GROUNDWATER MONITORING – NOVEMBER 2023

TOLL SITE TOMAGO

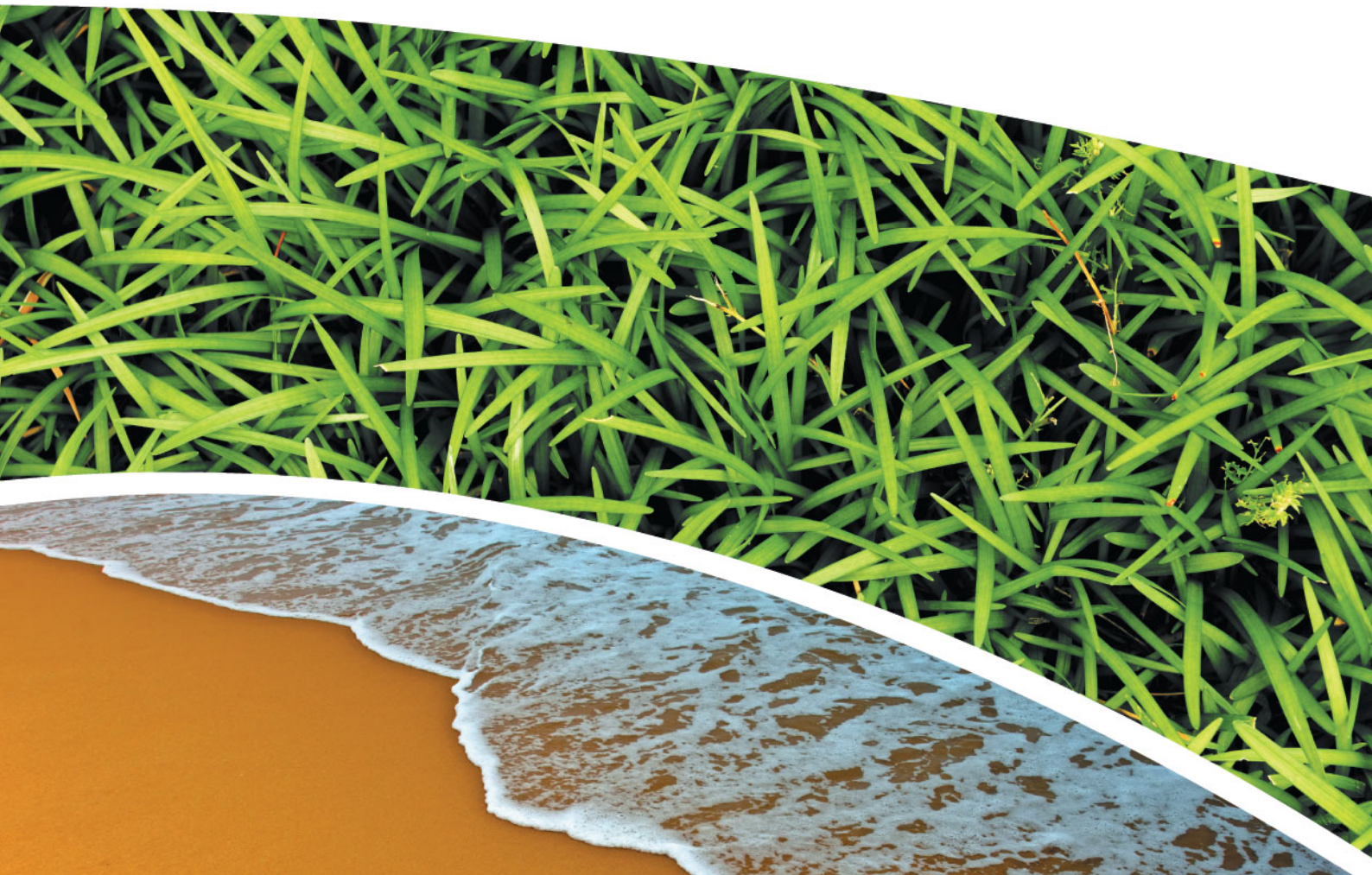
Prepared for TOLL GROUP

Prepared by RCA Australia

RCA ref 12513e-202/0

DECEMBER 2023

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL



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DOCUMENT STATUS						
Rev No	Comment	Author	Reviewer	Approved for Issue (Project Manager)		
				Name	Signature	Date
/1	Final	F Brooker	K Yan	F Brooker		21.12.23

DOCUMENT DISTRIBUTION				
Rev No	Copies	Format	Issued to	Date
/0	1	Electronic (email)	Toll Group Stefan Nightingale stefan.nightingale@tollgroup.com	21.12.23
/0	1	Electronic report	RCA – job archive	21.12.23

Contents

RCA ref 12513e-202/0

21 December 2023

Toll Group
Old Punt Road
Tomago NSW 2322

Attention: Stefan Nightingale

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Geotechnical Engineering
Engineering Geology
Environmental Engineering
Hydrogeology
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Environmental Monitoring
Noise & Vibration
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GROUNDWATER MONITORING REPORT – NOVEMBER 2023
TOLL SITE, TOMAGO

1 INTRODUCTION

This report presents the findings of a groundwater monitoring round undertaken at the Toll Group's 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 screening situated below the groundwater depth and was replaced (by MW8a) and one (1) well (MW5) is inaccessible under a shed / containers. 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 and the EPL was amended, formally in March 2022, to include monitoring of selected groundwater wells at the site. The current EPL which 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 November 2023 round of monitoring implemented in accordance with the EPL and was requested by Stefan Nightingale of Toll Group (Toll). The next sampling round will be due in May 2024.

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 [1])	IN1 – General Industrial
Current use	Storage of Ammonium Nitrate
Size of site	2.59ha
Land use to the: North	Light industrial
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)
Nearest sensitive receptor (environmental)	Unnamed creek approximately 900m to north 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

Two (2) environmental personnel experienced in the handling of potentially contaminated groundwater undertook monitoring of nine (9) wells on the 15th November 2023 as per the EPL monitoring requirements. The scope of work included:

- Screening of volatile hydrocarbon vapours around the well and in the well space using a photoionisation detector (PID).
    - It is noted that none of the wells had a gas sampling cap and as such the screening around the wells was undertaken prior to remove groundwater well cap while the screening in the well space was undertaken by immediately inserting the PID probe into the well space after removal of the groundwater cap. There would have been a loss of volatiles during this process such that the PID readings may not be fully representative of the volatile hydrocarbon vapours within the well space.
- Dipping of all available wells to determine depth of 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 accessed and MW8 was excluded from the scope.

- Placement of a low flow pump into the well and purging until pH and electrical conductivity readings stabilised. It is noted that the groundwater level within some of the wells was lowered during the purging and sampling process and the recharging of groundwater in these wells were slow.
    - A new bladder was utilised for each well.
- Following the stabilisation of pH and electrical conductivity, field readings were recorded and a sample was collected into laboratory prepared bottles and then 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 day following sampling and analysed from a suite 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 PID readings around the wells ranged from 0ppm to 6.8ppm with readings in the well spaces ranging from 1.2ppm to 2.8ppm with the exception of MW4 (104.6ppm), MW6 (98.5ppm) and MW9 (11.6ppm). The PID readings in the well space of MW4 decreased by approximately 50% since the May 2023 monitoring event.

Groundwater was situated at between 0m (MW10) and 1.36m (MW2) below the surface.

Visual or olfactory indications of hydrocarbon contamination were identified at wells MW1 and MW4 only during sampling. No LNAPL was identified in well MW4 either during gauging or in the collected bottles prior to these being submitted to the laboratory.

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 (laboratory control samples, matrix spikes and method blanks) as being generally acceptable. There were two (2) minor non-compliances that were not considered significant to the characterisation of the water quality.
    - The external assessment of 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. The duplicate undertaken in the May 2024 round will be interlaboratory to provide for assessment of accuracy on an intermittent basis throughout the monitoring.

- Precision
  - The precision of the data has been assessed by internal means (duplicates) as being generally acceptable. There was one result which indicates some uncertainty such that the MW2 oxidisable nitrogen result may be under-represented.
  - The precision of the data has been assessed by external means (intralaboratory duplicates) as being generally acceptable. There is some uncertainty such that the MW2 ammonia concentration may be under represented.

  As such the precision of the data set is considered acceptable. As the sampling was undertaken as part of long term monitoring, RCA have not undertaken data substitution however will consider in the next round as part of overall assessment of trends
- Completeness
  - All data that was sought during the investigation was able to be retrieved with the exception of the trip spike and trip blank which were not received by the laboratory. The absence of these quality assurance samples is not considered to convey uncertainty in the analysis of the received samples.
  - 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 such as TRH C_6-C_{10} and BTEX 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 generally consistent with the overall historical data; MW2 and MW4 levels have increased since the previous round in May 2023.

