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Easting: 503131      Northing: 6960922      RL: -1.65 m  
Logger: CS/DT      Operator: SO      Machine: Scout 2

Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	FR	NMLC									
				0.0		Silty CLAY (CH) high plasticity, dark grey and black.						
				1.0								
				2.0								
				3.0								
				4.0								
				5.0								
				6.0								
				7.0								
				8.0								
				9.0								
				10.0								

SOIL SURVEYS 00:LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:32 8.30.002 Developed by Dargel

**Comments:**  
1) Drilled from floating barge - all depths measured from river bed level. 2) Note: the coring method used was NQ3 not NMLC. 3) Borehole grouted on completion.

**Defects - 1.54m : F,60° P,R,O,C**

Depth (m)	Type	Dip (Deg)	Planarity	Roughness	Aperture	Wt%
	B - Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
	C - Clay seam		D - Discontinuous	P - Polished	F - Filled	F - Iron Oxide
	F - Foliation		P - Planar	R - Rough	N - Clean	K - Kaolinite
	H - Schistosity		S - Subplanar	S - Smooth	O - Open	L - Limonite
	J - Joint		T - Stepped	V - Very rough	S - Stain	Q - Quartz
	L - Cleavage		U - Undulating			S - Secondary mineral
	R - Fracture					U - Unidentified mineral
	S - Shear zone					W - Weathered rock
	T - Contact					X - Carbonaceous
	V - Vein					Z - Clean
	Z - Decomposed Zone					
	DI - Drilling induced break					

**Weathering Grades**

RS - Residual Soil  
XW - Extremely weathered  
DW - Distinctly weathered  
SW - Slightly weathered  
FR - Fresh

**Rock Strength**

VW - Very weak  
W - Weak  
MS - Medium strong  
S - Strong  
VS - Very strong  
ES - Extremely strong

**Samples**

U50  
SPT  
Disturbed Sample

Approved: \_\_\_\_\_  
Date: \_\_\_\_\_



Easting: 503131      Northing: 6960922      RL: -1.65 m  
Logger: CS/DT      Operator: SO      Machine: Scout 2

Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	FR	NM/LC									
				11.0		Silty CLAY (CH) high plasticity, dark grey and black. (continued)						
				11.25								
				12.0		Sandy SILT (ML) medium plasticity, dark grey and black, fine grained sand.						
				13.0								
				14.0								
				15.0								
				16.0								
				17.0								
				18.0								
				19.0								
				20.0	19.90							

SOIL SURVEYS 00:LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:32 8.30.002 Developed by Dajgeel

**Comments:**  
1) Drilled from floating barge - all depths measured from river bed level. 2) Note: the coring method used was NQ3 not NM/LC. 3) Borehole grouted on completion.

**Defects - 1.54m : F,60° P,R,O,C**

Depth (m)	Type	Dip (Deg)	Planarity	Roughness	Aperture	Width
B	Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
C	Clay seam		D - Discontinuous	P - Polished	F - Filled	F - Iron Oxide
F	Foliation		P - Planar	R - Rough	N - Clean	K - Kaolinite
H	Schistosity		S - Subplanar	S - Smooth	O - Open	L - Limonite
J	Joint		T - Stepped	V - Very rough	S - Stain	Q - Quartz
L	Devalve		U - Undulating			S - Secondary mineral
R	Fracture					U - Unidentified mineral
S	Shear zone					W - Weathered rock
T	Contact					X - Carbonaceous
V	Vein					Z - Clean
Z	Decomposed Zone					
DI	Drilling induced break					

**Weathering Grades**

RS - Residual Soil  
XW - Extremely weathered  
DW - Distinctly weathered  
SW - Slightly weathered  
FR - Fresh

**Rock Strength**

VW - Very weak  
W - Weak  
MS - Medium strong  
S - Strong  
VS - Very strong  
ES - Extremely strong

