

ARIA Property Group

SOIL SAMPLING REPORT

4 EDMONSTONE STREET

SOUTH BRISBANE

Prepared By:

WASTE SOLUTIONS AUSTRALIA PTY LTD

RN 05/394

AUGUST 2005

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PROPERTY DESCRIPTION

SITE ADDRESS 4 Edmonstone Street,
South Brisbane, QLD

LOT DESCRIPTION: Lot 153 on B3137
EPA File Number BNE 24817

OWNER: ARIA Property Group

LOCAL AUTHORITY AREA: Brisbane City Council

CURRENT ZONING: Special Purposes SP13

CURRENT USE: Vacant Commercial

FUTURE ZONING: Unknown (proposed residential)

PROPOSED USE: High density residential development

LISTED ON THE EMR Yes (based on EPA request for information)

LISTED ON THE CLR: No

August 2005

SOIL SAMPLING REPORT

OF LOT 153 ON B3137

1 INTRODUCTION

1.1 Background

Waste Solutions Australia Pty Ltd (WSA) was commissioned by ARIA Property Group (ARIA) to undertake a soil sampling report of Lot 153 on B3137, at 4 Edmonstone Street, South Brisbane (the site).

1.2 Objectives

The objective of the work was to assess the presence of potential or indicative soil contamination that may require remedial action in order to allow proposed future residential development to proceed. This initial assessment was based upon the analysis of soil samples obtained during a geotechnical investigation of the site (completed by Morrison Geotechnic Pty Ltd [Morrison]).

This work was in response to an information request from the Queensland Government Environmental Protection Agency (EPA) Reference Number BCC/7/05(3) Part 1, dated 11 August 2005 in order to enable a Suitability Statement to be issued for the site.

As mentioned in the information request, if the site is to remain on the Qld EPA Environment Management Register (EMR) as a "Managed" site a draft Site Management Plan (SMP) must be prepared and submitted to the EPA.

1.3 Scope of Work

The works carried out for the project involved the following:

- Conducting a brief inspection of the site, identifying areas of potential environmental concern;
- Drilling of five (5) boreholes to a maximum depth of 16.64 metres below ground level (mbgl) by Morrison;
- Collection of soil samples by Morrison with determination of selected samples for analysis by WSA. Analysis of nine (9) soil samples, plus 1 duplicate for laboratory analysis of metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc) and 5 of the samples and 1 duplicate for total petroleum hydrocarbons (TPH), benzene, ethylbenzene, toluene and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAH) and;
- Preparation of a report, detailing the findings of the laboratory soil analyses.

The scope of work did not include a site history, aerial photograph review, title search, etc. The scope was to select soils for analysis and assess the results of these soil samples obtained by Morrison during the geotechnical investigation.

2 SITE DESCRIPTION

2.1 Site Inspection

The following observations were made during the brief site inspection by WSA:

- The building on site is a multistory concrete block building. It was vacant at the time of the investigation.
- Almost the whole surface of the site is concrete sealed.
- The site slopes gently to the south with a gradient of < 5%.

Surrounding Land Use

The surrounding land use is described below in Table 1.

Table 1 Description of Surrounding Land Use

Northwest:	Block and concrete building with no basement.
Northeast:	Commercial building.
Southeast:	Residential concrete apartment building with a single level basement founding on timber piles.
Southwest:	Edmonstone Street followed by commercial properties.

2.2 Proposed Use

It is proposed to develop the site for residential apartments. It is understood that the proposed building is a multistory apartment building with a two level basement carpark. Part of the proposed development will be a requirement to remove soils from the current site to approximately 5 metres below the current ground level. This will include the removal of any identified shallow fill material.

2.3 Regional Geology

Information about the regional geology was obtained from the 1:500,000 Moreton Geological Map produced by the Department of Mines in 1980. The site is underlain by Devonian-Carboniferous Bunya Phyllite comprising phyllite and greywacks.

2.4 Regional Hydrogeology

Information about the local hydrogeology was obtained from the 1:2500 000 Groundwater Resources Queensland map produced by Queensland Department of Mines, 1987. The groundwater has a yield of <5 L/sec and a salinity of 500-1500 mg/L. The groundwater is suitable for most stock and some domestic and irrigation. The lithology of the aquifer is metamorphic rocks.

3 METHODOLOGY

Morrison Geotechnic Pty Ltd conducted the soil sampling at the site as part of a geotechnical investigation.

It is understood that boreholes were hand augured for the first metre and then drilled, using a solid stem auger mounted on a 4WD Landcruiser. The solid stem auger was used to obtain soil samples, at various depths and locations. The drilling program was aimed at identifying geotechnical properties of soils in addition to the potential presence of soil contamination on the site.

The site is approximately 0.09ha in area. The Australian Standard Guide to Sampling and Investigation of Potentially Contaminated Soil, Part 1 (1997) recommends 5 to 6 sampling points in an area 0.05 to 0.1ha. Buildings restricted locations of the boreholes. However it was attempted to gain as much coverage of the site as possible within these limitations by drilling 5 boreholes over the site. Overhead building height restricted access of the drilling equipment to the south east area of the site therefore sampling was not conducted in the area.

Boreholes were progressed to a maximum depth of 16.64 metres below ground level (mbgl). Soil samples were collected from each borehole at a maximum 0.5m intervals or change in strata. Soil samples were provided to WSA upon completion of the geotechnical investigation.

From the samples provided by Morrison, WSA selected nine primary soil samples (plus 1 duplicate sample, at a rate of 1:10, which is the standard Qld EPA requirement) for laboratory analysis of metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc). Additionally five of the soil samples plus 1 duplicate were analysed for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAH).

Groundwater was encountered during the drilling works in borehole 4 and borehole 5 at depths of 5.9m and 5.65m respectively. However groundwater investigations were not carried out during these works.

Soil samples collected by Morrison were placed in sealed plastic bags and stored in eskies on site. WSA received the samples at the end of the geotechnical investigation and transferred them into teflon sealed, laboratory prepared glass jars. These were then placed in a fridge prior to subsequent transfer to an esky with placement on ice and transported to Australian Laboratory Services (ALS), a National Association of Testing Authorities (NATA) registered laboratory.

4 QUALITY ASSURANCE

The laboratory performed internal Quality Assurance (QA) and Quality Control (QC) analysis. The QA/QC employed by the laboratory comprises anomalous samples (spikes) for organic analysis and certified reference sampling for inorganics. The results of the QC testing are presented in the laboratory certificates (*Appendix B*). Results also indicate how much of a particular analyte was recovered. Duplicate testing is undertaken by the laboratory to compare the results obtained in analysing samples.

In addition, duplicate samples were collected on site and tested by the same laboratory. No rinsates or trip blanks were obtained, as WSA did not undertake the soil sampling. Results of these are discussed in *Section 6*.

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5 ASSESSMENT CRITERIA

5.1 Soils

Soils analysis results were compared to the Queensland Environmental Protection Agency (EPA) Investigation Threshold Levels (*Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland*, 1998).

Various Health-based Investigation Levels (HBILs) (A-F) have been developed by the National Environmental Health Forum (NEHF) for different exposure settings. These exposure settings are dependent on land use. The NEHF Investigation Levels used by WSA for validation purposes at this site are the HBIL-A levels (Health Based Investigation Levels for Residential Land use).

In the absence of official EPA guidelines for TPH and BTEX compounds, the internal guideline levels (IGLs) that the EPA considers acceptable have been used. The assessment criteria used during this assessment are detailed in Table 2. In the absence of Queensland EPA Guideline levels, the NSW EPA Guidelines for Assessing Service Station Sites 1994 were referenced.

Table 2 Assessment Criteria for Soils

Compound	Nominated Health Based Investigation Levels (soil) mg/kg
Total Petroleum Hydrocarbons	
<i>C₆ – C₉</i>	100 ⁽¹⁾
<i>C₁₀ – C₁₄</i>	100 ⁽¹⁾
<i>C₁₅ – C₂₈</i>	1000 ⁽¹⁾
<i>C₂₉ – C₃₆</i>	1000 ⁽¹⁾
Benzene	1 ⁽¹⁾
Toluene	130 ⁽²⁾
Ethylbenzene	50 ⁽²⁾
Xylenes	25 ⁽²⁾
Total BTEX	7 ⁽³⁾
Benzo(a)pyrene	1 ⁽³⁾
Total Polycyclic Aromatic Hydrocarbons	20 ⁽³⁾
Arsenic	100 ⁽³⁾
Cadmium	20 ⁽³⁾
Chromium	12% ⁽³⁾
Copper	200 ⁽³⁾
Lead	300 ⁽³⁾
Nickel	600 ⁽³⁾
Zinc	400 ⁽³⁾

(1) EPA Internal Guideline Levels

(2) Guidelines for Assessing Service Station Sites, Contaminated Sites Section, NSW Environment Protection Authority (1994).

(3) Draft Guidelines for the Assessment & Management of Contaminated Land in Qld (Department of Environment (now Qld EPA), May 1998).

6 RESULTS

Laboratory results are summarised and appended in this report.

6.1 Soil Results

Investigation findings are summarised below regarding soil contamination at the subject site:

- Heavy metals have been identified in the shallow fill material at levels exceeding the HBIL-A;
- Lead and zinc were identified in borehole 2 at 0.2 m at concentrations of 1010 mg/kg and 507 mg/kg respectively, exceeding the HBIL-A of 300 mg/kg and 400mg/kg respectively; and
- Copper and zinc were identified in borehole 5 at 0.3 m at concentrations of 294 mg/kg and 711 mg/kg respectively, exceeding the HBIL-A of 200 mg/kg and 400 mg/kg respectively.

6.2 Quality Assurance

6.2.1 Field Data

The appended summary table of laboratory results shows the measurable relative percent differences (RPD) within the acceptable range with a maximum of 25.5%. The general maximum acceptable level for RPD values is 30%. This indicates that sample collection procedures were carried out appropriately.

7 CONCLUSIONS AND RECOMMENDATIONS

Based on the information obtained from the laboratory soil analyses, WSA conclude the following:

- Elevated levels of the metal contaminants lead, copper and zinc are present within the shallow fill material.
- Concentrations of contaminants of concern in the underlying natural material were either not detected or were within the nominated investigation levels.
- Based upon soil sampling results there will be a requirement to remove the shallow fill to a maximum of 0.5m to allow the removal of the site from the EMR.

Additionally:

- Should the site stay on the EMR, a Site Management Plan (SMP) will be required, however, should you wish the site to be removed from the EMR, limited remediation will be necessary.
- It is understood that a two level basement carpark is to be excavated under the building and hence any potentially contaminated material should be selectively removed to an appropriate licensed landfill under conditions of a disposal permit.
- Following removal of the shallow soils, sampling of the underlying material should be undertaken to validate the site as suitable for future residential use.
- Should the basements extend to within one metre of the current groundwater, the quality of this groundwater should be assessed.

