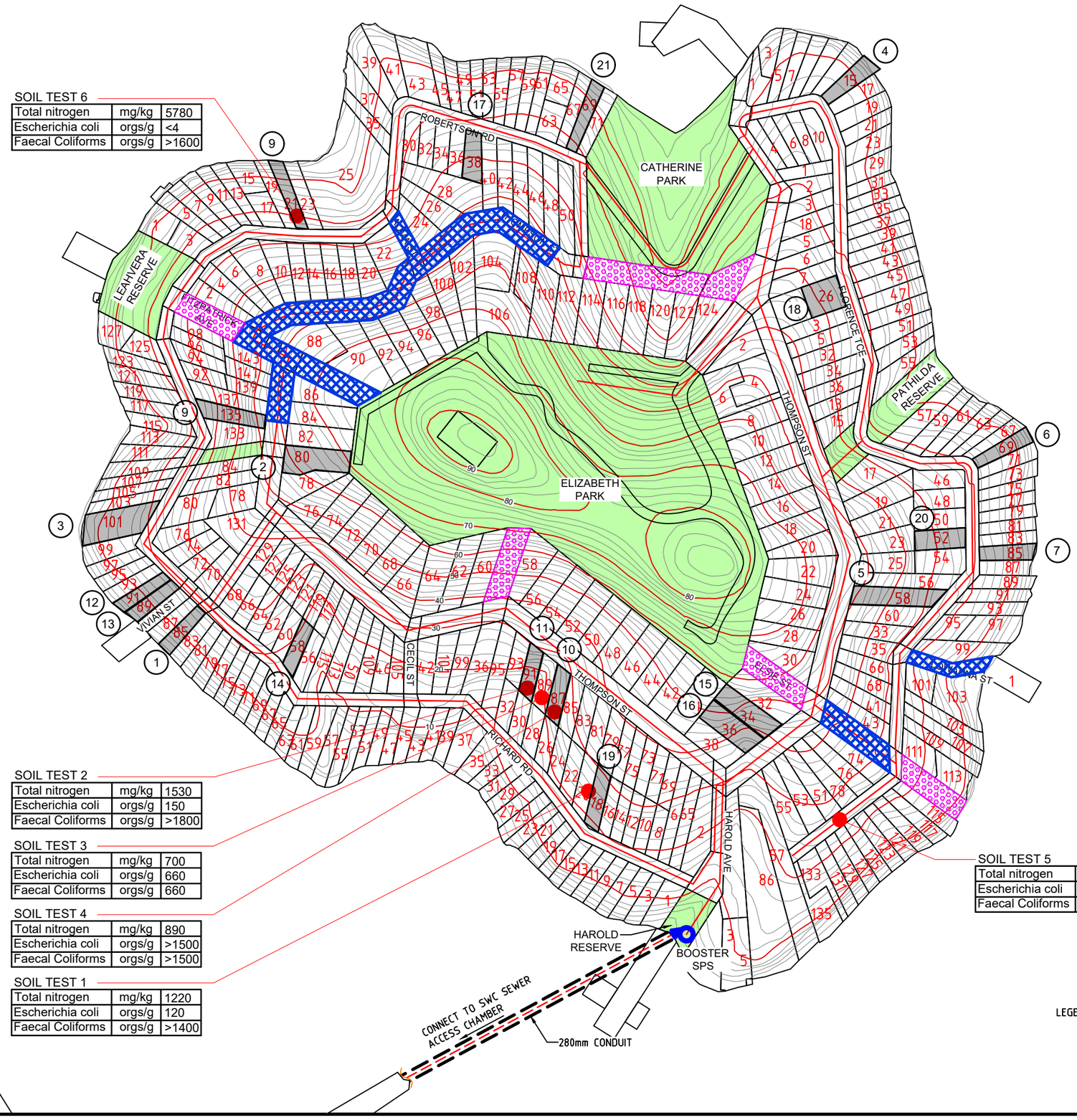

SOIL TEST 6

Total nitrogen	mg/kg	5780
Escherichia coli	orgs/g	<4
Faecal Coliforms	orgs/g	>1600

SOIL TEST 2

Total nitrogen	mg/kg	1530
Escherichia coli	orgs/g	150
Faecal Coliforms	orgs/g	>1800

SOIL TEST 3

Total nitrogen	mg/kg	700
Escherichia coli	orgs/g	660
Faecal Coliforms	orgs/g	660

SOIL TEST 4

Total nitrogen	mg/kg	890
Escherichia coli	orgs/g	>1500
Faecal Coliforms	orgs/g	>1500

