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All Correspondence
PO Box 6405
Yatala DC QLD 4207

Weekly Interim Report

Client: Australian Dewatering Systems Pty Ltd	**Week:** 42
Site Address: 45 Honeysuckle Dr, Newcastle, NSW	**Sampling Date:** 13.07.22
Project Reference: ADG1272.21	**Sampled By:** LO
Receiving Waters: Newcastle Harbour	**Receiving Ecosystem:** Estuarine (moderately disturbed)

Typical Discharge Criteria		**Sampling Location**
Physico-chemical		***Discharge***
pH (pH units)	6.5 – 8.5[1]	7.67
Electrical conductivity (mS/cm)	-	26.3
Dissolved oxygen (% saturation)	>80[1]	114.3
Turbidity (NTU)	<50[1]	40.3
Suspended solids (mg/L)	<50[1]	13
Redox (mV)	-	-

Receiving Water Quality Objectives (WQO)		**Sampling Location**		
Physico-chemical		***Discharge***	***RW***	***BW***
pH (pH units)	7.0 – 8.5[2]	As above	7.45	7.50
Electrical conductivity (mS/cm)	-		3.77	2.52
Dissolved oxygen (%Sat)	80 – 110[2]		**118.7**	**120.9**
Turbidity (NTU)	<10[2]		**81.1**	**50.7**
Suspended solids (mg/L)	<50[2]		39	25
Redox (mV)	-		-	-
Dissolved Metals (µg/L)				
Arsenic	24[2]	2	nd	nd
Cadmium	0.7[2]	nd	nd	nd
Chromium	27.4[2]	nd	nd	nd
Copper	1.3[2]	nd	1	**2**
Lead	4.4[2]	nd	nd	nd
Nickel	7[2]	nd	2	1
Zinc	8[3]	5	5	**14**
Iron	No relevant ANZG criterion available	890	260	200
Mercury	0.1[2]	nd	nd	nd
Total Metals (µg/L)				
Iron	No relevant ANZG criterion available	3,530	2,870	2,190
Nutrients (µg/L)				
Total Nitrogen	300[2]	**1,100**	**1,200**	**1,900**
Nitrate	2,400[2]	10	330	970

Total Phosphorus	30[2]	**220**	**160**	**140**
Ammonia	910 (pH dependant)[2]	790	60	90

Comments

- Significant rainfall in the two weeks prior to monitoring.
- All physico-chemical parameters in the discharge waters were compliant with the discharge criteria, as per the site-based Dewatering Management Plan (DMP) (Reditus).
- In the receiving water (RW) mixing zone, turbidity was in exceedance of the water quality objective (WQO) of <10 NTU at 81.1 NTU. The dissolved oxygen (DO) in the RW mixing zone was also in exceedance of the WQO of 80 - 110% saturation, at 118.7% saturation.

  Note: The substantial exceedances in turbidity and DO in the background water are relatively consistent with the elevated turbidity and DO in the background water (BW). These levels can also be attributed to recent overland rainfall run-off from the previous weeks serve weather event.
- All remaining physico-chemical parameters in the RW mixing zone were compliant with the WQO's as per the site-based DMP (Reditus).
- All dissolved metal concentrations in the discharge and RW mixing zone were either below the laboratory limit of reporting (LOR) (reported as non-detectable) or below the relevant (available) site based WQOs.
- The following nutrients were reported in exceedance:
  - Total nitrogen at 1,100 µg/L (discharge), 1,200 µg/L (RW), and 1,900 µg/L (BW); criterion 300 µg/L.
  - Total phosphorus at 220 µg/L (discharge), 160 µg/L (RW), and 140 µg/L (BW); criterion 30 µg/L.