**Samples**

U50  
SPT  
Disturbed Sample

Approved: \_\_\_\_\_  
Date: \_\_\_\_\_



Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	FR	NMLC									
				21.0	x x x x	TUFF (DW) Medium strong, brown, highly fractured, some clay seams. (continued)						
				22.0	x x x x							
				22.60	x x x x							
				23.0	o o o o	SANDSTONE, fine grained, pale grey, granular, thinly laminated, extremely closely spaced to closely spaced fractures.	DW					22.90 m; B, 9°, P, S, O, Z
				23.30	X	CORE LOSS 0.30m (23.00-23.30)						
				23.62	o o o o	SANDSTONE, fine grained, pale grey, granular, thinly laminated, closely spaced fractures.	SW			85	29	23.38 m; B, 9°, P, S, O, Z 23.48 m; B, 10°, P, R, O, Z 23.54 m; J, 60°, P, S, O, C 23.64 m; DI, 4°, S, R, O, Z 23.68 m; J, 65°, P, R, O, Z 23.77 m; V, 7°, P, R, C, Q 23.95m, Is50 = MPa
				24.0	o o o o	CONGLOMERATE, coarse grained, pale grey speckled blue grey, granular, medium bedded, very closely to closely spaced fractures. Clasts are medium gravel sized subrounded siltstone, sandstone and quartz.						23.86 m; DI, 21°, S, R, O, Z 23.92 m; DI, 5°, U, R, O, Z 24.08 m; DI, 4°, S, R, O, Z 24.20 m; DI, 15°, S, R, O, Z 24.24 m; J, 43°, P, R, O, Z 24.30 m; T, 2°, P, R, O, Z 24.40 m; J, 80°, P, S, O, Z 24.46 m; J, 75°, U, R, O, Z
				24.29	o o o o							
				25.0	o o o o	SILTSTONE, fine grained, grey to light grey, thinly laminated, very closely spaced to closely spaced fractures.	FR					25.25m, Is50 = 0.4 MPa
				24.93	o o o o							
				25.72	o o o o	SANDSTONE, fine grained, pale grey, granular, thinly laminated, closely spaced fractures, thin interlamination of siltstone.				99	60	25.62m, Is50 = 0.61 MPa
				26.0	o o o o	Interlaminated SILTSTONE and SANDSTONE, fine grained, alternating pale grey to dark grey, granular, thinly laminated with some thin beds of fine sandstone, extremely closely spaced to moderately widely spaced fractures. Veins of quartz with sulphides/ oxides present. Coal bed at 32.16m. Fine gravel present from 32.3m to 32.44m. Clay seam from 32.54m to 32.59m.						25.91 m; J, 50°, P, R, O, Z 26.1m, Is50 = 0.31 MPa 26.25m, Is50 = 0.41 MPa 26.17 m; V, 22°, P, S, O, Q 26.46 m; V, 45°, S, R, O, Q 26.69 m; V, 17°, P, S, C, Q
				27.0	o o o o							
				28.0	o o o o							
				29.0	o o o o					100	86	24.35-32.70 m; B, 5 - 20°, P, S, O, Z 29.26 m; J, 26°, P, S, O, Z 29.56 m; J, 21°, U, S, O, Z 29.7m, Is50 = 0.79 MPa 29.95m, Is50 = 0.92 MPa
				30.0	o o o o							

SOIL SURVEYS 00: LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:32 8.30.002 Developed by Dajcel

**Comments:**  
1) Drilled from floating barge - all depths measured from river bed level. 2) Note: the coring method used was NQ3 not NMLC. 3) Borehole grouted on completion.

**Defects - 1.54m : F,60°,P,R,O,C**

Depth (m)	Type	Dip (deg)	Planarity	Roughness	Aperture	Width
	B - Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
	F - Foliation		D - Discontinuous	P - Polished	F - Filled	F - Iron Oxide
	H - Schistosity		P - Planar	R - Rough	N - Clean	K - Calcite
	J - Joint		S - Subplanar	S - Smooth	O - Open	L - Limonite
	L - Cleavage		T - Stepped	V - Very rough	S - Stain	Q - Quartz
	R - Fracture		U - Undulating			S - Secondary mineral
	S - Shear zone					U - Unidentified mineral
	T - Contact					W - Weathered rock
	V - Vein					X - Carbonaceous
	Z - Decomposed Zone					Z - Clean
	DI - Drilling induced break					

