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TARAGO RAIL LOOP EXPANSION

AUGUST 2019 SURFACE WATER MONITORING - TARAGO RAIL LOOP EXPANSION

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CONTENTS

1.	INTRODUCTION	4
1.1	Preamble	4
1.2	Background	4
1.3	Objective	4
2.	SCOPE OF WORK	5
2.1	Monitoring Scope	5
2.2	Sampling Methodology	5
2.3	Quality Assurance and Quality Control Program	6
3.	ASSESSMENT CRITERIA	7
4.	RESULTS	10
4.1	Field Sampling Observations	10
4.2	Analytical Results	10
4.2.1	Metals	10
4.2.2	Nitrogen	10
4.2.3	Total Recoverable Hydrocarbons	10
4.2.4	BTEX	10
5.	CONCLUSIONS	11
6.	REFERENCES	12

TABLE OF TABLES

Table 2-1: Surface Water Sampling Locations	5	
Table 3-1: Health-based screening criteria for recreational waters (NHMRC 2008)	8	
Table 3-2: Ecological screening criteria for surface water	8	

APPENDICES

Appendix 1

Figures

Appendix 2

Results Tables

Appendix 3

Laboratory Reports

Appendix 4

Photographs

1. INTRODUCTION

1.1 Preamble

Ramboll Australia Pty Ltd (Ramboll) was commissioned by John Holland Rail (JHR) to conduct surface water monitoring within the Country Regional Network (CRN) rail corridor adjacent Tarago Station, Tarago NSW.

The monitoring was commissioned to establish a baseline of surface water conditions ahead of proposed expansion of the Tarago Rail Loop. The construction footprint associated with loop expansion is here-in referred to as “the site”.

This report presents the results from surface water monitoring conducted in August 2019.

1.2 Background

The proposed construction includes extension of an existing passing loop opposite the Tarago Railway Station. The site is understood to occupy approximately 1800 lineal meters of rail corridor from Chainage (CH): 261.280 km to CH: 263.100 km (as distance from Sydney).

JHR provided a procedure to guide surface water monitoring which included sampling at six locations as defined on **Figure 1, Appendix 1** integrating assessment of three water bodies running beneath the rail formation within the site at up-stream (west) and down-stream (east) locations relative to the formation. Analyses were prescribed as presented in **Table 1-1**.

Table 1-1: Prescribed Surface Water Analytes

General Parameters	Dissolved Metals	Nutrients	Hydrocarbons
Electrical Conductivity (1:5)	Aluminium	Ammonia as N	BTEX (Benzene, Toluene, Ethyl Benzene, Xylene)
pH	Beryllium	Nitrate an N	TPH (C6 to C36)
Total Dissolved Solids	Barium	Nitrite as N	
Total Suspended Solids	Cobalt	Total Nitrogen	
Turbidity	Lead	Total Phosphorus	
	Iron		
	Manganese		
	Zinc		

1.3 Objective

The objective of surface water monitoring is to establish a baseline of surface water conditions to inform assessment of potential impacts associated with the proposed loop expansion.

2. SCOPE OF WORK

2.1 Monitoring Scope

The following scope of work was undertaken to complete the surface water sampling:

- Mobilisation to site
- Inspection of the six prescribed surface water sampling locations (SW1 to SW6) to assess the presence of surface water suitable for sampling
- Sampling of surface water at locations where water was observed noting this included one prescribed location (SW4), sampled 6 August 2019, and one additional location (SW1 UP), sampled 12 August 2019. A summary of all prescribed locations and SW1 UP is presented in **Table 2-1**. Sampling occurred in general accordance with the procedure supplied by JHR and per the methodology outlined in **Section 2.2**
- Submission of samples to the laboratory for prescribed analysis, as outlined in **Table 1-1**.
- Preparation of this report presenting the results of the monitoring.

Table 2-1: Surface Water Sampling Locations

Sample Designation	Location
SW1 – UP	Intended as an up-gradient sample, located on a western tributary of the Mulwaree River, approximately 100 m west of the rail corridor at CH. 262.600. Water was present as small, non-continuous ponds – no flow was observed.
SW1	Adjacent to a culvert on the western side of the rail line at CH 262.600 on tributary of Mulwaree River. Water was not present and could not be sampled.
SW2	Adjacent to a culvert on the eastern side of the rail line at CH 262.600 on tributary of Mulwaree River. Water was not present and could not be sampled.
SW3	Adjacent to a culvert on the western side of the rail line at CH 262.300. Water was not present and could not be sampled.
SW4	Adjacent to a culvert on the eastern side of the rail line at CH 262.300. Water as present as a series of stagnant ponds and not flowing.
SW5	Adjacent to a culvert on the western side of the rail line at CH 262.000. Water was not present and could not be sampled.
SW6	Adjacent to a culvert on the eastern side of the rail line at CH 262.000. Water was not present and could not be sampled.

Sampling locations are also presented in **Figure 1, Appendix 1**.

2.2 Sampling Methodology

The following procedures were undertaken for the sampling program:

1. Samples of surface water were collected from two locations where water was present (SW1-UP and SW4). The other five prescribed locations (SW1, SW2, SW3, SW5 and SW6) were dry and could not be sampled. Sample locations are shown as per **Table 2-1** and shown on **Figure 1 (Appendix 1)**.
2. Chemical and physical parameters, including temperature, pH, electrical conductivity, dissolved oxygen and oxidation/reduction potential were measured in the field as part of the sampling event for the collection of SW4. Sample SW1-UP was collected as an opportunistic grab sample in a later sampling event (12 August 2019) and the field water quality meter was not available for field measurement. Both samples were filtered in the field for metals analysis.
3. At each sampling location, surface water was collected using a clean container and placed into clean laboratory-supplied sample bottles, containing the appropriate preservative for the analysis required.
4. Samples were collected from a depth of approximately 0.1 m below the water surface.
5. Each sample bottle was clearly labelled with a unique sample name, date and location.

6. Samples were collected following the quality control and quality assurance procedures described in **Section 2.3**.
7. Samples were analysed for the following analytical suite which included the parameters listed in **Table 1-1**. Additional metals, arsenic, cadmium, chromium, copper, mercury and nickel were also analysed. For SW4, analysis for total lead was also included. **NB** The sample SW1-UP was incorrectly labelled as S03-UP in the Eurofins Laboratory report. All references in this report to SW1_UP should be referenced to the result for S03-UP in Eurofins report 670969_W (**Appendix 3**).

2.3 Quality Assurance and Quality Control Program

The following quality assurance and quality control (QA/QC) procedures were employed during the sampling program:

1. All samples were collected by personnel trained and experienced in the collection of water samples for analysis, using standard industry techniques for sample collection
2. All proposed samples were collected (where water was present)
3. Clean, single location use sampling equipment was used to collect each sample to minimise the opportunity for cross contamination
4. With the exception of dissolved metals analysis, all samples were promptly placed in clean, laboratory-supplied containers appropriate for the required analyses and containing the appropriate preservative
5. For dissolved metals analysis, all samples were filtered using a single use syringe and 0.45 µm filter, prior to placement in the container with appropriate preservative
6. All samples were labelled with unique names, identifying location and date
7. All samples were placed in an esky chilled with ice
8. Samples were submitted to the laboratory under chain-of-custody protocols
9. All samples were analysed within the recommended holding times
10. A NATA accredited laboratory was used for the analyses conducted and is experienced in the analytical requirements for potentially contaminated soil and groundwater.
11. Submission of quality control samples for analysis:
 - a. Field duplicate – analysed for all parameters, Duplicate ID: D01_130819. Primary sample ID: SW1-UP (S03-UPTC)
 - b. Field duplicate – analysed for all parameters, Duplicate ID: SW04A. Primary sample ID: SW4
 - c. Trip blanks - 6 August 2019 and 12 August 2019 – analysed for TRH C6-C9 and BTEXN
 - d. Trip spikes - 6 August 2019 and 12 August 2019 – analysed for BTEXN and TRH C6-C9.

Quality control results are summarised in **Table 3, Appendix 2**. Results for the trip blanks found no detectable concentrations. Results for the trip spike were within acceptable recovery limits. Review of the calculated relative percent difference (RPD) between primary and duplicate sample pairs found all concentrations within the RPD criteria of $\pm 30\%$.

Internal laboratory quality control analyses including method blanks, laboratory control samples (LCS), matrix spikes and laboratory duplicates were completed to cover project analytes.

Laboratory internal quality assurance (QA) testing results are contained within the laboratory report sheets, **Appendix 3**. Internal laboratory review indicated internal duplicates, method blanks, laboratory control samples and matrix spikes to be within acceptable quality control limits.

The analytical data is considered to be of suitable quality for the purpose of this project.

3. ASSESSMENT CRITERIA

Assessment criteria proposed for the assessment of surface water are sourced from the following references:

1. National Environment Protection Council (2013) *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)* (NEPM 2013)
2. National Health and Medical Research Council (2008) *Guidelines for Managing Risks in Recreational Water*
3. NSW DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*
4. ANZECC & ARMCANZ (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*

NSW DEC (2007) indicates that for assessing groundwater quality, it is first necessary to assess the beneficial uses of groundwater and surface water downgradient of the site. This assessment of beneficial uses is considered to be suitable for assessing surface water quality.