8 LIMITATIONS OF REPORTING

Waste Solutions Australia Pty Ltd has prepared this report for the use of ARIA Property Group in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report may not contain sufficient information for purposes other than for the client and its respective consulting advisers.

The accuracy of the assessment made in this report is dependent upon the accuracy and reliability of evidence drawn together from a number of sources. The field investigations on which this report is based were not completed by WSA but by Morrison. WSA cannot verify the sampling methodology or techniques used by Morrison and therefore can only place partial reliance on the results. WSA were only requested to subsequently select samples for analysis and interpret the results of the analysis. It is important, however, that the limitations of the assessment be clearly recognised when the findings of this study are being interpreted. This report is based on sampling and information derived from others over which Waste Solutions Australia Pty Ltd had no control.

The report is based on conditions encountered in a limited number of investigation locations. Investigations have not been conducted to characterise all possible contamination on site, nor to fulfil the purposes of all possible site developments. Conditions may be encountered in subsequent investigations or during site re-development which were not encountered in this investigation.

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9 REFERENCES

Draft Guidelines for the Assessment & Management of Contaminated Land in Qld (Department of Environment (now Qld EPA), May 1998).

Guidelines for Assessing Service Station Sites, Contaminated Sites Section, NSW Environment Protection Authority (1994).

The Australian Standard AS 4482.1-1997. Guide to Sampling and Investigation of Potentially Contaminated Soil. Part 1: Non-volatile and semi-volatile compounds. Standards Australia, North Sydney NSW (1997)

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Approved by:

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.....
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August 2005

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FIGURES

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SUMMARY TABLE

LABORATORY RESULTS

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Analysis results of soil samples collected from boreholes at 4 Edmonstone Street on August 10 2005. Shaded cells exceed assessment criteria.

	Sample		BH1	BH2	BH2	BH3	BH3	BH4	BH4	BH5	BH5	Dup 2	RPD
	Depth(m)		0.4	0.2	0.9	0.6	0.9-1	0.5	1	0.3	1.1	is BH3 0.6	
	Unit	LOR											%
Moisture Content (dried @ 103°C)	%	1	19.4	9.5	12.7	6.5	8.4	10.6	11.1	9.8	12.7	8.4	25.5
Metals													
Arsenic	mg/kg	5	<5	5	<5	<5	<5	8	10	19	<5	<5	nd
Cadmium	mg/kg	1	<1	<1	<1	<1	<1	1	1	2	<1	<1	nd
Chromium	mg/kg	2	12	18	25	11	14	97	116	NA	27	11	0.0
Copper	mg/kg	5	10	18	6	<5	<5	109	120	294	188	<5	nd
Lead	mg/kg	5	50	1010	37	10	12	18	10	<5	79	8	22.2
Nickel	mg/kg	2	4	4	3	3	2	193	182	271	6	3	0.0
Zinc	mg/kg	5	308	507	28	10	8	211	184	711	123	9	10.5
PAH													
Naphthalene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Acenaphthylene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Acenaphthene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Fluorene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Phenanthrene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Anthracene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Fluoranthene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Pyrene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Benz(a)anthracene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Chrysene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Benzo(b)fluoranthene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Benzo(k)fluoranthene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Benzo(a)pyrene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Indeno(1.2.3.cd)pyrene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Dibenz(a,h)anthracene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
Benzo(g,h,i)perylene	mg/kg	0.5	<5	<0.5	NA	<5	NA	<0.5	NA	<0.5	NA	<5	nd
TPH													
C6 - C9 Fraction	mg/kg	2	<2	<2	NA	<2	NA	<2	NA	<2	NA	<2	nd
C10 - C14 Fraction	mg/kg	50	<50	<50	NA	<50	NA	<50	NA	<50	NA	<50	nd
C15 - C28 Fraction	mg/kg	100	<100	<100	NA	<100	NA	<100	NA	<100	NA	<100	nd
C29 - C36 Fraction	mg/kg	100	<100	<100	NA	<100	NA	<100	NA	<100	NA	<100	nd

NA - not analysed

Continued overleaf

nd - not determined

 Level above assessment criteria outlined in Table 2 in Section 5.1

August 2005

	Sample		BH1	BH2	BH2	BH3	BH3	BH4	BH4	BH5	BH5	Dup 2	RPD
	Depth(m)		0.4	0.2	0.9	0.6	0.9-1	0.5	1	0.3	1.1	is BH3 0.6	
	Unit	LOR											%
BTEX													
Benzene	mg/kg	0.2	<2	<0.2	NA	<2	NA	<0.2	NA	<0.2	NA	<2	nd
Toluene	mg/kg	0.2	<2	<0.2	NA	<2	NA	<0.2	NA	<0.2	NA	<2	nd
Ethylbenzene	mg/kg	0.2	<2	<0.2	NA	<2	NA	<0.2	NA	<0.2	NA	<2	nd
meta- & para-Xylene	mg/kg	0.2	<2	<0.2	NA	<2	NA	<0.2	NA	<0.2	NA	<2	nd
ortho-Xylene	mg/kg	0.2	<2	<0.2	NA	<2	NA	<0.2	NA	<0.2	NA	<2	nd

NA - not analysed

nd - not determined

 Level above assessment criteria outlined in Table 2 in Section 5.1

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APPENDIX A

BORELOGS

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APPENDIX B

LABORATORY CERTIFICATES

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August 2005



Morrison Geotechnic Pty Ltd

A.B.N. 051 009 878 899
PO Box 3063, Darra, QLD 4076
Phone: (07) 3279 0900 Fax: (07) 3279 0955

Engineering Log - Borehole

Borehole No.: BH5

Page: 1 of 3

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:
Northing:
RL:
Total Depth: 12.00

Drilling Rig: Jacro 105
Driller: R. Battison
Logged By: G. Rose
Date: 29/07/2005

Total Depth: 12.00			Date: 29/07/2005			Location: V. Lakshmi Nagar								
Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm Auger							Concrete: Reinforced concrete slab				Paveme			
											Paveme			
			0.2								Drilled			
			0.25	FIL		FIL	Silty Sand (SM): Fine to coarse grained bedding sand, orange - brown, moist.	M	M	L St	7			
											5			
			0.5			FIL	Gravelly Clay (CI): Medium plasticity clay, with fine to medium grained gravel, yellow brown and red	M		VSt-H	6			
							Sandy Clay (CH): High plasticity clay with fine to medium grained sand, brown mottled grey				12			
											2			
			1.0								3			
				Natural		CI	Sandy Clay: Medium plasticity clay, fine grained sand, grey streaked orange brown	M		H	5			
											6			
											7			
											12			
											20			
			2.0											
			2.1			CH	Sandy Clay: As above except high plasticity clay and fine to medium grained gravel, orange brown	M		H				
			2.6			CI	Sandy Clay: As above except medium plasticity and some fine sand layers	M		H				
			3.0											
			3.6			CH	Silty Clay: High plasticity clay with some fine to medium grained gravel (sandstone)	M		VSt				
		4.0												

2.9

U50

PP>600kPa

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	St Stiff	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	VSt Very stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



Morrison Geotechnic Pty Ltd

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Phone: (07) 3279 0900 Fax: (07) 3279 0955

Engineering Log - Borehole

Borehole No.: BH5

Page: 2 of 3

Job Number: 205E/175

Easting:

Drilling Rig: Jacro 105

Client: Aria Properties Group

Northing:

Driller: R. Battison

Project: Geotechnical Site Investigation

RL:

Logged By: G. Rose

Total Depth: 12.00

Date: 29/07/2005

Location: 4 Edmondstone Street, South Brisbane

Drilling Information				Material Description					Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
100mm Auger	SWL 08/03/05					CH	Silty Clay : High plasticity clay with some fine to medium grained gravel (sandstone)		M	VSt					
			4.3			CH	Sandy Clay: High plasticity clay with water coming in through sand layers, grey		M	St					
			5.0												
			5.2			CH	Sandy Clay: As above except moist to wet		M-W	St					
			5.5			CH	Silty Clay : High plasticity clay with some fine grained sand layers, grey (SWL at 5.7m)		M	VSt					
			6.0												
			7.0												
			7.2			CH	Silty Clay : As above except very stiff to hard		M	VSt-H					
			8.0												

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	St Stiff	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	VSt Very stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



Morrison Geotechnic Pty Ltd

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Engineering Log - Borehole

Borehole No.: BH5

Page: 3 of 3

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: Jacro 105

Northing:

Driller: R. Battison

RL:

Logged By: G. Rose

Total Depth: 12.00

Date: 29/07/2005

Drilling Information				Material Description						Test Samples				
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm Auger						CH	Silty Clay : As above except very stiff to hard		M	VSt-H				
			8.3			CH	Silty Clay : As above except hard		M	H				
			9.0											
			10.0											
			10.5			CH	Silty Clay : As above except with some black nodules of silty clay		M	H				
			11.0											
			11.6			CH	Silty Clay : High plasticity clay with some black (organic?) nodules of silt, grey with yellow streaking		M	St-VSt				
			12.0											

Comments:

12.00m: BOREHOLE
TERMINATED

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft S Soft	VL Very loose L Loose	ELS Extremely low	U50 Undisturbed 50mm diam tube. D Disturbed sample.
► Water inflow	XW Extremely weathered	F Firm St Stiff	MD Medium dense	VLS Very low LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
◄ Water outflow	DW Distinctly weathered	VSt Very stiff H Hard	D Dense VD Very dense	MS Medium HS High	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	SW Slightly weathered	Moisture D Dry M Moist W Wet		VHS Very high EHS Extremely high	S Vane shear value kPa DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
	FR Fresh				From AS1289-1993 Methods of Testing Soils for Engineering Purposes



Morrison Geotechnic Pty Ltd

A.B.N. 051 009 878 899

PO Box 3063, Darra, QLD 4076

Phone: (07) 3279 0900 Fax: (07) 3279 0955

Engineering Log - Borehole

Borehole No.: BH4

Page: 1 of 3

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: Jacro 105

Northing:

Driller: R. Battison

RL:

