
APPENDIX C

Geotechnical Laboratory Results

Particle Size Distribution & Plasticity Index tests

**Mining &
Civil**

Geotest Pty Ltd

unit1/1 Pusey Road, Jandakot, WA 6164

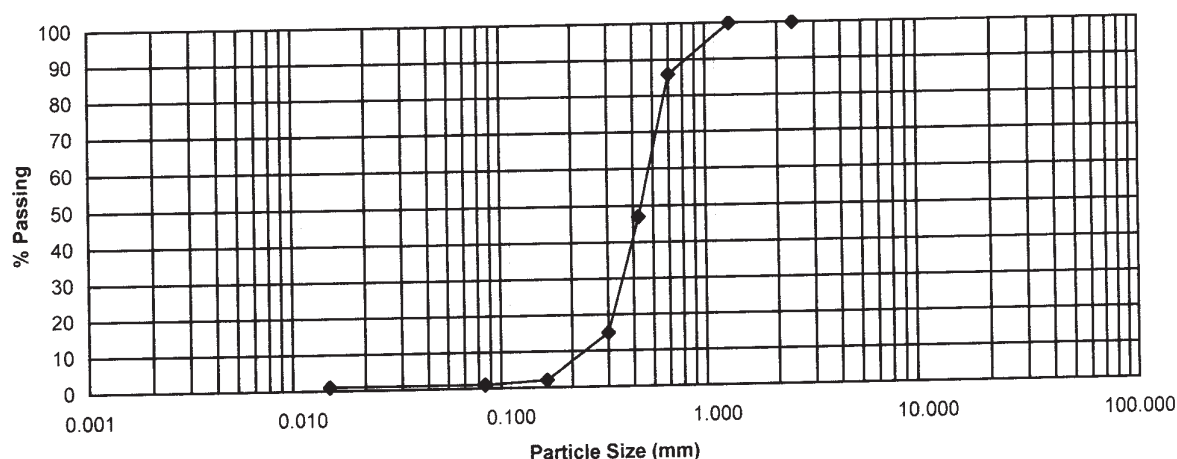
Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/823
Sample No: P08/823
Issue Date: 15 May 2008

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis

Sample Location: TP 1
Depth (m): 1.0



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	86
0.425	47
0.300	15
0.150	2
0.075	1
0.0135	1

Plasticity index tests
Australian Standard 1289
Liquid limit 3.1.1 na %
Plastic limit 3.2.1 %
Plasticity index 3.3.1 %
Linear shrinkage 3.4.1 %

Cracked ☐

Curled ☐

Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

**Mining &
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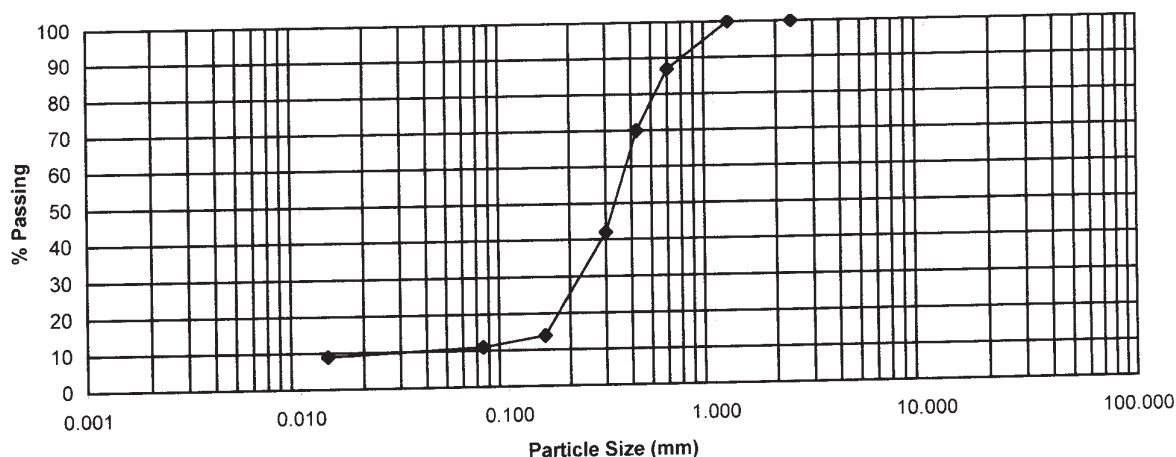
Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/824
Sample No: P08/824
Issue Date: 15 May 2008

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis

Sample Location: TP 5
Depth (m): 1.3



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	87
0.425	70
0.300	42
0.150	14
0.075	11
0.0135	9

Plasticity index tests Australian Standard 1289

Liquid limit 3.1.1	na %
Plastic limit 3.2.1	%
Plasticity index 3.3.1	%
Linear shrinkage 3.4.1	%

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Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

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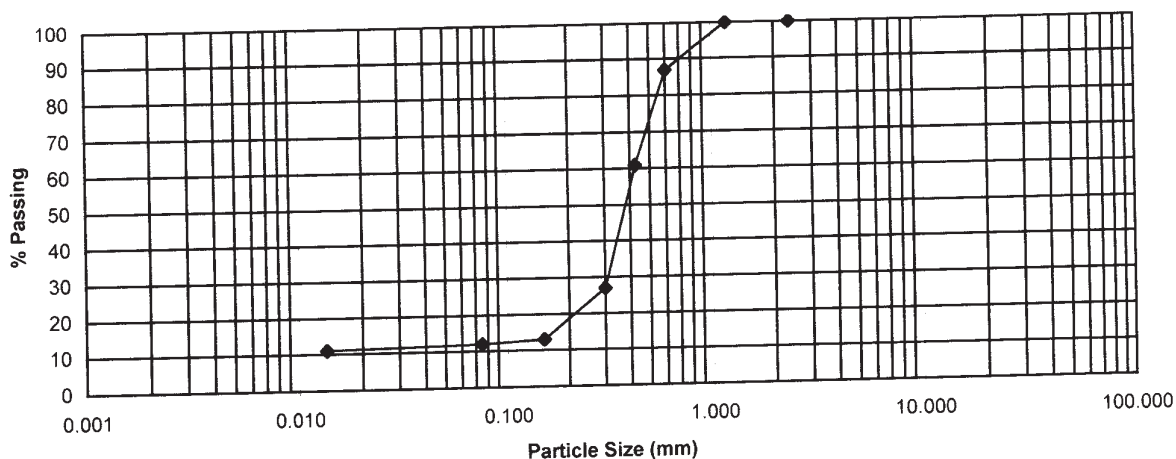
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Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/825
Sample No: P08/825
Issue Date: 15 May 2008
Sample Location: TP 9
Depth (m): 2.0

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	87
0.425	61
0.300	27
0.150	13
0.075	12
0.0135	11

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1 23 %

Plastic limit 3.2.1 15 %

Plasticity index 3.3.1 8 %

Linear shrinkage 3.4.1 2.5 %

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Particle Size Distribution & Plasticity Index tests

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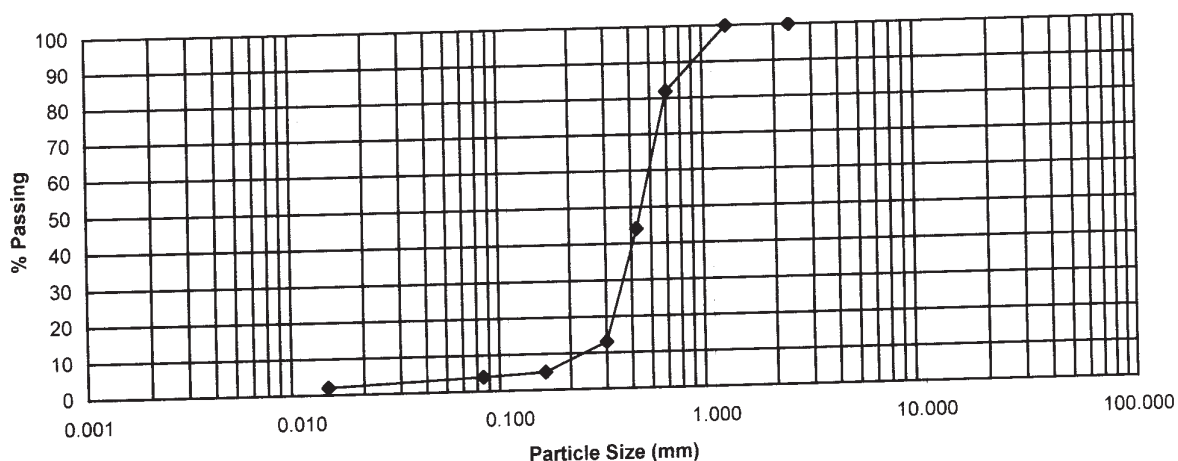
unit1/1 Pusey Road, Jandakot, WA 6164

Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Client: **Golden Asset Pty Ltd**
Project: **Lots 460 - 463 Baldivis Road**
Location: **Baldivis**

Job No: **60017**
Report No: **60017-PO8/826**
Sample No: **P08/826**
Issue Date: **15 May 2008**
Sample Location: **TP 12**
Depth (m): **1.5**



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	82
0.425	44
0.300	13
0.150	5
0.075	4
0.0135	2

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1 na %

Plastic limit 3.2.1 %

Plasticity index 3.3.1 %

Linear shrinkage 3.4.1 %

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Particle Size Distribution & Plasticity Index tests

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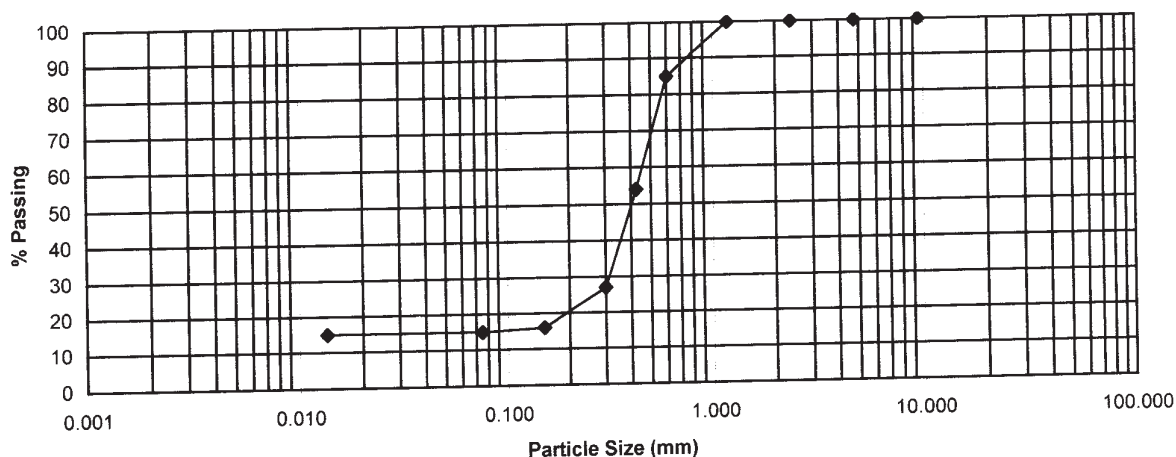
Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/827
Sample No: P08/827
Issue Date: 15 May 2008

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis

Sample Location: TP 15
Depth (m): 1.0



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	100
4.75	100
2.36	100
1.18	100
0.600	85
0.425	54
0.300	27
0.150	16
0.075	15
0.0135	15

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	40 %
Plastic limit 3.2.1	17 %
Plasticity index 3.3.1	23 %
Linear shrinkage 3.4.1	8.5 %

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Particle Size Distribution & Plasticity Index tests

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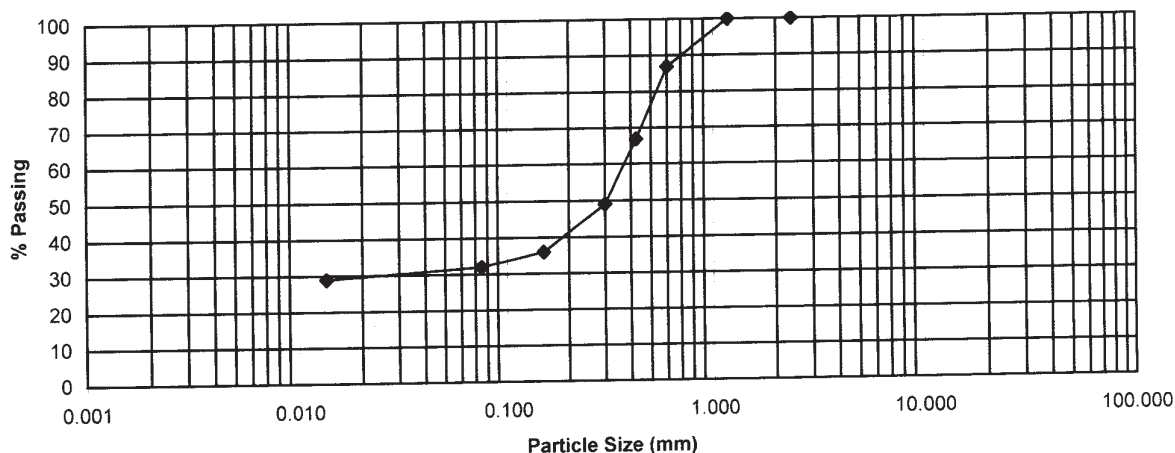
Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/828
Sample No: P08/828
Issue Date: 15 May 2008

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis

Sample Location: TP 16
Depth (m): 0.5



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	87
0.425	67
0.300	49
0.150	36
0.075	32
0.0135	29

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	58 %
Plastic limit 3.2.1	21 %
Plasticity index 3.3.1	37 %
Linear shrinkage 3.4.1	15.5 %

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Particle Size Distribution & Plasticity Index tests

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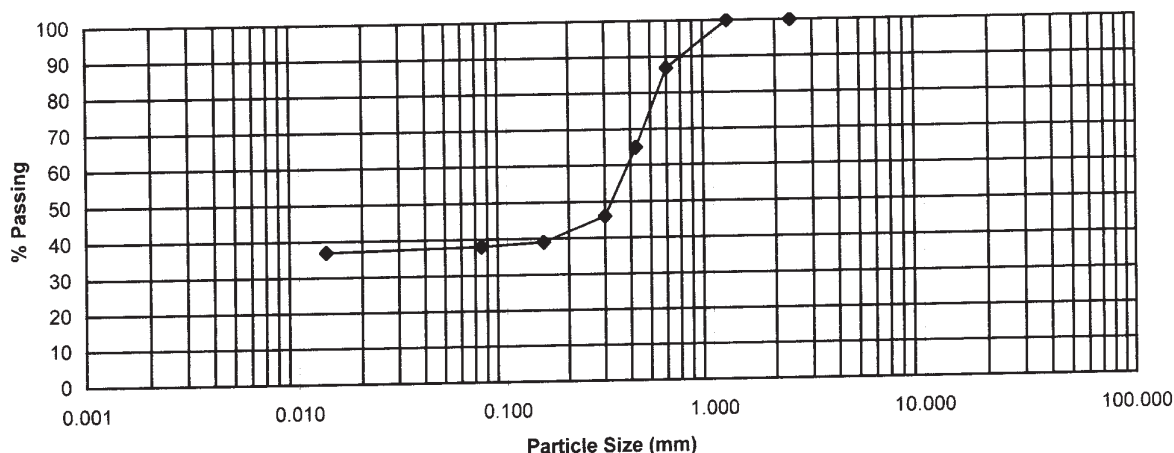
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Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/830
Sample No: P08/830
Issue Date: 15 May 2008

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis

Sample Location: TP 17
Depth (m): 2.0



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	87
0.425	65
0.300	46
0.150	39
0.075	38
0.0135	37

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	68 %
Plastic limit 3.2.1	18 %
Plasticity index 3.3.1	50 %
Linear shrinkage 3.4.1	22.0 %

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Particle Size Distribution & Plasticity Index tests

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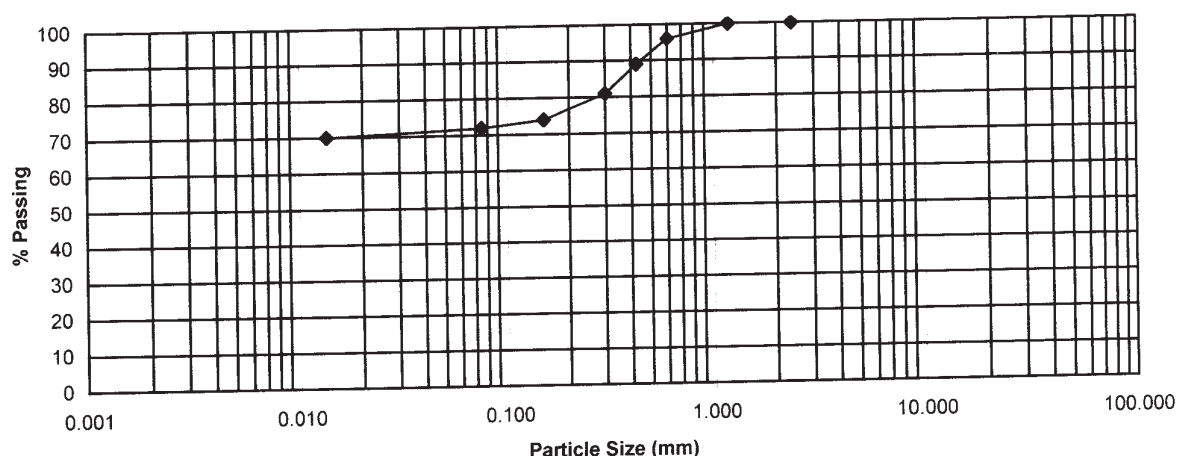
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Job No: 60017
Report No: 60017-PO8/831
Sample No: P08/831
Issue Date: 15 May 2008
Sample Location: TP 20
Depth (m): 0.3

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldvis Road
Location: Baldvis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	96
0.425	89
0.300	81
0.150	74
0.075	72
0.0135	70

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1 95 %

Plastic limit 3.2.1 26 %

Plasticity index 3.3.1 69 %

Linear shrinkage 3.4.1 21.0 %

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Particle Size Distribution & Plasticity Index tests

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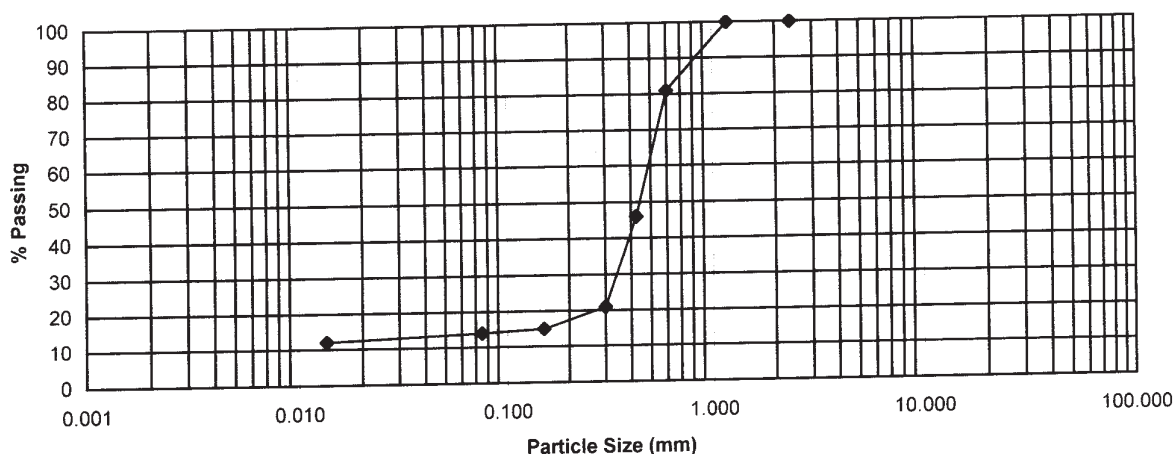
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Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/832
Sample No: P08/832
Issue Date: 15 May 2008

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis

Sample Location TP 21
Depth (m) 0.5



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	81
0.425	46
0.300	21
0.150	15
0.075	14
0.0135	12

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1 39 %

Plastic limit 3.2.1 14 %

Plasticity index 3.3.1 25 %

Linear shrinkage 3.4.1 9.0 %

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Particle Size Distribution & Plasticity Index tests

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Email: kevin@mcgeotest.com.au

Job No: 60017

Report No: 60017-PO8/833

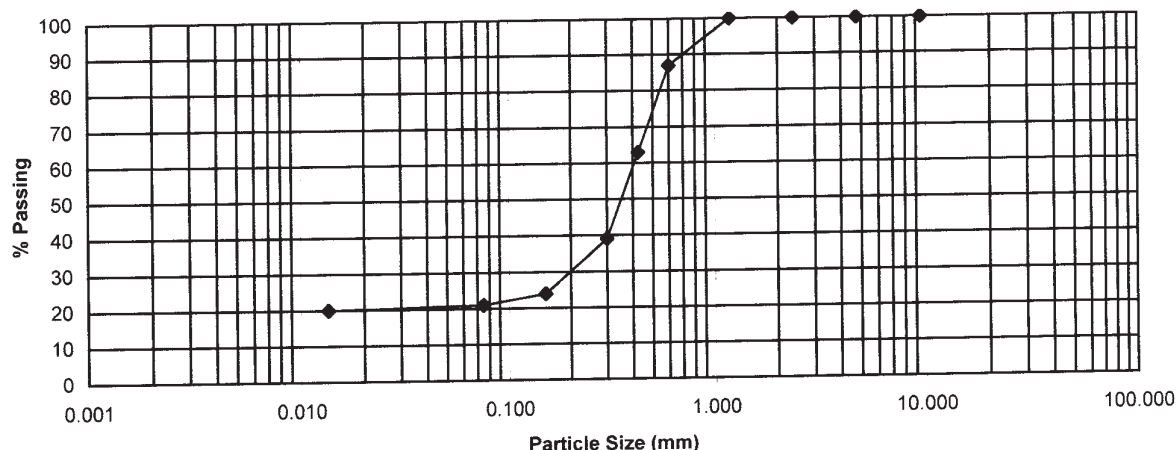
Sample No: P08/833

Issue Date: 15 May 2008

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis

Sample Location: TP 26

Depth (m): 1.0



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	100
4.75	100
2.36	100
1.18	100
0.600	87
0.425	63
0.300	39
0.150	24
0.075	21
0.0135	20

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1 47 %

Plastic limit 3.2.1 17 %

Plasticity index 3.3.1 30 %

Linear shrinkage 3.4.1 9.5 %

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Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

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Email: kevin@mcgeotest.com.au

Job No: 60017

Report No: 60017-PO8/834

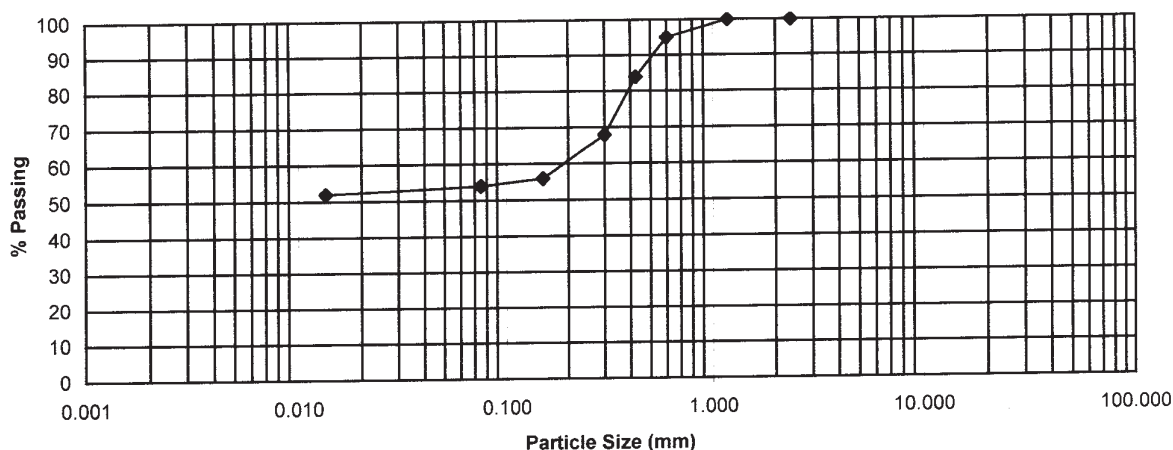
Sample No: P08/834

Issue Date: 15 May 2008

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis

Sample Location: TP 28

Depth (m): 0.3



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	95
0.425	84
0.300	68
0.150	56
0.075	54
0.0135	52

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	65 %
Plastic limit 3.2.1	17 %
Plasticity index 3.3.1	48 %
Linear shrinkage 3.4.1	14.5 %

Cracked ☐

Curled ☒

Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

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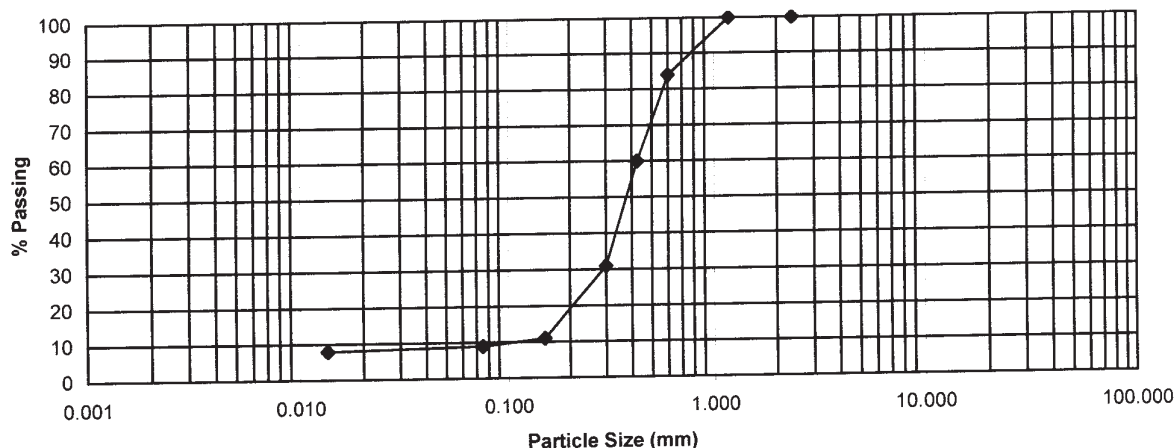
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Job No: 60017
Report No: 60017-PO8/835
Sample No: P08/835
Issue Date: 15 May 2008
Sample Location: TP 30
Depth (m): 1.5

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	84
0.425	60
0.300	31
0.150	11
0.075	9
0.0135	8

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	21 %
Plastic limit 3.2.1	18 %
Plasticity index 3.3.1	3 %
Linear shrinkage 3.4.1	0.0 %

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Particle Size Distribution & Plasticity Index tests

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Job No: 60017

Report No: 60017-PO8/836

Sample No: P08/836

Issue Date: 15 May 2008

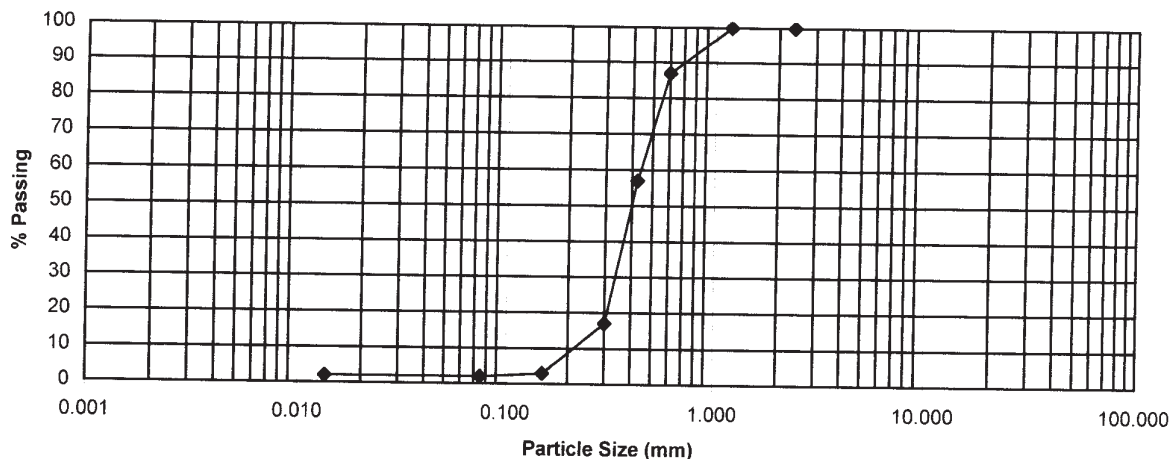
Client: Golden Asset Pty Ltd

Project: Lots 460 - 463 Baldivis Road

Location: Baldivis

Sample Location: TP 36

Depth (m): 1.5



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	87
0.425	57
0.300	17
0.150	3
0.075	2
0.0135	2

SIC = Slipped in cup

NP = Non Plastic

*Non standard test as liquid limit not determined.

