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Location Number: BH 303

Project Number: 110-12936

Project Name: Cross River Rail

Location: Brisbane

Client: AECOM

Date: 13/12/2011

Page: 1 OF 4

Easting: 503291 Northing: 6960727 RL: -16.27 m
Logger: CB/DT Operator: SO Machine: Scout 2

SOIL SURVEYS 00: LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:31 8.30.002 Developed by Datigel

Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	FR	NMLC									
				0.00		NATURAL Silty CLAY (CH) Very soft, high plasticity, dark grey, with sulphate smell.						
				1.00								
				2.00								
				3.00								
				4.00								
				4.60								
				5.00		Silty CLAY (CH) Very soft, high plasticity, dark grey, with fine size angular to subangular gravel.						
				6.00								
				7.00								
				8.00								
				8.80		Sandy GRAVEL (GP) Medium dense, fine size angular to subangular, grey and brown, fine grained sand.						
				9.00								
				9.80		TUFF (XW) Weak, pale light grey.						
				10.00								

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
	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 - Dievage		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: 503291 Northing: 6960727 RL: -16.27 m
Logger: CB/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									
				10.80		CONGLOMERATE (DW-SW) Medium strong, grey. (continued)						
				11.0		CONGLOMERATE, coarse grained, pale white grey and speckled dark grey, granular, thickly bedded, widely spaced fractures, clasts are medium size sub-rounded gravel of siltstone, sandstone and quartz. Clast supported. Coarse sandstone lenses from 11.66m to 11.76m.	SW - FR			100	79	10.87 m; J, 25°, P, R, O, U 10.95 m; J, 22°, P, R, O, W 11.09 m; DI, 10°, U, R, O, Z 11.31m, Is50 = 0.84 MPa
				12.0								12.83m, Is50 = 1.12 MPa
				13.06		SILTSTONE, fine grained, dark grey, granular, laminated, very closely to closely spaced fractures. Sandy silt lenses from 13.56m to 13.72m. Coarse Sandstone lense from 14.16m to 14.33m, Mudstone from 14.33m to 14.42m. Fine size gravel conglomerate from 14.49m to 14.54m.				95	20	13.06 m; J, 30°, U, S, O, Z 13.17 m; J, 10°, P, R, O, Z 13.28 m; DI, 10°, U, R, O, Z 13.40 m; J, 35°, P, S, O, C 13.47 m; DI, 10°, P, S, O, Z
				14.0								13.82 m; J, 10°, P, R, O, W
				14.65		SANDSTONE, coarse grained, pale grey speckled white grey, medium bedded, moderately widely to widely spaced fractures, with some fine to medium size gravel clasts.	FR					14.12 m; J, 10°, U, S, O, W 14.16 m; J, 11°, P, S, O, C 14.28 m; J, 13°, P, R, O, Z 14.34 m; DI, 5°, P, R, O, C 14.37 m; J, 10°, P, R, O, C
				15.0								14.65 m; R, 5°, P, O, W 14.68 m; R, 5°, P, O, W
				15.36		CONGLOMERATE, coarse grained, pale white grey and speckled dark grey, granular, thickly bedded, closely to widely spaced fractures, clasts are medium size sub-rounded gravel, moderate to low sphericity, siltstone, sandstone and quartz. Clast supported. Coarse sandstone lense from 19.38m to 19.47m, with trace of coal.						14.95 m; J, 10°, P, R, O, Z 15.06m, Is50 = 2.3 MPa
				15.6m								15.56m, Is50 = 1.1 MPa
				16.0								15.56m, Is50 = 1.1 MPa
				16.42 m; J, 20°, U, R, O, Z 16.70 m; J, 5°, T, S, O, Z								100
				17.0								17.41 m; J, 5°, P, R, O, Z
				17.84 m; J, 10°, T, R, O, Z 18.09 m; J, 10°, P, R, O, Z 18.36m, Is50 = 0.79 MPa 18.28 m; DI, 15°, U, R, O, Z								100
				19.0								19.42 m; J, 15°, P, S, O, C
				19.66								19.67 m; J, 10°, C, S, O, C 19.88m, Is50 = 0.73 MPa

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
	F - Fault		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: _____

SOIL SURVEYS 00: LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:31 8.30.002 Developed by Dajcel



Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	RR	NM/LC									
				20.13		Interbedded SILTSTONE and SANDSTONE, fine grained, alternating pale grey and dark grey, laminated. (continued)	FR			100	93	20.10 m; J, 15°, P, S, O, C 20.26m, Is50 = 2.87 MPa 20.17 m; J, 10°, P, S, O, W
				21.0		SANDSTONE, coarse grained, pale grey speckled white grey, medium bedded, moderately widely spaced fractures. Medium size gravel conglomerate band from 20.50m to 20.70m.						20.60 m; DI, 5°, P, R, O, C 20.87 m; J, 10°, P, R, O, Z 21.11 m; R, 5°, U, V, O, Z 21.21 m; J, 45°, P, S, O, W
				22.0		CONGLOMERATE, coarse grained, pale white grey and speckled dark grey, granular, thickly bedded, moderately widely spaced fractures, clasts are medium size sub-rounded gravel of siltstone, sandstone and quartz. Clast supported.				100	99	21.51 m; DI, 5°, U, R, O, Z 21.69 m; B, 20°, P, R, O, Z 21.82m, Is50 = 0.98 MPa 22.27 m; DI, 15°, S, R, O, Z
				23.0								22.8m, Is50 = 1.87 MPa 22.71 m; DI, 20°, S, R, O, Z 22.92 m; DI, 10°, P, R, O, Z
				24.0								23.10 m; DI, 8°, P, R, O, Z 23.29 m; DI, 5°, U, R, O, Z 23.59 m; J, 35°, P, R, O, Z
				25.0								24.53m, Is50 = 0.5 MPa 24.49 m; DI, 10°, P, R, O, Z 24.72 m; DI, 30°, P, R, O, Z
				25.40								24.96 m; DI, 10°, P, R, O, Z 25.17 m; J, 10°, P, S, O, Z
				26.0		CONGLOMERATE, coarse grained, dark grey speckled white grey, granular, thickly bedded, moderately widely spaced fractures, clasts are medium size sub-rounded gravel of siltstone. With a thin siltstone band from 25.90m to 25.96m.						25.42 m; DI, 50°, C, R, O, Z 25.75m, Is50 = 0.91 MPa 25.83 m; DI, 15°, S, R, O, Z 25.95 m; B, 30°, P, S, O, Z
				26.74		CONGLOMERATE, coarse grained, pale white grey and speckled dark grey, granular, thinly bedded, widely spaced fractures, clasts are fine to medium size sub-rounded gravel clasts of siltstone, sandstone and quartz. Clast supported.						
				27.0		SANDSTONE, medium grained, pale grey, granular, thinly bedded, closely spaced fractures.						26.84 m; B, 90°, P, S, O, Z 27.05m, Is50 = 0.82 MPa
				28.0		CONGLOMERATE, coarse grained, pale white grey and speckled dark grey, granular, thickly bedded, closely to moderately widely spaced fractures, clasts are coarse size sub-rounded gravel, siltstone, sandstone and quartz. Clast supported, sandy matrix.						27.31 m; DI, 50°, S, R, O, Z 27.45 m; DI, 70°, S, R, O, Z 27.67 m; J, 25°, P, S, O, Z 27.76 m; DI, 90°, S, R, O, Z
				28.26								28.14 m; DI, 40°, S, R, O, Z 28.26 m; T, 20°, C, S, O, Z 28.44m, Is50 = 0.84 MPa 28.47 m; B, 180°, P, S, O, Z
				28.85		Interbedded SILTSTONE and SANDSTONE, fine grained, alternating pale grey and dark grey, laminated, with some coal stringers.						
				29.0		SANDSTONE, coarse grained, pale grey, banded dark grey, granular, thinly bedded, closely to moderately widely spaced fractures, with some coal stringers and siltstone beds. Fine grained from 28.91m to 19.11m.						28.85 m; B, 180°, P, R, O, Z 29.06 m; DI, 6°, P, R, O, Z
				30.0								29.66m, Is50 = 3.23 MPa 29.70 m; T, 4°, P, R, O, Z 29.90 m; B, 21°, P, R, O, X

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	Cl - Clay
	C - Clay seam		D - Discontinuous	P - Polished	F - Filled	FI - 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 - Silts	Q - Quartz
	L - Cleavage		R - Fracture			S - Secondary mineral
	R - Fracture		S - Shear zone			U - Unidentified mineral
	T - Contact		Z - Decomposed Zone			W - Weathered rock
	V - Vein		DI - Drilling induced break			X - Carbonaceous
	Z - Decomposed Zone					Z - Clean