SOIL TEST 1

Total nitrogen	mg/kg	1220
Escherichia coli	orgs/g	120
Faecal Coliforms	orgs/g	>1400

SOIL TEST 5

Total nitrogen	mg/kg	5700
Escherichia coli	orgs/g	12
Faecal Coliforms	orgs/g	>1600

LEGEND:
- PROPOSED PRESSURE SEWER MAIN
- ROAD RESERVE WITHOUT CARRIAGEWAY OR FOOTPATH
- ROAD RESERVE WITH FOOTPATH ONLY

Date: 12/02/2019

Drawing No: SK05

Rev: A

Scale: 0 20 40 60 80 100m SCALE 1:2000 AT A1

SCOTLAND ISLAND
SOIL TEST LOCATIONS AND RESULTS

Pressure System Solutions Pty Ltd
PLANNING, DESIGN & IMPLEMENTATION OF WATER & WASTEWATER SYSTEMS
Our Understanding and Experience Provides Certainty
PO Box 630 Jannali NSW 2226
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E: admin@pssolutions.net.au
PS Solutions

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1905204**	Page	: 1 of 4
Client	: **Pressure System Solutions P/L**	Laboratory	: Environmental Division Sydney
Contact	: Steve Wallace	Contact	: Customer Services ES
Address	: Unit 1 / 47 - 51 Lorraine Street Peakhurst 2210	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Scotland Island	Date Samples Received	: 19-Feb-2019 16:40
Order number	:	Date Analysis Commenced	: 20-Feb-2019
C-O-C number	: ----	Issue Date	: 28-Feb-2019 14:18
Sampler	: Steve Wallace		
Site	: ----		
Quote number	: ----		
No. of samples received	: 6		
No. of samples analysed	: 6		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	WRG Subcontracting, Smithfield, NSW

General Comments

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

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

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

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

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

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK061G: Matrix spike failed recovery for TKN due to sample heterogeneity. Confirmed by re-digestion and re-analysis.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID	Soil Sample 1 - 18 Richard Received as 1	Soil Sample 2 - 91 Thompson Received as 2	Soil Sample 3 - 89 Thompson Received as 3	Soil Sample 4 - 87 Thompson Received as 4	Soil Sample 5 - Florence Terrace Street Received as 5
				Client sampling date / time	18-Feb-2019 14:30	18-Feb-2019 14:30	18-Feb-2019 14:30	18-Feb-2019 14:30	18-Feb-2019 14:30
					ES1905204-001	ES1905204-002	ES1905204-003	ES1905204-004	ES1905204-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		6.8	7.0	6.4	6.1	4.7
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		83	83	92	54	641
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		19.4	37.6	34.3	26.6	33.3
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		2.7	4.2	2.4	2.5	----
Exchangeable Magnesium	----	0.1	meq/100g		1.4	1.4	1.0	1.2	----
Exchangeable Potassium	----	0.1	meq/100g		0.3	0.2	0.3	0.3	----
Exchangeable Sodium	----	0.1	meq/100g		0.3	0.3	0.4	0.5	----
Cation Exchange Capacity	----	0.1	meq/100g		4.7	6.2	4.1	4.5	----
Exchangeable Sodium Percent	----	0.1	%		7.0	5.6	9.8	10.2	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	----	5.5
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	----	2.0
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	----	0.6
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	----	0.2
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	8.2
Exchangeable Sodium Percent	----	0.1	%		----	----	----	----	2.0
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		3.7	12.2	2.7	2.1	435
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg		1220	1520	700	890	5700
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg		1220	1530	700	890	6140
EK074: Fluoride Extractable Phosphorus (Bray)									
Fluoride Extractable P (Bray)	----	1.0	mg/kg		1.3	70.5	70.4	115	33.3
MM804: E.coli and Thermotolerant Coliforms by MPN									
Escherichia coli	----	2	orgs/g		120	150	660	>1500	13
Faecal Coliforms	----	2	orgs/g		>1400	>1800	660	>1500	>1600