Logged By: G. Rose

Total Depth: 12.00

Date: 29/07/2005

Drilling Information				Material Description				Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm Auger			0.2	Fill		FIL	Concrete: Reinforced concrete slab				Paveme			
		0.25						Paveme						
				FIL		FIL	Silty Sand (SM): Fine to coarse grained bedding sand, orange - brown, moist.		M	L	Drilled			
								M	St	Drilled				
										3				
			0.65	FIL		FIL	Gravelly Clay (Cl): Medium plasticity clay, with fine to medium grained gravel, yellow brown and red				4			
										11				
				FIL		FIL	Gravelly Sandy Clay (Cl): Medium plasticity clay with fine to medium grained sand and fine gravel, dark grey brown		M	St-VSt	2			
										3				
			1.0							8				
			1.05	FIL		FIL	Clayey Sand/ Sandy Clay (Cl): Medium plasticity clay, with fine to medium sand dark grey brown		M	St	2			
										1				
										2				
										3				
										2				
			1.5	Natural		CH	Silty Clay : High plasticity clay with some fine grained sand, grey mottled orange brown		M	St	2			
										3				
										3				
										5				
			2.0							5				
									9					
									12					
						13								
		2.3	CH		CH	Silty Clay : As above except very stiff		M	VSt	17				
		2.7	CH		CH	Sandy Clay: High plasticity clay with fine grained sand, grey mottled orange brown		M	VSt					
		3.0	CH		CH									
			CH		CH	Silty Clay : High plasticity clay with some fine grained sand, grey streaked orange brown								
		3.9												
		4.0	CH					M	VSt-H					

2.9

}

U50

PP=280kPa

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			



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Engineering Log - Borehole

Borehole No.: BH4

Page: 2 of 3

Job Number: 205E/175

Easting:

Drilling Rig: Jacro 105

Client: Aria Properties Group

Northing:

Driller: R. Battison

Project: Geotechnical Site Investigation

RL:

Logged By: G. Rose

Location: 4 Edmondstone Street, South Brisbane

Total Depth: 12.00

Date: 29/07/2005

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm Auger	SWL 08/03/05		5.0			CH	Silty Clay : High plasticity clay with some fine grained sand, grey streaked orange brown		M	VSI-H				
			5.3			CH	Silty Clay : As above except stiff with some sand lenses		M	St				
			5.9			CH	Silty Clay : As above except water coming into hole through sand lenses (SWL at 5.9m)		M	St				
			7.0											
			7.6			CH	Silty Clay : High plasticity clay, with some black silty clay layers, water coming in from sand layers above		M	VSI-H				
			8.0											

Comments:

Authorised by:

Date:

Water

Water level on date shown
Water inflow
Water outflow

Weathering

RS Residual soil
XW Extremely weathered
DW Distinctly weathered
SW Slightly weathered
FR Fresh

Consistency

VS Very soft
S Soft
F Firm
St Stiff
VSt Very stiff
H Hard
Moisture
D Dry M Moist W Wet

Density

VL Very loose
L Loose
MD Medium dense
D Dense
VD Very dense

Rock Strength

ELS Extremely low
VLS Very low
LS Low
MS Medium
HS High
VHS Very high
EHS Extremely high

Tests & Results

U50 Undisturbed 50mm diam tube.
D Disturbed sample.
SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
PP Hand penetrometer estimate of unconfined compressive strength, kPa.
S Vane shear value kPa
DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
From AS1289-1993 Methods of Testing Soils for Engineering Purposes



Page: 3 of 3

Location: 4 Edmondstone Street, South Brisbane

Date: 29/07/2005

RTI DL RELEASE - EHP

Water	Weathering		Consistency		Density		Rock Strength		Tests & Results	
 Water level on date shown	RS	Residual soil	VS	Very soft	VL	Very loose	ELS	Extremely low	U50	Undisturbed 50mm diam tube.
 Water inflow	XW	Extremely weathered	S	Soft	L	Loose	VLS	Very low	D	Disturbed sample.
 Water outflow	DW	Distinctly weathered	F	Firm	MD	Medium dense	LS	Low	SPT	Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
			St	Stiff						
			VSt	Very stiff	D	Dense	MS	Medium	PP	Hand penetrometer estimate of unconfined compressive strength, kPa.
			H	Hard	VD	Very dense	HS	High	S	Vane shear value kPa
	SW	Slightly weathered	Moisture				VHS	Very high	DC	Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
	FR	Fresh	D Dry	M Moist	W Wet		EHS	Extremely high		From AS1289-1993 Methods of Testing Soils for Engineering Purposes

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: EHV2000

Nothing:

Driller: Sutherland Exploration

RL:

Logged By: G. Rose

Total Depth: 16.64

Date: 28/07/2005

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm Auger			0.15	Fill		FIL	Concrete: Reinforced concrete slab		M	L				
			0.2	Fill		FIL	Silty Sand (SM): Fine to coarse grained bedding sand, orange - brown, moist.		M	L - MD				
			0.6	Natural		SM	Clayey Sandy Gravel (GC): Fine to medium gravel, fine to coarse sand and Cl clay fines, grey brown		M	MD				
			1.0				Clayey Silty Sand: Fine to medium sand and trace of coarse sand dark brown							
			1.4			CH	Sandy Clay: High plasticity clay with MD-D sand layers, brown		M	H				
			1.6			SC	Clayey Sand: Fine to medium grained sand, orange - brown		M	MD				
			2.0			CH	Sandy Clay: High plasticity clay, fine to coarse sand and rare fine gravel, orange to brown		M	VSt - H				
			2.3			CH	Sandy Clay: As above except grey and orange		M	VSt				
			2.6			CH	Sandy Clay: High plasticity clay, grey		M	H				
	Washbore Blade Bit			3.0										
			3.8			CH	Sandy Clay: As above except increase in sand layers and sandy clay. Thin 20 mm layers of indurated oxidised sandy clay - forming gravels when drilled of pale to grey colour with brown indurated layers		M	St - VSt				
											1.5		U50	PP>600kPa
											3		SPT	9/11/16 N=27 (PP>600kPa)

Comments:

Authorised by:

Date:

Water	Weathering		Consistency		Density		Rock Strength		Tests & Results	
▼ Water level on date shown	RS	Residual soil	VS Very soft	S Soft	VL Very loose	L Loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.	D Disturbed sample.	
▶ Water inflow	XW	Extremely weathered	F Firm	MD Medium dense	VLS Very low	LS Low		SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.		
▶ Water outflow	DW	Distinctly weathered	VSt Very stiff	D Dense	MS Medium	HS High		PP Hand penetrometer estimate of unconfined compressive strength, kPa.	S Vane shear value kPa	
	SW	Slightly weathered	H Hard	VD Very dense	VHS Very high	EHS Extremely high		DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.		
	FR	Fresh	M Moist	W Wet						From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH3

Page: 2 of 5

Job Number: 205E/175

Eastings:

Drilling Rig: EHV2000

Client: Aria Properties Group

Northing:

Driller: Sutherland Exploration

Project: Geotechnical Site Investigation

RL:

Logged By: G. Rose

Location: 4 Edmondstone Street, South Brisbane

Total Depth: 16.64

Date: 28/07/2005

Total Depth: 16.64				Date: 20/07/2005											
Drilling Information				Material Description						Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
Washbore Blade Bit			5.0			CH	Sandy Clay: As above except increase in sand layers and sandy clay. Thin 20 mm layers of indurated oxidised sandy clay - forming gravels when drilled of pale to grey colour with brown indurated layers		M	St - VSt					
			6.0	6		CH	Sandy Clay: As above except hard		M	H		6	SPT	5/10/8 N=18kPa (PP=150-220kPa)	
			7.0												
			7.1			CH	Silty Clay: High plasticity clay, hard, some fine sand, pale grey with some dark grey layers		M	H		7.5	SPT	3/5/7 N=12 (PP=450kPa)	
			8.0												

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
				VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
				EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH3

Page: 3 of 5

Job Number: 205E/175

Easting:

Drilling Rig: EHV2000

Client: Aria Properties Group

Northing:

Driller: Sutherland Exploration

Project: Geotechnical Site Investigation

RL:

Logged By: G. Rose

Location: 4 Edmondstone Street, South Brisbane

Total Depth: 16.64

Date: 28/07/2005

Drilling Information				Material Description					Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
Washbore Blade Bit						CH	Silty Clay : High plasticity clay, hard, some fine sand, pale grey with some dark grey layers		M	H					
			8.2			CH	Silty Clay : As above except grey with orange brown mottles		M	H					
			9.0	9		CH	Silty Clay : As above except very stiff		M	VS		9	SPT	4/6/6 N=12 (PP=350kPa)	
			10.0												
			10.2			CH	Silty Clay : As above except with black silty layers		M	St			10.5	SPT	2/4/5 N=9 (PP=170kPa)
			10.9	11.0		CH	Silty Clay : As above with a trace of fine to medium sand		M	St					
			11.1			CH	Silty Clay : As above except no black silty layers, no sand		M	F-St					
		11.7			CH	Silty Clay : As above except green grey and sands (clay nodules - brown). Trace of black clay nodules		M	F-St						
		12.0													

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
				VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
				EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH3

Page: 4 of 5

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: EHV2000

Northing:

Driller: Sutherland Exploration

RL:

Logged By: G. Rose

Total Depth: 16.64

Date: 28/07/2005

Drilling Information				Material Description						Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
Washbore Blade Bit						CH	Silty Clay : As above except green grey and sands (clay nodules - brown). Trace of black clay nodules		M	F-St		12	SPT	2/3/4 N=7 (PP=190kPa)	
			12.6	Bedrock		PHY	XW Phyllite : Extremely weathered, extremely low strength phyllits brown with quartz gravel from quartz veins and CL clay layers	XW	M	ELS					
			13.0												
			14.0										13.5	SPT	6/11/14 N=15
			14.5			PHY	Phyllite : Extremely weathered, very low strength phyllite	XW	M	VLS					
		15.0										15	SPT	14/18/26 N=44	
		15.85				PHY	Phyllite : As above except increase in strength (rig working harder)	XW		VLS - LS					
		16.0													

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
on date shown	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water inflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
Water outflow	SW Slightly weathered	VSt Very stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
				VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
				EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		Moisture			
		D Dry M Moist W Wet			

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Engineering Log - Borehole

Borehole No.: BH3

Page: 5 of 5

Job Number: 205E/175

Easting:

Drilling Rig: EHV2000

Client: Aria Properties Group

Northing:

Driller: Sutherland Exploration

Project: Geotechnical Site Investigation

RL:

Logged By: G. Rose

Location: 4 Edmondstone Street, South Brisbane

Total Depth: 16.64

Date: 28/07/2005

[illegible]

Comments:										Authorised by: Date:	
Water		Weathering		Consistency		Density		Rock Strength		Tests & Results	
 Water level on date shown	RS	Residual soil	VS	Very soft	VL	Very loose	ELS	Extremely low	U50	Undisturbed 50mm diam tube.	
	XW	Extremely weathered	S	Soft	L	Loose			D	Disturbed sample.	
 Water inflow	DW	Distinctly weathered	F	Firm	MD	Medium dense	VLS	Very low	SPT	Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.	
			St	Stiff			LS	Low	PP	Hand penetrometer estimate of unconfined compressive strength, kPa.	
 Water outflow			VSt	Very stiff	D	Dense	MS	Medium	HS	Vane shear value kPa	
	SW	Slightly weathered	H	Hard	VD	Very dense	HS	High	S		
							VHS	Very high	DC	Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.	
	FR	Fresh	Moisture					EHS	Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes	
			D Dry	M Moist	W Wet						