The closest surface water body to the site is Mulwaree River, located approximately 600 m east of site. Mulwaree River falls under the Goulburn-Mulwaree Council Local Environmental Plan (LEP), and is classified as a recreational waterway (W2) zone, protective of the following values:

1. Ecological, scenic and recreational
2. Water based recreational, and
3. A sustainable agricultural industry for irrigation and stock watering.

Assessment criteria has been adopted to be consistent with the values described above consistent with values were taken from:

1. Health-based screening criteria for recreational water derived from drinking water standards by factoring by ten, in accordance with the National Health and Medical Research Council *Guidelines for Managing Risk in Recreational Waters 2008* (NHMRC 2008)
2. Ecological criteria based on the ANZECC & ARMCANZ (2000) *Australian And New Zealand Guidelines for Fresh and Marine Water Quality for the Protection of Aquatic Ecosystems of Receiving Waters 2000* (ANZECC 2000)

As of August 2018, the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, October 2000), were replaced by the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018). The ANZG 2018 guidelines have been used in this assessment of surface water however it is noted that there are no changes to assessment criteria in the revised guidelines.

ANZG (2018) advocates a site-specific approach to developing guideline trigger values based on such factors as local biological effects data and the current levels of disturbance of the ecosystem. The guidelines present 'low risk trigger values' which are defined as concentrations of key performance parameters below which there is a low risk of adverse biological effects. If these trigger values are exceeded, then further action is required which may include further site-specific investigations to assess ecological risks or management and remedial actions. Low risk trigger values are presented ANZG 2018 for the protection of 80-99% of species in fresh waters, with trigger values depending on the health of the receiving waters.

A 95% protection of freshwater species was selected due to the partially degraded environment in the river which flow to Mulwaree River.

A summary of the assessment criteria for surface water is provided in **Table 3-1** and **Table 3-2**.

Table 3-1: Health-based screening criteria for recreational waters (NHMRC 2008)

Analyte	Recreational Water (µg/L)
Ammonia	5000
Nitrate	50,000
Nitrite	30,000
Total Kjeldahl nitrogen	800
TRH C6-C10 minus BTEX (F1)	-
TRH >C10-C16 minus naphthalene (F2)	-
Benzene	10
Toluene	8,000
Ethylbenzene	3,000
Xylenes	6,000
Naphthalene	17
Aluminium	2000
Arsenic	100
Barium	2000
Beryllium	600
Cadmium	20
Copper	20,000
Iron	3,000
Lead	100
Manganese	5,000
Mercury (total)	10
Nickel	200
Zinc	30,000

Table 3-2: Ecological screening criteria for surface water

Analyte	Ecological, freshwater criteria (µg/L)	Reference
Aluminium (filtered)	55	ANZG 2018, fresh water guideline adopted
Beryllium (filtered)	No criteria	
Cobalt (filtered)	No criteria	
Iron (filtered)	300	ANZECC 2000, fresh water guideline adopted
Lead (filtered)	3.4	ANZG 2018, fresh water guideline adopted
Manganese (filtered)	1900	ANZG 2018, fresh water guideline adopted
Arsenic (filtered)	24	ANZG 2018, fresh water guideline adopted
Cadmium (filtered)	2	ANZG 2018, fresh water guideline adopted
Chromium (filtered)	27	ANZG 2018, fresh water guideline adopted
Copper (filtered)	12	ANZG 2018, fresh water guideline adopted
Mercury (filtered)	0.6	ANZG 2018, fresh water guideline adopted

Analyte	Ecological, freshwater criteria (µg/L)	Reference
Nickel (filtered)	97	ANZG 2018, fresh water guideline adopted
Zinc (filtered)	70	ANZG 2018, fresh water guideline adopted
Ammonia	900	ANZG 2018, fresh water guideline adopted
Nitrate	3500	ANZG 2018, fresh water guideline adopted
Total Suspended Solids (TSS)	700	
Benzene	950	ANZG 2018, fresh water guideline adopted
Toluene	180	ANZG 2018, fresh water guideline adopted
Total xylenes	200	ANZG 2018, fresh water guideline adopted
Ethylbenzene	80	ANZG 2018, fresh water guideline adopted

4. RESULTS

4.1 Field Sampling Observations

Sampling of SW4 occurred on 6 August 2019 and sampling of SW1 UP occurred on 13 August 2019.

The Bureau of Meteorology indicated no rainfall had occurred in the preceding week. The weather was fine with very light winds.

Surface water was limited to non-flowing ponds at SW4 and SW1 UP and was not observed elsewhere onsite (including at any of the other prescribed sampling points).

Physico-chemical parameters for each of the sample locations are presented in **Table 1, Appendix 2**.

The following was generally noted:

1. pH ranged from slightly alkaline (7.9 – SW4) to alkaline (8.8 – SW1-UP)
2. Conductivity indicated fresh to slightly brackish water
3. Oxidising conditions and moderately oxygenated water in SW4

Photographs of sampling locations are presented in **Appendix 4**.

4.2 Analytical Results

The analytical results are presented as a summary table in **Table 2, Appendix 2** and laboratory reports are presented in **Appendix 3**.

A brief discussion of the results is presented below.

4.2.1 Metals

Arsenic, cadmium, barium, copper, lead, nickel and zinc were detected above the laboratory limits of reporting in the surface water samples as follows:

1. SW1-UP, (Ba)
2. SW4, (Al, As, Ba, Cd, Cu, Fe, Pb, Ni, Zn)

Metal concentrations were below the adopted human health criteria but exceeded ecological criteria of 55 µg/L for aluminium, 2 µg/L for cadmium, 12 µg/L for copper, 8 µg/L for lead, 11 µg/L nickel and 70 µg/L for zinc at SW4.

Beryllium, cobalt, chromium and mercury were not detected at concentrations above the laboratory limits of reporting at either sampling location.

4.2.2 Nitrogen

Nitrogen was detected as follows:

1. Ammonia was detected at SW1-UP
2. Kjeldahl nitrogen was detected at SW4

Nitrogen concentrations were otherwise below the laboratory limits of reporting and all were below adopted ecological criteria of 900 µg/L for ammonia and 3500 µg/L for nitrate.

4.2.3 Total Recoverable Hydrocarbons

TRH fractions were below laboratory limits of reporting for all samples.

4.2.4 BTEX

BTEX compounds at the sampling locations were reported below the laboratory limit of reporting.

5. CONCLUSIONS

The preliminary surface water sampling event for the Tarago Rail Loop area was conducted on 6 August and 12 August 2019.

Of the six prescribed locations (SW1 to SW6), water was only observed at SW4. A location upstream from SW1, (SW1-UP), where water was observed, was also sampled to provide an indication of background surface water conditions. Surface water in both locations was observed to be in isolated stagnating ponds with no flow evident.

All results were reported below human health criteria.

Exceedances of ecological criteria were identified for location SW4 for metals, aluminium, cadmium, copper, lead, nickel and zinc.

All other results were reported below laboratory limits of reporting or adopted criteria.

It is considered that given the location of the impacted sample (SW4), within the rail corridor and the dry conditions (no flow), the implications for potential impacts on offsite downstream receptors is unclear.

6. REFERENCES

ANZECC & ARMCANZ (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality

AS/NZS 5667.11 1998, Water Quality – Sampling – Guidance on Sampling of Groundwater

Australian and New Zealand Environment and Conservation Council (ANZECC) 1992, Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018)

Contaminated Land Management Act NSW 1997

National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM 2013)

National Health and Medical Research Council (2008) Guidelines for Managing Risks in Recreational Water

NSW DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination

APPENDIX 1
FIGURES



RAMBOLL AUSTRALIA - GIS MAP file : 318000780 GIS_P001_ManagementPlan | F004_SurfaceWaterSamples_V01 | 20/08/2019

Legend

- Rail corridor
- Rail corridor fence
- 0.1km chainage point
- Goulburn Street level crossing
- Construction compound
- Goods shed exclusion zone

Surface water sampling locations

- S Sampled
- P Proposed (dry)

A4
1:8,000

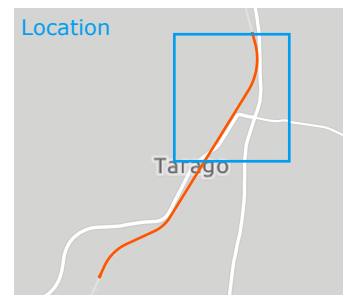


Figure 1 | Surface Water Sampling Locations

APPENDIX 2
RESULTS TABLES

Project No: 318000780
 Client Name: JHR
 Project Name: Surface Water Sampling Tarago Rail Loop
 Project Site: Tarago Station
 29-08-19

Table 1 - Surface Water Geochemical Data



Sample Location	Sample Date	Time	Sample Depth (m below surface)	Temp (°C)	Spec Conductivity (µScm ⁻¹)	pH	Dissolved Oxygen (mg/L)	Redox (mV)	TDS (ppm)	Comments
SW1-UP	12-08-19	7:45	0.1	NA	820.0	7.9	NA	NA	420.0	stagnant pond, clear
SW4	06-08-19	11:35	0.1	12.4	169.00	8.80	9.74	200.0	-	stagnant pond, clear, slightly yellow

Notes

ppm = parts per million
 µScm⁻¹ = microSiemens per centimetre
 mV = milli Volts
 n/a = not applicable

