GROUNDWATER MONITORING – MAY 2024

TOLL SITE TOMAGO

Prepared for TOLL GROUP

Prepared by RCA Australia

RCA ref 12513e-211/0

JULY 2024

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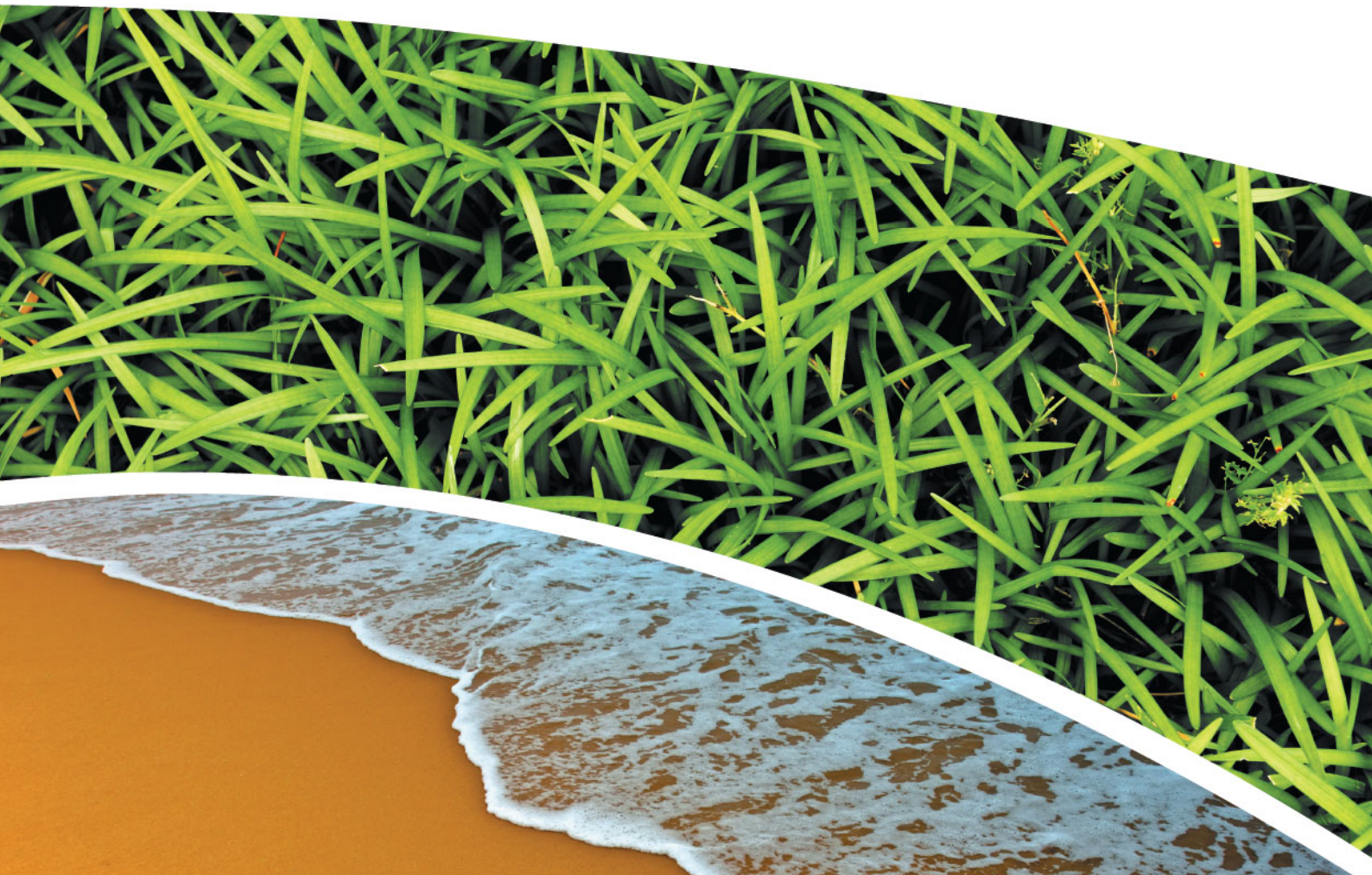

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RCA ref 12513e-211/0

19 July 2024

Toll Group
Old Punt Road
Tomago NSW 2322

Attention: Stefan Nightingale

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GROUNDWATER MONITORING REPORT – MAY 2024
TOLL SITE, TOMAGO

1 INTRODUCTION

This report presents the findings of a groundwater monitoring round undertaken at the Toll Group's (Toll) Tomago site as part of the continuation of a monitoring programme being implemented at the site.

A total of eleven (11) monitoring wells are located at the site, however one (1) well (MW8) has its entire screened interval situated below the groundwater surface and was replaced (by MW8a) and one (1) well (MW5) is inaccessible under a shed / container. As such, nine (9) of the total 11 groundwater wells are used for long term monitoring. Four (4) of the wells are situated in close proximity to the current and former petroleum storage area and the remainder are situated around the site. The locations of the wells are included on **Drawing 1**, **Appendix A**.

Historical monitoring has identified the presence of hydrocarbons and metals in some wells and ammonia in all wells. The Environment Protection Licence (EPL #20125) for the site was amended, formally in March 2022, to include monitoring of selected groundwater wells at the site. The current EPL requires the following six-monthly monitoring in relation to groundwater:

- Hydrocarbons at MW1, MW2, MW3 and MW4.
- Ammonia, electrical conductivity, nitrate, nitrite and standing water level from MW1, MW2, MW3, MW4, MW6 and MW10.
- Metals at MW1, MW2, MW3, MW4 and MW10.

This report presents the findings of the May 2024 round of monitoring implemented in accordance with the EPL as requested by Stefan Nightingale of Toll. The next monitoring round will be undertaken in accordance with a Sampling and Analysis Quality Plan (SAQP, Ref [1]), issued under section 8 of the EPL. The SAQP has been endorsed by the appointed NSW EPA accredited Contaminated Land Site Auditor.

2 SITE IDENTIFICATION AND DESCRIPTION

The site is described as 12 Old Punt Road, Tomago and Lot 7 DP562394. The site is currently used for the storage of ammonium nitrate, heavy vehicle storage and maintenance works.

Additional site details are shown in **Table 1**.

Table 1 *Site Details*

Current zoning (Ref [2])	E4 – General Industrial
Current use	Storage of Ammonium Nitrate
Size of site	2.59ha
Land use to the: North	Light industrial – petroleum fuel dispensing facility
South	Light industrial
East	Old Punt Road, light industrial
West	Vacant, vegetated land
Nearest sensitive receptor (human health)	Adjacent residence (although considered to be used as a commercial property) and onsite workers
Nearest sensitive receptor (environmental)	Unnamed creek approximately 900m to north west, marsh lands approx. 700m to the west and unnamed creek approximately 1km to south west – both of which connect to Hunter River.

Drawing 1, **Appendix A** shows the locality and the layout of the site.

3 FIELDWORK

A team of environmental personnel experienced in the sampling and handling of potentially contaminated groundwater undertook monitoring of nine (9) wells on 20 and 21 May 2024 as per the EPL monitoring requirements. The scope of work included:

- Field screening of volatile hydrocarbon vapours in the air space around each well and in the well head space using a photoionisation detector (PID).

  - It is noted that none of the wells have a gas sampling cap and as such field screening the air space around the wells was undertaken prior to removing the groundwater well cap and while screening in the well head space was undertaken by immediately inserting the PID probe into the well head space after removal of the groundwater cap. The field screening readings are indictive, noting that there was likely to be some loss of volatiles during the well cap removal process such that the PID readings may not be fully representative of the volatile hydrocarbon vapours within the well head space.

- Dipping of all accessible wells to measure the depth to the groundwater and presence of any phase separated light non-aqueous phase liquid (LNAPL). No assessment for phase separated dense non-aqueous phase liquid (DNAPL) was undertaken.
  - MW5 could not be located due to undercover pavement or containers and MW8 was excluded from the scope.
- Placement of a low flow pump into the well and purging until pH and EC readings stabilised. It is noted that the groundwater within some of the wells was lowered during the purging and sampling process and the recharging of groundwater in these wells was slow.
  - A new bladder was utilised for each well.
- Following the stabilisation of pH and electrical conductivity readings, additional field readings of turbidity, dissolved oxygen, temperature and salinity were recorded, and a sample was collected into laboratory prepared bottles and then placed into an insulated container on ice.
  - Samples were 0.45μm filtered prior to preservation for metals analysis.
- The samples were transported to the NATA accredited analytical laboratory the same day of sampling and analysed for a suite of chemicals which included benzene, toluene, ethylbenzene, xylene, naphthalene (BTEXN), total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH), metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc, mercury), ammonia and oxidisable nitrogen.

The relevant calibration sheet for the water quality meter and field sheets are attached in **Appendix B**.

The recorded PID readings were 0.0ppm at all wells.

Groundwater was measured to be at between 0m (MW10) and 1.13m (MW7) below the surface.

Visual or olfactory indications of hydrocarbon contamination were identified at well MW4 only during sampling. No LNAPL was identified in well MW4 during gauging or sampling.

Due to the use of designated tubing and bladders, the decontamination of the sampling equipment comprised the rinsing of the pump housing after every sample with potable water and distilled water.

4 QUALITY ASSURANCE/QUALITY CONTROL

RCA has reviewed the quality assurance and control in **Appendix C** and assessed the data as follows:

- Accuracy
    - The accuracy of the data has been assessed by internal means (surrogates, laboratory control samples, matrix spikes and method blanks) as being generally acceptable. All the results were within acceptance criteria or not considered to indicate significant uncertainty.
    - The accuracy of the data has not been assessed by external means due to the extent of the scope.

    As such the accuracy of the data set is considered acceptable to the extent it was assessed.
- Precision
    - The precision of the data has been assessed by internal means (duplicates) as being acceptable. All the results were within acceptance criteria or not considered to indicate significant uncertainty.
    - The precision of the data has been assessed by external means (intralaboratory duplicates) as being generally acceptable. The results were within acceptance criteria or minor noncompliance which is not considered to indicate significant uncertainty.

    As such the precision of the data set is considered acceptable.
- Completeness
    - All data that was sought during the investigation was able to be retrieved.
    - Chain of custody were completed for all samples.

    As such, completeness is considered 100% for the collected samples.
- Representativeness
    - This assessment has considered groundwater contaminant concentrations on-site. The method of sampling was appropriate for the sampling of volatile compounds within water which was a potential concern at the site.

    As such the groundwater data is considered representative of the concentrations at the site.
- Comparability
    - Works were undertaken by personnel experienced in the sampling of potentially contaminated groundwater. The methodology of groundwater sampling is consistent with the majority, and the most recent, groundwater sampling techniques.
    - All samples were appropriately preserved for the requested analysis and all groundwater samples were kept on ice or in the refrigerator between sampling and analysis.