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Engineering Log - Borehole

Borehole No.: BH2

Page: 1 of 5

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:
Northing:
RL:
Total Depth: 16.59

Drilling Rig: EHV2000
Driller: Sutherland Exploration
Logged By: G. Rose
Date: 27/07/2005

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm Auger			0.15	FIL		FIL	Concrete: Reinforced concrete slab		M	L				
			0.2	FIL		FIL	Silty Sand (SM): Fine to coarse grained bedding sand, orange - brown, moist.		M	L				
			0.35	FIL		FIL	Silty Sand (SM): Fine to medium sand, some coarse brown		M	MD				
			0.6	Natural		CH	Silty Sand (SM): As above except medium dense and orange brown		M	VSt				
			1.0				Sandy Clay: High plasticity clay, fine to medium sand, pale grey mottled red brown							
			1.2			SC	Clayey Sand: Fine to medium grained sand, pale grey and orange grey		M	D				
			1.5			SC	Sandy Clay/ Clayey Sand: Sandy clay/ clayey sand, pale grey mottled orange brown with a trace of fine gravel		M	D				
			2.0											
			2.2			SC	Sandy Clay/ Clayey Sand: As above except fine grey and sandy clay (CH) with high plasticity		M	H				
			2.6			SC	Sandy Clay/ Clayey Sand: As above except pale grey mottled orange		M	H				
Washbore Blade Bit			2.75			SC	Sandy Clay/ Clayey Sand: As above except increase in sand content, layers of and less sand content in clay		M	H				
			3.0											
			3.45			CH	Silty Clay : High plasticity clay with a trace of fine sand, pale grey/orange brown		M	H				
			4.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH2

Page: 2 of 5

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: EHV2000

Northing:

Driller: Sutherland Exploration

RL:

Logged By: G. Rose

Total Depth: 16.59

Date: 27/07/2005

Drilling Information				Material Description				Test Samples			
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results
Washbore Blade Bit			4.25			CH	Silty Clay : High plasticity clay with a trace of fine sand, pale grey/orange brown		M	H	
			4.7			CH	Silty Clay : As above except sandy clay layers with sands (SP), MD, fine to medium grained with orange stains		M	St-VSt	
			5.0			CH	Silty Clay : As above except with fine quartz gravel		M	St-VSt	
			5.6			CH	Silty Clay : As above except trace of fine gravel and increased sand content		M	St-VSt	
			6.0			CH	Sandy Clay: High plasticity clay, with fine gravel sized sandy nodules which are brown clay, pale grey		M	St-VSt	
			6.35			SP	Sand: Fine to medium sand, pale grey		M	MD	
			7.0								
			7.1			CH	Silty Clay : High plasticity clay, with ironstone layers forming fine to medium gravels when cut by blade and a trace of fine sand, pale grey with brown ironstone gravel		M	VSt-H	
			8.0								

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			



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Engineering Log - Borehole

Borehole No.: BH2

Page: 3 of 5

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: EHV2000

Northing:

Driller: Sutherland Exploration

RL:

Logged By: G. Rose

Total Depth: 16.59

Date: 27/07/2005

Drilling Information				Material Description						Test Samples				
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
Washbore Blade Bit			8.2			CH	Silty Clay : High plasticity clay, with ironstone layers forming fine to medium gravels when cut by blade and a trace of fine sand, pale grey with brown ironstone gravel	M	M	VSl - H				
						CH	Silty Clay : High plasticity clay, pale grey with some dark grey layers and trace of fine grained sand		M	VSl - H				
			8.65			CH	Silty Clay : As above, except increase in strength, drilling rig working harder		M	VSl - H				
			9.0			CH	Silty Clay : As above except pale grey only		M	VSl - H				
			10.0											
			10.8			CH	Silty Clay : As above except hard, dark grey and pale grey		M	H				
			11.0											
			11.25			CH	Silty Clay : As above except dark grey brown		M	VSl - H				
			11.7			CH	Silty Clay : As above except soft, some yellow fragments of sandy clay, possible phyllite fragments		M	S				
		12.0												

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			



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Engineering Log - Borehole

Borehole No.: BH2

Page: 4 of 5

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: EHV2000

Northing:

Driller: Sutherland Exploration

RL:

Logged By: G. Rose

Total Depth: 16.59

Date: 27/07/2005

Drilling Information				Material Description						Test Samples				
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
Washbore Blade Bit						CH	Silty Clay : As above except soft, some yellow fragments of sandy clay, possible phyllite fragments		M	S		12	SPT	2/1/2 N=3 (PP=90-150kPa)
			12.2			CH	Silty Clay : As above with fine grain sized fragments of XW ELS phyllite		M	VSt - H				
			12.75			GC	Clayey Gravel: Quartz with gravel, brown, gravel - sand - clay mixture, quartz has some fragments of XW phyllite		M	F (Clay) MD (sand)				
			13.0			PHY	XW Phyllite : Extremely weathered, extremely low to low strength, some CL clay layers grey brown	XW		ELS - LS				
			14.0									13.5	SPT	7/11/15 N=26
			14.65			PHY	XW Phyllite : XW VLS phyllite bedrock grey brown	XW		VLS				
			15.0									15	SPT	30/120mm N=75
			15.9				DW Phyllite : DW, LS phyllite grey							
			16.0			PHY		DW		MS				

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	LS Low	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	MS Medium High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			

Job Number: 205E/175

Easting:

Drilling Rig: EHV2000

Client: Aria Properties Group

Northing:

Driller: Sutherland Exploration

Project: Geotechnical Site Investigation

RL:

Logged By: G. Rose

Location: 4 Edmondstone Street, South Brisbane

Total Depth: 16.59

Date: 27/07/2005

[illegible]

Comments:										Authorised by:	
										Date:	
Water	Weathering		Consistency		Density		Rock Strength		Tests & Results		
 Water level on date shown	RS	Residual soil	VS	Very soft	VL	Very loose	ELS	Extremely low	U50	Undisturbed 50mm diam tube.	
 Water inflow	XW	Extremely weathered	S	Soft	L	Loose	VLS	Very low	D	Disturbed sample.	
 Water outflow	DW	Distinctly weathered	F	Firm	MD	Medium dense	LS	Low	SPT	Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.	
	SW	Slightly weathered	St	Stiff			MS	Medium	PP	Hand penetrometer estimate of unconfined compressive strength, kPa.	
	FR	Fresh	VSt	Very stiff	D	Dense	HS	High	S	Vane shear value kPa	
			H	Hard	VD	Very dense	VHS	Very high	DC	Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.	
			Moisture				EHS	Extremely high		From AS1289-1993 Methods of Testing Soils for Engineering Purposes	
			D Dry	M Moist	W Wet						



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Engineering Log - Borehole

Borehole No.: BH1

Page: 1 of 4

Job Number: 205E/175

Easting:

Drilling Rig: EHV2000

Client: Aria Properties Group

Northing:

Driller: Sutherland Exploration

Project: Geotechnical Site Investigation

RL:

Logged By: G. Rose

Location: 4 Edmondstone Street, South Brisbane

Total Depth: 15.08

Date: 27/07/2005

Drilling Information				Material Description				Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm Auger			0.15	Natural			Concrete: Reinforced concrete slab							
			0.2			FIL	Sand (SP): Fine to medium bedding sand, grey		M	MD				
						FIL			M	St				
			0.4			FIL	Sandy Clay (CI): Medium plasticity clay, fine to coarse sand, dark brown to red, contains broken bricks		M	St				
			0.5			SM	Sandy Clay (CI): As above except no broken brick		M	L				
			0.75			SM	Silty Sand : Fine to medium sand, dark grey, some clay fines		M	L				
			1.0				Silty Sand : As above except grey		M	VSt - H				
			1			CH	Silty Clay : High plasticity clay, trace of fine sand orange - brown							
			1.4			CH	Silty Clay : As above except pale grey and yellow with a trace of fine gravel		M	VSt - H				
			2.0											
Washbore Blade Bit			2			CH	Sandy Clay: High plasticity clay, pale grey, trace of fine to medium gravel		M	H				
			3.0											
			3.1			CH	Silty Clay : High plasticity clay, pale grey mottled red in places, with some fine to coarse gravel		M	St - VSt				
			3.6			CH	Silty Clay : As above except some fine brown sandstone gravel		M	St - VSt				
			3.75			CH	Silty Clay : As above except no gravel and pale grey fine sand		M	VSt - H				
			3.85			CH	Silty Clay : High plasticity clay with some fine brown sandstone		M	St - VSt				
			4.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
▶ Water inflow	XW Extremely weathered	S Soft	L Loose	D Disturbed sample	D Disturbed sample.
▶ Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	LS Low	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	MS Medium	S Vane shear value kPa
		H Hard		HS High	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		VHS Very high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet		EHS Extremely high	



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Engineering Log - Borehole

Borehole No.: BH1

Page: 2 of 4

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: EHV2000

Northing:

Driller: Sutherland Exploration

RL:

Logged By: G. Rose

Total Depth: 15.08

Date: 27/07/2005

Total Depth: 15.08			Date: 2/10/2005													
Drilling Information				Material Description					Test Samples							
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result		
Washbore Blade Bit			4.15			CH	Silty Clay : High plasticity clay with some fine brown sandstone		M	St- VSt						
			4.2			SM	Silty Sand : Fine sand, pale brown		M	MD St- VSt						
						CH	Silty Clay : High plasticity clay with 50 mm thick silty sand to sand layer (Wet), pale grey and orange brown		M							
												4.5	SPT	6/4/6 N=10		
			5.0													
													6	U50	PP=350kPa	
			6.0													
			6.6			CH	Silty Clay : As above except grey brown		M	VSt						
			6.9			CH	Silty Clay : High plasticity clay, pale grey, variable strength		M	St- VSt						
			7.0													
												7.5	SPT	4/5/6 N=11 (PP=350kPa)		
			8.0													

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			



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Engineering Log - Borehole

Borehole No.: BH1

Page: 3 of 4

Job Number: 205E/175

Easting:

Drilling Rig: EHV2000

Client: Aria Properties Group

Northing:

Driller: Sutherland Exploration

Project: Geotechnical Site Investigation

RL:

Logged By: G. Rose

Location: 4 Edmondstone Street, South Brisbane

Total Depth: 15.08

Date: 27/07/2005

Drilling Information				Material Description				Test Samples			
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results
			9.0			CH	Silty Clay : High plasticity clay, pale grey, variable strength		M	St - VSt	
			9.4			MH	Silt: High plasticity silt, dark grey mottled black		M	St - VSt	
			9.5			CH	Silty Clay : Pale grey clay		M	St - VSt	
			9.8			CH	Silty Clay : As above except with some fine - coarse sand and fine quartz gravel		M	St - VSt	
			10.0			CH	Sandy Clay: As above except sandy clay and very stiff		M	St - VSt	
			10.3			CH	Sandy Clay: As above except sandy clay and very stiff		M	St - VSt	
			10.5			SP	Clayey Gravelly Sand: Fine to coarse sand, fine quartz gravel, high plasticity clay, pale grey orange brown		M	MD-D	
			11.0			SP	Clayey Gravelly Sand: As above except less clay fines and pale grey		M	MD-D	
			11.1			SP	Clayey Gravelly Sand: As above except with grey phyllite fragments, quartz veins in phyllite		M	MD-D	
			11.6			SP	Clayey Gravelly Sand: As above except with grey phyllite fragments, quartz veins in phyllite		M	MD-D	
			11.75			SP	Clayey Gravelly Sand: As above with increase in clay fines		M	MD-D	
			12.0								

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			



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Engineering Log - Borehole

Borehole No.: BH1

Page: 4 of 4

Job Number: 205E/175

Client: Aria Properties Group

Project: Geotechnical Site Investigation

Location: 4 Edmondstone Street, South Brisbane

Easting:

Drilling Rig: EHV2000

Northing:

Driller: Sutherland Exploration

RL:

Logged By: G. Rose

Total Depth: 15.08

Date: 27/07/2005

Drilling Information				Material Description						Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
Washbore Blade Bit			12.0	Bedrock		PHY	XW Phyllite : Extremely weathered, extremely low to low strength, some CL clay layers grey brown	XW		EL-L		12.0	SPT	14/18/24 N=42	
		12.8	PHY			XW Phyllite : As above except low strength with quartz veining and clay layers	XW		L						
		13.0													
		14.0									13.5	SPT	12/21/30/115mm N=60		
		14.2		PHY	DW Phyllite Distinctly weathered, grey and brown with some thin quartz veins	DW		MS							
			15.0									15.0	SPT	30/80mm N=112	
			15.08	15.08m: BOREHOLE TERMINATED											
			16.0												

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
▶ Water inflow	XW Extremely weathered	S Soft	L Loose	low	D Disturbed sample.
▶ Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	LS Low	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	MS Medium	S Vane shear value kPa
		H Hard		HS High	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		VHS Very high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet		EHS Extremely high	



CERTIFICATE OF ANALYSIS

Client	: WASTE SOLUTIONS AUSTRALIA P/L	Laboratory	: ALS Environmental Perth	Page	: 1 of 6
Contact	: MS AMANDA GRAVINA	Contact	: Shaun Crabb	Work order	: EP0500795
Address	: P O BOX 514 ASHGROVE QLD AUSTRALIA 4050	Address	: 10 Hod Way Malaga WA Australia 6090		
Project	: - Not provided -	Quote number	: BN/183/05	Date received	: 12 Aug 2005
Order number	: - Not provided -			Date issued	: 18 Aug 2005
C-O-C number	: 115862.115863				
Site	: Edmonstone St				
E-mail	: wsa@wastesolutions.biz	E-mail	: Shaun.Crabb@alsenviro.com	No. of samples	
Telephone	: 07 3366 5778	Telephone	: 61-8-9209-7655	Received	: 22
Facsimile	: 07 3366 7302	Facsimile	: 61-8-9209-7600	Analysed	: 10

This final report for the ALSE work order reference EP0500795 supersedes any previous reports with this reference.

Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

- Analytical results for samples submitted
- Surrogate control limits

Work order specific comments

All samples labelled as per the COC, depth discrepancies are listed below.

Sample 5 jar labelled BH3 - 0.9.

Sample 8 jar labelled BH5 - 1.0.

Sample 17 jar labelled BH3 - 0.6.

ALSE - Excellence in Analytical Testing

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory

Shaun Crabb
Steven McGrath
Steven McGrath

Department

Perth Inorganics - NATA 15847 (Perth)
Perth Organics - NATA 15847 (Perth)
Perth Inorganics - NATA 15847 (Perth)



NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Client : WASTE SOLUTIONS AUSTRALIA PL
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

Page Number : 2 of 6
Issue Date : 18 Aug 2005

ALS Environmental



When moisture determination has been performed, results are reported on a dry weight basis. When a reported 'less than' result is higher than the LOR, this may be due to primary sample extracts/digestion dilution and/or insufficient sample amount for analysis. Surrogate Recovery Limits are static and based on USEPA SW846 or ALS-QWL/EN38 (in the absence of specified USEPA limits).
Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting, # Indicates a raised LOR, * Indicates failed Surrogate Recoveries.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes.

Analytical Results

Analytical Results													
		Client Sample ID :		BH2		BH5		BH3		BH2		BH3	
		Description :		SOIL / SOIL		SOIL / SOIL		SOIL / SOIL		SOIL / SOIL		SOIL / SOIL	
		Sample Date / Time :		29 Jul 2005		29 Jul 2005		29 Jul 2005		29 Jul 2005		29 Jul 2005	
		Laboratory Sample ID :		15:00		15:00		15:00		15:00		15:00	
Analyte	CAS number	LOR	Units	EP0500795-001	EP0500795-002	EP0500795-003	EP0500795-004	EP0500795-005					
EA055: Moisture Content													
Moisture Content (dried @ 103°C)													
EG0057: Total Metals by ICP-AES													
Arsenic	7440-38-2	5	mg/kg	9.5	9.8	6.5	12.7	8.4					
Cadmium	7440-43-9	1	mg/kg	<1	2	<1	<1	<1					
Chromium	7440-47-3	2	mg/kg	18	151	11	25	14					
Copper	7440-50-8	5	mg/kg	18	294	<5	6	<5					
Lead	7439-92-1	5	mg/kg	1010	<5	10	37	12					
Nickel	7440-02-0	2	mg/kg	4	271	3	3	2					
Zinc	7440-66-6	5	mg/kg	507	711	10	28	8					
EP075(SIMB): Polynuclear Aromatic Hydrocarbons													
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Benz(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Benz(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Benz(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
Benz(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	—	—					
EP080071: Total Petroleum Hydrocarbons													
C6 - C9 Fraction	2	mg/kg	<2	<2	<2	<2	—	—					
C10 - C14 Fraction	50	mg/kg	<50	<50	<50	<50	—	—					
C15 - C28 Fraction	100	mg/kg	<100	<100	<100	<100	—	—					
C29 - C36 Fraction	100	mg/kg	<100	<100	<100	<100	—	—					

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

Page Number : 3 of 6
Issue Date : 18 Aug 2005

ALS Environmental



Analytical Results

Analyte	CAS number	LOR	Client Sample ID :		Sample Matrix Type / Description :		Sample Date / Time :		Laboratory Sample ID :	
			BH2	BH5	BH3	BH2	BH3	BH3	BH3	BH3
EP080: BTEX			0.2	0.3	0.6	0.9	0.9-1.0			
Benzene	71-43-2	0.2	<0.2	<0.2	<0.2	—	—	—	—	—
Toluene	108-88-3	0.2	<0.2	<0.2	<0.2	—	—	—	—	—
Ethylbenzene	100-41-4	0.2	<0.2	<0.2	<0.2	—	—	—	—	—
meta- & para-Xylene	108-38-3 106-42-3	0.2	<0.2	<0.2	<0.2	—	—	—	—	—
ortho-Xylene	95-47-6	0.2	<0.2	<0.2	<0.2	—	—	—	—	—
EP075(SIM)S: Phenolic Compound Surrogates										
2-Fluorophenol	367-12-4	0.1	99.6	101	102	—	—	—	—	—
Phenol-d6	13127-88-3	0.1	84.6	79.0	87.0	—	—	—	—	—
2-Chlorophenol-D4	93951-73-6	0.1	79.3	84.8	86.4	—	—	—	—	—
2,4,6-Tribromophenol	118-79-6	0.1	71.2	70.1	78.0	—	—	—	—	—
EP075(SIM)T: PAH Surrogates										
2-Fluorobiphenyl	321-60-8	0.1	85.2	91.6	91.1	—	—	—	—	—
Anthracene-d10	1719-06-8	0.1	108	114	118	—	—	—	—	—
4-Terphenyl-d14	1718-51-0	0.1	104	97.0	115	—	—	—	—	—
EP080S: TPH(V)/BTEX Surrogates										
1,2-Dichloroethane-D4	17060-07-0	0.1	87.1	81.5	85.9	—	—	—	—	—
Toluene-D8	2037-26-5	0.1	88.4	87.6	84.9	—	—	—	—	—
4-Bromofluorobenzene	460-00-4	0.1	87.6	85.6	84.0	—	—	—	—	—

RTI DL RELEASED

Client : WASTE SOLUTIONS AUSTRALIA PT
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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ALS Environmental



Analytical Results

Client Sample ID :
Sample Matrix Type / Description :
Sample Date / Time :
Laboratory Sample ID :

Analyte CAS number LOR

EA055: Moisture Content
Moisture Content (dried @ 103°C)

EG00051: Total Metals by ICP-AES

Arsenic	7440-38-2	5	mg/kg	<5
Cadmium	7440-43-9	1	mg/kg	<1
Chromium	7440-47-3	2	mg/kg	12
Copper	7440-50-8	5	mg/kg	10
Lead	7439-92-1	5	mg/kg	50
Nickel	7440-02-0	2	mg/kg	14
Zinc	7440-66-6	5	mg/kg	308

EP075(S)MB: Polynuclear Aromatic Hydrocarbons

Naphthalene	91-20-3	0.5	mg/kg	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5
Dibenzo(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5

EP080(07): Total Petroleum Hydrocarbons

C6 - C9 Fraction	2	mg/kg	<2
C10 - C14 Fraction	50	mg/kg	<50
C15 - C28 Fraction	100	mg/kg	<100
C29 - C36 Fraction	100	mg/kg	<100

EP080: BTEX

Benzene	71-43-2	0.2	mg/kg	<0.2
Toluene	108-88-3	0.2	mg/kg	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2
meta- & para-Xylene	108-38-3, 106-42-3	0.2	mg/kg	<0.2

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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Analytical Results

Analytical Results										
Client Sample ID :			Sample Matrix Type / Description :				Sample Date / Time :			
Laboratory Sample ID :			BHT1				BHT4			
LOR			0.4				1.0			
CAS number			SOIL / SOIL				SOIL / SOIL			
EP080: BTEX			29 Jul 2005				29 Jul 2005			
ortho-Xylene			15:00				15:00			
EP075(SIMS): Phenolic Compound Surrogates			EP0500795-006				EP0500795-007			
2-Fluorophenol			0.2 mg/kg				0.2			
Phenol-d6			0.1 %				103			
2-Chlorophenol-D4			0.1 %				82.8			
2,4,6-Trichlorophenol			0.1 %				89.3			
EP075(SIM)T: PAH Surrogates			118-79-6				78.2			
2-Fluorobiphenyl			0.1 %				95.4			
Anthracene-d10			0.1 %				101			
4-Terphenyl-d14			0.1 %				100			
EP080S: TPH(V)/BTEX Surrogates			17060-07-0				82.1			
Toluene-D8			0.1 %				84.2			
4-Bromofluorobenzene			0.1 %				81.5			

RTI DL RELEASE - EPI

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
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ALS ENVIRONMENTAL



Surrogate Control Limits

The analytical procedures used by ALS Environmental are based on established internationally-recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house procedure 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 herein. Reference methods from which ALSE methods are based are provided in parenthesis.