TABLE 2:
 Surface Water Sampling Analytical Results

Guidelines	Health-based Screening Criteria (Recreational Waters)	Stockwater Guidelines (ANZECC 2000)	STV - Irrigation (ANZECC 2000)	Ecological Scceening Criteria (ANZG 95% Protection) Fresh Water	Sample Type:	Surface Water	Surface Water
					Lab ID	12-08-19	06-08-19
					Sample date:	SW1-UP	SW4
					Sample ID:	Tarago SW Monitoring	Tarago SW Monitoring
					Project Name:	318000780	318000780
					Project No:	Tarago Rail Loop	Tarago Rail Loop
					Sample Location:	surface water sample	surface water sample
					Sampling Method:	-	-
					Sample Description:		
Analyte grouping/Analyte		Units		LOR			
Inorganics							
Ammonia (as N)	500	-	-	900	µg/L	10	<10
Conductivity (at 25@°C)	-	-	-	-	µS/cm	100	820
Nitrate & Nitrite (as N)	-	-	-	-	µg/L	10	< 10
Nitrate (as N)	50000	400000	-	3500	µg/L	10	< 20
Nitrite (as N)	30000	30000	-	-	µg/L	10	< 20
pH (at 25@°C)	-	-	-	-	pH units	0.1	7.9
Phosphate total (as P)	-	-	800-1200	-	µg/L	10	< 50
Total Dissolved Solids Dried at 180°C ± 2°C	-	-	-	-	mg/L	5	420
Total Kjeldahl Nitrogen (as N)	800	-	-	-	µg/L	5	<20
Total Nitrogen (as N)	-	-	25000-125000	-	µg/L	5	<20
Total Suspended Solids Dried at 105°C	-	-	-	700	mg/L	5	< 5
Turbidity	-	-	-	-	NTU	1	1
							6
Dissolved and Total Metals							
Aluminium (filtered)	2000	5000	20000	55	µg/L	50	< 50
Barium (filtered)	2000	-	-	-	µg/L	1	100
Beryllium (filtered)	600	-	500	0.13	µg/L	1	<1
Cobalt (filtered)	-	1000	100	90	µg/L	1	<1
Iron (filtered)	3000	-	10000	300	µg/L	50	< 50
Lead (total)	-	-	-	-	µg/L	100	NA
Lead (filtered)	100	100	5000	3.4	µg/L	1	<1
Manganese (filtered)	5000	10000	2500	1900	µg/L	5	<5
Arsenic (filtered)	100	500	2000	13	µg/L	1	<1
Cadmium (filtered)	20	10	50	0.2	µg/L	0.2	<0.2
Chromium (filtered)	500	1000	1000	3.3	µg/L	1	<1
Copper (filtered)	20000	500	100	1.4	µg/L	1	<1
Mercury (filtered)	10	2	2	0.06	µg/L	0.1	<0.1
Nickel (filtered)	200	1000	2000	11	µg/L	1	<1
Zinc (filtered)	30000	20000	5000	8	µg/L	5	<5
							1200
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	-	-	-	-	µg/L	50	<50
TRH C10-C36 (Total)	-	-	-	-	µg/L	100	<100
TRH C15-C28	-	-	-	-	µg/L	100	<100
TRH C29-C36	-	-	-	-	µg/L	100	<100
TRH C6-C9	-	-	-	-	µg/L	20	<20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	17	-	-	16	µg/L	10	<10
TRH >C10-C16	-	-	-	-	µg/L	50	<50
TRH >C10-C16 less Naphthalene (F2)	-	-	-	-	µg/L	50	<50
TRH >C10-C40 (total)*	-	-	-	-	µg/L	100	<100
TRH >C16-C34	-	-	-	-	µg/L	100	<100
TRH >C34-C40	-	-	-	-	µg/L	100	<100
TRH C6-C10	-	-	-	-	µg/L	20	<20
TRH C6-C10 less BTEX (F1)	-	-	-	-	µg/L	20	<20
BTEX							
Benzene	10	-	-	950	µg/L	1	<1
Ethylbenzene	3000	-	-	80	µg/L	1	<2
m&p-Xylenes	-	-	-	-	µg/L	2	<2
o-Xylene	-	-	-	-	µg/L	1	<2
Toluene	8000	-	-	180	µg/L	1	<2
Xylenes - Total	6000	-	-	200	µg/L	3	<3

- indicates no criterion available
 All results are in µg/L
 LOR = Limit of Reporting
 Concentrations below the LOR noted as <value
 NOC = No observed contamination
 National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM) Groundwater Investigation Levels for Fresh and Marine Water Quality. Investigation levels apply to typical slightly-moderately disturbed systems. See ANZECC & ARMCANZ (2000) for guidance on applying these levels to different ecosystem conditions.
 Australia and New Zealand Environment and Conservation Council (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Guidelines in *italics* are low level reliability guidelines
 ANZECC, NEPM and NHMRC guidelines for mercury are based on total mercury.
 Concentration in **red bold** font exceed the Health-based Recreational Use Criteria
 Concentration in **grey bold** font exceed the Ecological Criteria
 Concentration in **blue bold** font exceed the Irrigation short term value Criteria
 Concentration in **green bold** font exceed the Stock watering Criteria
 Blank where not analysed
 (1) Generally 95% protective level for fresh water ecosystems.
 Details of Guideline values are presented in Section 3 of report, (Tables 3.1 and 3.2)

TABLE 3:
Surface Water QA Results
August 2019 Round

	Sample Type:		Surface Water	Surface Water	RPD (%)	Surface Water	Surface Water	RPD (%)	Blank	Spike	Blank	Spike
	Lab ID		-	-		-	-		Blank	Spike	Blank	Spike
	Sample date:		12-08-19	12-08-19		06-08-19	06-08-19		12-08-19	12-08-19	06-08-19	06-08-19
	Sample ID:		SW1-UP	D01_130819		SW4	SW4A		BLANK	SPIKE	BLANK	SPIKE
	Project Name:		Tarago SW Monitoring	Tarago SW Monitoring		Tarago SW Monitoring	Tarago SW Monitoring		Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring
	Project No:		318000780	318000780		318000780	318000780		318000780	318000780	318000780	318000780
	Sample Location:		Tarago Rail Loop	Tarago Rail Loop		Tarago Rail Loop	Tarago Rail Loop		Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop
	Sampling Method:		surface water sample	surface water sample		surface water sample	surface water sample		Blank	Spike	Blank	Spike
Analyte grouping/Analyte	Units	LOR										
Inorganics												
Ammonia (as N)	µg/L	10	10	<10	ND	<10	<10	ND	--	--	--	--
Conductivity (at 25@°C)	µS/cm	100	820	790	3.7	170	170	0.0	--	--	--	--
Nitrate & Nitrite (as N)	µg/L	10	< 10	< 5	ND	<50	<50	ND	--	--	--	--
Nitrate (as N)	µg/L	10	< 20	< 20	ND	< 20	< 20	ND	--	--	--	--
Nitrite (as N)	µg/L	10	< 20	< 20	ND	< 20	< 20	ND	--	--	--	--
pH (at 25@°C)	pH units	0.1	7.9	7.9	0.0	6.9	7	1.4	--	--	--	--
Phosphate total (as P)	µg/L	10	< 50	< 50	ND	30	30	ND	--	--	--	--
Total Dissolved Solids Dried at 180°C ±	mg/L	5	420	440	4.7	< 10	< 10	ND	--	--	--	--
Total Kjeldahl Nitrogen (as N)	µg/L	5	<20	<20	ND	100	120	18.2	--	--	--	--
Total Nitrogen (as N)	µg/L	5	<20	<20	ND	100	120	18.2	--	--	--	--
Total Suspended Solids Dried at 105°C	mg/L	5	< 5	9	ND	7	7.4	5.6	--	--	--	--
Turbidity	NTU	1	1	< 1	ND	6	5.9	1.7	--	--	--	--
Dissolved Metals												
Aluminium	µg/L	50	< 50	< 50	ND	170	80	72.0	--	--	--	--
Barium (filtered)	µg/L	0.2	100	100	0.0	40	100	85.7	--	--	--	--
Beryllium (filtered)	µg/L	1	<1	< 1	ND	<1	< 1	ND	--	--	--	--
Cobalt (filtered)	µg/L	1	<1	< 1	ND	<1	< 1	ND	--	--	--	--
Iron (filtered)	µg/L	1	< 50	<50	ND	220	<50	ND	--	--	--	--
Lead (total)	µg/L	0.1	NA	NA	ND	13	12	8.0	--	--	--	--
Lead (filtered)	µg/L	1	<1	<1	ND	8	8	0.0	--	--	--	--
Manganese (filtered)	µg/L	5	<5	<5	ND	15	14	6.9	--	--	--	--
Arsenic (filtered)	µg/L	1	<1	<1	ND	1	<1	ND	--	--	--	--
Cadmium (filtered)	µg/L	0.2	<0.2	<0.2	ND	5.5	5.6	1.8	--	--	--	--
Chromium (filtered)	µg/L	1	<1	<1	ND	1	<1	ND	--	--	--	--
Copper (filtered)	µg/L	1	<1	<1	ND	140	150	6.9	--	--	--	--
Mercury (filtered)	µg/L	0.1	<0.1	<0.1	ND	<0.1	<0.1	ND	--	--	--	--
Nickel (filtered)	µg/L	1	<1	<1	ND	14	14	0.0	--	--	--	--
Zinc (filtered)	µg/L	5	<5	<5	ND	1200	1200	0.0	--	--	--	--
Total Recoverable Hydrocarbons - 1999 NEPM Fractions												
TRH C10-C14	µg/L	50	<50	<100	ND	<50	<100	ND	--	--	--	--
TRH C10-C36 (Total)	µg/L	100	<100	< 50	ND	<100	< 50	ND	--	--	--	--
TRH C15-C28	µg/L	100	<100	< 100	ND	<100	< 100	ND	--	--	--	--
TRH C29-C36	µg/L	100	<100	< 100	ND	<100	< 100	ND	--	--	--	--
Total Recoverable Hydrocarbons - 2013 NEPM Fractions												
Naphthalene	µg/L	10	< 10	< 10	ND	< 10	< 10	ND	<10	--	<10	--
TRH >C10-C16	µg/L	50	< 50	< 50	ND	< 50	< 50	ND	--	--	--	--
TRH >C10-C16 less Naphthalene (F2)	µg/L	50	< 50	< 50	ND	< 50	< 50	ND	--	--	--	--
TRH >C10-C40 (total)*	µg/L	100	< 100	< 100	ND	< 100	< 100	ND	--	--	--	--
TRH >C16-C34	µg/L	100	< 100	< 100	ND	< 100	< 100	ND	--	--	--	--
TRH >C34-C40	µg/L	100	< 100	< 100	ND	< 100	< 100	ND	--	--	--	--
TRH C6-C10	µg/L	20	< 20	< 20	ND	< 20	< 20	ND	<20	--	<20	--
TRH C6-C10 less BTEX (F1)	µg/L	20	< 20	< 20	ND	< 20	< 20	ND	<20	--	<20	--
BTEX												
Benzene	µg/L	1	<1	<1	ND	<1	<1	ND	<1	100%	<1	100%
Ethylbenzene	µg/L	1	<1	<1	ND	<1	<1	ND	<1	100%	<1	100%
m&p-Xylenes	µg/L	2	<2	<2	ND	<2	<2	ND	<2	100%	<2	100%
o-Xylene	µg/L	1	<1	<1	ND	<1	<1	ND	<1	100%	<1	100%
Toluene	µg/L	1	<1	<1	ND	<1	<1	ND	<1	99%	<1	99%
Xylenes - Total	µg/L	3	<3	<3	ND	<3	<3	ND	<3	100%	<3	100%