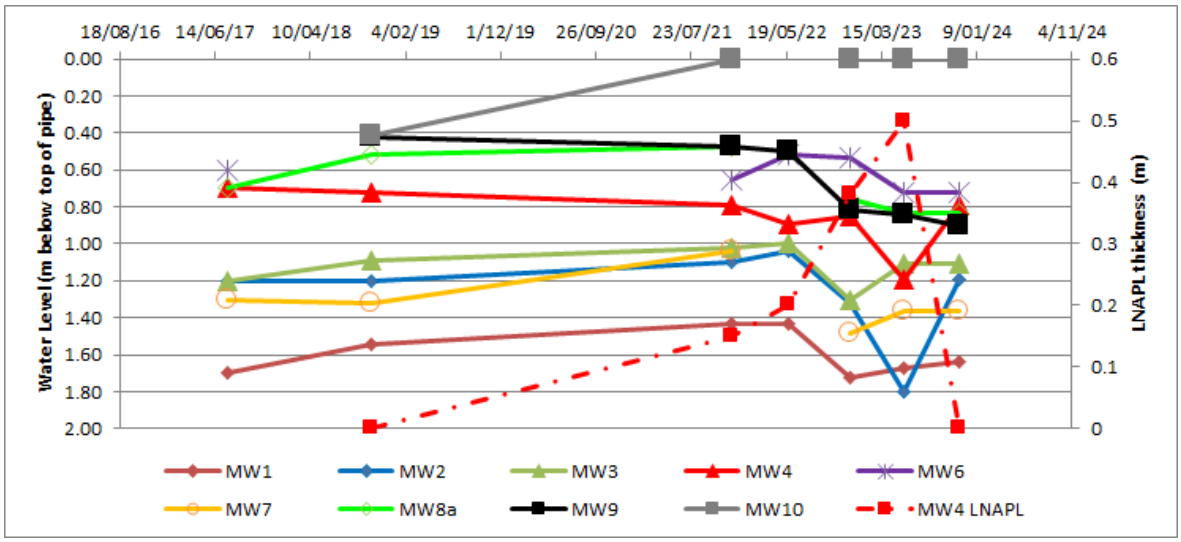


Figure 1 *Groundwater levels 2017-2023.*

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. 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 anomaly presented at MW1 is considered to be associated with the change in pipe length and will be investigated further during the next site attendance.

With regards chemical concentrations:

- pH ranged from 3.74 at MW10 to 6.73 at MW1.
- Electrical conductivity ranged from 1.8mS/cm at MW1 to 16.9mS/cm at MW10.
- BTEX were not detected in monitoring wells MW1, MW2 or MW3 and as such concentrations are below the ecological (Ref [2]) and the drinking water criteria (Ref [3]). The results are generally consistent with previous results.

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

  - It is noted that due to the water depth being less than two (2) metres below the surface, the vapour based human health criteria (Ref [4]) for benzene and F1[1] are not applicable. For completeness only RCA reviewed the results and note that the MW4 concentrations are approximately 16% of the benzene guideline and 8% of the F1 criterion.

- TRH was detected in MW1, MW2, MW3 and MW4 and as such are in excess of the ecological criterion (Ref [2]); the MW4 results are in excess of the TRH >C_{10}-C_{16} solubility limits and as such are considered representative of LNAPL although none was able to be physically measured or sighted. The results of MW1-MW3 represent between 70-89% of the May 2023 results whereas the MW4 results represent less than 0.5% of the previous May 2023 result. All are within the historical data ranges (refer **Figure 2** below).
- PAH compounds were identified MW1, MW2, MW3 and MW4. Results are all less than the ecological criteria except the anthracene and benzo(a)pyrene concentrations at MW4 the fluoranthene, naphthalene and phenanthrene concentrations are inferred to be in excess of the ecological criteria although cannot be distinctly quantified due to the raised detection limit.

  The MW4 benzo(a)pyrene concentration is quantified in excess of the drinking water criterion (Ref [3]).

  No anthracene or benzo(a)pyrene was detected in MW1, MW2 or MW3 however the detection limit is in excess of the ecological criterion and drinking water criterion respectively.
- With the exception of mercury, which was not detected in any well, metals were detected in at least one of the five (5) monitored wells (MW1, MW2, MW3, MW4 and MW10).
  - Arsenic was detected only in MW1-MW4; 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.
  - Chromium was detected only in MW4 and MW10; concentrations in excess of the ecological criterion (Ref [2]) at MW4 only. This is consistent with the historical data range.
  - Copper was detected only in MW4 and MW10; concentrations in excess of the ecological criterion (Ref [2]) at MW10 only, at reduced levels since the May 2023 monitoring round.
  - Lead was detected only in MW4 and MW10; concentrations are in excess of the ecological criterion (Ref [2]) at MW10 only. The MW4 concentration has significantly (10x) decreased and the MW10 slightly since the May 2023 monitoring results.

[1] TRH C_{6}-$_{10}$ concentrations minus BTEX concentrations. There are no criteria for TEXN or TRH >C_{10} for commercial / industrial land use.

- Nickel was detected at MW2, MW3, MW4 and MW10; concentrations are in excess of the ecological criterion (Ref [2]) at MW10 only. All concentrations are decreased from those in May 2023.
- Zinc concentrations are in excess of the ecological criterion (Ref [5]) at all wells; concentrations were decreased from those in May 2023 with the exception of MW4 in which the concentration increased slightly.

- Ammonia was detected at concentrations in excess of the ecological criterion (Ref [2]) in all six (6) sampled wells as presented in **Figure 3**. All results represent an increase to those from May 2023, ranging from 38% to 510% (at MW10) increase. All results were within the historical ranges.
- Oxidisable nitrogen (nitrate + nitrite) was detected only in MW4 and MW6 as presented in **Figure 3**; concentrations were in excess of the ecological criterion (Ref [2]). Compared to the previous monitoring round, the results represent a variable change; MW1, MW2, MW3 and MW10 have decreased whereas MW4 and MW6 have increased, both by an approximate factor of ten (10). The concentrations are within the historical data ranges with the exception of MW6.

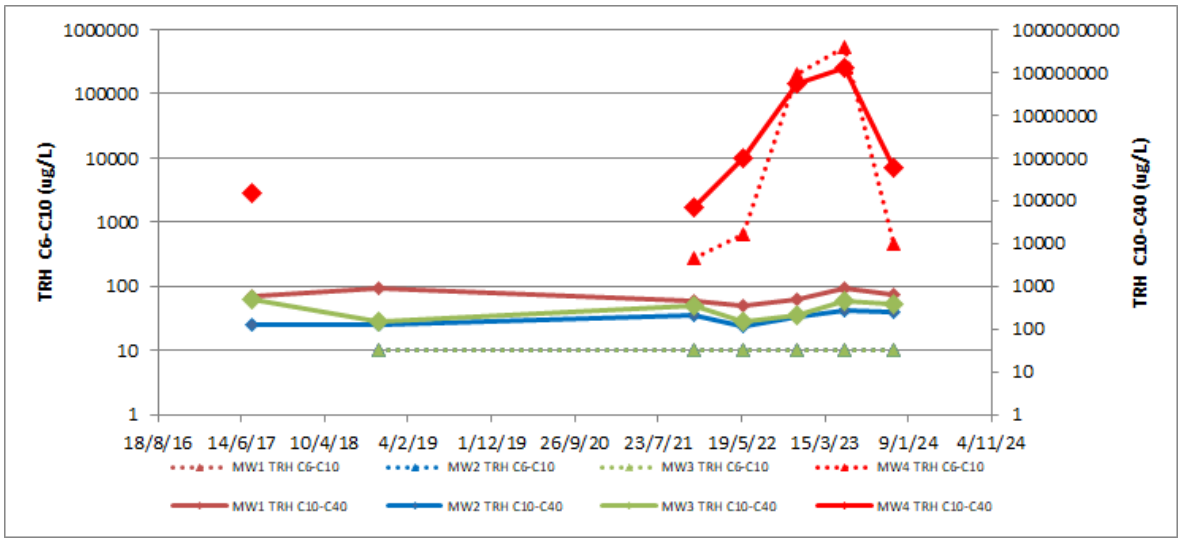


Figure 2 *TRH Concentrations 2017-2023 (noting that 2017 data does not include TRH C_6-C_{10} and that MW1, MW2 and MW3 TRH C_6-C_{10} has not been detected such that all data is represented by the MW3 series).*

