



WDL246-01 MONITORING REPORT 2020/2021

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EXECUTIVE SUMMARY

Nathan River Resources (NRR) currently holds a Waste Discharge Licence (WDL246-01) for the authorised discharge of water from both the mine and associated port facilities. During the reporting period, NRR discharged an approximate total volume of 621.17 ML over five discharge events between January and April 2021 into the Towns River.

The objective of the monitoring program was to ensure compliance with conditions of WDL246-01 and to protect the receiving environment to the level of protection required including:

- No change in biodiversity beyond natural variation;
- No change in water / sediment chemical and physical properties beyond natural variation; and
- Achieve 99% Species Protection for Freshwater Ecosystems (ANZG 2018).

Surface water, biological and sediment sampling programs were undertaken during the reporting period in accordance with WDL conditions. Monitoring did not identify any change in biodiversity and sediment chemical and physical properties, nor did water quality results indicate variance outside of naturally occurring background concentrations within the Towns River system.

Where 99% Species Protection for Freshwater Ecosystems (ANZG 2018) could not be achieved, concentrations of contaminants recorded were not considered to constitute material environmental harm as:

- Concentrations at upstream sample locations were consistent with or higher than concentrations at downstream sample locations during the same sampling events; and
- Concentrations at downstream sample locations were considered within the range of naturally occurring background concentrations previously recorded upstream in the Towns River system.

In general, discharge was undertaken in accordance with the requirements of WDL246-01, however several non-conformances and data gaps were recorded during the discharge period. NRR have identified and investigated these non-conformances and have developed strategies and procedures to improve WDL compliance and reporting for future discharge events. These include:

- Improved managerial oversight;
- Recruitment of a back-to-back environmental advisor;
- Established a Dewatering Procedure to ensure compliance with WDL246-01;
- Completed a review of monitoring procedures and training for field staff to ensure sampling and reporting compliance;
- Investigation of alternative all weather access monitoring locations for potential inclusion in a WDL modification; and
- Commitment to repair or replace any malfunctioning field and remote logging equipment as soon as practicable.

NRR are committed to improving its WDL compliance and reporting performance during the 2021/2021 wet season.

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Attachment B: Surface Water Monitoring Field Sheets

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Attachment D: Summarised Surface Water Results

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1.0 INTRODUCTION

Nathan River Resources (NRR) currently holds a Waste Discharge Licence (WDL246-01) for the authorised discharge of water from both the mine and associated port facilities. This report details the monitoring program stipulated by the WDL and provides evaluation of results against specified criteria.

1.1 Discharge Summary

Water was discharged into the Towns River over five events between January and March 2021. An approximate total volume of 621.17 ML of mine affected water was discharged. Discharge records are provided in Attachment A.

2.0 MONITORING OBJECTIVES

The objective of the monitoring program was to ensure compliance with conditions of WDL246-01 and protect the receiving environment to the level of protection required including:

- No change in biodiversity beyond natural variation;
- No change in water / sediment chemical and physical properties beyond natural variation; and
- Achieve 99% Species Protection for Freshwater Ecosystems (ANZG 2018).

3.0 MONITORING METHODOLOGY

Discharge into the Towns River was not subject to an approved monitoring plan, other than that specified in WDL246-01. Details of the surface water, sediment and biological monitoring methodologies are provided below.

3.1 Monitoring Locations

Surface water monitoring locations specified in WDL246-01 are summarised in Table 3.1-1 below and shown in Figure 1. Biological and sediment sampling locations are presented in Figure 2 and Figure 3 respectively.

Two gauging stations have been installed in Towns River, upstream and downstream of the discharge point. The stations log flow rate, volume, depth, temperature and electrical conductivity. A third station, logging electrical conductivity, has been installed on a tributary to the Towns River before it joins the Towns River upstream of RBSWDS.

Table 3.1-1 WDL Discharge Monitoring Locations

ID	Location	Latitude	Longitude
RBSW01	Towns River (upstream)	-15.150350	135.0414867
RBSW04	Towns River north of Danehill East pit (FE1)	-15.142696	135.0873022
RBSWDS	Towns River downstream gauging station	-15.131360	135.1032216

ID	Location	Latitude	Longitude
RBSWUS	Towns River upstream gauging station (No Sampling)	-15.148232	135.0524957
RBSW02US	Towns River tributary upstream gauging station	-15.158711	135.0874376
RBAD1	Authorised Discharge Point (FE1)	-15.145085	135.0867320

3.2 Receiving Environment

Mine affected water from Danehill East (FE1) is discharged into the Towns River which is a sensitive environmental receptor. The river passes through the centre of the project area before being joined by two major tributaries; the Magaranyi River and Yumanji Creek (Little Towns River) approximately 20km downstream.

Stream flows are restricted to during and just after the wet season (November to April), with surface waters confined to remnant pools during the dry season (May to October). During the wet season, Towns River may cease flowing during periods of low rainfall.

Towns River and its tributaries display a highly sinuous and meandering form, alternating between well-defined channels and braided channel areas. Low-lying floodplain in the vicinity of the mine is wide and flat, containing many non-active channel features including ox-bow lakes and abandoned pools (EcOz 2012).

3.3 Surface Water Sampling Methodology

Prior to sample collection, field parameters at each location were recorded using a AquaTROLL 500 multi parameter water quality meter (WQM). Field parameters were recorded on an electronic field sheet and saved daily. Monitoring records are provided in Attachment B.

Surface water samples were collected away from the riverbank and at least 100 mm below the surface using a HDP container attached to a telescopic sampler. Samples were transferred into laboratory prepared containers, labelled and placed on ice in an esky for transport under chain of custody to a NATA accredited laboratory (Eurofins) for the analysis of analytes specified in Appendix 1 of WDL246-01.

Sampling was undertaken at the frequency required in Appendix 1 of WDL246-01 during five discharge events, occurring between 2 January 2021 and 1 April 2021. A discharge event on 24 February 2021 was technically non-compliant as discharge water was sourced from FE2 rather than FE1. This event is discussed in greater detail in Section 8.3. Discharge details are summarised in the Table below.

Table 3.3-1 Discharge Event Summary

Discharge Event	Start	Finish	Location
1	2 January 2021	10 January 2021	Towns River
2	7 February 2021	20 February 2021	Towns River
3	24 February 2021	24 February 2021	Towns River

Discharge Event	Start	Finish	Location
4	3 March 2021	4 March 2021	Towns River
5	17 March 2021	1 April 2021	Towns River

3.4 Biological Monitoring Sampling Methodology

Biological sampling was undertaken in accordance with NRR approved Water Management and Monitoring Plan (NRR 2019). Sampling was completed by Freshwater Ecology Pty Ltd in May 2021.

Macroinvertebrate Survey

Macroinvertebrate surveys were conducted in accordance with Northern Territory AUSRIVAS methodology. Two edge samples were collected and preserved as batch samples, with samples identified to the family level. In accordance with AUSRIVAS requirements, Five percent of samples processed were subject to QA/QC checks for correct identification by an external taxonomist.

Habitat Assessment

A habitat assessment was undertaken along a 100 m section of river at each sample location. Assessment included:

- Water Quality;
- Characteristics of macroinvertebrate habitat;
- Instream physical characteristics (flow velocity and depth, instream habitat characteristics, bank height, riparian width);
- Riparian vegetation characteristics (types, percentage cover, exotic species, erosion, land use);
- Water quality observations (clarity, odour, evidence of hydrocarbons/oils, foam/scum, plume, sediment oils, sediment odours); and
- Sketch and photographs of the site including cross section.

3.5 Sediment Monitoring Sampling Methodology

Due to large remnant pools occurring at sediment monitoring locations, post wet season sampling was delayed until all sample locations became safe to access. NRR undertook sample collection in accordance with the NRR approved Water Management and Monitoring Plan in July 2021 with analytical results pending at the time of reporting.

Sediment sampling was also undertaken during the reporting period by EcOz Environmental Consultants Pty Ltd in September 2020. Samples were collected from reasonably straight reaches of river in the primary channel. At each location, five subsamples were collected from the top 200 mm of sediment at evenly spaced locations across the stream bed. The five subsamples were composited in a clean bucket with a composite sample then collected in a laboratory prepared sample container.

Quality assurance procedures included the use of fresh disposable nitrile gloves at each sample location.

3.6 Limitations and Data Gaps

Surface Water Monitoring

During the reporting period, there were occasions when monitoring locations could not be sampled. This was largely due to safety issues associated with flooding, which restricted access to monitoring locations at various times. Aerial photos taken during flooding is provided in Attachment C. There were also limited instances where sample locations were missed due to sampler error.

Remote logging stations RBSWUS, RBSWDS and RBSW02US also experienced some data loss which is detailed in Table 4.2-1.

Biological Monitoring

One biological monitoring location (B5) was not sampled due to concerns due to potential interaction with buffalo and saltwater crocodiles. Field staff advised NRR that loss of this location is not significant due to the presence of other nearby monitoring sites.

Sediment Sampling

No data gaps were noted for the sediment sampling program.

4.0 DISCHARGE SURFACE WATER MONITORING RESULTS

4.1 Discharge Trigger Limits

Discharge trigger values are detailed in Appendix 2 of the WDL246-01 and are based on a combination of site-specific triggers and ANZG (2018) 99% species protection for lowland tropical rivers in Northern Australia.

Trigger values for physical parameters and nutrients are based on 20th and 80th percentiles of all available data for sample location RBSW01. As we could not meet the minimum data requirements for calculation of site-specific triggers as per guidance provided in ANZG (2018), ANZG default trigger values for lowland tropical rivers in Northern Australia were adopted upon consultation with NTEPA.