**Weathering Grades**

RS - Residual Soil  
XW - Extremely weathered  
DW - Distinctly weathered  
SW - Slightly weathered  
FR - Fresh

**Rock Strength**

VW - Very weak  
W - Weak  
MS - Medium strong  
S - Strong  
VS - Very strong  
ES - Extremely strong

**Samples**

U50  
SPT  
Disturbed Sample

Approved: \_\_\_\_\_  
Date: \_\_\_\_\_



Easting: 503131      Northing: 6960922      RL: -1.65 m  
Logger: CS/DT      Operator: SO      Machine: Scout 2

Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	RR	NM/LC									
				31.0		Interlaminated SILTSTONE and SANDSTONE, fine grained, alternating pale grey to dark grey, granular, thinly laminated with some thin beds of fine sandstone, extremely closely spaced to moderately widely spaced fractures. Veins of quartz with sulphides/ oxides present. Coal bed at 32.16m. Fine gravel present from 32.3m to 32.44m. Clay seam from 32.54m to 32.59m. (continued)	FR			99	35	30.17 m; J, 24°, P, S, O, Z 30.38 m; DI, 56°, S, R, O, Z 30.84 m; J, 80°, P, S, O, Z 30.90 m; V, 85°, P, S, C, Q 31.10 m; V, 84°, P, S, C, Q 31.58 m; J, 80°, S, R, O, Z 32.10 m; J, 85°, U, R, O, Z 32.45 m; J, 43°, P, R, O, Z
				32.70			RS DW RS					
				33.0		PHYLLITE, fine grained, alternating pale grey, dark grey and green, cryptocrystalline, thinly laminated to laminated, fragmented to widely spaced fractures. Green appears to be chlorite alteration, with some quartz veins. Trace of pygmatic folding. Some clay seams. Quartz veins are aligned with foliations. Calcite associated with quartz.	SW			100	0	33.40 m; F, 44°, P, S, O, Z 33.50 m; C, 20°, P, R, O, Z 33.54 m; F, 32°, S, R, O, Z 33.71 m; F, 25°, P, R, O, Z 33.76 m; V, 25°, P, R, O, Z 33.95 m; C, 29°, P, R, O, Z
				34.10		CORE LOSS 0.25m (34.10-34.35)						
				34.35		PHYLLITE, fine grained, alternating pale grey, dark grey and green, cryptocrystalline, thinly laminated to laminated, fragmented to widely spaced fractures. Green appears to be chlorite alteration, with some quartz veins. Trace of pygmatic folding. Some clay seams. Quartz veins are aligned with foliations. Calcite associated with quartz.	SW			72	44	
				35.0								
				36.0			DW - SW			100	43	36.27 m; J, 72°, S, R, O, Z 36.60 m; J, 75°, S, R, O, Z 36.9m, Is50 = 0.32 MPa
				37.0			SW					
				38.0								37.82 m; S, 75°, P, R, C, Q 38.06m, Is50 = 0.66 MPa 38.23m, Is50 = 1.3 MPa 38.18 m; V, 65°, P, R, C, Q
				39.0						100	70	
				40.0						89	81	39.78 m; V, 70°, P, R, C, Q

Comments:  
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**Defects - 1.54m : F, 60°, P, R, O, C**

Depth (m)	Type	Dip (deg)	Planarity	Roughness	Aperture	Fill
	B - Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
	C - Clay seam		D - Discontinuous	P - Polished	F - Filled	F - Iron Oxide
	F - Foliation		P - Planar	R - Rough	N - Clean	K - Calcite
	H - Schistosity		S - Subplanar	S - Smooth	O - Open	L - Limonite
	J - Joint		T - Stepped	V - Very rough	S - Stain	Q - Quartz
	L - Cleavage		U - Undulating			S - Secondary mineral
	R - Fracture					U - Unidentified mineral
	S - Shear zone					W - Weathered rock
	T - Contact					X - Carbonaceous
	V - Vein					Z - Clean
	Z - Decomposed Zone					
	DI - Drilling induced break					

**Weathering Grades**

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**Rock Strength**

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MS - Medium strong  
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VS - Very strong  
ES - Extremely strong

