



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID					
			Sampling date / time					
Compound	CAS Number	LOR	Unit	MW-1	MW-2	MW-3	MW-4	
				12-Jun-2023 11:30	12-Jun-2023 00:15	12-Jun-2023 13:45	12-Jun-2023 14:00	
				EB2317736-001	EB2317736-002	EB2317736-003	EB2317736-004	
				Result	Result	Result	Result	
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.30	6.97	7.00	5.90	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	30.2	5.31	29.9	22.9	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	30100	3600	20400	29300	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	19600	2340	13300	19000	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	7390	1130	2420	5610	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	149	462	540	142	----
Total Alkalinity as CaCO3	----	1	mg/L	149	462	540	142	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5900	891	131	7010	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	9210	429	5900	6130	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	700	248	228	612	----
Magnesium	7439-95-4	1	mg/L	1370	124	449	991	----
Sodium	7440-23-5	1	mg/L	5970	410	3380	3940	----
Potassium	7440-09-7	1	mg/L	13	15	72	69	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.3	0.6	0.2	0.3	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.02	4.95	0.22	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	0.04	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.84	0.03	0.02	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.84	0.03	0.02	0.03	----



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Sample ID		MW-1		MW-2		MW-3		MW-4	
Compound	CAS Number	Sampling date / time	Unit	Result	Result	Result	Result	Result	Result	Result	Result
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser											
Total Kjeldahl Nitrogen as N	---	0.1	mg/L	<0.5	0.2	13.6	6.3	---	---	---	---
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser											
^ Total Nitrogen as N	---	0.1	mg/L	0.8	0.2	13.6	6.3	---	---	---	---
EK067G: Total Phosphorus as P by Discrete Analyser											
Total Phosphorus as P	---	0.01	mg/L	0.26	0.37	2.68	0.16	---	---	---	---
EK071G: Reactive Phosphorus as P by discrete analyser											
Reactive Phosphorus as P	14285-44-2	0.01	mg/L	0.22	0.16	0.21	<0.01	---	---	---	---
EN055: Ionic Balance											
ø Total Anions	---	0.01	meq/L	386	39.9	180	322	---	---	---	---
ø Total Cations	---	0.01	meq/L	408	40.8	197	285	---	---	---	---
ø Ionic Balance	---	0.01	%	2.78	1.13	4.57	6.01	---	---	---	---



QUALITY CONTROL REPORT

Work Order	: EB2317736	Page	: 1 of 7
Client	: BRISBANE CITY COUNCIL	Laboratory	: Environmental Division Brisbane
Contact	: [REDACTED]	Contact	: Carsten Enrich
Address	: [REDACTED]	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: [REDACTED]	Telephone	: +61 7 3552 8616
Project	: Sherwood Arboretum & Secret Forest	Date Samples Received	: 13-Jun-2023
Order number	: 4400529397	Date Analysis Commenced	: 13-Jun-2023
C-O-C number	: [REDACTED]		
	: [REDACTED]		
Quote number	: [REDACTED] Sherwood Arboretum & Secret Forest		
No. of samples received	: EB23BRICIT0002		
No. of samples analysed	: 4		
	: 4		



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, unless the sampling was conducted by ALS. 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
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



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Work Order : EB2317736
Client : BRISBANE CITY COUNCIL
Project : Sherwood Arboretum & Secret Forest

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

Key :

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 5108381)									
EB2317493-001	Anonymous	EA005-P: pH Value	-----	0.01	pH Unit	7.75	7.77	0.3	0% - 20%
EB2317695-001	Anonymous	EA005-P: pH Value	-----	0.01	pH Unit	7.05	7.08	0.4	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 5110835)									
EB2317776-002	Anonymous	EA005-P: pH Value	-----	0.01	pH Unit	9.09	9.04	0.6	0% - 20%
EB2317651-001	Anonymous	EA005-P: pH Value	-----	0.01	pH Unit	7.49	7.53	0.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 5108383)									
EB2317493-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	-----	1	µS/cm	783	813	3.8	0% - 20%
EB2317695-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	-----	1	µS/cm	2060	2150	4.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 5110836)									
EB2317651-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	-----	1	µS/cm	269	270	0.4	0% - 20%
EB2317728-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	-----	1	µS/cm	318	316	0.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 5108385)									
EB2317493-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	202	203	0.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	-----	1	mg/L	202	203	0.7	0% - 20%
		ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
EB2317695-001	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	496	498	0.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	-----	1	mg/L	496	498	0.5	0% - 20%
		ED037P: Alkalinity by PC Titrator (QC Lot: 5110834)							
EB2317651-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit

Sub-Matrix: WATER		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5110834) - continued									
EB2317651-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	36	40	8.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	36	40	8.0	0% - 20%
EB2317728-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	27	# 22	21.1	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	42	43	3.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	69	65	5.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5108761)									
EB2317648-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	290	296	2.1	0% - 20%
EB2317741-008	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	845	839	0.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5111687)									
EB2317736-001	MW-1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5900	5850	0.8	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5108758)									
EB2317648-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
EB2317741-008	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	7950	8020	0.9	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5111690)									
EB2317736-001	MW-1	ED045G: Chloride	16887-00-6	1	mg/L	9210	9330	1.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5108968)									
EB2317485-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	317	314	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	961	948	1.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8040	8080	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	289	291	1.0	0% - 20%
EB2317539-023	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	61	62	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	34	34	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	174	176	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 5108969)									
EB2317660-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	27	26	4.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	12	11	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	46	45	2.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EB2317847-013	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	11	10	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	29	28	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 5108387)									
EB2317493-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EB2317695-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 5110833)									



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Work Order : EB2317736
Client : BRISBANE CITY COUNCIL
Project : Sherwood Arboretum & Secret Forest

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method/Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK040P: Fluoride by PC Titrator (QC Lot: 5110833) - continued									
EB2317776-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	2.9	2.8	0.0	0% - 50%
EB2317728-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.8	0.7	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5115874)									
EB2317736-001	MW-1	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.06	51.9	No Limit
EB2317741-007	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.17	0.15	14.0	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 5108764)									
EB2317648-007	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2317741-008	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 5111689)									
EB2317736-001	MW-1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5115875)									
EB2317736-001	MW-1	EK059G: Nitrite + Nitrate as N	-----	0.01	mg/L	0.84	0.84	0.0	0% - 20%
EB2317741-007	Anonymous	EK059G: Nitrite + Nitrate as N	-----	0.01	mg/L	0.01	<0.01	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5108371)									
ET2303013-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	-----	0.1	mg/L	1.8	1.7	0.0	0% - 50%
ET2303013-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	-----	0.1	mg/L	6.8	7.3	7.4	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5108370)									
EB2317615-001	Anonymous	EK067G: Total Phosphorus as P	-----	0.01	mg/L	0.12	0.14	12.3	No Limit
ET2303013-001	Anonymous	EK067G: Total Phosphorus as P	-----	0.01	mg/L	1.36	1.36	0.7	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 5108767)									
EB2317648-007	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.04	0.04	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 5111688)									
EB2317736-001	MW-1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.22	0.22	0.0	0% - 20%



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

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Control Spike (LCS) Report							
Method/Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)		
				Result			LCS		Low	High	
EA005P: pH by PC Titrator (QCLot: 5108381)											
EA005-P: pH Value	----	----	pH Unit	----		4 pH Unit	100		98.0	102	
				----		7 pH Unit	99.6		98.0	102	
EA005P: pH by PC Titrator (QCLot: 5110835)											
EA005-P: pH Value	----	----	pH Unit	----		4 pH Unit	100		98.0	102	
				----		7 pH Unit	100		98.0	102	
EA010P: Conductivity by PC Titrator (QCLot: 5108383)											
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1		4000 µS/cm	99.2		90.0	106	
				<1		12890 µS/cm	101		90.0	106	
EA010P: Conductivity by PC Titrator (QCLot: 5110836)											
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1		220 µS/cm	101		90.0	106	
				<1		12890 µS/cm	101		90.0	106	
ED037P: Alkalinity by PC Titrator (QCLot: 5108385)											
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----		200 mg/L	94.8		80.0	120	
ED037P: Alkalinity by PC Titrator (QCLot: 5110834)											
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----		200 mg/L	109		80.0	120	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5108761)											
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1		25 mg/L	102		85.0	118	
				<1		100 mg/L	90.6		85.0	118	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5111687)											
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1		25 mg/L	95.1		85.0	118	
				<1		100 mg/L	89.9		85.0	118	
ED045G: Chloride by Discrete Analyser (QCLot: 5108758)											
ED045G: Chloride	16887-00-6	1	mg/L	<1		10 mg/L	108		90.0	115	
				<1		1000 mg/L	92.1		90.0	115	
ED045G: Chloride by Discrete Analyser (QCLot: 5111690)											
ED045G: Chloride	16887-00-6	1	mg/L	<1		10 mg/L	111		90.0	115	
				<1		1000 mg/L	109		90.0	115	
ED093F: Dissolved Major Cations (QCLot: 5108968)											
ED093F: Calcium	7440-70-2	1	mg/L	<1		50 mg/L	108		70.0	130	
ED093F: Magnesium	7439-95-4	1	mg/L	<1		50 mg/L	100		70.0	130	
ED093F: Sodium	7440-23-5	1	mg/L	<1		50 mg/L	101		70.0	130	



