

RCA ref 15579a-403/0
Client ref PO28777

6 October 2023

Uralla Shire Council
PO Box 106
URALLA NSW 2358

Attention: Dr Benjamin Kogo (Manager Environment and Waste)



Geotechnical Engineering
Engineering Geology
Environmental Engineering
Hydrogeology
Construction Materials Testing
Environmental Monitoring
Noise & Vibration
Occupational Hygiene

ENVIRONMENTAL MONITORING REPORT SEPTEMBER 2023 URALLA LANDFILL, URALLA

1 INTRODUCTION AND BACKGROUND

This report provides a summary of gas, water and leachate monitoring undertaken at the Uralla Landfill located on Rowan Avenue, Uralla. The works were undertaken at the request of Dr Benjamin Kogo of Uralla Shire Council (Council).

The environmental monitoring works are required under Environmental Protection License (EPL) No.5899 (Ref [1]). Four (4) rounds (quarterly and biannual) of environmental monitoring, to include the assessment of surface gas, surface water, leachate and groundwater are required throughout the annual reporting period (October 2022 – October 2023). The current event (September 2023) was a quarterly round and included the monitoring of one (1) groundwater well (UW3), and surface and accumulated gas monitoring (refer **Attachment A**).

The purpose of this summary report is to present the methodology and results from the current scheduled round (September 2023) of landfill gas and water monitoring. This has been undertaken to provide an assessment on the status of methane gas across the site and the potential leachate impact in downstream surface water and groundwater locations.

2 FIELDWORK

An environmental engineer experienced in the handling of potentially contaminated waters and in the assessment of methane gases undertook the fieldwork on 14 and 15 September July 2023.

Surface water, leachate and groundwater sampling locations are shown on **Drawing 1, Attachment A**, the monitored surface gas area is shown on **Drawing 2, Attachment A**, and accumulated methane gas monitoring locations are shown on **Drawing 3, Attachment A**.

Photographs of the sampled water locations and field observations from the surface gas survey are included in **Attachment B**. Field sheets are provided in **Attachment C**

The scope of work undertaken on site is detailed below.

2.1 SURFACE WATER AND LEACHATE MONITORING – QUARTERLY MONITORING

Surface water monitoring in this round comprised the measurement of field readings from surface water sample US1 and the leachate pond UL1 with the following methodology:

- Water from US1 collected from middle of the creek bed for field measurements by syphoning water up through a syringe as there was only a shallow stream of trickling water (refer **Attachment B**).
- Water from UL1 was collected from a point approximately 1.5m from the bank of the leachate pond (refer **Attachment B**) using a sampling pole.
- The collected water was assessed in the field using a calibrated Horiba U-52 (**Attachment C**) water quality meter for pH, turbidity, electrical conductivity (EC), oxidation-reduction potential (ORP), dissolved oxygen (DO), temperature and salinity. Additional sample observations including clarity, odour, colour, sheen, flow rate and algae presence were also recorded.

It is noted that measurements were not collected from surface water locations US2 and US3 and overflow point EPL 2 due to no discharge from the leachate pond (refer **Attachment B**) or site during the monitoring works.

2.2 GROUNDWATER MONITORING – QUARTERLY MONITORING

Groundwater monitoring in this round comprised the gauging of groundwater levels at three (3) locations (UW1, UW2 and UW3), field readings (methane and water chemistry) at UW1 and UW2, and collection of a groundwater sample from one (1) location (UW3) with the following methodology:

- Monitoring of methane gas was conducted at each groundwater monitoring well prior to the collection of water samples by carefully removing the well cap and placing the gas monitor's cup into the groundwater monitoring well. It is noted that this reading can be considered indicative only as there would likely be loss of volatile gasses (through the introduction of oxygen), should these be present, once the cap was removed.
- Wells were dipped to determine the depth of groundwater. All bores were purged of one bore volume using a hand bailer; further purging was undertaken at UW3 until pH and EC readings stabilised.
- The collected water was assessed in the field using a Horiba U-52 water quality meter for pH, EC, ORP, DO, temperature and salinity. Additional sample observations including bore depth, water depth, purged volume, odour, colour and sheen were also recorded.
- The sample at UW3 was transferred from the hand bailer into suitably prepared laboratory supplied bottles and analysed by a NATA accredited laboratory for the required EPL (Ref [1]) parameters. Samples to be analysed for dissolved metals were filtered in the field using syringes and 0.45µm filters. Samples were placed into an insulated container on ice.
- A photographic record was taken in the field of the water column at each location (**Attachment B**).

2.3 SURFACE AND ACCUMULATED GAS MONITORING – QUARTERLY MONITORING

- Surface gas monitoring was undertaken across the area of the landfill with the pathway shown in green on **Drawing 2, Attachment A**.
- The surface gas survey was conducted in accordance with Section 5.2 of the NSW EPA guidelines (Ref [2]).
 - A Huberg Laser One gas analyser was used to record methane concentrations in parts per million (ppm) and on a volume (%) basis. This analyser was calibrated and zeroed prior to use on site in accordance with the manufacturer's recommendations.
 - Surface gas was logged approximately 5cm above the ground surface continuously: manual records of elevated readings were additionally recorded. When possible, gas readings were taken where depressions, erosion or indications of vegetative stress were observed during transects at the site.

- If methane readings exceeded 500ppm at a sampling point, additional readings were taken in the immediate vicinity to delineate the extent of elevated readings.
- It is noted that the monitor has a GPS capability however these were unable to be retrieved. This is the third time that this has occurred and RCA consulted with the supplier of the unit during the works; it is considered that the absence of recording is related to external GPS signal strength and is not related to a fault in the unit or error with its use.
- RCA also surveyed the northern landfill cell methane vent (**Drawing 2, Attachment A**). The monitor was placed inside the large PVC piped vent, situated approximately 2m above the ground level, and a reading was recorded. This was undertaken as a work health and safety procedure based on previous readings within the vent exceeding the lower explosive limit (LEL) for methane (Ref [2]).
- The accumulated gas survey was undertaken within the onsite recycling and service building (AMP1, Point 1) as shown on **Drawing 3, Attachment A**. This survey included assessment of all internal areas of the building (both floor and ceiling), internal drains and other potential intrusion pathways, and recording of highest reading.
- RCA also assessed the large storage shipping container (Point 2) and an open aired recycling sorting building (Point 3) as these are located within 250m of the active tipping area and as such were considered to require assessment (Ref [2]).
- The shipping container was unlocked for the monitoring; due to the storage of equipment, the monitoring was only undertaken to approximately half way into the container. RCA were informed that it had been opened once since the previous monitoring in July 2023.