  All concentrations of total nitrogen and total phosphorus in the discharge, RW mixing zone and background water were reported in exceedance of the site based WQOs. In addition, since background concentrations of total nitrogen and total phosphorus are known to be elevated in the local RW of Newcastle Harbour, no significant impacts are anticipated. In addition, as stated in the Reditus Groundwater and Dewatering Management and Monitoring Plan. "*There is currently no proven and cost-effective method for the removal of nutrients with the available retention times and available space on construction sites. However, medium to high flow conditions and natural aquatic processes in Newcastle Harbour receiving waters are likely to mitigate possible impacts of nutrient loading. This will need to be monitored for physical and chemical stresses if trigger values are exceeded*." As such, monitoring of these nutrients in the RW and BW will occur over the subsequent monitoring rounds to assess if any significant impacts are occurring to the receiving environment.
- All remaining nutrients were reported either below the laboratory LOR (reported as non-detectable) or below the relevant (available) site based WQOs.
- Based off the initial two consecutive weeks where discharge, RW and BW laboratory samples were reported in compliance with the WQOs (non-detectable concentrations) the sampling frequency of volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), BTEX, organochlorine pesticides (OCPs), organophosphorus pesticides (OPPs), polychlorinated biphenyls (PCBs) and total recoverable hydrocarbons (TRHs) has been reduced as per the site-based Dewatering Management Plan (Reditus).

Recommendations

- pH dosing of the extracted groundwater is not required. In the event that pH decreases below 7.0 commence pH dosing to achieve a discharge pH of approximately 8.0 - 8.2 pH units. This will assist in the precipitation and retention of heavy metals within the treatment system.
- Continue regular monitoring to confirm the suitability of water for discharge and to detect any potential impacts to the receiving environment.

Table notes:

1. Typical discharge criteria recognised throughout NSW.
2. REDITUS (2019). Site specific *Dewatering and Groundwater Management and Monitoring Plan* - 45 Honeysuckle Drive, Newcastle, NSW. Table 8-1: Water Quality Objectives – DGVs.
3. ANZG (2018) – Marine water trigger values for 95% species protection.

* = Insufficient data to derive a reliable trigger value. Low reliability value adopted (refer ANZECC/ARMCANZ (2000) Section 8.3.7.
Bold = Exceedance of adopted criteria.
- = No criteria available and / or no monitoring undertaken during this sampling event.
nd = non detect.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2224705**

Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services ES
Address	: PO BOX 6405 YATALA DC 4207	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: mail@adgconsulting.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: +61 07 5580 8063	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: ADG1272.21 45 Honeysuckle Road, Newcastle, NSW	Page	: 1 of 2
Order number	: ----	Quote number	: EB2020ADGCON0001 (BNBQ/004)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Chelsey Zeeman		

Dates

Date Samples Received	: 13-Jul-2022 12:52	Issue Date	: 13-Jul-2022
Client Requested Due Date	: 20-Jul-2022	Scheduled Reporting Date	: **20-Jul-2022**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 18.1'c
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

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
- **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.**
- **pH analysis will be conducted by ALS Newcastle-Water**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- 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.

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: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005: pH pH	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - IN-1 EC plus TDS Calculated	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-02 8 Metals
ES2224705-001	13-Jul-2022 00:00	Discharge	✓	✓	✓	✓	✓	✓	✓
ES2224705-002	13-Jul-2022 00:00	RW	✓	✓	✓	✓	✓	✓	✓
ES2224705-003	13-Jul-2022 00:00	BW	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA045 Turbidity	WATER - EP025 Dissolved Oxygen (DO)
ES2224705-001	13-Jul-2022 00:00	Discharge	✓	✓
ES2224705-002	13-Jul-2022 00:00	RW	✓	✓
ES2224705-003	13-Jul-2022 00:00	BW	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	mail@adgconsulting.com.au

MICHAEL CAMPBELL

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

Printed 12/7

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 2/1 Burma Road Pooraka SA 5095 Ph 08 8162 5130 E adelaide@alsglobal.com
BRISBANE 2 Byth Street Stafford QLD 4053 Ph 07 3243 7222 E samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Gladstone QLD 4680 Ph 07 4978 7944 E ALSEnviro.Gladstone@alsglobal.com
MACKAY ... Ph 07 4952 5795 E ...
MELBOURNE ... Ph 03 8549 9600 E ...
MUDGEE ... Ph 02 6372 6735 E ...
NEWCASTLE ... Road Mayfield West NSW 2304
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph 02 8784 8555 E samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph 07 4796 0600 E ALSEnviro.Townsville@alsglobal.com
WOLLONGONG 1/19-21 Ralph Black Drive Nth Wollongong NSW 2500 Ph 02 4225 3125 E wollongong@alsglobal.com