Matrix Type: SOIL

Method name	Analyte name	Lower Limit	Upper Limit
EP075(SIM): PAH/Phenols (SIM)			
EP075(SIM):S: Phenolic Compound Surrogates	2-Fluorophenol	62.7	125
	Phenol-d6	65.5	117
	2-Chlorophenol-D4	60.3	109
	2,4,6-Trichlorophenol	50.6	111
EP075(SIM):T: PAH Surrogates	2-Fluorobiphenyl	66.4	123
	Anthracene-d10	62.7	124
	4-Terphenyl-d14	63.7	124
EP080: TPH Volatiles/BTEX			
EP080S: TPH(V)/BTEX Surrogates	1,2-Dichloroethane-D4	79.2	121
	Toluene-D8	78.3	120
	4-Bromofluorobenzene	79.7	122



QUALITY CONTROL REPORT

Client	: WASTE SOLUTIONS AUSTRALIA P/L	Laboratory	: ALS Environmental Perth	Page	: 1 of 7
Contact	: MS AMANDA GRAYINA	Contact	: Shaun Crabb	Work order	: EP0500795
Address	: P O BOX 514 ASHGROVE QLD AUSTRALIA 4060	Address	: 10 Hod Way Malaga WA Australia 6090	Amendment No.	:
Project	: - Not provided -	Quote number	: BN/183/05	Date received	: 12 Aug 2005
Order number	: - Not provided -			Date issued	: 18 Aug 2005
C-O-C number	: 115862,115863				
Site	: Edmonstone St				
E-mail	: wsa@wastesolutions.biz	E-mail	: Shaun.Crabb@alsenviro.com	No. of samples	
Telephone	: 07 3366 5778	Telephone	: 61-8-9209-7655	Received	: 22
Facsimile	: 07 3366 7302	Facsimile	: 61-8-9209-7600	Analysed	: 10

This final report for the ALSE work order reference EP0500795 supersedes any previous reports with this reference. Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

- Laboratory Duplicates (DUP); Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Samples (LCS); Recovery and Acceptance Limits
- Matrix Spikes (MS); Recovery and Acceptance Limits

Work order specific comments

All samples labelled as per the COC, depth discrepancies are listed below.

Sample 5 jar labelled BH3 - 0.9.
Sample 8 jar labelled BH5 - 1.0.
Sample 17 jar labelled BH3 - 0.6.

ALSE - Excellence in Analytical Testing

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory

Shaun Crabb
Steven McGrath
Steven McGrath

Department

Perth Inorganics - NATA 15847 (Perth)
Perth Organics - NATA 15847 (Perth)
Perth Inorganics - NATA 15847 (Perth)

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IEC 17025



Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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Issue Date : 18 Aug 2005



Quality Control Report - Laboratory Duplicates (DUP)

The quality control term **Laboratory Duplicate** refers to an intralaboratory split sample randomly selected from the sample batch. Laboratory duplicates provide information on method precision and sample heterogeneity.

- Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot. Abbreviations: **LOR** = Limit of Reporting, **RPD** = Relative Percent Difference.
- * Indicates failed QC. The permitted ranges for the RPD of Laboratory Duplicates (relative percent deviation) are specified in ALS Method QWL-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%

Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EA055: Moisture Content						
EA055: Moisture Content - (QC Lot: 102581)						
EP0500791-001	Anonymous	Moisture Content (dried @ 103°C)	1.0 %	17.1	16.8	1.3
EP0500791-010	Anonymous	Moisture Content (dried @ 103°C)	1.0 %	15.6	15.5	0.0
EA055: Moisture Content - (QC Lot: 102582)						
EP0500795-003	BH3 - 0.6	Moisture Content (dried @ 103°C)	1.0 %	6.5	6.8	3.6
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 102580)						
EP0500795-001	BH2 - 0.2	Arsenic	5 mg/kg	<5	5	0.0
		Cadmium	1 mg/kg	<1	1	0.0
		Chromium	2 mg/kg	16	18	8.6
		Copper	5 mg/kg	16	19	17.7
		Lead	5 mg/kg	916	1100	18.0
		Nickel	2 mg/kg	4	4	0.0
		Zinc	5 mg/kg	458	528	14.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 102568)						
EP0500795-001	BH2 - 0.2	Naphthalene	0.5 mg/kg	<0.5	<0.5	0.0
		Acenaphthylene	0.5 mg/kg	<0.5	<0.5	0.0
		Acenaphthene	0.5 mg/kg	<0.5	<0.5	0.0
		Fluorene	0.5 mg/kg	<0.5	<0.5	0.0
		Phenanthrene	0.5 mg/kg	<0.5	<0.5	0.0
		Anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Pyrene	0.5 mg/kg	<0.5	<0.5	0.0
		Benz(a)anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Chrysene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(b)fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(k)fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(a)pyrene	0.5 mg/kg	<0.5	<0.5	0.0

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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Laboratory Duplicates (DUP) Report



Matrix Type: SOIL

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - continued						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 102568) - continued						
EP0500795-001	BH2 - 0.2	Indeno(1,2,3,cd)pyrene	0.5 mg/kg	mg/kg	mg/kg	%
		Dibenz(a,h)anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(g,h,i)perylene	0.5 mg/kg	<0.5	<0.5	0.0
EP080/071: Total Petroleum Hydrocarbons						
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 102394)						
EP0500795-001	BH2 - 0.2	C6 - C9 Fraction	2 mg/kg	mg/kg	mg/kg	%
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 102567)						
EP0500795-001	BH2 - 0.2	C10 - C14 Fraction	50 mg/kg	mg/kg	mg/kg	%
		C15 - C28 Fraction	100 mg/kg	<50	<50	0.0
		C29 - C36 Fraction	100 mg/kg	<100	<100	0.0
EP080: BTEX						
EP080: BTEX - (QC Lot: 102394)						
EP0500795-001	BH2 - 0.2	Benzene	0.2 mg/kg	mg/kg	mg/kg	%
		Toluene	0.2 mg/kg	<0.2	<0.2	0.0
		Ethylbenzene	0.2 mg/kg	<0.2	<0.2	0.0
		meta- & para-Xylene	0.2 mg/kg	<0.2	<0.2	0.0
		ortho-Xylene	0.2 mg/kg	<0.2	<0.2	0.0

RTI DL RELEASE

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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ALS ENVIRONMENTAL



Quality Control Report - Method Blank (MB) and Laboratory Control Samples (LCS)

The quality control term **Method Blank (MB)** 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 type is to monitor potential laboratory contamination. The quality control term **Laboratory Control Sample (LCS)** refers to a known, interference free matrix spiked with target analytes or certified reference material. The purpose of this QC type is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of actual laboratory data. Abbreviations: LOR = Limit of reporting.

Matrix Type: SOIL

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

Analyte name	LOR	Method blank result	Actual Results		Recovery Limits	
			Spike concentration	Spike Recovery	Low	High
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 102580)						
Arsenic	5 mg/kg	mg/kg	mg/kg	%	%	%
	5 mg/kg	<5	13.75	108	70	130
Cadmium	1 mg/kg	mg/kg	2.82	106	70	130
	1 mg/kg	<1	mg/kg	mg/kg	mg/kg	mg/kg
Chromium	2 mg/kg	mg/kg	61.6	106	70	130
	2 mg/kg	<2	mg/kg	mg/kg	mg/kg	mg/kg
Copper	5 mg/kg	mg/kg	54.7	106	70	130
	5 mg/kg	<5	mg/kg	mg/kg	mg/kg	mg/kg
Lead	5 mg/kg	mg/kg	55.5	103	70	130
	5 mg/kg	<5	mg/kg	mg/kg	mg/kg	mg/kg
Nickel	2 mg/kg	mg/kg	55.1	107	70	130
	2 mg/kg	<2	mg/kg	mg/kg	mg/kg	mg/kg
Zinc	5 mg/kg	mg/kg	105	103	70	130
	5 mg/kg	<5	mg/kg	mg/kg	mg/kg	mg/kg
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 102568)						
Acenaphthene	0.5 mg/kg	mg/kg	mg/kg	%	%	%
	0.5 mg/kg	<0.5	10	86.7	62.0	116
Acenaphthylene	0.5 mg/kg	mg/kg	10	90.4	61.5	120
	0.5 mg/kg	<0.5	mg/kg	mg/kg	mg/kg	mg/kg
Anthracene	0.5 mg/kg	mg/kg	10	92.7	64.6	128
	0.5 mg/kg	<0.5	mg/kg	mg/kg	mg/kg	mg/kg
Benz(a)anthracene	0.5 mg/kg	mg/kg	10	83.4	67.0	117
	0.5 mg/kg	<0.5	mg/kg	mg/kg	mg/kg	mg/kg
Benzo(a)pyrene	0.5 mg/kg	mg/kg	10	84.8	56.0	112
	0.5 mg/kg	<0.5	mg/kg	mg/kg	mg/kg	mg/kg

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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Issue Date : 18 Aug 2005

