e-geo solutions Limited
Oak House
Groes Lwyd
Abergele
Conwy
LL22 7SU
01745828494
07899 980958
huwlittlerjones@egeosolutions.co.uk

7 December 2005
e0014/hlj/071205

Mr W P Jurkock
Pen Rallt
Russell Street
Cefn Mawr
LL14 3BL

Dear Sir,

BRON-Y-GRAIG - GROUND INVESTIGATION AND PRELIMINARY CONTAMINATION ASSESSMENT

Please find enclosed our report on the Ground Investigation and Preliminary Contamination Assessment at Bron-Y-Graig. If you have any questions or wish to discuss the findings please do not hesitate to contact us.

Yours Sincerely,

Huw Littler-Jones
Director for
e-geo solutions Limited

Enc

e-geo solutions ltd
Oak House, Groes Lwyd, Abergele, LL22 7SU
Tel 01745 828494 huwlittlerjones@egeosolutions.co.uk
Company Reg No 5522916

BRON-Y-GRAIG, CEFN MAWR

GROUND INVESTIGATION AND PRELIMINARY CONTAMINATION ASSESSMENT

Report No. E0014/R1

December 2005

e-geo SOLUTIONS LTD

Project Title :	Bron-y-Graig, Cefn Mawr
Document Title:	Ground Investigation and Preliminary Contamination Assessment
Project No.	e0014
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e-geo Solutions Ltd
Oak House
Groes Lwyd
Abergele
LL22 7SU

Tel. 01745 828494
Fax. 01745 828493
Email. huwlittlerjones@egeosolutions.co.uk
Web www.egeosolutions.co.uk

Distribution:

e-geo Solutions ltd (Copy No.1)

(Copy No.2)

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Prepared by:	Huw Littler-Jones		
Approved by:	Huw Littler-Jones		
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Signed:	H Littler Jones		

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1. INTRODUCTION.

1.1 In November 2005 e-geo-Solutions Ltd were instructed to undertake a preliminary ground investigation and contamination assessment at a site adjacent to Bron-Y-Graig, Cefn Mawr near Wrexham. It is proposed to develop the site with three detached residential properties and outline planning permission has been granted.

1.2 The objective of the investigation was to assess the status of the site with respect to potential contamination and particularly that which could present a risk to building materials or to the proposed development. The investigation was not designed in response to any particular requirement from the Local Authority to assess contamination in response to any Planning Condition.

2. SITE INVESTIGATION WORKS.

2.1 The ground investigation and assessment was undertaken in accordance with the following UK legislation and regulatory guidance for the investigation of contaminated land.

- Investigation of Potentially Contaminated Sites – Code of Practice (British Standard 10175:2001)
- CLR 8, 'Potential contaminants for the assessment of contaminated land' DEFRA/EA, March 2002.
- CLR 10, 'Contaminated Land Exposure Assessment Model (CLEA), Environment Agency 2002
- CLR 11, 'Model procedures for the management of contaminated land: risk assessment procedures' DoE 1998
- Environmental Protection Act 1990, Part IIA, as inserted by section 57 of the Environment Act 1995.

2.2 The scope of work included the following tasks:

- Utility Clearance – confirmation that no services are present below ground before the intrusive investigation works.
- Intrusive Ground Investigation – excavation of 3 No. trial holes to depths of 1.20m to 1.40m at locations adjacent to the proposed properties, description of ground strata encountered and collection of representative ground samples from each trial hole.
- Laboratory analysis – laboratory chemical analysis of 3 No. samples at a UKAS/MCERTS accredited laboratory, for the following analytical suite:

  pH, arsenic, cadmium, chromium (hexavalent) , chromium (total), lead, mercury, selenium, boron (water soluble), copper, nickel, zinc, cyanide (free, complex, total), sulphide, sulphur, sulphate (total), water soluble sulphate, phenols, and PAH (total).

2.3 The assessment of ground contamination undertaken for the this site is a 'Tier 1 Generic Risk Assessment' which requires the comparison of contaminant concentrations to a set of generic risk based screening concentrations to determine whether a pathway specific risk assessments is required.

3. SITE INVESTIGATION RESULTS

Geology

3.1 A detailed description of the ground strata encountered in the trial holes is included on the trial pit logs in Appendix 1. Made ground was encountered for the full depth of each trial hole and comprised loose cobbles of sandstone in a silty clay and sand matrix (reworked natural ground) in TP1 and TP2 from 0.90m, a loose dark brown silty sand and weathered shale in TP3 and a dark brown clayey silt with gravel and cobbles, slate and concrete in TP2 to 0.90m. No groundwater was encountered.

