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SALINITY ASSESSMENT
1975 – 1985 CAMDEN VALLEY WAY, PRESTONS

FOR

VICTOR & ALFIA CUSUMANO
C/- MOSCA PSERRAS ARCHITECTS

PROJECT NO. 17468/7486B **MARCH 2010**
REPORT NO. 10/0284

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1. INTRODUCTION

This report presents the results of a salinity investigation undertaken by SMEC Testing Services Pty Limited (STS) for the proposed new residential development at 1975 to 1985 Camden Valley Way, Prestons. We have been informed the proposed development includes a service station site, car wash, fruit barn, fast food outlet and retail shops.

The purpose of the investigation was to:

- determine the subsurface conditions over the site,
- address the issue of site salinity, and
- determine the soil aggressiveness to concrete and steel.

In regards to the salinity assessment, the procedures given in the publication below, has been adopted for his study:

- DLWC (2002) publication, "Site Investigation for Urban Salinity."

The work was undertaken at the request of Frank Mosca of Mosca Pserras Architects on behalf of Victor and Alfia Cusumano.

2. METHOD OF INVESTIGATION

2.1 Fieldwork

The fieldwork consisted of drilling two (2) borehole numbered BH1 and BH2, at the locations shown on Drawing No. 10/0284. The boreholes were drilled using an Edson RP70 drilling rig owned and operated by STS and were advanced using solid flight augers. Drilling operations were carried out by one of STS's experienced senior technical officers who also logged the subsurface conditions encountered. In order to monitor groundwater levels a piezometer was installed in BH1.

The subsurface conditions observed are recorded on the borehole logs in Appendix A. An explanation of the terms used on the logs is also given in Appendix A. Notes relating to geotechnical reports are also attached.

A total of nineteen (19) samples were collected from the boreholes. These are numbered S1 to S18 inclusive and S29. The depth of these samples are shown on the borehole logs. A total of eleven (11) surface samples were collected from a depth of 0 to 0.15 metres below the groundsurface. These are numbered S19 to S27, S29 and S30. The location of these samples is shown on Drawing No. 10/0284. S28 is a duplicate of 10, S29 is a duplicate of S20 and S30 is a duplicate of S27.

All surface sampling was carried out using hand tools. Those from the boreholes were collected using a drilling rig and tubes. After mixing the samples were transferred into new clean jars prepared by Australian Laboratory Services (ALS). All jars were filled to the rim to minimize head space. The sample jars were then placed into ice-filled chests and transferred to ALS for testing purposes. Chain of Custody documentation was used to record and track the samples.

All sampling equipment was decontaminated prior to use and between sampling locations by washing with a mixture of water and DECON 90 and rinsing with potable water.

2.2 Laboratory Testing

In order to assessment salinity of the soils and its aggressiveness selected representative soil samples were tested to determine the following:

- pH and electrical conductivity
- sulphate and chloride content.

The detailed test report is given in Appendix B.

3. GEOLOGY AND SITE CONDITIONS

The Penrith geological series sheet at a scale of 1:100,000 shows Triassic Age Bringelly Shale of the Wianamatta Group underlie the site. Rocks within this formation comprise shale, claystone and laminite. These weather to form silty clay.

At the time of the fieldwork the site was being used as a garden supply facility. Site vegetation comprised grass, trees and shrubs.

The groundsurface falls about a metre towards a farm dam in the northwest corner of the property.

4. SUBSURFACE CONDITIONS

When making an assessment of the subsurface conditions across a site from a limited number of boreholes there is the possibility that variations may occur between test locations. The data derived from the site investigation programme are extrapolated across the site to form a geological model and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. The actual conditions at the site may differ from those inferred, since no subsurface exploration programme, no matter how comprehensive, can reveal all subsurface details and anomalies.

The subsurface conditions consist of fill overlying silty clays and weathered shale. The fill is 0.8 and 1.2 metres thick. Natural silty clays underlie the site to depths of 2.4 and 2.9 metres. The strength of these materials vary between stiff and very stiff. Weathered shale was observed to the depth of drilling, 4.0 metres.

No groundwater was observed in BH1 during the fieldwork and it remained dry fivee days after drilling.

5. LABORATORY ANALYTICAL PROGRAMME

5.1 Data Quality Objectives

The purpose of data quality objectives is to develop criteria to assess the reliability of the laboratory data. The data quality objectives established for this project are summarised below:

- Collection and analysis of field samples as duplicate specimens,
- Relative percentage differences (RPDs) were calculated for duplicates. The RPD was calculated as the absolute value of the difference between the initial and repeat result divided by the average value, expressed as a percentage. The following acceptance criteria were used to assess the RPD results:
- For results that were greater than 10 times the Level of Reporting (LOR) values RPDs, less than 50% were considered acceptable.
- For results that were between 5 and 10 times LOR values, RPDs less than 75% were considered acceptable.
- For results that were less than 5 times the LOR values, RPDs less than 100% were considered acceptable.
- Review of laboratory QA/QC data (including surrogate recovery, repeat analysis, duplicates, matrix spikes and method blanks).