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	Soil Sample 6 - 21 Robertson Received as 6	----	----	----	----
			Client sampling date / time	18-Feb-2019 14:30	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1905204-006	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**5.0**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**200**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**38.8**	----	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**7.1**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**2.3**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	**0.5**	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.6**	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**10.5**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**6.2**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	**126**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	**5650**	----	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)								
^ **Total Nitrogen as N**	----	20	mg/kg	**5780**	----	----	----	----
EK074: Fluoride Extractable Phosphorus (Bray)								
Fluoride Extractable P (Bray)	----	1.0	mg/kg	**44.2**	----	----	----	----
MM804: E.coli and Thermotolerant Coliforms by MPN								
Escherichia coli	----	2	orgs/g	<4	----	----	----	----
Faecal Coliforms	----	2	orgs/g	**>1600**	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1905204**	Page	: 1 of 5
Client	: **Pressure System Solutions P/L**	Laboratory	: Environmental Division Sydney
Contact	: Steve Wallace	Contact	: Customer Services ES
Address	: Unit 1 / 47 - 51 Lorraine Street Peakhurst 2210	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Scotland Island	Date Samples Received	: 19-Feb-2019
Order number	:	Date Analysis Commenced	: 20-Feb-2019
C-O-C number	: ----	Issue Date	: 28-Feb-2019
Sampler	: Steve Wallace		
Site	: ----		
Quote number	: ----		
No. of samples received	: 6		
No. of samples analysed	: 6		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	WRG Subcontracting, Smithfield, NSW

General Comments

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

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

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

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 1:5 (Soils) (QC Lot: 2196408)									
ES1905204-001	Soil Sample 1 - 18 Richard Received as 1	EA002: pH Value	----	0.1	pH Unit	6.8	6.8	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 2196407)									
ES1905204-001	Soil Sample 1 - 18 Richard Received as 1	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	83	84	1.56	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2196590)									
ES1905204-004	Soil Sample 4 - 87 Thompson Received as 4	EA055: Moisture Content	----	0.1	%	26.6	28.5	7.10	0% - 20%
ES1905241-001	Anonymous	EA055: Moisture Content	----	0.1	%	12.1	13.8	13.5	0% - 20%
ED007: Exchangeable Cations (QC Lot: 2200636)									
ES1905204-001	Soil Sample 1 - 18 Richard Received as 1	ED007: Exchangeable Sodium Percent	----	0.1	%	7.0	7.1	1.90	0% - 20%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	2.7	2.5	4.80	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	1.4	1.4	0.00	0% - 50%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.3	0.3	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.3	0.3	0.00	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	4.7	4.5	4.31	0% - 20%
ED008: Exchangeable Cations (QC Lot: 2200639)									
ES1905204-005	Soil Sample 5 - Florence Terrace Street Received as 5	ED008: Exchangeable Sodium Percent	----	0.1	%	2.0	2.0	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	5.5	5.5	0.00	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	2.0	2.0	0.00	0% - 20%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.6	0.6	0.00	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 (%)*
ED008: Exchangeable Cations (QC Lot: 2200639) - continued									
ES1905204-005	Soil Sample 5 - Florence Terrace Street Received as 5	ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	0% - 20%
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	8.2	8.2	0.00	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2196409)									
ES1905204-001	Soil Sample 1 - 18 Richard Received as 1	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	3.7	3.6	4.59	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2202148)									
ES1905204-001	Soil Sample 1 - 18 Richard Received as 1	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	1220	1030	16.4	0% - 20%
ES1905252-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	2420	2260	6.84	0% - 20%
EK074: Fluoride Extractable Phosphorus (Bray) (QC Lot: 2197486)									
ES1905204-001	Soil Sample 1 - 18 Richard Received as 1	EK074: Fluoride Extractable P (Bray)	----	1	mg/kg	1.3	1.1	14.4	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 Spike (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 (1:5) (QCLot: 2196407)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	96.1	92	108
ED007: Exchangeable Cations (QCLot: 2200636)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	100	76	120
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	97.0	75	115
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	104	80	120
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	102	80	120
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Exchangeable Cations (QCLot: 2200639)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	99.0	82	128
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	94.0	82	120
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	108	70	140
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	98.8	78	136
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2196409)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	2.5 mg/kg	97.6	88	118
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2202148)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	85.1	72	106
				<20	100 mg/kg	98.7	70	122
				<20	500 mg/kg	107	74	118
EK074: Fluoride Extractable Phosphorus (Bray) (QCLot: 2197486)								
EK074: Fluoride Extractable P (Bray)	----	1	mg/kg	<1.0	3.5 mg/kg	105	88	118

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	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2196409)							
ES1905204-001	Soil Sample 1 - 18 Richard Received as 1	EK059G: Nitrite + Nitrate as N (Sol.)	----	2.5 mg/kg	89.2	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2202148)							
ES1905204-001	Soil Sample 1 - 18 Richard Received as 1	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	# 145	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1905204**	Page	: 1 of 5
Client	: **Pressure System Solutions P/L**	Laboratory	: Environmental Division Sydney
Contact	: Steve Wallace	Telephone	: +61-2-8784 8555
Project	: Scotland Island	Date Samples Received	: 19-Feb-2019
Site	: ----	Issue Date	: 28-Feb-2019
Sampler	: Steve Wallace	No. of samples received	: 6
Order number	:	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	ES1905204--001	Soil Sample 1 - 18 Richard Rec	**Total Kjeldahl Nitrogen as N**	----	145 %	70-130%	**Recovery greater than upper data quality objective**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