(1) Trip Spike in % recovery
 LOR = Limit of Reporting
 ND = not calculated as one or more results are below the LOR.
Bold and Shaded cells exceed RPD >30%
Bold indicates when above the acceptance criteria for Trip Spikes/Blanks and Rinsates
 Blank Cell indicates not analysed

APPENDIX 3
LABORATORY REPORTS



CHAIN OF CUSTODY RECORD

Sydney Laboratory
Unit F3 Bld F 16 Mars Road Lane Cove West NSW 2066
Tel: 02 952 4800 EnviroSample@eurofins.com

Sydney Laboratory
Unit F3 Bld F 16 Mars Road Lane Cove West NSW 2066
Tel: 02 952 4800 EnviroSample@eurofins.com

Brisbane Laboratory
Unit 1 J1 Swindlers Place Marooch QLD 4132
Tel: 07 392 4800 EnviroSample@eurofins.com

Perth Laboratory
Unit 2 91 Leach Highway Kewdale WA 6105
Tel: 08 9251 9600 EnviroSampleWA@eurofins.com

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
Tel: 03 8564 5000 EnviroSampleVIC@eurofins.com

Company		RAMROLL AUSTRALIA		Project No		318000780		Project Manager		STEPHEN MAXWELL		Sampler(s)		EXTENDABLE ARM SWINGS SAMPLER.			
Address		LEVEL 3, 100 PACIFIC HIGHWAY, NORTH SYDNEY NSW, 2060.		Project Name		IHR SURFACE WATER SAMPLING		EDD Format		ESdel, ECU's etc		Handed over by		ASIF KHAN			
Contact Name		ASIF KHAN		Analytes Where needed, an analyte code must be used to attach a QUOTE number.		GENERAL PARAMETERS		DISSOLVED METALS		TOTAL METALS		NUTRIENTS		HYDROCARBONS (SIXX TRH)			
Phone No		02 9954 8139.															
Special Directions																	
Purchase Order																	
Quote ID No												Email for Invoice		AIKHAN@RAMBOLL.COM			
												Email for Results		AIKHAN@RAMBOLL.COM			
												Containers Change container type & size if necessary.		Required Turnaround Time Default will be 5 days if not locked.			
												<input checked="" type="checkbox"/> 500mL Plastic <input type="checkbox"/> 250mL Plastic <input type="checkbox"/> 125mL Plastic <input checked="" type="checkbox"/> 200mL Amber Glass <input checked="" type="checkbox"/> 40mL Vial <input type="checkbox"/> 500mL PPAS PET <input type="checkbox"/> Jar (Glass or HDPE) <input checked="" type="checkbox"/> 60mL Plastic		* Surcharge will apply <input type="checkbox"/> Overnight (reporting by 9am) <input type="checkbox"/> Same day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 5 days (Standard) <input type="checkbox"/> Other			
No	Client Sample ID	Sampled Date/Time	Matrix											Sample Comments / Dangerous Goods Hazard Warning			
1	SW04	6-8-19 10:45	W	✓	✓	✓	✓	✓					1	2	3	} ESKY 01 of 61	
2	SW04A	6-8-19 11:00	W	✓	✓	✓	✓	✓					1	2	3		
3	SWY (TRIP BLANK)		W											2			
4	SWX (TRIP SPIKE)		W											2			
Total Counts																	
Method of Shipment		<input type="checkbox"/> Courier (#)) <input checked="" type="checkbox"/> Hand Delivered		<input type="checkbox"/> Postal		Name		ASIF KHAN		Signature		Date		06/08/19		Time	
Eurofins mgt Laboratory Use Only		Received By		SYD BNE MEL PER ADL NTL DRW		Signature		Date		Date		Time		Temperature		Report No	
		Leena D						06/08/19				3:06 PM		8.7 °C		669788	

Enviro Sample NSW

To: Asim Khan
Subject: RE: Sampling Bottles Required

From: Nibha Vaidya [mailto:NibhaVaidya@eurofins.com]
Sent: Friday, August 02, 2019 11:51 AM
To: Asif Iqbal Khan <AIKHAN@ramboll.com>
Cc: Stephen Maxwell <SMAXWELL@ramboll.com>; Victoria Sedwick <vsedwick@ramboll.com>; AlenaBounkeua<eurofins.com>; AsimKhan@eurofins.com
Subject: RE: Sampling Bottles Required

Hi Asif,

Thanks for your call. We will arrange the delivery to your North Sydney office for Monday morning. We will also include 2 eskies as requested.

Please find below the list of containers required for these parameters:

Parameters	Containers Required
General Parameters	
Electrical Conductivity	
pH	
Total Dissolved Solids	
Total Suspended Solids	
Turbidity	
Dissolved Metals	
Al, Be, Ba, Co, Pb, Fe, Mn, Zn	1 x 500mL plastic (no preservative) - <i>green label</i>
Total Metals	
Pb	1 x 60mL plastic metals (Nitric acid preserved) - <i>red/orange label</i> <i>Field filter at 0.45 um</i>
Nutrients	
Ammonia	1 x 60mL plastic metals (Nitric acid preserved) - <i>red/orange label</i>
Nitrate	
Nitrite	1 x 60mL plastic nutrients (H2SO4 preserved) - <i>purple label</i> <i>Nitrite will be conducted from the unpreserved plastic bottle listed above.</i>
Total Nitrogen	
Total Phosphate*	
Hydrocarbons	
BTEX	1 x 200mL glass (no preservative) - <i>orange label</i> 2 x 40mL VOA vials (HCl preserved) - <i>pink label</i>
TRH (C6 to C36)	

*Total Phosphate is a nutrients analysis and is the recommended technique in water samples.

As discussed, our Sample Receipt section is open till around midnight. If you are dropping off samples around 6 / 7 pm next Tuesday and if the front gate or glass door is locked, please call Asim on **0429 051 456 / 02 9900 8432**.

Please feel free to contact me should you need anything else.

Enviro Sample NSW

To: Stephen Maxwell
Subject: RE: Eurofins Sample Receipt Advice - Report 669788 : Site JHR SURFACE WATER SAMPLING (318000780)

From: Stephen Maxwell [<mailto:SMAXWELL@ramboll.com>]
Sent: Tuesday, 6 August 2019 4:08 PM
To: Enviro Sample NSW
Cc: Asif Iqbal Khan
Subject: RE: Eurofins Sample Receipt Advice - Report 669788 : Site JHR SURFACE WATER SAMPLING (318000780)

Thanks

Please analyse the spike sample for what ever it was spiked with (C6 – C9?) and analyse the blank for BTEX and TRH C6 – C9.