- All laboratory analyses have been conducted by NATA accredited methodologies that comply with the international standard methods.
- Comparable analytes shown some concurrence between analytical results. The detected concentrations show some concurrence with field observations of the presence of contamination.

As such it is considered that the comparability of the data is appropriate.

It is therefore considered that the data obtained from this testing is generally accurate and adequately reliable in as far as it can be ascertained.

5 RESULTS

Groundwater results from this sampling round are compared to the relevant criteria in **Appendix D**; the following presents a summary.

Groundwater depths of monitoring wells since 2017 were shown in **Figure 1** below. The groundwater MW10 remains as 0m (at ground level) since the December 2021 monitoring round. Groundwater depths for all the remaining wells were increased since the previous round in November 2023.

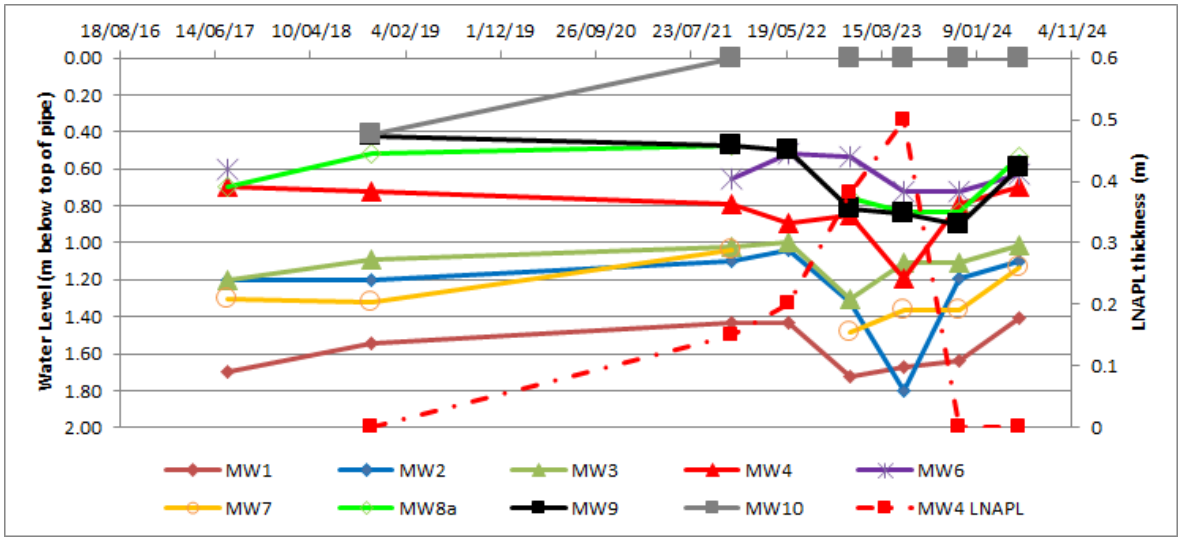


Figure 1 *Groundwater levels 2017-2024.*

Groundwater contours were generated from the water levels using surveyed data for the wells and indicates a westerly flow direction as presented on **Drawing 1**, **Appendix A**, noting that RCA have excluded MW10 based on the understanding that it is representative of a different aquifer. It is noted that the flow direction is consistent with the previous round in November 2023. RCA also noted that the height of the pipe at MW1 is inconsistent with the surveyed difference of top of pipe and ground level and as such has used the ground level survey as the basis for the assessment of groundwater flow direction. The change in pipe height is considered to be associated either with pipe breakage or settling of the previously filled surface. It is noted that based on the MW1 log, the screen remains above the groundwater level.

With regards chemical concentrations:

- pH ranged from 4.21 at MW10 to 7.16 at MW1.
- Electrical conductivity ranged from 0.77mS/cm at MW1 to 17.4mS/cm at MW10.
- BTEX were not detected in monitoring wells MW1, MW2 or MW3 and as such concentrations are below the ecological (Ref [3]) and the drinking water criteria (Ref [4]). The results are generally consistent with previous results.

  Benzene concentrations were detected in MW4 at reduced concentrations to that detected in November 2023; the concentration is in excess of the drinking water criterion. Toluene, ethylbenzene and xylene were not detected, and concentrations are well below the drinking water and the ecological criteria.

  - It is noted that due to the groundwater depth being less than two (2) metres below the surface, the vapour based human health criteria (Ref [5]) for benzene and F1[1] are not applicable. For completeness only RCA reviewed the results and note that the MW4 concentrations are approximately 0.08% of the benzene guideline criterion and 64% of the F1 criterion.
  - The concentration of F2 (TRH >C_{10}-C_{16}) at MW4 of 16,500 mg/L is significantly above the solubility limit of 3.0 mg/L, indicating formation of a separate non-aqueous phase (i.e. LNAPL) is highly likely to occur.
- TRH was detected in MW1 and MW4 and as such are in excess of the ecological criterion (Ref [3]). No detectable concentrations were present in MW2 or MW3. The results of MW2 and MW3 represent a decrease (to between 40-63%) of the November 2023 results whereas the MW1 and MW4 results represent an increase (113% and 6200% respectively). All are within the historical data ranges (refer **Figure 2** below).
- PAH compounds were identified in MW2, MW3 and MW4. Results are all less than the ecological criteria except the naphthalene and phenanthrene concentrations at MW4. The anthracene, benzo(a)pyrene and fluoranthene in this well are inferred to be in excess of the ecological criteria although cannot be distinctly quantified due to the raised detection limit.

  No anthracene or benzo(a)pyrene was detected in MW1, MW2 or MW3 however the detection limit of these compounds is in excess of the ecological criterion and drinking water criterion respectively.
- Metals were detected in at least one of the five (5) monitored wells (MW1, MW2, MW3, MW4 and MW10).
  - Arsenic was detected in MW2, MW3, MW4 and MW10; all concentrations were below the ecological and drinking water criteria.
  - Cadmium was detected only in MW10; the concentration was equal to the ecological criterion and less than the drinking water criterion.

[1] TRH C_{6}-$_{10}$ concentrations minus BTEX concentrations. The criteria for TEXN and volatile TRH >C_{10}-C_{16} for commercial / industrial land use is not limiting.

- Chromium was detected only in MW10; concentrations in excess of the ecological criterion and less than the drinking water criterion (hexavalent chromium criterion is adopted for screening purposes). This is consistent with the historical data range.
- Copper was detected only in MW1; concentrations in excess of the ecological criterion and less than the drinking water criterion, at increased levels since the November 2023 monitoring round.
- Lead was detected only in MW4 and MW10; concentrations are in excess of the ecological criterion and less than the drinking water criterion. The MW4 concentration has slightly increased and the MW10 slightly decreased since the November 2023 monitoring results.
- Nickel was detected in all wells; concentrations are in excess of the ecological criterion at MW2 and MW10 only. All concentrations are increased from those in November 2023 except MW3.
- Zinc concentrations are in excess of the ecological criterion at all wells; concentrations were increased from those in November 2023 with the exception of MW3 and MW4 in which the concentration decreased slightly.

- Ammonia was detected in all wells; concentrations are in excess of the ecological criterion at MW2, MW3 and MW4 only as presented in **Figure 3**. All results represent a decrease to those from November 2023, ranging from 4% to 98% (at MW1). All results were within the historical ranges.
- Oxidisable nitrogen (nitrate + nitrite) was detected in all wells; concentrations are in excess of the ecological criterion at all wells with the exception of MW2, which is equal to ecological criterion as presented in **Figure 3**. The results represent a significant increase compared to the previous November 2023 monitoring round with exception of MW4. The concentrations are within the historical data ranges with the exception of MW3 and MW6 which were the highest in the relevant historical ranges; the MW10 was equal to the highest in the historical range.

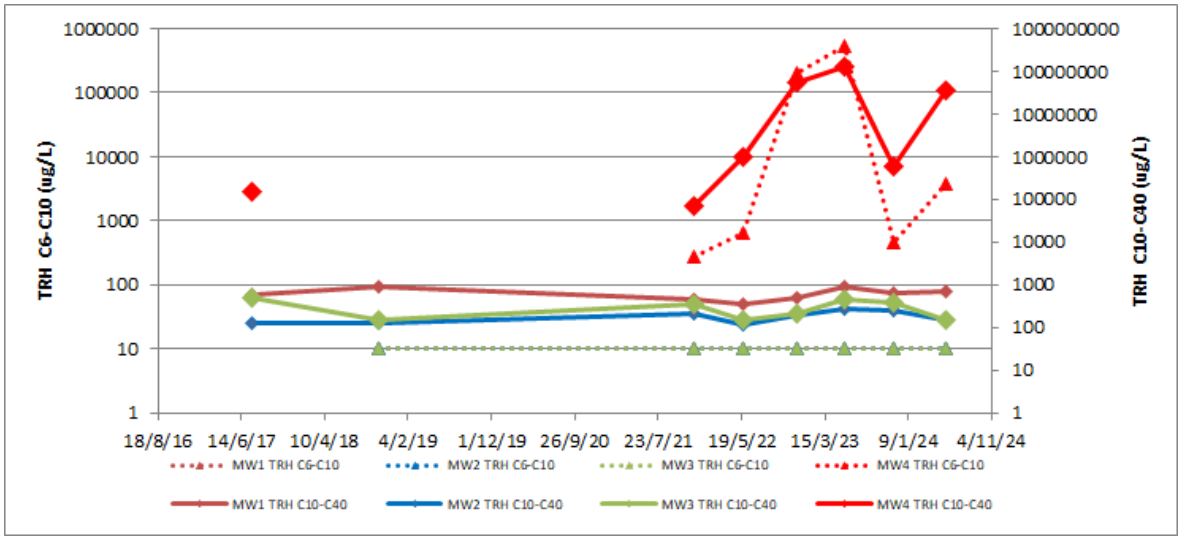


Figure 2 *TRH Concentrations 2017-2024 (noting that 2017 data does not include TRH C_6-C_{10} and that MW1, MW2 and MW3 TRH C_6-C_{10} has not been detected such that all data is represented by the MW3 series).*