3 QUALITY ASSURANCE/QUALITY CONTROL

RCA has reviewed the laboratory's internal quality assurance and control (refer laboratory report sheets in **Attachment D**), and a summary is as follows:

- At least one (1) internal duplicate was conducted on the batch for each of the specified analytes, with the exception of carbon dioxide, representing a percentage of 10%, in accordance with the frequency recommended by the ASC NEPM (Ref [3]).
 - The reported relative percentage difference were within the acceptable range of $\pm 30\%$ (Ref [4]).
 - The reason for the absence of a duplicate for carbon dioxide is not identified by the laboratory, however given the absence of guideline criteria is not considered to be significant.
- One (1) method blank was run on each of the requested analytes with no detectable concentrations reported with the exception of alkalinity, for which a blank is not considered technically feasible, and carbon dioxide.
- One (1) laboratory control spike was run on each of the requested analytes with recoveries within the acceptance criteria of 70-130%, with the exception of carbon dioxide.
- One (1) matrix spike was run either from a project sample and/or an anonymous sample within the same analytical batch for each of the requested analytes with the exception of alkalinity, carbon dioxide or iron.
 - Recoveries were within the acceptance criteria of 70-130%.
 - The absence of a matrix spike for alkalinity is not identified by the laboratory; seventeen (17) samples were included within the laboratory batch such that one matrix spike was expected. The absence of a matrix spike is considered to be a minor non-compliance.
 - The reason for the absence of a matrix spike for carbon dioxide is not identified by the laboratory, however given the absence of guideline criteria is not considered to be significant.
 - The absence of a matrix spike for iron is not identified by the laboratory; twenty (20) samples were included within the laboratory batch such that one matrix spike was expected. The absence of a matrix spike is considered to be a minor non-compliance.
- Holding Times were within laboratory specified time frames except for:
 - Total Organic Carbon. The wrong sample bottle was utilised such that the samples were not submitted in sufficient time for the analysis.

While there is potentially some uncertainty associated with these results it is not considered likely to be significant.

RCA therefore considers that the data obtained from this testing is accurate and reliable in as far as it can be ascertained.

4 SUMMARY OF RESULTS

4.1 SURFACE WATER – QUARTERLY MONITORING

Field readings from US1 are compared to the relevant criteria in **Attachment E**. RCA utilised the specific health, ecological, irrigation and livestock criteria and trigger levels to allow comparison to identifiable environmental onsite and offsite risks and to ensure consistency to what has historically been utilised at the site. All results were also compared to historical data collected from previous rounds of monitoring as summarised below.

- The pH of surface water at US1 was neutral and within the relevant guideline range (Ref [5]) and the historical range for this location.
- The recorded conductivity concentration at US1 was above the relevant ecological guideline (Ref [5]) and above the historical mean, however within the historical range for this location.
- Redox potential was positive and was within the historical range for this location.
- The recorded temperature was within the historical range for this location, noting that sampling was undertaken mid-afternoon.
- The dissolved oxygen concentration at US1 was above the historical mean however was within the historical range for this location.
- The salinity percentage was the highest recorded at this location.

4.2 LEACHATE – BIENNIAL MONITORING

Field readings from UL1 are compared to the relevant criteria in **Attachment E**. RCA utilised the specific health, ecological, irrigation and livestock criteria and trigger levels to allow comparison to identifiable environmental onsite and offsite risks and to ensure consistency to what has historically been utilised at the site. All results were also compared to historical data collected from previous rounds of monitoring as summarised below.

- The pH of the leachate at UL1 was neutral and within the relevant guideline range (Ref [5]) and the historical range for this location.
- The recorded conductivity concentration at UL1 was above the relevant ecological guideline (Ref [5]) and the historical average for this location, however within the historical range. The concentration is generally equitable with the surface water (US1).

- Redox potential was positive and within the historical range of results available to RCA.
- The recorded temperature was within the historical range for this location noting the sample was collected mid-afternoon.
- The dissolved oxygen concentration at UL1 was well below the historical mean however within the historical range of results available to RCA.
- The salinity percentage was generally equitable to the historical mean and was within the historical range for this location.

4.3 GROUNDWATER – QUARTERLY MONITORING

Analytical results from UW3 and field results from UW1, UW2 and UW3 are compared to the relevant criteria in **Attachment E**. RCA utilised the specific health, ecological, irrigation and livestock criteria and trigger levels to allow comparison to identifiable environmental onsite and offsite risks and to ensure consistency to what has historically been utilised at the site. All results were also compared to historical data collected from previous rounds of monitoring as summarised below.

- Groundwater levels from the September 2023 monitoring event were measured between 79.24mAHD (UW2) and 85.42mAHD (UW3).
 - Measured groundwater depths decreased marginally at UW1 (0.04m) and UW2 (0.037m) since July 2023 and with a slightly larger decrease in groundwater level at UW3 (0.192m) since July 2023.
- The pH at the three (3) groundwater locations varied from 6.23 (UW3) to 6.93 (UW2). All results were within the guideline range (Ref [5]); UW1 and UW2 results were within the historical ranges available to RCA however the UW3 result was marginally the lowest recorded.
- The recorded conductivity concentrations at the three (3) groundwater locations varied from 1730µS/cm (UW1) to 3160µS/cm (UW3) indicating more brackish to saline conditions within the groundwater at UW3 only compared to surface water. All reported concentrations exceeded the relevant ecological guideline (Ref [5]) and the UW3 reading was the highest in the data set available to RCA.
- Methane concentrations were below 5ppm at the three (3) groundwater locations and within the historical data range available to RCA, noting that methane measurements only commenced in July 2021. The UW3 concentration is approximately 23% of the previous July 2023 reading.
- Redox potential at the three (3) groundwater locations varied from 156mV (UW1) to 225mV (UW3) and were all within their respective historical ranges.

- The recorded temperatures at the three (3) groundwater locations varied from 14.18°C (UW2) to 17.75°C (UW1), noting that readings were taken late afternoon at UW1 and early morning at UW2 and UW3. These results are within the historical ranges for all wells.
- The dissolved oxygen concentration at the three (3) groundwater locations varied from 0.94mg/L (UW3) to 3.07mg/L (UW1) and were within historical ranges.
- The free carbon dioxide concentration at UW3 (158mg/L) is approximately half the historical mean however within the historical range.
- NO_x concentration at UW3 (11.5mg/L) was in excess of the ecological criterion (Ref [5]) and the long term irrigation guideline (Ref [6]) however was within the historical range for this location.
- Arsenic concentrations at UW3 were in excess of the ecological (Ref [5]) and human health guidelines (Ref [7]), generally equitable to the historical mean and within the historical range.
- Iron was not detected in UW3, consistent with historical results.
- Manganese concentrations at UW3 were below the ecological (Ref [5]) and human health guidelines (Ref [7]), slightly above the historical mean and within the historical range.

4.1 SURFACE GAS – QUARTERLY MONITORING

The weather conditions on 14 September 2023 were recorded by the Bureau of Meteorology (BOM) Armidale Airport weather station (056238) which is situated approximately 19km from the site as the Uralla BOM weather station (056034 located at Dumaresq Street Uralla) and only provides specific daily rainfall and temperature readings.