Kind regards
Stephen Maxwell
Lead Consultant

D +61 478658194
M +61 478658194
smaxwell@ramboll.com

Ramboll Australia Pty Ltd.
ACN 095 437 442
ABN 49 095 437 442

From: EnviroSampleNSW@eurofins.com <EnviroSampleNSW@eurofins.com>
Sent: 6 August, 2019 4:01 PM
To: Stephen Maxwell <SMAXWELL@ramboll.com>
Cc: Asif Iqbal Khan <AIKHAN@ramboll.com>
Subject: Eurofins Sample Receipt Advice - Report 669788 : Site JHR SURFACE WATER SAMPLING (318000780)

Dear Valued Client,

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins | mgt Analytical Services Manager as soon as possible to make certain that they get changed.

Regards

Luca Dominici
Sample Receipt

Eurofins | Environmental Testing
Unit F3, Parkview Building
16 Mars Road
LANE COVE WEST NSW 2066
AUSTRALIA
Phone: +61 29900 8421
Email: EnviroSampleNSW@eurofins.com
Website: environment.eurofins.com.au

[EnviroNote 1079 - PFAS Fingerprinting](#)

[EnviroNote 1080 - Total Organofluorine Analysis & PFAS Investigations](#)

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Alena Bounkeua

From: Stephen Maxwell <SMAXWELL@ramboll.com>
Sent: Monday, 26 August 2019 9:50 AM
To: Alena Bounkeua
Subject: RE: Eurofins Test Results - Report 669788 : Site JHR SURFACE WATER SAMPLING (318000780)

Follow Up Flag: Follow up
Flag Status: Completed

EXTERNAL EMAIL*

Hi Alena

Can you confirm if remnant volume is available on these samples to complete the following analyses?

Aluminium (filtered)
Barium (filtered)
Beryllium (filtered)
Cobalt (filtered)
Iron (filtered)
Lead (filtered)
Manganese (filtered)

If so, please proceed on fastest available turn-around.

Kind regards
Stephen Maxwell
Lead Consultant

D +61 478658194
M +61 478658194
smaxwell@ramboll.com

Ramboll Australia Pty Ltd.
ACN 095 437 442
ABN 49 095 437 442

From: AlenaBounkeua@eurofins.com <AlenaBounkeua@eurofins.com>
Sent: 9 August, 2019 5:14 PM
To: Stephen Maxwell <SMAXWELL@ramboll.com>
Cc: Asif Iqbal Khan <AIKHAN@ramboll.com>
Subject: Eurofins Test Results - Report 669788 : Site JHR SURFACE WATER SAMPLING (318000780)

Dear Stephen,

Please find attached results for your project in the subject header.

Kind Regards

Alena Bounkeua
Analytical Services Manager

Eurofins | Environment Testing

Unit F3, Parkview Building
16 Mars Road
LANE COVE WEST NSW 2066
AUSTRALIA
Phone: +61 2 9900 8414
Mobile: +61 429 365 410
Email: AlenaBounkeua@eurofins.com
Website: environment.eurofins.com.au

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Melbourne

6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney

Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane

1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth

2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

Sample Receipt Advice

Company name: **Ramboll Australia Pty Ltd**
Contact name: Stephen Maxwell
Project name: JHR SURFACE WATER SAMPLING
Project ID: 318000780
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Aug 6, 2019 3:06 PM
Eurofins reference: **669788**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

- Appropriate sample containers have been used.
- Sample containers for volatile analysis received with zero headspace.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Stephen Maxwell - smaxwell@ramboll.com.

Ramboll Environ Australia Pty Ltd
 Level 3/100 Pacific Highway
 North Sydney
 NSW 2060



NATA Accredited
 Accreditation Number 1261
 Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: **Stephen Maxwell**

Report **669788-W-V2**
 Project name **JHR SURFACE WATER SAMPLING**
 Project ID **318000780**
 Received Date **Aug 06, 2019**

Client Sample ID			SW04 Water S19-Au07234 Aug 06, 2019	SW04A Water S19-Au07235 Aug 06, 2019	SWY (TRIP BLANK) Water S19-Au07236 Aug 06, 2019	R20 SWX (TRIP SPIKE) Water S19-Au07237 Aug 06, 2019
Sample Matrix	LOR	Unit				
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01	94
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	88
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	82
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	-	-
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	91
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	87
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	88
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	87
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	92
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	89
4-Bromofluorobenzene (surr.)	1	%	94	93	89	101
Ammonia (as N)						
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01	-	-
Conductivity (at 25°C)						
Conductivity (at 25°C)	1	uS/cm	170	170	-	-
Nitrate & Nitrite (as N)						
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	-	-
Nitrate (as N)						
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	-	-
Nitrite (as N)						
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	-	-
pH (at 25°C)						
pH (at 25°C)	0.1	pH Units	6.9	7.0	-	-
Phosphate total (as P)						
Phosphate total (as P)	0.01	mg/L	0.03	0.03	-	-
Total Dissolved Solids Dried at 180°C ± 2°C						
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	< 10	< 10	-	-
Total Kjeldahl Nitrogen (as N)						
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0	1.2	-	-
Total Nitrogen (as N)						
Total Nitrogen (as N)	0.2	mg/L	1	1.2	-	-
Total Suspended Solids Dried at 103–105°C						
Total Suspended Solids Dried at 103–105°C	1	mg/L	7.0	7.4	-	-
Turbidity						
Turbidity	1	NTU	6.0	5.9	-	-

Client Sample ID			SW04	SW04A	SWY (TRIP BLANK)	R20SWX (TRIP SPIKE)
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			S19-Au07234	S19-Au07235	S19-Au07236	S19-Au07237
Date Sampled			Aug 06, 2019	Aug 06, 2019	Aug 06, 2019	Aug 06, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	0.17	0.08	-	-
Arsenic (filtered)	0.001	mg/L	0.001	< 0.001	-	-
Barium (filtered)	0.02	mg/L	0.04	0.04	-	-
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Cadmium (filtered)	0.0002	mg/L	0.0055	0.0056	-	-
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Copper (filtered)	0.001	mg/L	0.14	0.15	-	-
Iron (filtered)	0.05	mg/L	0.22	0.14	-	-
Lead	0.001	mg/L	0.013	0.012	-	-
Lead (filtered)	0.001	mg/L	0.008	0.008	-	-
Manganese (filtered)	0.005	mg/L	0.015	0.014	-	-
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	-	-
Nickel (filtered)	0.001	mg/L	0.014	0.014	-	-
Zinc (filtered)	0.005	mg/L	1.2	1.2	-	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Aug 07, 2019	7 Days
Total Recoverable Hydrocarbons - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Aug 07, 2019	7 Days
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Aug 07, 2019	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Aug 07, 2019	14 Days
Eurofins mgt Suite B1			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Aug 07, 2019	
Eurofins mgt Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P			
Ammonia (as N) - Method: LTM-INO-4200 Ammonia by Discrete Analyser	Melbourne	Aug 07, 2019	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	Aug 07, 2019	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	Aug 07, 2019	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	Aug 07, 2019	2 Days
Phosphate total (as P) - Method: APHA 4500-P E. Phosphorus	Melbourne	Aug 07, 2019	28 Days
Total Kjeldahl Nitrogen (as N) - Method: LTM-INO-4310 TKN in Waters & Soils by FIA	Melbourne	Aug 07, 2019	7 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Aug 07, 2019	28 Days
pH (at 25°C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Aug 07, 2019	0 Hours
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Aug 09, 2019	7 Days
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Aug 09, 2019	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Aug 07, 2019	2 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Aug 26, 2019	180 Days
Metals M8 filtered - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Aug 07, 2019	28 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Aug 08, 2019	180 Days

Company Name:	Ramboll Australia Pty Ltd	Order No.:		Received:	Aug 6, 2019 3:06 PM
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	Report #:	669788	Due:	Aug 26, 2019
Project Name:	JHR SURFACE WATER SAMPLING	Phone:	02 9954 8118	Priority:	3 Day
Project ID:	318000780	Fax:	02 9954 8150	Contact Name:	Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium (filtered)	Barium (filtered)	Beryllium (filtered)	Cobalt (filtered)	Conductivity (at 25°C)	Iron (filtered)	Lead	Manganese (filtered)	pH (at 25°C)	Total Dissolved Solids Dried at 180°C ± 2°C	Total Suspended Solids Dried at 103–105°C	Turbidity	Metals M8 filtered	Eurofins mgt Suite B1	BTEXN and Volatile TRH	Eurofins mgt Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P		
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736																							
External Laboratory																							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																		
1	SW04	Aug 06, 2019		Water	S19-Au07234	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2	SW04A	Aug 06, 2019		Water	S19-Au07235	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	SWY (TRIP BLANK)	Aug 06, 2019		Water	S19-Au07236															X			
4	SWX (TRIP SPIKE)	Aug 06, 2019		Water	S19-Au07237															X			
Test Counts						2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Internal Quality Control Review and Glossary
General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103–105°C	mg/L	< 1			1	Pass	
Turbidity	NTU	< 1			1	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	111			70-130	Pass	
Naphthalene	%	111			70-130	Pass	
TRH C6-C10	%	109			70-130	Pass	
TRH C6-C10	%	109			70-130	Pass	
TRH >C10-C16	%	79			70-130	Pass	
LCS - % Recovery							