Potential Contamination

3.2 In accordance with current best practice the chemical analysis results have been screened against the Contaminated Land Assessment (CLEA 2002) Soil Guideline Values (SGVs) for 'residential with plant uptake' end-use, where available to assess the existence of a contamination source. Where SGVs are not currently available the results have been compared to adjusted Dutch Intervention Values (DIV) as a useful indicator of relative concentrations of contamination.

3.3 The results of this screening are presented in Table 1 to 3 below:

Table1. Summary of Results for Potentially Hazardous Metals

Contaminant	Units	Number of Analyses	Concentration TP1 0.5m	TP2 0.5m	TP3 0.5m	Number Exceeding SGV	Soil Guideline Value*
Arsenic	mg/kg	3	13.6	15.7	17.2	0	20
Selenium	mg/kg	3	<1.0	<1.0	1	0	35
Lead	mg/kg	3	43.5	448.8	170.6	0	450
Cadmium	mg/kg	3	<0.2	<0.2	<0.2	0	2
Chromium	mg/kg	3	14.7	14	23.6	0	130
Nickel	mg/kg	3	10.8	21.6	18.2	0	50
Mercury	mg/kg	3	2.8	8.8	3.6	0	8

Notes:
* SGV for end-use of residential with plant uptake

Table2. Summary of Results for Metals and Inorganics

Contaminant	Units	Number of Analyses	Concentration S1 0.6m	S2 0.6m	BH2 0.45m	Number Exceeding DIV	Dutch Int Value*
Copper	mg/kg	3	16.1	80.3	50.5	0	91
Zinc	mg/kg	3	66.8	606.5	227.2	1	303
Boron	mg/kg	3	<0.5	<0.5	<0.5	0	5500
Sulphate	mg/kg	3	3269	1204	593	-	-
Sulphide	mg/kg	3	<2.0	10.4	<2.0	-	-
Cyanide	mg/kg	3	<2.0	<2.0	<2.0	-	-
Thiocyanate	Mg/kg	3	<4	<4	<4	-	-
Sulphur	mg/kg	3	1232	822	735	-	-
Sulphate (ws)	mg/l	3	60	43	107	**	**
Phenols	mg/kg	3	<1	<1	1.2	0	5
pH	na	3	4.7	7.9	6.2	-	-

Notes:
* DIV above which there may be a risk to the environment and human health
** BRE Special Digest 1

Table3. Summary of Results for Total PAH

Contaminant	Units	Number of Analyses	Concentration S1 0.6m S2 0.6m BH2 0.45m				Number Exceeding RBSL	Risk Based Screening Level*
Total PAH	mg/kg	3	<0.1	25.8	23.3		0	134

Notes:
* RBSL for end-use of residential with plant uptake

3.4 Comparison of the results from the sample analysis with the Tier 1 SGVs, DIVs and RBSLs indicates that the near surface soils at the site do not contain any chemical contaminants above respective trigger concentrations. The concentration of zinc in the sample from TP2 at 0.50m exceeded the trigger concentration slightly however there is no risk to human health or construction materials.