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	SIC %
Plastic limit 3.2.1	NP %
Plasticity index 3.3.1	NP %
Linear shrinkage 3.4.1	0.0* %

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Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

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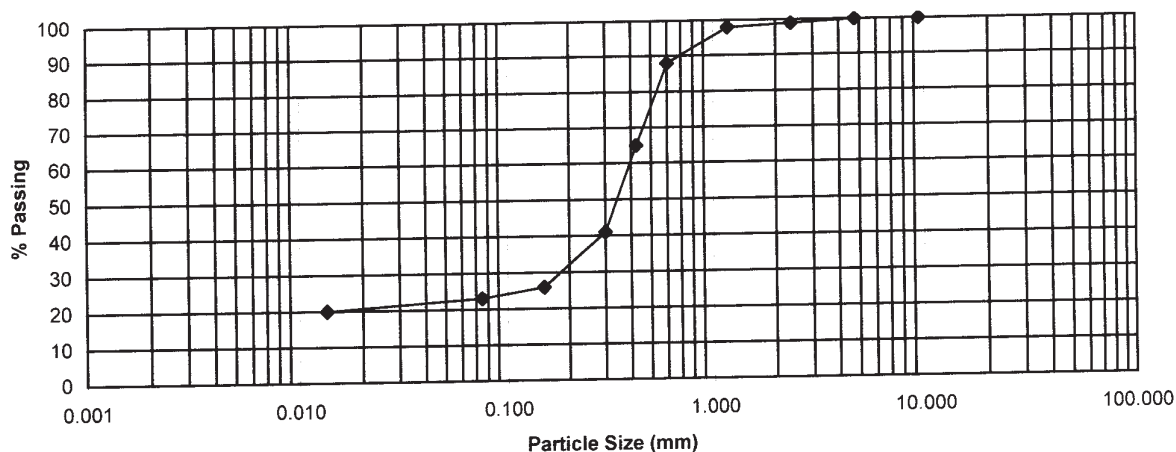
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Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/837
Sample No: P08/837
Issue Date: 15 May 2008
Sample Location: TP 50
Depth (m): 0.2

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	100
4.75	100
2.36	99
1.18	98
0.600	88
0.425	65
0.300	41
0.150	26
0.075	23
0.0135	20

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	44 %
Plastic limit 3.2.1	15 %
Plasticity index 3.3.1	29 %
Linear shrinkage 3.4.1	12.0 %

Cracked ☐

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Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

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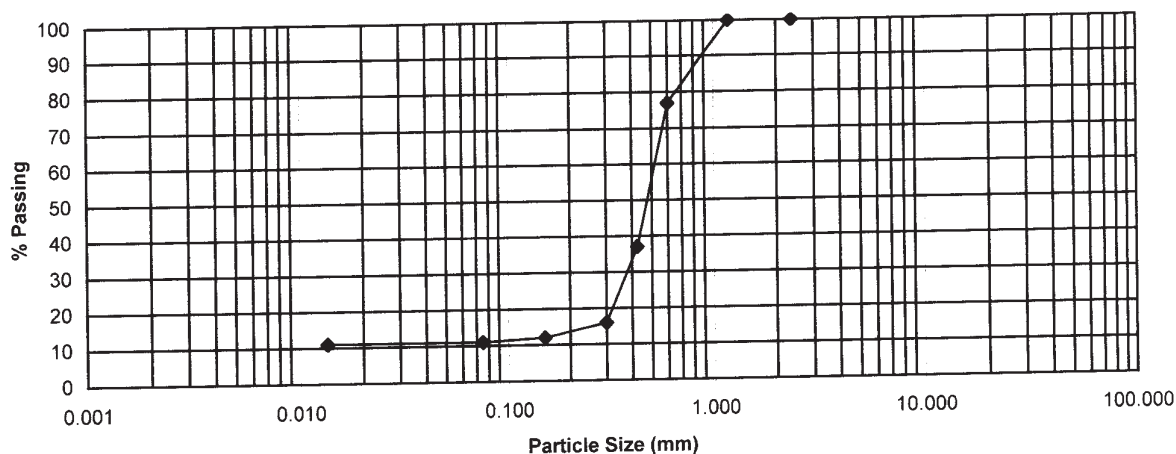
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Job No: 60017
Report No: 60017-PO8/838
Sample No: P08/838
Issue Date: 15 May 2008
Sample Location: TP 55
Depth (m): 1.5

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	77
0.425	37
0.300	16
0.150	12
0.075	11
0.0135	11

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	29 %
Plastic limit 3.2.1	13 %
Plasticity index 3.3.1	16 %
Linear shrinkage 3.4.1	7.0 %

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Particle Size Distribution & Plasticity Index tests

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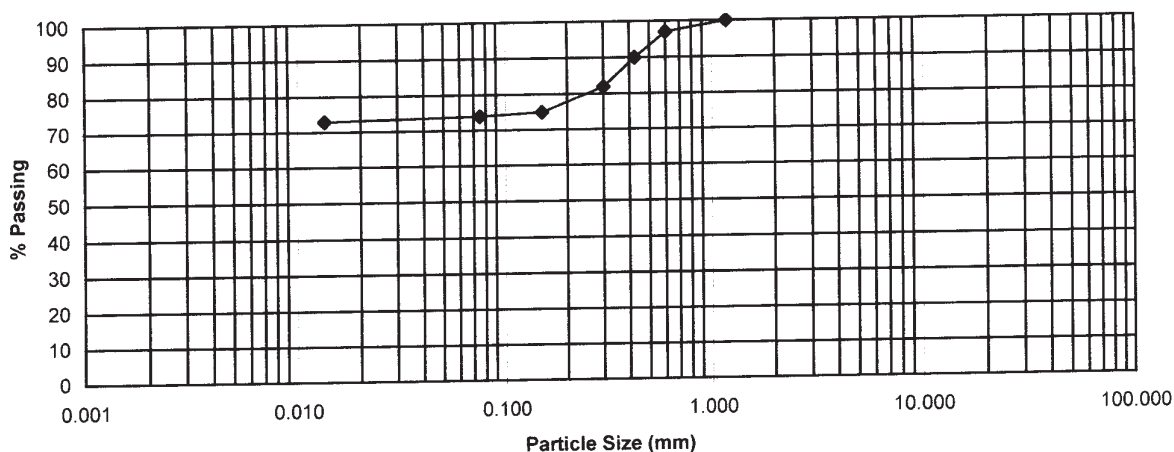
unit1/1 Pusey Road, Jandakot, WA 6164

Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/839
Sample No: P08/839
Issue Date: 15 May 2008
Sample Location: TP 58
Depth (m): 0.3

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100
0.600	97
0.425	90
0.300	82
0.150	75
0.075	74
0.0135	73

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	92 %
Plastic limit 3.2.1	24 %
Plasticity index 3.3.1	68 %
Linear shrinkage 3.4.1	21.0 %

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Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

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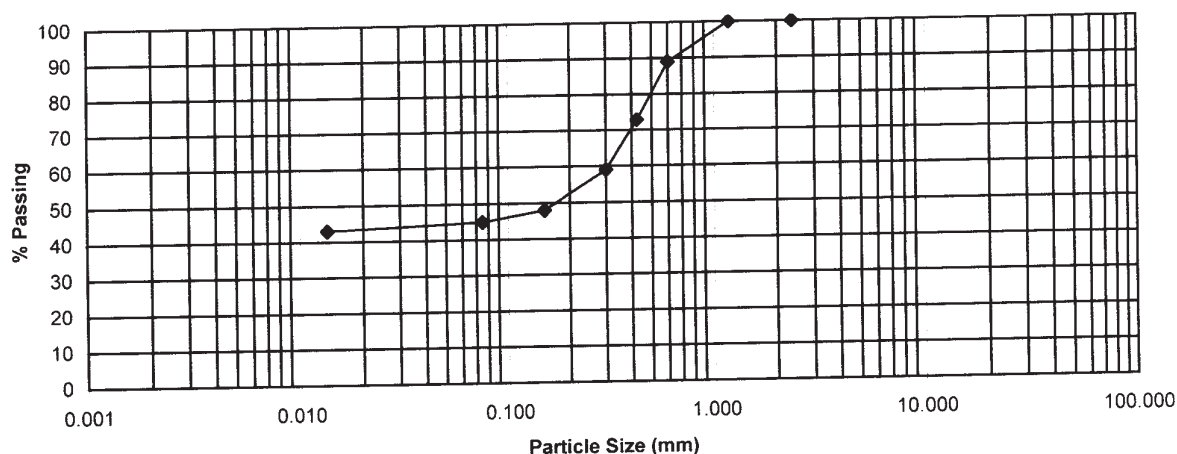
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Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/842
Sample No: P08/842
Issue Date: 15 May 2008
Sample Location TP 70
Depth (m) 0.5

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	89
0.425	73
0.300	59
0.150	48
0.075	45
0.0135	43

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	71 %
Plastic limit 3.2.1	19 %
Plasticity index 3.3.1	52 %
Linear shrinkage 3.4.1	18.0 %

Cracked ☐

Curled ☒

Sampling Procedure: Tested as received



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Kevin M Jones
Kevin M Jones

Particle Size Distribution & Plasticity Index tests

**Mining &
Civil**

Geotest Pty Ltd

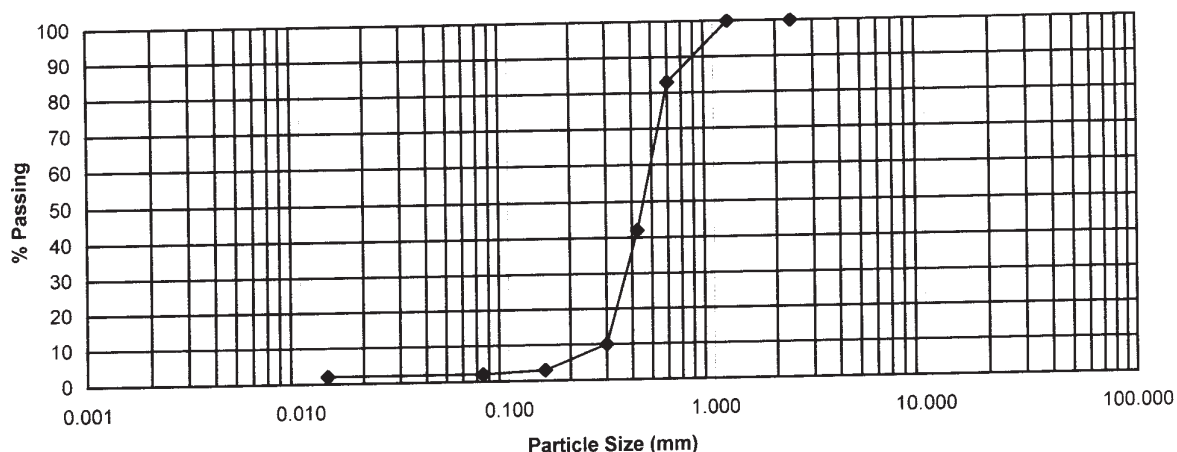
unit1/1 Pusey Road, Jandakot, WA 6164

Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/843
Sample No: P08/843
Issue Date: 15 May 2008
Sample Location: TP 73
Depth (m): 1.0

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	83
0.425	42
0.300	10
0.150	3
0.075	2
0.0135	2

SIC = Slipped in cup

NP = Non Plastic

*Non standard test as liquid limit not determined.

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	SIC %
Plastic limit 3.2.1	NP %
Plasticity index 3.3.1	NP %
Linear shrinkage 3.4.1	0.0* %

Cracked ☐

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Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

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Civil**

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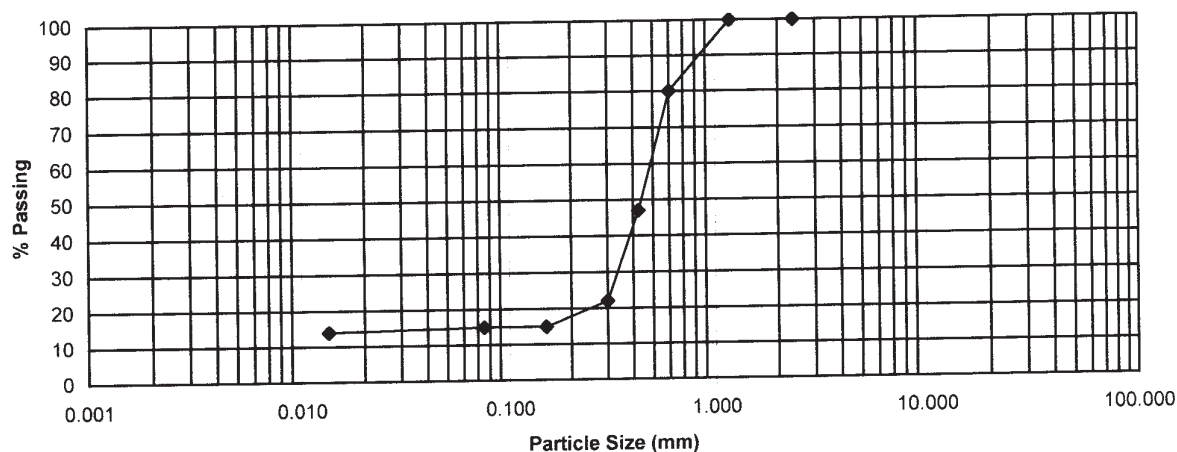
unit1/1 Pusey Road, Jandakot, WA 6164

Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/844
Sample No: P08/844
Issue Date: 15 May 2008
Sample Location: TP 74
Depth (m): 1.5

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	80
0.425	47
0.300	22
0.150	15
0.075	15
0.0135	14

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	38 %
Plastic limit 3.2.1	14 %
Plasticity index 3.3.1	24 %
Linear shrinkage 3.4.1	9.5 %

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Curled ☐

Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

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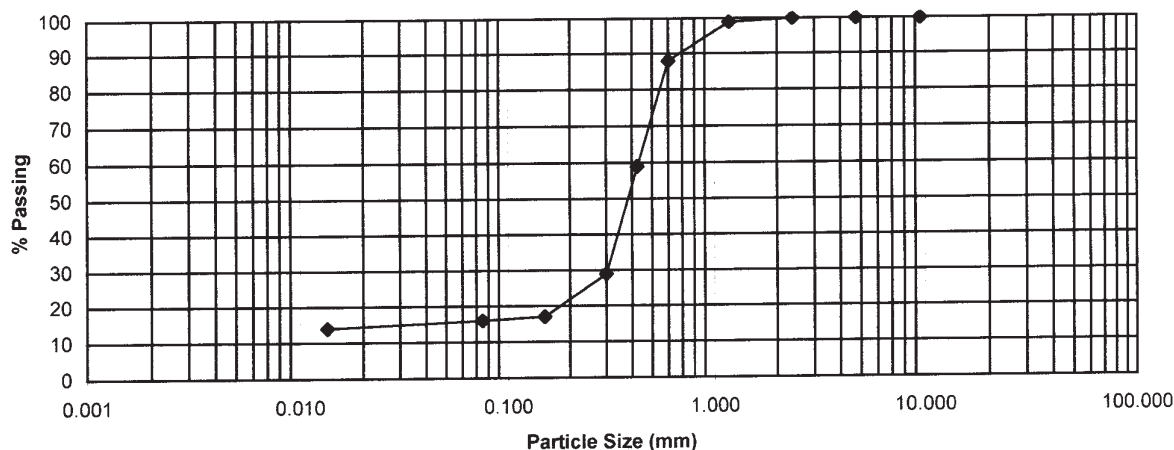
unit1/1 Pusey Road, Jandakot, WA 6164

Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017
Report No: 60017-PO8/845
Sample No: P08/845
Issue Date: 15 May 2008
Sample Location: TP 76
Depth (m): 0.2

Client: Golden Asset Pty Ltd
Project: Lots 460 - 463 Baldivis Road
Location: Baldivis



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	100
4.75	100
2.36	100
1.18	99
0.600	88
0.425	59
0.300	29
0.150	17
0.075	16
0.0135	14

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	33 %
Plastic limit 3.2.1	14 %
Plasticity index 3.3.1	19 %
Linear shrinkage 3.4.1	7.0 %

Cracked ☐

Curled ☐

Sampling Procedure: Tested as received



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Particle Size Distribution & Plasticity Index tests

Mining &

Civil

Geotest Pty Ltd

unit1/1 Pusey Road, Jandakot, WA 6164

Ph (08) 9414 8022 Fax (08) 9414 8011

Email: kevin@mcgeotest.com.au

Job No: 60017

Report No: 60017-PO8/846

Sample No: P08/846

Issue Date: 15 May 2008

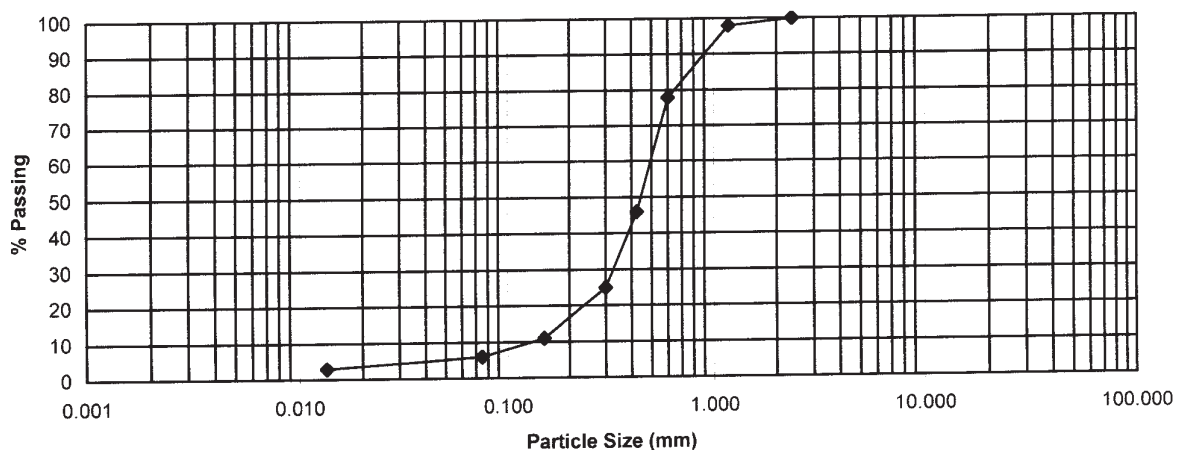
Client: Golden Asset Pty Ltd

Project: Lots 460 - 463 Baldivis Road

Location: Baldivis

Sample Location: TP 75

Depth (m): 0.5



SIEVE ANALYSIS WA 115.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	98
0.600	78
0.425	46
0.300	25
0.150	11
0.075	6
0.0135	3

SIC = Slipped in cup

NP = Non Plastic

*Non standard test as liquid limit not determined.

Plasticity index tests

Australian Standard 1289

Liquid limit 3.1.1	SIC %
Plastic limit 3.2.1	NP %
Plasticity index 3.3.1	NP %
Linear shrinkage 3.4.1	1.5* %

Cracked ☐

Curled ☐

Sampling Procedure: Tested as received



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Kevin M Jones
Kevin M Jones

**Mining &
Civil
Geotest Pty Ltd**

**Organic content of Soils
ASTM: D 2974-07a
Test Method C**

Ph (08) 9414 8022 Fax (08) 9414 8011

Email kevin@mcgeotest.com.au

Unit 1/1 Pusey Road, JANDAKOT WA 6164

Job No: 60017

Report No: 60017-P08/841 & 845

Date of issue: 15 MAY 2008

Client: Golden Asset Pty Ltd
Lots 460 - 463 Baldivis Road
Project Baldivis

Date tested: 7 May 2008
Tested by: S Sandilands
Checked: K M Jones

Sample Number	Location and depth (m)	Ash content %	Organic content %
P08/841	TP 65, 0.5	98.1	1.9
P08/845	TP 76, 0.2	99.2	0.8
Samples oven dried prior to test Furnace temperature 440 ^o c			

testr.xls - Sept 2006

Authorised Signature  Kevin M Jones

Table D-1 – Summary of Screening and Chromium Suite Results

Test Pit	Sample ID	Depth (m)	Soil Type	Screening Tests ¹			Chromium Suite of Results							
				pH _F	pH _{FOX}	RxN Strength	Δ ² pH	pH _{KCl}	TAA ³ (%S)	S _{CR} ⁴ (%S)	NASS ⁵ (%S)	ANC ⁶ (%S)	Net ⁷ Acidity (%S)	
Assessment Criteria				<4	<3		>1							>0.03
TP2	1	0.5	SAND – dark grey	6.1	5.5	Slight	0.6	-	-	-	-	-	-	-
TP2	2	1	SAND - grey	5.9	5.5	Slight	0.4	7.0	<0.02	<0.02	NR	<0.01	<0.02	<0.02
TP2	3	1.5	SAND – grey	6.1	5.5	Slight	0.6	-	-	-	-	-	-	-
TP2	4	2	SAND – grey	6.1	5.4	Slight	0.7	6.4	<0.02	<0.02	NR	NR	<0.02	<0.02
TP2	5	2.5	CEMENTED SAND – dark brown	6.1	4.8	Slight	1.3	-	-	-	-	-	-	-
TP6	6	0.5	SAND – grey-brown	6.4	5.5	Slight	0.9	7.6	<0.02	<0.02	NR	0.12	<0.02	<0.02
TP6	7	1	SAND – dark grey	6.9	5.2	Slight	1.7	-	-	-	-	-	-	-
TP6	8	1.5	SAND – dark grey	6.8	3.6	Slight	3.2	-	-	-	-	-	-	-
TP6	9	2	SAND – dark grey	6.6	2.3	Slight	4.3	6.2	<0.02	<0.02	NR	NR	<0.02	<0.02
TP6	10	2.5	SAND – dark grey	6.7	4.8	Slight	1.9	-	-	-	-	-	-	-
TP10	11	0.5	SAND – grey-brown	6.5	5.2	Slight	1.3	-	-	-	-	-	-	-
TP10	12	1	SAND – dark grey-brown	6.4	1.8	Slight	4.6	5.5	<0.02	0.15	NR	NR	0.16	0.16
TP10	13	1.5	SAND – dark grey-brown	6.3	2.0	Moderate	4.3	-	-	-	-	-	-	-
TP10	14	2	SAND – dark grey-brown	6.8	3.5	Slight	3.3	6.0	<0.02	0.04	NR	NR	0.04	0.04
TP14	15	0.5	SAND – grey-brown	6.8	5.2	Slight	1.6	-	-	-	-	-	-	-
TP14	16	1	SAND – brown	7.5	5.5	Slight	2	6.4	<0.02	<0.02	NR	NR	<0.02	<0.02
TP14	17	1.5	SAND – grey	8.0	5.6	Slight	2.4	-	-	-	-	-	-	-
TP14	18	2	SAND – grey	8.1	5.6	Slight	2.5	-	-	-	-	-	-	-
TP14	19	2.5	SAND – dark grey	7.9	5.6	Slight	2.3	-	-	-	-	-	-	-
TP14	20	3	SAND – dark grey	7.5	3.0	Slight	4.5	6.1	<0.02	0.07	NR	NR	0.07	0.07
TP18	22	0.5	SANDY CLAY – grey-brown	6.2	4.9	Slight	1.3	-	-	-	-	-	-	-
TP18	23	1	SANDY CLAY – grey-brown	6.4	5.1	Slight	1.3	6.2	<0.02	<0.02	NR	NR	<0.02	<0.02
TP18	24	1.5	CLAYEY SAND – grey-brown	6.9	5.4	Slight	1.5	-	-	-	-	-	-	-

Test Pit	Sample ID	Depth (m)	Soil Type	Screening Tests ¹				Chromium Suite of Results					
				pH _F	pH _{FOX}	RxN Strength	Δ ² pH	pH _{KCl}	TAA ³ (%S)	S _{CR} ⁴ (%S)	NASS ⁵ (%S)	ANC ⁶ (%S)	Net ⁷ Acidity (%S)
Assessment Criteria				<4	<3		>1						>0.03
TP18	25	2	CLAYEY SAND – grey-brown	7.2	5.0	Slight	2.2	-	-	-	-	-	-
TP18	26	2.5	CLAYEY SAND – grey-brown	6.9	5.4	Slight	1.5	-	-	-	-	-	-
TP18	27	3	CLAYEY SAND – grey-brown	7.4	5.4	Slight	2	6.3	<0.02	<0.02	NR	NR	<0.02
TP26	40	0.5	CLAYEY SAND - brown	6.8	5.6	Slight	1.2	6.6	<0.02	<0.02	NR	0.55	<0.02
TP26	41	1	CLAYEY SAND – brown	6.9	5.5	Slight	1.4	-	-	-	-	-	-
TP26	42	1.5	CLAYEY SAND – brown	6.9	5.7	Slight	1.2	-	-	-	-	-	-
TP26	43	2	CLAYEY SAND – green-brown	8.0	5.8	Slight	2.2	-	-	-	-	-	-
TP26	44	2.5	CLAYEY SAND – green-brown	8.1	4.0	Slight	4.1	-	-	-	-	-	-
TP26	45	3	CLAYEY SAND – green-brown	8.1	3.7	Slight	4.4	6.3	<0.02	0.03	NR	NR	0.03
TP28	46	0.5	SAND – dark brown	6.7	5.3	Slight	1.4	5.9	<0.02	<0.02	NR	NR	<0.02
TP28	47	1	SAND – dark brown	6.8	5.4	Slight	1.4	-	-	-	-	-	-
TP28	48	1.5	SAND – dark brown	6.5	5.4	Slight	1.1	-	-	-	-	-	-
TP28	49	2	CLAYEY SAND - grey	7.0	5.5	Slight	1.5	6.0	<0.02	<0.02	NR	NR	<0.02
TP28	50	2.5	CLAYEY SAND – grey	7.1	5.7	Slight	1.4	-	-	-	-	-	-
TP28	51	3	CLAYEY SAND – grey	7.1	5.5	Slight	1.6	-	-	-	-	-	-
TP31	52	0.5	CLAYEY SAND – brown	7.3	5.7	Slight	1.6	-	-	-	-	-	-
TP31	53	1	SAND - grey	7.3	5.6	Slight	1.7	-	-	-	-	-	-
TP31	54	1.5	SAND – grey	7.9	5.4	Slight	2.5	6.8	<0.02	0.02	NR	0.30	0.02
TP31	55	2	SAND – grey	7.7	5.4	Slight	2.3	-	-	-	-	-	-
TP31	56	2.5	SAND - brown	7.5	4.7	Slight	2.8	-	-	-	-	-	-
TP31	57	3	SAND – brown	7.8	2.2	Moderate	5.6	5.8	<0.02	0.07	NR	NR	0.07
TP35	58	0.5	SAND – yellow-brown	7.7	4.4	Slight	3.3	-	-	-	-	-	-
TP35	59	1	SAND - grey	7.4	2.1	Strong	5.3	5.5	<0.02	0.04	NR	NR	0.04
TP35	60	1.5	SAND – grey	7.4	3.1	Slight	4.3	-	-	-	-	-	-
TP35	61	2	SAND – grey	7.6	4.6	Slight	3	6.2	<0.02	<0.02	NR	NR	0.02

Test Pit	Sample ID	Depth (m)	Soil Type	Screening Tests ¹				Chromium Suite of Results						
				pH _F	pH _{FOX}	RxN Strength	Δ ² pH	pH _{KCl}	TAA ³ (%S)	S _{CR} ⁴ (%S)	NASS ⁵ (%S)	ANC ⁶ (%S)	Net ⁷ Acidity (%S)	
Assessment Criteria				<4	<3		>1							>0.03
TP39	64	0.5	SAND – yellow-brown	7.5	5.2	Slight	2.3	6.5	<0.02	<0.02	NR	0.12	<0.02	
TP39	65	1	SAND – yellow-brown	7.4	5.2	Slight	2.2	6.4	<0.02	<0.02	NR	NR	<0.02	
TP43	66	0.5	SAND – off-white	7.3	5.2	Slight	2.1	-	-	-	-	-	-	
TP43	67	1	SAND – off-white	7.3	5.1	Slight	2.2	6.0	<0.02	<0.02	NR	NR	<0.02	
TP43	68	1.5	SAND – off-white	7.2	3.7	Slight	3.5	-	-	-	-	-	-	
TP43	69	2	SAND- brown	7.0	2.7	Moderate	4.3	5.6	<0.02	0.03	NR	NR	0.03	
TP47	70	0.5	SAND – off-white	7.4	5.1	Slight	2.3	-	-	-	-	-	-	
TP47	71	1	SAND – brown	7.2	3.6	Slight	3.6	6.3	<0.02	<0.02	NR	NR	<0.02	
TP47	72	1.5	SAND – brown	7.4	3.6	Slight	3.8	-	-	-	-	-	-	
TP47	73	2	SAND – light brown	7.3	3.9	Slight	3.4	5.9	<0.02	<0.02	NR	NR	<0.02	
TP51	74	0.5	CLAYEY SAND – dark brown	7.6	5.2	Slight	2.4	-	-	-	-	-	-	
TP51	75	1	CLAYEY SAND – dark brown	6.7	5.3	Slight	1.4	-	-	-	-	-	-	
TP51	76	1.5	CLAYEY SAND – dark grey-brown	7.2	5.3	Slight	1.9	-	-	-	-	-	-	
TP51	77	2	CLAYEY SAND – dark grey-brown	7.7	2.5	Extreme	5.2	5.9	<0.02	0.04	NR	NR	0.04	
TP51	78	2.5	CLAYEY SAND – dark grey-brown	7.9	4.7	Slight	3.2	-	-	-	-	-	-	
TP51	79	3	CLAYEY SAND – dark grey-brown	7.9	1.7	Slight	6.2	5.7	<0.02	0.08	NR	NR	0.09	
TP55	80	0.5	SAND - grey	7.9	5.1	Slight	2.8	-	-	-	-	-	-	
TP55	81	1	SAND – grey	8.1	4.6	Slight	3.5	5.9	<0.02	<0.02	NR	NR	<0.02	
TP55	82	1.5	SAND – grey	8.5	5.2	Slight	3.3	-	-	-	-	-	-	
TP55	83	2	CLAYEY SAND – grey-brown	8.0	4.8	Slight	3.2	-	-	-	-	-	-	
TP55	84	2.5	CLAYEY SAND – grey-brown	7.9	5.2	Slight	2.7	-	-	-	-	-	-	
TP55	85	3	CLAYEY SAND – grey-brown	7.9	3.7	Moderate	4.2	6.0	<0.02	<0.02	NR	NR	<0.02	
TP61	86	0.5	SAND – yellow-brown	7.1	5.2	Slight	1.9	-	-	-	-	-	-	

Test Pit	Sample ID	Depth (m)	Soil Type	Screening Tests ¹			Chromium Suite of Results							
				pH _F	pH _{FOX}	RxN Strength	Δ ² pH	pH _{KCl}	TAA ³ (%S)	S _{CR} ⁴ (%S)	NASS ⁵ (%S)	ANC ⁶ (%S)	Net ⁷ Acidity (%S)	
Assessment Criteria				<4	<3		>1							>0.03
TP61	87	1	SAND – yellow-brown	7.3	5.3	Slight	2	-	-	-	-	-	-	-
TP61	88	1.5	SAND – grey	8.3	2.7	Strong	5.6	6.1	<0.02	0.03	NR	NR	NR	0.03
TP61	89	2	SAND – grey	8.4	2.4	Strong	6	-	-	-	-	-	-	-
TP61	90	2.5	SAND – grey	8.0	1.5	Moderate	6.5	5.8	<0.02	0.03	NR	NR	NR	0.04
TP61	91	3	CEMENTED SAND – brown	7.7	2.2	Moderate	5.5	5.8	<0.02	0.10	NR	NR	NR	0.10
TP64	92	0.5	CLAYEY SAND – grey to yellow-brown	6.6	4.5	Slight	2.1	-	-	-	-	-	-	-
TP64	93	1	CLAYEY SAND – grey to yellow-brown	6.2	4.1	Slight	2.1	5.1	0.03	<0.02	NR	NR	NR	0.03
TP64	94	1.5	CLAYEY SAND – grey to yellow-brown	5.9	4.4	Slight	1.5	-	-	-	-	-	-	-
TP64	95	2	CLAYEY SAND – grey to yellow-brown	7.6	2.7	Slight	4.9	5.9	<0.02	0.02	NR	NR	NR	0.03
TP68	96	0.5	SAND - brown	7.5	3.9	Slight	3.6	-	-	-	-	-	-	-
TP68	97	1	SAND – brown	7.5	4.1	Slight	3.4	-	-	-	-	-	-	-
TP68	98	1.5	SAND – brown	7.2	2.1	Slight	5.1	5.7	<0.02	0.06	NR	NR	NR	0.06
TP68	99	2	CEMENTED SAND – dark brown	7.5	4.2	Slight	3.3	5.8	<0.02	0.03	NR	NR	NR	0.04
TP75	100	0.5	SAND - grey	6.8	5.0	Slight	1.8	5.7	<0.02	<0.02	NR	NR	NR	<0.02
TP75	101	1	SAND – grey-brown	7.3	5.2	Slight	2.1	-	-	-	-	-	-	-
TP75	102	1.5	SAND – grey-brown	7.3	5.5	Slight	1.8	-	-	-	-	-	-	-
TP75	103	2	SAND – grey-brown	7.8	5.5	Slight	2.3	-	-	-	-	-	-	-
TP75	104	2.5	SAND - brown	7.2	2.4	Strong	4.8	-	-	-	-	-	-	-
TP75	105	3	SAND – brown	7.2	1.7	Strong	5.5	5.8	<0.02	0.06	NR	NR	NR	0.06
TP80	106	0.5	SAND - brown	6.2	4.9	Slight	1.3	-	-	-	-	-	-	-
TP80	107	1	SAND – brown	6.1	5.2	Slight	0.9	-	-	-	-	-	-	-
TP80	108	1.5	SAND – brown	6.1	5.1	Slight	1.0	5.9	<0.02	<0.02	NR	NR	NR	<0.02

Test Pit	Sample ID	Depth (m)	Soil Type	Screening Tests ¹			Chromium Suite of Results							
				pH _F	pH _{FOX}	RxN Strength	Δ ² pH	pH _{KCl}	TAA ³ (%S)	S _{CR} ⁴ (%S)	NASS ⁵ (%S)	ANC ⁶ (%S)	Net ⁷ Acidity (%S)	
Assessment Criteria				<4	<3		>1							>0.03
TP80	109	2	SAND – grey	6.8	5.0	Slight	1.8	-	-	-	-	-	-	-
TP80	110	2.5	SAND – dark grey	6.6	5.3	Slight	1.3	6.2	<0.02	<0.02	NR	NR	<0.02	<0.02
TP80	111	3	SAND – dark grey	6.2	4.4	Moderate	1.8	-	-	-	-	-	-	-

Notes:

- Screening Tests undertaken by ALS Laboratory Group
 - Δ pH** – pH_F - pH_{FOX}
 - TAA – titratable actual acidity
 - Scr – chromium reducible sulfur
 - N_{RASS} – retained acidity (reported for pH_{KCL} < 4.5)
 - ANC – acid neutralising capacity (reported for pH_{KCl} > 6.5).
 - Net Acidity = TAA + Scr + NASS – ANC/FF
- NR Not Reported
 - Sample not selected for analysis.