Test		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9		%	107			70-130	Pass	
TRH C10-C14		%	85			70-130	Pass	
LCS - % Recovery								
BTEX								
Benzene		%	103			70-130	Pass	
Toluene		%	102			70-130	Pass	
Ethylbenzene		%	104			70-130	Pass	
m&p-Xylenes		%	102			70-130	Pass	
Xylenes - Total		%	103			70-130	Pass	
LCS - % Recovery								
Ammonia (as N)		%	97			70-130	Pass	
Nitrate & Nitrite (as N)		%	100			70-130	Pass	
Nitrate (as N)		%	100			70-130	Pass	
Nitrite (as N)		%	103			70-130	Pass	
Phosphate total (as P)		%	100			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C		%	72			70-130	Pass	
Total Kjeldahl Nitrogen (as N)		%	118			70-130	Pass	
Total Suspended Solids Dried at 103–105°C		%	118			70-130	Pass	
LCS - % Recovery								
Heavy Metals								
Lead		%	93			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1				
Naphthalene	S19-Au07004	NCP	%	94		70-130	Pass	
TRH C6-C10	S19-Au07004	NCP	%	93		70-130	Pass	
TRH >C10-C16	M19-Au03666	NCP	%	74		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1				
TRH C6-C9	S19-Au07004	NCP	%	91		70-130	Pass	
TRH C10-C14	M19-Au03666	NCP	%	79		70-130	Pass	
Spike - % Recovery								
BTEX				Result 1				
Benzene	S19-Au07004	NCP	%	93		70-130	Pass	
Toluene	S19-Au07004	NCP	%	86		70-130	Pass	
Ethylbenzene	S19-Au07004	NCP	%	80		70-130	Pass	
m&p-Xylenes	S19-Au07004	NCP	%	80		70-130	Pass	
o-Xylene	S19-Au07004	NCP	%	88		70-130	Pass	
Xylenes - Total	S19-Au07004	NCP	%	82		70-130	Pass	
Spike - % Recovery								
				Result 1				
Ammonia (as N)	M19-Au07034	NCP	%	96		70-130	Pass	
Nitrate & Nitrite (as N)	M19-Au07034	NCP	%	96		70-130	Pass	
Nitrate (as N)	M19-Au07034	NCP	%	96		70-130	Pass	
Nitrite (as N)	M19-Au07034	NCP	%	97		70-130	Pass	
Phosphate total (as P)	P19-Au10001	NCP	%	101		70-130	Pass	
Total Kjeldahl Nitrogen (as N)	P19-Au10001	NCP	%	118		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Lead	M19-Au02575	NCP	%	81		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M19-Au09112	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Naphthalene	M19-Au09112	NCP	mg/L	< 0.01	**	<1	30%	Pass	
TRH C6-C10	M19-Au09112	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	M19-Au09112	NCP	mg/L	< 0.02	**	<1	30%	Pass	
TRH >C10-C16	M19-Au03675	NCP	mg/L	4.1	2.5	50	30%	Fail	Q15
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M19-Au09112	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M19-Au03675	NCP	mg/L	4.0	2.5	47	30%	Fail	Q15
TRH C15-C28	M19-Au03675	NCP	mg/L	2.5	0.9	95	30%	Fail	Q15
TRH C29-C36	M19-Au03675	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M19-Au09112	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M19-Au09112	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M19-Au09112	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M19-Au09112	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M19-Au09112	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	M19-Au09112	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M19-Au03122	NCP	mg/L	28	28	3.0	30%	Pass	
Conductivity (at 25°C)	M19-Au08824	NCP	uS/cm	48000	48000	1.0	30%	Pass	
Nitrate & Nitrite (as N)	M19-Au03122	NCP	mg/L	12	12	<1	30%	Pass	
Nitrate (as N)	M19-Au03122	NCP	mg/L	< 2	< 2	<1	30%	Pass	
Nitrite (as N)	M19-Au03122	NCP	mg/L	11	11	2.0	30%	Pass	
pH (at 25°C)	M19-Au08824	NCP	pH Units	7.5	7.6	pass	30%	Pass	
Total Kjeldahl Nitrogen (as N)	P19-Au07887	NCP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Turbidity	S19-Au09751	NCP	NTU	25	31	20	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	M19-Au02575	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Dissolved Solids Dried at 180°C ± 2°C	M19-Au11648	NCP	mg/L	1200	1200	3.0	30%	Pass	

Comments

This report has been revised (V2) to include results for additional filtered metals.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q02	The duplicate %RPD is outside the recommended acceptance criteria. Further analysis indicates sample heterogeneity as the cause
Q15	The RPD reported passes Eurofins mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
R20	This sample is a Trip Spike and therefore all results are reported as a percentage

Authorised By

Alena Bounkeua	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Julie Kay	Senior Analyst-Inorganic (VIC)



Glenn Jackson General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

Sydney Laboratory
Unit F3 Bld.F, 16 Mars Rd, Lane Cove West, NSW 2056
02 9900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
Unit 1, 21 Smallwood Pl., Murarie, QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
Unit 2, 91 Leach Highway, Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company		RAMBOLL		Project No		318000780		Project Manager		STEVE MAXWELL							
Address		6685 RD THE JUNCTION NSW 2291		Project Name		-		Report Format		PDF & EXCEL							
Contact Name		STEVE MAXWELL		Analysis (Note: Where matrix are requested, please specify "Total" or "Filtered") PH GREEN BIRUMALS (P.SOURCE) PH EC, TDS, TSS, TURBIDITY LEAD						Relinquished by		STEVE MAXWELL					
Phone No		0478658194								Email for Results		smaxwell@ramboll.com					
Special Direction		SOIL MAT								Containers				Turn Around Requirements			
Purchase Order		-								1L Plastic				<input type="checkbox"/> Overnight (9am)*			
Quote ID No										250mL Plastic				<input checked="" type="checkbox"/> 1 Day* <input type="checkbox"/> 2 Day*			
				125mL Plastic				<input type="checkbox"/> 3 Day* <input type="checkbox"/> 5 Day*									
				200mL Amber Glass				<input type="checkbox"/> Other ()									
				40mL vial				* Surcharges apply									
				125mL Amber Glass				Sample Comments / DG Hazard Warning									
				Other ()													
No	Client Sample ID	Date	Matrix														
1	SS 03 UP	13/8/19	WATER														
2	SS 23	12/8/19	SOIL				X										
3	SS 24																
4	SS 25																
5	SS 26																
6	SS 27																
7	SS 28																
8	SS 29																
9	SS 30																
10	DOE-120819																
Total Counts																	
Method of Shipment		<input type="checkbox"/> Courier (#) <input type="checkbox"/> Hand Delivered <input type="checkbox"/> Postal		Name		Signature		Date		Time		Temperature					
Laboratory Use Only		Received By <i>Grave Turnell</i>		SYD BNE MEL PER ADL NEW DAR		Signature <i>[Signature]</i>		Date <i>13.8.19</i>		Time <i>12.13</i>		Temperature <i>6.87</i>					
		Received By		SYD BNE MEL PER ADL NEW DAR		Signature		Date		Time		Report No <i>670968</i>					

P1/2



CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

Sydney Laboratory
Unit F3 Bld.F, 16 Mars Rd, Lane Cove West, NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
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Perth Laboratory
Unit 2, 91 Leach Highway, Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company		Project No		Project Manager		Relinquished by													
Address		Project Name		Report Format		_____													
Contact Name		Analysis <small>(Note where multiple are requested, please specify "Total" or "Element")</small> TPH BTEX, 8 METALS (D-SOLVED) PH, EL, TDS, TS, TOC, SS, TSS BTEX C6-C9 LEAD		Email for Results		_____													
Phone No				Containers		Turn Around Requirements													
Special Direction				1 L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	125mL Amber Glass	Jar	Other ()	<input type="checkbox"/> Overnight (9am)* <input type="checkbox"/> 1 Day* <input type="checkbox"/> 2 Day* <input type="checkbox"/> 3 Day* <input type="checkbox"/> 5 Day* <input type="checkbox"/> Other ()							
Purchase Order				1 DAY CAT								Sample Comments / DG Hazard Warning							
Quote ID No																			
No	Client Sample ID	Date	Matrix	TPH	BTEX	8 METALS	PH, EL, TDS, TS, TOC, SS, TSS	BTEX C6-C9	LEAD	1 L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	125mL Amber Glass	Jar	Other ()	Sample Comments / DG Hazard Warning	
1	TOE-120819	12/8/19	SOIL						X									Send to ACS for Analysis	
2	DO2-120819	↓	↓						X										
3	TO2-120819	↓	↓						X									Send to ACS for Analysis	
4	DO1-130819	13/8/19	WATER	X															
5	SPIKE		WATER						X										
6	BANK		WATER						X										
7																			
8																			
9																			
10																			
Total Counts																			
Method of Shipment		<input type="checkbox"/> Courier (#)		<input type="checkbox"/> Hand Delivered		<input type="checkbox"/> Postal		Name		Signature		Date		Time		Time		Temperature	
Laboratory Use Only		Received By		Grace Turnbull		SYD BNE MEL PER ADL NEW DAR		Signature		Date		13/8/19		Time		12:13		6.87	
		Received By				SYD BNE MEL PER ADL NEW DAR		Signature		Date		---		Time		---		Report No	
																		670968	

P2/2

Enviro Sample NSW

Subject: FW: Eurofins Sample Receipt Advice - Report 670968 : Site 318000780

From: Stephen Maxwell [<mailto:SMAXWELL@ramboll.com>]

Sent: Wednesday, 14 August 2019 9:43 AM

To: Enviro Sample NSW

Subject: RE: Eurofins Sample Receipt Advice - Report 670968 : Site 318000780

Thanks

If feasible to achieve and still report can we add the following analytes to the water samples:

Dissolved Metals

Aluminium

Beryllium

Barium

Cobalt

Iron

Manganese

Nutrients

Ammonia as N

Nitrate an N

Nitrite as N

Total Nitrogen

Total Phosphorus

Kind regards

Stephen Maxwell

Lead Consultant

D +61 478658194

M +61 478658194

smaxwell@ramboll.com

Ramboll Australia Pty Ltd.