Gas monitoring commenced at 1.00p.m.: the Armidale station's atmospheric reading at 1p.m. was 102.9kPa which is just above the 'preferable' atmospheric pressure monitoring range of less than '101.3kPa and stable' (Ref [2]). The maximum wind speed was 28km/h (around time of monitoring at 1:06p.m.), and the wind-speeds at 9a.m. and 3p.m. were 7km/hr and 13km/hr, which are above the recommended maximum of 10km/h (Ref [2]). All winds were from the eastern quadrant – ranging between east south east and north east. The atmospheric pressure was 102.9 and 102.6 at 9a.m. and 3p.m. The weather was sunny with intermittent and variable winds, with a maximum temperature of 10.2°C and the ground was observed to damp to wet.

Wind speed was recorded at the site on a portable anemometer and was up to 4.7km/h from the east however the wind also blew from the south east and north east during the monitoring. The Huberg Laser One telescopic rod utilised during sampling on the landfill surface has a suction cup attached around the sensor to reduce any potential impact of wind and was placed on the ground surface every few steps, or where readings were observed to be increasing above ambient levels.

Minor erosion rills consistent with historical observations were present on the northern and western sides of the active landfill area (**Attachment B**). Gas readings taken within and beside the rills were less than 10ppm.

Due to the failure of the GPS logging system of the monitor, no data is available to provide the traverse pathway or areas of high readings except those above 500ppm recorded manually by field personnel. Six (6) areas of readings above 500ppm were identified, located in four (4) localised areas as shown in **Table 1**. The grid associated with the references are shown on **Drawing 2, Attachment A**.

Table 1 Concentration Recorded >500ppm 14 September 2023

Grid Reference of sample location	Description	Peak Methane (ppm)	Peak Methane (%)
I3	Bare soil to north of active tipping area.	~800	0.08
H3	Bare soil and grassed area to north of active tipping face	~4,200	0.42
H5	Pile of waste to the south of the active tipping area.	~4,200	0.42
H5	1m to north of waste pile	~1,500	0.15
H5	3m to north of waste pile	~3,000	0.30
N4	Vegetated area near tyres and drum collection point.	~4,200	0.42

The methane within the northern methane vent was a maximum of 19.8% (198,000ppm) at the base of the vent where the pipe is broken; this result is above the upper explosive limit (UEL) for methane (150,000ppm) and above the threshold for methane in enclosed spaces (10,000ppm). The readings at the top of the pipe were significantly reduced (6,500ppm / 0.067%) at the top of the vent. The location of the vent is shown on **Drawing 2, Attachment A**.

Methane concentrations within the Main Transfer Building and the Recycling Building were a maximum of 2.4ppm and the maximum in the shipping container was 3.2ppm.

5 CONCLUSION AND DISCUSSION

This report has presented the findings of gas, water and leachate monitoring undertaken at the Uralla Landfill located on Rowan Avenue, Uralla in accordance with the site EPL (Ref [1]) and previously utilised methodologies.

Quarterly monitoring of water was undertaken at one (1) onsite groundwater well location (UW3) with field readings recorded for one (1) surface water location, two (2) additional groundwater monitoring locations (UW1 and UW2) and one (1) leachate location (UL1). Sampling was not conducted at offsite surface water locations US2 and US3 or at the onsite spillway (EPL2) due to no discharge being observed from the onsite leachate dam at the time of monitoring; there was no irrigation of leachate being undertaken at the time of the inspection.

Quarterly monitoring for surface and accumulated methane gases was also undertaken across the landfill site.

There was only minimal flow observed at US1; all field readings except for salinity were within the historical ranges for this location. The salinity was the highest recorded however is not considered to represent any gross leachate impact.

The level within the leachate pond was very low and exhibited conductivity in excess of the relevant criteria at levels generally indicative of surface water. This characterisation appears generally consistent with previous monitoring events conducted at the site.

Groundwater levels decreased at all wells with the conductivity in excess of the guidelines at all three (3) locations. Oxidisable nitrogen and arsenic were in excess of the guidelines at the only sampled well (UW3). This characterisation appears generally consistent with previous monitoring events conducted at the site and do not appear to show any gross indication of leachate impact.

No methane was detected within the buildings above the relevant thresholds (Ref [2]) noting that readings within the shipping container were only possible to approximately half way inside.

Methane concentrations at the site surface were identified above the relevant 500ppm threshold (Ref [2]) in four (4) areas; these have at some stage in the previous two (2) years been identified to have elevated methane.

The methane concentration at the northern vent was in excess of the UEL for methane (Ref [2]) at its base; concentrations were decreased at the top of the vent pipe.

Based on the majority of results and comparison of these results to historical data collected at the site, RCA does not consider that additional monitoring is required before the next scheduled round of monitoring in the quarter 17 October 2023 to 16 January 2024.

Yours faithfully

RCA AUSTRALIA



Fiona Brooker
Manager of Environmental Services
BEng(Env)

LIMITATIONS

This report has been prepared for Uralla Shire Council in accordance with an agreement with RCA Australia (RCA). The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Uralla Shire Council. The report may not contain sufficient information for purposes of other uses or for parties other than Uralla Shire Council. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without written permission from RCA Australia.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. Conditions can vary across any site that cannot be explicitly defined by investigation. Environmental conditions including contaminant concentrations can change in a limited period of time. This should be considered if the report is used following a significant period of time after the date of issue.

This report has been prepared on the basis of information provided by Uralla Shire Council and RCA has made no independent verification of the accuracy of this information. As such, RCA assumes no responsibilities for any inaccuracies, omissions or subsequent changes to information used by RCA.

REFERENCES

- [1] NSW EPA, *EPL - Environment Protection Licence No. 5899*.
- [2] EPL NSW EPA, *Environmental Guidelines – Solid Waste Landfills*, Second Edition 2016
- [3] NEPC, *National Environment Protection (Assessment of Site Contamination) Measure*, 1999 as amended 2013.
- [4] Standards Australia, *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds*, AS 4482.1-2005.
- [5] ANZG, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia., August 2018. Available at www.waterquality.gov.au/anz-guidelines.
- [6] ANZECC, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, October 2000.
- [7] National Health and Medical Research Council, *Australian Drinking Water Guidelines*, 2011.