Environmental Division

SAMPLE RECEIPT NOTIFICATION (SRN)
Comprehensive Report

Work Order : **EP0802287**

Client : **DOUGLAS PARTNERS PTY LTD**
Contact : **MR ROBERT SHAPLAND**
Address : **36 O'MALLEY STREET**
OSBORNE PARK WA 6017

E-mail : **shaplandr@douglaspartners.com.au**
Telephone : **+61 08 9204 3511**
Facsimile : **+61 08 9204 3522**

Project : **46751**
Order number : **74406**
C-O-C number : **----**

Site : **----**
Sampler : **----**

Laboratory : **Environmental Division Perth**
Contact : **Michael Sharp**
Address : **10 Hod Way Malaga WA Australia 6090**

E-mail : **michael.sharp@alsenviro.com**
Telephone : **+61-8-9209 7655**
Facsimile : **+61-8-9209 7600**

Page : **1 of 4**

Quote number : **EP2008DOUPARWA0084 (EN-020-08 BQ)**

QC Level : **NEPM 1999 Schedule B(3) and ALS QCS3 requirement**

Dates

Date Samples Received : **28-APR-2008**
Client Requested Due Date : **30-APR-2008**

Issue Date : **30-APR-2008 10:55**
Scheduled Reporting Date : **30-APR-2008**

Delivery Details

Mode of Delivery : **Carrier**
No. of coolers/boxes : **2 Large**
Security Seal : **Not intact.**

Temperature : **Chilled**
No. of samples received : **99**
No. of samples analysed : **97**

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Requested Deliverables
- Samples received in appropriately pretreated and preserved containers.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Recommended holding times exceeded during transit, ASS samples must be received within 24hrs of sampling unless frozen.
- **Samples received in appropriately pretreated and preserved containers.**
- **Samples 62 and 63 were not received by lab, client has been notified.**
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of Work Order.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exist.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis
EP0802287-001	27-MAR-2008 15:00	1		✓
EP0802287-002	27-MAR-2008 15:00	2		✓
EP0802287-003	27-MAR-2008 15:00	3		✓
EP0802287-004	27-MAR-2008 15:00	4		✓
EP0802287-005	27-MAR-2008 15:00	5		✓
EP0802287-006	27-MAR-2008 15:00	6		✓
EP0802287-007	27-MAR-2008 15:00	7		✓
EP0802287-008	27-MAR-2008 15:00	8		✓
EP0802287-009	27-MAR-2008 15:00	9		✓
EP0802287-010	27-MAR-2008 15:00	10		✓
EP0802287-011	27-MAR-2008 15:00	11		✓
EP0802287-012	27-MAR-2008 15:00	12		✓
EP0802287-013	27-MAR-2008 15:00	13		✓
EP0802287-014	27-MAR-2008 15:00	14		✓
EP0802287-015	27-MAR-2008 15:00	15		✓
EP0802287-016	27-MAR-2008 15:00	16		✓
EP0802287-017	27-MAR-2008 15:00	17		✓
EP0802287-018	27-MAR-2008 15:00	18		✓
EP0802287-019	27-MAR-2008 15:00	19		✓
EP0802287-020	27-MAR-2008 15:00	20		✓
EP0802287-021	27-MAR-2008 15:00	21		✓
EP0802287-022	27-MAR-2008 15:00	22		✓
EP0802287-023	27-MAR-2008 15:00	23		✓
EP0802287-024	27-MAR-2008 15:00	24		✓
EP0802287-025	27-MAR-2008 15:00	25		✓
EP0802287-026	27-MAR-2008 15:00	26		✓
EP0802287-027	27-MAR-2008 15:00	27		✓
EP0802287-040	22-APR-2008 15:00	40		✓
EP0802287-041	22-APR-2008 15:00	41		✓
EP0802287-042	22-APR-2008 15:00	42		✓
EP0802287-043	22-APR-2008 15:00	43		✓
EP0802287-044	22-APR-2008 15:00	44		✓
EP0802287-045	22-APR-2008 15:00	45		✓
EP0802287-046	22-APR-2008 15:00	46		✓
EP0802287-047	22-APR-2008 15:00	47		✓



			(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis
EP0802287-048	22-APR-2008 15:00	48		✓
EP0802287-049	22-APR-2008 15:00	49		✓
EP0802287-050	22-APR-2008 15:00	50		✓
EP0802287-051	22-APR-2008 15:00	51		✓
EP0802287-052	22-APR-2008 15:00	52		✓
EP0802287-053	22-APR-2008 15:00	53		✓
EP0802287-054	22-APR-2008 15:00	54		✓
EP0802287-055	22-APR-2008 15:00	55		✓
EP0802287-056	22-APR-2008 15:00	56		✓
EP0802287-057	22-APR-2008 15:00	57		✓
EP0802287-058	22-APR-2008 15:00	58		✓
EP0802287-059	22-APR-2008 15:00	59		✓
EP0802287-060	22-APR-2008 15:00	60		✓
EP0802287-061	22-APR-2008 15:00	61		✓
EP0802287-062	22-APR-2008 15:00	62	✓	
EP0802287-063	22-APR-2008 15:00	63	✓	
EP0802287-064	22-APR-2008 15:00	64		✓
EP0802287-065	22-APR-2008 15:00	65		✓
EP0802287-066	22-APR-2008 15:00	66		✓
EP0802287-067	22-APR-2008 15:00	67		✓
EP0802287-068	22-APR-2008 15:00	68		✓
EP0802287-069	22-APR-2008 15:00	69		✓
EP0802287-070	22-APR-2008 15:00	70		✓
EP0802287-071	22-APR-2008 15:00	71		✓
EP0802287-072	22-APR-2008 15:00	72		✓
EP0802287-073	22-APR-2008 15:00	73		✓
EP0802287-074	22-APR-2008 15:00	74		✓
EP0802287-075	22-APR-2008 15:00	75		✓
EP0802287-076	22-APR-2008 15:00	76		✓
EP0802287-077	22-APR-2008 15:00	77		✓
EP0802287-078	22-APR-2008 15:00	78		✓
EP0802287-079	22-APR-2008 15:00	79		✓
EP0802287-080	22-APR-2008 15:00	80		✓
EP0802287-081	22-APR-2008 15:00	81		✓
EP0802287-082	22-APR-2008 15:00	82		✓
EP0802287-083	22-APR-2008 15:00	83		✓
EP0802287-084	22-APR-2008 15:00	84		✓
EP0802287-085	22-APR-2008 15:00	85		✓
EP0802287-086	22-APR-2008 15:00	86		✓
EP0802287-087	22-APR-2008 15:00	87		✓
EP0802287-088	23-APR-2008 15:00	88		✓



			(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis
EP0802287-089	23-APR-2008 15:00	89		✓
EP0802287-090	23-APR-2008 15:00	90		✓
EP0802287-091	23-APR-2008 15:00	91		✓
EP0802287-092	23-APR-2008 15:00	92		✓
EP0802287-093	23-APR-2008 15:00	93		✓
EP0802287-094	23-APR-2008 15:00	94		✓
EP0802287-095	23-APR-2008 15:00	95		✓
EP0802287-096	23-APR-2008 15:00	96		✓
EP0802287-097	23-APR-2008 15:00	97		✓
EP0802287-098	23-APR-2008 15:00	98		✓
EP0802287-099	23-APR-2008 15:00	99		✓
EP0802287-100	23-APR-2008 15:00	100		✓
EP0802287-101	23-APR-2008 15:00	101		✓
EP0802287-102	23-APR-2008 15:00	102		✓
EP0802287-103	23-APR-2008 15:00	103		✓
EP0802287-104	23-APR-2008 15:00	104		✓
EP0802287-105	23-APR-2008 15:00	105		✓
EP0802287-106	23-APR-2008 15:00	106		✓
EP0802287-107	23-APR-2008 15:00	107		✓
EP0802287-108	23-APR-2008 15:00	108		✓
EP0802287-109	23-APR-2008 15:00	109		✓
EP0802287-110	23-APR-2008 15:00	110		✓
EP0802287-111	23-APR-2008 15:00	111		✓

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice

Email dpperth@douglaspartners.com.au

MR ROBERT SHAPLAND

- A4 - AU Sample Receipt Notification - Environmental

Email shaplandr@douglaspartners.com.a

u

- Default - Chain of Custody

Email shaplandr@douglaspartners.com.a

u

- EDI Format - ENMRG

Email shaplandr@douglaspartners.com.a

u

- EDI Format - XTab

Email shaplandr@douglaspartners.com.a

u

Matrix: SOIL
Workgroup: EP0802287
Project name/number: 46751

Sample Type:
ALS Sample number:
Sample date:
Client sample ID (1st):
Client sample ID (2nd):
Site:
Purchase Order:

Analyte grouping/Analyte	CAS Number	Units	LOR
EA037: Ass Field Screening Analysis			
pH (F)		pH Unit	0.1
pH (Fox)		pH Unit	0.1
Reaction Rate		-	1

REG	REG	REG	REG	REG
EP0802287001	EP0802287002	EP0802287003	EP0802287004	EP0802287005
27/03/2008	27/03/2008	27/03/2008	27/03/2008	27/03/2008
1	2	3	4	5
74406	74406	74406	74406	74406
6.1	5.9	6.1	6.1	6.1
5.5	5.5	5.5	5.4	4.8
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287006	EP0802287007	EP0802287008	EP0802287009	EP0802287010
27/03/2008	27/03/2008	27/03/2008	27/03/2008	27/03/2008
6	7	8	9	10
74406	74406	74406	74406	74406
6.4	6.9	6.8	6.6	6.7
5.5	5.2	3.6	2.3	4.8
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287011	EP0802287012	EP0802287013	EP0802287014	EP0802287015
27/03/2008	27/03/2008	27/03/2008	27/03/2008	27/03/2008
11	12	13	14	15
74406	74406	74406	74406	74406
6.5	6.4	6.3	6.8	6.8
5.2	1.8	2.0	3.5	5.2
Slight	Slight	Moderate	Slight	Slight

REG	REG	REG	REG	REG
EP0802287016	EP0802287017	EP0802287018	EP0802287019	EP0802287020
27/03/2008	27/03/2008	27/03/2008	27/03/2008	27/03/2008
16	17	18	19	20
74406	74406	74406	74406	74406
7.5	8.0	8.1	7.9	7.5
5.5	5.6	5.6	5.6	3.0
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287021	EP0802287022	EP0802287023	EP0802287024	EP0802287025
27/03/2008	27/03/2008	27/03/2008	27/03/2008	27/03/2008
21	22	23	24	25
74406	74406	74406	74406	74406
7.3	6.2	6.4	6.9	7.2
2.8	4.9	5.1	5.4	5.0
Moderate	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287026	EP0802287027	EP0802287040	EP0802287041	EP0802287042
27/03/2008	27/03/2008	22/04/2008	22/04/2008	22/04/2008
26	27	40	41	42
74406	74406	74406	74406	74406
6.9	7.4	6.8	6.9	6.9
5.4	5.4	5.6	5.5	5.7
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287043	EP0802287044	EP0802287045	EP0802287046	EP0802287047
22/04/2008	22/04/2008	22/04/2008	22/04/2008	22/04/2008
43	44	45	46	47
74406	74406	74406	74406	74406
8.0	8.1	8.1	6.7	6.8
5.8	4.0	3.7	5.3	5.4
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287048	EP0802287049	EP0802287050	EP0802287051	EP0802287052
22/04/2008	22/04/2008	22/04/2008	22/04/2008	22/04/2008
48	49	50	51	52
74406	74406	74406	74406	74406
6.5	7.0	7.1	7.1	7.3
5.4	5.5	5.7	5.5	5.7
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287053	EP0802287054	EP0802287055	EP0802287056	EP0802287057
22/04/2008	22/04/2008	22/04/2008	22/04/2008	22/04/2008
53	54	55	56	57
74406	74406	74406	74406	74406
7.3	7.9	7.7	7.5	7.8
5.6	5.4	5.4	4.7	2.2
Slight	Slight	Slight	Slight	Moderate

REG	REG	REG	REG	REG
EP0802287058	EP0802287059	EP0802287060	EP0802287061	EP0802287064
22/04/2008	22/04/2008	22/04/2008	22/04/2008	22/04/2008
58	59	60	61	64
74406	74406	74406	74406	74406
7.7	7.4	7.4	7.6	7.5
4.4	2.1	3.1	4.6	5.2
Slight	Strong	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287065	EP0802287066	EP0802287067	EP0802287068	EP0802287069
22/04/2008	22/04/2008	22/04/2008	22/04/2008	22/04/2008
65	66	67	68	69
74406	74406	74406	74406	74406
7.4	7.3	7.3	7.2	7.0
5.2	5.2	5.1	3.7	2.7
Slight	Slight	Slight	Slight	Moderate

REG	REG	REG	REG	REG
EP0802287070	EP0802287071	EP0802287072	EP0802287073	EP0802287074
22/04/2008	22/04/2008	22/04/2008	22/04/2008	22/04/2008
70	71	72	73	74
74406	74406	74406	74406	74406
7.4	7.2	7.4	7.3	7.6
5.1	3.6	3.6	3.9	5.2
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287075	EP0802287076	EP0802287077	EP0802287078	EP0802287079
22/04/2008	22/04/2008	22/04/2008	22/04/2008	22/04/2008
75	76	77	78	79
74406	74406	74406	74406	74406
6.7	7.2	7.7	7.9	7.9
5.3	5.3	2.5	4.7	1.7
Slight	Slight	Extreme	Slight	Slight

REG	REG	REG	REG	REG
EP0802287080	EP0802287081	EP0802287082	EP0802287083	EP0802287084
22/04/2008	22/04/2008	22/04/2008	22/04/2008	22/04/2008
80	81	82	83	84
74406	74406	74406	74406	74406
7.9	8.1	8.5	8.0	7.9
5.1	4.6	5.2	4.8	5.2
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287085	EP0802287086	EP0802287087	EP0802287088	EP0802287089
22/04/2008	22/04/2008	22/04/2008	23/04/2008	23/04/2008
85	86	87	88	89
74406	74406	74406	74406	74406
7.9	7.1	7.3	8.3	8.4
3.7	5.2	5.3	2.7	2.4
Moderate	Slight	Slight	Strong	Strong

REG	REG	REG	REG	REG
EP0802287090	EP0802287091	EP0802287092	EP0802287093	EP0802287094
23/04/2008	23/04/2008	23/04/2008	23/04/2008	23/04/2008
90	91	92	93	94
74406	74406	74406	74406	74406
8.0	7.7	6.6	6.2	5.9
1.5	2.2	4.5	4.1	4.4
Moderate	Moderate	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287095	EP0802287096	EP0802287097	EP0802287098	EP0802287099
23/04/2008	23/04/2008	23/04/2008	23/04/2008	23/04/2008
95	96	97	98	99
74406	74406	74406	74406	74406
7.6	7.5	7.5	7.2	7.5
2.7	3.9	4.1	2.1	4.2
Slight	Slight	Slight	Slight	Slight

REG	REG	REG	REG	REG
EP0802287100	EP0802287101	EP0802287102	EP0802287103	EP0802287104
23/04/2008	23/04/2008	23/04/2008	23/04/2008	23/04/2008
100	101	102	103	104
74406	74406	74406	74406	74406
6.8	7.3	7.3	7.8	7.2
5.0	5.2	5.5	5.5	2.4
Slight	Slight	Slight	Slight	Strong

REG	REG	REG	REG	REG
EP0802287105	EP0802287106	EP0802287107	EP0802287108	EP0802287109
23/04/2008	23/04/2008	23/04/2008	23/04/2008	23/04/2008
105	106	107	108	109
74406	74406	74406	74406	74406
7.2	6.2	6.1	6.1	6.8
1.7	4.9	5.2	5.1	5.0
Strong	Slight	Slight	Slight	Slight

REG	REG
EP0802287110	EP0802287111
23/04/2008	23/04/2008
110	111

74406	74406
-------	-------

6.6	6.2
5.3	4.4
Slight	Moderate



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Geotechnics • Environment • Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Baldvins Road
Project No: 46751
DP Contact Person: R Shapland
Prior Storage: esky (fridge / shelved (circle))

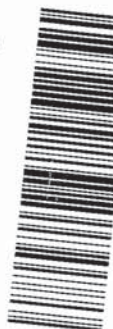
To: ALS Environmental
10 Rod Way, Adelaide
Ph: 9209 7655
Attn: _____

Sample ID	Sampling Time / Date	Sample Type S-soil W-water	Preservation	Lab ID	Analytes	NOTES
1	27/3/08		ICE			
2			ICE			
3			"			
4			"			
5			"			
6			"			
7			"			
8			"			
9			"			
10			"			
11			"			
12			"			
PQL (S)						
PQL (W)						

Environmental Division
Perth

Work Order

EP0802287



Telephone : + 61-8-9209 7655

PQL = practical quantification limit, *As per Laboratory Method Detection Limit

Send Results to:

Douglas Partners Pty Ltd
182 Bennett Street
EAST PERTH 6004
Ph: (08) 9325 4774
Fax: (08) 9325 4771

Date/Time: 28/4/08
Date/Time: _____
Date/Time: _____
Date/Time: _____

Sign: [Signature]
Sign: _____
Sign: _____
Sign: _____

Relinquished By: D. Donalain
Relinquished By: _____
Relinquished By: _____
Relinquished By: _____

Sampled By: D. Donalain
Received By: _____
Received By: _____
Received By: _____

** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 **



Douglas Partners
Geotechnical • Environment • Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Baldavis Road
Project No: 46751
DP Contact Person: R. Shapland
Prior Storage: esky / fridge / shelved (circle)

To: ALS Environmental
10 Rod Way, Glodora
Ph: 9209 7655
Attn: _____

Sample ID	Sampling Time / Date	Sample Type S-soil W-water	Preservation	Lab ID	Analytes										NOTES
13	27/3/08		ice		46751										
14			ice												
15			"												
16			"												
17			"												
18			"												
19			"												
20			"												
21			"												
22			"												
23			"												
24			"												
PQL (S)															
PQL (W)															

PQL = practical quantification limit, *As per Laboratory Method Detection Limit

Sampled By: D. Donalain
Received By: _____
Received By: _____
Received By: _____

Relinquished By: D. Donalain
Relinquished By: _____
Relinquished By: _____
Relinquished By: _____

Sign: [Signature]
Sign: _____
Sign: _____
Sign: _____

Date/Time: 28/4/08
Date/Time: _____
Date/Time: _____
Date/Time: _____

Send Results to:

Douglas Partners Pty Ltd
182 Bennett Street
EAST PERTH 6004
Ph: (08) 9325 4774
Fax: (08) 9325 4771

** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 **



Douglas Partners
Geotechnical • Environment • Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Baldvins Road
Project No: 46751
DP Contact Person: R. Shapland
Prior Storage: esky (fridge / shelved (circle))

To: ALS Environmental
10 Rod Way, Malaga
Ph: 9209 7655
Attn: _____

Sample ID	Sampling Time / Date	Sample Type S-soil W-water	Preservation	Lab ID	Analytes										NOTES
25			ice		PO3A										
26			ice												
27			"												
40	22/4/08		"												
41			"												
42			"												
43			"												
44			"												
45			"												
46			"												
47			"												
48			"												
POL (S)															
POL (W)															

POL = practical quantification limit, *As per Laboratory Method Detection Limit

Sampled By: D. Donalain
Received By: _____
Received By: _____
Received By: _____

Relinquished By: D. Donalain
Relinquished By: _____
Relinquished By: _____
Relinquished By: _____

Sign: [Signature]
Sign: _____
Sign: _____
Sign: _____

Date/Time: 28/4/08
Date/Time: _____
Date/Time: _____
Date/Time: _____

Send Results to:

Douglas Partners Pty Ltd
182 Bennett Street
EAST PERTH 6004
Ph: (08) 9325 4774
Fax: (08) 9325 4771

**** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 ****



Douglas Partners
Geotechnical - Environment - Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Baldvins Road
Project No: 46751
DP Contact Person: R. Shapland
Prior Storage: esky / fridge / shelved (circle)

To: ALS Environmental
10 Rod Way, Malaga
Ph: 9209 7655
Attn: _____

Sample ID	Sampling Time / Date	Sample Type S-soil W-water	Preservation	Lab ID	Analytes										NOTES
49	22/4/08		ICE		6237										
50			ICE												
51			"												
52			"												
53			"												
54			"												
55			"												
56			"												
57			"												
58			"												
59			"												
60			"												
PQL (S)															
PQL (W)															

PQL = practical quantification limit, *As per Laboratory Method Detection Limit

Sampled By: D. Donalain Relinquished By: D. Donalain Sign: [Signature] Date/Time: 28/4/08
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____

Send Results to:

Douglas Partners Pty Ltd
182 Bennett Street
EAST PERTH 6004
Ph: (08) 9325 4774
Fax: (08) 9325 4771

**** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 ****



Douglas Partners
Geotechnical • Environment • Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Baldvins Road
Project No: 46751
DP Contact Person: R. Shapland
Prior Storage: esky / fridge / shelved (circle)

To: ALS Environmental
10 Rod Way, Malaga
Ph: 9209 7655
Attn: _____

Sample ID	Sampling Time / Date	Sample Type S-soil W-water	Preservation	Lab ID	Analytes				NOTES
61	28/4		ICE						
62			ICE						
63			"						
64			"						
65			"						
66			"						
67			"						
68			"						
69			"						
70			"						
71			"						
72			"						
PQL (S)									
PQL (W)									

PQL = practical quantification limit, *As per Laboratory Method Detection Limit

Sampled By: D. Donalain Relinquished By: D. Donalain Sign: [Signature] Date/Time: 28/4/08
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____

Send Results to:

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Douglas Partners
Geotechnics • Environment • Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Baldvins Road
Project No: 46751
DP Contact Person: R. Shapland
Prior Storage: esky / fridge / shelved (circle)

To: ALS Environmental
10 Hod Way, Malaga
Ph: 9209 7655
Attn: _____

Sample ID	Sampling Time / Date	Sample Type S-soil W-water	Preservation	Lab ID	Analytes										NOTES
73	22/4		ICE		10037										
74			ICE												
75			"												
76			"												
77			"												
78			"												
79			"												
80			"												
81			"												
82			"												
83			"												
84			"												
PQL (S)															
PQL (W)															

PQL = practical quantification limit, *As per Laboratory Method Detection Limit

Sampled By: D. Donalain
Received By: _____
Received By: _____
Received By: _____

Relinquished By: D. Donalain
Relinquished By: _____
Relinquished By: _____
Relinquished By: _____

Sign: [Signature]
Sign: _____
Sign: _____
Sign: _____

Date/Time: 28/4/08
Date/Time: _____
Date/Time: _____
Date/Time: _____

Send Results to:

Douglas Partners Pty Ltd
182 Bennett Street
EAST PERTH 6004
Ph: (08) 9325 4774
Fax: (08) 9325 4771

** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 **



Douglas Partners
Geotechnics • Environment • Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Baldivis Road
Project No: 46751
DP Contact Person: R. Shapland
Prior Storage: esky / fridge / shelved (circle)

To: ALS Environmental
10 Hadaway, Malaga
Ph: 9209 7655
Attn: _____

Sample ID	Sampling Time / Date	Sample Type S-soil W-water	Preservation	Lab ID	Analytes	NOTES
85	22/4/08		ICE	46751		
86			ICE			
87			"			
88	23/4/08		"			
89			"			
90			"			
91			"			
92			"			
93			"			
94			"			
95			"			
96			"			
PQL (S)						
PQL (W)						

PQL = practical quantification limit, *As per Laboratory Method Detection Limit

Sampled By:	Relinquished By:	Date/Time:
<u>D. Donalain</u>	<u>D. Donalain</u>	<u>28/4/08</u>
Received By:	Relinquished By:	Date/Time:
Received By:	Relinquished By:	Date/Time:
Received By:	Relinquished By:	Date/Time:

Send Results to:
Douglas Partners Pty Ltd
182 Bennett Street
EAST PERTH 6004
Ph: (08) 9325 4774
Fax: (08) 9325 4771

**** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 ****



Douglas Partners
Geotechnics • Environment • Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Baldavis Road
Project No: 46751
DP Contact Person: R. Shapland
Prior Storage: esky / fridge / shelved (circle)

To: ALS Environmental
10 Had May, Adelaide
Ph: 9209 7655
Attn: _____

Sample ID	Sampling Time / Date	Sample Type S-soil W-water	Preservation	Lab ID	Analytes										NOTES
97	23/4/08		ICE	4637											
98			ICE												
99			"												
100			"												
101			"												
102			"												
103			"												
104			"												
105			"												
106			"												
107			"												
108			"												
PQL (S)															
PQL (W)															

PQL = practical quantification limit, *As per Laboratory Method Detection Limit

Sampled By: D. Donalain Relinquished By: D. Donalain Sign: [Signature] Date/Time: 28/4/08
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____
Received By: _____ Relinquished By: _____ Sign: _____ Date/Time: _____

Send Results to:
Douglas Partners Pty Ltd
182 Bennett Street
EAST PERTH 6004
Ph: (08) 9325 4774
Fax: (08) 9325 4771

** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 **



CHAIN OF CUSTODY DESPATCH SHEET

Prior Storage:

esky /fridge / shelved (circle)

.....