The success of the data quality objectives is based on assessment of the data set as a whole and not on individual acceptance or exceedance within the data set.

Internal laboratory quality control testing consisted of reagent blank and spiked sample. No analyte was detected in the reagent blank and spike recoveries were within acceptable limits. Detailed calculations of RPDs are given in Appendix C. The RPD is within the project data quality objectives outlined in Section 5.1. The above implies that internal QA/QC was maintained during testing.

Table 5.1 summarises the soil salinity test results.

TABLE 5.1 – SALINITY RESULTS

Sample ID	$EC_{1:5}$ (µS/cm)	Soil Type	Multiplier Factor	EC_e (µS/cm)	Salinity Class
S1	124	Silty gravel	17	2108	Slightly saline
S2	57	Silty gravel	17	969	Non saline
S3	89	Silty clay	7	623	Non saline
S4	90	Silty clay	7	630	Non saline
S5	98	Silty clay	7	786	Non saline
S6	132	Silty clay	7	924	Non saline
S7	117	Silty clay	7	819	Non saline
S8	115	Shale	9	1035	Non saline
S9	112	Shale	9	1008	Non saline
S10	171	Silty gravel	17	2907	Slightly saline
S11	441	Silty clay	7	3087	Slightly saline
S12	440	Silty clay	7	3080	Slightly saline
S13	445	Silty clay	7	3115	Slightly saline
S14	270	Silty clay	7	1890	Non saline
S15	525	Silty clay	7	3675	Slightly saline
S16	545	Shale	9	3815	Slightly saline
S17	416	Shale	9	3744	Slightly saline
S18	396	Shale	9	3564	Slightly saline
S19	103	Gravelly sand	17	1751	Non saline
S20	47	Gravelly sand	17	799	Non saline
S21	38	Gravelly sand	17	644	Non saline
S22	135	Gravelly sand	17	2295	Slightly saline
S23	85	Gravelly sand	17	1445	Non saline
S24	88	Gravelly sand	17	1462	Non saline
S25	117	Gravelly sand	17	1989	Non saline
S26	200	Gravelly sand	17	3400	Slightly saline
S27	164	Gravelly sand	17	1086	Non saline
S28	166	Silty gravel	17	2822	Slightly saline
S29	39	Gravelly sand	17	663	Non saline
S30	110	Gravelly sand	17	1870	Non saline

6. DISCUSSION

6.1 Salinity Assessment

6.1.1 Soil Test Results

Table 5.1 also includes the appropriate multiplier factors used to convert results to EC_e (µS/cm) and the salinity class with which the soil sample falls according to Table 6.2: EC_e Values of Soil Salinity Classes in the publication entitled "Site Investigation for Urban Salinity (DLWC, 2002)".

EC_e is representative of the actual salinity level that the plant roots are exposed to and as such provides an indication of the toxicity of the soils to various plant species. Reported EC_e for the samples ranged from 623 µS/cm to 3815 µS/cm and may be classified as non and slightly saline.

6.1.2 Groundwater Salinity

As noted above, a standpipe piezometer was installed in borehole BH1. No groundwater was present several days after installation.

6.1.3 Potential Impacts on Development

The general impacts that have the potential to occur may be summarised as:

- damage to and subsequent reduction of the lifespan of buildings and associated infrastructure such as roads and underground services as a result of construction close to aggressive groundwater. This may include:
    - degradation of bricks, concrete, road base and curbing materials leading to expansion, cracking, strength and mass loss;
    - corrosion of reinforcement and loss of structural integrity;

- rising/falling damp; and

- non-structural impacts, such as efflorescence on bricks.

- degradation of drainage infrastructure by a rise in the groundwater level. Damage to pipes has the potential to exacerbate the problem by further recharging the shallow groundwater; and

- damage to or prevention of the cultivation of salt-sensitive vegetation in landscaped areas and gardens may arise across the site due to the identification of slight and moderate salinity levels in surface soils.

The risks considered to be potentially posed to individual assets and activities and appropriate management options are detailed below.

The construction and maintenance stages of the proposed development have the potential to adversely affect salinity conditions on the site and in the surrounding area, mostly by altering the current hydrological cycle. Potential impacts include:

- a rise in the groundwater level due to increased water inputs associated with urban development. e.g. irrigation and leaking pipes. Reduced infiltration due to the construction of hardstand across a large proportion of the site may offset this to some extent;

- altered flow and drainage patterns which may result in increased water accumulation and associated salinity issues in areas of impeded flow, as a consequence of e.g. the construction of drainage lines, footings and roads;

- interception of groundwater should local groundwater levels be raised by prolonged periods of precipitation, creation of a perched water table, or increased recharge of the regional or localized aquifer may result from cutting or compaction within the perched or permanent aquifer;

- saline discharges into Cabramatta Creek may result from the interception of saline groundwater by drainage design in the proposed development; and

- excavation and redistribution of saline soil during excavation and filling operations around the site.