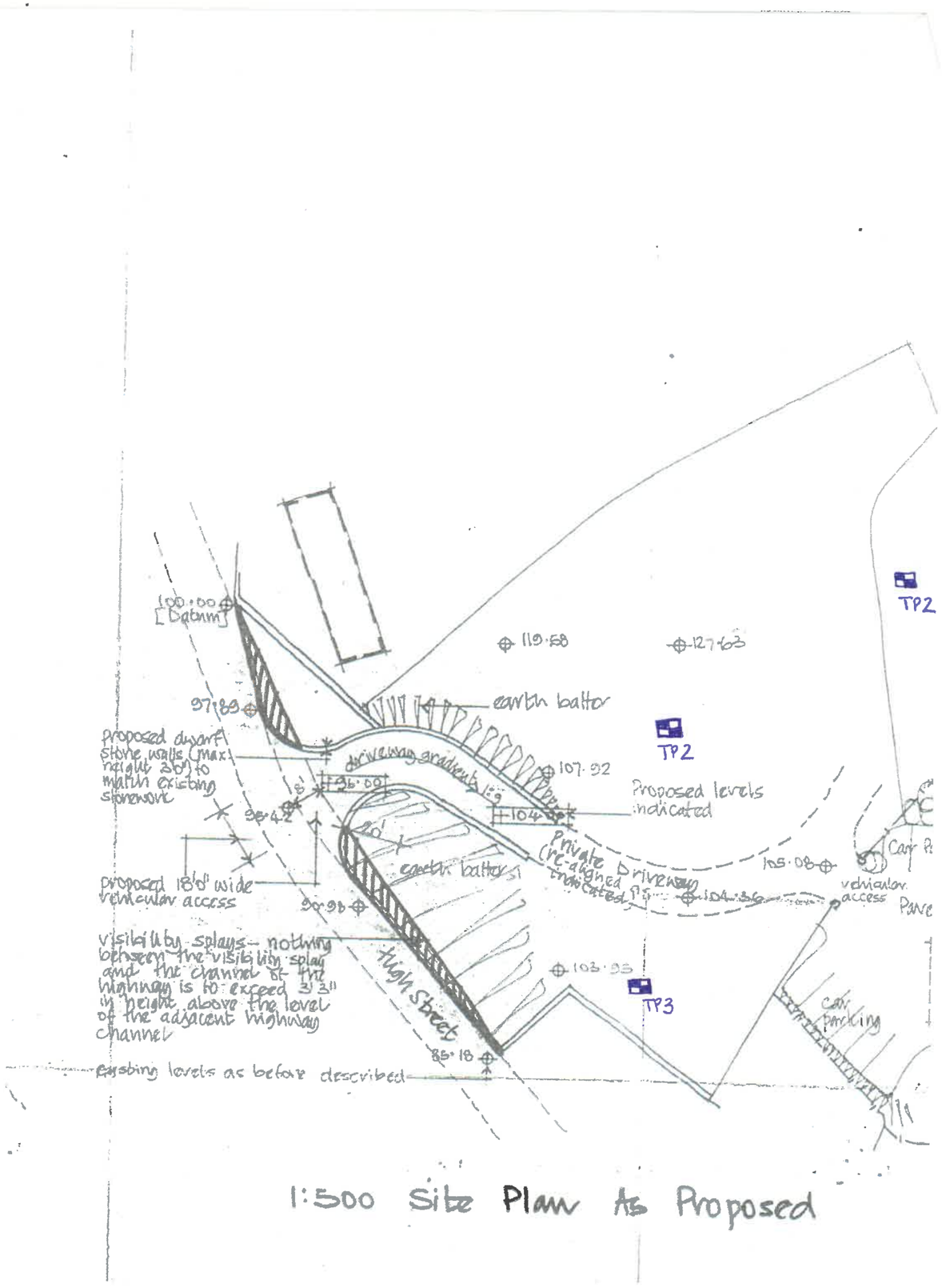
4. RESULTS ASSESSMENT AND CONCLUSIONS

4.1 On the basis of the available results and the Tier 1 Generic Risk Assessment the ground materials within the areas of investigation cannot be described as contaminated and presenting a risk to construction materials and the proposed development.

4.2 However near surface materials comprise made ground of variable composition and the risk of contamination being encountered in other areas can not be discounted. Personnel involved in site construction activities should adopt appropriate PPE. During site activities involving ground excavation if unusual materials, odours, or liquids are encountered, or if contamination is suspected then further sampling and analysis should be carried out. If site preparation works will involve a site strip and off site disposal of materials then the need to dispose of the spoil at a licensed landfill should be assessed.

4.3 The results of tests for soluble sulphate indicate that ground materials to be classed as DS – 1 and all buried concrete should be designed to for the classification.

Drawing 1 - Trial Hole Location Plan



1:500 Site Plan As Proposed

Appendix 1 - Trial Hole Records

TRIAL PIT REPORT

	Trial pit no: **TP 1**
Date : 18/11/2005	Site: Bron-y-Graig
Excavator type : JCB	
Pit dimensions : 1.5m x 0.6m Depth : 1.20m	Elev (m AOD): NA

TRIAL PIT LOG

Pit no	Depth From (m)	Depth To (m)	Interval (m)	Description	Legend	SAMPLE RECORD Type B U D W	Depth from (m)	Depth To (m)
TP1	0.00	1.20	1.20+	**Made Ground.Loose to medium dense dark brown cobbles of sandstone in a silty clay and sand matrix with many boulders of sandstone**		D	0.50	
	1.20			Base of pit at 1.20m				

Remarks

Sidewalls :	Sides collapsing from 1.00m
Groundwater :	None observed
In-situ testing :	N/A
Contaminants :	N/A
Other :	None
Pocket Penetrometer	N/A

e-geo solutions Ltd
Oak House, Groes Lwyd, Abergele, LL22 7SU
Tel : 01745 828494 Fax : 01745 828493

TRIAL PIT REPORT

	Trial pit no **TP 2**
Date : 18/11/2005	Site:Bron-y-Graig
Excavator type : JCB	
Pit dimensions : 1.5m x 0.7m Depth : 1.4m	Elev (m AOD):NA