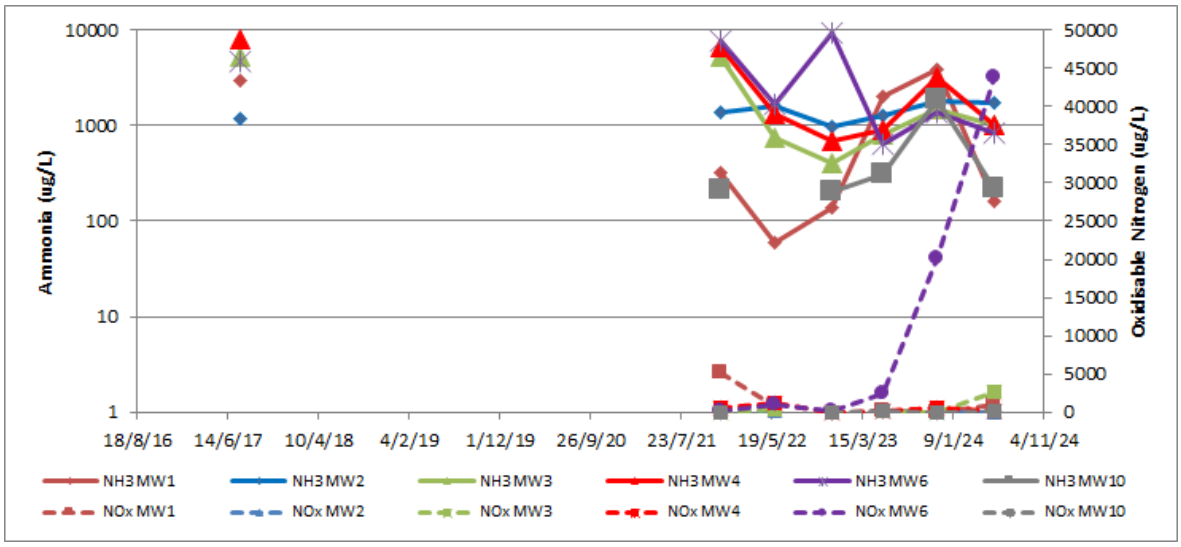


Figure 3 *Ammonia and Oxidisable Nitrogen Concentrations 2017-2024.*

6 DISCUSSION

Based on the results it is considered that groundwater is impacted by:

- Hydrocarbons in the immediate vicinity of the petroleum infrastructure and historical spill, particularly MW4 which is in close proximity (<5m) from the refuelling area and associated bowser.
- Ammonia and nitrogen in the northern part of the site.

A historical surface hydrocarbon spill occurred at the site and MW1, MW2 and MW3 were installed as part of remediation / validation works. While hydrocarbons have been detected in these wells, the concentrations are minor compared to those detected in MW4. The contamination is considered to be indicative of a diesel product however no specific identification analysis has been undertaken. It is noted that the cause of the increase in hydrocarbon concentrations (since 2021 until May 2024 except previous round November 2023) at MW4 is also unknown in the absence of any known leak of the site's current petroleum facilities.

The concentrations of ammonia at three (3) wells (MW2, MW3, MW4) were in excess of the ecological criterion (Ref [3]) at between approximately 1.1 to 2.0 times the criterion. The highest ammonia concentration at MW2 (the upgradient of the sampled wells) indicated that an offsite source of ammonia is possible, noting that the low result in MW1 indicates significant variation within that well's historical range. The receiving water is considered likely to be the Hunter River however groundwater may first discharge into the wetland area to the north and west of the site or into one of the unnamed creeks to the north west and south west.

Ammonium nitrate is stored at the site however current practices are such that unless there is an accident that results in the breakage of a bulk bag there should not be any product leakage to the ground.

The metals concentrations in the groundwater are in excess of the ecological criteria, however in the absence of any specific source of metals except potentially lead in association with the petroleum contamination, it is not considered that the site is the likely source of the detected metals. Nickel and zinc are the only metals considered to represent a potential risk to the environment. No further action is considered to be necessary with regards to metals concentrations unless concentrations indicate a potential source of contamination at the site.

7 CONCLUSIONS

This report has presented the findings of groundwater monitoring undertaken at the Toll site situated in Tomago which is currently used for storage of bulk ammonium nitrate as well as storage and maintenance of the heavy vehicle fleet.

A total of six (6) groundwater monitoring wells were sampled and chemically analysed in May 2024 in accordance with the EPL requirements. The collected samples were analysed for hydrocarbons, metals and nitrogen compounds including ammonia, in general accordance with the EPL.

No LNAPL was identified at MW4 during field gauging however dissolved hydrocarbon concentrations had significantly increased to greater than 61 times the previous November 2023 result. Hydrocarbon contamination at MW2 and MW3 had decreased by 38% and 61% and increased at MW1 by 13%.

Concentrations of zinc at all five (5) monitored wells, nickel at MW2, lead at MW4, and chromium, lead, nickel at MW10, were in excess of the ecological guidelines (Ref [3]). The source is not considered to be the site in the absence of any known metal contaminating activity.

Ammonia was detected at all wells and in excess of the guidelines (Ref [3]) at MW2, MW3 and MW4. Oxidisable nitrogen was detected at all wells and in excess of the guidelines at all wells except MW2 which is equivalent to ecological guideline. The source is considered to be historical use of the site, given that current site practices appear to be suitable for the minimisation of potential ammonia contamination from the storage of ammonium nitrate at the site. It is noted that the NSW EPA is satisfied with Toll's 'debagging procedure' and has incorporated its implementation to the existing EPL.

The next groundwater monitoring event will be required in accordance with the SAQP (Ref [1]).

8 LIMITATIONS

This report has been prepared for Toll Group 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 Toll Group. The report may not contain sufficient information for purposes of other uses or for parties other than Toll Group. 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.

Yours faithfully

RCA AUSTRALIA

Muhammad Hayyat
Environmental Engineer
BEng, MEng (Env)

REFERENCES

[1] RCA Australia, *Sampling and Analysis Quality Plan for Further Groundwater Assessment Works, Toll Tomago Site*, RCA ref 12513d-410/1, July 2024.

[2] Port Stephens Council, *Port Stephens Local Environment Plan 2013 under the Environmental Planning and Assessment Act 1979* as updated 22 March 2024.

[3] 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.

[4] National Health and Medical Research Council, *Australian Drinking Water Guidelines*, 2011.

[5] NEPC, *National Environment Protection (Assessment of Site Contamination) Measure*, 1999 as amended 2013.

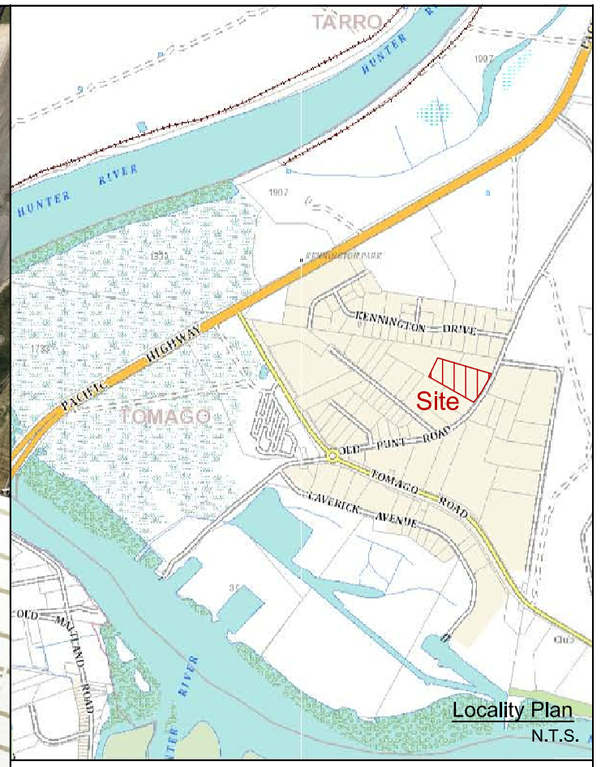
[6] Standards Australia, *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds*, AS 4482.1-2005.

GLOSSARY

ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure.
Intralaboratory	A sample split into two and sent blind to the sample laboratory for comparative analysis.
kg	kilogram, 1000 gram.
LEP	Local environment plan. A planning tool for the Local Government.
µg	microgram, 1/1000 milligram.
mg	milligram, 1/1000 gram.
NAPL	Non-aqueous phase liquid. This can be lighter than water (LNAPL), or more dense than water (DNAPL).
NEPC	National Environment Protection Council.
NHMRC	National Health and Medical Research Council.
NSW EPA	NSW Environment Protection Authority – made a separate entity in 2011 to regulates the contaminated land industry.
PID	Photoionisation detector. Measures volatile gases in air or emanating from soil or water.
PQL	Practical Quantitation Limit.
QA	Quality Assurance.
QC	Quality Control.
RPD	Relative Percentage Difference.
<u>Chemical Compounds</u>	
BTEXN	Benzene, toluene, ethylbenzene, xylene, naphthalene.
PAH	Polycyclic aromatic hydrocarbons. Multi-ring compounds found in fuels, oils and creosote. These are also common combustion products.
TPH	Total petroleum hydrocarbons.
TRH	Total recoverable hydrocarbons

Appendix A

Drawing



LEGEND

- Approximate location of site boundary
- Approximate location of historical diesel spill
- Approximate groundwater monitoring well location (2018)
- Approximate groundwater monitoring well location (RCA Report 12513-203/1, August 8 2017)
- Approximate soil borehole and/or groundwater monitoring well location (previous investigation GEOTSGTE20230AA)
- Inferred groundwater contours (MW1-4, MW6, MW7, MW8a, MW9 only)
- Inferred groundwater direction

Aerial image taken from Nearmap, 3 April 2024
(Used in accordance with commercial licence)

Note: Storage/parking areas slightly different than observed

0 10 20 30 40 50
metres

N

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SITE LOCALITY AND LAYOUT PLAN GROUNDWATER MONITORING 12 OLD PUNT ROAD TOMAGO

CLIENT	Toll Group			RCA Ref	12513e-211/0
DRAWN BY	FB	SCALE	~1 : 1000 (A3)	DRAWING No	1 REV 0
APPROVED BY	FB	DATE	19/07/2024	OFFICE	NEWCASTLE

CDT-DWG-A3H-001/1

Appendix B

Calibration Record and Field Sheets

SERVICE & CALIBRATION REPORT
Water Quality Meter

Customer Details:	Job Number	Date
RCA 92 Hill Street Carrington Attn: Kenny Yan	240326	19/03/2024

Instrument Model:	Instrument Serial Number:
HORIBA U-52/10m Multi-Parameter Water Quality Meter	1PH7HSWB 2019

Fault Report

Requires service/calibration.

Repairs Carried Out

Replaced DO membrane. Replaced pH glass electrode (slow response). Refilled pH reference electrode (solidified). 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)	6.63	7.01	7.01	Pass
pH (pH)	4.51	4.00	4.00	Pass
ORP (mV)	238	225	225	Pass
Conductivity (mS/cm)	0.000	0.000	0.000	Pass
Conductivity (mS/cm)	0.702	0.718	0.718	Pass
Conductivity (mS/cm)	6.52	6.67	6.67	Pass
Conductivity (mS/cm)	58.1	58.6	58.6	Pass
Turbidity (NTU)	12.8	0.0	0.0	Pass
Turbidity (NTU)	35.1	8.0	8.0	Pass
Turbidity (NTU)	91.2	80.0	80.0	Pass
Turbidity (NTU)	409	400	400	Pass
D.O. zero (mg/L)	0.00	0.00	0.00	Pass
D.O. zero (mg/L)	7.71mg/L @ 23°C	8.81mg/L @23°C	8.81mg/L @23°C	Pass
Temperature (°C)	24.83°C	24.9°C	24.9°C	Pass

Sensors:

pH Glass Electrode	pH Ref Electrode	ORP Electrode	DO Electrode
211143	WGTAD2NV	NH00S3C6	X3H6CF5A

Comments:

MAKE SURE the pH reference electrode is refilled with soln #330 regularly. If the #330 soln solidifies inside the pH reference electrode, remove the liquid junction cap (flat black rubber cap with wick in the middle) and rinse out the old solution with distilled water. Then refill with fresh HORIBA soln # 330 and refit the liquid junction cap. Please read the notes on pH maintenance.