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Work Order : EB2317736
Client : BRISBANE CITY COUNCIL
Project : Sherwood Arboretum & Secret Forest

Sub-Matrix: WATER				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	Low	High
ED093F: Dissolved Major Cations (QCLot: 5108968) - continued									
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.7	70.0	70.0	130
ED093F: Dissolved Major Cations (QCLot: 5108969)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	107	70.0	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.7	70.0	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.9	70.0	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.0	70.0	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 5108387)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	100	80.0	80.0	117
EK040P: Fluoride by PC Titrator (QCLot: 5110833)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	96.0	80.0	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5115874)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	92.4	83.5	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5108764)									
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	91.7	90.0	90.0	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5111689)									
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	93.4	90.0	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5115875)									
EK059G: Nitrite + Nitrate as N	---	0.01	mg/L	<0.01	0.5 mg/L	93.4	85.7	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5108371)									
EK061G: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	<0.1	1 mg/L	89.9	70.1	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5108370)									
EK067G: Total Phosphorus as P	---	0.01	mg/L	<0.01	4.42 mg/L	87.6	84.7	84.7	106
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5108767)									
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	93.1	81.7	81.7	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5111688)									
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	90.3	81.7	81.7	117

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 (DOOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER

Laboratory sample ID			Sample ID		Method: Compound			Matrix Spike (MS) Report			
Laboratory sample ID			Sample ID		Method: Compound			Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	Low High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5108761)											



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Work Order : EB2317736
Client : BRISBANE CITY COUNCIL
Project : Sherwood Arboretum & Secret Forest

Sub-Matrix: WATER

Sub-Matrix: WATER				Matrix Spike (MS) Report			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5108761) - continued							
EB2317648-008	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5111687)							
EB2317901-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	80.6	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 5108758)							
EB2317648-008	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	98.4	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 5111690)							
EB2317901-001	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 5108387)							
EB2317462-011	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	93.9	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 5110833)							
EB2316827-003	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	125	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5115874)							
EB2317736-002	MW-2	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	102	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5108764)							
EB2317648-008	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	96.3	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5111689)							
EB2317901-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	109	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5115875)							
EB2317736-002	MW-2	EK059G: Nitrite + Nitrate as N	---	0.4 mg/L	94.2	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5108371)							
EB2317615-010	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	---	5 mg/L	97.5	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5108370)							
EB2317615-002	Anonymous	EK067G: Total Phosphorus as P	---	5 mg/L	91.5	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5108767)							
EB2317648-008	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	98.1	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5111688)							
EB2317901-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	77.3	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2317736	Page	: 1 of 8
Client	: BRISBANE CITY C	Telephone	: +61 7 3552 8616
Project	: Sherwood Arboretum & Secret Forest	Date Samples Received	: 13-Jun-2023
Site	: Sherwood Arboretum & Secret Forest	Issue Date	: 19-Jun-2023
Sampler	: 4400529397	No. of samples analysed	: 4

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 Laboratory Control outliers occur.
- Duplicate outliers exist - please see following pages for full details.
- 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

- Analysis Holding Time Outliers exist - please see following pages for full details.