These impacts have the potential to lead to an increase in the surface expression of soil salinity and adversely affect downstream water quality.

6.1.4 Salinity Model

The testing indicates that the onsite soils are mainly non or slightly saline. The groundwater below the site is expected to be saline.

The main mechanisms by which salts could be moved around the site, thereby amplifying salinity issues, include;

- raising of the groundwater table;
- impedance of groundwater flow or surface water drainage;

All these mechanisms would result in an increased surface expression of salinity.

6.1.5 Salinity Risk Assessment

Existing site conditions were assessed by ECe concentrations for the onsite natural materials. Analytical results are summarised in Table 5.1. The available information indicates that;

- the onsite soils are mainly non or slightly saline,

- groundwater is expected to be saline,

- even though soil salinity is not expected to impact on the site development, management measures including topsoiling and revegetation procedures, adequate drainage design, suitable landscaping designs, restrictions on irrigation and rainwater absorption tanks and selection of appropriate building designs and materials should be implemented.

6.2 Soil Aggressiveness

The aggressiveness or erosion potential of an environment in building materials, particularly concrete and steel is dependent on the levels of soil pH and the types of salts present, generally sulphates and chlorides. The values have been compared to Tables 6.4.2 (C) and 6.5.2 (C) in AS2159 – 2009 Piling – Design and Installation. The test results are summarised in Table 6.1.

TABLE 6.1 – TEST RESULT SUMMARY

Sample ID	Borehole No.	Depth (m)	pH	Soluble mg/kg	Soluble Chloride mg/kg
S3	BH1	0.5	6.7	70	40
S13	BH1	0.5	5.2	240	960

The report results range between:

- pH - 5.2 and 6.7
- soluble SO_4 - 70 and 240 mg/kg
- soluble chloride - 40 and 960 mg/kg

A review of the durability aspects indicates that:

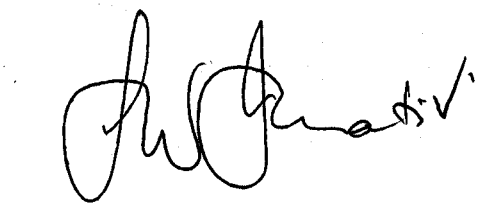
- AS2159 – 2009 criteria for piles in soils are expressed as percentages and soluble sulphates are expressed as SO_4. The soils on the site consist of low permeability silty clays. Therefore, the soil conditions B are considered appropriate.

  - pH : 5.2 and 6.7
  - SO_4 : 240 mg/kg [criteria 5000 mg/kg] and
  - C1 : 960 mg/kg [criteria 5000 mg/kg]

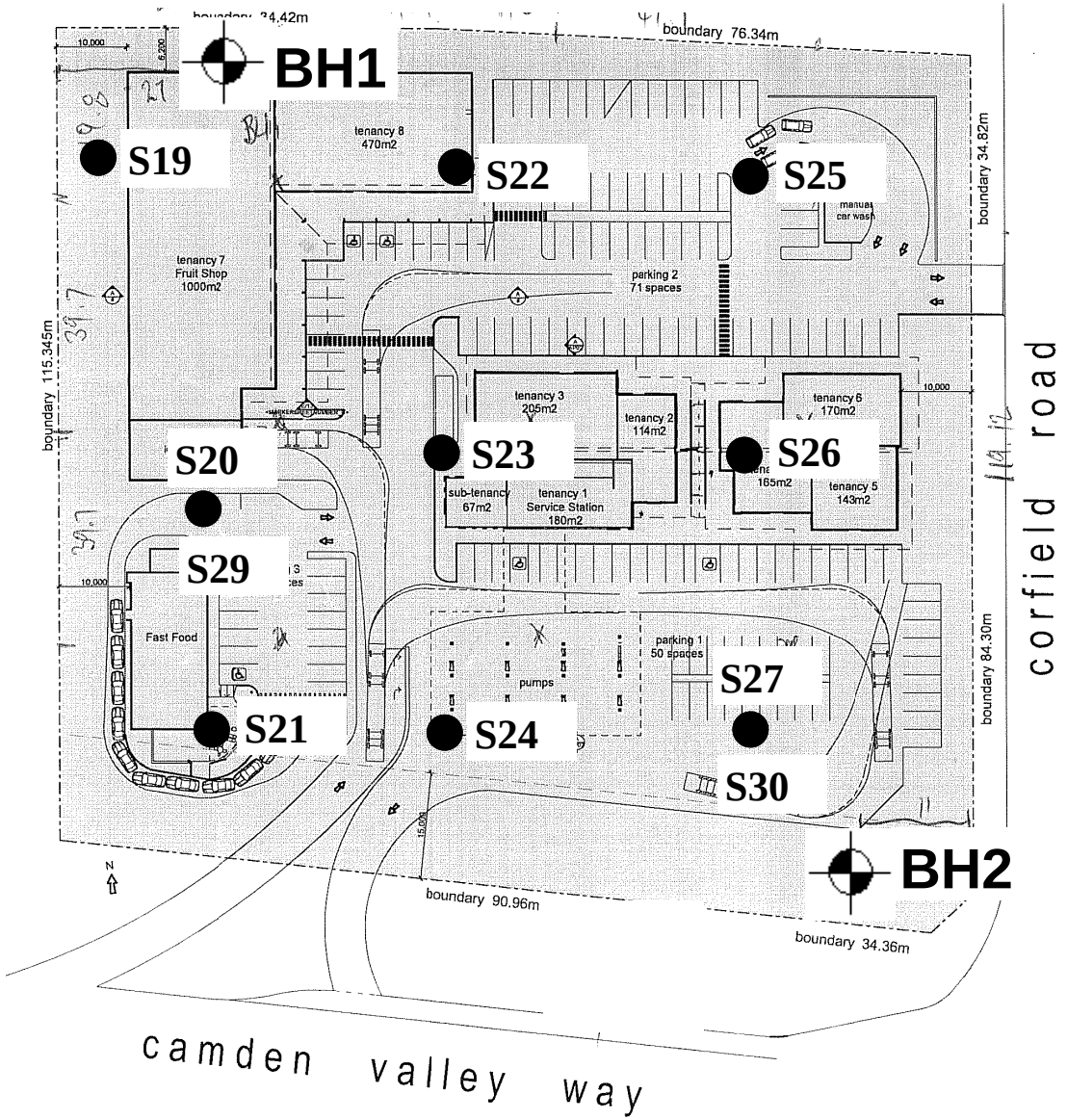
The exposure classification for the onsite soils is non-aggressive to steel and mild to concrete.