Attn:

PQL = practical quantification limit. *As per Laboratory Method Detection Limit					
Sampled By:	<u>D. Donalain</u>	Relinquished By:	<u>D. Donalain</u>	Sign:	<u>[Signature]</u>
Received By:	_____	Relinquished By:	_____	Sign:	_____
Received By:	_____	Relinquished By:	_____	Sign:	_____
Received By:	_____	Relinquished By:	_____	Sign:	_____
Date/Time:	_____	Date/Time:	_____	Date/Time:	_____
Date/Time:	_____	Date/Time:	_____	Date/Time:	_____
Date/Time:	_____	Date/Time:	_____	Date/Time:	_____
Date/Time:	_____	Date/Time:	_____	Date/Time:	_____
** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 **					
Send Results to:		Douglas Partners Pty Ltd 182 Bennett Street EAST PERTH 6004 Ph: (08) 9325 4774 Fax: (08) 9325 4771			

Relinquished By: _____

**** IMPORTANT: PLEASE SIGN AND DATE TO ACKNOWLEDGE RECEIPT OF SAMPLES AND RETURN BY FAX TO (08) 9325 4771 ****

Ph: (08) 9325 4774
Fax: (08) 9325 4771

No	Details
40	TP 26 - 0.5 m
41	TP 26 - 1.0
42	TP 26 1.5
43	TP 26 2.00
44	TP 26 2.5
45	TP 26 3.00
46	TP 28 0.5
47	TP 28 1.00
48	TP 28 1.5
49	TP 28 2.00
50	TP 28 2.5
51	TP 28 3.0
52	TP 31 0.5
53	TP 31 1.00
54	TP 31 1.5
55	TP 31 2.00
56	TP 31 2.5
57	TP 31 3.00
58	TP 35 0.5
59	TP 35 1.0
60	TP 35 1.5
61	TP 35 2.00
62	Missing
63	
64	TP 39 0.5
65	TP 39 0.5 1.0



Environmental Division

SAMPLE RECEIPT NOTIFICATION (SRN)
Comprehensive Report

Work Order : **EP0802477**

Client : **DOUGLAS PARTNERS PTY LTD**
Contact : **MR ROBERT SHAPLAND**
Address : **36 O'MALLEY STREET**
OSBORNE PARK WA 6017

E-mail : **shaplandr@douglaspartners.com.au**
Telephone : **+61 08 9204 3511**
Facsimile : **+61 08 9204 3522**

Project : **Ex EP0802287 46751**
Order number : **74426**
C-O-C number : **----**

Site : **----**
Sampler : **----**

Laboratory : **Environmental Division Perth**
Contact : **Michael Sharp**
Address : **10 Hod Way Malaga WA Australia 6090**

E-mail : **michael.sharp@alsenviro.com**
Telephone : **+61-8-9209 7655**
Facsimile : **+61-8-9209 7600**

Page : **1 of 3**

Quote number : **EP2008DOUPARWA0084 (EN-020-08 BQ)**

QC Level : **NEPM 1999 Schedule B(3) and ALS QCS3 requirement**

Dates

Date Samples Received : **05-MAY-2008**
Client Requested Due Date : **14-MAY-2008**

Issue Date : **06-MAY-2008 16:04**
Scheduled Reporting Date : **14-MAY-2008**

Delivery Details

Mode of Delivery : **Carrier**
No. of coolers/boxes : **NIL**
Security Seal : **Intact.**

Temperature : **Ambient**
No. of samples received : **40**
No. of samples analysed : **40**

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Requested Deliverables
- Samples received in appropriately pretreated and preserved containers.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Recommended holding times exceeded during transit, ASS samples must be received within 24hrs of sampling unless frozen.
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of Work Order.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exist.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils
EP0802477-001	27-MAR-2008 15:00	2	✓
EP0802477-002	27-MAR-2008 15:00	4	✓
EP0802477-003	27-MAR-2008 15:00	6	✓
EP0802477-004	27-MAR-2008 15:00	9	✓
EP0802477-005	27-MAR-2008 15:00	12	✓
EP0802477-006	27-MAR-2008 15:00	14	✓
EP0802477-007	27-MAR-2008 15:00	16	✓
EP0802477-008	27-MAR-2008 15:00	20	✓
EP0802477-009	27-MAR-2008 15:00	21	✓
EP0802477-010	27-MAR-2008 15:00	23	✓
EP0802477-011	27-MAR-2008 15:00	27	✓
EP0802477-012	27-MAR-2008 15:00	40	✓
EP0802477-013	27-MAR-2008 15:00	45	✓
EP0802477-014	27-MAR-2008 15:00	46	✓
EP0802477-015	27-MAR-2008 15:00	49	✓
EP0802477-016	27-MAR-2008 15:00	54	✓
EP0802477-017	27-MAR-2008 15:00	57	✓
EP0802477-018	27-MAR-2008 15:00	59	✓
EP0802477-019	27-MAR-2008 15:00	61	✓
EP0802477-020	27-MAR-2008 15:00	64	✓
EP0802477-021	27-MAR-2008 15:00	65	✓
EP0802477-022	27-MAR-2008 15:00	67	✓
EP0802477-023	27-MAR-2008 15:00	69	✓
EP0802477-024	27-MAR-2008 15:00	71	✓
EP0802477-025	27-MAR-2008 15:00	73	✓
EP0802477-026	27-MAR-2008 15:00	77	✓
EP0802477-027	27-MAR-2008 15:00	79	✓
EP0802477-028	27-MAR-2008 15:00	81	✓
EP0802477-029	27-MAR-2008 15:00	85	✓
EP0802477-030	27-MAR-2008 15:00	88	✓
EP0802477-031	27-MAR-2008 15:00	90	✓
EP0802477-032	27-MAR-2008 15:00	91	✓
EP0802477-033	27-MAR-2008 15:00	93	✓
EP0802477-034	27-MAR-2008 15:00	95	✓
EP0802477-035	27-MAR-2008 15:00	98	✓



				SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils
EP0802477-036	27-MAR-2008 15:00	99		✓
EP0802477-037	27-MAR-2008 15:00	100		✓
EP0802477-038	27-MAR-2008 15:00	105		✓
EP0802477-039	27-MAR-2008 15:00	108		✓
EP0802477-040	27-MAR-2008 15:00	110		✓

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice

Email dpperth@douglaspartners.com.au

MR ROBERT SHAPLAND

- *AU Certificate of Analysis - NATA

Email shaplandr@douglaspartners.com.au

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)

Email shaplandr@douglaspartners.com.au

- *AU QC Report 2 DEFAULT (Anon QC Rep) - NATA

Email shaplandr@douglaspartners.com.au

- A4 - AU Sample Receipt Notification - Environmental

Email shaplandr@douglaspartners.com.au

- Default - Chain of Custody

Email shaplandr@douglaspartners.com.au

- EDI Format - ENMRG

Email shaplandr@douglaspartners.com.au

- EDI Format - XTab

Email shaplandr@douglaspartners.com.au

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EP0802477	Page	: 1 of 10
Client	: DOUGLAS PARTNERS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: MR ROBERT SHAPLAND	Contact	: Michael Sharp
Address	: 36 O'MALLEY STREET OSBORNE PARK WA 6017	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: shaplandr@douglaspartners.com.au	E-mail	: michael.sharp@alsenviro.com
Telephone	: +61 08 9204 3511	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 9204 3522	Facsimile	: +61-8-9209 7600
Project	: Ex EP0802287 46751	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 74426	Date Samples Received	: 05-MAY-2008
C-O-C number	: ----	Issue Date	: 14-MAY-2008
Sampler	: ----	No. of samples received	: 40
Site	: ----	No. of samples analysed	: 40
Quote number	: EN-020-08 BQ		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

WORLD RECOGNISED
ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Stacey Hawkins	Senior Chemist - Acid Sulphate Soils	Perth Inorganics

Environmental Division Perth
Part of the **ALS Laboratory Group**

10 Hod Way Malaga WA Australia 6090
Tel. +61-8-9209 7655 Fax. +61-8-9209 7600 www.alsglobal.com

A Campbell Brothers Limited Company



Page : 2 of 10
Work Order : EP0802477
Client : DOUGLAS PARTNERS PTY LTD
Project : Ex EP0802287 46751

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = Chemistry Abstract Services number
LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- Limiting rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.
- Retained Acidity not required because pH KCl greater than or equal to 4.5



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL	Client sample ID							
	Client sampling date / time							
Compound	CAS Number	LOR	Unit	2	4	6	9	12
27-MAR-2008 15:00								
EP0802477-001								
EP0802477-002								
EP0802477-003								
EP0802477-004								
EP0802477-005								
EA033-A: Actual Acidity								
pH KCl (23A)	-----	0.1	pH Unit	7.0	6.4	7.6	6.2	5.5
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	<2	<2	<2	5
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	-----	0.02	% S	<0.02	<0.02	<0.02	<0.02	0.15
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	<10	<10	<10	12	92
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)	-----	0.01	% CaCO3	<0.01	-----	0.12	-----	-----
acidity - Acid Neutralising Capacity (a-19A1)	-----	10	mole H+ / t	<10	-----	24	-----	-----
sulfidic - Acid Neutralising Capacity (s-19A1)	-----	0.01	% pyrite S	<0.01	-----	0.04	-----	-----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S	<0.02	<0.02	<0.02	<0.02	0.16
Net Acidity (acidity units)	-----	10	mole H+ / t	<10	<10	<10	12	97
Liming Rate	-----	1	kg CaCO3/t	<1	<1	<1	<1	7
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	<0.02	<0.02	<0.02	<0.02	0.16
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	<10	<10	<10	12	97
Liming Rate excluding ANC	-----	1	kg CaCO3/t	<1	<1	<1	<1	7



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL		Client sampling date / time		Client sample ID				
Compound	CAS Number	LOR	Unit	14	16	20	21	23
				27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00
				EP0802477-006	EP0802477-007	EP0802477-008	EP0802477-009	EP0802477-010
EA033-A: Actual Acidity								
pH KCl (23A)	-----	0.1	pH Unit	6.0	6.4	6.1	6.1	6.2
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	-----	0.02	% S	0.04	<0.02	0.07	0.06	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	25	<10	45	34	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S	0.04	<0.02	0.07	0.06	<0.02
Net Acidity (acidity units)	-----	10	mole H+ / t	27	<10	46	36	<10
Limiting Rate	-----	1	kg CaCO3/t	2	<1	3	3	<1
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	0.04	<0.02	0.07	0.06	<0.02
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	27	<10	46	36	<10
Limiting Rate excluding ANC	-----	1	kg CaCO3/t	2	<1	3	3	<1



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL		Client sample ID				Client sampling date / time					
Compound	CAS Number	LOR	Unit	27	40	45	46	49			
				27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00			
EA033-A: Actual Acidity		EP0802477-011							EP0802477-013	EP0802477-014	EP0802477-015
pH KCl (23A)	-----	0.1	pH Unit	6.3	6.6	6.3	5.9	6.0			
Titrratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	<2	<2	5	<2			
sulfidic - Titrratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02			
EA033-B: Potential Acidity											
Chromium Reducible Sulfur (22B)	-----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02			
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	<10	<10	17	<10	<10			
EA033-C: Acid Neutralising Capacity											
Acid Neutralising Capacity (19A1)	-----	0.01	% CaCO3	-----	0.55	-----	-----	-----			
acidity - Acid Neutralising Capacity (a-19A1)	-----	10	mole H+ / t	-----	110	-----	-----	-----			
sulfidic - Acid Neutralising Capacity (s-19A1)	-----	0.01	% pyrite S	-----	0.18	-----	-----	-----			
EA033-E: Acid Base Accounting											
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5			
Net Acidity (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02			
Net Acidity (acidity units)	-----	10	mole H+ / t	<10	<10	17	<10	<10			
Liming Rate	-----	1	kg CaCO3/t	<1	<1	1	<1	<1			
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02			
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	<10	<10	17	<10	<10			
Liming Rate excluding ANC	-----	1	kg CaCO3/t	<1	<1	1	<1	<1			



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL		Client sampling date / time				Client sample ID			
Compound	CAS Number	LOR	Unit	54	57	59	61	64	
				27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	
				EP0802477-016	EP0802477-017	EP0802477-018	EP0802477-019	EP0802477-020	
EA033-A: Actual Acidity									
pH KCl (23A)	-----	0.1	pH Unit	6.8	5.8	5.5	6.2	6.5	
Titrratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	2	2	2	<2	
sulfidic - Titrratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	-----	0.02	% S	0.02	0.07	0.04	<0.02	<0.02	
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	15	41	25	12	<10	
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A1)	-----	0.01	% CaCO3	0.30	-----	-----	-----	0.12	
acidity - Acid Neutralising Capacity (a-19A1)	-----	10	mole H+ / t	61	-----	-----	-----	24	
sulfidic - Acid Neutralising Capacity (s-19A1)	-----	0.01	% pyrite S	0.10	-----	-----	-----	0.04	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5	
Net Acidity (sulfur units)	-----	0.02	% S	<0.02	0.07	0.04	0.02	<0.02	
Net Acidity (acidity units)	-----	10	mole H+ / t	<10	44	27	14	<10	
Liming Rate	-----	1	kg CaCO3/t	<1	3	2	1	<1	
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	0.02	0.07	0.04	0.02	<0.02	
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	15	44	27	14	<10	
Liming Rate excluding ANC	-----	1	kg CaCO3/t	1	3	2	1	<1	



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL	Client sample ID		Client sampling date / time		65	67	69	71	73
	CAS Number	LOR	Unit	EP0802477-021	EP0802477-022	EP0802477-023	EP0802477-024	EP0802477-025	
EA033-A: Actual Acidity									
pH KCl (23A)	-----	0.1	pH Unit	6.4	6.0	5.6	6.3	5.9	
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	<2	2	<2	<2	
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	-----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02	
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	<10	<10	17	<10	<10	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5	
Net Acidity (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02	
Net Acidity (acidity units)	-----	10	mole H+ / t	<10	<10	19	<10	11	
Liming Rate	-----	1	kg CaCO3/t	<1	<1	1	<1	<1	
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02	
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	<10	<10	19	<10	11	
Liming Rate excluding ANC	-----	1	kg CaCO3/t	<1	<1	1	<1	<1	



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL	Client sample ID		Client sampling date / time		77	79	81	85	88
	CAS Number	LOR	Unit	EP0802477-026	EP0802477-027	EP0802477-028	EP0802477-029	EP0802477-030	
EA033-A: Actual Acidity									
pH KCl (23A)	-----	0.1	pH Unit	5.9	5.7	5.9	6.0	6.1	
Titrateable Actual Acidity (23F)	-----	2	mole H+ / t	<2	2	<2	<2	<2	
sulfidic - Titrateable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	-----	0.02	% S	0.04	0.08	<0.02	<0.02	0.03	
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	23	52	<10	10	18	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5	
Net Acidity (sulfur units)	-----	0.02	% S	0.04	0.09	<0.02	<0.02	0.03	
Net Acidity (acidity units)	-----	10	mole H+ / t	24	54	<10	12	20	
Liming Rate	-----	1	kg CaCO3/t	2	4	<1	<1	1	
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	0.04	0.09	<0.02	<0.02	0.03	
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	24	54	<10	12	20	
Liming Rate excluding ANC	-----	1	kg CaCO3/t	2	4	<1	<1	1	



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL	Client sampling date / time		Client sample ID					
	CAS Number	LOR	Unit	90	91	93	95	98
				27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00
Compound				EP0802477-031	EP0802477-032	EP0802477-033	EP0802477-034	EP0802477-035
EA033-A: Actual Acidity								
pH KCl (23A)	-----	0.1	pH Unit	5.8	5.8	5.1	5.9	5.7
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	2	4	18	2	2
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	0.03	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	-----	0.02	% S	0.03	0.10	<0.02	0.02	0.06
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	21	59	<10	14	36
EA033-E: Acid Base Accounting								
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S	0.04	0.10	0.03	0.03	0.06
Net Acidity (acidity units)	-----	10	mole H+ / t	23	63	19	17	38
Liming Rate	-----	1	kg CaCO3/t	2	5	1	1	3
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	0.04	0.10	0.03	0.03	0.06
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	23	63	19	17	38
Liming Rate excluding ANC	-----	1	kg CaCO3/t	2	5	1	1	3



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL		Client sampling date / time				Client sample ID						
Compound	CAS Number	LOR	Unit	99	100	105	108	110				
				27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00	27-MAR-2008 15:00				
EP0802477-036									EP0802477-037	EP0802477-038	EP0802477-039	EP0802477-040
EA033-A: Actual Acidity												
pH KCl (23A)	-----	0.1	pH Unit	5.8	5.7	5.8	5.9	6.2				
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	12	6	2	2	<2				
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02				
EA033-B: Potential Acidity												
Chromium Reducible Sulfur (22B)	-----	0.02	% S	0.03	<0.02	0.06	<0.02	<0.02				
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	16	<10	35	<10	<10				
EA033-E: Acid Base Accounting												
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5				
Net Acidity (sulfur units)	-----	0.02	% S	0.04	<0.02	0.06	<0.02	<0.02				
Net Acidity (acidity units)	-----	10	mole H+ / t	29	<10	38	<10	<10				
Liming Rate	-----	1	kg CaCO3/t	2	<1	3	<1	<1				
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	0.04	<0.02	0.06	<0.02	<0.02				
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	29	<10	38	<10	<10				
Liming Rate excluding ANC	-----	1	kg CaCO3/t	2	<1	3	<1	<1				

Luke Jones

From: Stacey Hawkins
Sent: Monday, 5 May 2008 3:32 PM
To: Samples Perth
Subject: FW: Scr Suite - ALS Work Order EP 0802287
Follow Up Flag: Follow up
Flag Status: Green
Attachments: EP0802287_COC.pdf; PO Als - Scr.pdf

Stacey Hawkins

Senior Chemist - Acid Sulfate Soils

ALS Laboratory Group**Environmental Division**

Perth, Western Australia

Phone: +61 8 92097655

Fax: +61 8 92097600

www.alsglobal.com

From: Rob Shapland [mailto:Rob.Shapland@douglaspartners.com.au]

Sent: Monday, 5 May 2008 2:05 PM

To: Stacey Hawkins

Subject: Scr Suite - ALS Work Order EP 0802287

Hi Stacey,

Please find attached a purchase order to undertake 40 Scr suite of tests as per the attached work order for the following samples ID's:

- ① 2
- ② 4
- ③ 6
- ④ 9
- ⑤ 12
- ⑥ 14
- ⑦ 16
- ⑧ 20
- ⑨ 21
- ⑩ 23
- ⑪ 27
- ⑫ 40
- ⑬ 45
- ⑭ 46
- ⑮ 49
- ⑯ 54
- ⑰ 57
- ⑱ 59
- ⑲ 61
- ⑳ 64
- ㉑ 65
- ㉒ 67
- ㉓ 69
- ㉔ 71
- ㉕ 73

Environmental Division
Perth

Work Order

EP0802477



Telephone : + 61-8-9209 7655

Luke Jones *LS*
 STS108 15:32

26 77
 27 79
 28 81
 29 85
 30 88
 31 90
 32 91
 33 93
 34 95
 35 98
 36 99
 37 100
 38 105
 39 108
 40 110

Please contact us if you have any queries or require further information.

Best regards,

Rob Shapland | Environmental Chemist/Associate

Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au

36 O'Malley Street Osborne Park WA 6017

P: 08 9204 3511 | F: 08 9204 3522 | M: 0412 448 485 | E: Rob.Shapland@douglaspartners.com.au

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through the ALS North America gateway.

Lula Sons



5/5/08

15:32

Environmental Division

QUALITY CONTROL REPORT

Work Order	: EP0802477	Page	: 1 of 6
Client	: DOUGLAS PARTNERS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: MR ROBERT SHAPLAND	Contact	: Michael Sharp
Address	: 36 O'MALLEY STREET OSBORNE PARK WA 6017	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: shaplandr@douglaspartners.com.au	E-mail	: michael.sharp@alsenviro.com
Telephone	: +61 08 9204 3511	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 9204 3522	Facsimile	: +61-8-9209 7600
Project	: Ex EP0802287 46751	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 05-MAY-2008
C-O-C number	: ----	Issue Date	: 14-MAY-2008
Sampler	: ----	No. of samples received	: 40
Order number	: 74426	No. of samples analysed	: 40
Quote number	: EN-020-08 BQ		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Stacey Hawkins	Senior Chemist - Acid Sulphate Soils	Perth Inorganics

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WORLD RECOGNISED
ACCREDITATION



Page : 2 of 6
Work Order : EP0802477
Client : DOUGLAS PARTNERS PTY LTD
Project : Ex EP0802287 46751

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = Chemistry Abstract Services number
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC



Page : 3 of 6
Work Order : EP0802477
Client : DOUGLAS PARTNERS PTY LTD
Project : Ex EP0802287 46751

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: SOIL

Sub-Matrix: SOIL		Client sample ID		Method: Compound		CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA033-A: Actual Acidity (QC Lot: 652374)												
EP0802477-001	2	EA033: sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit			
		EA033: Titratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	<2	0.0	No Limit			
		EA033: pH KCl (23A)	-----	0.1	pH Unit	7.0	6.9	0.0	0% - 20%			
EP0802477-011	27	EA033: sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit			
		EA033: Titratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	<2	0.0	No Limit			
		EA033: pH KCl (23A)	-----	0.1	pH Unit	6.3	6.3	0.0	0% - 20%			
EA033-A: Actual Acidity (QC Lot: 652375)												
EP0802477-021	65	EA033: sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit			
		EA033: Titratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	<2	0.0	No Limit			
		EA033: pH KCl (23A)	-----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%			
EP0802477-031	90	EA033: sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit			
		EA033: Titratable Actual Acidity (23F)	-----	2	mole H+ / t	2	2	0.0	No Limit			
		EA033: pH KCl (23A)	-----	0.1	pH Unit	5.8	5.8	0.0	0% - 20%			
EA033-B: Potential Acidity (QC Lot: 652374)												
EP0802477-001	2	EA033: Chromium Reducible Sulfur (22B)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit			
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	<10	<10	0.0	No Limit			
EP0802477-011	27	EA033: Chromium Reducible Sulfur (22B)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit			
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	<10	<10	0.0	No Limit			
EA033-B: Potential Acidity (QC Lot: 652375)												
EP0802477-021	65	EA033: Chromium Reducible Sulfur (22B)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit			
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	<10	<10	0.0	No Limit			
EP0802477-031	90	EA033: Chromium Reducible Sulfur (22B)	-----	0.02	% S	0.03	0.03	0.0	No Limit			
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	21	22	5.1	No Limit			
EA033-C: Acid Neutralising Capacity (QC Lot: 652374)												
EP0802477-001	2	EA033: Acid Neutralising Capacity (19A1)	-----	0.01	% CaCO3	<0.01	<0.01	0.0	No Limit			
		EA033: sulfidic - Acid Neutralising Capacity (s-19A1)	-----	0.01	% pyrite S	<0.01	<0.01	0.0	No Limit			
		EA033: acidity - Acid Neutralising Capacity (a-19A1)	-----	10	mole H+ / t	<10	<10	0.0	No Limit			
EA033-E: Acid Base Accounting (QC Lot: 652374)												
EP0802477-001	2	EA033: ANC Fineness Factor	-----	0.5	-	1.5	1.5	0.0	No Limit			
		EA033: Net Acidity (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit			
		EA033: Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit			
		EA033: Limiting Rate	-----	1	kg CaCO3/t	<1	<1	0.0	No Limit			
		EA033: Limiting Rate excluding ANC	-----	1	kg CaCO3/t	<1	<1	0.0	No Limit			



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Work Order : EP0802477
Client : DOUGLAS PARTNERS PTY LTD
Project : Ex EP0802287 46751

Sub-Matrix: SOIL			Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
EA033-E: Acid Base Accounting (QC Lot: 652374) - continued										
EP0802477-001	2	EA033: Net Acidity (acidity units)	-----	10	mole H+ / t	<10	<10	0.0	No Limit	
		EA033: Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	<10	<10	0.0	No Limit	
EP0802477-011	27	EA033: ANC Fineness Factor	-----	0.5	-	1.5	1.5	0.0	No Limit	
		EA033: Net Acidity (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit	
		EA033: Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit	
		EA033: Liming Rate	-----	1	kg CaCO3/t	<1	<1	0.0	No Limit	
		EA033: Liming Rate excluding ANC	-----	1	kg CaCO3/t	<1	<1	0.0	No Limit	
		EA033: Net Acidity (acidity units)	-----	10	mole H+ / t	<10	<10	0.0	No Limit	
EP0802477-021	65	EA033: Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	<10	<10	0.0	No Limit	
		EA033-E: Acid Base Accounting (QC Lot: 652375)								
		EA033: ANC Fineness Factor	-----	0.5	-	1.5	1.5	0.0	No Limit	
		EA033: Net Acidity (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit	
		EA033: Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	<0.02	<0.02	0.0	No Limit	
		EA033: Liming Rate	-----	1	kg CaCO3/t	<1	<1	0.0	No Limit	
		EA033: Liming Rate excluding ANC	-----	1	kg CaCO3/t	<1	<1	0.0	No Limit	
		EA033: Net Acidity (acidity units)	-----	10	mole H+ / t	<10	<10	0.0	No Limit	
		EA033: Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	<10	<10	0.0	No Limit	
		EA033: ANC Fineness Factor	-----	0.5	-	1.5	1.5	0.0	No Limit	
		EA033: Net Acidity (sulfur units)	-----	0.02	% S	0.04	0.04	0.0	No Limit	
		EA033: Net Acidity excluding ANC (sulfur units)	-----	0.02	% S	0.04	0.04	0.0	No Limit	
		EA033: Liming Rate	-----	1	kg CaCO3/t	2	2	0.0	No Limit	
		EA033: Liming Rate excluding ANC	-----	1	kg CaCO3/t	2	2	0.0	No Limit	
EP0802477-031	90	EA033: Net Acidity (acidity units)	-----	10	mole H+ / t	23	24	4.8	No Limit	
		EA033: Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t	23	24	4.8	No Limit	



Page : 5 of 6
Work Order : EP0802477
Client : DOUGLAS PARTNERS PTY LTD
Project : Ex EP0802287 46751

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

Sub-Matrix: SOIL				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report					
Method: Compound		CAS Number	LOR	Unit	Result	Spike Concentration		Spike Recovery (%)		Recovery Limits (%)	
EA033-A: Actual Acidity (QCLot: 652374)											
EA033: pH KCl (23A)		NA-23A-001	0.1	pH Unit	<0.1	NA-23A-001	NA-23A-001	NA-23A-001	NA-23A-001	NA-23A-001	NA-23A-001
EA033: Titratable Actual Acidity (23F)		NA-23F-001	2	mole H+ / t	<2	NA-23F-001	NA-23F-001	NA-23F-001	NA-23F-001	NA-23F-001	NA-23F-001
EA033: sulfidic - Titratable Actual Acidity (s-23F)		NA-23F-002	0.02	% pyrite S	<0.02	NA-23F-002	NA-23F-002	NA-23F-002	NA-23F-002	NA-23F-002	NA-23F-002
EA033-A: Actual Acidity (QCLot: 652375)											
EA033: pH KCl (23A)		NA-23A-002	0.1	pH Unit	<0.1	NA-23A-002	NA-23A-002	NA-23A-002	NA-23A-002	NA-23A-002	NA-23A-002
EA033: Titratable Actual Acidity (23F)		NA-23F-003	2	mole H+ / t	<2	NA-23F-003	NA-23F-003	NA-23F-003	NA-23F-003	NA-23F-003	NA-23F-003
EA033: sulfidic - Titratable Actual Acidity (s-23F)		NA-23F-004	0.02	% pyrite S	<0.02	NA-23F-004	NA-23F-004	NA-23F-004	NA-23F-004	NA-23F-004	NA-23F-004
EA033-B: Potential Acidity (QCLot: 652374)											
EA033: Chromium Reducible Sulfur (22B)		NA-22B-001	0.02	% S	<0.02	NA-22B-001	NA-22B-001	NA-22B-001	NA-22B-001	NA-22B-001	NA-22B-001
EA033: acidity - Chromium Reducible Sulfur (a-22B)		NA-22B-002	10	mole H+ / t	<10	NA-22B-002	NA-22B-002	NA-22B-002	NA-22B-002	NA-22B-002	NA-22B-002
EA033-B: Potential Acidity (QCLot: 652375)											
EA033: Chromium Reducible Sulfur (22B)		NA-22B-003	0.02	% S	<0.02	NA-22B-003	NA-22B-003	NA-22B-003	NA-22B-003	NA-22B-003	NA-22B-003
EA033: acidity - Chromium Reducible Sulfur (a-22B)		NA-22B-004	10	mole H+ / t	<10	NA-22B-004	NA-22B-004	NA-22B-004	NA-22B-004	NA-22B-004	NA-22B-004
EA033-E: Acid Base Accounting (QCLot: 652374)											
EA033: ANC Fineness Factor		NA-652-001	0.5		<0.5	NA-652-001	NA-652-001	NA-652-001	NA-652-001	NA-652-001	NA-652-001
EA033: Net Acidity (sulfur units)		NA-652-002	0.02	% S	<0.02	NA-652-002	NA-652-002	NA-652-002	NA-652-002	NA-652-002	NA-652-002
EA033: Net Acidity (acidity units)		NA-652-003	10	mole H+ / t	<10	NA-652-003	NA-652-003	NA-652-003	NA-652-003	NA-652-003	NA-652-003
EA033: Liming Rate		NA-652-004	1	kg CaCO3/t	<1	NA-652-004	NA-652-004	NA-652-004	NA-652-004	NA-652-004	NA-652-004
EA033-E: Acid Base Accounting (QCLot: 652375)											
EA033: ANC Fineness Factor		NA-652-005	0.5		<0.5	NA-652-005	NA-652-005	NA-652-005	NA-652-005	NA-652-005	NA-652-005
EA033: Net Acidity (sulfur units)		NA-652-006	0.02	% S	<0.02	NA-652-006	NA-652-006	NA-652-006	NA-652-006	NA-652-006	NA-652-006
EA033: Net Acidity (acidity units)		NA-652-007	10	mole H+ / t	<10	NA-652-007	NA-652-007	NA-652-007	NA-652-007	NA-652-007	NA-652-007
EA033: Liming Rate		NA-652-008	1	kg CaCO3/t	<1	NA-652-008	NA-652-008	NA-652-008	NA-652-008	NA-652-008	NA-652-008

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Work Order

: EP0802477

Client

: DOUGLAS PARTNERS PTY LTD

Project

: Ex EP0802287 46751



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**



Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EP0802477	Page	: 1 of 7
Client	: DOUGLAS PARTNERS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: MR ROBERT SHAPLAND	Contact	: Michael Sharp
Address	: 36 O'MALLEY STREET OSBORNE PARK WA 6017	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: shaplandr@douglaspartners.com.au	E-mail	: michael.sharp@alsenviro.com
Telephone	: +61 08 9204 3511	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 9204 3522	Facsimile	: +61-8-9209 7600
Project	: Ex EP0802287 46751	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: 	Date Samples Received	: 05-MAY-2008
C-O-C number	: 	Issue Date	: 14-MAY-2008
Sampler	: 	No. of samples received	: 40
Order number	: 74426	No. of samples analysed	: 40
Quote number	: EN-020-08 BQ		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Environmental Division Perth

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A Campbell Brothers Limited Company



Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date		Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Date analysed	Due for analysis	Evaluation	
EA033-A: Actual Acidity							
80° dried soil		27-MAR-2008	05-MAY-2008	27-MAR-2009	09-MAY-2008	03-AUG-2008	✓
4, 2, 9, 12, 14, 20, 21, 23, 27, 40, 46, 54, 59, 64, 67, 71, 77, 81, 88, 90, 93, 98, 100, 108, 110							



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date		Extraction / Preparation		Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Date analysed	Due for analysis
EA033-B: Potential Acidity						
80* dried soil	4,	27-MAR-2008	05-MAY-2008	27-MAR-2009	09-MAY-2008	03-AUG-2008
	9,					
	14,					
	20,					
	23,					
	27,					
	40,					
	46,					
	54,					
	59,					
	64,					
	67,					
	71,					
	77,					
	81,					
	88,					
	91,					
	95,					
	99,					
100,						
108,						
110						



Matrix: SOIL		Evaluation: * = Holding time breach ; ✓ = Within holding time.					
Method	Container / Client Sample ID(s)	Sample Date		Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity							
80° dried soil							
2, 4, 9, 14, 20, 23, 27, 40, 46, 54, 59, 64, 67, 71, 73, 77, 81, 85, 90, 93, 95, 98, 100, 105, 108, 110		05-MAY-2008	27-MAR-2009	✓	09-MAY-2008	03-AUG-2008	✓
EA033-E: Acid Base Accounting							
80° dried soil							
2, 4, 9, 14, 20, 23, 27, 40, 46, 54, 59, 64, 67, 71, 73, 77, 81, 85, 90, 93, 95, 98, 100, 105, 108, 110		05-MAY-2008	27-MAR-2009	✓	09-MAY-2008	03-AUG-2008	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: **x** = Quality Control frequency not within specification ; **✓** = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	4	40	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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Project : Ex EP0802287 46751

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods		Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils		EA033	SOIL	Ahem et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Preparation Methods		Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)		EN020PR	SOIL	In house



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

APPENDIX E

CSIRO Notes on Foundation Maintenance

Foundation Maintenance and Footing Performance: A Homeowner's Guide



BTF 18
replaces
Information
Sheet 10/91

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the homeowner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

This Building Technology File is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking in buildings.

Soil Types

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. The table below is Table 2.1 from AS 2870, the Residential Slab and Footing Code.

Causes of Movement

Settlement due to construction

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction, but has been known to take many years in exceptional cases.

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

Erosion

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

Saturation

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume – particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

Seasonal swelling and shrinkage of soil

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

Shear failure

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.
- In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

GENERAL DEFINITIONS OF SITE CLASSES

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites with only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which can experience moderate ground movement from moisture changes
H	Highly reactive clay sites, which can experience high ground movement from moisture changes
E	Extremely reactive sites, which can experience extreme ground movement from moisture changes
A to P	Filled sites
P	Sites which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise

Tree root growth

Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.
- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

Unevenness of Movement

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Swelling gradually reaches the interior soil as absorption continues. Shrinkage usually begins where the sun's heat is greatest.