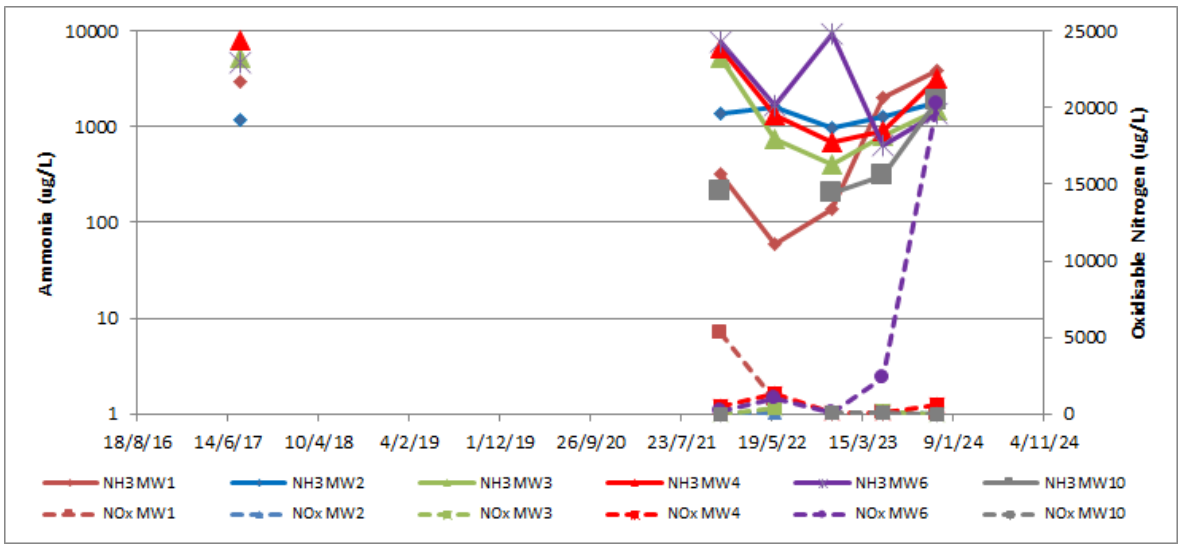


Figure 3 *Ammonia and Oxidisable Nitrogen Concentrations 2017-2023.*

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. The cause of the significant decrease in the hydrocarbon concentrations at MW4 is unknown as no works have been undertaken on site which would have reduced the concentrations. It is noted that the cause of the increase in hydrocarbon concentrations (almost 2000x since 2021 until May 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 all six (6) wells were in excess of the ecological criterion (Ref [2]) ranged from 1.6 to 4 times of the criterion. The lowest ammonia concentration at MW6 (the most downgradient of the sampled wells) and highest ammonia concentration at MW1 indicated that the offsite migration of ammonia is possible. 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.

In the absence of any specific sources of metals contamination except potentially lead in association with the petroleum contamination, it is not considered that the site is the likely source of the metals. MW10 showed concentrations of copper, lead, nickel and zinc in excess of the ecological criterion, chromium at MW4 was in excess of the ecological criteria, and zinc at MW1 to MW4 was in excess of the ecological criterion (Ref [2]). 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 in November 2023 in accordance with the EPL requirements. The collected samples were analysed differentially for hydrocarbons, metals and nitrogen compounds in general accordance with the EPL.

No LNAPL was identified at MW4 either during field gauging or in the collected samples in the current monitoring round; dissolved hydrocarbon concentrations were significantly decreased to less than 0.5% of the previous May 2023 result. Hydrocarbon contamination at MW1, MW2 and MW3 was also decreased by between 11% and 30%. The cause for the decrease is unknown.

Concentrations of zinc at all five (5) monitored wells, chromium at MW4, and copper, lead, nickel at MW10, were in excess of the ecological guidelines (Ref [2]). The source is not considered to be the site in the absence of any known contaminating activity.

Ammonia was detected in excess of the guidelines (Ref [2]) at all monitoring wells while oxidisable nitrogen was detected, and in excess of the guidelines, only at MW4 and MW6. The source is considered to be historical use of the site as 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.

Monitoring of groundwater is required in accordance with Toll's EPL in six (6) months and as such will be undertaken in May 2024.

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

Fiona Brooker
Manager of Environmental Services
BEng(Env)

Dr. Kenny Yan
Environmental Scientist
BSc(Hons)(Env), PhD(Env Remediation)

REFERENCES

[1] Port Stephens Council, *Port Stephens Local Environment Plan 2013* under the Environmental Planning and Assessment Act 1979, February 2014.

[2] 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.

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

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

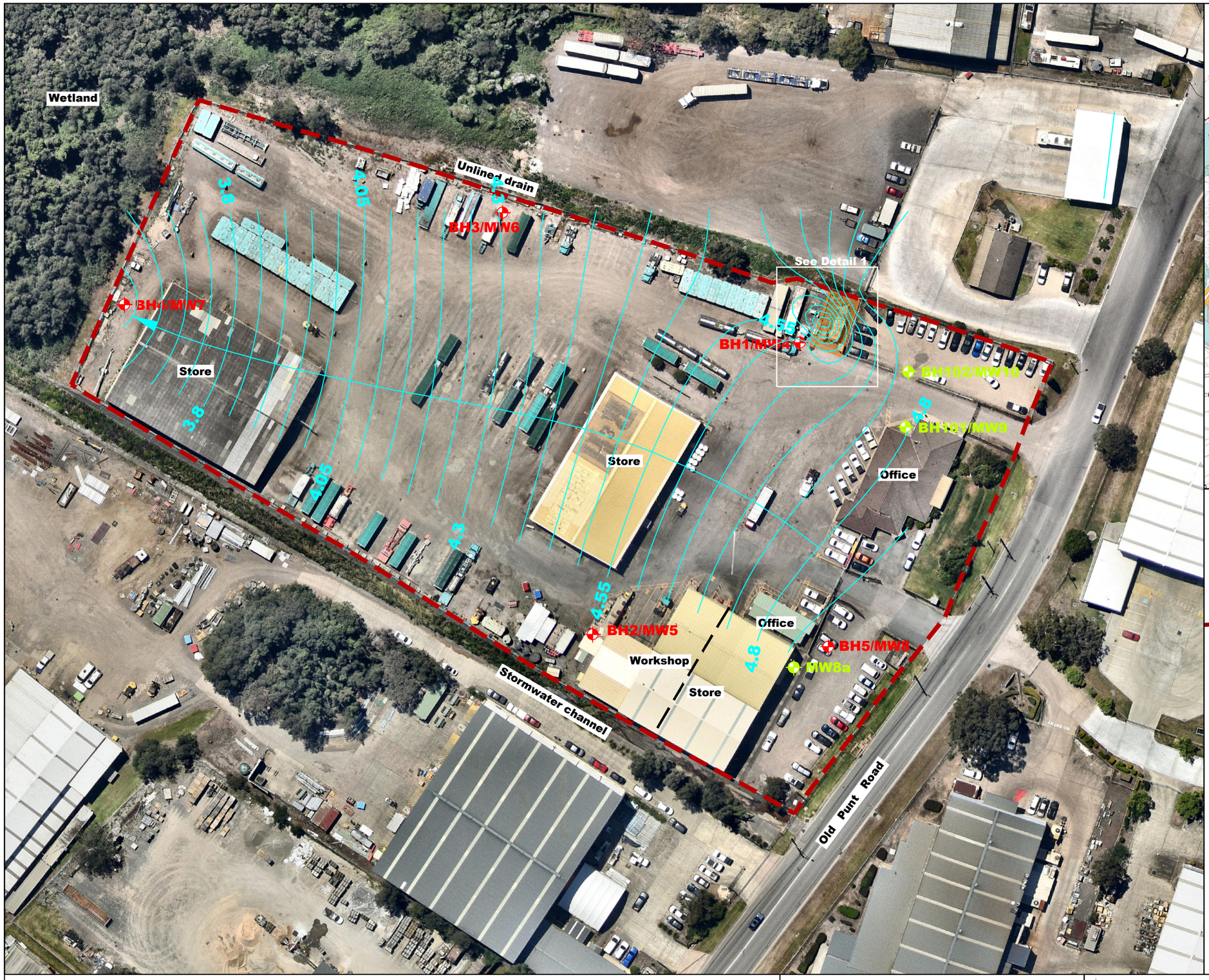
[5] Standards Australia, Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds, AS 4482.1-2005.