7. FINAL COMMENTS

During construction should the subsurface conditions vary to those inferred in this report, a suitably experienced geotechnical engineer should review the design and recommendations given above to determine if any alterations are required.



Laurie Ihnativ, BE, MEngSc, MBA, FIE Aust
Manager, SMEC Testing Services Pty Limited



SMEC TESTING SERVICES Pty. Ltd.	Scale: Unknown	Date: March 2010
Client: VICTOR & ALFIA CUSUMANO		
SALINITY ASSESSMENT **1975-1985 CAMDEN VALLEY WAY, PRESTONS** **BOREHOLE AND SAMPLE LOCATIONS**	Project No. 17468/7486B	
	Drawing No: 10/0284	

NOTES RELATING TO GEOTECHNICAL REPORTS

Introduction

These notes have been provided to outline the methodology and limitations inherent in geotechnical reporting. The issues discussed are not relevant to all reports and further advice should be sought if there are any queries regarding any advice or report.

When copies of reports are made, they should be reproduced in full.

Geotechnical Reports

Geotechnical reports are prepared by qualified personnel on the information supplied or obtained and are based on current engineering standards of interpretation and analysis.

Information may be gained from limited subsurface testing, surface observations, previous work and is supplemented by knowledge of the local geology and experience of the range of properties that may be exhibited by the materials present. For this reason, geotechnical reports should be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

Where the report has been prepared for a specific purpose (eg. design of a three-storey building), the information and interpretation may not be appropriate if the design is changed (eg. a twenty storey building). In such cases, the report and the sufficiency of the existing work should be reviewed by SMEC Testing Services Pty Limited in the light of the new proposal.

Every care is taken with the report content, however, it is not always possible to anticipate or assume responsibility for the following conditions:

- Unexpected variations in ground conditions. The potential for this depends on the amount of investigative work undertaken.
- Changes in policy or interpretation by statutory authorities.
- The actions of contractors responding to commercial pressures.

If these occur, SMEC Testing Services Pty Limited would be pleased to resolve the matter through further investigation, analysis or advice.

Unforeseen Conditions

Should conditions encountered on site differ markedly from those anticipated from the information contained in the report, SMEC Testing Services Pty Limited should be notified immediately. Early identification of site anomalies generally results in any problems being more readily resolved and allows re-interpretation and assessment of the implications for future work.

Subsurface Information

Logs of a borehole, recovered core, test pit, excavated face or cone penetration test are an engineering and/or geological interpretation of the subsurface conditions. The reliability of the logged information depends on the drilling/testing method, sampling and/or observation spacings and the ground conditions. It is not always possible or economic to obtain continuous high quality data. It should also be recognised that the volume or material observed or tested is only a fraction of the total subsurface profile.

Interpretation of subsurface information and application to design and construction must take into consideration the spacing of the test locations, the frequency of observations and testing, and the possibility that geological boundaries may vary between observation points.