Effects of Uneven Soil Movement on Structures

Erosion and saturation

Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpendes).

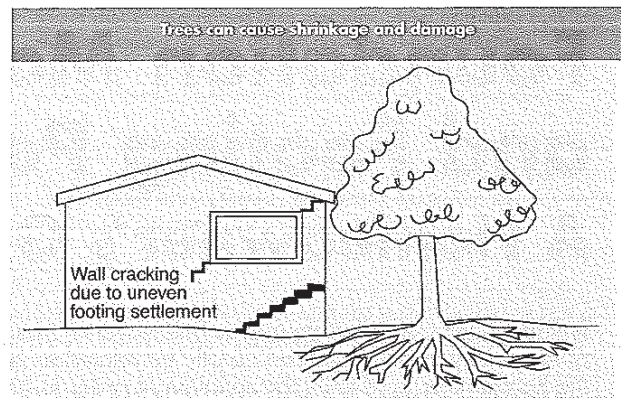
Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

Seasonal swelling/shrinkage in clay

Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.



As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

Movement caused by tree roots

In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

Complications caused by the structure itself

Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

Effects on full masonry structures

Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

Effects on framed structures

Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation cause a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

Effects on brick veneer structures

Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

Water Service and Drainage

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem.

Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.

- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870.

AS 2870 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

Prevention/Cure

Plumbing

Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

Ground drainage

In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

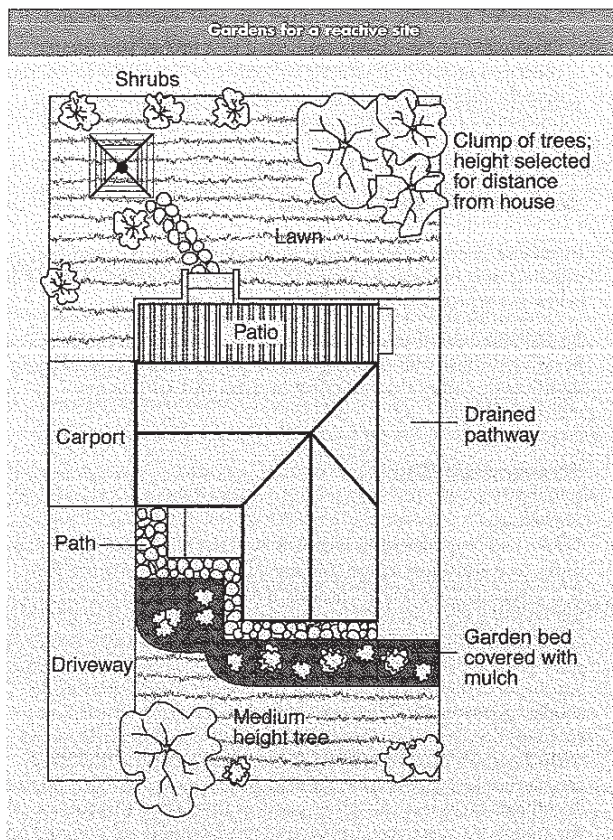
Protection of the building perimeter

It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving

CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage category
Hairline cracks	<0.1 mm	0
Fine cracks which do not need repair	<1 mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly	<5 mm	2
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired	5–15 mm (or a number of cracks 3 mm or more in one group)	3
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted	15–25 mm but also depend on number of cracks	4



should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

Condensation

In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

Warning: Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

The garden

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

Existing trees

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

Information on trees, plants and shrubs

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

Excavation

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

This BTF was prepared by John Lewer FAIB, MIAMA, Partner, Construction Diagnosis.

The information in this and other issues in the series was derived from various sources and was believed to be correct when published.

The information is advisory. It is provided in good faith and not claimed to be an exhaustive treatment of the relevant subject.

Further professional advice needs to be obtained before taking any action based on the information provided.

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APPENDIX 3

PRI Test Results



Q/R	6.4Å N 2 &=0&.+	6-(4!Å @/	Q/R
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JPK _____ JPK

\$%&() &A*++), '-.A (* -0(* %&A)), '†, A 2) 3A/5 7A8+09: ;
<* A2*%A-A-8 1::



Q/R	6.4Å 2 &=0&.+	6-(=4!Å @/	Q/R
-----	---------------	------------	-----

JAN _____ JAN _____

\$%&() &A*++), '-.A (* -0(* &%&)), '↑, A 2) 3A/5 7A8+09: ;
<* A2*%&A-g 1::



Q/R	6.4Å 2 &=0&.+	6-(=4!Å @/	Q/R
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JAN _____ JAN _____

\$%&() &A*++), '-.A (* -0(* &%&)), '↑, A 2) 3A/5 7A8+09: ;
<* A2*%&A-g 1::



Q(R	6.&4ÄN 2 &=0&.+	6-(-4!Ä @/	Q(R
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JPK _____ JPK

\$%&() &A*++), '-.A (* -0(* &%&)), '↑, A 2) 3A/5 6A8+ 09: ;
<* A2* %&A-'@ 1 ::



ANALYTICAL REPORT

CLIENT DETAILS

Contact **Angela Filardi**
Client **RPS Environment and Planning Pty Ltd**
Address **PO Box 465
SUBIACO WA 6904**

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Project **D1203102 Nth Baldivis**
Order Number **D1203102**
Samples **12**

LABORATORY DETAILS

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SGS Reference **PE079973 R0**
Report Number **0000066574**
Date Reported **30 Jul 2013**
Date Received **25 Jul 2013**

COMMENTS

Whilst SGS laboratories conform to ISO:17025 standards, results of analysis in this report fall outside of the current scope of NATA accreditation

SIGNATORIES

Leanne Orsmond
Inorganics Coordinator

Ros Ma
Laboratory Manager



ANALYTICAL REPORT

PE079973 R0

Parameter	Sample Number	PE079973.001	PE079973.002	PE079973.003	PE079973.004
	Sample Matrix	Soil	Soil	Soil	Soil
	Sample Date	18 Jul 2013	18 Jul 2013	18 Jul 2013	18 Jul 2013
	Sample Name	C01S01	C01S02	C02S01	C02S02
	Units	LOR			

Phosphorus Retention Index Method: AN242

PRI (1:20)	No unit	1	<1	<1	12	5
------------	---------	---	----	----	----	---



ANALYTICAL REPORT

PE079973 R0

Parameter	Sample Number	PE079973.005	PE079973.006	PE079973.007	PE079973.008
	Sample Matrix	Soil	Soil	Soil	Soil
	Sample Date	18 Jul 2013	18 Jul 2013	18 Jul 2013	18 Jul 2013
	Sample Name	C02S03	C03S01	C03S02	C03S03
Units		LOR			

Phosphorus Retention Index Method: AN242

PRI (1:20)	No unit	1	3	25	3	2
------------	---------	---	---	----	---	---



ANALYTICAL REPORT

PE079973 R0

Parameter	Sample Number	PE079973.009	PE079973.010	PE079973.011	PE079973.012
	Sample Matrix	Soil	Soil	Soil	Soil
	Sample Date	18 Jul 2013	18 Jul 2013	18 Jul 2013	18 Jul 2013
	Sample Name	C04S01	C04S02	C04S03	C04S04
Units		LOR			

Phosphorus Retention Index Method: AN242

PRI (1:20)	No unit	1	1	<1	<1	<1
------------	---------	---	---	----	----	----

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Phosphorus Retention Index **Method: ME-(AU)-[ENV]AN242**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
PRI (1:20)	LB068648	No unit	1	<1	0%

METHOD

AN242

METHODOLOGY SUMMARY

A sample of soil is equilibrated with a solution of potassium chloride containing a known concentration of phosphorus (10mgP/L) for a set period of time. The amount of phosphorus subsequently present in the solution is measured on an Aquakem Discrete Analyser from which the soils ability to retain phosphorus may be determined.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	This analysis is not covered by the scope of accreditation.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
^	Performed by outside laboratory.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here:
<http://www.sgs.com.au.pv.sgs.v3/~media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf>

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APPENDIX 4

OEPA Correspondence



- 8 OCT 2013

John Halleen
Technical Director
RPS
38 Station Street
SUBIACO WA 6008

Your Ref: L13009
Our Ref:
Enquiries: Gary Williams, 6145 0821
Email: Gary.Williams@epa.wa.gov.au

Dear Mr Halleen

NORTH BALDIVIS LOCAL STRUCTURE PLAN – PROPOSED WETLAND MANAGEMENT

I refer to your letter dated 15 August 2013 seeking the Office of the Environmental Protection Authority's (OEPA) comments on the proposed management of the wetland within the North Baldivis Local Structure Plan.

The Environmental Protection Authority's (EPA) environmental objectives for hydrological processes and environmental quality of inland waters (wetland) are to:

- maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected; and
- maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social are protected (Environmental Assessment Guideline No. 8 - Environmental factors and objectives).

The OEPA has reviewed your letter (dated 15 August 2013) and the Indicative Resource Enhancement Wetland Buffer attached to the letter. The OEPA is satisfied that the proposed management measures and buffer will protect the environmental values of the Resource Enhancement wetland within the proposed North Baldivis Local Structure Plan.

The management measures include:

- Provision of a 30m buffer from the edge of the wetland primarily to retain the *Melaleuca raphiophylla* trees.
- Maintaining ecological water requirements to the *Melaleuca raphiophylla* trees.
- Weed management.
- Revegetation of the core wetland area and surface water retention swales using endemic species.
- Interface treatments between conservation areas and recreation areas.

I trust this information is of assistance. Should you have any enquiries please contact Gary Williams on 6145 0821.

Yours sincerely

A handwritten signature in black ink, appearing to read 'D. Foster', with a stylized flourish at the end.

Darren Foster
DIRECTOR

2 October 2013

cc: Department of Planning
City of Rockingham

APPENDIX 5

Water Quality Information

APPENDIX 5: Water Quality Information

Note: Regional Bore IDs (i.e. B3 to B5, B7 to B8) are not the same reference as site bores (i.e. B3 to B5, B7 to B8). Figures 5-1 and 5-2 show the regional and site bore locations for reference.

Table 5-1: Site Water Quality- Nutrients

Sample ID	Date	Ammonia	NOx-N	TN	TP	FRP
ANZECC (2000) Wetlands		0.04	0.1	1.5	0.06	0.03
Peel-Harvey WQIP					0.1	
B1	13/07/2005	0.5	0.01	2.8	0.1	0.04
	14/10/2007	0.4	0.09	1.7	0.06	0.02
	30/01/2006	0.2	0.38	1.6	0.12	0.04
	24/04/2006	n/a	n/a	n/a	n/a	n/a
	25/07/2006	1	31	31	1.7	0.08
	23/10/2006	0.6	13	13	0.7	0.03
	2/02/2007	n/a	n/a	n/a	n/a	n/a
	28/03/2007	n/a	n/a	n/a	n/a	n/a
	27/07/2007	0.2	0.09	6.1	0.35	0.06
	13/02/2008	n/a	n/a	n/a	n/a	n/a
	8/04/2008	0.5	<0.1	21	1.2	0.07
	28/07/2008	0.3	0.01	3.1	0.27	0.07
	Average	0.46	6.37	10.04	0.56	0.05
	Max	1.00	31.00	31.00	1.70	0.08
	Min	0.20	0.01	1.60	0.06	0.02
B2	13/07/2005	0.4	0.06	9.2	12	12
	14/10/2007	0.2	0.01	1.8	3.5	3.4
	30/01/2006	0.2	0.03	0.7	0.29	0.21
	24/04/2006	0.4	0.01	1.7	0.13	0.13
	25/07/2006	0.6	3.8	3.9	4.2	0.2
	23/10/2006	0.6	6.9	6.9	10	10
	2/02/2007	1	5.8	5.8	9.6	7.9
	28/03/2007	0.7	5.3	0.03	5.7	5.3
	Average	0.51	2.74	3.75	5.68	4.89
	Max	1.00	6.90	9.20	12.00	12.00
	Min	0.20	0.01	0.03	0.13	0.13

Sample ID	Date	Ammonia	NOx-N	TN	TP	FRP
ANZECC (2000) Wetlands		0.04	0.1	1.5	0.06	0.03
Peel-Harvey WQIP					0.1	
B3	18/12/2012	0.16	11	23.6	4.78	2.07
	10/03/2013	0.08	7.1	3	4.59	3.74
	18/06/2013	0.06	2.65	6.6	4.34	
	30/09/2013	0.19	0.05	4.6	7.35	6.34
	Average	0.12	5.20	9.45	5.27	4.05
	Max	0.19	11.00	23.60	7.35	6.34
	Min	0.06	0.05	3.00	4.34	2.07
B4	18/12/2012	0.05	2.93	4	0.05	0.04
	10/03/2013	0.91	0.03	4.5	0.87	0.1
	18/06/2013	1.08	0.02	3.2	0.24	
	30/09/2013	0.2	0.69	1.6	0.05	0.02
	Average	0.56	0.92	3.33	0.30	0.05
	Max	1.08	2.93	4.50	0.87	0.10
	Min	0.05	0.02	1.60	0.05	0.02
B5	18/12/2012	0.19	14.4	20.4	5.98	5.98
	10/03/2013	1.19	4.05	12	9.33	8.49
	18/06/2013	0.9	8.16	15.8	7.7	
	30/09/2013	0.08	5.93	11.3	2.75	2.81
	Average	0.59	8.14	14.88	6.44	5.76
	Max	1.19	14.40	20.40	9.33	8.49
	Min	0.08	4.05	11.30	2.75	2.81
B6	18/12/2012	0.72	0.01	3.7	0.17	0.04
	10/03/2013	0.71	0.01	4.2	0.24	0.03
	18/06/2013	0.63	0.05	4.8	0.16	NT
	30/09/2013	0.08	0.02	2	0.35	0.06
	Average	0.54	0.02	3.68	0.23	0.04
	Max	0.72	0.05	4.80	0.35	0.06
	Min	0.08	0.01	2.00	0.16	0.03
B7	18/12/2012	0.18	0.01	36.3	1.88	0.02
	10/03/2013	0.06	0.16	7.5	0.5	0.02
	18/06/2013	0.06	19.4	25.7	0.1	NT
	30/09/2013	0.51	0.05	6.1	0.52	0.39
	Average	0.20	4.91	18.90	0.75	0.14
	Max	0.51	19.40	36.30	1.88	0.39
	Min	0.06	0.01	6.10	0.10	0.02

Sample ID	Date	Ammonia	NOx-N	TN	TP	FRP
ANZECC (2000) Wetlands		0.04	0.1	1.5	0.06	0.03
Peel-Harvey WQIP					0.1	
B8	18/12/2012	0.23	2.63	10.4	1.15	0.01
	10/03/2013	0.2	0.01	2.7	0.19	0.02
	18/06/2013	0.21	0.05	3.1	0.05	NT
	30/09/2013	0.12	2.37	3.9	0.05	0.01
	Average	0.19	1.27	5.03	0.36	0.01
	Max	0.23	2.63	10.40	1.15	0.02
	Min	0.12	0.01	2.70	0.05	0.01
SG2	18/06/2013	0.16	0.05	8	2.71	NT
	30/09/2013	0.17	0.05	5.2	1.13	0.92
	Average	0.17	0.05	6.60	1.92	0.92
	Max	0.17	0.05	8.00	2.71	0.92
	Min	0.16	0.05	5.20	1.13	0.92
SG1	30/09/2013	0.1	0.05	4.5	0.99	0.76
	Average	0.10	0.05	4.50	0.99	0.76
	Max	0.10	0.05	4.50	0.99	0.76
	Min	0.10	0.05	4.50	0.99	0.76

Green shading indicates exceeds WQIP – Water Quality Improvement Plan for the Rivers and Estuary of the Peel-Harvey System – Phosphorus Management (EPA 2008) – Water Quality Target

Blue shading indicates exceeds values for Wetland environments - Table 3-3.3.6 ANZECC/ARMCANZ 2000 Freshwater and Marine WQ Guidelines Chapter 3

Table 5-2: Site Water Quality- Field Parameters

Bore ID	Date	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Redox (mV)	DO (ppm)
B1	18/12/2012	21.20	6.38	1,344	-142.00	0.99
	19/02/2013	22.00	6.09	1,254	-136.00	1.61
	10/03/2013	25.00	6.26	1,244	-109.00	4.79
	23/04/2013	22.50	6.18	1,271	-101.00	2.17
	22/05/2013	18.30	5.87	1,948	-90.00	2.29
	18/06/2013	17.80	6.35	1,840	-137.00	3.12
	18/07/2013	16.40	6.35	2,342	-92.00	6.91
	23/08/2013	16.40	6.41	1,382	-90.00	7.43
	30/09/2013	17.40	6.25	1,160	-123.00	
	25/10/2013	18.20	6.27	1,286	-139.00	1.23
	27/11/2013	20.80	6.36	1,197	-142.00	1.49
	Average	19.64	6.25	1,479	-118.27	3.20
	Max	25.00	6.41	2,342	-90.00	7.43
	Min	16.40	5.87	1,160	-142.00	0.99

Bore ID	Date	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Redox (mV)	DO (ppm)
B2	18/12/2012	25.60	5.90	424	-74.00	0.15
	19/02/2013	24.50	5.33	367	-102.00	0.59
	10/03/2013	23.60	5.26	360	-99.00	0.24
	23/04/2013	22.00	5.25	374	-60.00	
	22/05/2013	19.00	5.54	442	5.00	
	18/06/2013	17.60	5.30	606	-202.00	0.19
	18/07/2013	16.80	5.71	527	-155.00	2.17
	23/08/2013	16.00	5.73	415	-82.00	0.60
	30/09/2013	17.10	5.26		-51.00	
	25/10/2013	19.00	5.63	289	-129.00	
	27/11/2013	23.40	5.83	242	-156.00	0.04
	Average	20.42	5.52	405	-100.45	0.57
	Max	25.60	5.90	606	5.00	2.17
	Min	16.00	5.25	242	-202.00	0.04
B3	18/12/2012	25.40	6.38	596	-37.00	1.01
	19/02/2013	22.70	6.03	547	-49.00	0.66
	10/03/2013	24.70	6.15	524	-59.00	2.10
	23/04/2013	22.40	6.21	549	-79.00	
	22/05/2013	19.30	6.13	468	-20.00	0.00
	18/06/2013	19.20	6.28	521	-77.00	0.07
	18/07/2013	17.70	6.31	394	-53.00	0.07
	23/08/2013	17.20	5.42	132	93.00	0.20
	30/09/2013	18.40	5.35	133	32.00	
	25/10/2013	18.70	5.97	365	-20.00	
	27/11/2013	21.50	5.99	663	-134.00	0.07
	Average	20.65	6.02	445	-36.64	0.52
	Max	25.40	6.38	663	93.00	2.10
	Min	17.20	5.35	132	-134.00	0.00
B4	18/12/2012	23.50	7.38	11,220	-28.00	3.88
	19/02/2013	20.70	7.11	4,060	-81.00	6.65
	10/03/2013	28.40	6.90	2,640	-82.00	3.41
	23/04/2013	22.20	6.71	2,630	-135.00	2.72
	22/05/2013	19.30	5.73	2,450	-103.00	1.04
	18/06/2013	19.40	6.77	2,710	-124.00	1.70
	18/07/2013	17.20	7.12	7,020	-80.00	8.34
	23/08/2013	18.00	7.48	9,210	-40.00	8.44
	30/09/2013	17.70	7.17	6,870	-113.00	0.12
	25/10/2013	19.20	7.23	7,460	-82.00	2.04
	27/11/2013	21.20	7.18	3,220	-68.00	5.72
	Average	20.62	6.98	5,408	-85.09	4.01
	Max	28.40	7.48	11,220	-28.00	8.44
	Min	17.20	5.73	2,450	-135.00	0.12

Bore ID	Date	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Redox (mV)	DO (ppm)
B5	18/12/2012	26.40	5.23	323	127.00	1.08
	19/02/2013	27.60	5.16	319	71.00	0.71
	10/03/2013	26.40	5.07	366	87.00	1.40
	23/04/2013	24.70	5.41	379	118.00	0.38
	22/05/2013	20.30	4.87	319	179.00	1.04
	18/06/2013	19.20	5.20	427	-46.00	0.66
	18/07/2013	18.20	5.70	399	14.00	4.71
	23/08/2013	16.90	5.06	276	126.00	1.57
	30/09/2013	17.70	4.67	181	270.00	1.27
	25/10/2013	19.90	4.70	198	321.00	0.28
	27/11/2013	25.10	4.73	207	271.00	0.22
	Average	22.04	5.07	308	139.82	1.21
	Max	27.60	5.70	427	321.00	4.71
	Min	16.90	4.67	181	-46.00	0.22
B6	18/12/2012	26.80	6.26	3,080	-169.00	0.13
	20/01/2013	20.90	6.27	2,980	-163.00	4.16
	10/03/2013	25.30	6.35	2,820	-149.00	4.20
	23/04/2013	22.60	6.30	2,860	-156.00	1.24
	22/05/2013	19.40	6.10	2,620	-137.00	0.74
	18/06/2013	18.50	6.20	2,970	-184.00	2.86
	18/07/2013	17.60	6.88	698	-56.00	6.79
	23/08/2013	17.80	6.96	1,123	-114.00	1.48
	30/09/2013	17.90	6.56	2,175	-155.00	3.47
	25/10/2013	23.10	6.39	2,330	-151.00	2.56
	27/11/2013	28.80	6.14	2,570	-212.00	0.32
	Average	21.70	6.40	2,384	-149.64	2.54
	Max	28.80	6.96	3,080	-56.00	6.79
	Min	17.60	6.10	698	-212.00	0.13
B7	18/12/2012	25.00	6.85	818	-142.00	0.13
	20/01/2013	23.90	6.30	886	-103.00	0.25
	10/03/2013	25.00	6.42	1,071	-81.00	4.29
	23/04/2013	23.30	6.34	1,112	-128.00	0.08
	22/05/2013	20.70	6.32	1,090	4.00	0.16
	18/06/2013	18.50	6.44	1,455	-144.00	2.96
	18/07/2013	15.90	5.88	1,291	89.00	8.66
	23/08/2013	17.00	5.67	575	101.00	6.71
	30/09/2013	16.30	5.83	363	91.00	0.01
	25/10/2013	18.60	6.05	638	107.00	0.90
	27/11/2013	22.10	6.28	695	20.00	0.98
	Average	20.57	6.22	909	-16.91	2.28
	Max	25.00	6.85	1,455	107.00	8.66
	Min	15.90	5.67	363	-144.00	0.01

Bore ID	Date	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Redox (mV)	DO (ppm)
B8	18/12/2012	26.80	6.49	3,140	-84.00	0.73
	20/01/2013	21.40	6.26	1,601	-140.00	0.82
	10/03/2013	22.40	6.26	1,885	-138.00	4.22
	23/04/2013	21.50	6.23	1,663	-147.00	0.00
	22/05/2013	20.20	6.06	1,765	-123.00	2.04
	18/06/2013	19.50	6.24	1,818	-186.00	2.32
	18/07/2013	18.30	6.31	1,942	-111.00	7.50
	23/08/2013	18.30	6.50	2,720	-80.00	7.38
	30/09/2013	16.40	6.43	2,770	101.00	0.28
	25/10/2013	21.40	6.51	2,610	-88.00	0.28
	27/11/2013	24.50	6.26	1,815	-195.00	0.15
	Average	20.97	6.32	2,157	-108.27	2.34
	Max	26.80	6.51	3,140	101.00	7.50
	Min	16.40	6.06	1,601	-195.00	0.00

Table 5-3: Regional Water Quality- Nutrients

Bore ID	Date	NH ₄ -N	NO _x -N	TN	TP	FRP
ANZECC (2000) Wetlands		0.04	0.1	1.5	0.06	0.03
B1	13/07/2005	0.5	0.01	2.8	0.1	0.04
	14/10/2007	0.4	0.09	1.7	0.06	0.02
	30/01/2006	0.2	0.38	1.6	0.12	0.04
	24/04/2006	n/a	n/a	n/a	n/a	n/a
	25/07/2006	1	31	31	1.7	0.08
	23/10/2006	0.6	13	13	0.7	0.03
	2/02/2007	n/a	n/a	n/a	n/a	n/a
	28/03/2007	n/a	n/a	n/a	n/a	n/a
	27/07/2007	0.2	0.09	6.1	0.35	0.06
	13/02/2008	n/a	n/a	n/a	n/a	n/a
	8/04/2008	0.5	<0.1	21	1.2	0.07
	28/07/2008	0.3	0.01	3.1	0.27	0.07
B2	13/07/2005	0.4	0.06	9.2	12	12
	14/10/2007	0.2	0.01	1.8	3.5	3.4
	30/01/2006	0.2	0.03	0.7	0.29	0.21
	24/04/2006	0.4	0.01	1.7	0.13	0.13
	25/07/2006	0.6	3.8	3.9	4.2	0.2
	23/10/2006	0.6	6.9	6.9	10	10
	2/02/2007	1	5.8	5.8	9.6	7.9
	28/03/2007	0.7	5.3	0.03	5.7	5.3

Bore ID	Date	NH ₄ -N	NO _x -N	TN	TP	FRP
ANZECC (2000) Wetlands		0.04	0.1	1.5	0.06	0.03
B3	13/07/2005	0.2	6.5	11	1.6	1.6
	14/10/2007	0.2	1.6	5	1.3	1.3
	30/01/2006	0.2	0.11	2	1.7	1.6
	24/04/2006	n/a	n/a	n/a	n/a	n/a
	25/07/2006	0.2	4.4	4.4	1.2	0.2
	23/10/2006	0.2	2.4	2.7	0.73	0.52
	2/02/2007	0.2	4.8	4.8	1	0.27
	28/03/2007	0.2	6.1	0.11	0.57	0.41
B4	13/07/2005	0.5	18	21	0.31	0.22
	14/10/2007	0.2	18	21	0.27	0.21
	30/01/2006	0.2	0.33	1	0.19	0.09
	24/04/2006	0.2	0.02	2.3	0.31	0.02
	25/07/2006	0.2	1.7	1.7	0.33	0.02
	23/10/2006	0.2	4.1	8.7	0.73	0.05
	2/02/2007	0.2	1.8	2.1	0.2	0.01
	28/03/2007	0.2	1.2	0.01	0.12	0.01
B5	13/07/2005	0.2	28	34	1.7	1.6
	14/10/2007	0.2	5.1	10	1.3	1.3
	30/01/2006	0.2	0.03	1.1	0.75	0.47
	24/04/2006	0.3	0.03	2	0.75	0.68
	25/07/2006	0.4	1.9	1.9	0.45	0.21
	23/10/2006	0.4	1.4	1.8	0.6	0.48
	2/02/2007	1.2	2.2	2.2	0.64	0.61
	28/03/2007	1	1.9	0.01	0.46	0.45
B8	1/02/2007	0.4	0.06	11	0.02	0.01
	27/03/2007	0.2	4.1	0.57	0.37	0.03
	27/07/2007	0.2	0.9	3.1	0.21	0.02
	13/02/2008	0.2	0.21	1.50	0.11	<0.01
	8/04/2008	<0.2	0.01	0.80	0.09	0.04
	28/07/2008	0.2	0.19	4.40	0.14	0.03
B9	1/02/2007	0.9	0.77	12	0.03	0.01
	27/03/2007	Insufficient water for sample				
	27/07/2007	0.5	6.8	18	0.55	0.02
	13/02/2008	0.2	1.20	4.80	0.1	<0.1
	8/04/2008	<0.2	0.10	2.80	0.17	0.03
	28/07/2008	0.2	2.50	11.00	0.26	0.06

Blue shading indicates exceeds values for Wetland environments - Table 3-3.3.6 ANZECC/ARMCANZ 2000 Freshwater and Marine WQ Guidelines Chapter 3

Table 5-4: Regional Water Quality- Field Parameters

Bore I.D.	Date	pH	EC (µS/cm)
B1	13/06/2005	6.18	1778
	14/10/2005	5.99	1509
	30/01/2006	6.89	1497
	24/04/2006	n/a	n/a
	24/07/2006	n/a	1380
	23/10/2006	6.22	1970
	1/02/2007	n/a	n/a
	27/03/2007	n/a	n/a
	27/07/2007	6.33	6230
	27/08/2007	6.19	6000
	25/09/2007	6.03	3590
	25/10/2007	6.44	2580
	27/11/2007	6.39	1867
	13/02/2008	Inadequate Water	
	10/03/2008	6.25	1695
	8/04/2008	6.31	1253
	6/05/2008	6.25	1386
	28/05/2008	6.38	1212
	26/06/2008	6.48	1043
	28/07/2008	6.31	1376
	27/08/2008	6.18	1350
	24/09/2008	6.06	1436
	22/10/2008	6.34	1344
B2	13/06/2005	5.67	823
	14/10/2005	5.38	203
	30/01/2006	5.89	171
	24/04/2006	5.23	150
	24/07/2006	n/a	530
	23/10/2006	6.09	950
	1/02/2007	6.12	689
	27/03/2007	5.83	510
B3	13/06/2005	6.14	736
	14/10/2005	5.82	893
	30/01/2006	6.72	756
	24/04/2006	n/a	n/a
	24/07/2006	n/a	630
	23/10/2006	6.17	620

Bore I.D.	Date	pH	EC (µS/cm)
	1/02/2007	5.87	780
	27/03/2007	5.43	1660
B4	13/06/2005	6.64	767
	14/10/2005	6.1	76
	30/01/2006	6.72	968
	24/04/2006	6.13	930
	24/07/2006	n/a	790
	23/10/2006	6.27	710
	1/02/2007	6.04	881
	27/03/2007	6.24	920
B5	13/06/2005	6.19	1609
	14/10/2005	6.07	981
	30/01/2006	7.36	566
	24/04/2006	6.36	550
	24/07/2006	n/a	420
	23/10/2006	6.54	450
	1/02/2007	6.56	380
	27/03/2007	6.35	390
B8	1/02/2007	6.77	468
	27/03/2007	6.45	520
	27/07/2007	6.64	443
	27/08/2007	6.33	4.24
	25/09/2007	6.3	334
	25/10/2007	6.46	298
	27/11/2007	6.53	302
	13/02/2008	6.27	446
	10/03/2008	7.22	980
	8/04/2008	6.49	454
	6/05/2008	6.54	524
	28/05/2008	6.86	537
	26/06/2008	7.02	632
	28/07/2008	6.33	363
	27/08/2008	5.89	353
	24/09/2008	5.92	445
	22/10/2008	6.44	380

Bore I.D.	Date	pH	EC (µS/cm)
B9	1/02/2007	6.65	299
	27/07/2007	6.56	363
	27/08/2007	6.68	823
	25/09/2007	6.93	592
	25/10/2007	7.15	639
	27/11/2007	6.86	399
	13/02/2008	6.29	317
	10/03/2008	7.03	641
	8/04/2008	6.71	254
	6/05/2008	6.44	264
	28/05/2008	6.12	332
	26/06/2008	6.92	429
	28/07/2008	6.61	383
	27/08/2008	6.27	589
	24/09/2008	6.57	502
	22/10/2008	7.05	467



Figure 5-1: Regional Groundwater Monitoring Locations (modified from PB 2009)



Figure 5-2: Site Monitoring Locations



Environmental Division



CERTIFICATE OF ANALYSIS

Work Order	: EP1210593	Page	: 1 of 4
Client	: RPS ENVIRONMENT PTY LTD	Laboratory	: Environmental Division Perth
Contact	: SIMON HEWITT	Contact	: Tracy Presland
Address	: 38 STATION STREET SUBIACO WA, AUSTRALIA 6008	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: simon.hewitt@rpsgroup.com.au	E-mail	: Tracy.Presland@alsglobal.com
Telephone	: +61 08 93824744	Telephone	: 08 9209 7604
Facsimile	: +61 08 93821177	Facsimile	: 08 9209 7600
Project	: D1203102	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 19-DEC-2012
C-O-C number	: ----	Issue Date	: 09-JAN-2013
Sampler	: JR	No. of samples received	: 7
Site	: North Baldivis	No. of samples analysed	: 7
Quote number	: EP-167-10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
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Page : 2 of 4
Work Order : EP1210593
Client : RPS ENVIRONMENT PTY LTD
Project : D1203102

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- It is recognised that total phosphorus (EK067G) is less than reactive phosphorus (EK071G) for samples 'B5'. However, the difference is within experimental variation of the methods.



Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID						
Compound	Client sampling date / time		B3	B4	B5	B6	B7		
	CAS Number	LOR						Unit	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.16	0.05	0.19	0.72	0.18	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	-----	0.01	mg/L	0.03	0.01	0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	11.0	2.95	14.4	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	-----	0.01	mg/L	11.0	2.96	14.4	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	-----	0.1	mg/L	12.6	1.0	6.0	3.7	36.3	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
Total Nitrogen as N	-----	0.1	mg/L	23.6	4.0	20.4	3.7	36.3	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	-----	0.01	mg/L	4.78	<0.05	5.38	0.17	1.88	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	-----	0.01	mg/L	2.07	0.04	5.98	0.04	0.02	



Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID			
			Client sampling date / time		B8	BZ
Compound	CAS Number	LOR	Unit		EP1210593-006	EP1210593-007
EK055G: Ammonia as N by Discrete Analyser						
Ammonia as N	7664-41-7	0.01	mg/L		0.23	0.04
EK057G: Nitrite as N by Discrete Analyser						
Nitrite as N		0.01	mg/L		0.08	0.01
EK058G: Nitrate as N by Discrete Analyser						
Nitrate as N	14797-55-8	0.01	mg/L		2.55	3.07
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser						
Nitrite + Nitrate as N		0.01	mg/L		2.63	3.08
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser						
Total Kjeldahl Nitrogen as N		0.1	mg/L		7.8	0.9
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser						
^ Total Nitrogen as N		0.1	mg/L		10.4	4.0
EK067G: Total Phosphorus as P by Discrete Analyser						
Total Phosphorus as P		0.01	mg/L		1.15	<0.05
EK071G: Reactive Phosphorus as P by discrete analyser						
Reactive Phosphorus as P		0.01	mg/L		0.01	0.03



Environmental Division



QUALITY CONTROL REPORT

Work Order	: EP1210593	Page	: 1 of 5
Client	: RPS ENVIRONMENT PTY LTD	Laboratory	: Environmental Division Perth
Contact	: SIMON HEWITT	Contact	: Tracy Presland
Address	: 38 STATION STREET SUBIACO WA, AUSTRALIA 6008	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: simon.hewitt@rpsgroup.com.au	E-mail	: Tracy.Presland@alsglobal.com
Telephone	: +61 08 93824744	Telephone	: 08 9209 7604
Facsimile	: +61 08 93821177	Facsimile	: 08 9209 7600
Project	: D1203102	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: North Baldivis	Date Samples Received	: 19-DEC-2012
C-O-C number	: ----	Issue Date	: 09-JAN-2013
Sampler	: JR	No. of samples received	: 7
Order number	: ----	No. of samples analysed	: 7
Quote number	: EP-167-10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



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Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Chas Tucker	Inorganic Chemist	Perth Inorganics





Page : 2 of 5
Work Order : EP1210593
Client : RPS ENVIRONMENT PTY LTD
Project : D1203102

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :

Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2659302)										
EP1210569-001	Anonymous		EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.28	1.28	0.0	0% - 20%
EP1210594-002	Anonymous		EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.08	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2658804)										
EP1210586-002	Anonymous		EK057G: Nitrite as N	----	0.01	mg/L	1.71	1.75	2.5	0% - 20%
EP1210593-007	BZ		EK057G: Nitrite as N	----	0.01	mg/L	0.01	0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2659301)										
EP1210569-001	Anonymous		EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	46.7	47.4	1.6	0% - 20%
EP1210594-002	Anonymous		EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2658729)										
EP1210466-001	Anonymous		EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<1.0	1.1	0.0	0% - 50%
EP1210528-001	Anonymous		EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.0	2.0	0.0	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2658731)										
EP1210593-005	B7		EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	36.3	41.4	13.0	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2658730)										
EP1210466-001	Anonymous		EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.10	<0.10	0.0	No Limit
EP1210528-001	Anonymous		EK067G: Total Phosphorus as P	----	0.01	mg/L	0.22	0.21	0.0	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2658732)										
EP1210593-005	B7		EK067G: Total Phosphorus as P	----	0.01	mg/L	1.88	1.99	6.0	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2658806)										
EP1210586-002	Anonymous		EK071G: Reactive Phosphorus as P	----	0.01	mg/L	3.00	3.06	1.9	0% - 20%
EP1210593-007	BZ		EK071G: Reactive Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.0	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound		CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2659302)								
EK055G: Ammonia as N	7684-41-7	0.01		mg/L	<0.01	1 mg/L	96.7	87 115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2658804)								
EK057G: Nitrite as N	-----	0.01		mg/L	<0.01	0.5 mg/L	95.2	86 112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2659301)								
EK059G: Nitrite + Nitrate as N	-----	0.01		mg/L	<0.01	0.5 mg/L	104	92 112
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2658729)								
EK061G: Total Kjeldahl Nitrogen as N	-----	0.1		mg/L	<0.1	10 mg/L	94.8	74 130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2658734)								
EK061G: Total Kjeldahl Nitrogen as N	-----	0.1		mg/L	<0.1	10 mg/L	87.4	74 130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2658730)								
EK067G: Total Phosphorus as P	-----	0.01		mg/L	<0.01	4.42 mg/L	95.8	70 130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2658732)								
EK067G: Total Phosphorus as P	-----	0.01		mg/L	<0.01	4.42 mg/L	95.6	70 130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2658806)								
EK071G: Reactive Phosphorus as P	-----	0.01		mg/L	<0.01	0.5 mg/L	112	87 115

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER			Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2659302)						
EP1210569-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	87.3	70 130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2658804)						
EP1210586-002	Anonymous	EK057G: Nitrite as N	-----	0.6 mg/L	77.2	70 130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2659301)						
EP1210569-001	Anonymous	EK059G: Nitrite + Nitrate as N	-----	0.6 mg/L	# Not Determined	70 130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2658729)						
EP1210466-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	-----	50 mg/L	89.4	70 130



Sub-Matrix: **WATER**

Sub-Matrix: WATER			Matrix Spike (MS) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery(%)	Recovery Limits (%)	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2658731)							
EP1210593-005	B7	EK061G: Total Kjeldahl Nitrogen as N	-----	25 mg/L	95.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2658730)							
EP1210466-001	Anonymous	EK067G: Total Phosphorus as P	-----	10 mg/L	88.8	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2658732)							
EP1210593-005	B7	EK067G: Total Phosphorus as P	-----	5 mg/L	89.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2658806)							
EP1210586-002	Anonymous	EK071G: Reactive Phosphorus as P	-----	0.5 mg/L	# Not Determined	70	130

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)		
				Concentration	MS	MSD	Low	High	Value	Control Limit	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2658729)											
EP1210466-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	-----	50 mg/L	89.4	-----	70	130	-----	-----	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2658730)											
EP1210466-001	Anonymous	EK067G: Total Phosphorus as P	-----	10 mg/L	88.8	-----	70	130	-----	-----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2658731)											
EP1210593-005	B7	EK061G: Total Kjeldahl Nitrogen as N	-----	25 mg/L	95.4	-----	70	130	-----	-----	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2658732)											
EP1210593-005	B7	EK067G: Total Phosphorus as P	-----	5 mg/L	89.0	-----	70	130	-----	-----	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2658804)											
EP1210586-002	Anonymous	EK057G: Nitrite as N	-----	0.6 mg/L	77.2	-----	70	130	-----	-----	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2658806)											
EP1210586-002	Anonymous	EK071G: Reactive Phosphorus as P	-----	0.5 mg/L	# Not Determined	-----	70	130	-----	-----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2659301)											
EP1210569-001	Anonymous	EK059G: Nitrite + Nitrate as N	-----	0.6 mg/L	# Not Determined	-----	70	130	-----	-----	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2659302)											
EP1210569-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	87.3	-----	70	130	-----	-----	

INTERPRETIVE QUALITY CONTROL REPORT

Work Order : **EP1210593**

Page : 1 of 7

Client : RPS ENVIRONMENT PTY LTD
 Contact : SIMON HEWITT
 Address : 38 STATION STREET
 SUBIACO WA, AUSTRALIA 6008
 E-mail : simon.hewitt@rpsgroup.com.au
 Telephone : +61 08 93824744
 Facsimile : +61 08 93821177

Laboratory : Environmental Division Perth
 Contact : Tracy Presland
 Address : 10 Hod Way Malaga WA Australia 6090

Project : D1203102
 Site : North Baldivis
 C-O-C number : ----
 Sampler : JR
 Order number : ----

Date Samples Received : 19-DEC-2012
 Issue Date : 09-JAN-2013

Quote number : EP-167-10
 No. of samples received : 7
 No. of samples analysed : 7

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date		Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK055G) B3, B5, B7, B8, BZ	B4, B6, B8, BZ	---	19-DEC-2012	---	20-DEC-2012	19-DEC-2012	✗
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) B3, B5, B7, B8, BZ	B4, B6, B8, BZ	---	20-DEC-2012	---	19-DEC-2012	20-DEC-2012	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Natural (EK059G) B3, B5, B7, B8, BZ	B4, B6, B8, BZ	---	20-DEC-2012	---	20-DEC-2012	20-DEC-2012	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Natural (EK061G) B3, B5, B7, B8, BZ	B4, B6, B8, BZ	21-DEC-2012	19-DEC-2012	✗	21-DEC-2012	18-JAN-2013	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Natural (EK067G) B3, B5, B7, B8, BZ	B4, B6, B8, BZ	21-DEC-2012	20-DEC-2012	✗	21-DEC-2012	18-JAN-2013	✓



Matrix: WATER		Evaluation: * = Holding time breach ; ✓ = Within holding time.					
Method	Container / Client Sample ID(s)	Extraction / Preparation		Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
B3, B4, B5, B6, B7, B8, BZ	B4, B6, B8,	---	20-DEC-2012	----	19-DEC-2012	20-DEC-2012	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER** Evaluation: ***** = Quality Control frequency not within specification ; **✓** = Quality Control frequency within specification.

Quality Control Sample Type		Method	Count		Rate (%)		Quality Control Specification	
Analytical Methods			QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)								
Ammonia as N by Discrete analyser		EK055G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser		EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser		EK057G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser		EK071G	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser		EK061G	3	28	10.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser		EK067G	3	28	10.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)								
Ammonia as N by Discrete analyser		EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser		EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser		EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser		EK071G	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser		EK061G	4	28	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser		EK067G	4	28	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)								
Ammonia as N by Discrete analyser		EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser		EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser		EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser		EK071G	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser		EK061G	2	28	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser		EK067G	2	28	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)								
Ammonia as N by Discrete analyser		EK055G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser		EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser		EK057G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser		EK071G	1	15	6.7	5.0	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser		EK061G	2	28	7.1	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser		EK067G	2	28	7.1	5.0	✓	ALS QCS3 requirement



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg D. 25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500-Norg / 4500-NO3-. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx)	by Discrete Ar EP1210569-001	Anonymous	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK071G: Reactive Phosphorus as P	by discrete analysis EP1210586-002	Anonymous	Reactive Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **WATER**

Method	Extraction / Preparation			Analysis	
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis
Container / Client Sample ID(s)					
EK055G: Ammonia as N by Discrete Analyser					
Clear Plastic Bottle - Natural					
B3,					
B5,					
B6,					
B7,					
BZ					
B4,					
B5,					
B6,					
B7,					
B8,					
BZ					
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser					
Clear Plastic Bottle - Natural					
B3,					
B5,					
B6,					
B7,					
BZ					
B4,					
B5,					
B6,					
B7,					
B8,					
BZ					
EK067G: Total Phosphorus as P by Discrete Analyser					
Clear Plastic Bottle - Natural					
B3,					
B5,					
B6,					
B7,					
BZ					
B4,					
B5,					
B6,					
B7,					
B8,					
BZ					



Matrix: **WATER**

Method		Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Date analysed	Days overdue
EK067G: Total Phosphorus as P by Discrete Analyser - Analysis Holding Time Compliance					
Clear Plastic Bottle - Natural B3, B5, B7, BZ	B4, B6, B8,	21-DEC-2012	20-DEC-2012	1	

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

SITE: Nth Baldivis
 PROJECT REF.: D1203102
 SCIENTIST(S): SMW
 SAMPLE TYPE: Groundwater
 REPORT TO: Simon.Bewitt@rpsgroup.com.au
 INVOICE TO: 
 rpsenvfinance@rpsgroup.com.au

38 Station Street Subiaco 6008
 Tel: (618) 9211 1111
 Fax: (618) 9211 1122
 Email: environment@rpsgroup.com.au

ANALYSIS SUITES

SAMPLE ID.	DATE	TN	TKN	Ammonia-N	NOX-N	TP	Reactive Phosphorus	Total	REMARKS
B3	1	20.3.13	✓	✓	✓	✓	✓	1	1 x 1L plastic
B4	2		✓	✓	✓	✓	✓	1	
B5	3		✓	✓	✓	✓	✓	1	
B6	4		✓	✓	✓	✓	✓	1	
B7	5		✓	✓	✓	✓	✓	1	
B8	6		✓	✓	✓	✓	✓	1	
B2	7		✓	✓	✓	✓	✓	1	
								Total	7

Environmental Division
 Perth

Work Order

EP1302018



Telephone : + 61-8-9209 7655

DESTINATION LABORATORY ALS

Relinquished by Shae Miller-Wilke

Organisation **RPS**

Date 21.3.17 Time 9.30am

Received by JD

Organisation **ALS**

Date 21/3 Time 12:48

Relinquished by _____

Organisation _____

Date _____ Time _____

Received by _____

Organisation _____

Date _____ Time _____



Environmental Division



CERTIFICATE OF ANALYSIS

Work Order	: EP1302018	Page	: 1 of 4
Client	: RPS ENVIRONMENT PTY LTD	Laboratory	: Environmental Division Perth
Contact	: MR SIMON HEWITT	Contact	: Tracy Presland
Address	: 38 STATION STREET SUBIACO WA, AUSTRALIA 6008	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: HewittS@rpsgroup.com.au	E-mail	: Tracy.Presland@alsglobal.com
Telephone	: +61 08 93824744	Telephone	: 08 9209 7604
Facsimile	: +61 08 93821177	Facsimile	: 08 9209 7600
Project	: D1203102	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ---	Date Samples Received	: 21-MAR-2013
C-O-C number	: ---	Issue Date	: 26-MAR-2013
Sampler	: SMW	No. of samples received	: 7
Site	: Nth Baldivis	No. of samples analysed	: 7
Quote number	: EP-167-10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Chas Tucker	Inorganic Chemist	Perth Inorganics

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Page : 2 of 4
Work Order : EP1302018
Client : RPS ENVIRONMENT PTY LTD
Project : D1203102

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID					
Compound	CAS Number	LOR	Client sampling date / time		B3	B4	B5	B6	B7
			Unit						
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.91	1.19	0.71		0.06
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N		0.01	mg/L	3.00	0.03	4.05	<0.01		0.16
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N		0.1	mg/L	4.1	4.5	8.0	4.2		7.3
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
Total Nitrogen as N		0.1	mg/L	7.1	4.5	12.0	4.2		7.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P		0.01	mg/L	4.59	0.87	9.33	0.24		0.50
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	3.74	0.01	8.49	0.03		0.02



Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Sub-Matrix: WATER (Matrix: WATER)									
				Client sample ID					
				Client sampling date / time					
Compound	CAS Number	LOR	Unit	B8		BZ			
				20-MAR-2013 15:00	EP1302018-006	20-MAR-2013 15:00	EP1302018-007		
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.20		1.22			
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N		0.01	mg/L	<0.01		4.11			
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N		0.1	mg/L	2.7		7.6			
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
Total Nitrogen as N		0.1	mg/L	2.7		11.7			
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P		0.01	mg/L	0.19		9.18			
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02		8.60			

QUALITY CONTROL REPORT

Work Order : **EP1205019**

Page : 1 of 5

Client : **RP3 ENSIRONV ENT PTY LTD**
 Contact : **MR SIMON HEWITT**
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SUBIACO WA, AUSTRALIA 6008

Laboratory : Environmental Division Perth
 Contact : Tracy Presland
 Address : 10 Hod Way Malaga WA Australia 6090

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E-mail : **Tracy.Presland@alsglobal.com**
 Telephone : **08 9209 7604**
 Facsimile : **08 9209 7600**

Project : **D1203102**
 Site : **Nth Baldivis**
 C-O-C number : **----**
 Sampler : **SMW**
 Order number : **----**

QC Level : **NEPM 1999 Schedule B(3) and ALS QCS3 requirement**

Date Samples Received : **21-MAR-2013**
 Issue Date : **26-MAR-2013**

Quote number : **EP-167-10**
 No. of samples received : **7**
 No. of samples analysed : **7**

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



NATA Accredited Laboratory 825
 Accredited for compliance with
 ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Chas Tucker	Inorganic Chemist	Perth Inorganics





Page : 2 of 5
Work Order : EP1302018
Client : RPS ENVIRONMENT PTY LTD
Project : D1203102

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :

Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK077G: Ammonia as N by Discrete Analyser (QC Lot: 5899599)									
EP1302018-001	B3	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.08	0.0	No Limit
EK07- G: Nitrite 4lps Nitrate as N (NOu) by Discrete Analyser (QC Lot: 5899598)									
EP1302018-001	B3	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	3.00	2.99	0.3	0% - 20%
EK0+1G: Total Kjeldaj I Nitrohen gy Discrete Analyser (QC Lot: 58988B7)									
EP1301999-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.0	0.9	0.0	No Limit
EP1302006-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.0	1.0	0.0	0% - 50%
EK0+8G: Total Pj os4j orps as P by Discrete Analyser (QC Lot: 58988B+)									
EP1301999-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP1302006-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.18	0.18	5.6	0% - 50%
EK081G: Reactive Pj os4j orps as P by discrete analyser (QC Lot: 589889+)									
EP1302018-001	B3	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	3.74	3.84	2.6	0% - 20%



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER					Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
Method: Compound		CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	Low	High
EK077G: Ammonia as N by Discrete Analyser (QCLot: 5899599)										
EK055G: Ammonia as N		7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	87	115	
EK07- G: Nitrite 4lps Nitrate as N (NOu) by Discrete Analyser (QC Lot: 5899598)										
EK059G: Nitrite as N		----	0.01	mg/L	<0.01	0.5 mg/L	100	92	112	
EK0+1G: Total Kjeldaj I Nitrohen gy Discrete Analyser (QCLot: 58988B7)										
EK061G: Total Kjeldahl Nitrogen as N		----	0.1	mg/L	<0.1	10 mg/L	97.0	74	130	
EK0+8G: Total Pj os4j orps as P by Discrete Analyser (QCLot: 58988B+)										
EK067G: Total Phosphorus as P		-----	0.01	mg/L	<0.01	4.42 mg/L	110	70	130	
EK081G: Reactive Pj os4j orps as P by discrete analyser (QC Lot: 589889+)										
EK071G: Reactive Phosphorus as P		14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	98.6	87	115	

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	MS	Recovery Limits (%)	Low
EK077G: Ammonia as N by Discrete Analyser (QCLot: 5899599)							
EP1302018-001	B3	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	94.0	70	130
EK07 - G: Nitrite 4lps Nitrate as N (NOu) by Discrete Analyser (QCLot: 5899598)							
EP1302018-001	B3	EK059G: Nitrite + Nitrate as N	-----	0.5 mg/L	# Not Determined	70	130
EK0+1G: Total Kjeldaj I Nitrohen gy Discrete Analyser (QCLot: 58988B7)							
EP1301999-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	-----	5.0 mg/L	96.2	70	130
EK0+8G: Total Pj os4j orps as P by Discrete Analyser (QCLot: 58988B+)							
EP1301999-001	Anonymous	EK067G: Total Phosphorus as P	-----	1 mg/L	106	70	130
EK081G: Reactive Pj os4j orps as P by discrete analyser (QCLot: 589889+)							
EP1302018-001	B3	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	# Not Determined	70	130

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report



The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	MS	Spike Recovery (%)	MSD	Recovery Limits (%)	RPDs (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number					Low	High
EK0+1G: Total Kjeldahl Nitrogen by Discrete Analyser (QCLot: 58988E7)									
EP1301999-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	---	5.0 mg/L	96.2	---	---	70	130
EK0+8G: Total Pj os4j orps as P by Discrete Analyser (QCLot: 58988B+)									
EP1301999-001	Anonymous	EK067G: Total Phosphorus as P	---	1 mg/L	106	---	---	70	130
EK081G: Reactive Pj os4j orps as P by discrete analyser (QCLot: 589889+)									
EP1302018-001	B3	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	# Not Determined	---	---	70	130
EK07- G: Nitrite 4lps Nitrate as N (NOu) by Discrete Analyser (QCLot: 5899598)									
EP1302018-001	B3	EK059G: Nitrite + Nitrate as N	---	0.5 mg/L	# Not Determined	---	---	70	130
EK077G: Ammonia as N by Discrete Analyser (QCLot: 5899599)									
EP1302018-001	B3	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	94.0	---	---	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EP1205019	Page	: 1 of 7
Client	: RPS ENVIRONMENT PTY LTD	Laboratory	: Environmental Division Perth
Contact	: MR SIMON HEWITT	Contact	: Tracy Presland
Address	: 38 STATION STREET SUBIACO WA, AUSTRALIA 6008	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: HewittS@rpsgroup.com.au	E-mail	: Tracy.Presland@alsglobal.com
Telephone	: +61 08 93824744	Telephone	: 08 9209 7604
Facsimile	: +61 08 93821177	Facsimile	: 08 9209 7600
Project	: D1203102	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Nth Baldivis	Date Samples Received	: 21-MAR-2013
C-O-C number	: ----	Issue Date	: 26-MAR-2013
Sampler	: SMW	No. of samples received	: 7
Order number	: ----	No. of samples analysed	: 7
Quote number	: EP-167-10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date		Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK077-G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle 6Natural (EK077G)	B3, B8, BZ	50φ AR65012	666	21-MAR-2013	-----	51φ AR65012	21-MAR-2013
	p iscellaneous Plastic bottle 6unreserved (EK077G)	B6, B7	50φ AR65012	666	21-MAR-2013	-----	51φ AR65012
EK07-G: Nitrite plus Nitrate as N (NO ₂) by Discrete Analyser							
Clear Plastic Bottle 6Natural (EK07-G)	B3, B8, BZ	50φ AR65012	666	22-MAR-2013	-----	51φ AR65012	22-MAR-2013
	p iscellaneous Plastic bottle 6unreserved (EK07-G)	B6, B7	50φ AR65012	666	22-MAR-2013	-----	51φ AR65012
EK0+1G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle 6Natural (EK0+1G)	B3, B8, BZ	50φ AR65012	52φ AR65012	21-MAR-2013	✖	57φ AR65012	20-APR-2013
	p iscellaneous Plastic bottle 6unreserved (EK0+1G)	B6, B7	50φ AR65012	52φ AR65012	21-MAR-2013	✖	57φ AR65012
EK0+8G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle 6Natural (EK0+8G)	B3, B8, BZ	50φ AR65012	52φ AR65012	22-MAR-2013	✖	57φ AR65012	20-APR-2013
	p iscellaneous Plastic bottle 6unreserved (EK0+8G)	B6, B7	50φ AR65012	52φ AR65012	21-MAR-2013	✖	57φ AR65012



Matrix: WATER		Evaluation: * = Holding time breach ; ✓ = Within holding time.				
Method	Container / Client Sample ID(s)	Extraction / Preparation		Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis
EKO81G: Reactive Pgoxgorus as P by discrete analyser						
Clear Plastic Bottle 6Natural (EKO81G) B3, B8,	B5, BZ	666	22-MAR-2013	----	516p AR65012	22-MAR-2013
						✓
p iscellaneous Plastic bottle 6unxreserved (EKO81G) B4, B7	B6,	666	22-MAR-2013	----	516p AR65012	22-MAR-2013
						✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	1	7	1412	1010	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	7	1412	1010	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	1412	1010	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	1012	1010	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	19	1012	1010	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	7	1412	710	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	7	1412	710	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	1412	710	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	1012	1010	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	19	1012	1010	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	7	1412	710	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	7	1412	710	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	1412	710	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	712	710	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	712	710	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	7	1412	710	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	7	1412	710	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	1412	710	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	712	710	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	712	710	✓	ALS QCS3 requirement



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg D. 25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500-Norg / 4500-NO3-. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
patrij Sxike (p S) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx)	EP1302018-001	B3	Nitrite H Nitrate as N	----	Not Determined	----	p S recovery not determined, back. round level. reater tgan or equal to 4j sxike levelIM
EK071G: Reactive Phosphorus as P by discrete analysis	EP1302018-001	B3	Reactive Pgosxgorus as P	14265-44-2	Not Determined	----	p S recovery not determined, back. round level. reater tgan or equal to 4j sxike levelIM

- For all matrices, no p etgod Blank value outliers occurM
- For all matrices, no Duxicate outliers occurM
- For all matrices, no Laboratory Control outliers occurM

Regular Sample Surrogates

- For all re. ular samxle matrices, no surro. ate recovery outliers occurM

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **WATER**

Method	Extraction / Preparation			Analysis	
	Date extracted	Due for extraction	Days overdue	Date analysed	Days overdue
Container / Client Sample ID(s)					
EK0+1G: Total Klaldagl Nitro. en By Discrete Analyser					
Clear Plastic Bottle 6Natural					
B3, B8,	23-MAR-2013	21-MAR-2013	5	----	----
p iscellaneous Plastic bottle 6unxreserved					
B4, B7	23-MAR-2013	21-MAR-2013	5	----	----
EK0+8G: Total Pgosxgorus as P by Discrete Analyser					
Clear Plastic Bottle 6Natural					
B3, B8,	23-MAR-2013	22-MAR-2013	1	----	----
p iscellaneous Plastic bottle 6unxreserved					
B4, B7	23-MAR-2013	21-MAR-2013	5	----	----

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: 7 of 7

Work Order

: EP1302018

Client

: RPS ENVIRONMENT PTY LTD

Project

: D1203102



Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist**

SITE: Nth Baldivis
 PROJECT REF: D1203102
 SCIENTIST(S): SMW
 SAMPLE TYPE: Groundwater
 REPORT TO:
 simon.hewitt@rpsgroup.com.au

INVOICE TO:
 rpsenvfinance@rpsgroup.com.au

SAMPLE ID.	DATE	TN	TKN	Ammonia-N	Nox-N	Total Phosphorus	ANALYSIS SUITES										Total	REMARKS
1 B3	18/06/2013	X	X	X	X	X											1	1 x 1L Plastic Bottle
2 B4	18/06/2013	X	X	X	X	X											1	1 x 1L Plastic Bottle
3 B5	18/06/2013	X	X	X	X	X											1	1 x 1L Plastic Bottle
4 B6	18/06/2013	X	X	X	X	X											1	1 x 1L Plastic Bottle
5 B7	18/06/2013	X	X	X	X	X											1	1 x 1L Plastic Bottle
6 B8	18/06/2013	X	X	X	X	X											1	1 x 1L Plastic Bottle
7 BZ	18/06/2013	X	X	X	X	X											1	1 x 1L Plastic Bottle
8 Gauge 2 SIP	18/06/2013	X	X	X	X	X											1	1 x 1L Plastic Bottle
Total																	8	
DESTINATION LABORATORY																		
ALS																		

RPS

38 Station Street Subiaco 6008
 Tel: (618) 9211 1111
 Fax: (618) 9211 1122
 Email: environment@rpsgroup.com.au

Environmental Division
 Perth

Work Order

EP1304641



Telephone : + 61-8-9209 7655

Relinquished by Shae Miller-White

Organisation RPS

Date 19/6/13 Time 10.00am

Received by J.D. Organisation ALS

Date 19/6 Time 12:05

Relinquished by Organisation

Received by Organisation

Date Time

Date Time



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EP1304641		
t aQ	g RPS ENVIRONMENT PTY LTD		
t : QFDL	ah c eSih MO&NEH L . .		
dA&S l l	a 28 eS. d. IMO eS. cEE.		
Eh Fja	SRUldt M&H d&RS. cdf Id&008		
. s&@n Qs	aNs- yLSw T@uT: r @D n Fr		
3FD yn y&	ap91&8e 28+5755		
PT @DL	ap91&8e 28+1177		
MP&S&D n 4sT	aV 1+0210+		
t &M& eD n 4sT	a&e&		
SFn @T	aSh H		
Sys	a Oln&F&y y		
(r : ls&D n 4sT	aEP&017&12		

. nlye Ts@T&L r @T sAsle F&be @S i y r le Ts@T l q - yne nlye Ts&Ts&D e c s l r ale F&be L e lmsel Fn @S l q Fl e l r 4n ylsAe d&e @usle : e lny e Ts@T l e nFi se 4ss&e Dns D&S&e F&O&e F&be F&be i sAe o l Ts&Fl se

- nlye s l y&F l se e&F&ly&e QF&Q& &ns&e a - y&eQ& Tn Fly Cg
- / s&S F&e : n n s&Q
- d&F&ly&F&e s l r al



WORLD RECOGNISED
ACCREDITATION

Signatories

Od. d&e&D&S&S&F& F&: T&L T&e&+j	. nlye A: D n s&e nFi e 4ss&e nFi e 4ss&e s&D&I: Q&F&abe l y&Q&e 4be lmsel Fr lms Tys&e l y&Q&L Tys&e l y&Q&L F&S&e 4sa - e E&S&D&I Q&e l y&Q&e nFi e 4ss&e D&F&Tys&e r l&e&D n @F&Q&e yne& D&Ar T&S l @ D&S&e Ag&e-1& 3c&F&T&e&1		
d&D&S&S&S&F& T&D n @F&Q&e yne	Position	Accreditation Category	
ISM&E&T e&70+ j	IC: TuF&Q&e ms n y L	Ps lms&C TuF&Q&e	
t nFi e r D&S&T			

Address 10&N: A&H F&be F&F&F&H d&e&R l D&F&500. 0 | PHON&e+61-8-9209 7655 | Facsimile &e91&86 +0. &900
EQ. T&e On s&Q&e&ly& y Q&S T&ms&U&O 85&00. e 29&N. P&F&e d&ms&e&F S&e T&e @&e&e&e&F S&e n l&S&A& n @&e.