CLIENT: ADG CONSULTING PTY LTD	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☑ Standard TAT (List due date): 19/07/2022 (4 day TAT) ☐ Non Standard or urgent TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: PO BOX 6405, Yatala DC 4207			Custody Seal Intact? Yes No N/A
PROJECT: 45 Honeysuckle Road, Newcastle, NSW PROJECT NO.: ADG1272.21	ALS QUOTE NO.: BNBQ/004/20	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes (No) N/A
ORDER NUMBER: PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 18.1 °C
PROJECT MANAGER: Michael Campbell CONTACT PH: 0415 960 372		OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Chelsey Zeeman SAMPLER MOBILE: 0451 042 949	RELINQUISHED BY: Lilli O'Sullivan	RECEIVED BY: [signature]	RELINQUISHED BY: [signature] / RECEIVED BY: [signature]
COC Emailed to ALS? (YES / NO) YES			
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au	DATE/TIME: 13.07.22	DATE/TIME: 13/7 1320	DATE/TIME: 13/7 1700 / DATE/TIME: 13/7/22 1930
Email Invoice to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au			

Comments: Please log as a planned event, please ensure that client requested reporting date is accurate on SRN.

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	EA025H (TSS)	IN-1 Electrical conductivity (EC)	EA005 pH	EA045 Turbidity		EP025 Dissolved Oxygen	NT-8 (Total Nitrogen, TKN, NO_x, NO_2, NO_3, NH_3, Total Phosphorus)	Iron (Fe) (dissolved & total)		W-2 (dissolved) (8 metals)		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	Discharge	13.07.22	W	P / N / SP)	4	x	x	x	x		x	x	x		x		
2	RW	13.07.22	W	P / N / SP)	4	x	x	x	x		x	x	x		x		
3	BW	13.07.22	W	P / N / SP)	4	x	x	x	x		x	x	x		x		
				TOTAL	12	3	3	3	3		3	3	3		3		

LAB OF ORIGIN: NEWCASTLE

Environmental Division
Sydney
Work Order Reference
ES2224705

Telephone : - 61-2-8784 8555

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; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

pH @ WN

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2224705**	Page	: 1 of 4
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services ES
Address	: PO BOX 6405 YATALA DC 4207	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 5580 8063	Telephone	: +61-2-8784 8555
Project	: ADG1272.21 45 Honeysuckle Road, Newcasle, NSW	Date Samples Received	: 13-Jul-2022 12:52
Order number	: ----	Date Analysis Commenced	: 13-Jul-2022
C-O-C number	: ----	Issue Date	: 20-Jul-2022 19:57
Sampler	: Chelsey Zeeman		
Site	: ----		
Quote number	: BNBQ/004		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Gregory Towers	Technical Officer	Chemistry, Newcastle West, NSW

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.

- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Discharge	RW	BW	----	----
			Sampling date / time	13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2224705-001	ES2224705-002	ES2224705-003	--------	--------
				Result	Result	Result	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**7.67**	**7.45**	**7.50**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**26300**	**3770**	**2520**	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**17100**	**2450**	**1640**	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**13**	**39**	**25**	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**40.3**	**81.1**	**50.7**	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.002**	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	**0.001**	**0.002**	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.002**	**0.001**	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	**0.005**	**0.005**	**0.014**	----	----
Iron	7439-89-6	0.05	mg/L	**0.89**	**0.26**	**0.20**	----	----
EG020T: Total Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**3.53**	**2.87**	**2.19**	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.79**	**0.06**	**0.09**	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	**0.01**	**0.02**	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.01**	**0.32**	**0.97**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.01**	**0.33**	**0.99**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**1.1**	**0.9**	**0.9**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Discharge	RW	BW	----	----
			Sampling date / time	13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2224705-001	ES2224705-002	ES2224705-003	--------	--------
				Result	Result	Result	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued								
^ **Total Nitrogen as N**	----	0.1	mg/L	**1.1**	**1.2**	**1.9**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.22**	**0.16**	**0.14**	**----**	**----**
EP025: Oxygen - Dissolved (DO)								
Dissolved Oxygen	----	0.1	mg/L	**10.4**	**10.8**	**11.0**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle - Water, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(WATER) EA005: pH