Groundwater observations and measurements outside of specially designed and constructed piezometers should be treated with care for the following reasons:

- In low permeability soils groundwater may not seep into an excavation or bore in the short time it is left open.
- A localised perched water table may not represent the true water table.
- Groundwater levels vary according to rainfall events or season.
- Some drilling and testing procedures mask or prevent groundwater inflow.

The installation of piezometers and long term monitoring of groundwater levels may be required to adequately identify groundwater conditions.

Supply of Geotechnical Information or Tendering Purposes

It is recommended tenderers are provided with as much geological and geotechnical information that is available and that where there are uncertainties regarding the ground conditions, prospective tenders should be provided with comments discussing the range of likely conditions in addition to the investigation data.

APPENDIX A

BOREHOLE LOGS & EXPLANATION SHEETS

SMEC Testing Services Pty Ltd

GEOTECHNICAL LOG - NON CORE BOREHOLE

Client: Victor and Alfia Cusumano
Project: 1975-1985 Camden valley Way, Prestons
Location: Refer to Drawing No. 10/0284

Project No.: 17468/7486B
Date : December 11, 2009
Logged: PI

BOREHOLE NO.: BH 1

Sheet 1 of 1

WATER TABLE	SAMPLES	DEPTH (m)	DESCRIPTION OF DRILLED PRODUCT (Soil type, colour, grain size, plasticity, minor components, observations)	SYMBOL	CONSISTENCY (cohesive soils) or RELATIVE DENSITY (sands and gravels)	MOISTURE
	S1 0-0.15 m		SILTY GRAVELLY SAND: dark brown/grey, fine to medium grained, fine to medium gravel, coal wash	GM/SM	DENSE	D
	S2 0.2-0.35 m		FILL			
	S3 0.5-0.65 m		SILTY CLAY: dark brown, low plasticity, some foam and metal	CL	SOFT TO FIRM AND STIFF	M
	S4 1.0-1.15 m	1.0	FILL			
	S5 1.5-1.65 m		SILTY CLAY: red brown with grey, low to medium plasticity	CL	STIFF BECOMING VERY STIFF	M
	S6 2.0-2.15 m	2.0	SILTY CLAY: light grey with red brown, medium to high plasticity	CL/CH	VERY STIFF	M
	S7 2.5-2.65 m		SILTY CLAY: grey, low to medium plasticity	CL	HARD	D-M
	S8 3.0-3.15 m	3.0	SHALE: brown		EXTREMELY LOW STRENGTH	
	S9 3.85-4.0 m	4.0	BOREHOLE DISCONTINUED AT 4.0 M			
		5.0				

NOTES: D - disturbed sample U - undisturbed tube sample B - bulk sample
WT - level of water table or free water N - Standard Penetration Test (SPT)

See explanation sheets for meaning of all descriptive terms and symbols

Contractor: STS
Equipment: Edson RP70
Hole Diameter (mm): 100
Angle from Vertical (°) 0

SMEC Testing Services Pty Ltd

GEOTECHNICAL LOG - NON CORE BOREHOLE

Client: Victor and Alfia Cusumano
Project: 1975-1985 Camden valley Way, Prestons
Location: Refer to Drawing No. 10/0284

Project No.: 17468/7486B
Date : December 11, 2009
Logged: PI

BOREHOLE NO.: BH 2

Sheet 1 of 1

WATER TABLE	SAMPLES	DEPTH (m)	DESCRIPTION OF DRILLED PRODUCT (Soil type, colour, grain size, plasticity, minor components, observations)	SYMBOL	CONSISTENCY (cohesive soils) or RELATIVE DENSITY (sands and gravels)	MOISTURE
	S10/S28 0-0.15 m		SILTY SANDY GRAVEL: dark grey, fine to medium grained sand, fine to medium gravel coal wash FILL	GM	DENSE	D
	S11 0.2-0.35 m		SILTY CLAY: orange brown, low to medium plasticity	CL	VERY STIFF	D
	S12 0.5-0.65 m		FILL			
	S13 1.0-0.15 m	1.0	SILTY CLAY: light grey, low to medium plasticity	CL	VERY STIFF	D
	S14 1.5-1.65 m		SILTY CLAY: light grey and red brown, low to medium plasticity	CL	HARD	D
	S15 2.0-2.15 m	2.0				
	S16 2.5-2.65 m		SHALE: brown		EXTREMELY LOW STRENGTH	
	S17 3.0-3.15 m	3.0				
	S18 3.85-4.0 m	4.0	BOREHOLE DISCONTINUED AT 4.0 M			
		5.0				

NOTES: D - disturbed sample U - undisturbed tube sample B - bulk sample
WT - level of water table or free water N - Standard Penetration Test (SPT)

See explanation sheets for meaning of all descriptive terms and symbols

Contractor: STS
Equipment: Edson RP70
Hole Diameter (mm): 100
Angle from Vertical (°) 0