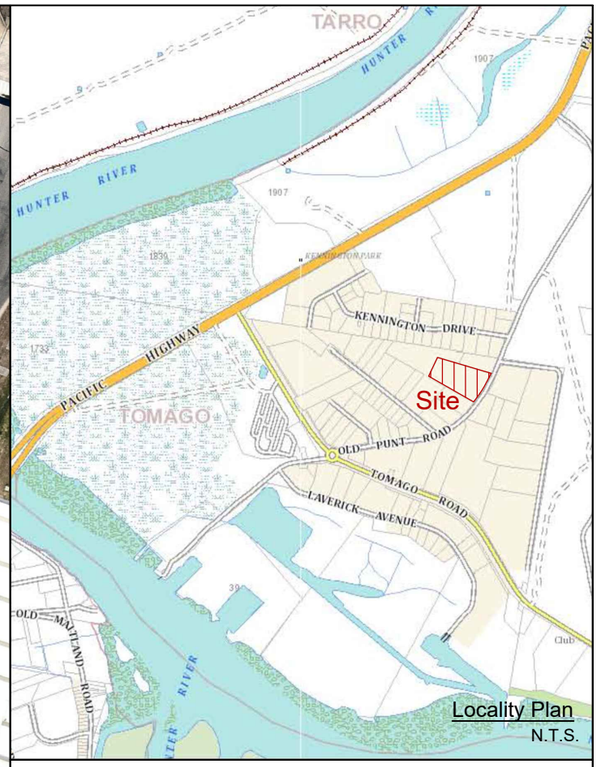
GLOSSARY

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, 23 October 2023
(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-202/0	
DRAWN BY	FB	SCALE	~1 : 1000 (A3)	DRAWING No	1	REV 0
APPROVED BY	FB	DATE	21/12/2023	OFFICE	NEWCASTLE	

CDT-DWG-A3H-001/1

Appendix B

Calibration Record and Field Sheets

SERVICE & CALIBRATION REPORT
Water Quality Meter

Customer details:
RCA Australia
92 Hill Street
Carrington NSW
Attn: Fiona Brooker

Job no. *230810*

Date: *3 August 2023*

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

Instrument serial number:
1PH7HSWB 2019

Fault report:
Requires service/calibration.

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

Calibration: (in accordance with manufacturer's specifications)

Parameter - unit	Before Calibration	Calibration value	After calibration	Comment
pH (pH)	7.08	7.01	7.01	Pass
pH (pH)	4.31	4.00	4.00	Pass
ORP (mV)	211	225	225	Pass
Conductivity (mS/cm	0.000	0.000	0.000	Pass
Conductivity (mS/cm)	0.712	0.718	0.718	Pass
Conductivity (mS/cm)	6.60	6.67	6.67	Pass
Conductivity (mS/cm)	56.9	58.6	58.6	Pass
Turbidity (NTU)	0.0	0.0	0.0	Pass
Turbidity (NTU)	6.3	8.0	8.0	Pass
Turbidity (NTU)	84.9	80	80	Pass
Turbidity (NTU)	407	400	400	Pass
D.O. zero (mg/L)	0.00	0.00	0.00	Pass
D.O span (mg/L)	11.02mg/L@22^{0}C	8.96mg/L@22^{0}C	8.96mg/L@22^{0}C	Pass
Temperature (^{0}C)	22.89^{0}C	23.1^{0}C	23.1^{0}C	Pass

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

Calibration carried out by:
Tony Fincher

AUSTRALIAN SCIENTIFIC PTY LTD
11 McDougall Street, Kotara NSW 2289
TEL: 1800 021 083
E-mail: sales@austscientific.com.au **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: 15.11.2023
PROJECT No: 12513e
CLIENT REF:

BORE OR LOCATION ID: MW1

TIME: 9:05 TO 9:10 am

BORE DEPTH: 3.22 (m TOP) HEIGHT ABOVE GROUND LEVEL: 0.75m

DEPTH TO LNAPL: — PID SURFACE (ppm): 0.5 ppm

DEPTH TO AQUIFER: 1.64m PID IN WELL (ppm): 1.4ppm

BORE OR LOCATION ID: MW2

TIME: 9.10 TO 9.15

BORE DEPTH: 2.88m (m TOP) HEIGHT ABOVE GROUND LEVEL: 0.62

DEPTH TO LNAPL: ~~2.88m~~ PID SURFACE (ppm): 0.1

DEPTH TO AQUIFER: 1.19 m PID IN WELL (ppm): 1.2

BORE OR LOCATION ID: MW3

TIME: 9.15 TO 9.20

BORE DEPTH: 3.88 (m TOP) HEIGHT ABOVE GROUND LEVEL: 0.48

DEPTH TO LNAPL: ~~3.88m~~ PID SURFACE (ppm): 0.2

DEPTH TO AQUIFER: 1.11 m PID IN WELL (ppm): 2.8

BORE OR LOCATION ID: MW4

TIME: 9.25 TO 9.35

- no any difference in sounds
- ~~Oil~~ observed

BORE DEPTH: 3.23 (m GL) ~~HEIGHT ABOVE GROUND LEVEL:~~ -0.05

DEPTH TO LNAPL: PID SURFACE (ppm): 0.8 around well

DEPTH TO AQUIFER: 0.79 PID IN WELL (ppm): 104.6

BORE OR LOCATION ID: MW5

Couldn't locate

TIME: TO

BORE DEPTH: ~~3.23~~ (m GL) ~~HEIGHT ABOVE GROUND LEVEL:~~

DEPTH TO LNAPL: PID SURFACE (ppm):

DEPTH TO AQUIFER: 0.- PID IN WELL (ppm):

RCA Australia	Sampled by:	Date:

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BORE OR LOCATION ID: MW6
TIME: 8:40am **TO** 8:50am
BORE DEPTH: 3.22 (m GL) **~~HEIGHT ABOVE GROUND LEVEL~~:** -0.05m
DEPTH TO LNAPL: — **PID SURFACE (ppm):** 0.0ppm
DEPTH TO AQUIFER: 0.51m **PID IN WELL (ppm):** 98.5ppm

BORE OR LOCATION ID: MW7
TIME: 9.50 **TO** 9.55
BORE DEPTH: 3.00 (m GL) **~~HEIGHT ABOVE GROUND LEVEL~~:** -0.05
DEPTH TO LNAPL: — **PID SURFACE (ppm):** 0.2
DEPTH TO AQUIFER: 1.36 m **PID IN WELL (ppm):** 0.2

BORE OR LOCATION ID: MW8a
TIME: 9.40 **TO** 9.45
BORE DEPTH: 1.35 (m GL) **~~HEIGHT ABOVE GROUND LEVEL~~:** -0.05
DEPTH TO LNAPL: — **PID SURFACE (ppm):** 0.4
DEPTH TO AQUIFER: 0.66 m **PID IN WELL (ppm):** 0.4

BORE OR LOCATION ID: MW9
TIME: 9.35 **TO** 9.40
BORE DEPTH: 2.84 (m GL) **~~HEIGHT ABOVE GROUND LEVEL~~:** -0.05
DEPTH TO LNAPL: — **PID SURFACE (ppm):** 1.1
DEPTH TO AQUIFER: 0.8m **PID IN WELL (ppm):** 11.6

BORE OR LOCATION ID: MW10
TIME: ~~9:30~~am **TO** 9:35am
BORE DEPTH: 2.95 (m GL) **~~HEIGHT ABOVE GROUND LEVEL~~:** -0.05m
DEPTH TO LNAPL: — **PID SURFACE (ppm):** 0.9ppm around well cap
DEPTH TO AQUIFER: ~~0.78m~~ surface **PID IN WELL (ppm):** ~~4~~3.6ppm (3.6)
~~No difference of warning voice.~~

RCA Australia	Sampled by:	Date:

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

ENGINEERING FIELD SHEET

WATER SAMPLING RECORD

CLIENT: Toll Group
PROJECT: Groundwater Monitoring Programme
LOCATION: Toll Tomago Site
DATE: 15.11.2023
PROJECT No: 12513e
CLIENT REF:

WATER METER USED: Horiba
METHOD OF SAMPLING: Slow flow rate 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 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC, Hydrocarbons, metals
TIME: 10:50 am **TO** 11:20am **VOLUME PURGED:** 8L
RESULTS OF WATER QUALITY CHECK

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	6.84	1.17	262	1.50	23.05	0.059
2/	6.98	0.972	78.6	0.37	22.44	0.048
3/	6.83	1.55	123	1.60	22.46	0.082
4/	6.80	1.71	161	6.10	22.52	0.087
5/	6.74	1.82	160	1.89	22.97	0.092
6/	6.73	1.80	154	1.56	22.59	0.101

Sample Appearance: Pale grey/brown, slightly turbid, ~~no odour~~ slight hydrocarbon odour.
Duplicate/Equipment Wash Identification and Other Remarks:

BORE OR LOCATION ID: MW2 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC, Hydrocarbons, metals
TIME: 11:25am **TO** 12:00pm **VOLUME PURGED:** 8L
RESULTS OF WATER QUALITY CHECK

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	6.19	4.82	145	1.82	23.25	0.253
2/	6.26	3.96	131	3.37	22.56	0.210
3/	6.29	3.66	92.1	3.46	22.29	0.187
4/	6.29	3.55	78.3	3.48	22.25	0.184
5/						
6/						

Sample Appearance: Pale yellow/grey, slight turbid, no odour.
Duplicate/Equipment Wash Identification and Other Remarks: Dup 15/11/23

BORE OR LOCATION ID: MW3 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC, Hydrocarbons, metals
TIME: 12:10 **TO** **VOLUME PURGED:**
RESULTS OF WATER QUALITY CHECK

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	5.81	10.7	>1000	5.4	21.88	0.575
2/	5.99	7.25	>1000	3.55	21.84	0.378
3/	6.11	5.47	>1000	0.88	21.97	0.288
4/	6.12	4.61	575	6.34	22.07	0.244
5/	6.12	4.58	93.6	6.29	22.05	0.241
6/						

Sample Appearance:
Duplicate/Equipment Wash Identification and Other Remarks: Dark grey, no odour, turbid

RCA Australia	Sampled by: KY/AH	Date: 15.11.2023

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BORE OR LOCATION ID: MW4 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC, Hydrocarbons, metals
TIME: 12:55pm **TO** 13:30pm **VOLUME PURGED:** 8L
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/	5.73	12.7	>1000	1.0	24.48	0.743
2/	5.78	12.7	995	0.6	23.86	0.717
3/	5.80	12.4	997	0.56	23.7	0.698
4/	5.89	ID	885	0.68	23.6	0.554
5/	5.98	7.92	583	1.11	23.4	0.436
6/	5.99	7.89	562	1.23	23.69	0.427

Sample Appearance: Pale yellow
Duplicate/Equipment Wash Identification and Other Remarks: ~~Dark grey~~, turbid, strong hydrocarbon odour
See photo.

BORE OR LOCATION ID: MW6 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC.
TIME: 10:20am **TO** 10:50am **VOLUME PURGED:** 10L
RESULTS OF WATER QUALITY CHECK

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	5.49	11.6	>1000	3.48	20.44	0.649
2/	5.57	10.3	>1000	4.21	20.30	0.572
3/	5.64	9.58	>1000	4.28	20.23	0.532
4/	5.70	9.28	>1000	4.34	20.23	0.517
5/	5.88	8.99	964	4.54	20.19	0.499
6/	5.87	8.77	892	4.50	20.21	0.486

Sample Appearance: Pale brown/orange, turbid, no odour.
Duplicate/Equipment Wash Identification and Other Remarks:

BORE OR LOCATION ID: MW10 **ANALYSIS NEEDED:** Ammonia, Nitrate, Nitrite, EC, metals
TIME: 12.30 pm **TO** 12:58pm **VOLUME PURGED:** 8L
RESULTS OF WATER QUALITY CHECK

Check No.	pH	Conductivity (mS/cm)	Turbidity	Dissolved O_2 (mg/L)	Temperature (°C)	Salinity (%)
1/	3.74	16.9	>1000	2.57	25.16	0.993
2/	3.74	16.9	>1000	3.07	25.07	0.995
3/	3.74	16.9	>1000	3.10	25.15	0.995
4/						
5/						
6/						

Sample Appearance: Pale grey/yellow, turbid, no odour.
Duplicate/Equipment Wash Identification and Other Remarks:

RCA Australia	Sampled by: KY/AH	Date: 15.11.23

Appendix C

Quality Assurance Review and Laboratory Report Sheets

A total of 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 however these samples were not received by the laboratory.

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 four (4) results:

- The duplicate results of TRH >C_{16}-C_{34}, TRH >C_{34}-C_{40} and ammonia are higher whereas the MW2 phenanthrene result is higher than the duplicate result. None are considered to be significant with the possible exception of ammonia which is more than double the MW2 value and is further the highest result in the historical range.

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)	7	1 (1)	0 (1)	1	1
Mercury	7	1 (0)	1 (0)	1	1
Ammonia	7	2 (3)	2 (1)	3	3
Oxidisable Nitrogen	7	1 (3)	1 (1)	2	2
TRH C_6-C_{10}	5	0 (2)	0 (1)	1	1
TRH >C_{10}-C_{40}	5	0 (0)	0 (0)	1	1
BTEXN	5	0(2)	0 (1)	1	1
PAH	5	1 (0)	1 (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 reveals that ALS have undertaken laboratory quality assurance testing in accordance with the ASC NEPM (Ref [4]) with the exception of the absence of laboratory duplicates and matric spikes on TRH >C_{10}-C_{40}. Double sample volume was provided for this purpose however the non-conformance is not considered to indicate uncertainty in the provided results.

With regards to the results of the quality assurance testing:

- Laboratory control spikes recoveries were within acceptance criteria of 70-130%.
- Relative Percentage Differences for duplicates were below the acceptance criterion of 30% with the exception of:
    - Nitrate and nitrite in the duplicate sample with RPD of 122%. The laboratory duplicate for ammonia on this sample was consistent such that it is not considered that sample heterogeneity is the likely cause of the high RPD. The laboratory duplicate had the higher concentration and as such the reported result for the duplicate sample, and MW2, may be under-representative of the concentrations.

    The RPD for ammonia in an anonymous sample (not from the project) was also high however RCA can make no comment regarding the likely cause. It is noted that poor RPD does not necessarily reflect uncertainty on other samples within the laboratory batch.
- Matrix spike recoveries were within the acceptance criteria of 70-130% with the exception of:
    - Mercury and anthracene in MW1 which recoveries were 68.8% and 65.2% respectively. These results are considered minor non-compliance and not significant.

    The recovery for meta- and para- xylene was not determined in an anonymous sample (not from the project); RCA can make no comment regarding the likely cause. It is noted that poor recovery does not necessarily reflect uncertainty on other samples within the laboratory batch.
- Holding times were within laboratory specified time frames.
- No Laboratory Blank result was detected above the practical quantification limit (PQL).

Quality Assurance Type	Primary PQL		Intralaboratory Duplicate		RPD %
Sample Identification			MW2	DUP	
Date			15/11/2023		
Sample Description			Pale yellow and grey, slightly turbid, no odour.		
Sample Purpose			Monitoring		
Sample Collected by			RCA - KY/AH		
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)					
Benzene	1		0.5	0.5	*0.0*
Toluene	2		1	1	*0.0*
Ethylbenzene	2		1	1	*0.0*
meta- & para-Xylene	2		1	1	*0.0*
Ortho-xylene	2		1	1	*0.0*
Polycyclic Aromatic Hydrocarbons (PAH)					
Napthalene	5		2.5	2.5	*0.0*
Total Recoverable Hydrocarbons (TRH)					
TRH C_6-C_{10}	20		10	10	*0.0*
TRH >C_{10}-C_{16}	100		50	140	**94.7**
TRH >C_{16}-C_{34}	100		140	200	**35.3**
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		0.05	0.05	*0.0*
Fluorene	0.1		0.3	0.3	*0.0*
Indeno(1,2,3-c,d)pyrene	0.1		0.05	0.05	*0.0*
Naphthalene	0.1		0.1	0.1	*0.0*
Phenanthrene	0.1		0.2	0.1	**66.7**
Pyrene	0.1		0.05	0.05	*0.0*
Metals					
Arsenic	1		2	2	*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*
Mercury	0.1		0.05	0.05	*0.0*
Lead	1		0.5	0.5	*0.0*
Nickel	1		6	6	*0.0*
Zinc	5		12	16	*28.6*
Nutrients					
Ammonia as N	10		1800	3560	**65.7**
Nitrite + Nitrate as N	10		5	5	*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%*

CERTIFICATE OF ANALYSIS

Work Order	: **ES2339803**	Page	: 1 of 10
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: 92 HILL STREET CARRINGTON NSW 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 12513e	Date Samples Received	: 16-Nov-2023 15:01
Order number	: ----	Date Analysis Commenced	: 17-Nov-2023
C-O-C number	: ----	Issue Date	: 23-Nov-2023 16:06
Sampler	: ----		
Site	: ----		
Quote number	: SYBQ/400/21		
No. of samples received	: 9		
No. of samples analysed	: 7		

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

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.