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: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
ED037P: Alkalinity by PC Titrator	EB2317728-001	Anonymous	Carbonate Alkalinity as CaCO ₃	3812-32-6	21.1 %	0% - 20%	RPD exceeds LOR based limits
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EB2317648-008	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EB2317901-001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: WATER

Method	Extraction / Preparation			Analysis	
	Date extracted	Due for extraction	Days overdue	Date analysed	Days overdue
EA005P: pH by PC Titrator					
Clear Plastic Bottle - Natural					
MW-1, MW-3,					
MW-2, MW-4				14-Jun-2023	12-Jun-2023
					2

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: WATER

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

Method		Sample Date	Extraction / Preparation		Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Date analysed	Due for analysis
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural (EA005-P)						
MW-1,						
MW-3,						
MW-2,		12-Jun-2023			14-Jun-2023	12-Jun-2023
MW-4						✖
EA006: Sodium Adsorption Ratio (SAR)						
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)						
MW-1,		12-Jun-2023			15-Jun-2023	10-Jul-2023
MW-3,						
MW-2,						✔
MW-4						



Matrix: WATER									
Method		Sample Date	Extraction / Preparation			Analysis			Evaluation
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis		
EA010P: Conductivity by PC Titrator									
Clear Plastic Bottle - Natural (EA010-P)		MW-2, MW-3, MW-4	12-Jun-2023	---	----	---	14-Jun-2023	10-Jul-2023	✓
EA065: Total Hardness as CaCO3									
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		MW-2, MW-3, MW-4	12-Jun-2023	---	----	---	15-Jun-2023	10-Jul-2023	✓
ED037P: Alkalinity by PC Titrator									
Clear Plastic Bottle - Natural (ED037-P)		MW-2, MW-3, MW-4	12-Jun-2023	---	----	---	14-Jun-2023	26-Jun-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Clear Plastic Bottle - Natural (ED041G)		MW-2, MW-3, MW-4	12-Jun-2023	---	----	---	13-Jun-2023	10-Jul-2023	✓
Clear Plastic Bottle - Natural (ED041G)		MW-1	12-Jun-2023	---	----	---	14-Jun-2023	10-Jul-2023	✓
ED045G: Chloride by Discrete Analyser									
Clear Plastic Bottle - Natural (ED045G)		MW-2, MW-3, MW-4	12-Jun-2023	---	----	---	13-Jun-2023	10-Jul-2023	✓
Clear Plastic Bottle - Natural (ED045G)		MW-1	12-Jun-2023	---	----	---	14-Jun-2023	10-Jul-2023	✓
ED093F: Dissolved Major Cations									
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		MW-1, MW-3, MW-4	12-Jun-2023	---	----	---	15-Jun-2023	10-Jul-2023	✓
EK040P: Fluoride by PC Titrator									
Clear Plastic Bottle - Natural (EK040P)		MW-2, MW-3, MW-4	12-Jun-2023	---	----	---	14-Jun-2023	10-Jul-2023	✓
EK055G: Ammonia as N by Discrete Analyser									
Clear Plastic Bottle - Sulfuric Acid (EK055G)		MW-1, MW-3, MW-4	12-Jun-2023	---	----	---	16-Jun-2023	10-Jul-2023	✓
EK057G: Nitrite as N by Discrete Analyser									
Clear Plastic Bottle - Natural (EK057G)		MW-2, MW-3, MW-4	12-Jun-2023	---	----	---	13-Jun-2023	14-Jun-2023	✓
Clear Plastic Bottle - Natural (EK057G)		MW-1	12-Jun-2023	---	----	---	14-Jun-2023	14-Jun-2023	✓



Matrix: WATER									
Method		Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Clear Plastic Bottle - Sulfuric Acid (EK059G)		MW-2, MW-4	---	----	---	16-Jun-2023	10-Jul-2023	✓	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Clear Plastic Bottle - Sulfuric Acid (EK061G)		MW-2, MW-4	13-Jun-2023	10-Jul-2023	✓	13-Jun-2023	10-Jul-2023	✓	
EK067G: Total Phosphorus as P by Discrete Analyser									
Clear Plastic Bottle - Sulfuric Acid (EK067G)		MW-2, MW-4	13-Jun-2023	10-Jul-2023	✓	13-Jun-2023	10-Jul-2023	✓	
EK071G: Reactive Phosphorus as P by discrete analyser									
Clear Plastic Bottle - Natural (EK071G)		MW-2, MW-4	---	----	---	13-Jun-2023	14-Jun-2023	✓	
Clear Plastic Bottle - Natural (EK071G)			MW-1	---	----	---	14-Jun-2023	14-Jun-2023	✓