ATTACHMENTS

- Attachment A** – Drawings
- Attachment B** – Site Photographs
- Attachment C** – Field Sheets and Calibration Certificate
- Attachment D** – Laboratory Report Sheets
- Attachment E** – Results Summary

Attachment A

Drawings



LEGEND

Approximate site boundary

Approximate groundwater monitoring location

Approximate surface water location

Approximate leachate monitoring location

Approximate leachate overflow monitoring location

Watercourse

Aerial image taken from Nearmap, 27 February 2023
(used in accordance with commercial licence)

GEOTECHNICAL • ENVIRONMENTAL

**SITE LOCALITY, LAYOUT AND
WATER MONITORING LOCATIONS
ENVIRONMENTAL MONITORING REPORT
SEPTEMBER 2023
URALLA LANDFILL, URALLA**

CLIENT	Uralla Shire Council	RCA Ref		15579a-403/0	
DRAWN BY	FB	SCALE	1:2,500 (A3)	DRAWING No	1
APPROVED BY	ML	DATE	6/10/2023	OFFICE	NEWCASTLE
				REV	0



LEGEND

Approximate site boundary

Northern vent

Approximate pathway

Approximate area of active tipping (September 2023)

Approximate erosion location

Inaccessible due to irrigation (no irrigation in September 2023)

Methane concentration in parts per million (ppm)

> 500ppm over EPA guideline

> 2500ppm over EPA guideline

Note:
Aerial image taken from Nearmap, 27 February 2023
(used in accordance with commercial licence)
Grid ~40m x~40m

GEOTECHNICAL • ENVIRONMENTAL

CLIENT		Uralla Shire Council		RCA Ref		15579a-403/0	
DRAWN BY		FB		SCALE		1:2,500 (A3)	
APPROVED BY		ML		DATE		6/10/2023	
				DRAWING No		2	
				OFFICE		NEWCASTLE	
				REV		0	

**SURFACE GAS SURVEY
ENVIRONMENTAL MONITORING REPORT
SEPTEMBER 2023
URALLA LANDFILL, URALLA**



ACCUMULATED LOCATIONS	
MONITORING POINT	
1	Main Transfer Building (AMP1)
2	Shipping Container
3	Recycling Building

LEGEND



Approximate site boundary



Methane within normal background (<5ppm)



Methane above normal background



January 2023



May 2023

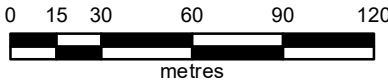


July 2023



September 2023

Aerial image taken from Nearmap, 27 February 2023
(used in accordance with commercial licence)






ACCUMULATED GAS MONITORING
ENVIRONMENTAL MONITORING REPORT
SEPTEMBER 2023
URALLA LANDFILL, URALLA

CLIENT	Uralla Shire Council	RCA Ref	15579a-403/0
DRAWN BY	FB	SCALE	1:2,500 (A3)
APPROVED BY	ML	DATE	6/10/2023
DRAWING No	3	REV	0
OFFICE	NEWCASTLE		

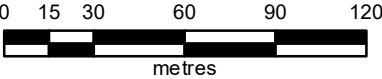


LEGEND

-  Approximate site boundary
- Methane concentration in parts per million (ppm)
-  > 500ppm over EPA guideline
-  > 2500ppm over EPA guideline

-  January 2023
-  May 2023
-  July 2023
-  September 2023

Note:
Aerial image taken from Nearmap, 27 February 2023
(used in accordance with commercial licence)
Grid ~40m x~40m



RESULTS IN EXCESS OF 500ppm
ENVIRONMENTAL MONITORING REPORT
2023
URALLA LANDFILL, URALLA

CLIENT		Uralla Shire Council		RCA Ref		15579a-403/0				
DRAWN BY		FB	SCALE		1:2,500 (A3)		DRAWING No	4	REV	0
APPROVED BY		ML	DATE		6/10/2023		OFFICE NEWCASTLE			

Attachment B

Photographs



US1 – Sampled Water at Boundary.



US1 – Upstream.



UW1 – Water Column.



UW2 – Water Column.



UW3 – Water Column.



UL1 – Leachate Pond Level Marker.



Ground Surface Elevated Reading: Grid I3.



Ground Surface Elevated Reading: Grid H3.



Location of Elevated Reading: Grid H5.



Location of Elevated Reading: Grid I3.



Southern face of landfill looking north.



Southern face of landfill looking east.



Western face looking south east.



Western face looking north east.



Northern face looking east.



Active tipping area looking south west.



Central northern area looking south east.



North eastern area of site looking south east.

Attachment C

Field Sheets and Calibration Certificate

ENVIRONMENTAL FIELD SHEET WATER SAMPLING RECORD

Project: Environmental Monitoring		Client: Uralla Shire Council	
Project number: 15579a		Date: 14/9/23	
Time: 8.15		Surface Water Location ID: US1	
Sampler (s): FB		Sample method: Direct - Syringe	
Weather: Sunny, calm with occasional light wind			
Sample appearance: Clear, slight brown.			
Additional comments: Minimal Alow (hole dug to get sample)			
Duplicate sample collected:	<input type="checkbox"/> YES - Sample ID:	Laboratory analysis:	<input type="checkbox"/> YES - Lab No:
	<input checked="" type="checkbox"/> NO		<input checked="" type="checkbox"/> NO

FIELD MEASUREMENTS

TEMP (C)	18.10 18.12
pH	7.68 7.53
ORP (mV)	20.60 -60 / 23 41
COND (mS/cm)	1.65 1.76
DO (mg/L)	3.82 4.85
Salinity (%)	0.089
Turbidity	191
Total Dissolved Solids	1.12

LABORATORY DETAILS

SAMPLE NO	SAMPLE BOTTLE NO	PRESERVATIVES

Sampled By:

Date:

ENVIRONMENTAL FIELD SHEET WATER SAMPLING RECORD

Project: Environmental Monitoring		Client: Uralla Shire Council	
Project number: 15579a		Date: 14/09/2023	
Time: 3.35		Surface Water Location ID: ULI	
Sampler (s): FB		Sample method: Direct	
Weather: Sunny & Calm			
Sample appearance: Clear			
Additional comments: Pond very, very low. No pumping			
Duplicate sample collected:	<input type="checkbox"/> YES - Sample ID:	Laboratory analysis:	<input type="checkbox"/> YES - Lab No:
	<input checked="" type="checkbox"/> NO		<input checked="" type="checkbox"/> NO

FIELD MEASUREMENTS

TEMP (C)	20.18
pH	7.69
ORP (mV)	76 (-62)
COND (mS/cm)	1.71
DO (mg/L)	1.73
Salinity (%)	0.086
Turbidity	13.6
Total Dissolved Solids	1.09

LABORATORY DETAILS

SAMPLE NO	SAMPLE BOTTLE NO	PRESERVATIVES

Sampled By:

Date:

ENVIRONMENTAL FIELD SHEET GROUNDWATER MONITORING

WATER SAMPLING RECORD

Project: Environmental Monitoring	Client: Uralla Shire Council	Site: Uralla Landfill
Project number: 15579a	Date: 14/09/2023	Time: 3.50
Sampler (s): FB/	Bore ID: UW1	
Bore depth (m): 30.45	Depth to aquifer (m): 18.87	Height above ground level (m): 0.76
Sample method: Bailer	Sample time: 4.20	Methane reading (ppm): 2.5ppm

Sample appearance / additional comments:

Depth measurement location:	<input type="checkbox"/> SURFACE LEVEL	Duplicate sample collected:	<input type="checkbox"/> YES - Sample ID:	Laboratory analysis:	<input type="checkbox"/> YES - Lab No:
	<input checked="" type="checkbox"/> TOP OF CASING (TOC)		<input checked="" type="checkbox"/> NO		<input checked="" type="checkbox"/> NO

VOLUME (L)	TEMP (C)	pH	ORP (mV)	CONDUCTIVITY (mS/cm)	Turbidity	DO (mg/L)	Salinity (%)	SWL (m TOC)	Comment
23	17.75	6.73	156(-12)	1.73	>1000	3.07	0.087	—	TDS 1.11

WATER SAMPLING RECORD



Sample appearance / additional comments:					
Depth measurement location:	<input type="checkbox"/> SURFACE LEVEL	Duplicate sample collected:	<input type="checkbox"/> YES - Sample ID:	Laboratory analysis:	<input type="checkbox"/> YES – Lab No:
	<input checked="" type="checkbox"/> TOP OF CASING (TOC)		<input checked="" type="checkbox"/> NO		<input checked="" type="checkbox"/> NO

[illegible]

ENVIRONMENTAL FIELD SHEET GROUNDWATER MONITORING

WATER SAMPLING RECORD

Project: Environmental Monitoring	Client: Uralla Shire Council	Site: Uralla Landfill
Project number: 15579a	Date: 14/09/2023	Time: 7.27
Sampler (s): FB	Bore ID: UW3	
Bore depth (m): 21.64	Depth to aquifer (m): 4.521	Height above ground level (m): 0.03
Sample method: Bailer	Sample time: 8.00	Methane reading (ppm): 4.8 ppm 14/9 230 ppm

Sample appearance / additional comments:

Depth measurement location:	<input type="checkbox"/> SURFACE LEVEL	Duplicate sample collected:	<input type="checkbox"/> YES - Sample ID:	Laboratory analysis:	<input type="checkbox"/> YES - Lab No:
	<input checked="" type="checkbox"/> TOP OF CASING (TOC)		<input checked="" type="checkbox"/> NO		<input checked="" type="checkbox"/> NO

VOLUME (L)	TEMP (C)	pH	ORP (mV)	CONDUCTIVITY (mS/cm)	Turbidity	DO (mg/L)	Salinity (%)	SWL (m TOC)	Comment
33	14.50	6.44	221 (3)	3.16	43.6	1.57	0.164	-	2.02 TDS
+3	15.10	6.26	225 (12)	3.18	47.1	1.08	0.155	-	2.03
+4	15.24	6.23	225 (13)	3.16 3.16	32298 32298	0.94	0.164	5.37	2.02

URALLA LANDFILL

SURFACE GAS MONITORING FIELD SHEET

Date: 14/09/2023	Time: 12.50	Page
Sampler: FB	Temperature (° C): 24.1 on site 17.7 Atm. lab	
Wind Speed (m/s): 2.5 m/s SE 15 km/h ESE	Wind Direction (bearing)	
Other observations: Gust 22 Sunny, breeze is intermittent & changeable (south east & north east). Pressure 1028.7 Monitor time ~ 15 min fast		

MONITORING POINT	TIME	CH ₄ (PPM)	CH ₄ (%)	COMMENTS
Shipping Container	12.45	3.2	-	Opened for FB to enter, half way only. Has only been opened once since last monitoring
Start site walk @ 12				
Northern Vent			19.8%	@ base
		~6700		@ top
Start site walk @ 1 pm				
Area north of active landfill - highest ~ 200 ppm				
Generally ranges 5-15. Photo location @ 65.				
photo location ~ 350 ppm				
1.20 Wind from East 4.7 m/s				
Restarted machine because memory ~ 90% over though GPS active				
Started again @ 1.25				
Photo location ~ 880 max, over ~ 2m ² area				
Restarted machine after speaking to Air/Mob				

Date:	Page
-------	------

MONITORING POINT	TIME	CH ₄ (PPM)	CH ₄ (%)	COMMENTS
				Site walk from bend in road ~ 1.41
				Note probe in bar & readings 2.4-25ppm
				1m to west reading ~ 4200ppm
				Photo/location ~ 4200. Area between 2
				photos had a couple of random ~50
				however rest 2.3-10ish
				About 1m north ~1800ppm / east ~400
				About 3m north ~3200 but not consistently
				Photo/location ~ 4200ppm Disappears @ 1m
				down away in all directions
				Recycling } both < 2.4 at floor &
				Main Shed } head height
				2.45pm stop monitoring. No recorded data
				Temp 28.2
				Wind Gust 2.4m/s from south east
				2.30 Arrivals 18.6°
				SE 17 km/h (Gust 26)
				Pressure 1027.2 hPa

Date:

Page

CERTIFICATION OF CALIBRATION



Issued by: QED Environmental Systems Ltd.

Calibration certificate number **41300 H-08413**
Instrument **Laser One** Serial Number **41300**

Description of the calibration procedure:

The calibration is verified with certified gas bottle. The maximum error of the instrument as specified in the datasheet.

Gas verification from **0-1000ppm CH4**

Full scale (ppm)	Gas concentration (ppm)	Response 1 (ppm)	Response 2 (ppm)	Response 3 (ppm)	Average response (ppm)	Maximum error (ppm)	Maximum error (% F.s.)	Maximum error %
1000	0.0	0	0	0	0.00	0.00	0.00	0.00
1000	3.11	3.1	3.1	3.1	3.10	0.01	0.00	0.00
1000	10.3	102	102	102	102.00	91.70	9.17	9.17
1000	100.0	100	100	100	100.00	0.00	0.00	0.00
1000	1002	1000	1000	1000	1000.00	2.00	0.20	0.20

Uncertainty	9.17	%
Max % error	9.17	% FS

Gas verification from **0-100% vol CH4**

Full scale (%vol)	Gas concentration (%vol)	Response 1 (%vol)	Response 2 (%vol)	Response 3 (%vol)	Average response (%vol)	Maximum error (%vol)	Maximum error (% F.s.)	Maximum error %
100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	2.20	2.20	2.20	2.20	2.20	0.00	0.00	0.00
100.00	5.00	5.00	5.00	5.00	5.00	0.00	0.00	0.00
100.00	15.00	15.00	15.00	15.00	15.00	0.00	0.00	0.00
100.00	50.00	49.90	49.90	49.90	49.90	0.10	0.10	0.10
100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00

Uncertainty	0.10	%
Max % error	0.10	% FS

Gas verification from **0-100% CH4 LEL (0-4.4% VOL)**

Full scale (%vol)	Gas concentration (LEL%)	Response 1 (LEL%)	Response 2 (LEL%)	Response 3 (LEL%)	Average response (%vol)	Maximum error (LEL%)	Maximum error (% F.s.)	Maximum error %
100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	2.00	0.00	2.00	2.00	1.33	2.00	2.00	2.00
100.00	50.00	0.00	0.00	0.00	0.00	50.00	50.00	50.00

Uncertainty	50.00	%
Max % error	50.00	% FS

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

Page 1 of 2

CERTIFICATION OF CALIBRATION



Issued by: QED Environmental Systems Ltd.