APPENDIX B

LABORATORY TEST RESULTS

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES0918937**	Page	: 1 of 8
Client	: **SMEC TESTING SERVICES PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR LAURIE IHNATIV	Contact	: Charlie Pierce
Address	: P O BOX 6989 WETHERILL PARK NSW, AUSTRALIA 2164	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
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Project	: 7468 7486B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 7874		
C-O-C number	: 132759,132760,132761	Date Samples Received	: 11-DEC-2009
Sampler	: PI	Issue Date	: 18-DEC-2009
Site	: PRESTONS		
		No. of samples received	: 30
Quote number	: EN/025/09	No. of samples analysed	: 30

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Hoa Nguyen	Inorganic Chemist	Inorganics
Kim McCabe	Senior Inorganic Chemist	Inorganics
Wisam.Marassa	Metals Coordinator	Inorganics

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **ED040S: Some samples were rerun (X10) due to matrix interference and LOR's have been raised accordingly.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: S1	S2	S3	S4	S5
				Client sampling date / time: 11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00
				ES0918937-001	ES0918937-002	ES0918937-003	ES0918937-004	ES0918937-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	----	----	**6.7**	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**124**	**57**	**89**	**90**	**98**
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	----	----	**13.6**	----	----
ED008: Exchangeable Cations								
^ Exchangeable Calcium	----	0.1	meq/100g	----	----	**5.2**	----	----
^ Exchangeable Magnesium	----	0.1	meq/100g	----	----	**3.6**	----	----
^ Exchangeable Potassium	----	0.1	meq/100g	----	----	**0.6**	----	----
^ Exchangeable Sodium	----	0.1	meq/100g	----	----	<0.1	----	----
^ Exchangeable Sodium Percent	----	0.1	%	----	----	**0.5**	----	----
^ Cation Exchange Capacity	----	0.1	meq/100g	----	----	**9.4**	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	----	**70**	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	----	----	**40**	----	----

Analytical Results

Sub-Matrix: SOIL			Client sample ID	S6	S7	S8	S9	S10
			Client sampling date / time	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00
Compound	CAS Number	LOR	Unit	ES0918937-006	ES0918937-007	ES0918937-008	ES0918937-009	ES0918937-010
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**132**	**117**	**115**	**112**	**171**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: S11	S12	S13	S14	S15
				Client sampling date / time: 11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00
				ES0918937-011	ES0918937-012	ES0918937-013	ES0918937-014	ES0918937-015
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	----	----	**5.2**	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**441**	**440**	**445**	**276**	**525**
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	----	----	**9.6**	----	----
ED008: Exchangeable Cations								
^ Exchangeable Calcium	----	0.1	meq/100g	----	----	**0.2**	----	----
^ Exchangeable Magnesium	----	0.1	meq/100g	----	----	**7.1**	----	----
^ Exchangeable Potassium	----	0.1	meq/100g	----	----	**0.4**	----	----
^ Exchangeable Sodium	----	0.1	meq/100g	----	----	**1.4**	----	----
^ Exchangeable Sodium Percent	----	0.1	%	----	----	**15.4**	----	----
^ Cation Exchange Capacity	----	0.1	meq/100g	----	----	**9.0**	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	----	**240**	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	----	----	**960**	----	----

Analytical Results

Sub-Matrix: SOIL				Client sample ID	S16	S17	S18	S19	S20
				Client sampling date / time	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00
Compound	*CAS Number*	*LOR*	*Unit*		ES0918937-016	ES0918937-017	ES0918937-018	ES0918937-019	ES0918937-020
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		545	416	396	103	47

Analytical Results

Sub-Matrix: SOIL			Client sample ID	S21	S22	S23	S24	S25
			Client sampling date / time	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00
Compound	CAS Number	LOR	Unit	ES0918937-021	ES0918937-022	ES0918937-023	ES0918937-024	ES0918937-025
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**38**	**135**	**85**	**88**	**117**

Analytical Results

Sub-Matrix: SOIL			Client sample ID	S26	S27	S28	S29	S30
			Client sampling date / time	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00	11-DEC-2009 09:00
Compound	CAS Number	LOR	Unit	ES0918937-026	ES0918937-027	ES0918937-028	ES0918937-029	ES0918937-030
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**200**	**164**	**166**	**39**	**110**

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES0918937**	Page	: 1 of 5
Client	: **SMEC TESTING SERVICES PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR LAURIE IHNATIV	Contact	: Charlie Pierce
Address	: P O BOX 6989 WETHERILL PARK NSW, AUSTRALIA 2164	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: smectesting@pacific.net.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 97562166	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 97561137	Facsimile	: +61-2-8784 8500
Project	: 7468 7486B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: PRESTONS		
C-O-C number	: 132759,132760,132761	Date Samples Received	: 11-DEC-2009
Sampler	: PI	Issue Date	: 18-DEC-2009
Order number	: 7874		
		No. of samples received	: 30
Quote number	: EN/025/09	No. of samples analysed	: 30