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: WATER

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Method		Count		Rate (%)		Quality Control Specification	
Analytical Methods				QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)									
Alkalinity by Auto Titrator	ED037-P	4	32			12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20			10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	23			13.04	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	4	39			10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by Auto Titrator	EK040P	4	34			11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	38			10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20			10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	3	20			15.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	4	38			10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	7			28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	17			17.65	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	13			15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20			10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)									
Alkalinity by Auto Titrator	ED037-P	2	32			6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20			5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	23			17.39	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	4	39			10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by Auto Titrator	EK040P	2	34			5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	38			5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20			5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20			10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	4	38			10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	7			28.57	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	17			23.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	13			7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20			5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)									
Ammonia as N by Discrete analyser	EK055G	1	20			5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	23			8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	2	39			5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by Auto Titrator	EK040P	2	34			5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	38			5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20			5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20			10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	7			28.57	5.00	✓	NEPM 2013 B3 & ALS QC Standard



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

Quality Control Sample Type		Count			Rate (%)		Quality Control Specification	
Analytical Methods		Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued								
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2		17	11.76	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1		13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1		20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)								
Ammonia as N by Discrete analyser	EK055G	1		20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2		23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by Auto Titrator	EK040P	2		34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1		20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2		20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2		7	28.57	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2		17	11.76	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1		13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1		20	5.00	5.00	✓	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 by Auto Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by Auto Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM Schedule B(3)
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Fluoride by Auto Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G. Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ -B. Nitrite is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ -F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colorimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ -F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)



Analytical Methods		Method	Matrix	Method Descriptions
Total Nitrogen as N (TKN + Nox) By Discrete Analyser		EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser		EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser		EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA		* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Preparation Methods		Method	Matrix	Method Descriptions
TKN/TP Digestion		EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)

From: [REDACTED]
Sent: Thursday, 22 June 2023 7:33 AM
To: ALSEnviro Brisbane <ALSEnviro.Brisbane@alsglobal.com>
Cc: [REDACTED]
Subject: [EXTERNAL] - Re: Additional soil testing on samples for EB2317032

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Please include ED007, ED008 or ED006.

Many thanks,

[REDACTED]

Planning and Design | City Projects Office | **BRISBANE CITY COUNCIL**

[REDACTED]

Green Square South Tower, Level 1, 505 St Pauls Terrace, Fortitude Valley, Qld 4006

[REDACTED]



Environmental Division
Brisbane
Work Order Reference
EB2318839



Telephone : + 61-7-3243 7222



I acknowledge the Traditional Custodians of the land which is now known as Brisbane. I also pay my respects to Elders past, present and emerging, and the broader Aboriginal and Torres Strait Islander community of Brisbane.

SECURITY LABEL: OFFICIAL

SECURITY LABEL: OFFICIAL

[REDACTED]

[REDACTED]

Subject: Additional soil testing on samples for EB2317032

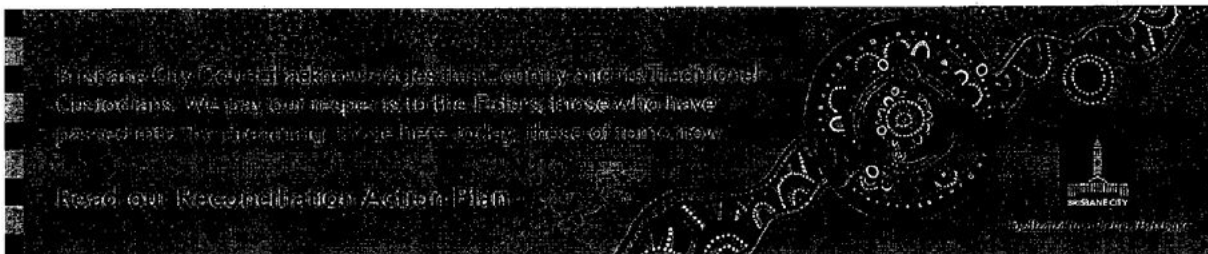
[REDACTED]

We would like to get an additional test on the recent soil samples that you received from us. The work order number for the soil samples is EB2317032. We would like to test for the Cation Exchange Capacity (CEC) for the same depth profiles as the original samples please.