Environmental conditions during calibration

Temp.	21.5	C
Pressure	1000	mBar

Gas bottles used for calibration

Gas	Cylinder number	Expiry date	Gas
N2	S1261680T	16/05/2024	N2
3 ppm	143444SG	20/02/2027	CH4
10 ppm	119779SG	11/04/2024	CH4
100 ppm	S1672767FF	29/05/2027	CH4
1000 ppm	S1035778	01/09/2027	CH4
1.0% Vol	S1198415S	10/04/2024	CH4
2.2% vol	1196601	13/09/2027	CH4
5.0% vol	217147	03/12/2024	CH4
15% vol	269223	07/11/2023	CH4
50% vol	189051SG	23/02/2024	CH4
100% vol	S1182097S	15/11/2025	CH4

Calibration results: Pass

Next scheduled calibration: 27/10/2023

Calibration date: 27/10/2022

Issued by: Laura McBride

Warranty Report

<u>Unit Type:</u> Laser One	<u>Part Number:</u>	<u>Date:</u>	<u>Next Service Due:</u>	<u>Customer Name:</u>
Serial Number: 41300	H-L1001000EN-H	27-Oct-2022	27-Oct-2023	Thermo Fisher Scientific Australia Pty
Actions/Investigation Description	Result	Comments		
Serial Number Check	Yes			
Battery Requires Replacing	No			
Service history of instrument reviewed	Yes			
Instrument turns on	Pass			
Backlight operates correctly	Yes			
External visual inspection performed	Pass			
Internal visual inspection performed	Pass			
Case assembly closed and screws tightened to correct torque	Yes			
Check instrument for visible damages /defects	Pass			
Inwards assessment stage reviewed	Yes			
Buzzer working correctly	Pass			
Software version correct	Pass			
Functionality check e.g. LEDs, , Keypad, Display and Buzzer test	Pass			
Flow is > 0.6 L/min	Pass			
Flow fail test	Pass			
Rattle Test	Pass			
Change external anti-water filter	Complete			

Warranty Report

<u>Unit Type: Laser One</u>		<u>Part Number:</u>	<u>Date:</u>	<u>Next Service Due:</u>	<u>Customer Name:</u>
<u>Serial Number: 41300</u>		H-L1001000EN-H	27-Oct-2022	27-Oct-2023	Thermo Fisher Scientific Australia Pty
Actions/Investigation Description		Result	Comments		
Bluetooth		Pass			
Flow is > 0.6 L/min		Pass			
Instrument turns on		Pass			
As Received Gas Check Performed		Pass	<p>As received today instrument did not present the symptom described by customer reading accurate for</p> <p>3 ; 10 ; 100 ; 200 and 500 ppm however</p> <p>for 1000 PPM the software and the instrument are showing different readings as such Software read 990 while instrument screen read 1850</p> <p>also for 5000 software read 5020 while instrument screen read 5710</p> <p>Checked the calibration tables together with Darren and saw how the values are still accurate both for the software reading and also within the calibration tables,</p> <p>Problem at hand, Why is the screen reading a different value? for details regarding progress of instrument please contact D.Davies</p>		
Keypad/dial test		Pass			
Cable Comms test		Pass			

Warranty Report

Unit Type: Laser One	Part Number:	Date:	Next Service Due:	Customer Name:
Serial Number: 41300	H-L1001000EN-H	27-Oct-2022	27-Oct-2023	Thermo Fisher Scientific Australia Pty
Actions/Investigation Description	Result	Comments		
LEDs checked	Pass			
Laser Bench Realignment & Optimization				
Full Calibration	Pass	Instrument passed calibration. Next calibration date 27/10/2023		
Verification of Instrument	Pass	PASS		

Customer Comments

Under Warranty.
 Reading 1500ppm when using 500ppm gas, but when using 2.5%, it reads correctly.
 Gas sample inlet loose unable to hold tubing - see image behind route card.
 Battery in same tray as analyser

Warranty Information

This instrument has been repaired under warranty due to a fault on one of the PCBs. The fault has been rectified by replacing the PCB. Should you have any queries regarding this issue, or you require any further technical assistance, please do not hesitate to contact us on our office number or via service@geotech.co.uk.

Service Details: Service Scheme	<input type="checkbox"/>	Service Engineer:	Calibration Engineer:	Approved By:	Signature:
Standard Service	<input checked="" type="checkbox"/>	Gary Sharma	Sabin Neagu	Laura McBride	DM



SERVICE & CALIBRATION REPORT

Water Quality Meter

Customer details:

RCA Australia
92 Hill Street
Carrington NSW
Attn: Fiona Brooker

Job no.

230810

Date:

3 August 2023

Instrument model:

HORIBA U-52/10m
Multi-parameter water quality meter

Instrument serial number:

1PH7HSWB 2019

Fault report:

Requires service/calibration.

Repairs carried out:

Replaced DO membrane and replaced pH liquid junction cap on reference electrode. Refilled reference electrode. Cleaned all sensors (dirty).
Re-calibrated all sensors as follows:

Calibration: (in accordance with manufacturer's specifications)

Parameter - unit	Before Calibration	Calibration value	After calibration	Comment
pH (pH)	7.08	7.01	7.01	Pass
pH (pH)	4.31	4.00	4.00	Pass
ORP (mV)	211	225	225	Pass
Conductivity (mS/cm)	0.000	0.000	0.000	Pass
Conductivity (mS/cm)	0.712	0.718	0.718	Pass
Conductivity (mS/cm)	6.60	6.67	6.67	Pass
Conductivity (mS/cm)	56.9	58.6	58.6	Pass
Turbidity (NTU)	0.0	0.0	0.0	Pass
Turbidity (NTU)	6.3	8.0	8.0	Pass
Turbidity (NTU)	84.9	80	80	Pass
Turbidity (NTU)	407	400	400	Pass
D.O. zero (mg/L)	0.00	0.00	0.00	Pass
D.O. span (mg/L)	11.02mg/L@22°C	8.96mg/L@22°C	8.96mg/L@22°C	Pass
Temperature (°C)	22.89°C	23.1°C	23.1°C	Pass

Comments:

MAKE SURE pH reference electrode is refilled with soln #330 regularly. If the #330 soln solidifies inside the pH reference electrode, remove the liquid junction cap and rinse out the old soln with distilled water. Then refill with fresh HORIBA soln # 330 and refit the liquid junction cap.