Weathering Grades

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

Rock Strength

VW - Very weak
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MS - Medium strong
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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 14:31 8.30.002 Developed by Datigel



Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	FR	NM/LC									
				30.26		Interlaminated SILTSTONE and MUDSTONE, fine grained, alternating pale grey and dark grey, thinly laminated, closely to widely spaced fractures.	FR					30.04 m; DI, 30°, P, R, O, Z 30.17 m; B, 16°, P, R, O, Z 30.23 m; J, 87°, D, R, O, Z 30.34 m; DI, 2°, P, R, O, Z
				31.0						100	92	
				32.0								
				33.0								
				34.0						100	100	
				35.0								
				36.0								
				37.0						100	100	36.81 m; B, 5°, P, S, O, Z 37.13 m; DI, 89°, D, S, O, Z
				38.0								
				38.72								
				39.0		BOREHOLE BH 303 TERMINATED AT 38.72 m						
				40.0								

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	Fill
	B - Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
	C - Clay seam		D - Discontinuous	P - Polished	F - Filled	F - Iron Oxide
	F - Fault		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					

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VS - Very strong
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Samples

U50

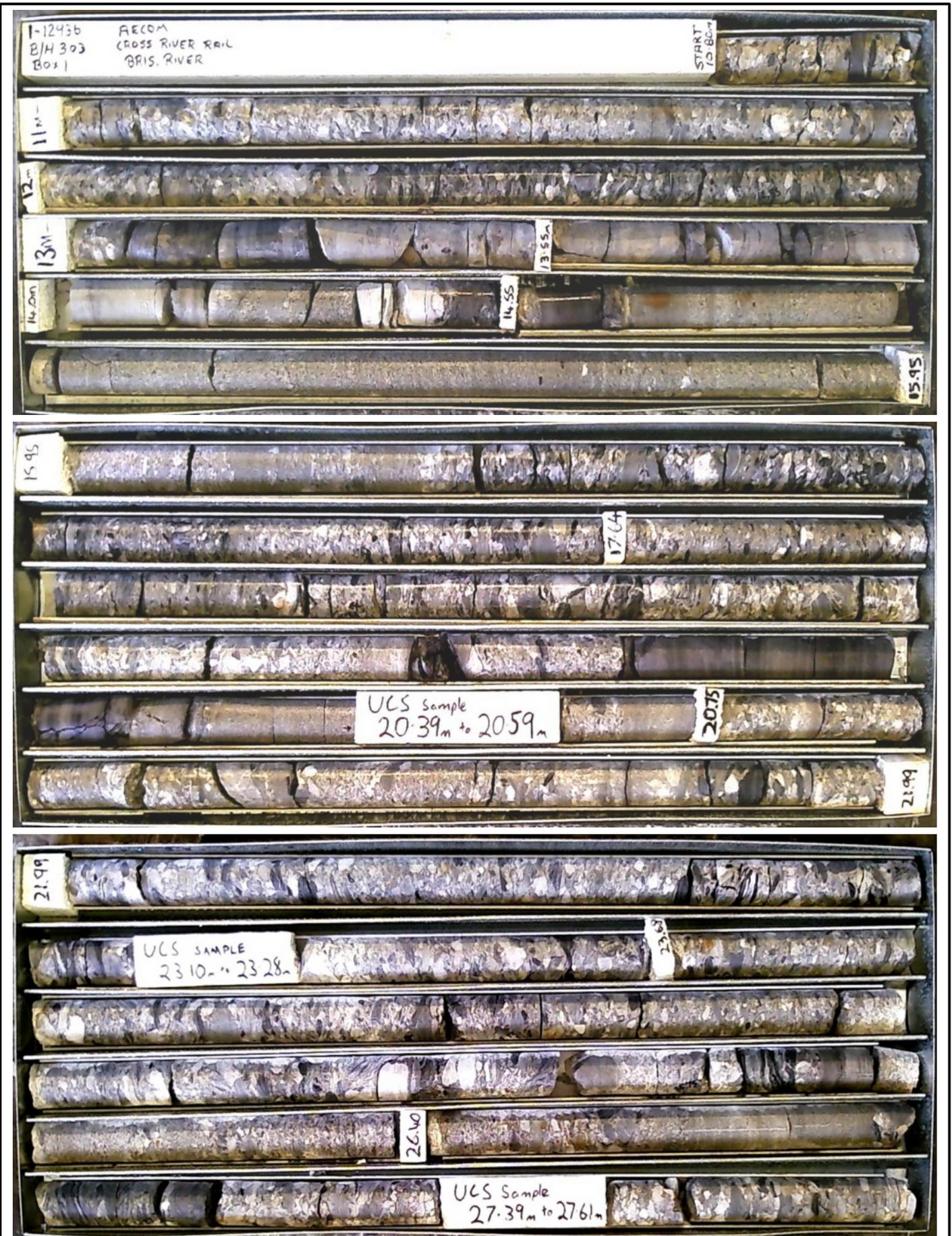
SPT

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 14:31 8.30.002 Developed by Datigel

SOIL_SURVEYS_00.LIBRARY.GLB.GriCtbl.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 303

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.Grictbl.DG PHOTO CORE PHOTO 4 PER PAGE 111-12936 NEW.GPJ <<DrawingFile>> 26/04/2012 14:47 8.2.856 Developed by Datgei



TITLE

AECOM
Brisbane
Cross River Rail
Core Photo - BH 303

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** **BH No.:** **303**
PROJECT No.: **110-12936** **Test No.:** **1**
Date: **15/12/2011**

Packer type: Double
Packer pressure: 2000kPa
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):	26.50
Centre of test section(m):	25.25
Base of casing (m):	31.00
Ground water (m)	TIDAL

Depth of centre of test section (m):	25.25
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	611.5	612.5	613.0	613.2	Flow (l/min)
	Water Take	0.00	1.00	0.50	0.20	0.113