**Samples**

U50  
SPT  
Disturbed Sample

Approved: \_\_\_\_\_  
Date: \_\_\_\_\_

SOIL SURVEYS 00:LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:32 8.30.002 Developed by Dafgei



Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	RR	NMLC									
				41.0	[Wavy line pattern]	PHYLLITE, fine grained, alternating pale grey, dark grey and green, cryptocrystalline, thinly laminated to laminated, fragmented to widely spaced fractures. Green appears to be chlorite alteration, with some quartz veins. Trace of pygmatic folding. Some clay seams. Quartz veins are aligned with foliations. Calcite associated with quartz. (continued)	SW	[Cross-hatch pattern]	[Vertical line pattern]	89	81	39.95 m; V, 75°, P, S, C, Q
				42.0								40.16 m; V, 50°, D, R, C, Q
				43.0								40.75 m, Is50 = 0.78 MPa
				44.0								41.6 m, Is50 = 1.1 MPa
				45.0								34.60-49.20 m; F, 25 - 55°, P, S, O, Z
				46.0								42.10 m; J, 86°, S, R, O, Q
				47.0								42.28 m; J, 86°, S, R, O, Z
				48.0								42.47 m; J, 33°, P, R, O, Z
				49.0								43.76 m; V, 35°, P, S, C, Q
				49.20								43.80 m; V, 50°, P, R, O, Q
						44.69 m, Is50 = 1.24 MPa						
						44.9 m, Is50 = 2.54 MPa						
						46.08 m, Is50 = 1.03 MPa						
						47.85 m, Is50 = 0.49 MPa						
						47.80 m; J, 35°, P, S, O, Z						
						48.48 m; V, 14°, P, S, C, Q						
						49.05 m, Is50 = 0.98 MPa						
						49.2 m, Is50 = 0.81 MPa						
				50.0	BOREHOLE BH 314 TERMINATED AT 49.20 m							

Comments:  
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**Defects - 1.54m : F, 60°, P, R, O, C**

Depth (m)	Type	Dip (deg)	Planarity	Roughness	Aperture	Fill
	B - Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
	C - Clay seam		D - Discontinuous	P - Polished	F - Filled	F - Iron Oxide
	F - Foliation		P - Planar	R - Rough	N - Clean	K - Calcite
	H - Schistosity		S - Subplanar	S - Smooth	O - Open	L - Limonite
	J - Joint		T - Stepped	V - Very rough	S - Stain	Q - Quartz
	L - Cleavage		U - Undulating			S - Secondary mineral
	R - Fracture					U - Unidentified mineral
	S - Shear zone					W - Weathered rock
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	Z - Decomposed Zone					
	DI - Drilling induced break					

**Weathering Grades**

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**Rock Strength**

VW - Very weak  
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MS - Medium strong  
S - Strong  
VS - Very strong  
ES - Extremely strong

**Samples**

U50 [Bar chart]

SPT [Bar chart]

Disturbed Sample [Bar chart]

Approved: [Signature]  
Date: [Date]

SOIL SURVEYS 00: LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:32 8.30.002 Developed by Dajgel



SOIL\_SURVEYS\_00\_LIBRARY.GLB Grctbl DG PHOTO CORE PHOTO 4 PER PAGE 111-12936 NEW.GPJ <<DrawingFile>> 26/04/2012 14:47 8.2.856 Developed by Datgel



TITLE

AECOM  
Brisbane  
Cross River Rail  
Core Photo - BH 314

DRAWN	DT	DATE	26/04/2012
CHECKED	CB	DATE	26/04/2012
SCALE	Not To Scale		A4
PROJECT No	110-12936	FIGURE No	1/2



SOIL\_SURVEYS\_00.LIBRARY.GLB.Grfctbl.DG PHOTO CORE PHOTO 4 PER PAGE 111-12936 NEW.GPJ <<DrawingFile>> 26/04/2012 14:47 8.2.856 Developed by Datgel