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

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

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

Matrix: **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 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
Soil Sample 1 - 18 Richard - Received as 1, Soil Sample 2 - 91 Thompson - Received as 2, Soil Sample 3 - 89 Thompson - Received as 3, Soil Sample 4 - 87 Thompson - Received as 4, Soil Sample 5 - Florence Terrace Street - Received as 5, Soil Sample 6 - 21 Robertson - Received as 6	**18-Feb-2019**	**21-Feb-2019**	25-Feb-2019	✓	**21-Feb-2019**	21-Feb-2019	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
Soil Sample 1 - 18 Richard - Received as 1, Soil Sample 2 - 91 Thompson - Received as 2, Soil Sample 3 - 89 Thompson - Received as 3, Soil Sample 4 - 87 Thompson - Received as 4, Soil Sample 5 - Florence Terrace Street - Received as 5, Soil Sample 6 - 21 Robertson - Received as 6	**18-Feb-2019**	**21-Feb-2019**	25-Feb-2019	✓	**21-Feb-2019**	21-Mar-2019	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
Soil Sample 1 - 18 Richard - Received as 1, Soil Sample 2 - 91 Thompson - Received as 2, Soil Sample 3 - 89 Thompson - Received as 3, Soil Sample 4 - 87 Thompson - Received as 4, Soil Sample 5 - Florence Terrace Street - Received as 5, Soil Sample 6 - 21 Robertson - Received as 6	**18-Feb-2019**	**----**	----	----	**20-Feb-2019**	04-Mar-2019	✓
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007)							
Soil Sample 1 - 18 Richard - Received as 1, Soil Sample 2 - 91 Thompson - Received as 2, Soil Sample 3 - 89 Thompson - Received as 3, Soil Sample 4 - 87 Thompson - Received as 4, Soil Sample 6 - 21 Robertson - Received as 6	**18-Feb-2019**	**22-Feb-2019**	18-Mar-2019	✓	**22-Feb-2019**	18-Mar-2019	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
Soil Sample 5 - Florence Terrace Street - Received as 5	**18-Feb-2019**	**22-Feb-2019**	18-Mar-2019	✓	**22-Feb-2019**	18-Mar-2019	✓

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
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Soil Glass Jar - Unpreserved (EK059G)							
Soil Sample 1 - 18 Richard - Received as 1, Soil Sample 2 - 91 Thompson - Received as 2, Soil Sample 3 - 89 Thompson - Received as 3, Soil Sample 4 - 87 Thompson - Received as 4, Soil Sample 5 - Florence Terrace Street - Received as 5, Soil Sample 6 - 21 Robertson - Received as 6	**18-Feb-2019**	**21-Feb-2019**	17-Aug-2019	✓	**21-Feb-2019**	17-Aug-2019	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Soil Glass Jar - Unpreserved (EK061G)							
Soil Sample 1 - 18 Richard - Received as 1, Soil Sample 2 - 91 Thompson - Received as 2, Soil Sample 3 - 89 Thompson - Received as 3, Soil Sample 4 - 87 Thompson - Received as 4, Soil Sample 5 - Florence Terrace Street - Received as 5, Soil Sample 6 - 21 Robertson - Received as 6	**18-Feb-2019**	**24-Feb-2019**	17-Aug-2019	✓	**25-Feb-2019**	17-Aug-2019	✓
EK074: Fluoride Extractable Phosphorus (Bray)							
Soil Glass Jar - Unpreserved (EK074)							
Soil Sample 1 - 18 Richard - Received as 1, Soil Sample 2 - 91 Thompson - Received as 2, Soil Sample 3 - 89 Thompson - Received as 3, Soil Sample 4 - 87 Thompson - Received as 4, Soil Sample 5 - Florence Terrace Street - Received as 5, Soil Sample 6 - 21 Robertson - Received as 6	**18-Feb-2019**	**27-Feb-2019**	17-Aug-2019	✓	**27-Feb-2019**	17-Aug-2019	✓
MM804: E.coli and Thermotolerant Coliforms by MPN							
Sterile Plastic Bottle - Sodium Thiosulfate (MM804)							
Soil Sample 1 - 18 Richard - Received as 1, Soil Sample 2 - 91 Thompson - Received as 2, Soil Sample 3 - 89 Thompson - Received as 3, Soil Sample 4 - 87 Thompson - Received as 4, Soil Sample 5 - Florence Terrace Street - Received as 5, Soil Sample 6 - 21 Robertson - Received as 6	**18-Feb-2019**	**----**	----	----	**21-Feb-2019**	22-Feb-2019	✓

