 m; B, 4°, P, S, O, Z 34.58 m; J, 60°, P, S, O, K	
35.08	fine grained, al grey, thinly lam widely spaced	MUDSTONE and SILTSTONE, Iternating pale grey and darker ininated, very closely spaced to fractures. Some fine sandstone and trace of thin calcite veins.					34.87 m; B, 3° , P, S, O, Z 35.32 m; B, 4° , P, S, O, Z 35.67 m; B, 5° , P, S, O, Z	
				! ! ፟፟ ₩			36.32m, ls50 = 0.79 MPa 36.25 m; J, 10° , T, R, O, Z 36.76 m; B, 6° , P, S, O, Z 36.92 m; B, 6° , P, S, O, Z	
					100	97	37.55 m; B, 3°, P, S, O, Z 37.7m, is50 = 0.99 MPa 37.83 m; DI, 0°, S, R, O, Z 38.06 m; B, 5°, P, S, O, Z	
39.0							38.7m, ls50 = 1.93 MPa 38.63 m; Dl, 10° , P, R, O, Z	
Comments: 1) Drilled from floating barge - all river bed level. 2) Note: the coring not NMLC. 3) Borehole grouted of					99	43	39.00 m; DI, 50° , C, R, O, Z 39.14 m; J, 45° , P, S, O, Z 39.22 m; V, 30° , P, S, C, C, Z 39.23 m; J, 20° , S, P, O, Z 39.34 m; B, 32° , P, S, O, Z 39.54 m; B, 32° , P, S, O, Z 39.56 m; J, 90° , C, R, O, Z 39.66 m; B, 20° , P, C, O, Z 39.64 m; B, 15° , P, P, O, Z	
Comments: 1) Drilled from floating barge - all river bed level. 2) Note: the coring not NMLC. 3) Borehole grouted of	depths measured from g method used was NQ3 n completion.	L - Cleavage U - Undulating S - Stain Q - C R - Fracture U - Undulating S - St	n Oxide slicite FR - Fresh Rock Streng W- Very weak condary mineral condary mi	l nered ered ered	U5 SP	0	Approved	
—— Water First Noted —— Water Ste	eady Level	S - Shear zone W - 1 T - Conflact W - 1 V - Vein X - C Z - Decomposed Zone Z - C D1 - Drilling Induced break	reathered rock Wi3 - Medium Strong	DIS	sturbe Sampl		Approved: Date:	

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SOIL SURVEYS

Logger: CS/DT

Easting: 503249

Northing: 6960895 RL: -9.05 m

Operator: SO

Machine: Scout 2

BOREHOLE RECORD SHEET

Location Number: BH 309

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

Location: Brisbane Client: AECOM

Date: 30/11/2011

	Page:	5	OF	5	
D.	Sam	ples	s and		

Logger. CS	·		300ut 2	Date: 50/1						rage. 3 Of 3	
Drilling Method NMIC Casing	Depth	o la portion	Description		Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks	
	41.0	Interlaminated fine grained, a grey, thinly lam widely spaced laminae preser (continued)	MUDSTONE and SIL Iternating pale grey ar inated, very closely s fractures. Some fine s and trace of thin cal	nd darker paced to sandstone cite veins.	FR	as lyw w kal s lys (5	20 60 20 600	99	43	40.02 m; J, 15°, C, R, O, Z 40.2m, Is50 = 1.2 MPa 40.13 m; B, 5°, P, S, O, Z 40.30 m; B, 5°, P, S, O, Z 40.35 m; V, 70°, C, S, C, K 40.65 m; B, 5°, P, S, O, Z 40.72 m; B, 5°, P, S, O, Z 40.72 m; B, 5°, P, S, O, Z 40.88 m; B, 6°, P, S, O, Z 41.23 m; B, 6°, P, S, O, Z 41.40 m; V, 80°, S, R, O, Z 41.45 m; J, 15°, P, S, O, Z 41.45 m; J, 10°, U, S, O, Z	
SUNVEYS OF DIRACKY 2012-05-G1B 10g SOIL, SURVEY BOREHOLE LOG 111-12938 NEW GPJ, <-DrawingFile>> 21/05/2012 14:32 8:30.002 Developed by Dargel Comments: 1, result in the property of the prop		pths measured from	Defects - 1.54m Deptit (m) Type Dip (days) Panaring R Panaring Pa	F.60° P.R.O.C Laghress Aponture Ivili Palated F. Filled F. Card C. Card O. Palated F. Card C. Card O. Palated F. Card C. Card O. Laghress Aponture Ivilian C. Card C. Card C. Card O. Laghress Aponture Ivilian C. Card C. C		Weathering Gr RS- Residual So XVW - Edsmickly weath	hered	ample U5			
.1	Noted Water Stead	pths measured from nethod used was NQ3 completion.	C - Clay seam D - Discontinuous P F- F-Bulleton II - Plenarir R II - Discontinuous P II - Dis	Polished F - Filled F - Iron Coloi	ide ie ary mineral Itflied mineral sered rock saceous	SW - Slightly weath FR - Fresh Rock Streng W - Very weak W - Weak MS - Medium strot S - Strong VS - Very strong ES - Extremely stro	th ing Dis	SP [*] sturbe	T]	Approved: Date:	