Calibration carried out by:

Tony Fincher

AUSTRALIAN SCIENTIFIC PTY LTD

11 McDougall Street, Kotara NSW 2289

TEL: 1800 021 083

E-mail: sales@[austscientific.com.au](mailto:sales@austscientific.com.au)

www.austscientific.com.au

Attachment D

Laboratory Report Sheets



CERTIFICATE OF ANALYSIS

Work Order : **ES2331681**
Client : **ROBERT CARR & ASSOCIATES P/L**
Contact : **MS FIONA BROOKER**
Address : **92 HILL STREET**
CARRINGTON NSW 2294
Telephone : **+61 02 4902 9200**
Project : **15579-Quarterly Monitoring**
Order number : **----**
C-O-C number : **----**
Sampler : **FIONA BROOKER**
Site : **----**
Quote number : **SYBQ/400/21**
No. of samples received : **1**
No. of samples analysed : **1**

Page : **1 of 3**
Laboratory : **Environmental Division Sydney**
Contact : **Customer Services ES**
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
Telephone : **+61-2-8784 8555**
Date Samples Received : **15-Sep-2023 16:12**
Date Analysis Commenced : **15-Sep-2023**
Issue Date : **22-Sep-2023 11:23**



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



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.

- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	UW3	----	----	----	----
Sampling date / time					15-Sep-2023 08:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2331681-001	-----	-----	-----	-----
				Result		----	----	----	----
EA165: CO2 - Free and Total									
Free Carbon Dioxide as CO2	85540-96-1	1	mg/L		158	----	----	----	----
Total Carbon Dioxide as CO2	85540-96-1	1	mg/L		868	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		807	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		807	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		456	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.047	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.021	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		0.54	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		11.0	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		11.5	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		3.2	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		11	----	----	----	----



QUALITY CONTROL REPORT

Work Order	: ES2331681	Page	: 1 of 5
Client	: ROBERT CARR & ASSOCIATES P/L	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: 92 HILL STREET CARRINGTON NSW 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 15579-Quarterly Monitoring	Date Samples Received	: 15-Sep-2023
Order number	: ----	Date Analysis Commenced	: 15-Sep-2023
C-O-C number	: ----	Issue Date	: 22-Sep-2023
Sampler	: FIONA BROOKER		
Site	: ----		
Quote number	: SYBQ/400/21		
No. of samples received	: 1		
No. of samples analysed	: 1		



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



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 (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5301915)									
WN2310993-001	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	37	34	6.9	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	217	206	5.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	254	241	5.5	0% - 20%
ES2331632-001	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	4	3	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	4	3	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 5302531)									
ES2331613-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	37	36	3.5	0% - 20%
ES2331613-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	38	39	0.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5308553)									
ES2331446-009	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.132	0.145	9.4	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.11	0.12	0.0	No Limit
ES2330129-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.60	1.58	0.8	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	41.5	42.4	2.1	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 5302529)									
ES2331613-006	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2331613-001	Anonymous	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: 5308603)									
ES2331649-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.94	1.97	1.7	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 (%)
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5308603) - continued									
ES2331683-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	3.75	3.81	1.7	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5308601)									
ES2331614-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	394	389	1.3	0% - 20%
ES2331683-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.2	1.1	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 5308493)									
ES2331408-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	255	254	0.5	0% - 20%
ES2331472-004	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	375	315	17.5	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				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 5301915)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	100	81.0	115
				----	50 mg/L	90.4	80.0	120
ED045G: Chloride by Discrete Analyser (QCLot: 5302531)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	91.5	80.9	127
				<1	1000 mg/L	90.8	80.9	127
EG020F: Dissolved Metals by ICP-MS (QCLot: 5308553)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.9	85.0	114
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.5	82.0	110
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	82.0	112
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5302529)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.8	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5308603)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5308601)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	99.2	69.0	101
				<0.1	1 mg/L	108	70.0	118
				<0.1	5 mg/L	102	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 5308493)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	97.2	72.0	120

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**

				Matrix Spike (MS) Report		
				Spike	SpikeRecovery(%)	Acceptable Limits (%)
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low High
ED045G: Chloride by Discrete Analyser (QCLot: 5302531)						
ES2331613-001	Anonymous	ED045G: Chloride	16887-00-6	50 mg/L	120	70.0 130
EG020F: Dissolved Metals by ICP-MS (QCLot: 5308553)						
ES2330129-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	106	70.0 130



Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
Laboratory sample ID	Sample ID	Method: Compound	CAS Number				
EG020F: Dissolved Metals by ICP-MS (QCLot: 5308553) - continued							
ES2330129-002	Anonymous	EG020A-F: Manganese	7439-96-5	1 mg/L	107	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5302529)							
ES2331613-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	99.7	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5308603)							
ES2331649-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	115	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5308601)							
ES2331633-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	104	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 5308493)							
ES2331423-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	109	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2331681	Page	: 1 of 4
Client	: ROBERT CARR & ASSOCIATES P/L	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Telephone	: +61-2-8784 8555
Project	: 15579-Quarterly Monitoring	Date Samples Received	: 15-Sep-2023
Site	: ----	Issue Date	: 22-Sep-2023
Sampler	: FIONA BROOKER	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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.
- **NO** Matrix Spike outliers occur.
- 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 : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis
EP005: Total Organic Carbon (TOC)						
Clear Plastic Bottle - Natural	UW3	----	----	----	21-Sep-2023	16-Sep-2023
						5

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	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) UW3	15-Sep-2023	----	----	----	18-Sep-2023	29-Sep-2023	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) UW3	15-Sep-2023	----	----	----	16-Sep-2023	13-Oct-2023	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) UW3	15-Sep-2023	----	----	----	20-Sep-2023	13-Mar-2024	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) UW3	15-Sep-2023	----	----	----	16-Sep-2023	17-Sep-2023	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) UW3	15-Sep-2023	----	----	----	20-Sep-2023	13-Oct-2023	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) UW3	15-Sep-2023	20-Sep-2023	13-Oct-2023	✓	21-Sep-2023	13-Oct-2023	✓
EP005: Total Organic Carbon (TOC)							
Clear Plastic Bottle - Natural (EP005) UW3	15-Sep-2023	----	----	----	21-Sep-2023	16-Sep-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		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	16	18.75	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	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
Free and Total CO ₂	EA165-P	WATER	In house: Referenced to APHA 4500-CO ₂ D. 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)
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.
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.
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - 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-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 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 (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 colourimetry 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)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. 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)



☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2170
 Ph: 02 8784 8555 E: samples_sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warnbrock NSW 2304
 Ph: 02 4983 9433 E: samples_newcastle@alsenviro.com

☐ Brisbane: 32 Shand St, Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsanvic.com

☐ Townsville: 14-15 Dasma Ct, Bohle QLD 4816
Ph: 07 4796 6600 E: townsville.environmental@alsanvic.com

☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsensiro.com

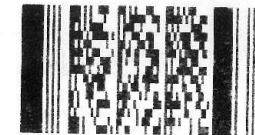
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5005
Ph: 08 8359 0890 E: adelaide@alsensiro.com