4.2 Remote Logging Data

Three remote loggers have been installed at sample locations RBSWUS, RBSW2US and RBSWDS to assess upstream and downstream conditions in the Towns River as well as the contribution of an associated tributary. A summary of logging stations and respective data availability is provided in the Table below.

Table 4.2-1 WDL Discharge Monitoring Locations

Location ID	Parameters	Data Availability	Comments
RBSWUS	Flow rate, Electrical conductivity, Temperature, Depth	Available from 15/01/21	Logger failure, unit replaced 15/01/21
RBSW2US	Electrical conductivity, Temperature	Available from 21/01/21	Probe damaged by animal activity. Probe replaced 21/01/21
RBSWDS	Flow rate, Electrical conductivity, Temperature, Depth	Available from 1/12/20	Flow rate at RBSWDS not recorded due to burial of the probe by sediment.

A summary of remote logging data is provided in the Table below. Data, in electronic format, is provided supplementary to this report.

Table 4.2-2 Remote Logger Data Summary

Location Name		Towns River Upstream	Towns River Downstream	Towns River Tributary
Location ID		RBSWUS	RBSWDS	RBSW2US
Flow Rate (Kl/s)	Min	0.006	n/a	--*
	Mean	4.5	n/a	--*
	Max	70.7	n/a	--*
Electrical Conductivity (µS/cm)	Min	15.0	17.0	53.0
	Mean	75.5	137.2	97.7
	Max	123.0	421.0	196.0

*Flow rate not recorded at RBSW2US due to buried probe.

An average flow rate of 4.5 Kl/s was recorded during the reporting period with highest flow rates at upstream logger RBSWUS typically recorded during February when the site experienced a significant flood event. Electrical conductivity ranged between 15 and 123 µS/cm at upstream Towns River logger RBSWUS and 17 to 421 µS/cm at downstream Towns River RBSWDS. Conductivity at RBSW2US was relatively stable during the reporting period.

4.3 Physical Parameters

A summary of surface water monitoring results over the discharge period for physical parameters is provided in the Table 4.3-1 below. Complete field and laboratory analytical results, including comparison to applicable trigger values (TV), are presented in Attachment D. Laboratory analytical reports are provided in Attachment E.

Table 4.3-1 Surface Water Result Summary (All Discharge Events)

Location		Field pH (units)	Lab. pH (units)	Field EC (µS/cm)	Lab. EC (µS/cm)	*Dissolved Oxygen (%)	*Field Turbidity (NTU)	Lab. Turbidity (NTU)
TV (RBSW04 / RBSWDS)		6.0 – 8.0	6.0 – 8.0	250	250	85 – 120	2 – 15	2 – 15
TV (RBAD1)		4.5 – 9.5	4.5 – 9.5	--	--	<10	--	--
Upstream Sample Locations								
RBSW01	Min	5.0	6.2	<LOR	29.0	75.1	9.6	8.5
	Mean	6.8	6.5	47.0	51.8	95.7	21.5	28.1
	Max	10.9	7.2	122	84.0	186.0	76.8	78.0
RBSW2US	Min	5.3	6.5	5.0	68.0	87.4	2.7	4.4
	Mean	7.3	7.1	66.6	76.75	116.4	6.8	5.9
	Max	8.9	8.3	100.5	93.0	139.0	18.8	9.0
Downstream Sample Locations								
RBSW04	Min	4.6	4.1	27.0	97.0	60.7	12.3	9.9

Location		Field pH (units)	Lab. pH (units)	Field EC (µS/cm)	Lab. EC (µS/cm)	*Dissolved Oxygen (%)	*Field Turbidity (NTU)	Lab. Turbidity (NTU)
	Mean	6.7	6.2	156.3	165.3	87.7	22.1	16.8
	Max	9.2	7.1	364.4	230.0	104.3	45.3	38.0
RBSWDS	Min	5.6	6.2	<LOR	81.0	83.1	11.0	11.0
	Mean	6.7	6.6	115.9	141.9	91.8	23.8	17.7
	Max	9.1	7.1	253.8	230.0	104.4	47.6	35.0
Discharge Point								
RBAD1	Min	5.8	6.6	735.0	1,000.0	50.6	7.5	4.0
	Mean	7.3	7.1	1,435.3	1,780.0	96.8	25.7	6.3
	Max	10.3	7.5	1,958.0	4,000.0	104.5	43.2	9.7

*Results summary table does not include low reliability results for dissolved oxygen and turbidity.

pH

Field pH ranged between 4.6 and 10.3, with an average of 6.9 at downstream sample locations RBSW04 and RBSWDS. pH at discharge point RBAD1 ranged between 5.8 and 10.3, with an average of 7.2. pH was sporadically recorded slightly outside of the trigger range at these locations on 13 out of 103 sampling events. However, similar pH values were typically recorded at upstream sampling location RBSW01 during the same sampling events.

Laboratory pH was recorded below the trigger range at 4.1 during one sampling event (17 March 2021) at RBSW04. The field measurement for the same sample recorded a pH of 6.7.

Electrical Conductivity (EC)

Field EC ranged between 0 and 364 µS/cm, with an average of 138 µS/cm at sample locations RBSW04 and RBSWDS. EC was sporadically recorded slightly outside of the trigger range at these locations on 5 out of 71 sampling events.

Laboratory EC was not detected at concentrations above the trigger limits at sample locations RBSW04 and RBSWDS.

Dissolved Oxygen (DO)

DO saturation was observed to be greatly exaggerated (outside of what would be reasonably expected in a freshwater system) in field measurements taken between 2 January and 19 February 2021. Erroneous readings were attributed to a faulty water quality meter with results during this period not considered reliable.

DO field measurements collected from 4 March 2021, with a new WQM, ranged between 50.6% and 104.4%, with an average of 89.8% at sample locations RBSW04, RBSWDS and RBAD1. DO was sporadically recorded slightly outside of the trigger range at sample locations RBSW04 and RBSWDS during March sampling rounds.

Turbidity

Turbidity was greatly exaggerated in field records taken between 2 January 2021 and 8 February 2021. Upon comparison to concurrent laboratory samples, erroneous readings were attributed to a faulty water quality meter with results during this period not considered reliable.

Turbidity recorded using a Hach turbidimeter from 9 February 2021 and later with a new WQM, ranged between 11 and 47.6 NTU, with an average of 22.9 NTU at sample locations RSW04 and RBSWDS. Turbidity was typically recorded above the trigger range at sample locations RBSW04 and RBSWDS with similar results recorded at upstream location RBSW01 during the same sampling events.

Laboratory turbidity was measured at levels above the trigger at sample locations RBSW04 and RBSWDS during 10 February and 17 March 2021 sampling events. Turbidity was recorded at or above these levels at upstream sampling location RBSW01 during these sampling events.

At discharge point RBAD1, average field turbidity measurements varied significantly compared to laboratory results (25.7 and 6.3 NTU, respectively). Average field and laboratory results for all other sample locations were generally consistent.

4.4 Nutrients

Average surface water monitoring results nutrients are provided in the table below. Complete laboratory analytical results, including comparison to applicable trigger values, are presented in Attachment D.

Table 4.4-1 Nutrient Result Summary (All Discharge Events)

Location		Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
TV (RBSW04 / RBSWDS)		0.2	0.01
Upstream Sample Locations			
RBSW01	Min	<LOR	<LOR
	Mean	0.87	0.17
	Max	1.67	0.34
RBSW2US	Min	<LOR	<LOR
	Mean	1.02	0.56
	Max	2.00	1.11
Downstream Sample Locations			
RBSW04	Min	0.07	0.01
	Mean	0.88	0.32
	Max	2.57	1.05
RBSWDS	Min	0.04	0.01
	Mean	0.84	0.23
	Max	1.84	0.82
Discharge Point			
RBAD1	Min	3.00	<LOR

Location		Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
TV (RBSW04 / RBSWDS)		0.2	0.01
	Mean	5.14	0.28
	Max	7.00	0.8

Total Nitrogen and Total Phosphorus

Total Nitrogen and Total Phosphorus were detected at concentrations above the trigger value at RBSW04 and RBSWDS during the reporting period. However, average concentrations at RBSW04 and RBSWDS were generally consistent with concentrations recorded at upstream sample locations RBSW01 and RBSW2US.

4.5 Heavy Metals (Dissolved)

Average surface water monitoring results for key heavy metals (those that exceeded the trigger value) are provided in the table below. Complete laboratory analytical results, including comparison to applicable trigger values, are presented in Attachment D.

Table 4.5-1 Heavy Metals Result Summary (All Discharge Events)

Location		Al (µg/l)	As (µg/l)	Cd (µg/l)	Cr (µg/l)	Co (µg/l)	Cu (µg/l)	Fe (µg/l)	Zn (µg/l)
TV (RBSW04 / RBSWDS)		27	0.8	0.06	0.01	1.4	1	300	2.4
Upstream Sample Locations									
RBSW01	Min	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	100.0	<LOR
	Mean	161.85	0.9	0.002	<LOR	<LOR	0.4	197.1	6.7
	Max	860.0	2.0	0.01	<LOR	<LOR	3.0	450.0	27.0
RBSW2US	Min	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	60.0	<LOR
	Mean	57.0	0.4	0.002	0.2	<LOR	<LOR	108.0	3.4
	Max	250.0	2.0	0.01	1.0	<LOR	<LOR	200.0	10.0
Downstream Sample Locations									
RBSW04	Min	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	Mean	190.3	0.6	0.01	0.4	0.7	<LOR	172.9	5.4
	Max	900.0	2.0	0.06	2.0	3.0	<LOR	590	17.0
RBSWDS	Min	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	Mean	212.6	0.9	0.009	0.3	0.1	0.1	214.3	7.6
	Max	1,000.0	4.0	0.03	1.0	1.0	1.0	640.0	19.0
Discharge Point									
RBAD1	Min	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	Mean	1.6	0.8	0.02	<LOR	7.2	0.2	28.0	5.4
	Max	5.0	4.0	0.03	<LOR	14.0	1	140.0	12.0

The following metals were detected at concentrations above trigger values. All other heavy metals were detected at concentrations below the trigger values or laboratory limits of reporting (LOR).