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2224705**	Page	: 1 of 7
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services ES
Address	: PO BOX 6405 YATALA DC 4207	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 5580 8063	Telephone	: +61-2-8784 8555
Project	: ADG1272.21 45 Honeysuckle Road, Newcasle, NSW	Date Samples Received	: 13-Jul-2022
Order number	: ----	Date Analysis Commenced	: 13-Jul-2022
C-O-C number	: ----	Issue Date	: 20-Jul-2022
Sampler	: Chelsey Zeeman		
Site	: ----		
Quote number	: BNBQ/004		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Gregory Towers	Technical Officer	Chemistry, Newcastle West, NSW

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**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005: pH (QC Lot: 4458005)									
ES2224703-014	Anonymous	EA005: pH Value	----	0.01	pH Unit	6.83	6.86	0.4	0% - 20%
ES2224752-005	Anonymous	EA005: pH Value	----	0.01	pH Unit	6.47	6.15	5.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4459199)									
ES2224673-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4330	4240	2.2	0% - 20%
ES2224700-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	506	502	0.7	0% - 20%
ES2224700-013	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	512	511	0.2	0% - 20%
ES2224703-008	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	371	373	0.6	0% - 20%
ES2224716-004	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2000	1990	0.3	0% - 20%
ES2224694-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	979	970	0.9	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 4465108)									
ES2224700-007	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	8	8	0.0	No Limit
ES2224776-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	8	7	0.0	No Limit
EA045: Turbidity (QC Lot: 4461969)									
ES2224683-001	Anonymous	EA045: Turbidity	----	0.1	NTU	143	139	2.8	0% - 20%
ES2224687-001	Anonymous	EA045: Turbidity	----	0.1	NTU	<0.1	<0.1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4465781)									
ES2224684-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	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 (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4465781) - continued									
ES2224684-003	Anonymous	EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
ES2224703-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.021	0.021	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4465785)									
ES2224716-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.007	0.007	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.007	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.25	2.21	1.9	0% - 20%
ES2224716-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.13	3.17	1.4	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 4465831)									
ES2224705-001	Discharge	EG020A-T: Iron	7439-89-6	0.05	mg/L	3.53	3.41	3.5	0% - 20%
ES2224724-005	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	2.75	2.67	2.9	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 4465780)									
ES2224674-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2224703-006	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4465784)									
ES2224705-003	BW	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2224716-008	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	0.0004	0.0004	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4466402)									
ES2224694-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.87	1.88	0.7	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4461146)									
ES2224705-001	Discharge	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	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 (%)*
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4461146) - continued									
ES2224773-015	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.07	0.07	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4466401)									
ES2224716-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.58	0.60	0.0	0% - 20%
ES2224694-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	3.13	3.14	0.4	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4466397)									
ES2224684-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.4	23.1	No Limit
ES2224716-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4466398)									
ES2224684-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2224716-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.15	0.14	0.0	0% - 50%

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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005: pH (QCLot: 4458005)								
EA005: pH Value	----	----	pH Unit	----	7.6 pH Unit	100	98.5	102
EA010P: Conductivity by PC Titrator (QCLot: 4459199)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	220 µS/cm	95.4	89.9	110
				<1	2100 µS/cm	98.7	90.2	111
				<1	58301 µS/cm	101	93.3	106
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 4465108)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	100	83.0	129
				<5	1000 mg/L	90.1	82.0	110
				<5	835 mg/L	94.5	83.0	118
EA045: Turbidity (QCLot: 4461969)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	97.0	91.0	105
EG020F: Dissolved Metals by ICP-MS (QCLot: 4465781)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	87.2	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	84.2	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	85.3	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	85.5	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	84.5	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	82.8	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	84.0	81.0	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	88.4	82.0	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 4465785)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.0	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	84.1	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	85.7	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	85.3	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	83.8	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	85.7	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	84.6	81.0	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	87.4	82.0	112
EG020T: Total Metals by ICP-MS (QCLot: 4465831)								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	85.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 4465780)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.4	83.0	105