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 **www.austscientific.com.au**

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ENGINEERING FIELD SHEET

WATER GAUGING RECORD

CLIENT: Toll Group
PROJECT: Groundwater Monitoring Programme
LOCATION: Toll Tomago Site

DATE: 20-5-2024
PROJECT No: 12513e
CLIENT REF:

BORE OR LOCATION ID: MW1
TIME: 12:45 **TO** 12:50
BORE DEPTH: 2.35m (m TOP) **HEIGHT ABOVE GROUND LEVEL:** 0.77m
DEPTH TO LNAPL: N/A **PID SURFACE (ppm):** NA
DEPTH TO AQUIFER: 1.41 m **PID IN WELL (ppm):** 0

BORE OR LOCATION ID: MW2
TIME: 12:50 **TO** 12:55
BORE DEPTH: 2.87 (m TOP) **HEIGHT ABOVE GROUND LEVEL:** 0.6m
DEPTH TO LNAPL: NA **PID SURFACE (ppm):** NA
DEPTH TO AQUIFER: 1.10m **PID IN WELL (ppm):** 0

BORE OR LOCATION ID: MW3
TIME: 12:55 **TO** 13:00
BORE DEPTH: 3.83 (m TOP) **HEIGHT ABOVE GROUND LEVEL:** 0.48m
DEPTH TO LNAPL: NA **PID SURFACE (ppm):** NA
DEPTH TO AQUIFER: 1.01 **PID IN WELL (ppm):** 0

BORE OR LOCATION ID: MW4
TIME: 13:40 **TO** 13:45
BORE DEPTH: 3.3 (m GL) ~~**HEIGHT ABOVE GROUND LEVEL:**~~
DEPTH TO LNAPL: NA **PID SURFACE (ppm):** 0
DEPTH TO AQUIFER: 0.7m **PID IN WELL (ppm):** 0

BORE OR LOCATION ID: MW5
TIME: Cannot locate **TO**
BORE DEPTH: (m GL) ~~**HEIGHT ABOVE GROUND LEVEL:**~~
DEPTH TO LNAPL: **PID SURFACE (ppm):**
~~**DEPTH TO AQUIFER:**~~ **PID IN WELL (ppm):**

RCA Australia	Sampled by: AM / MH	Date: 20.5.24

EFS-WSR-001/4

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BORE OR LOCATION ID: MW6

TIME: 13:05 **TO** 13:10

BORE DEPTH: 3.28 (m GL) ~~**HEIGHT ABOVE GROUND LEVEL:**~~ _____

DEPTH TO LNAPL: NA **PID SURFACE (ppm):** 0

DEPTH TO AQUIFER: 0.63m **PID IN WELL (ppm):** 0

BORE OR LOCATION ID: MW7

TIME: 13:15 **TO** 13:20

BORE DEPTH: 3.04 (m GL) ~~**HEIGHT ABOVE GROUND LEVEL:**~~ _____

DEPTH TO LNAPL: NA **PID SURFACE (ppm):** 0

DEPTH TO AQUIFER: 1.13m **PID IN WELL (ppm):** 0

BORE OR LOCATION ID: MW8a

TIME: 13:35 **TO** 13:40

BORE DEPTH: 1.36 (m GL) ~~**HEIGHT ABOVE GROUND LEVEL:**~~ _____

DEPTH TO LNAPL: NA **PID SURFACE (ppm):** 0

DEPTH TO AQUIFER: 0.53m **PID IN WELL (ppm):** 0

BORE OR LOCATION ID: MW9

TIME: 13:30 **TO** 13:35

BORE DEPTH: 2.84 (m GL) ~~**HEIGHT ABOVE GROUND LEVEL:**~~ _____

DEPTH TO LNAPL: NA **PID SURFACE (ppm):** 0

DEPTH TO AQUIFER: 0.59m **PID IN WELL (ppm):** 0

BORE OR LOCATION ID: MW10

TIME: 13:25 **TO** 13:30

BORE DEPTH: 2.9 (m GL) ~~**HEIGHT ABOVE GROUND LEVEL:**~~ _____

DEPTH TO LNAPL: NA **PID SURFACE (ppm):** 0

DEPTH TO AQUIFER: 0 **PID IN WELL (ppm):** 0

RCA AUSTRALIA
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ENGINEERING FIELD SHEET

WATER SAMPLING RECORD

CLIENT: Toll Group
PROJECT: Groundwater Monitoring Programme
LOCATION: Toll Tomago Site
DATE: 21-05-24
PROJECT No: 12513e
CLIENT REF:
WATER METER USED:
METHOD OF SAMPLING: Low flow pump
PRESERVATION & STORAGE (TICK): Field Temp ☐ Chilled (<4°C) ☐ Frozen ☐
Un-preserved ☐ Preserved: ☐ Acid (H_2SO_4) ☐ Acid (HNO_3) ☐ Alkaline (NaOH) ☐ Filtered ☐
TESTS REQUIRED: Refer to Each Location

BORE OR LOCATION ID: MW1
TIME: 10:40 Am TO 10:50 ANALYSIS NEEDED: Ammonia, Nitrate, Nitrite, EC, Hydrocarbons, metals
RESULTS OF WATER QUALITY CHECK VOLUME PURGED: Less than 1L

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	7.24	0.82	65.3	1.46	19.56	0.040
2/	7.16	0.77	48.0	1.04	19.40	0.038
3/						
4/						
5/						
6/						

Sample Appearance: clear to slightly turbid, no odour
Duplicate/Equipment Wash Identification and Other Remarks:

BORE OR LOCATION ID: MW2
TIME: 10:55 TO 11:55 Am ANALYSIS NEEDED: Ammonia, Nitrate, Nitrite, EC, Hydrocarbons, metals
RESULTS OF WATER QUALITY CHECK VOLUME PURGED: 3L+

QA = MW2

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	6.28	6.83	71.2	3.70	20.79	0.383
2/	6.15	6.98	60.4	2.60	20.63	0.378
3/	6.21	6.31	53.5	3.51	20.35	0.337
4/	6.25	5.41	46.5	3.98	20.22	0.315
5/						
6/						

Sample Appearance: slightly turbid, pale brown, no odour
Duplicate/Equipment Wash Identification and Other Remarks: Yes

BORE OR LOCATION ID: MW3
TIME: 12:04 Pm TO 12:45 ANALYSIS NEEDED: Ammonia, Nitrate, Nitrite, EC, Hydrocarbons, metals
RESULTS OF WATER QUALITY CHECK VOLUME PURGED: 5L

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	6.08	10.6	439	~~2.00~~ 0.35	21.10	0.557
2/	6.34	6.13	523	0.21	20.62	0.316
3/	6.38	5.12	472	0.28	20.43	0.261
4/						
5/						
6/						

Sample Appearance: Slightly Turbid, pale brown, no odour
Duplicate/Equipment Wash Identification and Other Remarks:

RCA Australia	Sampled by:	Date:

2.27
2.2

1.77

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

BORE OR LOCATION ID: MW4 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC, Hydrocarbons, metals
TIME: 1:50 pm **TO** _____ **VOLUME PURGED:** 5L+
RESULTS OF WATER QUALITY CHECK Do not sample if LNAPL present

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	6.40	11.4	0	0.67	21.59	0.626
2/	6.49	7.30	0	0.94	21.36	0.394
3/	6.49	7.18	71000	0.80	21.38	0.404
4/	6.46	7.41	71000	0.77	21.43	0.416
5/						
6/						

Sample Appearance: ~~Turbid, brown, no odour.~~ Dark grey, hydrocarbon odour.
Duplicate/Equipment Wash Identification and Other Remarks: oily sheens

BORE OR LOCATION ID: MW6 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC.
TIME: 9:10 Am **TO** 9:55 **VOLUME PURGED:** 3L+
RESULTS OF WATER QUALITY CHECK

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	5.65	5.54	0	6.30	18.81	0.294
2/	5.73	5.24	0	6.15	18.90	0.280
3/	5.76	5.19	0	5.93	18.90	0.279
4/						
5/						
6/						

Sample Appearance: Turbid, brown, no odour.
Duplicate/Equipment Wash Identification and Other Remarks: I think so rainwater went into (well. (I presumed with colour)

BORE OR LOCATION ID: MW10 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC, metals
TIME: 12:55 **TO** 1:40 pm **VOLUME PURGED:** 6L+
RESULTS OF WATER QUALITY CHECK

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	4.22	17.1	0	3.90	21.59	1.005
2/	4.21	17.4	0	3.17	22.02	1.024
3/						
4/						
5/						
6/						

Sample Appearance: Turbid, pale brown, no odours.
Duplicate/Equipment Wash Identification and Other Remarks: (no Lib)

RCA Australia	Sampled by:	Date:

Appendix C

Quality Assurance Review and Laboratory Report Sheets

One (1) water intralaboratory duplicate sample was submitted blind to the laboratory for analysis with the batch of samples. This represents a percentage of greater than 10%, in accordance with the frequency recommended for soil samples by the Australian Standard AS 4482.1 (Ref [5]) and RCA protocol.

One trip blank and one trip spike were submitted with the batch of samples by field personnel in accordance with the frequency recommended for soil samples by the Australian Standard AS 4482.1 (Ref [5]) and RCA protocol.

RCA omitted the field blank due to the low potential for cross contamination from the field conditions during the sampling process and the equipment wash due to the low potential for cross contamination from the designated sampling equipment.

Results, as shown further in this **Appendix**, indicate:

- All water analyses with RPD of less than 30% except for the phenanthrene and pyrene results. The duplicate results are higher than the primary sample (MW2) results, however the concentrations are less than 10times the PQL, the phenanthrene concentrations are less than 35% of the criterion and there is no criterion for pyrene. As such it is not considered that the uncertainty is significant.
- No detectable concentration within the trip blank, which is considered acceptable.
- Recoveries of 90 to 100% for the trip spike, which is considered acceptable.

ALS was chosen as the primary laboratory; ALS is NATA accredited and are experienced in the analytical requirements for potentially contaminated groundwater.

ALS undertook internal quality assurance testing. Results are contained within the laboratory report sheets, included in this **Appendix**. **Table 2** presents a summary of their review.