Aluminium

Aluminium was detected at concentrations slightly above the trigger value during three sampling events (4 March, 25 March and 31 March 2021) at RBSW04 and RBSWDS. Concentrations, above the trigger value, were also recorded upstream at RBSW01 during these events. Aluminium was not detected at concentrations above the LOR or trigger limit for all other samples analysed.

Average concentrations at RBSW04 and RBSWDS were generally consistent concentrations recorded upstream location RBSW01.

Arsenic

Arsenic was detected at concentrations slightly above the LOR and trigger value during two sampling events (17 February 2021 and 4 March 2021) at RBSW04 and RBSWDS. Arsenic was not detected at concentration above the LOR or trigger value for all other samples analysed.

Average concentrations at RBSW04 and RBSWDS were generally consistent with concentrations recorded upstream locations RBSW01 and RBSW2US.

Cadmium

Cadmium was detected at the trigger value during one sampling event (10 February 2021) at RBSW04. Cadmium was detected at concentrations below the trigger at discharge point RBAD1 during the same sampling event. Cadmium was not detected at concentration above the LOR or trigger value for all other samples analysed.

Chromium

Chromium was detected at concentrations at or slightly above the LOR and trigger value during two sampling event (17 February 2021 and 4 March 2021) at RBSW04 and RBSWDS. Chromium was not detected at concentration above the LOR or trigger value for all other samples analysed. Chromium speciation could not be undertaken due to insufficient sample remaining at the analysing laboratory.

Cobalt

Cobalt was detected at concentrations slightly above the trigger value during two sampling event (10 February 2021 and 4 March 2021) at RBSW04. Elevated cobalt was detected at discharge point RBAD1. Cobalt was not detected at concentration above the LOR or trigger value for other samples analysed.

Copper

Copper was detected at the trigger value during one sampling event (4 March 2021) at RBSWDS. Copper was not detected at concentration above the LOR or trigger limit for all other samples analysed.

Iron

Iron was detected at concentrations above the trigger limits during January and February sampling events at RBSW04 and RBSWDS. Concentrations, above the trigger value, were also recorded at

upstream location RBSW01 during these events. Iron was not detected at concentration above the LOR or trigger value for all other samples analysed.

Average concentrations at RBSW04 and RBSWDS were generally consistent with concentrations recorded upstream at RBSW01 and RBSW2US. The average concentration of iron at discharge point RBAD1 was 28 µg/l.

Zinc

Zinc was detected at concentrations slightly above the trigger value during three sampling events (4 March, 25 March and 31 March 2021) at RBSW04 and RBSWDS. Concentrations, above the trigger value, were also recorded upstream at RBSW01 during these events. Zinc was not detected at concentrations above the LOR or trigger value for all other samples analysed.

Average concentrations at RBSW04 and RBSWDS were generally consistent concentrations recorded at upstream locations RBSW01 and RBSW2US.

4.6 Contaminant Loading

Total contaminant load discharged from the mine during the reporting period has been calculated and is provided Table 4.6-1 below. Note that loading calculations are based on a total recorded discharge volume and average contaminant concentrations over the discharge period.

The volume of water discharged during two non-compliant discharge events in February 2021 have not been included due to uncertainty in the volume of water discharged. However, these discharge events may have contributed an additional 30% to contaminant loads recorded below.

Table 4.6-1 Contaminant Loading Results

Analyte	Mean Loading (kg/year)
Aluminium	0.98
Arsenic	0.49
Antimony*	n/a
Boron	67.13
Cadmium	0.01
Chromium*	n/a
Cobalt	4.39
Copper	0.12
Iron	17.09
Lead*	n/a
Manganese	482.15
Molybdenum*	n/a
Nickel	2.56
Selenium	0.37
Tin*	n/a
Uranium*	n/a

Analyte	Mean Loading (kg/year)
Zinc	3.30
Total Nitrogen	3.14
Total Phosphorous	0.17

*Contaminant concentrations below laboratory limits of reporting. Loading value not calculated

5.0 BIOLOGICAL MONITORING RESULTS

Results of the biological monitoring program are provided in the Aquatic Macroinvertebrate Assessment Report (Freshwater Ecology 2021) provided as Attachment F.

6.0 SEDIMENT MONITORING RESULTS

Results of the sediment monitoring program is provided in the Sediment Monitoring Report (EcOz 2020) provided as Attachment G.

7.0 QA/QC EVALUATION

7.1 Surface Water Monitoring

A summary of laboratory QA/QC data is presented in the following table:

Table 7.1-1 Contaminant Loading Results

Report Number	Analysis Holding Time	Lab. Duplicate RPD %	Lab Matrix Spike Recovery	Lab. Control Sample	Method Blank
767973-W	✓	✓	n/a	✓	✓
773566-W	✓	✓	✓	✓	✓
774157-W	✓	X	✓	✓	✓
774976-W-V3	✓	✓	X	✓	✓
778953-W-V2	✓	X	✓	✓	✓
781906-W-V2	✓	✓	✓	✓	✓
785262-W	✓	✓	✓	✓	✓
783491-W	✓	✓	✓	✓	✓
785544-W	✓	✓	✓	✓	✓
✓ = Pass X = Fail					

774157-W

Laboratory duplicate RPD% exceeded the acceptance criteria of 70 – 130% for lead, however, were accepted under the laboratory acceptance criteria.

774976-W-V3

Laboratory spike matrix recoveries exceeded the acceptance criteria of 70 – 130% for sulphate, however, were accepted under internal laboratory criteria as an acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

778953-W-V2

Laboratory duplicate RPD% exceeded the acceptance criteria of 70 – 130% for lead, however, were accepted under the laboratory acceptance criteria.

NRR accepts the integrity of the analytical data.

8.0 DISCUSSION

8.1 Surface Water Monitoring

Physical Parameters

Excluding low reliability field DO and turbidity results collected in January and February 2021, physical parameters were generally in compliance with the adopted trigger values with exception of pH and turbidity. Exceedances were attributed to:

- Naturally elevated pH (above the upper trigger value) at upstream sampling locations. Exceedances at downstream sample locations were considered indicative of naturally occurring pH at the time of sampling; and
- Use of conservative ANZG (2018) turbidity trigger values due to a lack of site-specific data. The Towns River is naturally turbid, with an average turbidity of 21.5 NTU recorded during the reporting period. Exceedances at downstream sample locations were considered indicative of naturally occurring turbidity at the time of sampling. These exceedances are discussed further in Section 8.3 below.

Comparison between field and laboratory results showed little variance with exception of turbidity at discharge point RBAD1, with an average turbidity of 25.7 and 6.3 NTU respectively. This discrepancy may be due to aeration of the water column at the discharge point, resulting in small bubbles which can increase turbidity reading recorded by the WQM. Based on laboratory results, turbidity of water discharged into the Towns River was within the adopted trigger limits during the reporting period.

Nutrients

Average concentrations of nutrients at upstream and downstream sample locations over the reporting period were found to exceed the adopted trigger values. Whilst nutrient concentrations were generally within compliance, where exceedances were identified, concentrations were found to consistent with background concentrations observed upstream at RBSW01 and RBSW2US during the reporting period.

Heavy Metals (Dissolved)

Heavy metals were variously detected at concentrations above trigger values during the reporting period. Towns River was observed have natural background concentrations of aluminium, arsenic, chromium, cadmium, iron and zinc with several of these metals regularly occurring at concentrations

above the trigger limit at upstream sample locations RBSW01 and RBSW2US. All other metals analysed were either detected at concentrations below the laboratory LOR or adopted trigger values.

Average concentrations of heavy metals at downstream sample locations RBSWDS and RSBW04 were typically below the trigger value with exception of arsenic, chromium and zinc. These average metal concentrations were generally consistent with background concentrations upstream at RBSW01 and RBSW2US during the reporting period.

Trigger value exceedances downstream of discharge point RBAD1 appeared indicative of natural background concentrations rather than operational impact and are discussed further in Section 8.3 below.

8.1 Biological Monitoring

Detailed discussion of the biological monitoring program is provided in Attachment F. A summary of key discussion points is summarised below:

- *In situ* water quality values varied across all sites with values considered typical of waterways across the region following the end of the wet season;
- Habitat was variable between sites both at the reach extent and the macroinvertebrate sampling habitat scales. This appears to be the biggest driver determining the macroinvertebrate assemblages;
- A statistical difference in macroinvertebrate assemblages was detected between control and impact sites. These differences appear to be largely driven by inherent differences in habitat between the sites rather than any impacts associated with mining activities; and
- The locations of the biological sampling sites are considered suitable for meeting the compliance requirements for the project. However, considering the inherent physical habitat differences between some of the waterways, emphasis should be placed on comparing any changes in the sites over time rather than simply between control and impact sites.