Let me know if you have any questions.

Many thanks,

[REDACTED]



The contents of this email message and any attachments are intended only for the addressee and may be confidential, private or the subject of copyright. If you have received this email in error please notify Brisbane City Council, by replying to the sender or calling +61 7 3403 8888, and delete all copies of the e-mail and any attachments.

[REDACTED]

To: ALSEnviro Brisbane <ALSEnviro.Brisbane@alsglobal.com>

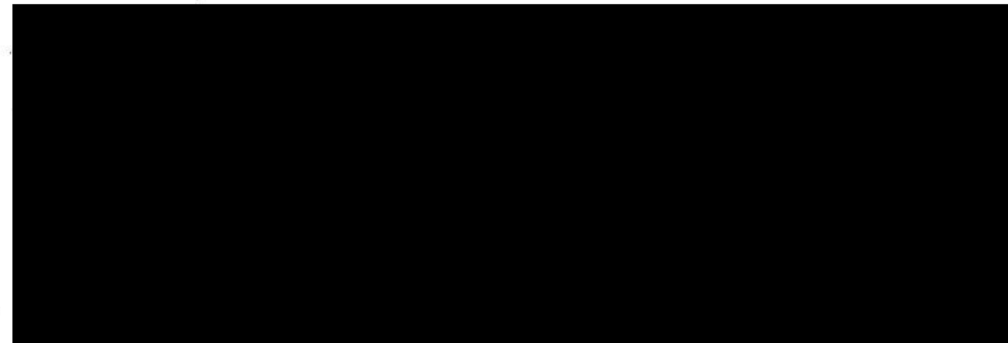
[REDACTED]

Subject: [EXTERNAL] - Re: Additional soil testing on samples for EB2317032

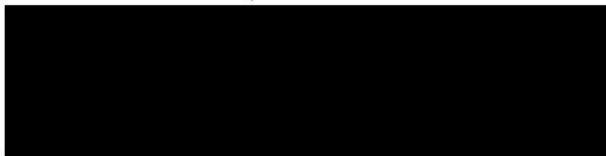
CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Please include ED007, ED008 or ED006.

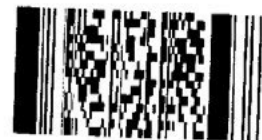
Many thanks,



Green Square South Tower, Level 1, 505 St Pauls Terrace, Fortitude Valley, Qld 4006



Environmental Division
Brisbane
Work Order Reference
EB2318839



Telephone : + 61-7-3243 7222



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SECURITY LABEL: OFFICIAL

SECURITY LABEL: OFFICIAL

[REDACTED]



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB2318839

Client : BRISBANE CITY COUNCIL

Address : [REDACTED]

E-mail : [REDACTED]

Project : GK15 - Sherwood Arboretum & Secret Forest

Order number : ----

C-O-C number : ----

Site : Sherwood Arboretum

Sampler : [REDACTED]

Laboratory : Environmental D [REDACTED]

Address : [REDACTED]

2 Byth Street Stafford QLD Australia 4053

Facsimile : [REDACTED]

Page : 1 of 3

Quote number : EB2023BRICIT0002

(EB23BRICIT0002)

QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 22-Jun-2023 07:33

Client Requested Due Date : 29-Jun-2023

Issue Date : 22-Jun-2023

Scheduled Reporting Date : 29-Jun-2023

Delivery Details

Mode of Delivery : Samples On Hand

No. of coolers/boxes : ----

Receipt Detail : RE-BATCH

Security Seal : Not Available

Temperature : ----

No. of samples received / analysed : 8 / 8

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- This workorder has been created to re-batch samples from EB2317032.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months $\pm$ 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

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

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 EB Only Agricultural Soil Suite 1 EB Only
EB2318839-001	06-Jun-2023 00:00	BH01_0.3-0.5	✓
EB2318839-002	06-Jun-2023 00:00	BH01_0.8-1	✓
EB2318839-003	06-Jun-2023 00:00	BH01_1.8-2	✓
EB2318839-004	06-Jun-2023 00:00	BH01_2.3-2.5	✓
EB2318839-005	06-Jun-2023 00:00	BH02_0.3-0.5	✓
EB2318839-006	06-Jun-2023 00:00	BH02_0.8-1	✓
EB2318839-007	06-Jun-2023 00:00	BH02_1.8-2	✓
EB2318839-008	06-Jun-2023 00:00	BH02_2.8-3	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **SOIL**