ACN 095 437 442

ABN 49 095 437 442

From: EnviroSampleNSW@eurofins.com <EnviroSampleNSW@eurofins.com>

Sent: 13 August, 2019 12:54 PM

To: Stephen Maxwell <SMAXWELL@ramboll.com>

Subject: Eurofins Sample Receipt Advice - Report 670968 : Site 318000780

Dear Valued Client,

T01_120819 and T02_120819 (1 jar each) sent to ALS.

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins | mgt Analytical Services Manager as soon as possible to make certain that they get changed.

Regards

Grace Tuckwell

Sample Receipt

Eurofins | Environment Testing

Unit F3, Parkview Building

16 Mars Road

LANE COVE WEST NSW 2066

AUSTRALIA

Phone: +61 29900 8421

Email: EnviroSampleNSW@eurofins.com

Website: environment.eurofins.com.au

[EnviroNote 1079 - PFAS Fingerprinting](#)

[EnviroNote 1080 - Total Organofluorine Analysis & PFAS Investigations](#)

Click [here](#) to report this email as spam.

ScannedByWebsenseForEurofins

Melbourne

6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney

Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane

1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth

2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

Sample Receipt Advice

Company name: **Ramboll Australia Pty Ltd**

Contact name: Stephen Maxwell

Project ID: 318000780

COC number: Not provided

Turn around time: 1 Day

Date/Time received: Aug 14, 2019 9:43 AM

Eurofins reference: **670968**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

- Appropriate sample containers have been used.
- Sample containers for volatile analysis received with zero headspace.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

T01_120819 and T02_120819 (1 jar each) sent to ALS.

Contact notes

If you have any questions with respect to these samples please contact:

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Stephen Maxwell - smaxwell@ramboll.com.

Company Name:	Ramboll Australia Pty Ltd	Order No.:		Received:	Aug 14, 2019 9:43 AM
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	Report #:	670968	Due:	Aug 15, 2019
Project Name:		Phone:	02 9954 8118	Priority:	1 Day
Project ID:	318000780	Fax:	02 9954 8150	Contact Name:	Stephen Maxwell

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Aluminium (filtered)	Barium (filtered)	Beryllium (filtered)	Cobalt (filtered)	Conductivity (at 25°C)	Iron (filtered)	Lead	Manganese (filtered)	pH (at 25°C)	Total Dissolved Solids Dried at 180°C ± 2°C	Total Suspended Solids Dried at 103--105°C	Turbidity	Moisture Set	Eurofins mg/L Suite B6 (filtered metals)	BTEXN and Volatile TRH	Eurofins mg/L Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	
Melbourne Laboratory - NATA Site # 1254 & 14271																					X	
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794																						
Perth Laboratory - NATA Site # 23736																						
External Laboratory																						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																	
1	S03 UP	Aug 13, 2019		Water	S19-Au17273	X	X	X	X	X	X		X	X	X	X	X		X		X	
2	SS23	Aug 12, 2019		Soil	S19-Au17274							X						X				
3	SS24	Aug 12, 2019		Soil	S19-Au17275							X						X				
4	SS25	Aug 12, 2019		Soil	S19-Au17276							X						X				
5	SS26	Aug 12, 2019		Soil	S19-Au17277							X						X				
6	SS27	Aug 12, 2019		Soil	S19-Au17278							X						X				
7	SS28	Aug 12, 2019		Soil	S19-Au17279							X						X				
8	SS29	Aug 12, 2019		Soil	S19-Au17280							X						X				
9	SS30	Aug 12, 2019		Soil	S19-Au17281							X						X				

Company Name:	Ramboll Australia Pty Ltd	Order No.:		Received:	Aug 14, 2019 9:43 AM
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Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Aluminium (filtered)	Barium (filtered)	Beryllium (filtered)	Cobalt (filtered)	Conductivity (at 25°C)	Iron (filtered)	Lead	Manganese (filtered)	pH (at 25°C)	Total Dissolved Solids Dried at 180°C ± 2°C	Total Suspended Solids Dried at 103–105°C	Turbidity	Moisture Set	Eurofins mg/L Suite B6 (filtered metals)	BTEXN and Volatile TRH	Eurofins mg/L Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	
Melbourne Laboratory - NATA Site # 1254 & 14271																					X	
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794																						
Perth Laboratory - NATA Site # 23736																						
10	D01_120819	Aug 12, 2019		Soil	S19-Au17282							X						X				
11	D02_120819	Aug 12, 2019		Soil	S19-Au17283							X						X				
12	D01_130819	Aug 12, 2019		Water	S19-Au17284	X	X	X	X	X	X		X	X	X	X			X		X	
13	SPIKE	Aug 12, 2019		Water	S19-Au17285															X		
14	BLANK	Aug 12, 2019		Water	S19-Au17286															X		
Test Counts						2	2	2	2	2	2	10	2	2	2	2	2	10	2	2	2	

Ramboll Environ Australia Pty Ltd
 Level 3/100 Pacific Highway
 North Sydney
 NSW 2060



NATA Accredited
 Accreditation Number 1261
 Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: Stephen Maxwell

Report 670968-W
 Project name
 Project ID 318000780
 Received Date Aug 13, 2019

Client Sample ID			S03 UP Water S19-Au17273 Aug 13, 2019	D01_130819 Water S19-Au17284 Aug 12, 2019	R20 SPIKE Water S19-Au17285 Aug 12, 2019	BLANK Water S19-Au17286 Aug 12, 2019
Sample Matrix	LOR	Unit				
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	110	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	82	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	-	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	87	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.5	-	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.5	-	-
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	100	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	100	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	100	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	100	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	100	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	100	< 0.003
4-Bromofluorobenzene (surr.)	1	%	90	83	97	92
Ammonia (as N)	0.01	mg/L	0.01	< 0.01	-	-
Conductivity (at 25°C)	1	uS/cm	820	790	-	-
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	-	-
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	-	-
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	-	-
pH (at 25°C)	0.1	pH Units	7.9	7.9	-	-
Phosphate total (as P)	0.05	mg/L	< 0.05	< 0.05	-	-
Total Dissolved Solids Dried at 180°C ± 2°C	5	mg/L	420	440	-	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	-	-
Total Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	-	-
Total Suspended Solids Dried at 103–105°C	5	mg/L	< 5	9.0	-	-
Turbidity	1	NTU	1.0	< 1	-	-

Client Sample ID			S03 UP	D01_130819	R20 SPIKE	BLANK
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			S19-Au17273	S19-Au17284	S19-Au17285	S19-Au17286
Date Sampled			Aug 13, 2019	Aug 12, 2019	Aug 12, 2019	Aug 12, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	-	-
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Barium (filtered)	0.02	mg/L	0.10	0.10	-	-
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	-	-
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Manganese (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	-	-
Nickel (filtered)	0.001	mg/L	< 0.001	< 0.001	-	-
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	-	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 13, 2019	7 Days
Total Recoverable Hydrocarbons - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 13, 2019	7 Days
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 13, 2019	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 13, 2019	14 Days
Eurofins mgt Suite B6 (filtered metals)			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 13, 2019	
Metals M8 filtered - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Aug 13, 2019	28 Days
Eurofins mgt Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P			
Ammonia (as N) - Method: LTM-INO-4200 Ammonia by Discrete Analyser	Melbourne	Aug 15, 2019	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	Aug 15, 2019	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	Aug 15, 2019	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	Aug 15, 2019	2 Days
Phosphate total (as P) - Method: E052 Total Phosphate (as P)	Sydney	Aug 14, 2019	28 Days
Total Kjeldahl Nitrogen (as N) - Method: LTM-INO-4310 TKN in Waters & Soils by FIA	Melbourne	Aug 15, 2019	7 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Sydney	Aug 13, 2019	28 Days
pH (at 25°C) - Method: LTM-GEN-7090 pH in water by ISE	Sydney	Aug 13, 2019	1 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Sydney	Aug 13, 2019	7 Days
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Sydney	Aug 13, 2019	7 Days
Turbidity - Method: LTM-INO-4140 Turbidity by Nephelometric Method	Sydney	Aug 13, 2019	2 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Aug 14, 2019	180 Days

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Project Name:		Phone:	02 9954 8118	Priority:	1 Day
Project ID:	318000780	Fax:	02 9954 8150	Contact Name:	Stephen Maxwell