8.2 Sediment Monitoring

Detailed discussion of the sediment monitoring program is provided in Attachment G. A summary of key discussion points is summarised below:

- Particle size analysis results were highly variable between sample locations with little variation between impact and reference sites observed. All samples were composed primarily of sand with gravels and some clay.
- All sediment samples analysed, except for RBSW14, had comparable physical parameters. Tidal influence at RBSW14 is apparent from elevated EC, pH and major salts. It was noted if there was little value in sampling RBSW14 due to tidal influence.
- Laboratory analysis of sediment samples identified elevated concentrations of aluminium, Iron and manganese at sample locations both upstream and downstream of discharge point RBAD1. Results did not identify heavy metals above default guideline values at all other locations sampled.
- Sediment quality results correlate with surface water monitoring results at the same locations which have elevated concentrations of these metals. No discernible variation between reference and impact sites were identified.

- It was recommended that sample location RBSW13 in the Magaranyi River be moved 5 km upstream and a third control site be added at Yumanji Creek (Little Towns River).

8.3 Exceedances and investigations

Trigger Value Exceedances

NTEPA was formally notified on 11 January 2021 of a potential non-compliance with Section 40.3 of WDL246-01. This related to inaccurate measurement of field turbidity and dissolved oxygen due to use of a faulty water quality meter. Results were found to be considerably exaggerated which were later confirmed through laboratory testing. NTEPA were informed that a replacement WQM had been ordered. No request for further information was received.

Throughout the reporting period, there were also occasions where full compliance with Section 40 of WDL246-01 was not achieved. These non-compliant results were not considered to be indicative of impact from site dewatering activities or constitute material environmental harm as:

- Concentrations at upstream sample locations RBSW01 and / or RBSW2US were consistent with or higher than concentrations at downstream sample locations during the same sampling events; or
- Concentrations at RBSW04 and / or RBSWDS were considered within the range of naturally occurring background concentrations previously observed at upstream sampling locations RBSW2US and RBSW01; or
- Concentrations at upstream sample locations RBSW01 and / or RBSW2US were greater than three times the trigger value during the same sampling event.

Details of all non-compliant results and associated investigation findings are presented in Attachment H.

Proposed Actions and Process Improvements

In future, NRR will ensure that as soon as a potential exceedance is identified it will be reported to the department in accordance with Condition 38. The following process and procedures have been implemented to improve compliance and reporting:

- Improved managerial oversight with strong emphasis on regulatory reporting;
- Recruitment of a back-to-back environmental advisor to ensure fulltime environmental presence onsite;
- Established a Dewatering Procedure to ensure compliance with all aspects of the WDL246-01;
- Completed a review of monitoring procedures and training for field staff to ensure sampling is undertaken in accordance with the WDL and NRR operating procedures and immediate identification and escalation of potential non-compliance conditions.; and
- Evaluated alternative 'all weather access' monitoring locations for potential inclusion in a WDL modification now NRR have a greater understanding of site conditions during wet season flows; and
- Commitment to repair or replace any malfunctioning field and remote logging equipment as soon as practicable.

Non-compliant Discharge Events

Between 13 and 16 February 2021, water was discharged from Danehill West (mining pits FE2 and FE3) through three unauthorised discharge points into the Towns River. NRR's Environmental Technician notified the Sustainability Manager on 15 February 2021 and, in accordance with Condition 38 of WDL246-01, the incident was reported within 24 hours on 16 February 2021. A final investigation report was submitted to NT EPA on 8 July 2021 (Attachment I).

Investigation into the incident identified several actual and potential contributing factors. Numerous mitigating and corrective actions were or have been scheduled to be implemented to ensure this incident does not occur again. Review of available environmental monitoring data including field measurements, laboratory analytical results and remote logging data indicates the risk of material environmental harm from the discharge event was likely negligible.

A second non-compliant discharge event occurred on 24 February 2021 which comprised discharge of water from Danehill West pit (FE2/FE3) rather than Danehill East pit (FE1) through authorised discharge point RBAD1. Discharge occurred for a period of less than six hours, however due to an operational oversight, it was not reported to the NT EPA at that time.

As a final flow meter reading was not obtained when discharged ceased so it is estimated 10.86 ML was discharged based on a maximum pump rate of 510 l/s. This figure likely overestimates volumes discharged as it does not consider pump rate losses due to elevation change between the pit floor and discharge point.

Investigation into the non-compliance did not identify a risk of material environmental harm as;

- The event was limited in duration, lasting less than six hours.
- Field water quality parameters collected from FE2 and accessible WDL246-01 monitoring locations during the non-compliance identified that the quality of water was within applicable WDL trigger values downstream of the discharge point.
- The Towns River experienced a flood event, with an average flow rate of 25.3 Kl/s recorded over the duration of the non-compliance. Flow rate data collected during other discharge events indicates that a minimum flow rate of 3 to 4 Kl/s is required to achieve sufficient dilution of potential contaminants within 100 m of discharge point RBAD1. The flow rate at the time of the non-compliance was many times that required for sufficient dilution suggesting potential contaminants were likely diluted to concentrations below WDL trigger values within a short distance of discharge point RBAD1.

9.0 CONCLUSIONS

During the reporting period, NRR discharged an approximate total volume of 621.17 ML over five discharge events between January and April 2021. Discharge was undertaken in general accordance with the requirements of WDL246-01, however several non-conformances and data gaps were recorded during the discharge period. NRR have identified and investigated these non-conformances and have developed strategies and procedures to improve WDL compliance and reporting for future discharge events. These include:

- Improved managerial oversight;

- Recruitment of a back-to-back environmental advisor;
- Established a Dewatering Procedure to ensure compliance with WDL246-01;
- Completed a review of monitoring procedures and training for field staff to ensure sampling and reporting compliance;
- Investigation of alternative all weather access monitoring locations for potential inclusion in a WDL modification; and
- Commitment to repair or replace any malfunctioning field and remote logging equipment as soon as practicable.

Environmental monitoring did not identify any change in biodiversity and sediment chemical and physical properties, nor did water quality results indicate variance outside of naturally occurring background concentrations within the Towns River system.

Where 99% Species Protection for Freshwater Ecosystems (ANZG 2018) could not be achieved, concentrations of contaminants were not considered to constitute material environmental harm as:

- Concentrations at upstream sample locations were consistent with or higher than concentrations at downstream sample locations during the same sampling events; and
- Concentrations at downstream sample locations were considered within the range of naturally occurring background concentrations previously recorded at upstream in the Towns River system.

NRR are committed to improving its WDL compliance and reporting performance during the 2021/2021 wet season.

10.0 CERTIFICATION

I Greg Oliver, Environmental Approvals Specialist, have reviewed this report and I confirm that to the best of my knowledge and ability all the information provided in the report is true and accurate.



13 September 2021

ABBREVIATIONS

Acronym	Meaning
NRR	Nathan River Resources
NRP	Nathan River Project
WQM	Water Quality Meter
TV	Trigger Value
RPD	Relative Percentage Difference

REFERENCES

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines

EcOz (2012). Draft Environmental Impact Statement, Western Desert Resources Limited, Roper Bar Iron Ore Project. EcOz Pty Ltd, 2019.

EcOz (2019). Dust Management Plan, Nathan River Resources Project. EcOz Pty Ltd, 2019.

EcOz (2020). Sediment Monitoring Report, Roper Bar Mine. EcOz Pty Ltd, 2020.

Freshwater Ecology (2021). Nathan River mine Aquatic Macroinvertebrate Assessment, April 2021. Freshwater Ecology Pty Ltd, 2021


NRR (2019). Water Management and Monitoring Plan (WMM).

NRR (2021). Revised Mine Management Plan (MMP) Authorisation 1062-01. Subject to departmental approval.