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Hoa Nguyen	Inorganic Chemist	Inorganics
Kim McCabe	Senior Inorganic Chemist	Inorganics
Wisam.Marassa	Metals Coordinator	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002 : pH (Soils) (QC Lot: 1194530)									
ES0918926-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.1	6.0	0.0	0% - 20%
ES0918962-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	7.6	7.6	0.0	0% - 20%
EA010: Conductivity (QC Lot: 1194532)									
ES0918937-001	S1	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	124	124	0.0	0% - 20%
ES0918937-011	S11	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	441	443	0.4	0% - 20%
EA010: Conductivity (QC Lot: 1194534)									
ES0918937-021	S21	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	38	38	0.0	0% - 20%
EA055: Moisture Content (QC Lot: 1193704)									
ES0918935-004	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	25.8	28.4	9.4	0% - 20%
ES0918947-026	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	22.5	22.8	1.4	0% - 20%
ED008: Exchangeable Cations (QC Lot: 1197807)									
ES0918937-003	S3	ED008: Exchangeable Sodium Percent	----	0.1	%	0.5	0.5	0.0	No Limit
		ED008: Exchangeable Calcium	----	0.1	meq/100g	5.2	5.3	0.0	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	3.6	3.6	0.0	0% - 20%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.6	0.6	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	9.4	9.6	1.4	0% - 20%
ED040S: Soluble Major Anions (QC Lot: 1194533)									
ES0918937-003	S3	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	70	70	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 1194531)									
ES0918926-001	Anonymous	ED045G: Chloride	16887-00-6	10	mg/kg	10	20	0.0	No Limit
ES0918926-006	Anonymous	ED045G: Chloride	16887-00-6	10	mg/kg	10	10	0.0	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010: Conductivity (QCLot: 1194532)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.5	70	130
EA010: Conductivity (QCLot: 1194534)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.7	70	130
ED008: Exchangeable Cations (QCLot: 1197807)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1.47 meq/100g	74.8	70.2	105
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	0.57 meq/100g	83.0	76.4	110
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.15 meq/100g	81.1	70.0	95.3
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.15 meq/100g	89.4	70.0	104
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	2.35 meq/100g	77.8	70.1	104
ED040S: Soluble Major Anions (QCLot: 1194533)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	150 mg/kg	107	70	130
ED045G: Chloride Discrete analyser (QCLot: 1194531)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	250 mg/kg	104	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 1194531)							
ES0918926-001	Anonymous	ED045G: Chloride	16887-00-6	1250 mg/kg	103	70	130

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0918937**	Page	: 1 of 6
Client	: SMEC TESTING SERVICES PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR LAURIE IHNATIV	Contact	: Charlie Pierce
Address	: P O BOX 6989 WETHERILL PARK NSW, AUSTRALIA 2164	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: smectesting@pacific.net.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 97562166	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 97561137	Facsimile	: +61-2-8784 8500
Project	: 7468 7486B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: PRESTONS		
C-O-C number	: 132759,132760,132761	Date Samples Received	: 11-DEC-2009
Sampler	: PI	Issue Date	: 18-DEC-2009
Order number	: 7874		
		No. of samples received	: 30
Quote number	: EN/025/09	No. of samples analysed	: 30

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002 : pH (Soils)							
Soil Glass Jar - Unpreserved							
S3, S13	**11-DEC-2009**	**14-DEC-2009**	18-DEC-2009	✓	**14-DEC-2009**	14-DEC-2009	✓
EA010: Conductivity							
Soil Glass Jar - Unpreserved							
S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19, S20, S21, S22, S23, S24, S25, S26, S27, S28, S29, S30	**11-DEC-2009**	**14-DEC-2009**	18-DEC-2009	✓	**14-DEC-2009**	11-JAN-2010	✓
EA055: Moisture Content							
Soil Glass Jar - Unpreserved							
S3, S13	**11-DEC-2009**	**----**	----	----	**11-DEC-2009**	18-DEC-2009	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved							
S3, S13	**11-DEC-2009**	**16-DEC-2009**	09-JUN-2010	✓	**17-DEC-2009**	09-JUN-2010	✓
ED040S : Soluble Sulfate by ICPAES							
Soil Glass Jar - Unpreserved							
S3, S13	**11-DEC-2009**	**14-DEC-2009**	18-DEC-2009	✓	**17-DEC-2009**	11-JAN-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride Discrete analyser							
Soil Glass Jar - Unpreserved							
S3, S13	**11-DEC-2009**	**14-DEC-2009**	18-DEC-2009	✓	**14-DEC-2009**	11-JAN-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chloride Soluble By Discrete Analyser	ED045G	2	10	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	3	30	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH (1:5)	EA002	2	4	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Chloride Soluble By Discrete Analyser	ED045G	2	10	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	2	30	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride Soluble By Discrete Analyser	ED045G	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	2	30	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride Soluble By Discrete Analyser	ED045G	1	10	**10.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	(APHA 21st ed., 4500H+) pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (1999) Schedule B(3) (Method 103)
Electrical Conductivity (1:5)	EA010	SOIL	(APHA 21st ed., 2510) Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (1999) Schedule B(3) (Method 104)
Moisture Content	EA055-103	SOIL	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)
Exchangeable Cations with pre-treatment	ED008	SOIL	Rayment & Higginson (1992) Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (1999) Schedule B(3) (Method 301)
Major Anions - Soluble	ED040S	SOIL	In-house. Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Chloride Soluble By Discrete Analyser	ED045G	SOIL	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition 4500-Cl- E.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