Table 2 *Internal Quality Assurance Review*

	Number Samples (including QA)	Laboratory Duplicates	Spikes	Laboratory Control Samples	Laboratory Blanks
Requirement		**10%**	**5%**	**One every batch**	**One every batch**
Water					
Metals (As, Cd, Cr, Cu, Ni, Pb, Zn)	6	0 (2)	0 (1)	1	1
Mercury	6	0 (3)	1 (1)	2	2
Ammonia	7	1 (1)	1 (0)	1	1
Oxidisable Nitrogen	7	1 (2)	1 (1)	2	2
TRH C_6-C_{10}	7	1 (1)	0 (1)	1	1
TRH >C_{10}-C_{40}	5	2 (0)	2 (0)	2	2
BTEXN	7	1 (1)	0 (1)	1	1
PAH	5	2 (0)	2 (0)	2	2

Numbers in brackets refer the tests undertaken on samples not from this project but within the same laboratory batch.

Examination of the above table indicates that ALS have undertaken laboratory quality assurance testing in accordance with the ASC NEPM (Ref [4]).

With regards to the results of the quality assurance testing:

- Recoveries of surrogates were within acceptance criteria of 70-130%.
- Relative Percentage Differences for duplicates were below the acceptance criterion of 30% with the exception of:
    - Cadmium in anonymous sample. As the sample was not collected by RCA no comment can be made about the cause of poor RPD, however it is noted that the potential uncertainty does not necessarily imply uncertainty for reminder of samples in the analytical batch.
    - TRH >C_{16}-C_{34} and phenanthrene in MW4. This sample is described as turbid and the cause of the high RPD is therefore considered to be sample heterogeneity. There is some uncertainty associated with the results. The primary sample has the highest TRH concentration and the uncertainty is considered to be conservative. Both the phenanthrene results are in excess of the guideline and the uncertainty is not considered significant in terms of long term monitoring.
- No Laboratory Blank result was detected above the practical quantification limit (PQL).
- Laboratory control spikes recoveries were within acceptance criteria of 70-130% with exception of:
    - The two (2) TRH >C_{10}-C_{16} results which had recoveries of 66.7% and 69.7%. These are considered a minor non-compliance and not significant.
- Matrix spike recoveries were within the within acceptance criteria of 70-130% with the exception of:
    - Oxidisable nitrogen in MW3 for which a result could not be determined. The spiked concentration is several orders of magnitude less than the detected concentration such that the absence of a measurable spike recovery is not considered to represent uncertainty in the result.
    - Pyrene and TRH C_{10}-C_{40} in MW4 for which a result could not be determined. The detected concentrations were several orders of magnitude above the spiked concentrations such that the absence of a measurable spike recovery is not considered to represent uncertainty in the result
- Holding times were within laboratory specified time frames.

Quality Assurance Type	Primary PQL	Intralaboratory Duplicate		RPD %	Trip Blank	Trip Spike
Sample Identification		MW2	DUP		TRIP BLANK	TRIP SPIKE
Date		21/05/2024			17/05/2024	17/05/2024
Sample Description		Slightly turbid, pale brown and no odour.			Water	Water
Sample Purpose		Monitoring			Quality Assurance	Quality Assurance
Sample Collected by		RCA - MH			Laboratory	Laboratory
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)						
Benzene	1	0.5	0.5	*0.0*	<1	100%
Toluene	2	1	1	*0.0*	<2	90%
Ethylbenzene	2	1	1	*0.0*	<2	95%
meta- & para-Xylene	2	1	1	*0.0*	<2	95%
Ortho-xylene	2	1	1	*0.0*	<2	100%
Polycyclic Aromatic Hydrocarbons (PAH)						
Napthalene	5	2.5	2.5	*0.0*	<5	90%
Total Recoverable Hydrocarbons (TRH)						
TRH C_6-C_{10}	20	10	10	*0.0*	<20	--
TRH >C_{10}-C_{16}	100	50	50	*0.0*	--	--
TRH >C_{16}-C_{34}	100	50	50	*0.0*	--	--
TRH >C_{34}-C_{40}	100	50	50	*0.0*	--	--
Polycyclic Aromatic Hydrocarbons (PAH)						
Acenaphthene	0.1	0.05	0.05	*0.0*	--	--
Acenaphthylene	0.1	0.05	0.05	*0.0*	--	--
Anthracene	0.1	0.05	0.05	*0.0*	--	--
Benz(a)anthracene	0.1	0.05	0.05	*0.0*	--	--
Benzo(a) pyrene	0.05	0.025	0.025	*0.0*	--	--
Benzo(b)&(j)fluoranthene	0.1	0.05	0.05	*0.0*	--	--
Benzo(g,h,i)perylene	0.1	0.05	0.05	*0.0*	--	--
Benzo(k)fluoranthene	0.1	0.05	0.05	*0.0*	--	--
Chrysene	0.1	0.05	0.05	*0.0*	--	--
Dibenz(a,h)anthracene	0.1	0.05	0.05	*0.0*	--	--
Fluoranthene	0.1	0.3	0.4	*28.6*	--	--
Fluorene	0.1	0.05	0.05	*0.0*	--	--
Indeno(1,2,3-c,d)pyrene	0.1	0.05	0.05	*0.0*	--	--
Naphthalene	0.1	0.05	0.05	*0.0*	--	--
Phenanthrene	0.1	0.1	0.2	**66.7**	--	--
Pyrene	0.1	0.2	0.3	**40.0**	--	--
Metals						
Arsenic	1	3	3	*0.0*	--	--
Cadmium	0.1	0.05	0.05	*0.0*	--	--
Chromium	1	0.5	0.5	*0.0*	--	--
Copper	1	0.5	0.5	*0.0*	--	--
Lead	1	0.5	0.5	*0.0*	--	--
Mercury	0.1	0.05	0.05	*0.0*	--	--
Nickel	1	22	22	*0.0*	--	--
Zinc	5	34	38	*11.1*	--	--
Nutrients						
Ammonia as N	10	1760	1680	*4.7*	--	--
Nitrite + Nitrate as N	10	40	40	*0.0*	--	--

Note all units in µg/L except for trip spikes results in % recovery

PQL = Practical Quantitation Limit.

Results underlined were not detected and are reported as half the detection limit for statistical purpose.

***BOLD identifies** where RPD results >30%*

***BOLD identifies** where blanks > PQL*

***BOLD identifies** where spikes outside of 70-130% recovery range*

CERTIFICATE OF ANALYSIS

Work Order	: **ES2416476**	Page	: 1 of 10
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Danae Hambly
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	: 12513e	Date Samples Received	: 21-May-2024 15:43
Order number	: ----	Date Analysis Commenced	: 21-May-2024
C-O-C number	: ----	Issue Date	: 28-May-2024 15:27
Sampler	: Muhammad		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 9		
No. of samples analysed	: 9		

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
- Surrogate Control Limits

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
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, 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.