FIGURES



KEY

 Discharge Monitoring Locations

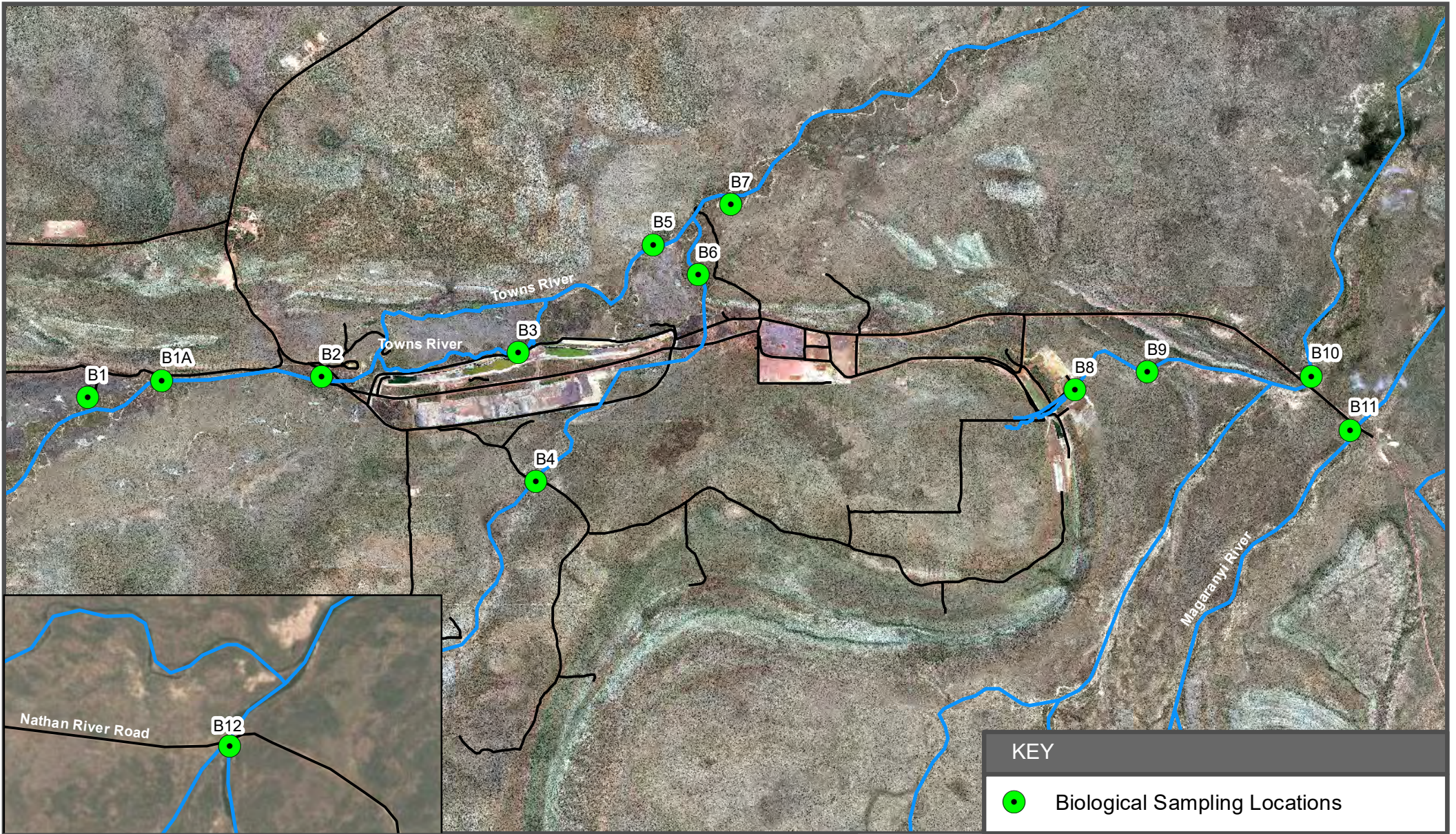
DISCHARGE MONITORING LOCATIONS

Nathan River Project, Roper Bar, Northern Territory




Figure 1





KEY

-  Biological Sampling Locations

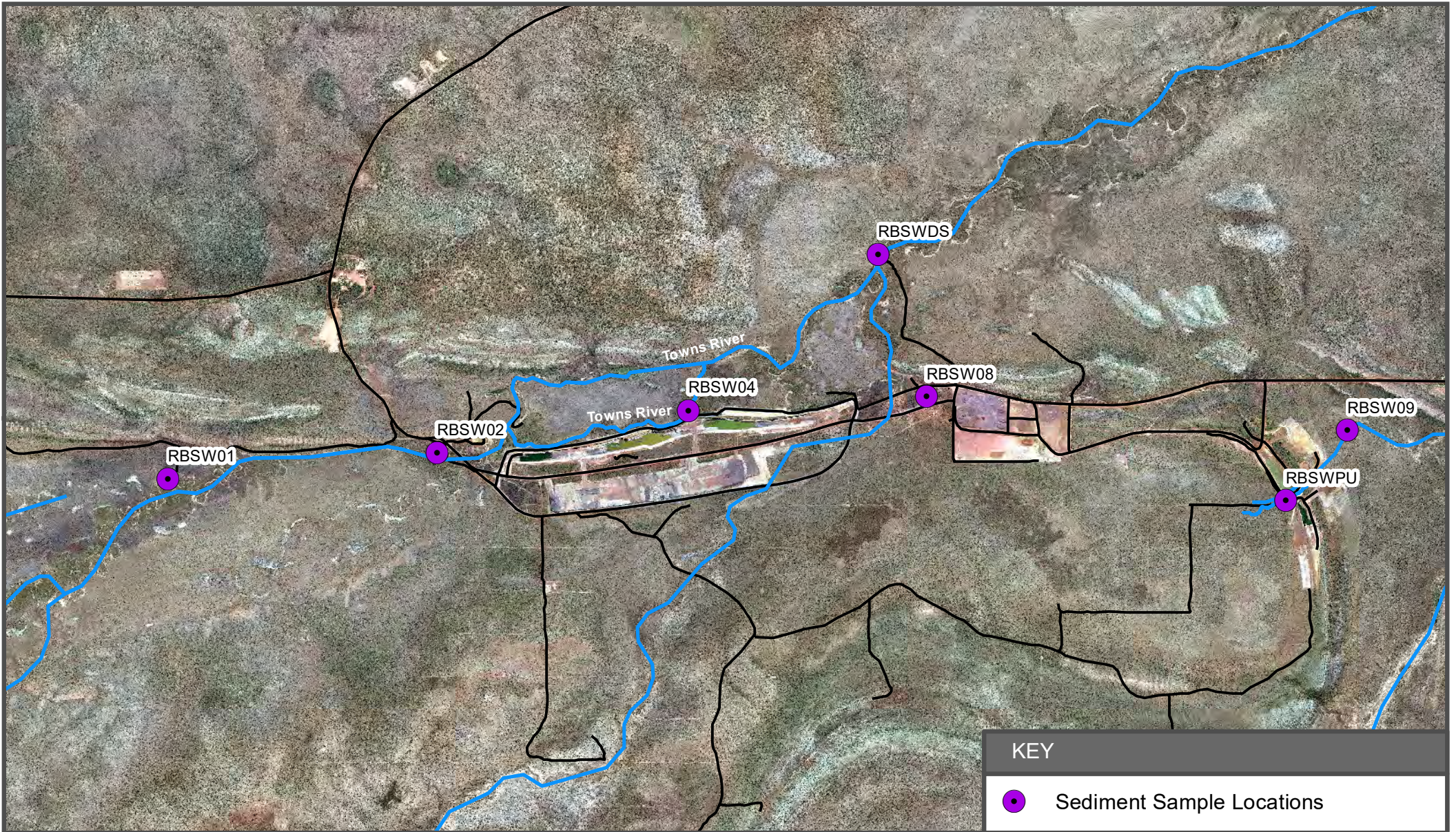
BIOLOGICAL MONITORING LOCATIONS

Nathan River Project, Roper Bar, Northern Territory




Figure 2





KEY

-  Sediment Sample Locations

SEDIMENT MONITORING LOCATIONS

Nathan River Project, Roper Bar, Northern Territory

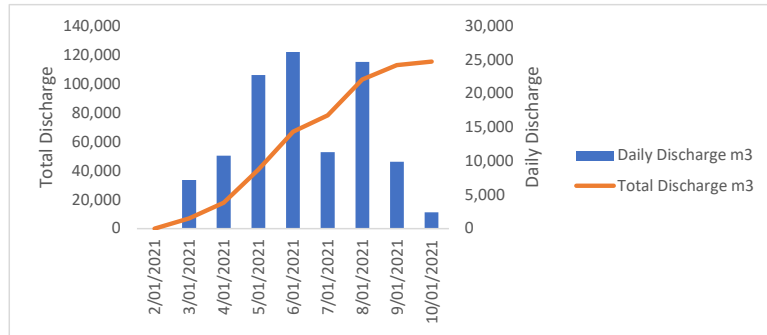


Figure 3

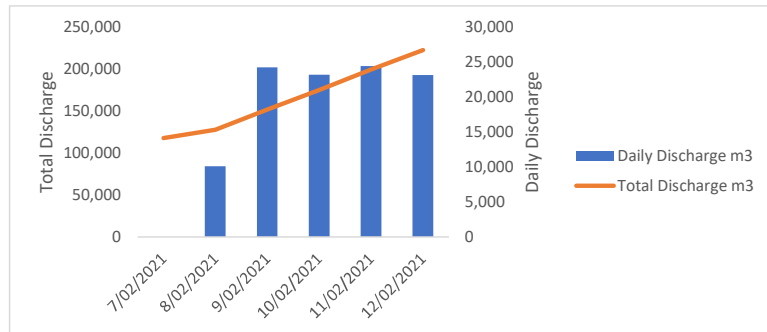


ATTACHMENT A

Discharge Event 1				
Date	Flow Rate (L/s)	Total Discharge m ³	Daily Discharge m ³	Compliance Monitoring (Y/N)
2/01/2021	95	0	0	Y
3/01/2021	95	7,227	7,227	Y
4/01/2021	125	18,050	10,823	Y
5/01/2021	295	40,840	22,790	Y
6/01/2021	280	67,033	26,193	Y (Lab Sample)
7/01/2021	200	78,388	11,355	Y
8/01/2021	280	103,102	24,714	Y
9/01/2021	143	113,025	9,923	Y
10/01/2021	30	115,482	2,457	Y
TOTAL DISCHARGE			115,482	



Discharge Event 2						
Date	Flow Rate (L/s)	Total Discharge m ³	Daily Discharge m ³	Compliance Monitoring (Y/N)		
7/02/2021	150	117,790	0	Y		
8/02/2021	280	127,929	10,139	Y		
9/02/2021	280	152,217	24,288	Y		
10/02/2021	280	175,438	23,221	Y (Lab Sample)		
11/02/2021	280	199,917	24,479	Y		
12/02/2021	276	223,112	23,195	Y		
13/02/2021	No discharge volume data available due to pumps and pipes being moved without HSEC approval and flow meters recording volumes of water transferred between mine pits rather than into the Towns River.			N		
14/02/2021				N		
15/02/2021				Y (Some Lab Samples)		
16/02/2021				N		
17/02/2021				Y (Some Lab Samples)		
18/02/2021				N		
19/02/2021				N		
20/02/2021				N		
TOTAL DISCHARGE				105,322		