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PFus g +e 05
H : TGM/TAsT g EP1205951
t 0L g c PSEOVIc MOh EO. 0. Yd . v
PT 0L q v1+0210+

General Comments

. nse FOfuJFae 0. DsAr Tser l sAe 4be lmsE EQ y. On sQFae v y y Ce nFI se 4ssCe Asi sa 0. Ae 0. n e s l F4g n sAe yQsTOfly Ofae TsD uQysAe 0. DsAr Tser l r Dne Fie l m l se 0. 4g n sAe 4be lmsE RSEPd 0. d PNd 0. dSe FOfae OEPh e lOe m r l s
Asi sa 0. Ae 0. DsAr Tser l f Tsken 0. bsAgQnnsF4l sQDse 0A. D n sQsAd l FCAFTN e Tbb0gQ00sJr s l L
H n s Tsken : y l r Ts0sTsTh yOfly Ce nFI 0ssCe 0. Tn sA00s l r al 0 Ts00 0. TsAe OfaeTbe symt0f l y
H n s Ts0f00 0. TsA00 l l dnFO0<00s l r 0g 0 n n s T0nFO0ns0 Mc 00n y 0n F00s00r s0. 00n F00 F0 000x l F00kys l l F0s0g l y Of0A0. T0Q r 00000 F0 0000 T0F00 l y
H n s Ts0ns0 Mc e 0f00 0. TsA00s l r 0000 T0 Mc 00n y 0n F00s00r s0. 0 n d l FCAFTN0 Mc 00n y 0n F00s00r s0. 0 n n y l r Ts0 QsQ00Q r 00000 F0 0000 T0r DsAe symtken 0. bsAg T0n F000Qs Ts TsQ0s
H n sQ0 F0 0. Q00n s0Q0 Tn Fly Qy 0. l00 i yA0000ns00sQ0 F0 0. Q000F0s l 0 Ts00 m - Qe ym r l f00n s0 n 0. QsQ000ns l s0Q l FQ0s l 00ns00n s0 n 0. QsQ0nFI 0ssQ0F l r n sA000ns004. TFl: T00 T00 Ds l l y000 T0 l s l
Ksb0g t d SOr n 4s T00 d S00suy l 000 n 4s T00 n 0AF l F4FI sen F0QF0sA000 ns n yF0004 l l F0Dl 00sT y0s l e ns0 ns n yF0004 l l F0Dl 00sT y0s l y Ce 00ns0n s yF000 ns n yF000: D0s0
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A0e n y 00s l r 000 0. n 0. l sA00 n 000y yA F00F00s0s l sDy Q f l e T04: i s0ns00s0 s0 000 0. TlQ0

- EK059G: LOR raised due to possible sample matrix interference.
- EK067G: LOR for sample 'B7' raised due to the high amount of NOx present.



Analytical Results

Sr 4th FLX: WATER (h FLX: WATER)

Compound	CAS Number	LOR	Client sample ID		B3	B4	B5	B6	B7
			Client sampling date / time	Unit					
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	79955167	0.01	n ukf		0.06	1.08	0.90	0.63	0.06
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	6886	0.01	n ukf		2.65	0.02	8.16	<0.0j	19.4
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	6886	0.1	n ukf		4.0	3.2	7.6	4.8	6.3
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
Total Nitrogen as N	6886	0.1	n ukf		6.6	3.2	15.8	4.8	25.7
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	6886	0.01	n ukf		4.34	0.24	7.70	0.16	<0.10



Analytical Results

Sr 4th FLyx: WATER (h FLyx: WATER)

Sr-4th FLJx: WATER (n FLJx: WATER)				Client sample ID							
Client sampling date / time											
CAS Number				LOR	Unit						
Compound											
EK055G: Ammonia as N by Discrete Analyser											
Ammonia as N				799565167	0.01	n ulf	0.21	0.91	0.16	0.06	0.06
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser											
Nitrite + Nitrate as N				6666	0.01	n ulf	<0.0j	8.01	<0.0j	0.06	0.06
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser											
Total Kjeldahl Nitrogen as N				6666	0.1	n ulf	3.1	7.5	8.0	0.06	0.06
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser											
Total Nitrogen as N				6666	0.1	n ulf	3.1	15.5	8.0	0.06	0.06
EK067G: Total Phosphorus as P by Discrete Analyser											
Total Phosphorus as P				6666	0.01	n ulf	0.15	7.74	2.71	0.06	0.06



QUALITY CONTROL REPORT



Page : 2 of 5
Work Order : EP1304641
Client : RPS ENVIRONMENT PTY LTD
Project : D1203102

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :

Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER			Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG0FFb : Ammonia as N y(Diskrete Anal(ser)QC Lot: 8- 872F54									
EP1304633-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.70	0.70	0.0	0% - 20%
EP1304641-001	B3	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.06	0.0	No Limit
EG0F-b : Nitrite plus Nitrate as N)NOx4 y(Diskrete Anal(ser)QC Lot: 8- 872F24									
EP1304633-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP1304641-001	B3	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.65	2.65	0.0	0% - 20%
EG091b : Total Gjeldahl Nitrogen B(Diskrete Anal(ser)QC Lot: 8- 895884									
EP1304641-001	B3	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.0	4.2	5.4	No Limit
EG097b : Total Phosphorus as P y(Diskrete Anal(ser)QC Lot: 8- 895824									
EP1304641-001	B3	EK067G: Total Phosphorus as P	----	0.01	mg/L	4.34	4.07	6.5	0% - 20%



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER									
Method: Compound	CAS Number	LOR	Unit	Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	Low
EG0FFb : Ammonia as N y(Diskrete Anal(ser)QCLot: 8- 872F54									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L		<0.01	1 mg/L	101	87	115
EG0F- b : Nitrite plus Nitrate as N)NOx4 y(Diskrete Anal(ser)QCLot: 8- 872F24									
EK059G: Nitrite + Nitrate as N	-----	0.01	mg/L		<0.01	0.5 mg/L	104	92	112
EG091b : Total Gjeldahl Nitrogen B(Diskrete Anal(ser)QCLot: 8- 895884									
EK061G: Total Kjeldahl Nitrogen as N	-----	0.1	mg/L		<0.1	10 mg/L	95.6	74	130
EG097b : Total Phosphorus as P y(Diskrete Anal(ser)QCLot: 8- 895824									
EK067G: Total Phosphorus as P	-----	0.01	mg/L		<0.01	4.42 mg/L	97.0	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike		Recovery Limits (%)	
				Concentration	MS	Low	High
EG0FFb: Ammonia as N y(Diskrete Anal(ser)QCLot: 8- 872F54							
EP1304633-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	94.2	70	130
EG0F-b : Nitrite plus Nitrate as N)NOx4 y(Diskrete Anal(ser)QCLot: 8- 872F24							
EP1304633-001	Anonymous	EK059G: Nitrite + Nitrate as N	-----	0.6 mg/L	80.8	70	130
EG091b : Total Gjeldahl Nitrogen B(Diskrete Anal(ser)QCLot: 8- 895884							
EP1304641-001	B3	EK061G: Total Kjeldahl Nitrogen as N	-----	25 mg/L	91.8	70	130
EG097b : Total Phosphorus as P y(Diskrete Anal(ser)QCLot: 8- 895824							
EP1304641-001	B3	EK067G: Total Phosphorus as P	-----	5 mg/L	87.0	70	130

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER											
				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)		
				Concentration	MS	MSD	Low	High	Value	Control Limit	
EG091b : Total Kjeldahl Nitrogen B(Diskrete Anal(ser)QCLot: 8- 895884											
EP1304641-001	B3	EK061G: Total Kjeldahl Nitrogen as N	-----	25 mg/L	91.8	-----	70	130	-----	-----	-----



Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)
Laboratory sample ID	Client sample ID	Method: Compound				MS	MSD	Low	High	Value
EG097b : Total Phosphorus as P y(Diskrete Anal(ser)QCLot: 8- 895824										
EP1304641-001	B3	EK067G: Total Phosphorus as P			5 mg/L	87.0		70	130	
EG0F-b : Nitrite plus Nitrate as N)NOx4 y(Diskrete Anal(ser)QCLot: 8- 872F24										
EP1304633-001	Anonymous	EK059G: Nitrite + Nitrate as N			0.6 mg/L	80.8		70	130	
EG0FFb : Ammonia as N y(Diskrete Anal(ser)QCLot: 8- 872F54										
EP1304633-001	Anonymous	EK055G: Ammonia as N		7664-41-7	1.00 mg/L	94.2		70	130	



Environmental Division



INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EP1304641	Page	: 1 of 7
Client	: RPS ENVIRONMENT PTY LTD	Laboratory	: Environmental Division Perth
Contact	: MR SIMON HEWITT	Contact	: Scott dames
A33ress	: 8U STATION STREET SB, IACO WAGABSTRALIA 099U	A33ress	: 19 Ho3 Way Malaga WA Australia 09- 9
E. mail	: HewittS@rpsgroup.com.au	E. mail	: perthenviroservices@alsglobal.com
Telephone	: 201 9U - 8U4FJ FF	Telephone	: 201 U- 49- j 077
Qacsimile	: 201 9U - 8U411j j	Qacsimile	: 201 U- 49- j 099
Prolect	: D1498194	) C Level	: NEPM 1- - - Sche3ule , ØJan3 ALS) CS8 rekuirement
Site	: Nth , al3ivis	Date Samples Receive3	: 1- .dBN.4918
C. O. C number	:	Issue Date	: 4F.dBN.4918
Sampler	: SMW	No+of samples receive3	: U
Or3er number	:	No+of samples analyse3	: U
) note number	: EPØ1j 38		

This report superse3es any previous reportØJwith this reference+Results apply to the sampleØJas submitte3+All pages of this report have been chec5e3 an3 approve3 for release+

This Interpretive) uality Control Report contains the following information:

- Analysis Hol3ing Time Compliance
-) uality Control Parameter Qrekuency Compliance
- , rief Metho3 Summaries
- Summary of Outliers



Analysis Holding Time Compliance

The following report summarises the analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and preclude subsequent situations and reruns. Information is also provided re the sample container preservation period to analysis represents number of days from sampling where no extraction digestion is involved or period from extraction digestion where this is present. For composite samples digestion is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory procedures leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on BSEPA SW UF06 APHA AS and NEPM guidelines. A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods of elutriate vary according to the analytes being determined on the resulting solution. For non-volatile analytes the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil methods. These soil holding times are: Organics 3 days; Mercury 3 days; Arecor 3 days. A breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix : WATER
 Evaluation: ✖ = Holding time breach ; ✔ = Within holding time

Method		Sample Date	Extraction / Preparation		Analysis		Evaluation
Container / Client Sample ID(s)			Date extracted	Due for extraction	Date analysed	Due for analysis	
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK055G)							
, F6	18-JUN-2013	---	1- .dBN.4918		19-JUN-2013	1- .dBN.4918	✔
, 06							
, U6							
, Z6							
x auge 4 SIP							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Natural (EK059G)							
, F6	18-JUN-2013	---	1- .dBN.4918		19-JUN-2013	1- .dBN.4918	✔
, 06							
, U6							
, Z6							
x auge 4 SIP							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Natural (EK061G)							
, F6	18-JUN-2013	20-JUN-2013	1- .dBN.4918	✖	20-JUN-2013	1UdBL.4918	✔
, 06							
, U6							
, Z6							
x auge 4 SIP							
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Natural (EK067G)							
, F6	18-JUN-2013	20-JUN-2013	1- .dBN.4918	✖	20-JUN-2013	1UdBL.4918	✔
, 06							
, U6							
, Z6							
x auge 4 SIP							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory) C samples analysed within the analytical lot in which the submitted sample was where the submitted sample's actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix : **WATER** Evaluation: * =) uality Control frequency not within specification ; ✓ =) uality Control frequency within specification+

Quality Control Sample Type		Method		Count		Rate (%)		Quality Control Specification	
Analytical Methods				QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates qDBPJ									
Ammonia as N by Discrete analyser		EK977x		4	49	10.0	10.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Nitrite an3 Nitrate as N qNO/ J by Discrete Analyser		EK97- x		4	1U	11.1	10.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Total K(ei3ahl Nitrogen as N , y Discrete Analyser		EK901x		1	U	12.5	10.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Total Phosphorus as P , y Discrete Analyser		EK90j x		1	U	12.5	10.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Laboratory Control Samples qCSJ									
Ammonia as N by Discrete analyser		EK977x		1	49	5.0	5.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Nitrite an3 Nitrate as N qNO/ J by Discrete Analyser		EK97- x		1	1U	5.6	5.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Total K(ei3ahl Nitrogen as N , y Discrete Analyser		EK901x		4	U	25.0	10.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Total Phosphorus as P , y Discrete Analyser		EK90j x		4	U	25.0	10.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Metho3 _lanfs qM_ J									
Ammonia as N by Discrete analyser		EK977x		1	49	5.0	5.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Nitrite an3 Nitrate as N qNO/ J by Discrete Analyser		EK97- x		1	1U	5.6	5.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Total K(ei3ahl Nitrogen as N , y Discrete Analyser		EK901x		1	U	12.5	5.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Total Phosphorus as P , y Discrete Analyser		EK90j x		1	U	12.5	5.0	✓	NEPM 1--- Sche3ule , qJan3 ALS) CS8 rekuirement
Matrix/ Spi5es qMSJ									
Ammonia as N by Discrete analyser		EK977x		1	49	5.0	5.0	✓	ALS) CS8 rekuirement
Nitrite an3 Nitrate as N qNO/ J by Discrete Analyser		EK97- x		1	1U	5.6	5.0	✓	ALS) CS8 rekuirement
Total K(ei3ahl Nitrogen as N , y Discrete Analyser		EK901x		1	U	12.5	5.0	✓	ALS) CS8 rekuirement
Total Phosphorus as P , y Discrete Analyser		EK90j x		1	U	12.5	5.0	✓	ALS) CS8 rekuirement



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the BS EPA6APHA6AS and NEPM. In-house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Ammonia as N by Discrete analyser	EK977x	WATER	APHA 41st e3-6F799.NH8 x Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM 41st e3-6F799.NH8 x Ammonia.
Nitrite as N or Nitrate as N or NO ₃ - by Discrete Analyser	EK97- x	WATER	APHA 41st e3-6F799.NO8. Q. Combine 3 or 13ise3 Nitrogen or NO ₃ - is determined by Chemical Reduction and direct colorimetry by Discrete Analyser. This method is compliant with NEPM 41st e3-6F799.NO8. Q. Combine 3 or 13ise3 Nitrogen or NO ₃ -.
Total K or Total Nitrogen as N, y Discrete Analyser	EK901x	WATER	APHA 41st e3-6F799.Norg D+47mL water samples are digested using a traditional K or Total Nitrogen digestion followed by determination by Discrete Analyser. This method is compliant with NEPM 41st e3-6F799.Norg D+47mL water samples.
Total Nitrogen as N or Total Phosphorus as P, y Discrete Analyser	EK904x	WATER	APHA 41st e3-6F799.Norg GF799.NO8. + This method is compliant with NEPM 41st e3-6F799.Norg GF799.NO8. +.
Total Phosphorus as P, y Discrete Analyser	EK901 x	WATER	APHA 41st e3-6F799.P, & Q. This procedure involves sulphuric acid digestion of a 199mL sample to break down phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM 41st e3-6F799.P, & Q.

INVOICE TO:
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EP1307497



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RPS

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[illegible]

Relinquished by	Organisation	RPS
Shae Miller-White		

Received by	Organisation
-------------	--------------

Date 3/10/13 Time 10.00am

Date 3/10 Time 1010

Relinquished by _____ Organisation

Received by _____ Organisation _____

Date _____ Time _____

Date _____ Time _____

CERTIFICATE OF ANALYSIS

Work Order	: EP1307497	Page	: 1 of 6
Client	: RPS ENVIRONMENT PTY LTD	Laboratory	: Environmental Division Perth
Contact	: SIMON HEWITT	Contact	: Tracy Presland
Address	: 38 STATION STREET SUBIACO WA, AUSTRALIA 6008	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: simon.hewitt@rpsgroup.com.au	E-mail	: Tracy.Presland@alsglobal.com
Telephone	: +61 08 93824744	Telephone	: 08 9209 7604
Facsimile	: +61 08 93821177	Facsimile	: 08 9209 7600
Project	: D1203102	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ---	Date Samples Received	: 03-OCT-2013
C-O-C number	: ---	Issue Date	: 08-OCT-2013
Sampler	: S.M.W.	No. of samples received	: 9
Site	: Nth Baldivis	No. of samples analysed	: 9
Quote number	: EP-068-10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



Page : 2 of 6
Work Order : EP1307497
Client : RPS ENVIRONMENT PTY LTD
Project : D1203102

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- EK059G: LOR raised due to possible sample matrix interference (colour).
- EK061G/EK067G: LOR for sample 'B8' raised due to sample matrix interference.
- It is recognised that total phosphorus is less than reactive phosphorus for samples 'B5'. However, the difference is within experimental variation of the methods.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Benjamin Nicholson	Metals Chemist	Perth Inorganics
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Inorganic Chemist	Perth Inorganics
Efua Wilson	ICP-CHEMIST	Perth Inorganics



Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Sub-Matrix: WATER (Matrix: WATER)									
Compound	Client sample ID				B3	B4	B5	B6	B7
	CAS Number	LOR	Unit	Client sampling date / time					
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	-----	1	µS/cm		121	10000	203	2790	412
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	-----	10	mg/L		312	6360	326	2190	502
EA025: Suspended Solids									
Suspended Solids (SS)	-----	5	mg/L		128	45	16	288	<5
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		34	390	5	138	70
Total Alkalinity as CaCO3	-----	1	mg/L		34	390	5	138	70
ED038A: Acidity									
Acidity as CaCO3	-----	1	mg/L		120	32	47	28	62
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		8	-----	18	-----	65
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		-----	496	-----	117	-----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		15	3200	17	780	45
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	0.10	mg/L		6.49	0.49	0.88	57.7	5.68
Iron	7439-89-6	0.05	mg/L		15.1	0.53	0.24	29.5	2.88
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		1.50	<0.01	0.59	0.06	2.11
Arsenic	7440-38-2	0.001	mg/L		0.009	0.006	0.001	0.004	0.007
Cadmium	7440-43-9	0.0001	mg/L		0.0003	<0.0001	<0.0001	<0.0001	0.0001
Chromium	7440-47-3	0.001	mg/L		0.003	<0.001	0.002	0.002	0.006
Manganese	7439-96-5	0.001	mg/L		0.313	0.030	0.032	0.052	0.018
Nickel	7440-02-0	0.001	mg/L		0.026	0.003	0.009	0.001	0.023
Selenium	7782-49-2	0.01	mg/L		<0.01	0.02	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.347	0.014	0.087	0.006	1.78
Iron	7439-89-6	0.05	mg/L		10.5	0.10	0.15	0.21	1.88
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.19	0.20	0.08	0.51	0.08



Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Sub-Matrix: WATER (Matrix: WATER)									
Client sample ID									
Compound	Client sampling date / time								
	CAS Number	LOR	Unit	B3	B4	B5	B6	B7	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N		0.01	mg/L	<0.05	0.69	5.93	<0.02	<0.05	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N		0.1	mg/L	4.6	0.9	5.4	<2.0	6.1	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
Total Nitrogen as N		0.1	mg/L	4.6	1.6	11.3	<2.0	6.1	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P		0.01	mg/L	7.35	0.05	2.75	0.35	0.52	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	6.34	0.02	2.81	0.06	0.39	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	



Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID					
			Client sampling date / time					
Compound	CAS Number	LOR	Unit	B8	BZ	SG1	SG2	
				01-OCT-2013 15:00	01-OCT-2013 15:00	01-OCT-2013 15:00	01-OCT-2013 15:00	
EP1307497-006								
EP1307497-007								
EP1307497-008								
EP1307497-009								
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	-----	1	µS/cm	3450	9850	568	434	
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	-----	10	mg/L	2170	6450	455	410	
EA025: Suspended Solids								
Suspended Solids (SS)	-----	5	mg/L	21	22	32	<5	
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	129	392	55	52	
Total Alkalinity as CaCO3	-----	1	mg/L	129	392	55	52	
ED038A: Acidity								
Acidity as CaCO3	-----	1	mg/L	51	32	11	11	
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	-----	-----	33	23	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	296	493	-----	-----	
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	910	3180	123	84	
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	0.10	mg/L	5.70	0.49	0.68	0.33	
Iron	7439-89-6	0.05	mg/L	2.77	0.52	1.53	1.46	
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.07	<0.01	0.23	0.27	
Arsenic	7440-38-2	0.001	mg/L	0.002	0.006	0.001	0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.001	0.001	
Manganese	7439-96-5	0.001	mg/L	0.103	0.029	0.084	0.083	
Nickel	7440-02-0	0.001	mg/L	0.010	0.003	0.004	0.004	
Selenium	7782-49-2	0.01	mg/L	<0.01	0.02	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.218	0.016	0.007	0.007	
Iron	7439-89-6	0.05	mg/L	0.20	0.06	1.08	1.15	
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.12	0.20	0.10	0.17	



Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Sub-Matrix: WATER (Matrix: WATER)									
Client sample ID									
Client sampling date / time									
Compound	CAS Number	LOR	Unit	B8	BZ	SG1	SG2		
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N		0.01	mg/L	2.37	0.70	<0.05	<0.05		
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N		0.1	mg/L	1.5	0.8	4.5	5.2		
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
Total Nitrogen as N		0.1	mg/L	3.9	1.5	4.5	5.2		
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P		0.01	mg/L	<0.05	0.04	0.99	1.13		
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.03	0.76	0.92		
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1		



Environmental

QUALITY CONTROL REPORT

Work Order	: EP1307497	Page	: 1 of 10
Client	: RPS ENVIRONMENT PTY LTD	Laboratory	: Environmental Division Perth
Contact	: SIMON HEWITT	Contact	: Tracy Presland
Address	: 38 STATION STREET SUBIACO WA, AUSTRALIA 6008	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: simon.hewitt@rpsgroup.com.au	E-mail	: Tracy.Presland@alsglobal.com
Telephone	: +61 08 93824744	Telephone	: 08 9209 7604
Facsimile	: +61 08 93821177	Facsimile	: 08 9209 7600
Project	: D1203102	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: Nth Baldivis	Date Samples Received	: 03-OCT-2013
C-O-C number	: ----	Issue Date	: 08-OCT-2013
Sampler	: S.M.W.	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 9
Quote number	: EP-068-10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



Page : 2 of 10
Work Order : EP1307497
Client : RPS ENVIRONMENT PTY LTD
Project : D1203102

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC



WORLD RECOGNISED
ACCREDITATION

NATA Accredited
Laboratory 825

Accredited for
compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Benjamin Nicholson	Metals Chemist	Perth Inorganics
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Inorganic Chemist	Perth Inorganics
Efua Wilson	ICP-CHEMIST	Perth Inorganics



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA010P: Conductivity by PC Titrator (QC Lot: 3092620)										
EP1307497-001	B3		EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	121	121	0.0	0% - 20%
EP1307497-009	SG2		EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	434	442	1.8	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 3091921)										
EP1307487-001	Anonymous		EA015H: Total Dissolved Solids @180°C	----	10	mg/L	656	660	0.4	0% - 20%
EP1307497-007	BZ		EA015H: Total Dissolved Solids @180°C	----	10	mg/L	6450	6060	6.2	0% - 20%
EA025: Suspended Solids (QC Lot: 3091922)										
EP1307487-001	Anonymous		EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
EP1307497-007	BZ		EA025H: Suspended Solids (SS)	----	5	mg/L	22	27	18.2	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3092621)										
EP1307497-001	B3		ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
			ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
			ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	34	30	11.0	0% - 20%
			ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	34	30	11.0	0% - 20%
EP1307497-009	SG2		ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
			ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
			ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	52	52	0.0	0% - 20%
			ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	52	52	0.0	0% - 20%
ED038A: Acidity (QC Lot: 3093762)										
EP1307497-001	B3		ED038: Acidity as CaCO ₃	----	1	mg/L	120	126	5.1	0% - 20%
EP1307534-001	Anonymous		ED038: Acidity as CaCO ₃	----	1	mg/L	20	21	5.1	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 3092812)										
EP1307479-001	Anonymous		ED040F: Sulfate as SO ₄ 2-	14808-79-8	1	mg/L	97	96	0.0	0% - 20%
EP1307497-001	B3		ED040F: Sulfate as SO ₄ 2-	14808-79-8	1	mg/L	8	8	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 3090958)										
EP1307497-002	B4		ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	496	496	0.0	0% - 20%
EP1307503-002	Anonymous		ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	111	111	0.0	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 3090957)										
EP1307497-002	B4		ED045G: Chloride	16887-00-6	1	mg/L	3200	3180	0.8	0% - 20%
EP1307503-002	Anonymous		ED045G: Chloride	16887-00-6	1	mg/L	246	247	0.5	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 3091702)										
EP1307497-001	B3		EG005T: Iron	7439-89-6	0.05	mg/L	15.1	15.4	1.6	0% - 20%
			EG005T: Aluminium	7429-90-5	0.10	mg/L	6.49	6.51	0.3	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3091709)										
EP1307472-001	Anonymous		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0010	<0.0010	0.0	No Limit



Sub-Matrix: WATER			Laboratory Duplicate (DUP) Report								
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3091709) - continued											
EP1307472-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.0	No Limit		
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.075	0.073	3.0	No Limit		
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.458	0.444	3.0	0% - 20%		
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.486	0.486	0.0	0% - 20%		
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.096	0.094	2.2	No Limit		
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	246	234	4.8	0% - 20%		
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.0	No Limit		
		EG020A-F: Iron	7439-89-6	0.05	mg/L	6.69	6.64	0.8	0% - 50%		
		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.0	No Limit		
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.0	No Limit		
EP1307472-011	Anonymous	EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.072	0.073	2.2	No Limit		
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.450	0.458	1.7	0% - 20%		
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.485	0.498	2.7	0% - 20%		
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.090	0.088	1.2	No Limit		
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	226	227	0.6	0% - 20%		
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.0	No Limit		
		EG020A-F: Iron	7439-89-6	0.05	mg/L	6.38	6.74	5.5	0% - 50%		
		EG020F: Dissolved Metals by ICP-MS (QC Lot: 3093796)									
		EP1307497-001	B3	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0003	0.0003	0.0	No Limit
				EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.009	0.009	0.0	No Limit
EG020A-F: Chromium	7440-47-3			0.001	mg/L	0.003	0.004	0.0	No Limit		
EG020A-F: Manganese	7439-96-5			0.001	mg/L	0.313	0.318	1.6	0% - 20%		
EG020A-F: Nickel	7440-02-0			0.001	mg/L	0.026	0.027	0.0	0% - 20%		
EG020A-F: Zinc	7440-66-6			0.005	mg/L	0.347	0.353	1.5	0% - 20%		
EG020A-F: Aluminium	7429-90-5			0.01	mg/L	1.50	1.48	1.5	0% - 20%		
EG020A-F: Selenium	7782-49-2			0.01	mg/L	<0.01	<0.01	0.0	No Limit		
EG020A-F: Iron	7439-89-6			0.05	mg/L	10.5	10.9	3.5	0% - 20%		
EG020A-F: Cadmium	7440-43-9			0.0001	mg/L	<0.0005	<0.0005	0.0	No Limit		
EP1307518-003	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.008	0.005	36.6	No Limit		
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.007	0.007	0.0	No Limit		
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.154	0.150	2.3	0% - 20%		
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.0	No Limit		
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.025	<0.025	0.0	No Limit		
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.21	0.21	0.0	No Limit		
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	0.28	0.26	6.6	No Limit		
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.25	<0.25	0.0	No Limit		
		EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3091073)									
		EP1307496-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.0	No Limit
EP1307497-005	B7	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.08	0.0	No Limit		
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3091072)											



Sub-Matrix: WATER									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3091072) - continued									
EP1307496-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.23	0.23	0.0	0% - 20%
EP1307497-005	B7	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.05	<0.05	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3091844)									
EP1307486-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.1	1.1	0.0	No Limit
EP1307489-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.9	2.0	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3091847)									
EP1307497-003	B5	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.4	6.1	11.5	0% - 50%
EP1307506-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.4	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3091845)									
EP1307486-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.10	57.0	No Limit
EP1307489-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	3.62	3.51	3.1	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3091848)									
EP1307497-003	B5	EK067G: Total Phosphorus as P	----	0.01	mg/L	2.75	2.64	3.9	0% - 20%
EP1307506-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.25	0.25	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3090956)									
EP1307497-002	B4	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.0	No Limit
EP1307516-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.50	0.53	5.6	0% - 20%
EK085M: Sulfide as S2- (QC Lot: 3093722)									
EP1307497-001	B3	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EP1307534-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER

Sub-Matrix: WATER					Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EA010P: Conductivity by PC Titrator (QCLot: 3092620)									
EA010P: Electrical Conductivity @ 25°C	-----	1	µS/cm	<1	24800 µS/cm	98.3	95		105
EA015: Total Dissolved Solids (QCLot: 3091921)									
EA015H: Total Dissolved Solids @180°C	-----	10	mg/L	<10	293 mg/L	116	83		130
EA025: Suspended Solids (QCLot: 3091922)									
EA025H: Suspended Solids (SS)	-----	5	mg/L	<5	150 mg/L	91.3	70		130
ED037P: Alkalinity by PC Titrator (QCLot: 3092621)									
ED037P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	-----	-----	-----	-----	-----
ED037P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	-----	-----	-----	-----	-----
ED037P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	-----	-----	-----	-----	-----
ED037P: Total Alkalinity as CaCO3	-----	1	mg/L	<1	200 mg/L	98.2	87		121
ED038A: Acidity (QCLot: 3093762)									
ED038: Acidity as CaCO3	-----	1	mg/L	-----	20 mg/L	110	85		119
ED040F: Dissolved Major Anions (QCLot: 3092812)									
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	50 mg/L	92.0	90		108
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3090958)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.5	88		121
ED045G: Chloride Discrete analyser (QCLot: 3090957)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	104	84		120
EG005T: Total Metals by ICP-AES (QCLot: 3091702)									
EG005T: Aluminium	7429-90-5	0.1	mg/L	<0.10	1.0 mg/L	100	83		109
EG005T: Iron	7439-89-6	0.05	mg/L	<0.05	1.00 mg/L	109	83		111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3091709)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.50 mg/L	95.0	77		113
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	95.9	89		109
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1000 mg/L	95.9	89		109
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	95.9	88		106
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	94.7	87		107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	94.3	87		109
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.10 mg/L	97.4	93		117
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.100 mg/L	95.6	89		115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.50 mg/L	92.5	83		109
EG020F: Dissolved Metals by ICP-MS (QCLot: 3093796)									