2nd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 200	Flow reading	616.0	616.2	616.2	616.3
Water Take		0.00	0.20	0.00	0.10	0.020
3rd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 400	Flow reading	618.2	618.4	618.7	618.7
Water Take		0.00	0.20	0.30	0.00	0.033
4th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 600	Flow reading	619.0	619.5	619.8	620.0
Water Take		0.00	0.50	0.30	0.20	0.067
5th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 300	Flow reading	619.2	619.2	619.2	619.2
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	0.113	100.00	10.220	0.000	0.000	35.470	0.131	1.42E-08
2nd	0.020	200.00	20.440	0.000	0.000	45.690	0.018	1.95E-09
3rd	0.033	400.00	40.880	0.000	0.000	66.130	0.021	2.24E-09
4th	0.067	600.00	61.320	0.000	0.000	86.570	0.031	3.43E-09
5th	0.000	300.00	30.660	0.000	0.000	55.910	0.000	0.00E+00

*Where friction loss is assumed to be negligible.

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

IN-SITU PACKER PERMEABILITY TEST RESULT

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

BH No.: **303**
Test No.: **2**
Date: **15/12/2011**

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

Vertical depth to:
(below river bed)

Top of test section (m):	14.00
Base of test section (m):	16.50
Centre of test section(m):	15.25
Base of casing (m):	13.00
Ground water (m)	TIDAL

Depth of centre of test section (m):	15.25
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	807.0	807.4	807.6	807.6	Flow (l/min)
	Water Take	0.00	0.40	0.20	0.00	0.040
2nd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 200	Flow reading	810.0	810.5	810.7	810.9
Water Take		0.00	0.50	0.20	0.20	0.060
3rd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 400	Flow reading	812.3	812.5	812.7	812.8
Water Take		0.00	0.20	0.20	0.10	0.033
4th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 600	Flow reading	813.4	813.4	813.5	813.5
Water Take		0.00	0.00	0.10	0.00	0.007
5th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 300	Flow reading	811.6			
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	0.040	100.00	10.220	0.000	0.000	25.470	0.064	6.99E-09
2nd	0.060	200.00	20.440	0.000	0.000	35.690	0.069	7.48E-09
3rd	0.033	400.00	40.880	0.000	0.000	56.130	0.024	2.64E-09
4th	0.007	600.00	61.320	0.000	0.000	76.570	0.004	3.87E-10
5th	0.000	300.00	30.660	0.000	0.000	45.910	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 periods 4 & 5 - test ended