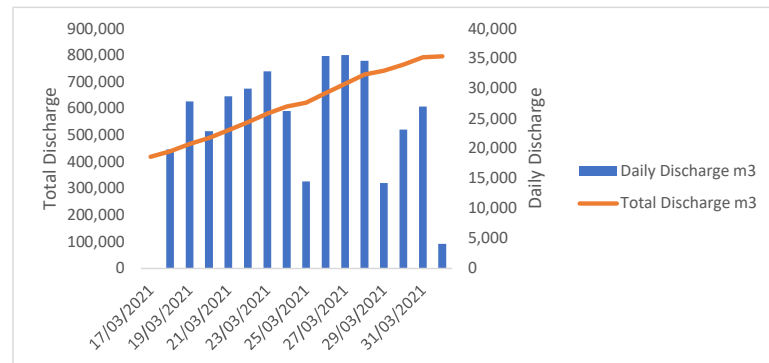
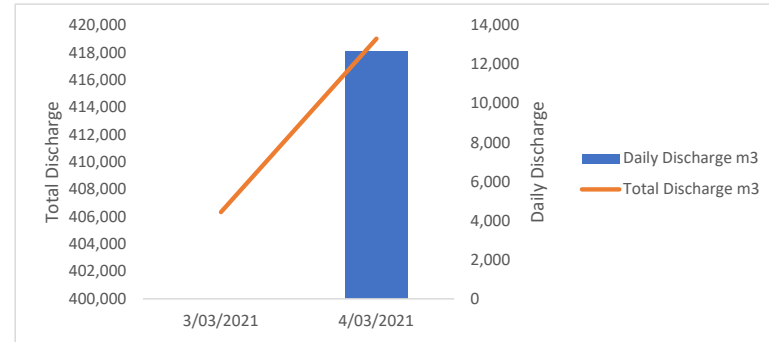
Discharge Event 3				
Date	Flow Rate (L/s)	Total Discharge m ³	Daily Discharge m ³	Compliance Monitoring (Y/N)
24/02/2021	510 (estimated maximum)	10,863*	10,863*	Y**
TOTAL DISCHARGE			10,863*	

Discharge Event 4				
Date	Flow Rate (L/s)	Total Discharge m ³	Daily Discharge m ³	Compliance Monitoring (Y/N)
3/03/2021	155	406,352	0	n/a
4/03/2021	155	419,030	12,678	Y (Lab Sample)
TOTAL DISCHARGE			12,678	

Discharge Event 5				
Date	Flow Rate (L/s)	Total Discharge m ³	Daily Discharge m ³	Compliance Monitoring (Y/N)
17/03/2021	155 - 410	419,034	0	Y (Lab Sample)
18/03/2021	290 - 410	438,874	19,840	Y
19/03/2021	0 - 410	466,729	27,855	Y
20/03/2021	410	489,600	22,871	Y
21/03/2021	292 - 410	518,317	28,717	Y
22/03/2021	415	548,290	29,973	Y
23/03/2021	350	581,124	32,834	Y
24/03/2021	290	607,380	26,256	Y
25/03/2021	157 - 415	621,867	14,487	Y (Lab Sample)
26/03/2021	416	657,285	35,418	Y
27/03/2021	411	692,848	35,563	Y
28/03/2021	298	727,445	34,597	Y
29/03/2021	158	741,684	14,239	Y
30/03/2021	299	764,820	23,136	Y
31/03/2021	162	791,800	26,980	Y (Lab Sample)
1/04/2021	101	795,863	4,063	N
TOTAL DISCHARGE			376,829	

* Estimate only based on maximum pump rates from 2 x 90KW and 1 x 150 pump. Does not take into account losses from elevation change between pit floor to discharge point.

** Field parameters only from accessible locations RBAD1, RBSW01 and RBAD0



ATTACHMENT B

SURFACE WATER
SAMPLE COLLECTION SHEET



**Nathan
River
Resources**

SITE ID	RBSW01	LOCATION	UP STREAM	PHOTO	
DATE	2.01.21	TIME	1525	INITIALS	SW

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
05.28	0	147.	289	189.1	0	28.9

OBSERVATIONS / NOTES
CLOUDY - CLEAR
NO SMELL
NO SMELL
RAINING WELL
RAINING @ TIME OF SAMPLE TAKEN

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBAD 1	LOCATION	DISCHARGE POINT	PHOTO	
DATE	02.01.21	TIME	1715	INITIALS	S.H

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
06.71	1958	144.2	177	27.5	1253	29.1

OBSERVATIONS / NOTES
PIPE FLOWING W/DL
NO SAMPLE
NO SNEED.

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW04	LOCATION	MIDDLE SAMPLING LOCATION	PHOTO	
DATE	02.01.21	TIME	1725	INITIALS	S.L

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.70	84	120.3	174 ?	105.4	54	28.3

OBSERVATIONS / NOTES
Running well
Cloudy - Clear
No smell
No sound.

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



**Nathan
River
Resources**

SITE ID	RBSWDS	LOCATION	Down Stream	PHOTO	
DATE	02.01.21	TIME	1630	INITIALS	J.LI

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
5.91	66	121.8	142	144.9	42	28.7

OBSERVATIONS / NOTES
CLOUDY - CLEAR
RUNNING WELL
NO SMELL
NO SMOG

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW01	LOCATION	UP STREAM	PHOTO	
DATE	03.01.21	TIME	0745	INITIALS	S.W

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
06.49	6	100	1219 ?	181.0	3	27.5

OBSERVATIONS / NOTES
CLOUDY - CLEAR
RUNNING WELL
NO SMELL
NO SMOOD

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



**Nathan
River
Resources**

SITE ID	RBAD1	LOCATION	DISCHARGE POND	PHOTO	
DATE	030121	TIME	0830	INITIALS	S.H

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
07.37	1670	143.1	1160 ?	20.6	1084	29.6

OBSERVATIONS / NOTES
DISCHARGE: 85-95 L/S
Following flow
CHOP
No smell
No sound.

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	R13SW04	LOCATION	MIDDLE POINT	PHOTO	
DATE	03.01.21	TIME	0850	INITIALS	S.L

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
07.37	78	112.6	1078	113.1	49	28.8

OBSERVATIONS / NOTES
Cloudy - Clear
Running slow
No smell
No silt

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER SAMPLE COLLECTION SHEET	 Nathan River Resources
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SITE ID	RBSWDS	LOCATION	Down STREAM	PHOTO	
DATE	0301.21	TIME	0920	INITIALS	S.H

FIELD PARAMETERS						
pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP ($^{\circ}\text{C}$)
07.29	38	117.9	1182 ?	122.7	24	28.9

OBSERVATIONS / NOTES
Running Well
Cloudy - Clear
No Smell
No Shown.

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



**Nathan
River
Resources**

SITE ID	RBSW01	LOCATION	UP STREAM	PHOTO	
DATE	04.01.21	TIME	0650	INITIALS	S.U

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
8.01	5	113.7	16.4 ? 1709 ?	211.6	2	29.4

OBSERVATIONS/NOTES
CLOUDY - CLEAR
NO SMELL
NO SWEEN
RUNNING WELL

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



**Nathan
River
Resources**

SITE ID	RBA01	LOCATION	Discharge Point	PHOTO	
DATE	04.01.21	TIME	0710	INITIALS	S.LI

FIELD PARAMETERS						
pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP ($^{\circ}\text{C}$)
5.82	1711	156.6	2060 ?	130.9	1131	30.4

OBSERVATIONS/NOTES
CLEAR
Following WSU
No SWU
No SWON.

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



**Nathan
River
Resources**

SITE ID	RBSW04	LOCATION	MIDDLE RIVER	PHOTO	
DATE	04.01.21	TIME	0730	INITIALS	S.M

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
4.59	74	131.7	2490 ?	227.3	48	30.7

OBSERVATIONS/NOTES
Running Water
Cloudy - Clear
No Smell
No Smell

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW ^{DS} 2205	LOCATION	Dross Stream	PHOTO	
DATE	04.01.21	TIME	0805	INITIALS	S.M

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
06.08	40	136.9	240?	139.8	26	31

OBSERVATIONS/NOTES
Remains well
No smelt
No smelt
Cloudy - Clear.

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



**Nathan
River
Resources**

SITE ID	RBSWDS	LOCATION	Down Stream	PHOTO	
DATE	05/01/21	TIME	0810	INITIALS	S.W.

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.18	97	165.4	1894?	116.3	63	31.3

OBSERVATIONS / NOTES
Remains well
No swison
No smoll
Cloudy - Clear.
2m MARK

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	BR8W01	LOCATION	UP STREAM	PHOTO	
DATE	05.01.21	TIME	0905	INITIALS	S.U

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.30	0	2155	3398?	113.9	0	30.2

OBSERVATIONS/NOTES
Remaining water
No smell
No smog
cloudy - clear

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



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SITE ID	RBAD1	LOCATION	Discharge Point	PHOTO	
DATE	09.01.21	TIME	0728	INITIALS	S.H

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.58	1670	21.3	3330?	86.6	1082	30.4

OBSERVATIONS / NOTES
Flowing well
No snow
No snow
Clear.
Time of Sampling
Flow @ 275 m/s
Total Discharge 38913

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW04	LOCATION	MIDDLE POINT	PHOTO	
DATE	05.01.21	TIME	0740	INITIALS	S.H

FIELD PARAMETERS						
pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP ($^{\circ}\text{C}$)
6.06	151	175.5	2733?	120.4	97	31.4

OBSERVATIONS / NOTES
RUNNING WELL (HAS DROPPED)
NO SMELL
NO SWOEN
CLOUDY - CLEAR.

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW01	LOCATION	UP STREAM	PHOTO	
DATE	6.01.21	TIME	0720	INITIALS	S.LI

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
06.37	0	260.7	3560?	107.8	0	31.7

OBSERVATIONS / NOTES
Running well
No snow
No snow
Cloudy - Clear

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID	RBSW01	SAMPLE ID		SAMPLE ID	
TIME	0720	TIME		TIME	
BOTTLES	5	BOTTLES		BOTTLES	
ANALYSIS	SW SURFES	ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBA01 RB01	LOCATION	DISCHARGE POINT	PHOTO	
DATE	06.01.21	TIME	0745	INITIALS	S.L

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
06.75	1678	183.0	2739?	71.5	1090	31.3

OBSERVATIONS / NOTES
Fines Well
No Smell
No Smell
Clear.