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG035F: Dissolved Mercury by FIMS (QCLot: 4465784)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.6	83.0	105
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4466402)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	102	90.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4461146)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	105	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4466401)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	94.3	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4466397)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	95.3	69.0	101
				<0.1	1 mg/L	103	70.0	118
				<0.1	5 mg/L	103	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4466398)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.3	71.3	126
				<0.01	0.442 mg/L	94.3	71.3	126
				<0.01	1 mg/L	101	71.3	126

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: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4465781)							
ES2224674-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	88.0	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	87.3	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	91.2	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	97.4	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	97.6	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	86.1	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	88.7	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4465785)							
ES2224716-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	90.8	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	84.7	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	88.9	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	90.3	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	91.9	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	84.1	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4465785) - continued							
ES2224716-002	Anonymous	EG020A-F: Zinc	7440-66-6	1 mg/L	85.5	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4465780)							
ES2224285-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	88.9	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4465784)							
ES2224705-002	RW	EG035F: Mercury	7439-97-6	0.01 mg/L	89.9	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4466402)							
ES2224694-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	119	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4461146)							
ES2224705-001	Discharge	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	115	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4466401)							
ES2224694-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4466397)							
ES2224684-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	97.5	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4466398)							
ES2224684-003	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	94.0	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2224705**	Page	: 1 of 8
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR MICHAEL CAMPBELL	Telephone	: +61-2-8784 8555
Project	: ADG1272.21 45 Honeysuckle Road, Newcasle, NSW	Date Samples Received	: 13-Jul-2022
Site	: ----	Issue Date	: 20-Jul-2022
Sampler	: Chelsey Zeeman	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 3

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

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

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

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
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	ES2224694--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EP025: Oxygen - Dissolved (DO)						
Clear Plastic Bottle - Natural Discharge, RW, BW	----	----	----	14-Jul-2022	13-Jul-2022	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Regular	Rate (%): Actual	Expected	Quality Control Specification
Matrix Spikes (MS)					
Total Metals by ICP-MS - Suite A	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA005: pH							
Clear Plastic Bottle - Natural (REGIONAL LAB) (EA005) Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**13-Jul-2022**	13-Jul-2022	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**14-Jul-2022**	10-Aug-2022	✓

Matrix: **WATER**

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
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**19-Jul-2022**	20-Jul-2022	✓
EA045: Turbidity							
Clear Plastic Bottle - Natural (EA045)							
Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**15-Jul-2022**	15-Jul-2022	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**19-Jul-2022**	09-Jan-2023	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
Discharge, RW, BW	**13-Jul-2022**	**19-Jul-2022**	09-Jan-2023	✓	**19-Jul-2022**	09-Jan-2023	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**19-Jul-2022**	10-Aug-2022	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**19-Jul-2022**	10-Aug-2022	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**15-Jul-2022**	15-Jul-2022	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**19-Jul-2022**	10-Aug-2022	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
Discharge, RW, BW	**13-Jul-2022**	**19-Jul-2022**	10-Aug-2022	✓	**19-Jul-2022**	10-Aug-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
Discharge, RW, BW	**13-Jul-2022**	**19-Jul-2022**	10-Aug-2022	✓	**19-Jul-2022**	10-Aug-2022	✓

Matrix: **WATER**

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
EP025: Oxygen - Dissolved (DO)							
Clear Plastic Bottle - Natural (EP025)							
Discharge, RW, BW	**13-Jul-2022**	**----**	----	----	**14-Jul-2022**	13-Jul-2022	✘

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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	6	58	**10.34**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	37	**10.81**	**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	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	3	**66.67**	**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
Turbidity	EA045	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	5	58	**8.62**	**8.33**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	37	**5.41**	**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	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	1	58	**1.72**	**1.67**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	37	**5.41**	**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	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	3	**33.33**	**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: **WATER**

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*	
Method Blanks (MB) - Continued							
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	37	**5.41**	**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	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	0	3	**0.00**	**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	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. 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)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 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-NO2- B. Nitrite is determined by direct colourimetry 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-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry 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 (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
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)
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)
Oxygen - Dissolved	EP025	WATER	In house: Referenced to APHA 4500-O G. Dissolved Oxygen Probe. 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)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)