TRIAL PIT LOG						SAMPLE RECORD		
Pit no	Depth From (m)	Depth To (m)	Interval (m)	Description	Legend	Type B U D W	Depth from (m)	Depth To (m)
TP 2	0.00	0.90	0.90	Made Ground. Loose dark brown clayey silt with much brick gravel and cobbles and many fragments of slate and cobbles of sandstone and concrete		D	0.50	
	0.90	1.40+	0.50+	Made Ground.Cobbles of sandstone in a sand matrix		D	0.90	
	1.40			Base of pit at 1.40m				

Remarks

Sidewalls :	Slight collapse of pit sides from 1.20m.
Groundwater :	None observed
In-situ testing :	N/A
Contaminants :	N/A
Other :	None
Pocket Penetrometer	N/A

Egniol Limited
Tre Felin, Bangor, Gwynedd, North Wales, LL57 4LH.
Tel : 01248 355996 Fax : 01248 371996

TRIAL PIT REPORT

e-geo

Trial pit no. **TP 3**

Date : 18/11/2005

Site: Bron-y-Graig

Excavator type : JCB

Pit dimensions : 1.40m x 0.7m Depth : 1.30m

Elev (m AOD):

TRIAL PIT LOG | **SAMPLE RECORD**

Pit no	Depth From (m)	Depth To (m)	Interval (m)	Description	Legend	Type B U D W	Depth from (m)	Depth To (m)
TP3	0.00	1.30	1.30+	**Made Ground. Loose dark brown and black silty sand and weathered shale with layers of light brown medium sand and cobbles of sandstone**		D	0.50	
	1.30			Base of pit at 1.30m				

Remarks

Sidewalls :	Generally stable
Groundwater :	None observed
In-situ testing :	N/A
Contaminants :	N/A
Other :	None
Pocket Penetrometer	N/A

Egniol Limited
Tre Felin, Bangor, Gwynedd, North Wales, LL57 4LH.
Tel : 01248 355996 Fax : 01248 371996

Appendix 2 - Chemical Analysis Results

ECõS Environmental
Low Moor Business Park,
Common Road, Bradford BD12 8ND
Tel: 01274 691122 Fax: 01274 608100

Client: **E-Geo Solutions Ltd**
Oak House
Groes Lwyd
Abergele
Conwy
LL22 7SU

FAO: Mr H Littler-Jones

Analytical Report Number: R05/3214

Client Project Name: **Bron-Y-Graig**
Client Project Number: **e007**
Your Order Number: **007/1**
Order Receipt Date: **22/11/05**
Reporting Date: **Tuesday 6 December 2005**

If you have any queries regarding this report please contact our Customer Services Manager

ECõS Environmental
Low Moor Business Park,
Common Road, Bradford BD12 8ND
Tel: 01274 691122 Fax: 01274 608100

Client Project Name: Bron-Y-Graig

Project Number: e007

Client: E-Geo Solutions Ltd

Reporting Date: Tuesday 6 December 2005

Comments

All analyses are carried out using the laboratory's standard methods unless otherwise agreed.

The test results in this report refer only to the actual samples on which testing has been performed.

Any opinions and/or interpretations expressed herein are outside the scope of the testing laboratory's UKAS accreditation.

The test report shall not be reproduced, except in full, without the testing laboratory's written approval.

This testing laboratory cannot be held responsible for the condition or suitability of samples submitted for testing by a third party or for the competency of personnel other than its own staff.

Soil Samples

Results are expressed based on air dried mass @ 40°C unless otherwise stated.

See key in Notes section for explanation of numerical categories for asbestos results, if applicable.

Stones (for example inert flints and inorganic minerals) >10mm are removed prior to analysis. Unless otherwise stated, results have not been corrected for this loss.

Samples submitted for leachate determination were prepared using agreed procedures and analysed using UKAS accredited methodology where appropriate.

Results are expressed without correction for recovery factors.

Key:

Accreditation:

MCERTS = This test is accredited to the British Standard BS EN ISO/IEC 17025:2000 and the Environment Agency MCERTS for soil standard.

17025 = This test is accredited to the British Standard BS EN ISO/IEC 17025:2000.

None = This test is currently not on our scope of accreditation.