TITLE

**AECOM**  
**Brisbane**  
**Cross River Rail**  
**Core Photo - BH 314**

DRAWN	DT	DATE	26/04/2012
CHECKED	CB	DATE	26/04/2012
SCALE	Not To Scale		A4
PROJECT No	110-12936	FIGURE No	2/2



## IN-SITU PACKER PERMEABILITY TEST RESULT

**PROJECT:** **CRR**  
**PROJECT No.:** **110-12936**

**BH No.:** **314**  
**Test No.:** **1**  
**Date:** **16/01/2012**

Packer type: Double  
Packer pressure: 2000kPa  
Gauge pressures measured in: kPa  
Tested by: CS

Vertical depth to:  
(below river bed)

Top of test section (m):	37.00
Base of test section (m):	39.50
Centre of test section(m):	38.25
Base of casing (m):	36.00
Ground water (m)	TIDAL

Depth of centre of test section (m):	38.25
Length of test section (m):	2.50

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

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure 100	Flow reading	978.5	979.0	979.5	979.5	Flow (l/min)
	Water Take	0.00	0.50	0.50	0.00	0.067
2nd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 200	Flow reading	981.8	982.0	982.0	982.1
	Water Take	0.00	0.20	0.00	0.10	0.020
3rd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 300	Flow reading	983.0	983.0	983.0	983.0
	Water Take	0.00	0.00	0.00	0.00	0.000
4th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 200	Flow reading	982.5	982.5	982.5	982.5
	Water Take	0.00	0.00	0.00	0.00	0.000
5th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 100	Flow reading				Flow (l/min)
	Water Take	0.00	0.00	0.00	0.00	0.000

Period	Flow (q) (l/min)	Gauge Press (kPa)	Gauge Press (m of water)	Friction Loss (m)*		Total Head (m)	Lugeon Value	Perm. (m/s)
				Basic	In extra rods			
1st	0.067	100.00	10.220	0.000	0.000	48.470	0.056	6.12E-09
2nd	0.020	200.00	20.440	0.000	0.000	58.690	0.014	1.52E-09
3rd	0.000	300.00	30.660	0.000	0.000	68.910	0.000	0.00E+00
4th	0.000	200.00	20.440	0.000	0.000	58.690	0.000	0.00E+00
5th	0.000	100.00	10.220	0.000	0.000	48.470	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 - zero flow in period 4 - test ended

## IN-SITU PACKER PERMEABILITY TEST RESULT

**PROJECT:** CRR      **BH No.:** 314  
**PROJECT No.:** 110-12936      **Test No.:** 2  
**Date:** 16/01/2012

Packer type: Double  
Packer pressure: 2000kPa  
Gauge pressures measured in: kPa  
Tested by: CS

Vertical depth to:  
(below river bed)

Top of test section (m):	28.00
Base of test section (m):	30.50
Centre of test section(m):	29.25
Base of casing (m):	27.00
Ground water (m)	TIDAL

Depth of centre of test section (m):	29.25
Length of test section (m):	2.50

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

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure 150	Flow reading	990.0	990.0	990.5	991.0	Flow (l/min)
	Water Take	0.00	0.00	0.50	0.50	0.067
2nd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 300	Flow reading	993.0	993.0	993.0	993.0
Water Take		0.00	0.00	0.00	0.00	0.000
3rd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 450	Flow reading	994.0	994.0	994.0	994.0
Water Take		0.00	0.00	0.00	0.00	0.000
4th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 300	Flow reading	993.5	993.5	993.5	993.5
Water Take		0.00	0.00	0.00	0.00	0.000
5th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 150	Flow reading				
Water Take		0.00	0.00	0.00	0.00	0.000

Period	Flow (q) (l/min)	Gauge Press (kPa)	Gauge Press (m of water)	Friction Loss (m)*		Total Head (m)	Lugeon Value	Perm. (m/s)
				Basic	In extra rods			
1st	0.067	150.00	15.330	0.000	0.000	44.580	0.061	6.65E-09
2nd	0.000	300.00	30.660	0.000	0.000	59.910	0.000	0.00E+00
3rd	0.000	450.00	45.990	0.000	0.000	75.240	0.000	0.00E+00
4th	0.000	300.00	30.660	0.000	0.000	59.910	0.000	0.00E+00
5th	0.000	150.00	15.330	0.000	0.000	44.580	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 - zero flow in period 4 - test ended