- 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: Results for ES2339803-4 confirmed by re analysis and re run.
- EG035: Poor matrix spike recovery was obtained for Mercury on sample ES2339803 - #001 due to matrix interference. Confirmed by re-analysis.
- EP075(SIM): Particular sample required dilution due to matrix interferences. LOR values have been adjusted accordingly.
- EP071 : Particular sample 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	15-Nov-2023 11:15	15-Nov-2023 12:00	15-Nov-2023 12:30	15-Nov-2023 13:30	15-Nov-2023 10:50
Compound	CAS Number	LOR	Unit		ES2339803-001	ES2339803-002	ES2339803-003	ES2339803-004	ES2339803-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.002**	**0.003**	**0.002**	----
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	**0.002**	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.006**	**0.010**	**0.003**	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	**0.003**	----
Zinc	7440-66-6	0.005	mg/L		**0.010**	**0.012**	**0.022**	**0.022**	----
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		**3.88**	**1.80**	**1.48**	**3.24**	**1.40**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	**0.29**	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	**0.28**	**20.2**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	**0.57**	**20.2**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		----	----	----	**394**	----
Acenaphthylene	208-96-8	1.0	µg/L		----	----	----	<95.2	----
Acenaphthene	83-32-9	1.0	µg/L		----	----	----	**102**	----
Fluorene	86-73-7	1.0	µg/L		----	----	----	**358**	----
Phenanthrene	85-01-8	1.0	µg/L		----	----	----	**823**	----
Anthracene	120-12-7	1.0	µg/L		----	----	----	<95.2	----
Fluoranthene	206-44-0	1.0	µg/L		----	----	----	<95.2	----
Pyrene	129-00-0	1.0	µg/L		----	----	----	**122**	----
Benz(a)anthracene	56-55-3	1.0	µg/L		----	----	----	<95.2	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW1	MW2	MW3	MW4	MW6
				Sampling date / time	15-Nov-2023 11:15	15-Nov-2023 12:00	15-Nov-2023 12:30	15-Nov-2023 13:30	15-Nov-2023 10:50
Compound	CAS Number	LOR	Unit		ES2339803-001	ES2339803-002	ES2339803-003	ES2339803-004	ES2339803-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	1.0	µg/L		----	----	----	<95.2	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		----	----	----	<95.2	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		----	----	----	<95.2	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		----	----	----	<95.2	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		----	----	----	<95.2	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		----	----	----	<95.2	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		----	----	----	<95.2	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L		----	----	----	**1800**	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L		----	----	----	<47.6	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	**290**	----
C10 - C14 Fraction	----	50	µg/L		**130**	<50	**80**	**226000**	----
C15 - C28 Fraction	----	100	µg/L		**470**	**180**	**260**	**347000**	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<1430	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		**600**	**180**	**340**	**573000**	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	**470**	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	**460**	----
>C10 - C16 Fraction	----	100	µg/L		**230**	<100	**150**	**323000**	----
>C16 - C34 Fraction	----	100	µg/L		**350**	**140**	**180**	**254000**	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<1430	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		**580**	**140**	**330**	**577000**	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		**230**	<100	**150**	**323000**	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	**8**	----
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	15-Nov-2023 11:15	15-Nov-2023 12:00	15-Nov-2023 12:30	15-Nov-2023 13:30	15-Nov-2023 10:50
Compound	CAS Number	LOR	Unit		ES2339803-001	ES2339803-002	ES2339803-003	ES2339803-004	ES2339803-005
					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	**8**	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	**104**	----
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		**2.8**	**0.7**	**1.4**	----	----
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		**0.2**	<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	<0.1	<0.1	----	----
Fluorene	86-73-7	0.1	µg/L		**0.6**	**0.3**	**0.3**	----	----
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		**0.9**	**0.1**	**0.3**	----	----
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	15-Nov-2023 11:15	15-Nov-2023 12:00	15-Nov-2023 12:30	15-Nov-2023 13:30	15-Nov-2023 10:50
Compound	CAS Number	LOR	Unit		ES2339803-001	ES2339803-002	ES2339803-003	ES2339803-004	ES2339803-005
					Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Phenanthrene	85-01-8	0.1	µg/L		**0.5**	**0.2**	**0.3**	----	----
Pyrene	129-00-0	0.1	µg/L		<0.1	<0.1	<0.1	----	----
^ **Sum of PAHs**	----	0.05	µg/L		**2.2**	**0.6**	**1.0**	----	----
^ **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	%		----	----	----	**28.5**	----
2-Chlorophenol-D4	93951-73-6	1.0	%		----	----	----	**63.5**	----
2.4.6-Tribromophenol	118-79-6	1.0	%		----	----	----	**66.5**	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		----	----	----	**78.3**	----
Anthracene-d10	1719-06-8	1.0	%		----	----	----	**52.5**	----
4-Terphenyl-d14	1718-51-0	1.0	%		----	----	----	**81.1**	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**120**	**117**	**113**	**110**	----
Toluene-D8	2037-26-5	2	%		**125**	**116**	**111**	**113**	----
4-Bromofluorobenzene	460-00-4	2	%		**129**	**121**	**117**	**116**	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**74.2**	**72.8**	**82.2**	----	----
Anthracene-d10	1719-06-8	0.1	%		**78.8**	**86.9**	**91.6**	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		**79.8**	**89.7**	**94.7**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW10	DUP151123	----	----	----
				Sampling date / time	15-Nov-2023 12:55	15-Nov-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2339803-006	ES2339803-007	--------	--------	--------
					Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.002**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		**0.0002**	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.002**	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.124**	**0.006**	----	----	----
Lead	7439-92-1	0.001	mg/L		**0.006**	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.190**	**0.016**	----	----	----
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		**1.89**	**3.56**	----	----	----
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		<0.01	<0.01	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		----	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		----	**80**	----	----	----
C15 - C28 Fraction	----	100	µg/L		----	**280**	----	----	----
C29 - C36 Fraction	----	50	µg/L		----	<50	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		----	**360**	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		----	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		----	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		----	**140**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW10	DUP151123	----	----	----
				Sampling date / time	15-Nov-2023 12:55	15-Nov-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2339803-006	ES2339803-007	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	µg/L		----	**200**	----	----	----
>C34 - C40 Fraction	----	100	µg/L		----	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		----	**340**	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		----	**140**	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		----	<1	----	----	----
Toluene	108-88-3	2	µg/L		----	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		----	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		----	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		----	<2	----	----	----
^ Total Xylenes	----	2	µg/L		----	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		----	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		----	<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		----	**0.5**	----	----	----
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	DUP151123	----	----	----
				Sampling date / time	15-Nov-2023 12:55	15-Nov-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2339803-006	ES2339803-007	--------	--------	--------
					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		----	<0.1	----	----	----
Fluorene	86-73-7	0.1	µg/L		----	**0.3**	----	----	----
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		----	**0.1**	----	----	----
Pyrene	129-00-0	0.1	µg/L		----	<0.1	----	----	----
^ **Sum of PAHs**	----	0.05	µg/L		----	**0.5**	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.05	µg/L		----	<0.05	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		----	**101**	----	----	----
Toluene-D8	2037-26-5	2	%		----	**107**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		----	**112**	----	----	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		----	**72.6**	----	----	----
Anthracene-d10	1719-06-8	0.1	%		----	**84.8**	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		----	**86.2**	----	----	----

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	: **ES2339803**	Page	: 1 of 9
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: 92 HILL STREET CARRINGTON NSW 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 12513e	Date Samples Received	: 16-Nov-2023
Order number	: ----	Date Analysis Commenced	: 17-Nov-2023
C-O-C number	: ----	Issue Date	: 23-Nov-2023
Sampler	: ----		
Site	: ----		
Quote number	: SYBQ/400/21		
No. of samples received	: 9		
No. of samples analysed	: 7		

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

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: 5439204)									
ES2339803-003	MW3	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	0.003	0.004	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	0.010	0.009	13.7	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.022	0.023	0.0	No Limit
ES2339727-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.008	0.008	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	0.014	0.012	14.3	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5439207)									
ES2339803-002	MW2	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: 5440737)									
ES2338604-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2339733-009	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.11	0.18	48.2	0% - 50%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5440740)									

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 (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5440740) - continued									
ES2339803-004	MW4	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	3.24	3.27	0.9	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5440951)									
EW2305066-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.04	0.0	No Limit
ES2339803-007	DUP151123	EK055G: Ammonia as N	7664-41-7	0.01 (0.10)*	mg/L	3.56	3.51	1.4	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 5431157)									
ES2339594-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2339594-010	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.11	0.11	0.0	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 5431161)									
ES2339803-002	MW2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EW2305095-001	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: 5440739)									
ES2339748-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.0	No Limit
ES2339748-011	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	43.0	44.0	2.1	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5440950)									
ES2339852-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2339803-007	DUP151123	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.04	122	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5434836)									
ES2339763-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	330	290	12.9	0% - 50%
ES2339850-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5434836)									
ES2339763-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	390	340	13.0	0% - 50%
ES2339850-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 5434836)									
ES2339763-001	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	87	78	11.4	0% - 20%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	112	98	12.9	0% - 20%
		EP080: ortho-Xylene	95-47-6	2	µg/L	37	33	12.9	0% - 50%
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2339850-004	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