☐ Perth: 10 Rod Way, Malaga WA 6090
Ph: 08 6209 7655 E: samples.perth@alsenviro.com

☐ Launceston: 27 Wellington St, Launceston TAS 7250
Ph: 03 6331 2158 E: launceston@alsenviro.com

[illegible]

Environmental Division
Sydney
Work Order Reference
ES2331681



Telephone : + 61-2-8784 8555

LAB OF ORIGIN:
NEWCASTLE

REMAILED



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2331681**

Client : **ROBERT CARR & ASSOCIATES P/L**
Contact : **MS FIONA BROOKER**
Address : **92 HILL STREET
CARRINGTON NSW 2294**

E-mail : **fionab@rca.com.au**
Telephone : **+61 02 4902 9200**
Facsimile : **+61 02 4902 9299**

Project : **15579-Quarterly Monitoring**
Order number : **----**
C-O-C number : **----**
Site : **----**
Sampler : **FIONA BROOKER**

Laboratory : **Environmental Division Sydney**
Contact : **Customer Services ES**
Address : **277-289 Woodpark Road Smithfield
NSW Australia 2164**

E-mail : **ALSEnviro.Sydney@ALSGlobal.com**
Telephone : **+61-2-8784 8555**
Facsimile : **+61-2-8784 8500**

Page : **1 of 2**
Quote number : **ES2017ROBCAR0004 (SYBQ/400/21)**
QC Level : **NEPM 2013 B3 & ALS QC Standard**

Dates

Date Samples Received : **15-Sep-2023 16:12**
Client Requested Due : **22-Sep-2023**
Date

Issue Date : **15-Sep-2023**
Scheduled Reporting Date : **22-Sep-2023**

Delivery Details

Mode of Delivery : **Undefined**
No. of coolers/boxes : **1**
Receipt Detail :

Security Seal : **Not Available**
Temperature : **1°C - Ice present**
No. of samples received / analysed : **1 / 1**

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.**
- 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 - EA165-PH CO2 - Free and Total (Default)	WATER - ED037-P Alkalinity as CaCO3 (Auto Titrator)	WATER - ED045G Chloride by Discrete Analyser	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EK061G Total Kjeldahl Nitrogen as N (TKN) By Discrete	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-04 Nitrite and Nitrate
ES2331681-001	15-Sep-2023 08:00	UW3	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ADMINISTRATOR

- *AU Certificate of Analysis - NATA (COA)	Email	administrator@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	administrator@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	administrator@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	administrator@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	administrator@rca.com.au
- Chain of Custody (CoC) (COC)	Email	administrator@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	administrator@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	administrator@rca.com.au

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	administrator@rca.com.au
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ENVIRO

- *AU Certificate of Analysis - NATA (COA)	Email	enviro@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	enviro@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	enviro@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	enviro@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	enviro@rca.com.au
- Chain of Custody (CoC) (COC)	Email	enviro@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	enviro@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	enviro@rca.com.au

FIONA BROOKER

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

Attachment E

Results Summary

Sample Identification		Laboratory PQL	Aquatic Ecosystem Guideline ^A	Human Health (Ingestion) Guideline ^B	Solid Waste Landfill Guideline ^C	Irrigation Guideline ^D	Livestock Guideline ^E	US1	UW1	UW2	UW3	UL1
Date								14-Sep-23	14-Sep-23	15-Sep-23	14-Sep-23	15-Sep-23
Groundwater Level (m AHD)								--	84.24	79.24	85.42	--
Depth (m top of water surface)								--	18.87	8.62	5.21	<0
Volumetric Flow Rate (kL/day)								Nil	--	--	--	Nil
Sample Purpose								Surface Water Monitoring	Groundwater Monitoring	Groundwater Monitoring	Groundwater Monitoring	Leachate Monitoring
Sample Description								Clear, light brown	Turbid, light brown, no odour	Clear / translucent, no odour	Clear, no odour	Clear. Low water level
Sample collected by								RCA-FB	RCA-FB	RCA-FB	RCA-FB	RCA-FB
Field Readings												
Temperature (°C)								18.12	17.75	14.18	15.24	20.18
pH (pH UNIT)		6.5 - 8.0				<6 ^F		7.53	6.73	6.93	6.23	7.69
ORP (mV)								41	156	190	225	76
Conductivity (uS/cm)		1000					>3582	1760	1730	1920	3160	1710
Turbidity (NTU)								191	>1000	1.98	29.8	13.6
Dissolved Oxygen (mg/L)								4.85	3.07	2.18	0.94	1.73
Salinity (%)								0.089	0.087	0.097	0.164	0.086
Methane Gas (ppm)				10000				--	2.5	2.4	4.8	--
Non Metallic Inorganics												
Total Organic Carbon	1							--	--	--	11	--
Free Carbon Dioxide as CO ₂	1							--	--	--	158	--
Total Carbon Dioxide as CO ₂	1							--	--	--	868	--
Nutrients												
TKN	0.1							--	--	--	3.2	--
Nitrite	0.01							--	--	--	0.54	--
Nitrate	0.01							--	--	--	11	--
Total Oxidisable Nitrogen as N	0.01	0.015			5	90		--	--	--	11.5	--
Total Nitrogen as N	0.1							--	--	--	14.7	--
Major Anions												
Hydroxide Alkalinity as CaCO ₃	1							--	--	--	<1	--
Carbonate Alkalinity as CaCO ₃	1							--	--	--	<1	--
Bicarbonate Alkalinity as CaCO ₃	1							--	--	--	807	--
Total Alkalinity as CaCO ₃	1							--	--	--	807	--
Chloride	1							--	--	--	456	--
Metals (dissolved)												
Arsenic	0.001	0.013	0.01					--	--	--	0.047	--
Iron	0.05	0.3						--	--	--	<0.05	--
Manganese	0.001	1.9	0.5					--	--	--	0.021	--

All results are in units of mg/L unless otherwise stated

Blank Cell indicates no criterion available

PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory

^A ANZG 2018 95% Protection Level for Fresh Waters and Default trigger values for aquatic ecosystems in upland rivers of south-east Australia that are slightly-moderately disturbed

^B NHMRC Australian Drinking Water Guidelines, 2011.

^C EPA Solid Waste Landfill Guidelines, methane in enclosed spaces

^D Guidelines presented based on ANZECC Long term irrigation water trigger value for use up to 100 years

^E Based on low risk trigger values for livestock drinking water

^F Causes corrosion of pipes

ANZG guidelines in *italics* are low level reliability guidelines

NHMRC arsenic guidelines are based on total arsenic

Results shown in shading are in excess of the 99% aquatic ecosystems guidelines

Results shown in **BOLD** are in excess of the 95% aquatic ecosystems guidelines

Results shown in underline are in excess of the human health (ingestion) guideline

Results shown in *italics* are in excess of the solid waste guideline

Results shown in shading are in excess of the long term irrigation guidelines

Results shown in shading are in excess of the livestock guidelines