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(were) 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)							
Electrical Conductivity (1:5)	EA010	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride extractable Phosphorus (Bray)	EK074	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	18	**11.11**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride extractable Phosphorus (Bray)	EK074	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	3	18	**16.67**	**14.29**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride extractable Phosphorus (Bray)	EK074	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	18	**5.56**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	18	**5.56**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard

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	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. 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 (2013) Schedule B(3) (Method 301)
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Higginson (2011) 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 (2013) Schedule B(3) (Method 301)
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	SOIL	In house: Thermo Scientific Method D08727 and NEMI (National Environmental Method Index) Method ID: 9171. This method covers the determination of total oxidised nitrogen (NOx-N) and nitrate (NO3-N) by calculation, Combined oxidised Nitrogen (NO2+NO3) in a water extract is determined by direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	In house: Referenced to APHA 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NOx) By Discrete Analyser	EK062G	SOIL	In house: Referenced to APHA 4500 Norg/NO3- Total Nitrogen is determined as the sum of TKN and Oxidised Nitrrogen, each determined seperately as N.
Fluoride extractable Phosphorus (Bray)	EK074	SOIL	In house: Referenced to Rayment & Higginson (2011) Method 9E1. Phosphorus is extracted from the soil using NH4F and determined by discrete analyzer.
E.coli and Thermotolerant Coliforms by MPN	MM804	SOIL	Microbiological analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to 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.
TKN/TP Digestion	EK061/EK067	SOIL	In house: Referenced to APHA 4500 Norg- D; APHA 4500 P - H. Macro Kjeldahl digestion.
Fluoride extractible Phosphorus (Bray)	EK074PR	SOIL	In house: Referenced to Rayment et al 9E1. Phosphorus is extracted from the soil using NH4F at a ratio of 7.14g: 50 ml for 1 minute. Phosphorus in the extract is determined by FIA.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade 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.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford Ph:07 3243 7222 E:samples.brisbane
☐ **Townsville**: 14-15 Desma Ct, Bo Ph:07 4796 0600 E: townsville.environn

CLIENT:	Pressure System Solutions P/L	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): Results required by ☐ Non Standard or urgent TAT (List due date):
OFFICE:	Unit 1 / 47 - 51 Lorraine Street, Peakhurst		
PROJECT:	Scotland Island	ALS QUOTE NO.:	
ORDER NUMBER:			
PROJECT MANAGER:	Steve Wallace	CONTACT PH: 0403 823 013	
SAMPLER:	Steve Wallace	SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to (will default to PM if no other addresses are listed): swallace@pssolutions.net.au			
Email Invoice to (will default to PM if no other addresses are listed):			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Steve Wallace	Scott Hopkins		
DATE/TIME: 18/02/19 2:30pm	DATE/TIME: 19/2/19 1640	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	MM804	pH and EC (1997 soil tests indicate soils are very acidic)	Sodicity (sodic soils aren't suitable for application of effluent)	Nitrogen (NO3-N)	Phosporus (Bray-P)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	Soil Sample 1 - 18 Richard	18/02/19 2:30pm		received as HT "1"	1	x	x	x	x	x				
2	Soil Sample 2 - 91 Thompson	18/02/19 2:30pm		"2"	1	x	x	x	x	x				
3	Soil Sample 3 - 89 Thompson	18/02/19 2:30pm		"3"	1	x	x	x	x	x				
4	Soil Sample 4 - 87 Thompson	18/02/19 2:30pm		"4"	1	x	x	x	x	x				
5	Soil Sample 5 - Florence Terrace Street	18/02/19 2:30pm		"5"	1	x	x	x	x	x				
6	Soil Sample 6 - 21 Robertson	18/02/19 2:30pm		"6"	1	x	x	x	x	x				
	Total N as per Steve. 20-2-19													
	Sodicity = CEC													
	MM804 = both Faecal + Ecoli													
				TOTAL										

Environmental Division Sydney
Work Order Reference
ES1905204

Telephone : + 61-2-8784 8555

Subcon / Forward Lab / Split WO
Lab / Analysis: [redacted] Tuesday (MM804)
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No: ES1905204
Attached By PO / Internal Sheet:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial 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.