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID	RBA01	SAMPLE ID		SAMPLE ID	
TIME	0745	TIME		TIME	
BOTTLES	5	BOTTLES		BOTTLES	
ANALYSIS	SW SITES	ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW04	LOCATION	Middle Point	PHOTO	
DATE	6/01/2021	TIME	08:11	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mv)	TDS (mg/L)	TEMP (°C)
06.43	0157	132.6	1058	+014.6	0100	32.3

OBSERVATIONS / NOTES
Flowing Well
no sheen
no smell
clear
flow rate 280L per S
total discharge - 63,108

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID	RBSW04	SAMPLE ID		SAMPLE ID	
TIME	08:11	TIME		TIME	
BOTTLES	5	BOTTLES		BOTTLES	
ANALYSIS	SW Surveys	ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSWDS	LOCATION	DOWN STREAM	PHOTO	
DATE	6 Jan 2021	TIME	08:47	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
06.22	0106	145.6	1023	+0113.8	0069	32.8

OBSERVATIONS / NOTES
flowing well
no sleet
no smell
clear
HAS DROPPED
APPROX 1.9 METRS.

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID	RBSWDS	SAMPLE ID		SAMPLE ID	
TIME	0847	TIME		TIME	
BOTTLES	5	BOTTLES		BOTTLES	
ANALYSIS	SEW SWDS	ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



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SITE ID	RBSW01	LOCATION	UP STREAM	PHOTO	28.2
DATE	07.01.21	TIME	0710	INITIALS	S.U

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.25	1	153.2	1809?	124.6	1	28.4

OBSERVATIONS / NOTES
RUNNING WELL
NO NO SNOW
NO SNOW
CLOUDY - CLEAR.

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBAD1	LOCATION	DISCHARGE POINT	PHOTO	
DATE	07.01.21	TIME	0850	INITIALS	S.M

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.75	1733	254.1	1876 ?	11.5	1140	31

OBSERVATIONS / NOTES
Flowing well
No silt
No smell
CLEAR.
flow rate 280
total discharge 78388

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



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RBSW04

MIDDLE

SITE ID	RBSAD1	LOCATION	DISCHARGE	PHOTO	
DATE	7/01/21	TIME	09.15	INITIALS	OG

FIELD PARAMETERS

pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
05.82	0138	148.8	1904	113.7	0089	30.4

OBSERVATIONS / NOTES

flowing well
no smell
no sheen
cloudy ~ clear

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SITE ID	RBSWDS	LOCATION	D / stream	PHOTO	
DATE	7/01/21	TIME	09.35	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mv)	TDS (mg/L)	TEMP (°C)
08.59	0000	121.0	1801	+156.9	0000	30.6

OBSERVATIONS / NOTES
Flowing well
no Sheen
no Smell
cloudy - clear
Metre mark - 2.15M

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RB3W01	LOCATION	UP Stream	PHOTO	
DATE	8/01/21	TIME	07:33	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
5.87	0	172.1	1576	125.7	0	30.1

OBSERVATIONS / NOTES
running well
no sheen
no smell
cloudy - clear

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW04	LOCATION	MIDDLE POINT	PHOTO	
DATE	08.01.21	TIME	0825	INITIALS	O.G

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.02	148	155.7	1738 25	137.3	91	31.1

OBSERVATIONS / NOTES
Clear Cloudy
No snow
No snow
Running well

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW DS	LOCATION	Down Stream	PHOTO	
DATE	8/01/21	TIME	09.00	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
06.04	96	158.7	162B	113.7	62	31.9

OBSERVATIONS / NOTES
Flow reasonably well
no smell
no sheen
clear cloudy
river height 2.05m

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW01	LOCATION	UP stream	PHOTO	
DATE	9/1/21	TIME	06-38	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.52	93	173.4	763	58763	59	29.3

OBSERVATIONS / NOTES
Flowing - dropped 2 foot in level since yesterday
no smell
no sheen
cloudy - clear

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBAD1	LOCATION	Discharge	PHOTO	
DATE	9/1/21	TIME	7.04	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP ($^{\circ}\text{C}$)
07.23	1721	230.1	###	45.8	1114	30.8
			894			

OBSERVATIONS / NOTES
discharge level down
no smell
no sheen
cloudy
9/1 07.00 am
143 L/S
113025 m ³

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW04	LOCATION	Middle	PHOTO	
DATE	9/1/21	TIME	7:20	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.67	210	150.2	695	78.7	141	30.3

OBSERVATIONS / NOTES
Flowing - Slowing though
no smell
no sheen
cloudy-clear

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



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SITE ID	RBSWDS	LOCATION	Down Stream	PHOTO	
DATE	10/01/21	TIME	07:30	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.57	29	151.3	373	105.9	18	30.2

OBSERVATIONS / NOTES
Flowing slowly
no smell
no sheen
Cloudy
River level: 1.25m

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	2BWS01	LOCATION	UP stream	PHOTO	
DATE	10/01/21	TIME	06.28	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.74	40	87.5	286	88.8	26	28.6
		191.7				

OBSERVATIONS / NOTES
flowing
no smell
no sheen
cloudy

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBAD1	LOCATION	Discharge	PHOTO	
DATE	10/01/21	TIME	06:49	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mv)	TDS (mg/L)	TEMP (°C)
6.39	1055	131.3	302	101.4	685	28.1

OBSERVATIONS / NOTES
no flowing
no smell
no clean
murky - cloudy
no discharge

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBSW04	LOCATION	Middle	PHOTO	
DATE	10/01/21	TIME	07.05	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
07.09	27	153.4	366	94.9	17	29.5

OBSERVATIONS / NOTES
flowing - slowly
no smell
no sleet
cloudy

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	R13WSSW01	LOCATION	UP Stream	PHOTO	
DATE	11/1/21	TIME	8.06	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.77	33	176.7	267	109.8	19	29.9

OBSERVATIONS / NOTES
Flowing well
no smell
no sheen
cloudy
Sample point 10m down stream due to level

PRIMARY SAMPLE		DUPLICATE		TRIPPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBAD 1	LOCATION	Discharge	PHOTO	
DATE	11/1/21	TIME	07:44	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.62	1570	162.3	308	71.6	1019	29.3

OBSERVATIONS / NOTES
no discharge
no sleet
no smell
murky - cloudy
0 L/sec no reading available AFS

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

SURFACE WATER
SAMPLE COLLECTION SHEET



SITE ID	RBWS04	LOCATION	Middle	PHOTO	
DATE	11/1/21	TIME	07:35	INITIALS	OG

FIELD PARAMETERS						
pH (Units)	EC (µs/cm)	DO (%)	TURBIDITY (NTU)	ORP (mV)	TDS (mg/L)	TEMP (°C)
6.73	22	212.3	304	107.3	14	29.9

OBSERVATIONS / NOTES
Flowing - slowly foam present
no smell
no sheen
cloudy

PRIMARY SAMPLE		DUPLICATE		TRIPLICATE	
SAMPLE ID		SAMPLE ID		SAMPLE ID	
TIME		TIME		TIME	
BOTTLES		BOTTLES		BOTTLES	
ANALYSIS		ANALYSIS		ANALYSIS	

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBAD1	8/02/2021	10:15 AM	Tim Gunns	http://www.gocanvas.com/values/10100517025	6.8	1385	67.2	86	101.6	894	29.6	Flowing Slightly Turbid	Light Pink
RBSW2US	8/02/2021	11:01 AM	Tim Gunns	http://www.gocanvas.com/values/10100518249	6.3	9	62.9	82	129.6	5	29.7	Flowing Slightly Turbid	Light Brown
RBSW01	8/02/2021	11:48 AM	Tim Gunns	http://www.gocanvas.com/values/10101550593	5.8	0	42.9	143	143.6	0	28.5	Flowing Very Turbid No Odour	Light Brown
RBSWDS	8/02/2021	4:12 PM	Tim Gunns	http://www.gocanvas.com/values/10101551289	5.9	32	41.1	220	134.6	21	29.7	Flowing Very Turbid No Odour	Moderate Pink
RBSW01	9/02/2021	4:00 PM	Tim Gunns	http://www.gocanvas.com/values/10111122697	6.6	0	59.5	31.3	163.2	0	28.4	Flowing Slightly Turbid No Odour	Light Brown
RBSW2US	9/02/2021	4:35 PM	Tim Gunns	http://www.gocanvas.com/values/10111122766	6.9	31	52.6	14.1	159.5	20	31.4	Flowing Slightly Turbid	Light Brown
RBAD1	9/02/2021	4:57 PM	Tim Gunns	http://www.gocanvas.com/values/10117045371	6.6	1544	53.3	40.3	104.9	997	29.5	Flowing Slightly Turbid	Light Pink
RBSWDS	9/02/2021	5:40 PM	Tim Gunns	http://www.gocanvas.com/values/10117046328	6.3	40	47.2	39.7	158.4	26	29.5	Flowing Moderately Turbid	Light Brown
RBSW01	10/02/2021	8:31 AM	Shaun Hill	http://www.gocanvas.com/values/10119990002	6.9	27	50.7	34.2	129	18	29.3	Flowing Slightly Turbid No Odour	Light Brown
RBSW04	10/02/2021	9:35 AM	Shaun Hill	http://www.gocanvas.com/values/10119990367	6.5	49	52	45.3	60.6	31	30.6	Flowing Slightly Turbid No Odour	Light Brown
RBSWDS	10/02/2021	10:42 AM	Shaun Hill	http://www.gocanvas.com/values/10119990510	6.9	27	52.3	47.6	116.3	17	31.1	Flowing Slightly Turbid No Odour	Light Brown
RBSP02	10/02/2021	2:44 PM	Shaun Hill	http://www.gocanvas.com/values/10120635458	7.8	432	94.4	63.7	88.6	280	33.5	Very Turbid No Odour	Light Pink
RBSP02	10/02/2021	3:04 PM	Shaun Hill	http://www.gocanvas.com/values/10120635519	7.6	1311	105.6	16.4	59.8	52	33.5	Clear No Odour	Clear
RBSW2US	10/02/2021	12:00 PM	Shaun Hill	http://www.gocanvas.com/values/10120635564	7.7	32	153.7	18.8	86	20	34	Flowing Slightly Turbid No Odour	Light Brown