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 (%)*
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 5434837)									
ES2339803-001	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	2.8	3.0	7.6	0% - 20%
		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	0.2	0.3	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
		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	0.6	0.8	17.1	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	0.9	1.0	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	0.5	0.6	19.7	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: 5439204)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.0	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.8	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.1	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.5	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.4	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.8	81.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 5439207)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.3	83.0	105
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5440737)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.0	90.0	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5440740)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	106	90.0	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5440951)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	95.5	90.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5431157)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	93.2	82.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5431161)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	98.9	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5440739)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	107	91.0	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5440950)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	91.0	113
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 5430918)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	75.0	50.0	94.0
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	88.9	63.6	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	93.9	62.2	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	92.9	63.9	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	106	62.6	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	89.2	64.3	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: 5430918) - continued								
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	98.3	63.6	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	94.6	63.1	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	78.2	64.1	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	74.0	62.5	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	96.0	61.7	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	93.5	63.0	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	94.3	63.3	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	96.8	59.9	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	90.1	61.2	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	91.7	59.1	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5430919)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	83.5	53.7	97.0
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	73.4	63.3	107
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	102	58.3	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5434836)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	95.4	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5430919)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	82.4	53.9	95.5
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	71.1	57.8	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	72.9	50.5	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5434836)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	94.4	75.0	127
EP080: BTEXN (QCLot: 5434836)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	109	68.3	119
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	109	73.5	120
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	115	73.8	122
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	116	73.0	122
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	115	76.4	123
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	103	75.5	124
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 5434837)								
EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	2 µg/L	93.7	60.0	120
EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	2 µg/L	75.9	59.0	123
EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	2 µg/L	93.1	36.0	144

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 5434837) - continued								
EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	2 µg/L	86.6	64.0	122
EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	2 µg/L	87.2	64.0	126
EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	2 µg/L	79.1	65.0	127
EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	2 µg/L	114	64.0	130
EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	2 µg/L	111	64.0	126
EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	2 µg/L	117	62.0	126
EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	2 µg/L	113	62.0	126
EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	2 µg/L	111	56.0	126
EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	2 µg/L	110	68.0	130
EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	2 µg/L	115	66.0	130
EP132: Coronene	191-07-1	0.1	µg/L	<0.1	2 µg/L	114	35.0	133
EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	2 µg/L	112	58.0	128
EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	2 µg/L	111	65.0	127
EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	2 µg/L	90.1	64.0	124
EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	2 µg/L	113	57.0	127
EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	2 µg/L	71.6	54.0	128
EP132: Perylene	198-55-0	0.1	µg/L	<0.1	2 µg/L	114	66.0	130
EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	2 µg/L	106	65.0	129
EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	2 µg/L	110	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: 5439204)							
EP2315895-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	99.4	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	96.5	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	95.8	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	96.2	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	103	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	95.3	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	97.2	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
EG035F: Dissolved Mercury by FIMS (QCLot: 5439207)							
ES2339803-001	MW1	EG035F: Mercury	7439-97-6	0.01 mg/L	# 68.8	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5440737)							
ES2338604-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	100	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5440740)							
ES2339803-004	MW4	EK055G: Ammonia as N	7664-41-7	1 mg/L	81.5	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5440951)							
ES2339803-007	DUP151123	EK055G: Ammonia as N	7664-41-7	10 mg/L	92.7	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5431157)							
ES2339594-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	107	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5431161)							
ES2339803-002	MW2	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	110	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5440739)							
ES2339748-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	102	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5440950)							
ES2339803-007	DUP151123	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	103	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5434836)							
ES2339763-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	77.4	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5434836)							
ES2339763-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	76.5	70.0	130
EP080: BTEXN (QCLot: 5434836)							
ES2339763-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	92.3	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	99.4	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	78.9	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	# Not Determined	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	83.6	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	106	70.0	130
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 5434837)							
ES2339803-001	MW1	EP132: 3-Methylcholanthrene	56-49-5	2 µg/L	74.8	59.0	115
		EP132: 2-Methylnaphthalene	91-57-6	2 µg/L	85.0	46.0	120
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	2 µg/L	72.7	21.0	135
		EP132: Acenaphthene	83-32-9	2 µg/L	83.5	62.0	114
		EP132: Acenaphthylene	208-96-8	2 µg/L	84.8	61.0	119
		EP132: Anthracene	120-12-7	2 µg/L	# 65.2	68.0	116
		EP132: Benz(a)anthracene	56-55-3	2 µg/L	88.2	67.0	122

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: 5434837) - continued							
ES2339803-001	MW1	EP132: Benzo(a)pyrene	50-32-8	2 µg/L	85.4	72.0	114
		EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	2 µg/L	88.2	69.0	119
		EP132: Benzo(e)pyrene	192-97-2	2 µg/L	86.4	71.0	119
		EP132: Benzo(g.h.i)perylene	191-24-2	2 µg/L	79.4	49.0	133
		EP132: Benzo(k)fluoranthene	207-08-9	2 µg/L	84.8	71.0	124
		EP132: Chrysene	218-01-9	2 µg/L	88.1	70.0	118
		EP132: Coronene	191-07-1	2 µg/L	81.5	29.0	138
		EP132: Dibenz(a.h)anthracene	53-70-3	2 µg/L	80.4	60.0	122
		EP132: Fluoranthene	206-44-0	2 µg/L	89.1	65.0	121
		EP132: Fluorene	86-73-7	2 µg/L	86.5	63.0	118
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	2 µg/L	80.9	57.0	123
		EP132: Naphthalene	91-20-3	2 µg/L	76.9	53.0	115
		EP132: Perylene	198-55-0	2 µg/L	87.4	71.0	118
		EP132: Phenanthrene	85-01-8	2 µg/L	88.5	67.0	120
		EP132: Pyrene	129-00-0	2 µg/L	88.8	70.0	117

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2339803**	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	: 16-Nov-2023
Site	: ----	Issue Date	: 23-Nov-2023
Sampler	: ----	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG035F: Dissolved Mercury by FIMS	ES2339803--001	MW1	**Mercury**	7439-97-6	68.8 %	70.0-130%	**Recovery less than lower data quality objective**
EP080: BTEXN	ES2339763--001	Anonymous	**meta- & para-Xylene**	108-38-3 106-42-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP132B: Polynuclear Aromatic Hydrocarbons	ES2339803--001	MW1	**Anthracene**	120-12-7	65.2 %	68.0-116%	**Recovery less than lower data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)						
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)						
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / *Container* / Client Sample ID(s)		*Sample Date*	*Extraction / Preparation*			*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,	**15-Nov-2023**	**----**	----	**----**	**21-Nov-2023**	13-May-2024	✓
MW3,	MW4,							
MW10,	DUP151123							

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
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MW1, MW2, MW3, MW4, MW10, DUP151123	**15-Nov-2023**	**----**	----	----	**22-Nov-2023**	13-Dec-2023	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
MW1, MW2, MW3, MW4, MW6, MW10, DUP151123	**15-Nov-2023**	**----**	----	----	**22-Nov-2023**	13-Dec-2023	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
MW1, MW2, MW3, MW4, MW6, MW10, DUP151123	**15-Nov-2023**	**----**	----	----	**17-Nov-2023**	17-Nov-2023	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
MW1, MW2, MW3, MW4, MW6, MW10, DUP151123	**15-Nov-2023**	**----**	----	----	**22-Nov-2023**	13-Dec-2023	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
MW4	**15-Nov-2023**	**17-Nov-2023**	22-Nov-2023	✓	**23-Nov-2023**	27-Dec-2023	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
MW1, MW2, MW3, MW4, DUP151123	**15-Nov-2023**	**17-Nov-2023**	22-Nov-2023	✓	**21-Nov-2023**	27-Dec-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW1, MW2, MW3, DUP151123	**15-Nov-2023**	**20-Nov-2023**	29-Nov-2023	✓	**20-Nov-2023**	29-Nov-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW4	**15-Nov-2023**	**20-Nov-2023**	29-Nov-2023	✓	**21-Nov-2023**	29-Nov-2023	✓