Sub-Matrix: WATER									
Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)	Low	High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 3093796) - continued									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.50 mg/L	101	77	113	
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	99.8	89	109	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1000 mg/L	107	89	109	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	105	88	106	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	105	87	107	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	99.6	87	109	
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.10 mg/L	113	93	117	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.100 mg/L	108	89	115	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.50 mg/L	105	83	109	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3091073)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	100	87	115	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3091072)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.0	92	112	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3091844)									
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	101	82	110	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3091847)									
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	102	82	110	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3091845)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	98.1	70	130	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3091848)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.4	70	130	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3090956)									
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	95.2	87	115	
EK085M: Sulfide as S2- (QCLot: 3093722)									
EK085: Sulfide as S2-	18496-25-8	0.10	mg/L	<0.1	0.50 mg/L	107	82	116	

Sub-Matrix: WATER							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3090958)							
EP1307497-002	B4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 3090957)							



Sub-Matrix: **WATER**

Sub-Matrix: WATER		Matrix Spike (MS) Report									
		Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	Spike		Recovery Limits (%)		
							Concentration	MS	Low	High	
ED045G: Chloride Discrete analyser (QCLot: 3090957) - continued											
EP1307497-002	B4			ED045G: Chloride	16887-00-6	1000 mg/L	100	70	130		
EG005T: Total Metals by ICP-AES (QCLot: 3091702)											
EP1307497-002	B4			EG005T: Aluminium	7429-90-5	1.0 mg/L	98.8	70	130		
				EG005T: Iron	7439-89-6	1.00 mg/L	102	70	130		
EG020F: Dissolved Metals by ICP-MS (QCLot: 3091709)											
EP1307472-002		Anonymous		EG020A-F: Arsenic	7440-38-2	0.4 mg/L	98.1	70	130		
				EG020A-F: Cadmium	7440-43-9	0.1 mg/L	96.4	70	130		
				EG020A-F: Chromium	7440-47-3	0.4 mg/L	89.2	70	130		
				EG020A-F: Manganese	7439-96-5	0.4 mg/L	# Not Determined	70	130		
				EG020A-F: Nickel	7440-02-0	0.4 mg/L	89.3	70	130		
				EG020A-F: Zinc	7440-66-6	0.4 mg/L	86.7	70	130		
EG020F: Dissolved Metals by ICP-MS (QCLot: 3093796)											
EP1307497-002	B4			EG020A-F: Arsenic	7440-38-2	0.200 mg/L	130	70	130		
				EG020A-F: Cadmium	7440-43-9	0.0500 mg/L	125	70	130		
				EG020A-F: Chromium	7440-47-3	0.200 mg/L	111	70	130		
				EG020A-F: Manganese	7439-96-5	0.200 mg/L	115	70	130		
				EG020A-F: Nickel	7440-02-0	0.200 mg/L	114	70	130		
				EG020A-F: Zinc	7440-66-6	0.200 mg/L	111	70	130		
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3091073)											
EP1307496-001		Anonymous		EK055G: Ammonia as N	7664-41-7	1.00 mg/L	101	70	130		
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3091072)											
EP1307496-001		Anonymous		EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	100	70	130		
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3091844)											
EP1307486-001		Anonymous		EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	86.6	70	130		
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3091847)											
EP1307497-003		B5		EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	88.1	70	130		
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3091845)											
EP1307486-001		Anonymous		EK067G: Total Phosphorus as P	----	5 mg/L	96.4	70	130		
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3091848)											
EP1307497-003		B5		EK067G: Total Phosphorus as P	----	5 mg/L	87.2	70	130		
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3090956)											
EP1307497-002		B4		EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	103	70	130		

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report



The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER			Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)			
				Concentration	MS	MSD	Low	High	Value	Control Limit		
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3090956)												
EP1307497-002	B4	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	103	-----	70	130	-----	-----		
ED045G: Chloride Discrete analyser (QCLot: 3090957)												
EP1307497-002	B4	ED045G: Chloride	16887-00-6	1000 mg/L	100	-----	70	130	-----	-----		
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3090958)												
EP1307497-002	B4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	-----	70	130	-----	-----		
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3091072)												
EP1307496-001	Anonymous	EK059G: Nitrite + Nitrate as N	-----	0.5 mg/L	100	-----	70	130	-----	-----		
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3091073)												
EP1307496-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	101	-----	70	130	-----	-----		
EG005T: Total Metals by ICP-AES (QCLot: 3091702)												
EP1307497-002	B4	EG005T: Aluminium	7429-90-5	1.0 mg/L	98.8	-----	70	130	-----	-----		
		EG005T: Iron	7439-89-6	1.00 mg/L	102	-----	70	130	-----	-----		
EG020F: Dissolved Metals by ICP-MS (QCLot: 3091709)												
EP1307472-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.4 mg/L	98.1	-----	70	130	-----	-----		
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	96.4	-----	70	130	-----	-----		
		EG020A-F: Chromium	7440-47-3	0.4 mg/L	89.2	-----	70	130	-----	-----		
		EG020A-F: Manganese	7439-96-5	0.4 mg/L	# Not Determined	-----	70	130	-----	-----		
		EG020A-F: Nickel	7440-02-0	0.4 mg/L	89.3	-----	70	130	-----	-----		
		EG020A-F: Zinc	7440-66-6	0.4 mg/L	86.7	-----	70	130	-----	-----		
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3091844)												
EP1307486-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	-----	25 mg/L	86.6	-----	70	130	-----	-----		
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3091845)												
EP1307486-001	Anonymous	EK067G: Total Phosphorus as P	-----	5 mg/L	96.4	-----	70	130	-----	-----		
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3091847)												
EP1307497-003	B5	EK061G: Total Kjeldahl Nitrogen as N	-----	25 mg/L	88.1	-----	70	130	-----	-----		
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3091848)												
EP1307497-003	B5	EK067G: Total Phosphorus as P	-----	5 mg/L	87.2	-----	70	130	-----	-----		
EG020F: Dissolved Metals by ICP-MS (QCLot: 3093796)												
EP1307497-002	B4	EG020A-F: Arsenic	7440-38-2	0.200 mg/L	130	-----	70	130	-----	-----		
		EG020A-F: Cadmium	7440-43-9	0.0500 mg/L	125	-----	70	130	-----	-----		
		EG020A-F: Chromium	7440-47-3	0.200 mg/L	111	-----	70	130	-----	-----		
		EG020A-F: Manganese	7439-96-5	0.200 mg/L	115	-----	70	130	-----	-----		
		EG020A-F: Nickel	7440-02-0	0.200 mg/L	114	-----	70	130	-----	-----		



Sub-Matrix: WATER

Sub-Matrix: WATER										
Laboratory sample ID		Client sample ID	Method: Compound		Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
			CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
EG020F: Dissolved Metals by ICP-MS (QCLot: 3093796) - continued										
EP1307497-002	B4		EG020A-F: Zinc	7440-66-6	0.200 mg/L	111		70	130	MSD = 100.00%

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EP1307497	Page	: 1 of 10
Client	: RPS ENVIRONMENT PTY LTD	Laboratory	: Environmental Division Perth
Contact	: SIMON HEWITT	Contact	: Tracy Presland
Address	: 38 STATION STREET SUBIACO WA, AUSTRALIA 6008	Address	: 10 Hod Way Malaga WA Australia 6090
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Telephone	: +61 08 93824744	Telephone	: 08 9209 7604
Facsimile	: +61 08 93821177	Facsimile	: 08 9209 7600
Project	: D1203102	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: Nth Baldivis	Date Samples Received	: 03-OCT-2013
C-O-C number	: ----	Issue Date	: 08-OCT-2013
Sampler	: S.M.W.	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 9
Quote number	: EP-068-10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation		Analysis		Evaluation
Container / Client Sample ID(s)			Date extracted	Due for extraction	Date analysed	Due for analysis	
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) B5, BZ, B8, SG1,	B7, BZ, SG2	01-OCT-2013	---	29-OCT-2013	04-OCT-2013	29-OCT-2013	✓
Clear Plastic Bottle - Natural (EA010-P) B3, B6	B4,	02-OCT-2013	---	30-OCT-2013	04-OCT-2013	30-OCT-2013	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015H) B5, B8, SG1,	B7, BZ, SG2	01-OCT-2013	---	08-OCT-2013	04-OCT-2013	08-OCT-2013	✓
Clear Plastic Bottle - Natural (EA015H) B3, B6	B4,	02-OCT-2013	---	09-OCT-2013	04-OCT-2013	09-OCT-2013	✓
EA025: Suspended Solids							
Clear Plastic Bottle - Natural (EA025H) B5, B8, SG1,	B7, BZ, SG2	01-OCT-2013	---	08-OCT-2013	04-OCT-2013	08-OCT-2013	✓
Clear Plastic Bottle - Natural (EA025H) B3, B6	B4,	02-OCT-2013	---	09-OCT-2013	04-OCT-2013	09-OCT-2013	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) B5, B8, SG1,	B7, BZ, SG2	01-OCT-2013	---	15-OCT-2013	04-OCT-2013	15-OCT-2013	✓
Clear Plastic Bottle - Natural (ED037-P) B3, B6	B4,	02-OCT-2013	---	16-OCT-2013	04-OCT-2013	16-OCT-2013	✓



Matrix: WATER

Matrix: WATER						
Method		Sample Date	Extraction / Preparation		Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Date analysed	Due for analysis
Evaluation: ✖ = Holding time breach ; ✔ = Within holding time						
ED038A: Acidity						
Clear Plastic Bottle - Natural (ED038)	B7, BZ, SG2	01-OCT-2013	----	----	07-OCT-2013	15-OCT-2013
						✔
Clear Plastic Bottle - Natural (ED038)	B4, B6	02-OCT-2013	----	----	07-OCT-2013	16-OCT-2013
						✔
ED040F: Dissolved Major Anions						
Clear Plastic Bottle - Natural (ED040F)	B7, SG2	01-OCT-2013	----	29-OCT-2013	07-OCT-2013	29-OCT-2013
						✔
Clear Plastic Bottle - Natural (ED040F)	B3	02-OCT-2013	----	30-OCT-2013	07-OCT-2013	30-OCT-2013
						✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA						
Clear Plastic Bottle - Natural (ED041G)	BZ	01-OCT-2013	----	29-OCT-2013	03-OCT-2013	29-OCT-2013
						✔
Clear Plastic Bottle - Natural (ED041G)	B6	02-OCT-2013	----	30-OCT-2013	03-OCT-2013	30-OCT-2013
						✔
ED045G: Chloride Discrete analyser						
Clear Plastic Bottle - Natural (ED045G)	B7, BZ, SG2	01-OCT-2013	----	29-OCT-2013	03-OCT-2013	29-OCT-2013
						✔
Clear Plastic Bottle - Natural (ED045G)	B4, B3, B6	02-OCT-2013	----	30-OCT-2013	03-OCT-2013	30-OCT-2013
						✔
EG005T: Total Metals by ICP-AES						
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG005T)	B5, B8, SG1,	01-OCT-2013	04-OCT-2013	30-MAR-2014	04-OCT-2013	30-MAR-2014
					✔	✔
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG005T)	B4, B3, B6	02-OCT-2013	04-OCT-2013	31-MAR-2014	04-OCT-2013	31-MAR-2014
					✔	✔

Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation		Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Date analysed	Due for analysis
EG020F: Dissolved Metals by ICP-MS						
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) B5, B8, SG2	B7, BZ, SG2	01-OCT-2013	---	30-MAR-2014	07-OCT-2013	30-MAR-2014
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) B6		02-OCT-2013	---	31-MAR-2014	04-OCT-2013	31-MAR-2014
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) B3,	B4	02-OCT-2013	---	31-MAR-2014	07-OCT-2013	31-MAR-2014
EK055G: Ammonia as N by Discrete Analyser						
Clear Plastic Bottle - Sulfuric Acid (EK055G) B5, B8, SG1,	B7, BZ, SG2	01-OCT-2013	---	29-OCT-2013	03-OCT-2013	29-OCT-2013
Clear Plastic Bottle - Sulfuric Acid (EK055G) B3, B6	B4,	02-OCT-2013	---	30-OCT-2013	03-OCT-2013	30-OCT-2013
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser						
Clear Plastic Bottle - Sulfuric Acid (EK059G) B5, B8, SG1,	B7, BZ, SG2	01-OCT-2013	---	29-OCT-2013	03-OCT-2013	29-OCT-2013
Clear Plastic Bottle - Sulfuric Acid (EK059G) B3, B6	B4,	02-OCT-2013	---	30-OCT-2013	03-OCT-2013	30-OCT-2013
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser						
Clear Plastic Bottle - Sulfuric Acid (EK061G) B5, B8, SG1,	B7, BZ, SG2	01-OCT-2013	08-OCT-2013	29-OCT-2013	08-OCT-2013	29-OCT-2013
Clear Plastic Bottle - Sulfuric Acid (EK061G) B3, B6	B4,	02-OCT-2013	08-OCT-2013	30-OCT-2013	08-OCT-2013	30-OCT-2013
EK067G: Total Phosphorus as P by Discrete Analyser						
Clear Plastic Bottle - Sulfuric Acid (EK067G) B5, B8, SG1,	B7, BZ, SG2	01-OCT-2013	08-OCT-2013	29-OCT-2013	08-OCT-2013	29-OCT-2013
Clear Plastic Bottle - Sulfuric Acid (EK067G) B3, B6	B4,	02-OCT-2013	08-OCT-2013	30-OCT-2013	08-OCT-2013	30-OCT-2013



Matrix: WATER		Evaluation: * = Holding time breach ; ✓ = Within holding time.					
Method	Sample Date	Extraction / Preparation		Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) B5, B8, SG1,	B7, BZ, SG2	---	03-OCT-2013	----	03-OCT-2013	03-OCT-2013	✓
Clear Plastic Bottle - Natural (EK071G) B3, B6	B4,	---	04-OCT-2013	----	03-OCT-2013	04-OCT-2013	✓
EK085M: Sulfide as S2-							
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) B5, B8, SG1,	B7, BZ, SG2	----	----	----	07-OCT-2013	08-OCT-2013	✓
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085) B3, B6	B4,	----	----	----	07-OCT-2013	09-OCT-2013	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Method	Count		Rate (%)		Quality Control Specification	
Analytical Methods			QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)								
Acidity as Calcium Carbonate		ED038	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Alkalinity by PC Titrator		ED037-P	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser		EK055G	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser		ED045G	2	19	10.5	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator		EA010-P	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A		EG020A-F	4	30	13.3	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved		ED040F	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser		EK059G	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser		EK071G	2	15	13.3	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	2	9	22.2	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-		EK085	2	16	12.5	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)		EA025H	2	13	15.4	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)		EA015H	2	14	14.3	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser		EK061G	4	39	10.3	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser		EK067G	4	39	10.3	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Recoverable Metals by ICP-AES		EG005T	1	9	11.1	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)								
Acidity as Calcium Carbonate		ED038	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Alkalinity by PC Titrator		ED037-P	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser		EK055G	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser		ED045G	2	19	10.5	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator		EA010-P	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A		EG020A-F	2	30	6.7	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved		ED040F	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser		EK059G	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser		EK071G	1	15	6.7	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	2	9	22.2	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-		EK085	1	16	6.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)		EA025H	2	13	15.4	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)		EA015H	2	14	14.3	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser		EK061G	2	39	5.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser		EK067G	2	39	5.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Recoverable Metals by ICP-AES		EG005T	1	9	11.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)								
Alkalinity by PC Titrator		ED037-P	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser		EK055G	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement



Matrix: WATER									
Quality Control Sample Type				Evaluation: ✖ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification					
Analytical Methods		Method	Count		Quality Control Specification				
			QC	Regular	Actual	Rate (%) Expected	Evaluation		
Method Blanks (MB) - Continued									
Chloride by Discrete Analyser Conductivity by PC Titrator Dissolved Metals by ICP-MS - Suite A Major Anions - Dissolved Nitrite and Nitrate as N (NOx) by Discrete Analyser Reactive Phosphorus as P-By Discrete Analyser Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser Sulfide as S2- Suspended Solids (High Level) Total Dissolved Solids (High Level) Total Kjeldahl Nitrogen as N By Discrete Analyser Total Phosphorus as P By Discrete Analyser Total Recoverable Metals by ICP-AES	ED045G	1	19	5.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EA010-P	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EG020A-F	2	30	6.7	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	ED040F	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EK059G	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EK071G	1	15	6.7	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	ED041G	1	9	11.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EK085	1	16	6.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EA025H	1	13	7.7	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EA015H	1	14	7.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
Matrix Spikes (MS)									
Ammonia as N by Discrete analyser Chloride by Discrete Analyser Dissolved Metals by ICP-MS - Suite A Nitrite and Nitrate as N (NOx) by Discrete Analyser Reactive Phosphorus as P-By Discrete Analyser Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser Total Kjeldahl Nitrogen as N By Discrete Analyser Total Phosphorus as P By Discrete Analyser Total Recoverable Metals by ICP-AES	EK055G	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	ED045G	1	19	5.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EG020A-F	2	30	6.7	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EK059G	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EK071G	1	15	6.7	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	ED041G	1	9	11.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EK061G	2	39	5.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EK067G	2	39	5.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		
	EG005T	1	9	11.1	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Suspended Solids (High Level)	EA025H	WATER	In-House, APHA 21st ed., 2540D A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrator) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Acidity as Calcium Carbonate	ED038	WATER	APHA 21st ed., 2310 B Acidity is determined by titration with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Major Anions - Dissolved	ED040F	WATER	APHA 21st ed., 3120. The 0.45um filtered samples are determined by ICP/AES for Sulfur and/or Silicon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	APHA 21st ed., 4500 Cl - G The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Total Recoverable Metals by ICP-AES	EG005T	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 Samples are digested by USEPA 3005 prior to analysis. The ICP/AES technique ionises the sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020); Samples are 0.45 um filtered prior to analysis. The ICP/MS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)



Analytical Methods		Method	Matrix	Method Descriptions
Nitrite and Nitrate as N (NOx) by Discrete Analyser		EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser		EK061G	WATER	APHA 21st ed., 4500-Norg D. 25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser		EK062G	WATER	APHA 21st ed., 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser		EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser		EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Sulfide as S2-		EK085	WATER	APHA 21st ed., 4500-S2- D Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. After the supernatant is discarded, the resultant precipitate is then coloured using methylene blue indicator and measured using UV-VIS detection at 664nm. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Preparation Methods		Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals		EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP1307497-002	B4	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	EP1307472-002	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

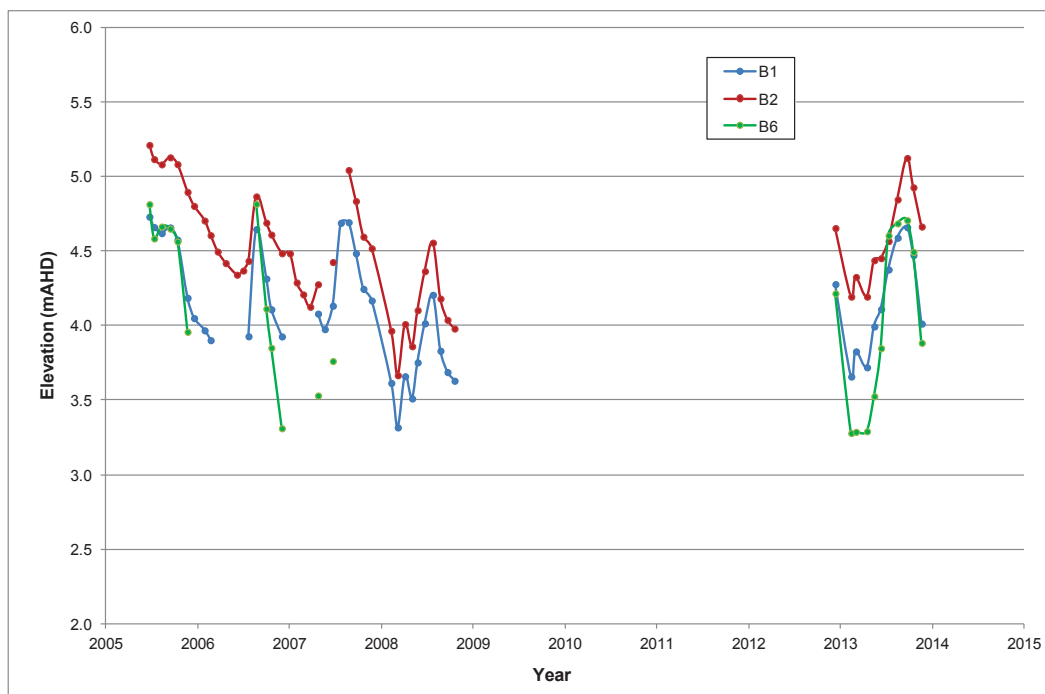
- No Quality Control Sample Frequency Outliers exist.

APPENDIX 6

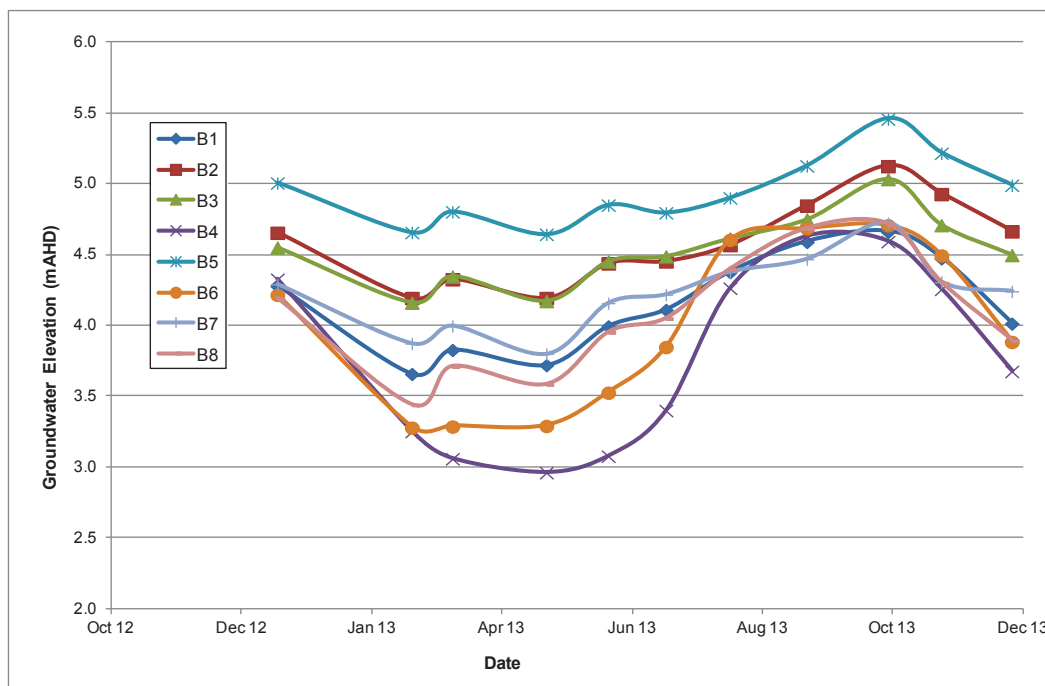
Groundwater Level Information

APPENDIX 6: Groundwater Level Information

Note: Regional Bore IDs (ie B3 to B5, B7 to B8) are not the same reference as site bores (ie B3 to B5, B7 to B8). Figures 6-1 and 6.2 show the regional and site bore locations for reference.



Graph 6-1: Long term Monitoring Hydrographs



Graph 6-2: 2012-2013 Monitoring Hydrographs

Table 6-1: 2005 to 2008 Monitoring Levels

DATE	B1	B2	B6
24/06/2005	4.733	5.214	4.817
13/07/2005	4.663	5.119	4.587
12/08/2005	4.623	5.084	4.667
15/09/2005	4.661	5.131	4.653
14/10/2005	4.579	5.085	4.567
23/11/2005	4.189	4.899	3.961
19/12/2005	4.053	4.805	
30/01/2006	3.971	4.707	
23/02/2006	3.905	4.609	
23/03/2006		4.499	
24/04/2006		4.422	
8/06/2006		4.344	
3/07/2006		4.372	
24/07/2006	3.931	4.437	
24/08/2006	4.65	4.869	4.819
3/10/2006	4.318	4.693	4.116
23/10/2006	4.112	4.613	3.854
4/12/2006	3.93	4.488	3.314
5/01/2007		4.487	
1/02/2007		4.292	
27/02/2007		4.212	
27/03/2007		4.129	
27/04/2007	4.083	4.28	3.534
24/05/2007	3.979		
25/06/2007	4.136	4.429	3.765
27/07/2007	4.692		
27/08/2007	4.696		
25/09/2007	4.488		
25/10/2007	4.249		
27/11/2007	4.171		
13/02/2008	3.618		
10/03/2008	3.32		
8/04/2008	3.663		
6/05/2008	3.514		
28/05/2008	3.756		
26/06/2008	4.018		
28/07/2008	4.209		
27/08/2008	3.834		
24/09/2008	3.691		
22/10/2008	3.633		

Table 6-2: 2012 to 2013 Monitoring Levels

Date	B1	B2	B3	B4	B5	B6	B7	B8
18/12/2012	4.281	4.657	4.553	4.329	5.008	4.219	4.293	4.192
19/02/2013	3.661	4.197	4.164	3.255	4.659	3.282	3.876	3.443
10/03/2013	3.830	4.329	4.349	3.063	4.805	3.290	4.000	3.713
23/04/2013	3.723	4.197	4.175	2.965	4.646	3.294	3.802	3.587
22/05/2013	3.997	4.441	4.455	3.081	4.852	3.529	4.161	3.954
18/06/2013	4.113	4.455	4.491	3.403	4.798	3.851	4.221	4.052
18/07/2013	4.379	4.570	4.617	4.266	4.903	4.607	4.380	4.399
23/08/2013	4.592	4.849	4.752	4.632	5.129	4.688	4.471	4.685
30/09/2013	4.663	5.127	5.036	4.595	5.459	4.710	4.726	4.715
25/10/2013	4.476	4.930	4.711	4.258	5.218	4.497	4.309	4.302
27/11/2013	4.016	4.667	4.500	3.679	4.992	3.887	4.244	3.895

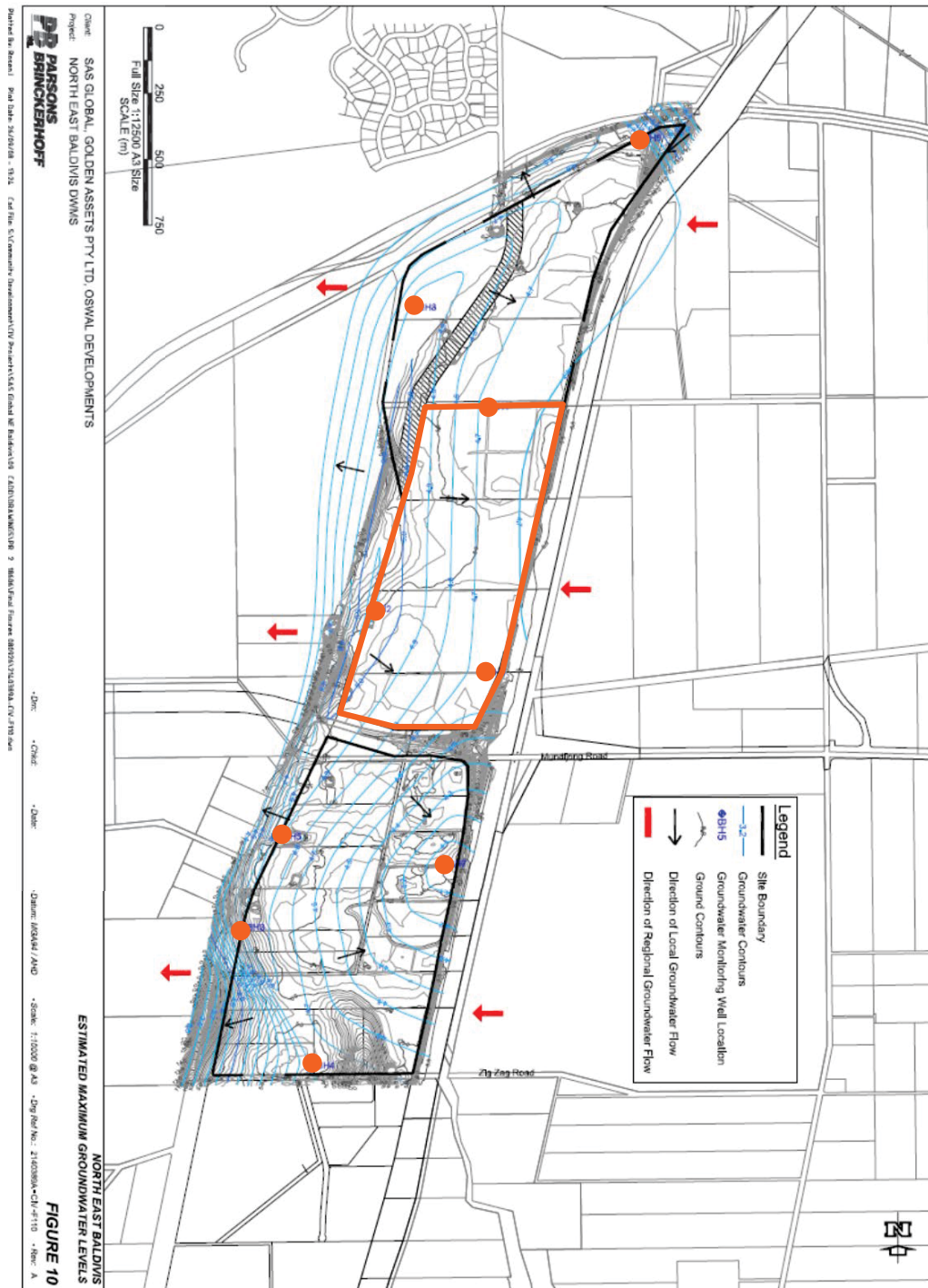


Figure 6-I: Regional Groundwater Monitoring Locations (modified from PB 2009)



Figure 6-2: Site Monitoring Locations