ALS Environmental



Matrix Type: SOIL

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

Analyte name		LOR	Method blank result	Actual Results		Recovery Limits	
				Spike concentration	Spike Recovery	Low	High
				LCS			
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - continued							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 102568) - continued							
Benzo(b)fluoranthene	0.5 mg/kg	0.5 mg/kg	—	10	104	51.2	126
	0.5 mg/kg	<0.5	—	—	—	—	—
Benzo(g,h,i)perylene	0.5 mg/kg	0.5 mg/kg	—	10	72.2	43.7	109
	0.5 mg/kg	<0.5	—	—	—	—	—
Benzo(k)fluoranthene	0.5 mg/kg	0.5 mg/kg	—	10	91.2	60.1	128
	0.5 mg/kg	<0.5	—	—	—	—	—
Chrysene	0.5 mg/kg	0.5 mg/kg	—	10	93.2	67.7	126
	0.5 mg/kg	<0.5	—	—	—	—	—
Dibenz(a,h)anthracene	0.5 mg/kg	0.5 mg/kg	—	10	70.9	48.2	98.7
	0.5 mg/kg	<0.5	—	—	—	—	—
Fluoranthene	0.5 mg/kg	0.5 mg/kg	—	10	86.1	60.7	120
	0.5 mg/kg	<0.5	—	—	—	—	—
Fluorene	0.5 mg/kg	0.5 mg/kg	—	10	87.2	64.4	115
	0.5 mg/kg	<0.5	—	—	—	—	—
Indeno(1,2,3,cd)pyrene	0.5 mg/kg	0.5 mg/kg	—	10	70.0	45.9	101
	0.5 mg/kg	<0.5	—	—	—	—	—
Naphthalene	0.5 mg/kg	0.5 mg/kg	—	10	91.3	62.7	118
	0.5 mg/kg	<0.5	—	—	—	—	—
Phenanthrene	0.5 mg/kg	0.5 mg/kg	—	10	80.4	66.3	118
	0.5 mg/kg	<0.5	—	—	—	—	—
Pyrene	0.5 mg/kg	0.5 mg/kg	—	10	89.2	62.1	122
	0.5 mg/kg	<0.5	—	—	—	—	—
EP080/071: Total Petroleum Hydrocarbons							
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 102394)							
C6 - C9 Fraction		2 mg/kg	—	32	104	77.6	120
		2 mg/kg	<2	—	—	—	—
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 102567)							
C10 - C14 Fraction		25 mg/kg	—	756	96.0	69.3	120
		50 mg/kg	<50	—	—	—	—

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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ALS ENVIRONMENTAL



Matrix Type: SOIL

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

Analyte name	LOR	Method blank result	Actual Results		Recovery Limits	
			Spike concentration	Spike Recovery	Low	High
EP080/071: Total Petroleum Hydrocarbons - continued						
EP080/071: Total Petroleum Hydrocarbons - (QC Lot: 102567) - continued						
C15 - C28 Fraction	50 mg/kg	—	1158	103	77.0	120
	100 mg/kg	<100	—	—	—	—
C29 - C36 Fraction	50 mg/kg	—	162	91.1	67.4	116
	100 mg/kg	<100	—	—	—	—
EP080: BTEX						
EP080: BTEX - (QC Lot: 102394)						
Benzene	0.2 mg/kg	—	2	98.1	79.7	122
	0.2 mg/kg	<0.2	—	—	—	—
Ethylbenzene	0.2 mg/kg	—	2	97.2	79.7	122
	0.2 mg/kg	<0.2	—	—	—	—
meta- & para-Xylene	0.2 mg/kg	—	4	98.6	79.6	122
	0.2 mg/kg	<0.2	—	—	—	—
ortho-Xylene	0.2 mg/kg	—	2	98.4	80.0	122
	0.2 mg/kg	<0.2	—	—	—	—
Toluene	0.2 mg/kg	—	2	97.0	78.3	120
	0.2 mg/kg	<0.2	—	—	—	—

RTI DL RELEASE END

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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ALS Environmental



Quality Control Report - Matrix Spikes (MS)

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 type is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQO's). 'Ideal' recovery ranges stated may be waived in the event of sample matrix interferences. - Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot. Abbreviations: LOR = Limit of Reporting, RPD = Relative Percent Difference.

Matrix Type: SOIL

Matrix Spike (MS) Report

Analyte name	Laboratory Sample ID	Client Sample ID	LOR	Spike Concentration	Actual Results		Recovery Limits	
					Sample Result	Spike Recovery MS	Static Limits	High
EG005T: Total Metals by ICP-AES								
EG005T: Total Metals by ICP-AES - (QC Lot: 102580)								
Arsenic	EP0500795-002	BH5 - 0.3	5 mg/kg	50	19	85.4	70	130
Cadmium			1 mg/kg	50	2	99.1	70	130
Chromium			2 mg/kg	50	151	72.4	70	130
Copper			5 mg/kg	50	294	* Not Determined	70	130
Lead			5 mg/kg	50	<5	102	70	130
Nickel			2 mg/kg	50	271	* Not Determined	70	130
Zinc			5 mg/kg	50	711	* Not Determined	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 102568)								
Acenaphthene	EP0500795-002	BH5 - 0.3	0.5 mg/kg	10	<0.5	79.5	62.0	116
Pyrene			0.5 mg/kg	10	<0.5	96.4	62.1	122
EP080(07): Total Petroleum Hydrocarbons								
EP080(07): Total Petroleum Hydrocarbons - (QC Lot: 102394)								
C6 - C9 Fraction	EP0500795-003	BH3 - 0.6	2 mg/kg	28	<2	81.6	77.6	120
EP080(07): Total Petroleum Hydrocarbons - (QC Lot: 102567)								
C10 - C14 Fraction	EP0500794-002	Anonymous	25 mg/kg	756	230	104	69.3	120
C15 - C28 Fraction			50 mg/kg	1158	1650	123	77.0	120
C29 - C36 Fraction			50 mg/kg	162	130	94.0	67.4	116
EP080: BTEX								
EP080: BTEX - (QC Lot: 102394)								
Benzene	EP0500795-003	BH3 - 0.6	0.2 mg/kg	2	<0.2	81.4	79.7	122
Toluene			0.2 mg/kg	2	<0.2	82.6	78.3	120



ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN) Comprehensive report

Client Details

Client : WASTE SOLUTIONS AUSTRALIA P/L
Contact : MS AMANDA GRAVINA
Address : P O BOX 514 ASHGROVE QLD AUSTRALIA
4060
Project : - Not provided -
Order number : - Not provided -
C-O-C Number : 115862,115863
Site : Edmonstone St
Sampler : Morrison Geotech
E-mail : wsa@wastesolutions.biz
Telephone : 07 3366 5778
Facsimile : 07 3366 7302

Laboratory Details

Laboratory : ALS Environmental Perth
Manager : Shaun Crabb
Address : 10 Hod Way Malaga WA Australia 6090
Quote number : EB20050164
Work order : EP0500795
E-mail : Shaun.Crabb@alsenviro.com
Telephone : 61-8-9209-7655
Facsimile : 61-8-9209-7600

Dates

Date Samples Received : 12 Aug 2005
SRA Issue Date : 12 Aug 2005
Scheduled Reporting Date : 18 Aug 2005

Delivery Details

Mode of Delivery : Carrier. Temperature : Chilled - Ice present
No. of coolers/boxes : 1 Large No. of samples - Received 22
Security Seal : Intact. - Analysed 10

Comments

- Samples received in appropriately pretreated and preserved containers.
- Volatile organic compound analysis may be compromised as sample containers contained headspace.
- All samples labelled as per the COC, depth discrepancies are listed below.
Sample 5 jar labelled BH3 - 0.9.
Sample 8 jar labelled BH5 - 1.0.
Sample 17 jar labelled BH3 - 0.6.
- Please direct any queries related to sample condition / numbering / breakages to Shaun Crabb.
- Analytical work for this work order will be conducted at ALSE Perth.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.
- When the sampling time is not supplied on the COC documentation, ALSE defaults the sampling time to that of the COC 'relinquishment' time (if supplied). If this also is not supplied, ALSE defaults the sampling time to the 'time of receipt at Laboratory'.

Disclaimer : This document contains privileged and confidential information intended only for the use of the addressee. If you are not the addressee, you are hereby notified that you must not disseminate, copy or take action of its contents. If you have received this document in error, please notify ALS immediately.

SAMPLE RECEIPT NOTIFICATION (SRN) - continued

Client : WASTE SOLUTIONS AUSTRALIA P/L
 Project : - Not provided -

Work Order : EP0500795
 ALS Quote Reference : EB20050164



Summary of Sample(s) / Container(s) and Requested Analysis

Some items described below may be packages. A package may contain additional analyses, such as moisture and preparation tasks, that form an implicit part of that package.

ALS Sample ID.	Client Sample ID - Sample Date	Requested Analysis									
		S-01 7 Metals (incl. Digestion)	S-07 TPH/BTEX/PAH (SIM)								
EP0500795-001	BH2 - 0.2 - 29 Jul 2005	1	1								
EP0500795-002	BH5 - 0.3 - 29 Jul 2005	1	1								
EP0500795-003	BH3 - 0.6 - 29 Jul 2005	1	1								
EP0500795-004	BH2 - 0.9 - 29 Jul 2005	1									
EP0500795-005	BH3 - 0.9-1.0 - 29 Jul 2005	1									
EP0500795-006	BH1 - 0.4 - 29 Jul 2005	1	1								
EP0500795-007	BH4 - 1.0 - 29 Jul 2005	1									
EP0500795-008	BH5 - 1.1 - 29 Jul 2005	1									
EP0500795-009	BH4 - 0.5 - 29 Jul 2005	1	1								
EP0500795-010	Dup 2 - 29 Jul 2005	1	1								
EP0500795-011	BH2 - 1.0 - 29 Jul 2005										
EP0500795-012	BH4 - 205E - 29 Jul 2005										
EP0500795-013	BH3 - 0.2 - 29 Jul 2005										
EP0500795-014	BH4 - 29 Jul 2005										
EP0500795-015	BH3 - 1.5 - 29 Jul 2005										
EP0500795-016	BH4 - 0.6 - 29 Jul 2005										
EP0500795-017	BH3 - 0.5 - 29 Jul 2005										
EP0500795-018	BH2 - 1.4 - 29 Jul 2005										
EP0500795-019	BH2 - 0.5 - 29 Jul 2005										
EP0500795-020	BH4 - 0.2 - 29 Jul 2005										
EP0500795-021	BH5 - 0.6 - 29 Jul 2005										
EP0500795-022	Dup 1 - 29 Jul 2005										
Total(s) :		10	6								

SAMPLE RECEIPT NOTIFICATION (SRN) - continued

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : EB20050164



Requested Reports

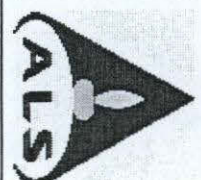
● MS AMANDA GRAVINA		
- A4 - Certificate of Analysis - NEPM format	Email	wsa@wastesolutions.biz
- A4 - Quality Control Report - NEPM format	Email	wsa@wastesolutions.biz
- A4 - Interpretive Quality Control Report - NEPM format	Email	wsa@wastesolutions.biz
- ENMRG Export Format	Email	wsa@wastesolutions.biz
- Chain of Custody Acknowledgement	Email	wsa@wastesolutions.biz
- A4 - Sample Receipt Notification - Comprehensive format	Email	wsa@wastesolutions.biz
- Invoice	Email	wsa@wastesolutions.biz

Sample Container(s) / Preservation Non-Compliance Log

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

- No sample container / preservation non-compliance exist.