- EP071: Poor duplicate precision for TPH C10-C36 due to sample matrix interferences.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP080: ES2416474-4 analysed water layer for Volatile analysis (has more than half oil on the top).
- EP075(SIM): Particular sample required dilution due to matrix interferences. LOR values have been adjusted accordingly.Poor Matrix Spike and surrogate not determined due to matrix interferences.
- EP080: Sample TRIP SPIKE contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory. BTEXN compounds spiked at 20 ug/L.
- EP071: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP132: Where reported, Total PAH reported as the sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene and Benzo(g,h,i)perylene.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW1	MW2	MW3	MW4	MW6
				Sampling date / time	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00
Compound	CAS Number	LOR	Unit		ES2416476-001	ES2416476-002	ES2416476-003	ES2416476-004	ES2416476-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.003**	**0.002**	**0.003**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		**0.003**	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L		**0.003**	**0.022**	**0.007**	**0.006**	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	**0.004**	----
Zinc	7440-66-6	0.005	mg/L		**0.012**	**0.034**	**0.014**	**0.020**	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.16**	**1.76**	**1.00**	**1.03**	**0.85**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	**0.02**	**0.35**	**0.06**	**0.12**
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.92**	**0.02**	**2.30**	**0.04**	**43.7**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.92**	**0.04**	**2.65**	**0.10**	**43.8**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		----	----	----	**14800**	----
Acenaphthylene	208-96-8	1.0	µg/L		----	----	----	<4760	----
Acenaphthene	83-32-9	1.0	µg/L		----	----	----	<4760	----
Fluorene	86-73-7	1.0	µg/L		----	----	----	**8070**	----
Phenanthrene	85-01-8	1.0	µg/L		----	----	----	**16800**	----
Anthracene	120-12-7	1.0	µg/L		----	----	----	<4760	----
Fluoranthene	206-44-0	1.0	µg/L		----	----	----	<4760	----
Pyrene	129-00-0	1.0	µg/L		----	----	----	<4760	----
Benz(a)anthracene	56-55-3	1.0	µg/L		----	----	----	<4760	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW1	MW2	MW3	MW4	MW6
				Sampling date / time	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00
Compound	CAS Number	LOR	Unit		ES2416476-001	ES2416476-002	ES2416476-003	ES2416476-004	ES2416476-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	1.0	µg/L		----	----	----	<4760	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		----	----	----	<4760	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		----	----	----	<4760	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		----	----	----	<4760	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		----	----	----	<4760	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		----	----	----	<4760	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		----	----	----	<4760	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		----	----	----	39700	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		----	----	----	<2380	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	2580	----
C10 - C14 Fraction	----	50	µg/L		90	<50	<50	5800000	----
C15 - C28 Fraction	----	100	µg/L		600	<100	<100	31200000	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	126000	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		690	<50	<50	37100000	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	3860	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	3860	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	16500000	----
>C16 - C34 Fraction	----	100	µg/L		610	<100	<100	19300000	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<14300	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		610	<100	<100	35800000	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	16500000	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	4	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW1	MW2	MW3	MW4	MW6
				Sampling date / time	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00
Compound	CAS Number	LOR	Unit		ES2416476-001	ES2416476-002	ES2416476-003	ES2416476-004	ES2416476-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	**4**	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	**361**	----
EP132B: Polynuclear Aromatic Hydrocarbons									
3-Methylcholanthrene	56-49-5	0.1	µg/L		<0.1	<0.1	<0.1	----	----
2-Methylnaphthalene	91-57-6	0.1	µg/L		<0.1	<0.1	<0.1	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Acenaphthene	83-32-9	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Acenaphthylene	208-96-8	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Anthracene	120-12-7	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benz(a)anthracene	56-55-3	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benzo(a)pyrene	50-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benzo(e)pyrene	192-97-2	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benzo(g.h.i)perylene	191-24-2	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benzo(k)fluoranthene	207-08-9	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Chrysene	218-01-9	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Coronene	191-07-1	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Dibenz(a.h)anthracene	53-70-3	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Fluoranthene	206-44-0	0.1	µg/L		<0.1	**0.3**	**0.2**	----	----
Fluorene	86-73-7	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Naphthalene	91-20-3	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perylene	198-55-0	0.1	µg/L		<0.1	<0.1	<0.1	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW1	MW2	MW3	MW4	MW6
				Sampling date / time	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00	21-May-2024 00:00
Compound	CAS Number	LOR	Unit		ES2416476-001	ES2416476-002	ES2416476-003	ES2416476-004	ES2416476-005
					Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Phenanthrene	85-01-8	0.1	µg/L		<0.1	**0.1**	<0.1	----	----
Pyrene	129-00-0	0.1	µg/L		<0.1	**0.2**	**0.1**	----	----
^ Sum of PAHs	----	0.05	µg/L		<0.05	----	----	----	----
^ Sum of PAHs	----	0.05	µg/L		----	**0.6**	**0.3**	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		----	----	----	**Not Determined**	----
2-Chlorophenol-D4	93951-73-6	1.0	%		----	----	----	**Not Determined**	----
2.4.6-Tribromophenol	118-79-6	1.0	%		----	----	----	**Not Determined**	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		----	----	----	**Not Determined**	----
Anthracene-d10	1719-06-8	1.0	%		----	----	----	**Not Determined**	----
4-Terphenyl-d14	1718-51-0	1.0	%		----	----	----	**Not Determined**	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**104**	**102**	**103**	**88.2**	----
Toluene-D8	2037-26-5	2	%		**114**	**115**	**112**	**109**	----
4-Bromofluorobenzene	460-00-4	2	%		**101**	**104**	**102**	**113**	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**82.6**	**73.0**	**65.6**	----	----
Anthracene-d10	1719-06-8	0.1	%		**85.7**	**75.1**	**70.5**	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		**84.1**	**77.0**	**75.8**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW10	TRIP BLANK	TRIP SPIKE	QA	----
				Sampling date / time	21-May-2024 00:00	17-May-2024 00:00	17-May-2024 00:00	21-May-2024 00:00	----
Compound	CAS Number	LOR	Unit		ES2416476-006	ES2416476-007	ES2416476-008	ES2416476-009	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.002**	----	----	**0.003**	----
Cadmium	7440-43-9	0.0001	mg/L		**0.0002**	----	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		**0.003**	----	----	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	<0.001	----
Nickel	7440-02-0	0.001	mg/L		**0.125**	----	----	**0.022**	----
Lead	7439-92-1	0.001	mg/L		**0.005**	----	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		**0.231**	----	----	**0.038**	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	<0.0001	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.22**	----	----	**1.68**	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.05**	----	----	**0.04**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.05**	----	----	**0.04**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		----	<20	----	<20	----
C10 - C14 Fraction	----	50	µg/L		----	----	----	<50	----
C15 - C28 Fraction	----	100	µg/L		----	----	----	<100	----
C29 - C36 Fraction	----	50	µg/L		----	----	----	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		----	----	----	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		----	<20	----	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		----	<20	----	<20	----
>C10 - C16 Fraction	----	100	µg/L		----	----	----	<100	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW10	TRIP BLANK	TRIP SPIKE	QA	----
				Sampling date / time	21-May-2024 00:00	17-May-2024 00:00	17-May-2024 00:00	21-May-2024 00:00	----
Compound	CAS Number	LOR	Unit		ES2416476-006	ES2416476-007	ES2416476-008	ES2416476-009	--------
					Result	Result	Result	Result	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	µg/L		----	----	----	<100	----
>C34 - C40 Fraction	----	100	µg/L		----	----	----	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		----	----	----	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		----	----	----	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		----	<1	**20**	<1	----
Toluene	108-88-3	2	µg/L		----	<2	**18**	<2	----
Ethylbenzene	100-41-4	2	µg/L		----	<2	**19**	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		----	<2	**19**	<2	----
ortho-Xylene	95-47-6	2	µg/L		----	<2	**20**	<2	----
^ Total Xylenes	----	2	µg/L		----	<2	**39**	<2	----
^ Sum of BTEX	----	1	µg/L		----	<1	**96**	<1	----
Naphthalene	91-20-3	5	µg/L		----	<5	**18**	<5	----
EP132B: Polynuclear Aromatic Hydrocarbons									
3-Methylcholanthrene	56-49-5	0.1	µg/L		----	----	----	<0.1	----
2-Methylnaphthalene	91-57-6	0.1	µg/L		----	----	----	<0.1	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L		----	----	----	<0.1	----
Acenaphthene	83-32-9	0.1	µg/L		----	----	----	<0.1	----
Acenaphthylene	208-96-8	0.1	µg/L		----	----	----	<0.1	----
Anthracene	120-12-7	0.1	µg/L		----	----	----	<0.1	----
Benz(a)anthracene	56-55-3	0.1	µg/L		----	----	----	<0.1	----
Benzo(a)pyrene	50-32-8	0.05	µg/L		----	----	----	<0.05	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L		----	----	----	<0.1	----
Benzo(e)pyrene	192-97-2	0.1	µg/L		----	----	----	<0.1	----
Benzo(g.h.i)perylene	191-24-2	0.1	µg/L		----	----	----	<0.1	----
Benzo(k)fluoranthene	207-08-9	0.1	µg/L		----	----	----	<0.1	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW10	TRIP BLANK	TRIP SPIKE	QA	----
				Sampling date / time	21-May-2024 00:00	17-May-2024 00:00	17-May-2024 00:00	21-May-2024 00:00	----
Compound	CAS Number	LOR	Unit		ES2416476-006	ES2416476-007	ES2416476-008	ES2416476-009	--------
					Result	Result	Result	Result	----
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.1	µg/L		----	----	----	<0.1	----
Coronene	191-07-1	0.1	µg/L		----	----	----	<0.1	----
Dibenz(a.h)anthracene	53-70-3	0.1	µg/L		----	----	----	<0.1	----
Fluoranthene	206-44-0	0.1	µg/L		----	----	----	**0.4**	----
Fluorene	86-73-7	0.1	µg/L		----	----	----	<0.1	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L		----	----	----	<0.1	----
Naphthalene	91-20-3	0.1	µg/L		----	----	----	<0.1	----
Perylene	198-55-0	0.1	µg/L		----	----	----	<0.1	----
Phenanthrene	85-01-8	0.1	µg/L		----	----	----	**0.2**	----
Pyrene	129-00-0	0.1	µg/L		----	----	----	**0.3**	----
^ **Sum of PAHs**	----	0.05	µg/L		----	----	----	**0.9**	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.05	µg/L		----	----	----	<0.05	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		----	**83.5**	**98.1**	**99.6**	----
Toluene-D8	2037-26-5	2	%		----	**92.8**	**104**	**109**	----
4-Bromofluorobenzene	460-00-4	2	%		----	**82.1**	**106**	**99.0**	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		----	----	----	**76.6**	----
Anthracene-d10	1719-06-8	0.1	%		----	----	----	**82.8**	----
4-Terphenyl-d14	1718-51-0	0.1	%		----	----	----	**82.4**	----

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	43	135
Anthracene-d10	1719-06-8	48	138
4-Terphenyl-d14	1718-51-0	48	144

QUALITY CONTROL REPORT

Work Order	: **ES2416476**	Page	: 1 of 11
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Danae Hambly
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	: 12513e	Date Samples Received	: 21-May-2024
Order number	: ----	Date Analysis Commenced	: 21-May-2024
C-O-C number	: ----	Issue Date	: 28-May-2024
Sampler	: Muhammad		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 9		
No. of samples analysed	: 9		

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
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, 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
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

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 (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5808048)									
ES2416357-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	87.0	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	0.005	0.005	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.013	0.0	No Limit
EW2402355-009	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	0.010	0.010	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5808047)									
EM2408193-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2415927-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.1 µg/L	<0.0001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5808051)									
EW2402371-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5816080)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5816080) - continued									
ES2416639-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	8.80	8.69	1.3	0% - 20%
ES2416476-003	MW3	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.00	0.97	3.4	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 5806003)									
ES2416476-006	MW10	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2416421-001	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: 5816079)									
ES2415927-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.09	0.09	0.0	No Limit
ES2416472-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.44	0.42	3.6	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5816081)									
ES2416476-003	MW3	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.65	2.70	1.9	0% - 20%
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 5806638)									
ES2416476-004	MW4	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1 (4760)*	µg/L	14800	16700	12.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1 (4760)*	µg/L	8070	8510	5.3	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1 (4760)*	µg/L	16800	23600	33.7	No Limit
		EP075(SIM): Anthracene	120-12-7	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1 (4760)*	µg/L	<4760	<4760	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5806633)									
ES2416476-001	MW1	EP071: C15 - C28 Fraction	----	100	µg/L	600	600	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	90	90	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5806639)									
ES2416476-004	MW4	EP071: C15 - C28 Fraction	----	100 (14300)*	µg/L	31200000	# 20800000	39.8	0% - 20%
		EP071: C10 - C14 Fraction	----	50 (14300)*	µg/L	5800000	# 7310000	23.0	0% - 20%
		EP071: C29 - C36 Fraction	----	50 (14300)*	µg/L	126000	52100	83.4	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5808069)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5808069) - continued									
ES2416416-018	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES2416476-002	MW2	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5806633)									
ES2416476-001	MW1	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	610	610	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5806639)									
ES2416476-004	MW4	EP071: >C10 - C16 Fraction	----	100 (14300)*	µg/L	16500000	15200000	8.7	0% - 20%
		EP071: >C16 - C34 Fraction	----	100 (14300)*	µg/L	19300000	# 13300000	36.6	0% - 20%
		EP071: >C34 - C40 Fraction	----	100 (14300)*	µg/L	<14300	<14300	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5808069)									
ES2416416-018	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
ES2416476-002	MW2	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 5808069)									
ES2416416-018	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2416476-002	MW2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 5806601)									
ES2416476-001	MW1	EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 5806601) - continued									
ES2416476-001	MW1	EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Coronene	191-07-1	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Perylene	198-55-0	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	<0.1	0.0	No Limit

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
EG020F: Dissolved Metals by ICP-MS (QCLot: 5808048)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.2	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.0	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	88.0	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	87.7	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.0	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	87.4	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.3	81.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 5808047)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	103	83.0	105
EG035F: Dissolved Mercury by FIMS (QCLot: 5808051)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.4	83.0	105
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5816080)								
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: 5806003)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5816079)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	92.7	91.0	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5816081)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	94.2	91.0	113
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 5806638)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	75.6	50.0	94.0
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	77.3	63.6	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	74.1	62.2	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	73.3	63.9	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	86.8	62.6	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	85.9	64.3	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	90.2	63.6	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	93.6	63.1	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	86.3	64.1	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	96.9	62.5	116