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 Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) MW1, MW2, MW3, MW4, DUP151123	**15-Nov-2023**	**17-Nov-2023**	22-Nov-2023	✓	**21-Nov-2023**	27-Dec-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW1, MW2, MW3, DUP151123	**15-Nov-2023**	**20-Nov-2023**	29-Nov-2023	✓	**20-Nov-2023**	29-Nov-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW4	**15-Nov-2023**	**20-Nov-2023**	29-Nov-2023	✓	**21-Nov-2023**	29-Nov-2023	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) MW1, MW2, MW3, DUP151123	**15-Nov-2023**	**20-Nov-2023**	29-Nov-2023	✓	**20-Nov-2023**	29-Nov-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW4	**15-Nov-2023**	**20-Nov-2023**	29-Nov-2023	✓	**21-Nov-2023**	29-Nov-2023	✓
EP132B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP132) MW1	**15-Nov-2023**	**20-Nov-2023**	22-Nov-2023	✓	**21-Nov-2023**	30-Dec-2023	✓
Amber Glass Bottle - Unpreserved (EP132) MW2, MW3, DUP151123	**15-Nov-2023**	**20-Nov-2023**	22-Nov-2023	✓	**22-Nov-2023**	30-Dec-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	5	34	**14.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	12	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	**0.00**	**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	0	20	**0.00**	**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	3	34	**8.82**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	12	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	**25.00**	**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	1	20	**5.00**	**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	3	34	**8.82**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	12	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	**25.00**	**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	1	20	**5.00**	**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	3	34	**8.82**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	12	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	**0.00**	**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	0	20	**0.00**	**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

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☐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 (List due date): 23/11/23 (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	**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: 2.6 °C
PROJECT MANAGER: Fiona Brooker	**CONTACT PH:** 0408 687 529		Other comment:
SAMPLER:	**SAMPLER MOBILE:**	**RELINQUISHED BY:** Anh Hoang anhoa	**RECEIVED BY:** JN 16.11.23
COC emailed to ALS? (NO)	**EDD FORMAT (or default):**	DATE/TIME: 16/11/23 14:05	DATE/TIME: 1500
Email Reports to: administrator@rca.com.au + enviro@rca.com.au		**RELINQUISHED BY:**	**RECEIVED BY:** Rough
Email Invoice to: as above		DATE/TIME:	DATE/TIME: 16/11/23 1935

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

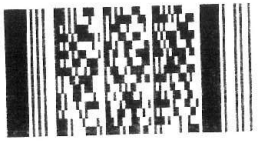
ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								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	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MW1	15.11.23 11:15am	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			Double Sample provided for internal QA
2	MW2	15.11.23 12:00pm	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			
3	MW3	15.11.23 12:30pm	Water	1*500mL AG, 1*100mL AG, 2 purple vials, 1 purple plastic, 1 red plastic, 1 500mL green plastic	5	x	x		x	x	x			
4	MW4	15.11.23 13:30pm	Water	1*500mL AG, 1*100mL AG, 2 purple vials, 1 purple plastic, 1 red plastic, 1 500mL green plastic	5	x		x	x	x	x			WATERS CONTAIN HIGH CONCENTRATIONS OF HYDROCARBONS
5	MW6	15.11.23 10:50am	Water	1 purple plastic, 1 500mL green plastic	2					x	x			
6	MW10	15.11.23 12:55pm	Water	1 purple plastic, 1 red plastic, 1 500mL green plastic	5					x	x		x	
7	DUP 15/11/23	15.11.23	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			
8	TRIP BLANK	9.11.23	Water	vial	1							x		
9	TRIP SPIKE	9.11.23	Water	vial	1							x		
				TOTAL	42	5	5	1	5	7	7	2	1	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Fo Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division Sydney

Work Order Reference

ES2339803



Telephone : + 61-2-8784 8555

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2339803**

Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: 92 HILL STREET CARRINGTON NSW 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: fionab@rca.com.au	E-mail	: ALSEnviro.Sydney@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	: ES2017ROBCAR0004 (SYBQ/400/21)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 16-Nov-2023 15:01	Issue Date	: 16-Nov-2023
Client Requested Due Date	: 23-Nov-2023	Scheduled Reporting Date	: **23-Nov-2023**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 2.6'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7
		No. of samples NOT collected	2

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).**
- Sample TRIP BLANK was not received due to the following reason: Sample not received
- Sample TRIP SPIKE was not received due to the following reason: Sample not received
- 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 - EP075 SIM PAH only SIM - PAH only	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
ES2339803-001	15-Nov-2023 11:15	MW1	✓		✓	✓		✓
ES2339803-002	15-Nov-2023 12:00	MW2	✓		✓	✓		✓
ES2339803-003	15-Nov-2023 12:30	MW3	✓		✓	✓		✓
ES2339803-004	15-Nov-2023 13:30	MW4	✓	✓		✓		✓
ES2339803-005	15-Nov-2023 10:50	MW6	✓			✓		
ES2339803-006	15-Nov-2023 12:55	MW10	✓			✓	✓	
ES2339803-007	15-Nov-2023 00:00	DUP151123	✓		✓	✓		✓

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

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		1.64	1.19	1.11	0.79	0.51	0.00
Date					15/11/23	15/11/23	15/11/23	15/11/23	15/11/23	15/11/23
Sample Description					Pale grey and brown, slightly turbid, slight hydrocarbon odour	Pale yellow and grey, slightly turbid, no odour.	Dark grey, turbid, no odour.	Pale yellow, turbid, strong hydrocarbon odour.	Pale brown and orange, turbid, no odour.	Pale grey and yellow, turbid, no odour.
Sample Purpose					Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Sample collected by					RCA - KY/AH	RCA - KY/AH	RCA - KY/AH	RCA - KY/AH	RCA - KY/AH	RCA - KY/AH
General Waster Quality (field readings)										
pH					6.73	6.29	6.12	5.99	5.87	3.74
Electrical Conductivity (mS/cm)					1.8	3.55	4.58	7.89	8.77	16.9
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)										
Benzene	1		950	1	<1	<1	<1	8	--	--
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	470	--	--
TRH >C_{10}-C_{16}	100				230	<100	150	323000	--	--
TRH >C_{16}-C_{34}	100				350	140	180	254000	--	--
TRH >C_{34}-C_{40}	100				<100	<100	<100	<1430	--	--
TRH C_6-C_{40}	320	*7*	*7*		**640**	**250**	**390**	**578185**	--	--
Polycyclic Aromatic Hydrocarbons (PAH)										
Acenaphthene	0.1				0.2	<0.1	0.1	394	--	--
Acenaphthylene	0.1				<0.1	<0.1	<0.1	<95.2	--	--
Anthracene[D]	0.1	*0.01*			<0.1	<0.1	<0.1	102	--	--
Benz(a)anthracene	0.1				<0.1	<0.1	<0.1	358	--	--
Benzo(a) pyrene[D]	0.05	*0.1*		0.01	<0.05	<0.05	<0.05	823	--	--
Benzo(b)&(j)fluoranthene	0.1				<0.1	<0.1	<0.1	<95.2	--	--
Benzo(g,h,i)perylene	0.1				<0.1	<0.1	<0.1	<95.2	--	--
Benzo(k)fluoranthene	0.1				<0.1	<0.1	<0.1	122	--	--
Chrysene	0.1				<0.1	<0.1	<0.1	<95.2	--	--
Dibenz(a,h)anthracene	0.1				<0.1	<0.1	<0.1	<95.2	--	--
Fluoranthene[D]	0.1	*1*			<0.1	<0.1	<0.1	<95.2	--	--
Fluorene	0.1				0.6	0.3	0.3	<95.2	--	--
Indeno(1,2,3-c,d)pyrene	0.1				<0.1	<0.1	<0.1	<95.2	--	--
Naphthalene	0.1		16		0.9	0.1	0.3	<95.2	--	--
Phenanthrene[D]	0.1	*0.6*			0.5	0.2	0.3	<95.2	--	--
Pyrene	0.1				<0.1	<0.1	<0.1	<95.2	--	--
Metals										
Arsenic	1		13	10	2	2	3	2	--	<1
Cadmium	0.1		0.2	2	<0.1	<0.1	<0.1	<0.1	--	0.2
Chromium	1		1	50	<1	<1	<1	**2**	--	1
Copper	1		1.4	2000	<1	<1	<1	1	--	**2**
Lead	1		3.4	10	<1	<1	<1	3	--	**6**
Mercury[D]	0.1	0.06	0.6	1	<0.1	<0.1	<0.1	<0.1	--	<0.1
Nickel	1		11		<1	6	10	3	--	**124**
Zinc	5		8		**10**	**12**	**22**	**22**	--	**190**
Non Metallic Inorganics						*				
Ammonia as N	10		900		**3880**	**1800**	**1480**	**3240**	**1400**	**1890**
Nitrate + Nitrite[E]	10	40			<10	<10	<10	**570**	**20200**	<10

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 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.