RTI DL RELEASE - EHP



INTERPRETIVE QUALITY CONTROL REPORT

Client	: WASTE SOLUTIONS AUSTRALIA P/L	Laboratory	: ALS Environmental Perth	Page	: 1 of 6
Contact	: MS AMANDA GRAVINA	Contact	: Shaun Crabb	Work order	: EP0500795
Address	: P O BOX 514 ASHGROVE QLD AUSTRALIA 4060	Address	: 10 Hod Way Malaga WA Australia 6090	Amendment No.	:
Project	: - Not provided -	Quote number	: BN/183/05	Date received	: 12 Aug 2005
Order number	: - Not provided -			Date issued	: 18 Aug 2005
C-O-C number	: 115862, 115863				
Site	: Edmonstone St				
E-mail	: wsa@wastesolutions.biz	E-mail	: Shaun.Crabb@alsenviro.com	No. of samples Received	: 22
Telephone	: 07 3366 5778	Telephone	: 61-8-9209-7655	Analysed	: 10
Facsimile	: 07 3366 7302	Facsimile	: 61-8-9209-7600		

This Interpretive Quality Control Report was issued on 18 Aug 2005 for the ALS work order reference EP0500795 and supersedes any previous reports with this reference. This report contains the following information:

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

RTI DL RELEASE EHP

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BM/183/05

Page Number : 2 of 6
Issue Date : 18 Aug 2005

ALS Environmental



Interpretive Quality Control Report - Analysis Holding Time

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 preclude subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the sample aliquot was taken. Elapsed time to analysis represents time from sampling where no extraction / digestion is involved or time from extraction / digestion where this is present. For composite samples, sampling date/time is taken as that of the oldest sample contributing to that composite. Sample date/time for laboratory produced leaches are taken from the completion date/time of the leaching process. Outliers for holding time are based on USEPA SW846, APHA, AS and NEPM (1999). Failed outliers, refer to the 'Summary of Outliers'.

Matrix Type: SOIL

Matrix Type: SOIL		Analysis Holding Time and Preservation						
Method	Container / Client Sample ID(s)	Date Sampled	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Pass?	Date analysed	Due for analysis	Pass?
EG0051: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved								
BH2 - 0.2,		29 Jul 2005	15 Aug 2005	25 Jan 2006	Pass	15 Aug 2005	25 Jan 2006	Pass
BH3 - 0.6,								
BH3 - 0.9-1.0,								
BH4 - 1.0,								
BH4 - 0.5,								
EP071: TPH - Semivolatile Fraction								
Soil Glass Jar - Unpreserved								
BH2 - 0.2,		29 Jul 2005	15 Aug 2005	12 Aug 2005	Fail by 3 days	15 Aug 2005	24 Sep 2005	Pass
BH3 - 0.6,								
BH4 - 0.5,								
EP075(SIM): PAH/Phenols (SIM)								
Soil Glass Jar - Unpreserved								
BH2 - 0.2,		29 Jul 2005	15 Aug 2005	12 Aug 2005	Fail by 3 days	15 Aug 2005	24 Sep 2005	Pass
BH3 - 0.6,								
BH4 - 0.5,								
EP080: TPH Volatiles/BTEX								
Soil Glass Jar - Unpreserved								
BH2 - 0.2,		29 Jul 2005	13 Aug 2005	12 Aug 2005	Fail by 1 day	15 Aug 2005	12 Aug 2005	Fail by 3 days
BH3 - 0.6,								
BH4 - 0.5,								

RTI DL RELEASE - EHP

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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Issue Date : 18 Aug 2005



Interpretive Quality Control Report - Frequency of Quality Control Samples

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which this work order was processed. Actual rate should be greater than or equal to the expected rate.

Matrix Type: SOIL

Matrix Type: SOIL					Frequency of Quality Control Samples	
Quality Control Sample Type	Count		Rate (%)		Quality Control Specification	
Method	QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)						
EA055-103: Moisture Content						
EG005T: Total Metals by ICP-AES	3	28	10.7	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP071: TPH - Semivolatile Fraction	1	10	10.0	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP075(SIM): PAH/Phenols (SIM)	1	10	10.0	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP075(SIM): PAH/Phenols (SIM)	1	6	16.7	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP080: TPH Volatiles/BTEX	1	10	10.0	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
Laboratory Control Samples (LCS)						
EG005T: Total Metals by ICP-AES	1	10	10.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP071: TPH - Semivolatile Fraction	1	10	10.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP075(SIM): PAH/Phenols (SIM)	1	6	16.7	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP080: TPH Volatiles/BTEX	1	10	10.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
Method Blanks (MB)						
EG005T: Total Metals by ICP-AES						
EP071: TPH - Semivolatile Fraction	1	10	10.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP075(SIM): PAH/Phenols (SIM)	1	10	10.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP075(SIM): PAH/Phenols (SIM)	1	6	16.7	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
EP080: TPH Volatiles/BTEX	1	10	10.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement	
Matrix Spikes (MS)						
EG005T: Total Metals by ICP-AES	1	10	10.0	5.0	ALS QCS3 requirement	
EP071: TPH - Semivolatile Fraction	1	10	10.0	5.0	ALS QCS3 requirement	
EP075(SIM): PAH/Phenols (SIM)	1	6	16.7	5.0	ALS QCS3 requirement	
EP080: TPH Volatiles/BTEX	1	10	10.0	5.0	ALS QCS3 requirement	

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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Interpretive Quality Control Report - Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged on the 'Quality Control Report'. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). - Anonymous -
Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot.

Non-surrogates

Matrix Type: SOIL

Summary of Outliers - Quality Control Samples

ALS QC Lot	Matrix Type	Laboratory Sample ID	Client Sample ID	Analyte	Data	Limits	Comment
Matrix Spikes (MS)							
EG005T: Total Metals by ICP-AES	SOIL	EP0500795-002	BH6 - 0.3	Copper	ND	---	MS recovery not determined, background level greater than or equal to 4x spike level.
				Nickel	ND	---	MS recovery not determined, background level greater than or equal to 4x spike level.
				Zinc	ND	---	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Petroleum Hydrocarbons	SOIL	EP0500794-002	Anonymous	C15 - C28 Fraction	123 %	77.0-120 %	Recovery greater than upper data quality objective

- For all matrices, no RPD recovery outliers occur for the duplicate analysis.
- For all matrices, no method blank result outliers occur.
- For all matrices, no laboratory spike recoveries breaches occur.

Surrogates

Surrogates	Matrix Type	Laboratory Sample ID	Client Sample ID	Analyte	Data	Limits	Comment
EP080S: TPH(V)/BTEX Surrogates	SOIL	EP0500795-009	BH4 - 0.5	4-Bromofluorobenzene	79.5 %	79.7-122 %	Recovery less than lower control limit

- For all matrices, no surrogate recovery outliers occur.

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BN/183/05

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Outliers : Analysis Holding Time

The following report highlights outliers within this Interpretive Quality Control Report - Analysis Holding Time.

Matrix Type: SOIL

Matrix Type: SOIL							
Method	Container / Client Sample ID(s)	Date Sampled	Extraction / Preparation		Analysis		
EP071: TPH - Semivolatile Fraction			Date extracted	Due for extraction	Pass?	Date analysed	Due for analysis
Summary of Outliers - Analysis Holding times and Preservation							
Soil Glass Jar - Unpreserved							
BH2 - 0.2, BH3 - 0.6, BH4 - 0.5, Dup 2		29 Jul 2005	15 Aug 2005	12 Aug 2005	Fail by 3 days	15 Aug 2005	24 Sep 2005
Pass							
Matrix Type: SOIL							
Summary of Outliers - Analysis Holding times and Preservation							
Method	Container / Client Sample ID(s)	Date Sampled	Extraction / Preparation		Analysis		
			Date extracted	Due for extraction	Pass?	Date analysed	Due for analysis
Summary of Outliers - Analysis Holding times and Preservation							
EP075(SIM): PAH/Phenols (SIM)							
Soil Glass Jar - Unpreserved							
BH2 - 0.2, BH3 - 0.6, BH4 - 0.5, Dup 2		29 Jul 2005	15 Aug 2005	12 Aug 2005	Fail by 3 days	15 Aug 2005	24 Sep 2005
Pass							
Matrix Type: SOIL							
Summary of Outliers - Analysis Holding times and Preservation							
Method	Container / Client Sample ID(s)	Date Sampled	Extraction / Preparation		Analysis		
			Date extracted	Due for extraction	Pass?	Date analysed	Due for analysis
Summary of Outliers - Analysis Holding times and Preservation							
EP080: TPH Volatiles/BTEX							
Soil Glass Jar - Unpreserved							
BH2 - 0.2, BH3 - 0.6, BH4 - 0.5, Dup 2		29 Jul 2005	13 Aug 2005	12 Aug 2005	Fail by 1 day	15 Aug 2005	12 Aug 2005
Fail by 3 days							

Outliers : Frequency of Quality Control Samples

The following report highlights outliers within this Interpretive Quality Control Report - Frequency of Quality Control Samples.

- No frequency outliers occur.

Client : WASTE SOLUTIONS AUSTRALIA P/L
Project : - Not provided -

Work Order : EP0500795
ALS Quote Reference : BM/183/05

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Method Reference Summary

The analytical procedures used by ALS Environmental are based on established internationally-recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house procedure 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 herein. Reference methods from which ALSE methods are based are provided in parenthesis.

Matrix Type: SOIL

Preparation Methods

EN69 : Hot Block Digest for metals in soils sediments and sludges - USEPA 2002 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and diluted to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)

ORG16 : Methanolic Extraction of Soils for Purge and Trap - (USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.

ORG17B : Tumbler Extraction of Solids (Option B - Non-concentrating) - In-house. Mechanical agitation (tumbler). 10g of sample, Na₂SO₄ and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.

Analytical Methods

EA055-103 : Moisture Content - A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)

EG005T : Total Metals by ICP-AES - (APHA 20th ed., 3120: USEPA SW 846 - 6010) (ICP/AES) Metals are determined following an appropriate acid digestion of the soil. The ICP/AES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)

EP071 : TPH - Semivolatile Fraction - (USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (1999) Schedule B(3) (Method 506.1)

EP075(SIM) : PAH/Phenols (SIM) - (USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 502 and 507)

EP080 : TPH Volatiles/BTEX - (USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantifications by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)

Method Reference Summary

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