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 5806638) - continued								
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	81.0	61.7	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	99.5	63.0	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	91.2	63.3	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	84.5	59.9	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	90.6	61.2	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	92.3	59.1	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5806633)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	65.0	53.7	97.0
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	65.9	63.3	107
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	92.6	58.3	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5806639)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	79.0	53.7	97.0
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	103	63.3	107
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	99.5	58.3	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5808069)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	79.2	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5806633)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	66.7	53.9	95.5
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	75.1	57.8	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	81.1	50.5	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5806639)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	69.7	53.9	95.5
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	102	57.8	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	95.1	50.5	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5808069)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	78.7	75.0	127
EP080: BTEXN (QCLot: 5808069)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	97.3	68.3	119
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	98.4	73.5	120
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	97.9	73.8	122
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	100	73.0	122
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	102	76.4	123
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	93.7	75.5	124

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
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 5806601)								
EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	2 µg/L	92.3	60.0	120
EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	2 µg/L	73.9	59.0	123
EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	2 µg/L	87.9	36.0	144
EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	2 µg/L	76.1	64.0	122
EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	2 µg/L	77.6	64.0	126
EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	2 µg/L	82.8	65.0	127
EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	2 µg/L	87.3	64.0	130
EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	2 µg/L	85.0	64.0	126
EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	2 µg/L	84.9	62.0	126
EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	2 µg/L	85.0	62.0	126
EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	2 µg/L	84.7	56.0	126
EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	2 µg/L	82.8	68.0	130
EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	2 µg/L	84.9	66.0	130
EP132: Coronene	191-07-1	0.1	µg/L	<0.1	2 µg/L	85.3	35.0	133
EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	2 µg/L	83.3	58.0	128
EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	2 µg/L	85.5	65.0	127
EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	2 µg/L	79.2	64.0	124
EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	2 µg/L	84.6	57.0	127
EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	2 µg/L	70.2	54.0	128
EP132: Perylene	198-55-0	0.1	µg/L	<0.1	2 µg/L	84.4	66.0	130
EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	2 µg/L	81.1	65.0	129
EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	2 µg/L	82.2	66.0	128

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: 5808048)							
ES2416357-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	106	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	106	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	100	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	102	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: 5808048) - continued							
ES2416357-002	Anonymous	EG020A-F: Lead	7439-92-1	1 mg/L	102	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	101	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	104	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 5808047)							
EM2408193-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	84.4	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 5808051)							
ES2416476-009	QA	EG035F: Mercury	7439-97-6	0.01 mg/L	73.1	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5816080)							
ES2416476-003	MW3	EK055G: Ammonia as N	7664-41-7	1 mg/L	77.3	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5806003)							
ES2416421-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	105	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5816079)							
ES2415927-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	97.9	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5816081)							
ES2416476-003	MW3	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 5806638)							
ES2416476-004	MW4	EP075(SIM): Acenaphthene	83-32-9	20 µg/L	# 0.0	70.0	130
		EP075(SIM): Pyrene	129-00-0	20 µg/L	# Not Determined	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5806633)							
ES2416476-001	MW1	EP071: C10 - C14 Fraction	----	200 µg/L	99.3	70.0	130
		EP071: C15 - C28 Fraction	----	250 µg/L	119	71.0	130
		EP071: C29 - C36 Fraction	----	200 µg/L	107	67.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5806639)							
ES2416476-004	MW4	EP071: C10 - C14 Fraction	----	200 µg/L	# Not Determined	70.0	130
		EP071: C15 - C28 Fraction	----	250 µg/L	# Not Determined	71.0	130
		EP071: C29 - C36 Fraction	----	200 µg/L	# Not Determined	67.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5808069)							
ES2416416-018	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	91.6	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5806633)							
ES2416476-001	MW1	EP071: >C10 - C16 Fraction	----	250 µg/L	86.9	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5806633) - continued							
ES2416476-001	MW1	EP071: >C16 - C34 Fraction	----	350 µg/L	100	75.0	130
		EP071: >C34 - C40 Fraction	----	150 µg/L	72.2	67.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5806639)							
ES2416476-004	MW4	EP071: >C10 - C16 Fraction	----	250 µg/L	# Not Determined	70.0	130
		EP071: >C16 - C34 Fraction	----	350 µg/L	# Not Determined	75.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5808069)							
ES2416416-018	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	89.5	70.0	130
EP080: BTEXN (QCLot: 5808069)							
ES2416416-018	Anonymous	EP080: Benzene	71-43-2	25 µg/L	100	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	100	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	104	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	104	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	107	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	113	70.0	130
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 5806601)							
ES2416476-001	MW1	EP132: 3-Methylcholanthrene	56-49-5	2 µg/L	99.1	59.0	115
		EP132: 2-Methylnaphthalene	91-57-6	2 µg/L	78.3	46.0	120
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	2 µg/L	129	21.0	135
		EP132: Acenaphthene	83-32-9	2 µg/L	80.2	62.0	114
		EP132: Acenaphthylene	208-96-8	2 µg/L	83.5	61.0	119
		EP132: Anthracene	120-12-7	2 µg/L	82.0	68.0	116
		EP132: Benz(a)anthracene	56-55-3	2 µg/L	84.8	67.0	122
		EP132: Benzo(a)pyrene	50-32-8	2 µg/L	82.1	72.0	114
		EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	2 µg/L	82.3	69.0	119
		EP132: Benzo(e)pyrene	192-97-2	2 µg/L	81.2	71.0	119
		EP132: Benzo(g.h.i)perylene	191-24-2	2 µg/L	81.8	49.0	133
		EP132: Benzo(k)fluoranthene	207-08-9	2 µg/L	78.7	71.0	124
		EP132: Chrysene	218-01-9	2 µg/L	82.2	70.0	118
		EP132: Coronene	191-07-1	2 µg/L	94.4	29.0	138
		EP132: Dibenz(a.h)anthracene	53-70-3	2 µg/L	82.0	60.0	122
		EP132: Fluoranthene	206-44-0	2 µg/L	78.2	65.0	121
		EP132: Fluorene	86-73-7	2 µg/L	82.6	63.0	118
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	2 µg/L	83.1	57.0	123
		EP132: Naphthalene	91-20-3	2 µg/L	74.6	53.0	115

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 5806601) - continued							
ES2416476-001	MW1	EP132: Perylene	198-55-0	2 µg/L	80.8	71.0	118
		EP132: Phenanthrene	85-01-8	2 µg/L	80.1	67.0	120
		EP132: Pyrene	129-00-0	2 µg/L	77.4	70.0	117

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2416476**	Page	: 1 of 8
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Telephone	: +61-2-8784 8555
Project	: 12513e	Date Samples Received	: 21-May-2024
Site	: ----	Issue Date	: 28-May-2024
Sampler	: Muhammad	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 9

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP080/071: Total Petroleum Hydrocarbons	ES2416476--004	MW4	**C10 - C14 Fraction**	----	23.0 %	0% - 20%	**RPD exceeds LOR based limits**
EP080/071: Total Petroleum Hydrocarbons	ES2416476--004	MW4	**C15 - C28 Fraction**	----	39.8 %	0% - 20%	**RPD exceeds LOR based limits**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	ES2416476--004	MW4	**>C16 - C34 Fraction**	----	36.6 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	ES2416476--003	MW3	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES2416476--004	MW4	**Acenaphthene**	83-32-9	0.0 %	70.0-130%	**Recovery less than lower data quality objective**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES2416476--004	MW4	**Pyrene**	129-00-0	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080/071: Total Petroleum Hydrocarbons	ES2416476--004	MW4	**C10 - C14 Fraction**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080/071: Total Petroleum Hydrocarbons	ES2416476--004	MW4	**C15 - C28 Fraction**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080/071: Total Petroleum Hydrocarbons	ES2416476--004	MW4	**C29 - C36 Fraction**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	ES2416476--004	MW4	**>C10 - C16 Fraction**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	ES2416476--004	MW4	**>C16 - C34 Fraction**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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*

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
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
MW1, MW2, MW3, MW4, MW10, QA	**21-May-2024**	**----**	----	----	**22-May-2024**	17-Nov-2024	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MW1, MW2, MW3, MW4, MW10, QA	**21-May-2024**	**----**	----	----	**24-May-2024**	18-Jun-2024	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
MW1, MW2, MW3, MW4, MW6, MW10, QA	**21-May-2024**	**----**	----	----	**27-May-2024**	18-Jun-2024	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
MW1, MW2, MW3, MW4, MW6, MW10, QA	**21-May-2024**	**----**	----	----	**21-May-2024**	23-May-2024	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
MW1, MW2, MW3, MW4, MW6, MW10, QA	**21-May-2024**	**----**	----	----	**27-May-2024**	18-Jun-2024	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
MW4	**21-May-2024**	**23-May-2024**	28-May-2024	✓	**25-May-2024**	02-Jul-2024	✓

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
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) MW1, QA	**21-May-2024**	**22-May-2024**	28-May-2024	✓	**23-May-2024**	01-Jul-2024	✓
Amber Glass Bottle - Unpreserved (EP071) MW2, MW3	**21-May-2024**	**22-May-2024**	28-May-2024	✓	**25-May-2024**	01-Jul-2024	✓
Amber Glass Bottle - Unpreserved (EP071) MW4	**21-May-2024**	**23-May-2024**	28-May-2024	✓	**28-May-2024**	02-Jul-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) TRIP BLANK	**17-May-2024**	**23-May-2024**	31-May-2024	✓	**24-May-2024**	31-May-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW1, MW2, MW3, QA	**21-May-2024**	**23-May-2024**	04-Jun-2024	✓	**24-May-2024**	04-Jun-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW4	**21-May-2024**	**23-May-2024**	04-Jun-2024	✓	**27-May-2024**	04-Jun-2024	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) MW1, QA	**21-May-2024**	**22-May-2024**	28-May-2024	✓	**23-May-2024**	01-Jul-2024	✓
Amber Glass Bottle - Unpreserved (EP071) MW2, MW3	**21-May-2024**	**22-May-2024**	28-May-2024	✓	**25-May-2024**	01-Jul-2024	✓
Amber Glass Bottle - Unpreserved (EP071) MW4	**21-May-2024**	**23-May-2024**	28-May-2024	✓	**28-May-2024**	02-Jul-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) TRIP BLANK	**17-May-2024**	**23-May-2024**	31-May-2024	✓	**24-May-2024**	31-May-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW1, MW2, MW3, QA	**21-May-2024**	**23-May-2024**	04-Jun-2024	✓	**24-May-2024**	04-Jun-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW4	**21-May-2024**	**23-May-2024**	04-Jun-2024	✓	**27-May-2024**	04-Jun-2024	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) TRIP BLANK	**17-May-2024**	**23-May-2024**	31-May-2024	✓	**24-May-2024**	31-May-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) TRIP SPIKE	**17-May-2024**	**23-May-2024**	31-May-2024	✓	**27-May-2024**	31-May-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW1, MW2, MW3, QA	**21-May-2024**	**23-May-2024**	04-Jun-2024	✓	**24-May-2024**	04-Jun-2024	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW4	**21-May-2024**	**23-May-2024**	04-Jun-2024	✓	**27-May-2024**	04-Jun-2024	✓
EP132B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP132) MW1	**21-May-2024**	**22-May-2024**	28-May-2024	✓	**23-May-2024**	01-Jul-2024	✓
Amber Glass Bottle - Unpreserved (EP132) MW2, MW3, QA	**21-May-2024**	**22-May-2024**	28-May-2024	✓	**24-May-2024**	01-Jul-2024	✓