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Aluminium (filtered)	Barium (filtered)	Beryllium (filtered)	Cobalt (filtered)	Conductivity (at 25°C)	Iron (filtered)	Lead	Manganese (filtered)	pH (at 25°C)	Total Dissolved Solids Dried at 180°C ± 2°C	Total Suspended Solids Dried at 103–105°C	Turbidity	Moisture Set	Eurofins mg/L Suite B6 (filtered metals)	BTEXN and Volatile TRH	Eurofins mg/L Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P		
Melbourne Laboratory - NATA Site # 1254 & 14271																					X		
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736																							
External Laboratory																							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																		
1	S03 UP	Aug 13, 2019		Water	S19-Au17273	X	X	X	X	X	X		X	X	X	X	X		X		X		
2	SS23	Aug 12, 2019		Soil	S19-Au17274							X						X					
3	SS24	Aug 12, 2019		Soil	S19-Au17275							X						X					
4	SS25	Aug 12, 2019		Soil	S19-Au17276							X						X					
5	SS26	Aug 12, 2019		Soil	S19-Au17277							X						X					
6	SS27	Aug 12, 2019		Soil	S19-Au17278							X						X					
7	SS28	Aug 12, 2019		Soil	S19-Au17279							X						X					
8	SS29	Aug 12, 2019		Soil	S19-Au17280							X						X					
9	SS30	Aug 12, 2019		Soil	S19-Au17281							X						X					

Company Name: Ramboll Australia Pty Ltd	Order No.:	Received: Aug 14, 2019 9:43 AM
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Project ID: 318000780		

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Aluminium (filtered)	Barium (filtered)	Beryllium (filtered)	Cobalt (filtered)	Conductivity (at 25°C)	Iron (filtered)	Lead	Manganese (filtered)	pH (at 25°C)	Total Dissolved Solids Dried at 180°C ± 2°C	Total Suspended Solids Dried at 103–105°C	Turbidity	Moisture Set	Eurofins mg/L Suite B6 (filtered metals)	BTEXN and Volatile TRH	Eurofins mg/L Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	
Melbourne Laboratory - NATA Site # 1254 & 14271																					X	
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794																						
Perth Laboratory - NATA Site # 23736																						
10	D01_120819	Aug 12, 2019		Soil	S19-Au17282							X						X				
11	D02_120819	Aug 12, 2019		Soil	S19-Au17283							X						X				
12	D01_130819	Aug 12, 2019		Water	S19-Au17284	X	X	X	X	X	X		X	X	X	X			X		X	
13	SPIKE	Aug 12, 2019		Water	S19-Au17285															X		
14	BLANK	Aug 12, 2019		Water	S19-Au17286															X		
Test Counts						2	2	2	2	2	2	10	2	2	2	2	2	10	2	2	2	

Internal Quality Control Review and Glossary
General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Conductivity (at 25°C)	uS/cm	< 1			1	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 5			5	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103–105°C	mg/L	< 5			5	Pass	
Turbidity	NTU	< 1			1	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	120			70-130	Pass	
TRH C6-C10	%	116			70-130	Pass	
TRH >C10-C16	%	80			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	120			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
TRH C10-C14	%	85			70-130	Pass		
LCS - % Recovery								
BTEX								
Benzene	%	111			70-130	Pass		
Toluene	%	112			70-130	Pass		
Ethylbenzene	%	114			70-130	Pass		
m&p-Xylenes	%	116			70-130	Pass		
o-Xylene	%	114			70-130	Pass		
Xylenes - Total	%	115			70-130	Pass		
LCS - % Recovery								
Conductivity (at 25°C)	%	101			70-130	Pass		
Phosphate total (as P)	%	99			70-130	Pass		
Total Dissolved Solids Dried at 180°C ± 2°C	%	96			70-130	Pass		
Total Kjeldahl Nitrogen (as N)	%	111			70-130	Pass		
Total Suspended Solids Dried at 103–105°C	%	87			70-130	Pass		
Turbidity	%	94			70-130	Pass		
LCS - % Recovery								
Heavy Metals								
Aluminium (filtered)	%	99			70-130	Pass		
Arsenic (filtered)	%	103			70-130	Pass		
Barium (filtered)	%	99			70-130	Pass		
Beryllium (filtered)	%	94			70-130	Pass		
Cadmium (filtered)	%	109			70-130	Pass		
Chromium (filtered)	%	102			70-130	Pass		
Cobalt (filtered)	%	101			70-130	Pass		
Copper (filtered)	%	100			70-130	Pass		
Iron (filtered)	%	97			70-130	Pass		
Lead (filtered)	%	103			70-130	Pass		
Manganese (filtered)	%	102			70-130	Pass		
Mercury (filtered)	%	99			70-130	Pass		
Nickel (filtered)	%	101			70-130	Pass		
Zinc (filtered)	%	102			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1				
Naphthalene	S19-Au01281	NCP	%	99		70-130	Pass	
TRH C6-C10	S19-Au01281	NCP	%	87		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1				
TRH C6-C9	S19-Au01281	NCP	%	92		70-130	Pass	
Spike - % Recovery								
BTEX				Result 1				
Benzene	S19-Au01281	NCP	%	100		70-130	Pass	
Toluene	S19-Au01281	NCP	%	99		70-130	Pass	
Ethylbenzene	S19-Au01281	NCP	%	100		70-130	Pass	
m&p-Xylenes	S19-Au01281	NCP	%	99		70-130	Pass	
o-Xylene	S19-Au01281	NCP	%	98		70-130	Pass	
Xylenes - Total	S19-Au01281	NCP	%	99		70-130	Pass	
Spike - % Recovery								
				Result 1				
Phosphate total (as P)	S19-Au17284	CP	%	86		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Aluminium (filtered)	S19-Au17284	CP	%	100		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Arsenic (filtered)	S19-Au17284	CP	%	102			70-130	Pass	
Barium (filtered)	S19-Au17284	CP	%	93			70-130	Pass	
Beryllium (filtered)	S19-Au17284	CP	%	103			70-130	Pass	
Cadmium (filtered)	S19-Au17284	CP	%	109			70-130	Pass	
Chromium (filtered)	S19-Au17284	CP	%	100			70-130	Pass	
Cobalt (filtered)	S19-Au17284	CP	%	98			70-130	Pass	
Copper (filtered)	S19-Au17284	CP	%	97			70-130	Pass	
Iron (filtered)	S19-Au17284	CP	%	92			70-130	Pass	
Lead (filtered)	S19-Au17284	CP	%	101			70-130	Pass	
Manganese (filtered)	S19-Au17284	CP	%	101			70-130	Pass	
Mercury (filtered)	S19-Au17284	CP	%	105			70-130	Pass	
Nickel (filtered)	S19-Au17284	CP	%	97			70-130	Pass	
Zinc (filtered)	S19-Au17284	CP	%	100			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Au01280	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-Au01280	NCP	mg/L	0.02	0.03	14	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Au01280	NCP	mg/L	0.02	0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Au01280	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-Au01280	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S19-Au01280	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-Au01280	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-Au01280	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-Au01280	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25°C)	S19-Au17175	NCP	uS/cm	690	710	3.0	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	S19-Au17273	CP	mg/L	420	490	16	30%	Pass	
Total Suspended Solids Dried at 103–105°C	S19-Au17273	CP	mg/L	< 5	< 5	<1	30%	Pass	
Turbidity	S19-Au18928	NCP	NTU	4.1	4.3	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	S19-Au17273	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic (filtered)	S19-Au17273	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	S19-Au17273	CP	mg/L	0.10	0.11	2.0	30%	Pass	
Beryllium (filtered)	S19-Au17273	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	S19-Au17273	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S19-Au17273	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	S19-Au17273	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	S19-Au17273	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	S19-Au17273	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	S19-Au17273	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	S19-Au17273	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Mercury (filtered)	S19-Au17273	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	S19-Au17273	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc (filtered)	S19-Au17273	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments
Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
R20	This sample is a Trip Spike and therefore all results are reported as a percentage

Authorised By

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Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
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**Glenn Jackson
General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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APPENDIX 4
PHOTOGRAPHIC LOG



Photo 1: SW1 UP location (upstream of Stewart Street and the rail culvert at approx. CH 262.660 km)



Photo 2: SW1 UP water at time of sampling (13/08/2019)

Title:	Tarago Rail Loop Surface Water Sampling	Approved:	FR	Project-Nr.:	318000780	Date:	August 2019
Site:	Tarago						
Client:	JHR						





Photo 3: SW1 location (dry)



Photo 4: SW2 location (dry)

Title:	Tarago Rail Loop Surface Water Sampling	Approved:	FR	Project-Nr.:	318000780	Date:	August 2019
Site:	Tarago						
Client:	JHR						





Photo 5: SW3 location (dry CH 262.354)



Photo 6: SW4 stagnant water observed and sampled (6/08/2019)

Title:	Tarago Rail Loop Surface Water Sampling	Approved:	FR	Project-Nr.:	318000780	Date:	August 2019
Site:	Tarago						
Client:	JHR						





Photo 7: SW4 yellow staining observed (6/08/2019)



Photo 8: SW5 location (dry CH 262.040)

Title:	Tarago Rail Loop Surface Water Sampling	Approved:	FR	Project-Nr.:	318000780	Date:	August 2019
Site:	Tarago						
Client:	JHR						





Photo 9: SW6 location (dry CH 262.040). Offsite receiving water in background

Title:	Tarago Rail Loop Surface Water Sampling	Approved:	Project-Nr.:	Date:
Site:	Tarago	FR	318000780	August 2019
Client:	JHR			