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

Method		Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
Client Sample ID(s)	Container						
EA002: pH (1:5)							
BH01_0.3-0.5	Soil Glass Jar - Unpreserved	13-Jun-2023	13-Jun-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH01_0.8-1	Soil Glass Jar - Unpreserved	13-Jun-2023	13-Jun-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH01_1.8-2	Soil Glass Jar - Unpreserved	13-Jun-2023	13-Jun-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH01_2.3-2.5	Soil Glass Jar - Unpreserved	13-Jun-2023	13-Jun-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH02_0.3-0.5	Soil Glass Jar - Unpreserved	13-Jun-2023	13-Jun-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH02_0.8-1	Soil Glass Jar - Unpreserved	13-Jun-2023	13-Jun-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH02_1.8-2	Soil Glass Jar - Unpreserved	13-Jun-2023	13-Jun-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH02_2.8-3	Soil Glass Jar - Unpreserved	13-Jun-2023	13-Jun-2023	22-Jun-2023	✖	22-Jun-2023	✖
EA010: Electrical Conductivity (1:5)							
BH01_0.3-0.5	Soil Glass Jar - Unpreserved	13-Jun-2023	11-Jul-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH01_0.8-1	Soil Glass Jar - Unpreserved	13-Jun-2023	11-Jul-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH01_1.8-2	Soil Glass Jar - Unpreserved	13-Jun-2023	11-Jul-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH01_2.3-2.5	Soil Glass Jar - Unpreserved	13-Jun-2023	11-Jul-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH02_0.3-0.5	Soil Glass Jar - Unpreserved	13-Jun-2023	11-Jul-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH02_0.8-1	Soil Glass Jar - Unpreserved	13-Jun-2023	11-Jul-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH02_1.8-2	Soil Glass Jar - Unpreserved	13-Jun-2023	11-Jul-2023	22-Jun-2023	✖	22-Jun-2023	✖
BH02_2.8-3	Soil Glass Jar - Unpreserved	13-Jun-2023	11-Jul-2023	22-Jun-2023	✖	22-Jun-2023	✖



Requested Deliverables

ACCOUNTS PAYABLE (Invoice)

- A4 - AU Tax Invoice (INV)

Email accountspayable@brisbane.qld.gov.au

SCOTT WATSON

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - XTab (XTAB)

Email scott.watson@brisbane.qld.gov.au
Email scott.watson@brisbane.qld.gov.au
Email scott.watson@brisbane.qld.gov.au
Email scott.watson@brisbane.qld.gov.au
Email scott.watson@brisbane.qld.gov.au
Email scott.watson@brisbane.qld.gov.au

TIM DAVIES

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - XTab (XTAB)

Email tim.davies@brisbane.qld.gov.au
Email tim.davies@brisbane.qld.gov.au
Email tim.davies@brisbane.qld.gov.au
Email tim.davies@brisbane.qld.gov.au
Email tim.davies@brisbane.qld.gov.au
Email tim.davies@brisbane.qld.gov.au

TIM GEORGE

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - XTab (XTAB)

Email tim.george@brisbane.qld.gov.au
Email tim.george@brisbane.qld.gov.au
Email tim.george@brisbane.qld.gov.au
Email tim.george@brisbane.qld.gov.au
Email tim.george@brisbane.qld.gov.au
Email tim.george@brisbane.qld.gov.au



CERTIFICATE OF ANALYSIS

Work Order	: EB2318839	Page	: 1 of 4
Client	: BRISBANE [REDACTED]	Contact	: Carsten Emrich
Address	: [REDACTED]	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 7 [REDACTED]	Telephone	: +61 7 3552 8616
Project	: GK15 - Sherwood Arboretum & Secret Forest	Date Samples Received	: 22-Jun-2023 07:33
Order number	: 123	Date Analysis Commenced	: 26-Jun-2023
C-O-C number	: [REDACTED]	Issue Date	: 28-Jun-2023 09:17
Sampler	: [REDACTED]		
Site	: Sherwood Arboretum		
Quote number	: EB23BRICIT0002		
No. of samples received	: 8		
No. of samples analysed	: 8		



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, unless the sampling was conducted by ALS. 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
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.