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	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	25	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	3	25	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	5	**40.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	5	**40.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**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*	
Matrix Spikes (MS) - Continued							
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	5	**40.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	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
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.
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)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	WATER	In house: Referenced to USEPA 3640 (GPC Cleanup), 8270 GCMS Capiliary column, SIM mode. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Sep. Funnel Extraction /Acetylation of Phenolic Compounds	ORG14-AC	WATER	In house: Referenced to USEPA 3510 (Extraction) / In-house (Acetylation): A 1L sample is extracted into dichloromethane and concentrated to 1 mL with echange into cyclohexane. Phenolic compounds are reacted with acetic anhydride to yield phenyl acetates suitable for ultra-trace analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
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: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT:	RCA Australia (ROBCAR)	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics) ☐ Standard TAT (List due date): 28-5-24	FOR LABORATORY USE ONLY (Circle)
OFFICE:	92 Hill Street, Carrington		Custody Seal intact? Yes No N/A
RCA Ref No:	12513e	ALS QUOTE NO.: SYBQ_400_18	Free ice / frozen ice bricks present upon receipt? Yes No N/A
		COC SEQUENCE NUMBER (Circle) COC: 1 OF: 1	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Fiona Brooker	CONTACT PH: 0408 687 529		Other comment: 6.1
SAMPLER: Muhammad	SAMPLER MOBILE: 0401905593	RELINQUISHED BY: DATE/TIME: 21.5.24 3:45pm	RECEIVED BY: DATE/TIME: 21/5/24 15:45
COC emailed to ALS? (NO)	EDD FORMAT (or default):	RELINQUISHED BY: WS DATE/TIME: 21/5/24	RECEIVED BY: C.C DATE/TIME: 21/5 19:47
Email Reports to: administrator@rca.com.au + enviro@rca.com.au			
Email Invoice to: as above			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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 Containers	W05 TRH, BTEXN, 8 dissolved metals	EP132B UT PAH	PAH	Please report Naphthalene results in BOTH BTEXN and PAH suites	EK055G Ammonia	NT-04 Nitrite + Nitrate	W-18 TRH C6-C9 / BTEX	W-02 8-metals	
✓	MW1		Water	2*500mL AG, 2*100mL AG, 2 purple vials, 1 purple plastic, 1 red plastic, 1 500mL green plastic	9	x	x		x	x	x			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
✓	MW2		Water	1*500mL AG, 1*100mL AG, 2 purple vials, 1 purple plastic, 1 red plastic, 1 500mL green plastic	7	x	x		x	x	x			Double Sample provided for internal QA
✓	MW3		Water	1*500mL AG, 1*100mL AG, 2 purple vials, 1 purple plastic, 1 red plastic, 1 500mL green plastic	7	x	x		x	x	x			
✓	MW4		Water	1*500mL AG, 1*100mL AG, 2 purple vials, 1 purple plastic, 1 red plastic, 1 500mL green plastic	7	x		x	x	x	x			WATERS CONTAIN HIGH CONCENTRATIONS OF HYDROCARBONS
✓	MW6		Water	1 purple plastic, 1 500mL green plastic	2					x	x			
✓	MW10		Water	1 purple plastic, 1 red plastic, 1 500mL green plastic	3					x	x		x	
✓	TRIP BLANK	17/5	Water	vial	1							x		
✓	TRIP SPIKE	17/5	Water	vial	1							x		
✓	QA		Water		7	x	x		x	x	x			
				TOTAL	~~37~~ 44	~~4~~ 5	~~4~~ 5	1	~~4~~ 5	~~6~~ 7	~~6~~ 7	2		

E-MAILED

Environmental Division Sydney
Work Order Reference
ES2416476

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;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2416476**

Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Danae Hambly
Address	: 92 HILL STREET CARRINGTON NSW 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: fionab@rca.com.au	E-mail	: danae.hambly@alsglobal.com
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 4902 9299	Facsimile	: +61-2-8784 8500
Project	: 12513e	Page	: 1 of 3
Order number	: ----	Quote number	: EN2023ROBCAR0002 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Muhammad		

Dates

Date Samples Received	: 21-May-2024 15:43	Issue Date	: 21-May-2024
Client Requested Due Date	: 28-May-2024	Scheduled Reporting Date	: **28-May-2024**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 6.1'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 9 / 9

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.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- 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 - EK055G Ammonia as N By Discrete Analyser	WATER - EP132B(PAH) Ultra Trace Polynuclear Aromatic Compounds	WATER - NT-04 Nitrite and Nitrate	WATER - W-02 8 Metals	WATER - W-05 TRH/BTEXN/8 Metals	WATER - W-18 TRH(C6 - C9)/BTEXN	WATER - W-26 TRH/BTEXN/PAH/8 Metals
ES2416476-001	21-May-2024 00:00	MW1	✓	✓	✓		✓		
ES2416476-002	21-May-2024 00:00	MW2	✓	✓	✓		✓		
ES2416476-003	21-May-2024 00:00	MW3	✓	✓	✓		✓		
ES2416476-004	21-May-2024 00:00	MW4	✓		✓				✓
ES2416476-005	21-May-2024 00:00	MW6	✓		✓				
ES2416476-006	21-May-2024 00:00	MW10	✓		✓	✓			
ES2416476-007	17-May-2024 00:00	TRIP BLANK						✓	
ES2416476-009	21-May-2024 00:00	QA	✓	✓	✓		✓		

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP080 BTEXN
ES2416476-008	17-May-2024 00:00	TRIP SPIKE	✓

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
- EDI Format - XTab (XTAB)	Email	administrator@rca.com.au

ALL INVOICES

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

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
- EDI Format - XTab (XTAB)	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
- EDI Format - XTab (XTAB)	Email	fionab@rca.com.au

Appendix D

Summary of Results

Sample Identification	PQL	Aquatic Ecosystem Guideline [A]		Human Health (Ingestion) Guideline [B]	MW1	MW2	MW3	MW4	MW6	MW10
Sample Depth (m) [C]		99% Fresh	95% Fresh		1.41	1.10	1.01	0.70	0.63	0.00
Date					21/05/2024	21/05/2024	21/05/2024	21/05/2024	21/05/2024	21/05/2024
Sample Description					Clear to slightly turbid and no odour.	Slightly turbid, pale brown and no odour.	Slightly turbid, pale brown and no odour.	Turbid, dark grey, oily sheen and strong hydrocarbon odour.	Turbid, brown and no odour.	Turbid, pale brown and no odour.
Sample Purpose					Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Sample collected by					RCA - MH	RCA - MH	RCA - MH	RCA - MH	RCA - MH	RCA - MH
General Waster Quality (field readings)										
pH					7.16	6.25	6.38	6.46	5.76	4.21
Electrical Conductivity (mS/cm)					0.77	5.91	5.12	7.41	5.19	17.4
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)										
Benzene	1		950	1	<1	<1	<1	4	--	--
Toluene	2		*180*	800	<2	<2	<2	<2	--	--
Ethylbenzene	2		*80*	300	<2	<2	<2	<2	--	--
meta- and para-Xylene	2		*275*		<2	<2	<2	<2	--	--
ortho-Xylene	2		350		<2	<2	<2	<2	--	--
Total Xylenes	4			600	2	2	2	2	--	--
Total Recoverable Hydrocarbons (TRH)										
TRH C_6-C_{10}	20				<20	<20	<20	3860	--	--
TRH >C_{10}-C_{16}	100				<100	<100	<100	16500000	--	--
TRH >C_{16}-C_{34}	100				610	<100	<100	19300000	--	--
TRH >C_{34}-C_{40}	100				<100	<100	<100	<14300	--	--
TRH C_6-C_{40}	320	*7*	*7*		**720**	160	160	**35811010**	--	--
Polycyclic Aromatic Hydrocarbons (PAH)										
Acenaphthene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Acenaphthylene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Anthracene[D]	0.1	*0.01*			<0.1	<0.1	<0.1	<4760	--	--
Benz(a)anthracene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Benzo(a) pyrene[D]	0.05	*0.1*		0.01	<0.05	<0.05	<0.05	<4760	--	--
Benzo(b)&(j)fluoranthene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Benzo(g,h,i)perylene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Benzo(k)fluoranthene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Chrysene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Dibenz(a,h)anthracene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Fluoranthene[D]	0.1	*1*			<0.1	0.3	0.2	<4760	--	--
Fluorene	0.1				<0.1	<0.1	<0.1	8070	--	--
Indeno(1,2,3-c,d)pyrene	0.1				<0.1	<0.1	<0.1	<4760	--	--
Naphthalene	0.1		16		<0.1	<0.1	<0.1	**14800**	--	--
Phenanthrene[D]	0.1	*0.6*			<0.1	0.1	<0.1	16800	--	--
Pyrene	0.1				<0.1	0.2	0.1	<4760	--	--
Metals										
Arsenic	1		13	10	<1	3	2	3	--	2
Cadmium	0.1		0.2	2	<0.1	<0.1	<0.1	<0.1	--	0.2
Chromium	1		1	50	<1	<1	<1	<1	--	**3**
Copper	1		1.4	2000	**3**	<1	<1	<1	--	<1
Lead	1		3.4	10	<1	<1	<1	**4**	--	**5**
Mercury[D]	0.1	0.06	0.6	1	<0.1	<0.1	<0.1	<0.1	--	<0.1
Nickel	1		11		3	**22**	7	6	--	**125**
Zinc	5		8		**12**	**34**	**14**	**20**	--	**231**
Non Metallic Inorganics										
Ammonia as N	10		900		160	**1760**	**1000**	**1030**	850	220
Nitrate + Nitrite[E]	10	40			**920**	40	**2650**	**100**	**43800**	**50**

All results are in units of µg/L

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] % Protection Level for Receiving Water Type.

[B] Australian Drinking Water Guidelines.

[C] Sample depths presented are as encountered at top of pipe or at ground level if pipe below ground prior to commencement of sampling

[D] Bioaccummulative Compounds

[E] Guidelines for Lowland (Coastal) Rivers in NSW

Ecological guidelines in *italics* are low level reliability guidelines

Ecological arsenic guideline based on As (III) for marine and As (V) for fresh, the lowest of presented guidelines.

Drinking Water arsenic guidelines are based on total arsenic

Guidelines for chromium are based on Cr (VI)

Ecological guidelines for mercury are based on inorganic mercury.

Drinking water guidelines for mercury are based on total mercury.

Results for TRH have been compared to TPH guidelines.

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

Where summation required (Xylene, TRH, PAH) calculation includes components reported as non detected as 1/2 PQL.