Sample Pretreatment (Appended to Method of Detection)

D = Air Dried @ 40°C

R = As Received

Sample Type

B = Bulk disturbed sample
C = Core Sample
D = Small disturbed sample
P = Piston sample
U = Undisturbed sample - open drive
W = Water Sample

Sample Results

Analysis not requested
*** Test not completed. Please see notes on last page

Signed: _____

For and on behalf of ECõS Environmental

Approved signatories:

Name	Position
J R Brown	Customer Services Manager
L Dewell	Production Manager
P Richardson	Quality Manager
J Stoddart	Technical Manager

ECõS Environmental
Low Moor Business Park,
Common Road, Bradford BD12 8ND
Tel: 01274 691122 Fax: 01274 608100

Client Project Name: Bron-Y-Graig

Project Number: e007

Client: E-Geo Solutions Ltd

Reporting Date: Tuesday 6 December 2005

Soil Samples

Method Statement

Determinand	Method of Detection	Sample Pretreatment	Limit of Detection	Accredi-tation	Sub-Contracted	Result Date
Arsenic	ICP-OES	D	0.1 mg/kg	17025	No	28/11/05
Cadmium	ICP-OES	D	0.2 mg/kg	17025	No	28/11/05
Chromium (hexavalent)	ICP-OES	D	1.0 mg/kg	17025	No	25/11/05
Chromium (total)	ICP-OES	D	0.2 mg/kg	17025	No	28/11/05
Lead	ICP-OES	D	0.5 mg/kg	17025	No	28/11/05
Mercury	ICP-OES	D	0.1 mg/kg	17025	No	28/11/05
Selenium	ICP-OES	D	1.0 mg/kg	17025	No	28/11/05
Boron (water soluble)	ICP-OES	D	0.5 mg/kg	17025	No	29/11/05
Copper	ICP-OES	D	0.2 mg/kg	17025	No	28/11/05
Nickel	ICP-OES	D	0.2 mg/kg	17025	No	28/11/05
Zinc	ICP-OES	D	0.2 mg/kg	17025	No	28/11/05
PAH (total)	GC-MS	D	0.1 mg/kg	17025	No	28/11/05
Phenols	Colorimetry	R	1.0 mg/kg	17025	No	25/11/05
Cyanide (free)	Colorimetry	R	2.0 mg/kg	17025	No	19/11/05
Cyanide (complex)	Colorimetry	R	2.0 mg/kg	17025	No	19/11/05
Cyanide (total)	Colorimetry	R	2.0 mg/kg	17025	No	19/11/05
Thiocyanate	Colorimetry	R	4 mg/kg	17025	No	25/11/05
Sulphate (total)	ICP-OES	D	30 mg/kg SO4	17025	No	28/11/05
Sulphide	Colorimetry	R	2.0 mg/kg	17025	No	24/11/05
Sulphur (total)	ICP-OES	D	10 mg/kg	17025	No	28/11/05
pH	pH-meter	D	N/A	17025	No	29/11/05
Sulphate (water soluble)	HPLC-IC	D	0.001 g/l SO4	17025	No	29/11/05

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Client Project Name: Bron-Y-Graig

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Client: E-Geo Solutions Ltd

Reporting Date: Tuesday 6 December 2005

BH/TP	TP1	TP2	TP3
Top Depth / m	0.50	0.50	0.50
Bottom Depth / m			
Customer ID			
Sample Type			
Date Sampled	18/11/05	18/11/05	18/11/05
Receipt Date	22/11/05	22/11/05	22/11/05
ECoS Sample ID	S0527176	S0527178	S0527179
Matrix Type	Soil	Soil	Soil
Determinand / **Units**			
Arsenic	mg/kg	13.6	15.7	17.2
Cadmium	mg/kg	<0.2	<0.2	<0.2
Chromium (hexavalent)	mg/kg	<1.0	<1.0	<1.0
Chromium (total)	mg/kg	14.7	14.0	23.6
Lead	mg/kg	43.5	448.8	170.6
Mercury	mg/kg	2.8	8.8	3.6
Selenium	mg/kg	<1.0	<1.0	1.0
Boron (water soluble)	mg/kg	<0.5	<0.5	<0.5
Copper	mg/kg	16.1	80.3	50.5
Nickel	mg/kg	10.8	21.6	18.2
Zinc	mg/kg	66.8	606.5	227.2
PAH (total)	mg/kg	<0.1	25.8	23.3
Phenols	mg/kg	<1.0	<1.0	1.2
Cyanide (free)	mg/kg	<2.0	<2.0	<2.0
Cyanide (complex)	mg/kg	<2.0	<2.0	<2.0
Cyanide (total)	mg/kg	<2.0	<2.0	<2.0
Thiocyanate	mg/kg	<4	<4	<4
Sulphate (total)	mg/kg SO4	3269	1204	593
Sulphide	mg/kg	<2.0	10.4	<2.0
Sulphur (total)	mg/kg	1232	822	735
pH	N/A	4.7	7.9	6.2
Sulphate (water soluble)	g/l SO4	0.060	0.043	0.107