- ALS is not NATA accredited for the analysis of Exchangeable Aluminium and Exchange Acidity in soils when performed under ALS Method ED005.
- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- ED006 (Exchangeable Cations on Alkaline Soils): Unable to calculate Magnesium/Potassium Ratio results for some samples as required Exchangeable Potassium results are less than the limit of reporting.
- ED006 (Exchangeable Cations on Alkaline Soils): BH01_2.3-2.5 (EB2318839-004) shows poor duplicate results due to sample heterogeneity. This has been confirmed by visual inspection.
- ED008 (Exchangeable Cations with pre-treatment): BH02_0.8-1 (EB2318839-006) shows poor duplicate results due to sample heterogeneity. This has been confirmed by visual inspection.
- 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 ($H^+ + Al^{3+}$).



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID		BH01_0.3-0.5		BH01_0.8-1		BH01_1.8-2		BH01_2.3-2.5		BH02_0.3-0.5	
		Sampling date / time											
Compound	CAS Number	LOR	Unit	Result		Result		Result		Result		Result	
EA002: pH 1:5 (Soils)													
pH Value	---	0.1	pH Unit	5.5	5.4	7.1	7.6	7.3					
EA010: Conductivity (1:5)													
Electrical Conductivity @ 25°C	---	1	µS/cm	61	111	589	986	141					
ED005: Exchange Acidity													
ø Exchange Acidity	---	0.1	meq/100g	8.2	5.9	---	---	---					
ø Exchangeable Aluminium	---	0.1	meq/100g	7.0	4.5	---	---	---					
ED006: Exchangeable Cations on Alkaline Soils													
ø Exchangeable Calcium	---	0.2	meq/100g	---	---	---	3.1	---					
ø Exchangeable Magnesium	---	0.2	meq/100g	---	---	---	7.1	---					
ø Exchangeable Potassium	---	0.2	meq/100g	---	---	---	<0.2	---					
ø Exchangeable Sodium	---	0.2	meq/100g	---	---	---	4.4	---					
ø Cation Exchange Capacity	---	0.2	meq/100g	---	---	---	14.8	---					
ø Exchangeable Sodium Percent	---	0.2	%	---	---	---	29.7	---					
ø Calcium/Magnesium Ratio	---	0.2	-	---	---	---	0.4	---					
ED007: Exchangeable Cations													
Exchangeable Calcium	---	0.1	meq/100g	4.4	2.8	---	---	16.0					
Exchangeable Magnesium	---	0.1	meq/100g	7.9	9.7	---	---	10.0					
Exchangeable Potassium	---	0.1	meq/100g	0.3	0.3	---	---	0.4					
Exchangeable Sodium	---	0.1	meq/100g	1.6	2.9	---	---	3.2					
Cation Exchange Capacity	---	0.1	meq/100g	22.4	21.6	---	---	---					
Cation Exchange Capacity	---	0.1	meq/100g	---	---	---	---	29.8					
Exchangeable Sodium Percent	---	0.1	%	11.5	18.3	---	---	10.9					
Calcium/Magnesium Ratio	---	0.1	-	0.6	0.3	---	---	1.6					
Magnesium/Potassium Ratio	---	0.1	-	27.5	29.4	---	---	24.8					
ED008: Exchangeable Cations													
Exchangeable Calcium	---	0.1	meq/100g	---	---	3.4	---	---					
Exchangeable Magnesium	---	0.1	meq/100g	---	---	10.0	---	---					
Exchangeable Potassium	---	0.1	meq/100g	---	---	0.2	---	---					
Exchangeable Sodium	---	0.1	meq/100g	---	---	3.1	---	---					
Cation Exchange Capacity	---	0.1	meq/100g	---	---	16.9	---	---					
Exchangeable Sodium Percent	---	0.1	%	---	---	18.6	---	---					
Calcium/Magnesium Ratio	---	0.1	-	---	---	0.3	---	---					
Magnesium/Potassium Ratio	---	0.1	-	---	---	46.3	---	---					