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

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

ES0918937

CHAIN OF CUSTODY DOCUMENTATION

17/12/09 132759

ALS Laboratory Group

CLIENT: SMEC Testing Services P/L
ADDRESS / OFFICE: PO Box 6989 Wetherill Park
PROJECT MANAGER (PM): L. Illingworth
PROJECT ID: 17468/17486B
SITE: Prestons
P.O. NO.: 7874
RESULTS REQUIRED (Date): 17/12/9
QUOTE NO.:

SAMPLER: P.L
MOBILE:
PHONE
EMAIL REPORT TO:
EMAIL INVOICE TO: (if different to report)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE 18.6
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected".
Extra volume for QC or trace LORs etc.

Subcon / Forward Lab / Split WO
Lab / Analysis: ALS ERSD
Organised By / Date: 11/12/09 SEQ
Relinquished By / Date:
Connote / Courier:
WO No: ES0918937
Attach By PO / Internal Sheet:

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	Electrical Conductivity	pH	Sulphates	Chlorides	ESP & CEC
1	S1	Soil	11/12	am	Jar	1	x				
2	S2										
3	S3							x	x	x	x
4	S4										
5	S5										
6	S6										
7	S7										
8	S8										
9	S9										
10	S10										
11	S11										
12	S12										

Environmental Division
Sydney
Work Order
ES0918937

Telephone : +61-2-8784 8555

RELINQUISHED BY:

Name:	J. Hyde	Date:	17/12/9
Of:	SMEC Testing	Time:	1336
Name:		Date:	
Of:		Time:	

RECEIVED BY

Name:	Sally Slater	Date:	11/12/09
Of:	ALS	Time:	13:55
Name:		Date:	
Of:		Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

132760

CLIENT: SIMEC Testing Services P/L	SAMPLER: P.T
ADDRESS / OFFICE: PO Box 6989 Wetherill Pk	MOBILE:
PROJECT MANAGER (PM): C. Thompson	PHONE
PROJECT ID: 17468/17486B	EMAIL REPORT TO:
SITE: Prestons P.O. NO.: 7879	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): 17/12/19 QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

ALS Laboratory Group

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE 18.6
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected".
Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		Electrical Conductivity	pH	Sulfates	Chlorides	ESP & CEC
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles					
13	S13	Soil	11/12	am	Jar	1	X	X	X	X	X
14	S14										
15	S15										
16	S16										
17	S17										
18	S18										
19	S19										
20	S20										
21	S21										
22	S22										
23	S23										
24	S24										

Environmental Division
Sydney
Work Order
ES0918937

Telephone : +61-2-8784 8555

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name:	Date: 11/12/19	Name:	Date: 11/12/19	Con' Note No:
Of:	Time: 1115	Of:	Time: 1255	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

132761

ALS Laboratory Group

CLIENT: SMEC Testing Services P/L
ADDRESS / OFFICE: PO Box 6989 Wellwill P/K
PROJECT MANAGER (PM): L. Thrall
PROJECT ID: 17468/ 7486B
SITE: Prestons
P.O. NO.: 7874
RESULTS REQUIRED (Date): 17/12/19
QUOTE NO.:

SAMPLER:
MOBILE:
PHONE
EMAIL REPORT TO:
EMAIL INVOICE TO: (if different to report)

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE 18.6
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected".
Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		Electrical Conductivity
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	
25	S25	Soil	11/12	ow	Jr	1	x
26	S26	↓	↓	↓	↓	↓	↓
27	S27						
28	S28						
29	S29						
30	S30	↓	↓	↓	↓	↓	↓

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: J Ayl	Date: 11/12/19	Name: Sophie	Date: 11/12/19	Con' Note No:
Of:	Time: 17:50	Of: ALS	Time: 13:55	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

APPENDIX C

QA/QC CALCULATIONS

RELATIVE PERCENTAGE DIFFERENCE(RPD)=((SAMPLEA-SAMPLEB)/((SAMPLEA+SAMPLEB/2))X100

Sample ID	EC
S10	171
S28	166
PRD	3

Sample ID	EC
S20	47
S29	39
PRD	19

Sample ID	EC
S27	164
S30	110
PRD	39