IN-SITU PACKER PERMEABILITY TEST RESULT

PROJECT:CRRBH No.:309Packer type:SinglePROJECT No.:110-12936Test No.:1Packer pressure:2000kPa

Date: 3/12/2011 Gauge pressures measured in: kPa
Tested by: JI

Vertical depth to: (below river bed)

Top of test section (m):	30.60
Base of test section (m):	35.60
Centre of test section(m):	33.10
Base of casing (m):	29.60
Ground water (m)	TIDAL

	Depth of centre of test section (m):	33.10
L	ength of test section (m):	5.00

Gauge Height above ground level (m):		
Hole Diameter in test section (mm)	75	

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	436.0	436.5	436.5	436.5	Flow (I/min)
100	Water Take	0.00	0.50	0.00	0.00	0.033
2nd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	438.5	439.5	439.5	440.0	Flow (I/min)
200	Water Take	0.00	1.00	0.00	0.50	0.100
3rd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	441.5	441.6	441.8	442.1	Flow (I/min)
400	Water Take	0.00	0.10	0.20	0.30	0.040
4th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading					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)
	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	0.033	100.00	10.220	0.000	0.000	43.320	0.016	1.99E-09
2nd	0.100	200.00	20.440	0.000	0.000	53.540	0.038	4.84E-09
3rd	0.040	400.00	40.880	0.000	0.000	73.980	0.011	1.40E-09
4th	0.000	200.00	20.440	0.000	0.000	53.540	0.000	0.00E+00
5th	0.000	0.00	0.000	0.000	0.000	33.100	0.000	0.00E+00

^{*}Where friction loss is assumed to be negligible.

N.B. Pressure Conversion: 1 bar = 100 kPa = 14.503 psi Note - backflow between period 3 & 4 - test ended

IN-SITU PACKER PERMEABILITY TEST RESULT

PROJECT:CRRBH No.:309Packer type:SinglePROJECT No.:110-12936Test No.:2Packer pressure:2000kPa

Date: 3/12/2011 Gauge pressures measured in: kPa
Tested by: JI

Vertical depth to: (below river bed)

Top of test section (m):	24.00
Base of test section (m):	27.00
Centre of test section(m):	25.50
Base of casing (m):	24.00
Ground water (m)	TIDAL

Depth of centre of test section (m):	25.50
Length of test section (m):	3.00

Gauge Height above ground level (m):		
Hole Diameter in test section (mm)	75	

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	442.5	443.0	443.0	443.2	Flow (I/min)
100	Water Take	0.00	0.50	0.00	0.20	0.047
2nd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	444.0	444.6	445.0	445.2	Flow (I/min)
200	Water Take	0.00	0.60	0.40	0.20	0.080
3rd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	446.5	447.0	447.6	448.5	Flow (I/min)
300	Water Take	0.00	0.50	0.60	0.90	0.133
4th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	448.0	448.2	448.2	448.2	Flow (I/min)
200	Water Take	0.00	0.20	0.00	0.00	0.013
5th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	448.0	448.0	448.0	448.0	Flow (I/min)
	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	0.047	100.00	10.220	0.000	0.000	35.720	0.044	5.06E-09
2nd	0.080	200.00	20.440	0.000	0.000	45.940	0.059	6.74E-09
3rd	0.133	300.00	30.660	0.000	0.000	56.160	0.081	9.19E-09
4th	0.013	200.00	20.440	0.000	0.000	45.940	0.010	1.12E-09
5th	0.000	0.00	0.000	0.000	0.000	25.500	0.000	0.00E+00

^{*}Where friction loss is assumed to be negligible.

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