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBAD1	11/02/2021	2:22 PM	Shaun Hill	http://www.gocanvas.com/values/10130562757	7.1	1366	92.6	37.7	76.2	887	31.1	Flowing Slightly Turbid No Odour	Light Brown
RBSW04	11/02/2021	10:08 AM	Shaun Hill	http://www.gocanvas.com/values/10130116892	6.7	27	85.1	37	110.6	16	30.6	Flowing Slightly Turbid No Odour	Light Brown
RBSW01	11/02/2021	9:30 AM	Shaun Hill	http://www.gocanvas.com/values/10130117018	6.7	0	74.9	30.5	100.5	0	30.3	Flowing Slightly Turbid No Odour	Light Brown
RBSWDS	11/02/2021	10:55 AM	Shaun Hill	http://www.gocanvas.com/values/10130118009	6.7	15	97.1	37.3	97	9	31.3	Flowing Slightly Turbid No Odour	Light Brown
RBSW2US	11/02/2021	12:22 PM	Shaun Hill	http://www.gocanvas.com/values/10130118675	7.1	5	126.5	16	107.4	3	31.4	Flowing Slightly Turbid No Odour	Light Brown
RBAD1	12/02/2021	9:23 AM	Shaun Hill	http://www.gocanvas.com/values/10139034340	6.2	1364	87.8	43.2	91.7	886	29.5	Flowing Slightly Turbid No Odour	Light Brown
RBSW04	12/02/2021	9:49 AM	Shaun Hill	http://www.gocanvas.com/values/10139675227	6.1	44	56.9	22.7	140.9	27	30.3	Flowing Slightly Turbid No Odour	Light Brown
RBSW01	12/02/2021	8:51 AM	Shaun Hill	http://www.gocanvas.com/values/10139675465	6.8	18	73.1	27.5	135.9	11	28.7	Flowing Slightly Turbid No Odour	Light Brown
RBSWDS	12/02/2021	11:25 AM	Shaun Hill	http://www.gocanvas.com/values/10139675806	6.1	24	62.2	23.3	103.6	15	30.6	Flowing Slightly Turbid No Odour	Light Brown
RBSW2US	12/02/2021	12:29 PM	Shaun Hill	http://www.gocanvas.com/values/10139675828	6.7	10	99.4	13.4	104.6	6	32.2	Flowing Slightly Turbid No Odour	Light Brown
RBSW01	14/02/2021	11:07 AM	Shaun Hill	http://www.gocanvas.com/values/10151636113	6.3	0	192.7	23	104.8	0	30.7	Flowing Slightly Turbid No Odour	Light Brown
RBAD1	14/02/2021	5:06 PM	Shaun Hill	http://www.gocanvas.com/values/10151743288	6.4	0	145.3	23.4	120.8	0	34.5	Flowing Slightly Turbid No Odour	Light Brown
RBSW01	15/02/2021	11:40 AM	Shaun Hill	http://www.gocanvas.com/values/10153989362	7.7	0	0	17.3	127.6	0	33.6	Flowing Slightly Turbid No Odour	Light Yellow

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBAD1	17/02/2021	9:06 AM	Shaun Hill	http://www.gocanvas.com/values/10169472082	9.4	896	502.3	38.5	61.8	583	30	Flowing Clear	Clear
RBSW01	17/02/2021	8:39 AM	Shaun Hill	http://www.gocanvas.com/values/10169472504	9.9	122	502.3	17.6	105.2	78	30	Flowing No Odour	Clear
RBSW04	17/02/2021	9:30 AM	Shaun Hill	http://www.gocanvas.com/values/10169472650	9.2	154	503.1	21	105.8	100	30.6	Flowing Moderatley Turbid No Odour	Dark Brown
RBSWDS	17/02/2021	10:24 AM	Shaun Hill	http://www.gocanvas.com/values/10169472874	8.5	120	503.2	18	93.4	78	30.7	Flowing Moderatley Turbid No Odour	Dark Brown
RBSW01	18/02/2021	9:38 AM	Shaun Hill	http://www.gocanvas.com/values/10178887870	10.5	100	501.4	16.3	115.5	65	29.6	Flowing Moderatley Turbid No Odour	Dark Brown
RBSW04	18/02/2021	10:37 AM	Shaun Hill	http://www.gocanvas.com/values/10178889367	9.1	109	502.9	15.9	111.5	69	30.1	Flowing Moderatley Turbid No Odour	Moderate Brown
RBAD1	18/02/2021	11:34 AM	Shaun Hill	http://www.gocanvas.com/values/10178889727	9.5	741	502.4	23.4	57.3	480	29.6	Flowing Clear No Odour	Clear
RBSW04	18/02/2021	11:53 AM	Shaun Hill	http://www.gocanvas.com/values/10178890444	8.4	118	502.9	24.5	92.9	76	29.9	Flowing Moderatley Turbid No Odour	Moderate Brown
RBSW01	19/02/2021	7:34 AM	Shaun Hill	http://www.gocanvas.com/values/10186273777	10.9	85	500.2	24.2	75.2	55	27.5	Flowing Moderatley Turbid No Odour	Moderate Brown
RBAD1	19/02/2021	8:38 AM	Shaun Hill	http://www.gocanvas.com/values/10187369890	10.3	735	501.1	22.4	49.8	476	28.5	Flowing Clear No Odour	Clear
RBSW04	19/02/2021	8:55 AM	Shaun Hill	http://www.gocanvas.com/values/10187370017	20	115	500.8	33.4	95.7	74	28.8	Clear Moderatley Turbid No Odour	Moderate Brown

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBSWDS	19/02/2021	9:37 AM	Shaun Hill	http://www.gocanvas.com/values/10187371573	9.1	109	500.8	28.4	95.6	70	28.6	Flowing Moderately Turbid No Odour	Moderate Brown
RBSW04	24/02/2021	12:11 PM	Tim Gunns	http://www.gocanvas.com/values/10224508795	7	80	105	9.9	155.4	52	29.1	Flowing Slightly Turbid	
RBAD1	24/02/2021	12:29 PM	Tim Gunns	http://www.gocanvas.com/values/10224508993	7.2	332	98.2	45	93.8	212	30.4	Flowing Moderately Turbid	
FE2*	24/02/2021	1:08 PM	Tim Gunns	http://www.gocanvas.com/values/10224509075	7.3	769	112.5	13	55.4	499	31.8	Pools Moderately Turbid	
RBSW02**	24/02/2021	2:15 PM	Tim Gunns	http://www.gocanvas.com/values/10224509219	7	125	96.2	9.5	89.6	80	30.4	Flowing Slightly Turbid	
RBAD1	4/03/2021	8:15 AM	Other	http://www.gocanvas.com/values/10291698623	7.4	1366.9	100.8	7.5	138.4	716.6	32.1	Flowing Slightly Turbid	Clear
RBSW04	4/03/2021	8:36 AM	Other	http://www.gocanvas.com/values/10291698870	6.6	221.8	90.4	12.3	159.9	127.7	31.8	Flowing Moderately Turbid	Light Brown
RBSWDS	4/03/2021	9:19 AM	Tim Gunns	http://www.gocanvas.com/values/10291716928	6.8	214.7	89	90.5	154.5	121.5	32.8	Flowing Moderately Turbid	Moderate Brown
RBSW01	4/03/2021	10:36 AM	Shaun Hill	http://www.gocanvas.com/values/10292181597	6.8	89.3	186	16.7	186	0	32.9	Flowing Moderately Turbid No Odour	Moderate Brown
RBSW2US	4/03/2021	11:16 AM	Other	http://www.gocanvas.com/values/10292183117	8.7	68.8	135.9	4.1	116.4	0	34.4	Flowing Clear Algae	Clear
RBSW04	4/03/2021	3:13 PM	Tim Gunns	http://www.gocanvas.com/values/10293706475	5.4	265.4	104.3	25.5	184.5	144.1	35.3	Flowing Moderately Turbid	Moderate Yellow
RBAD1	4/03/2021	3:23 PM	Tim Gunns	http://www.gocanvas.com/values/10293707302	7.6	1378.8	104.5	19.7	137	776	33	Flowing Clear	Clear
RBSW01	4/03/2021	3:53 PM	Tim Gunns	http://www.gocanvas.com/values/10293708158	7.1	83	110.4	17.2	151.2	44.5	36.2	Flowing Moderately Turbid	Moderate Brown
RBSW2US	4/03/2021	4:33 PM	Tim Gunns	http://www.gocanvas.com/values/10293708603	8.7	81.6	131.9	3.6	77.4	42.6	37.8	Flowing Clear Algae	Clear

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBSWDS	4/03/2021	5:27 PM	Tim Gunns	http://www.gocanvas.com/values/10293709004	6.9	253.8	104.4	13.7	153.5	136.3	36	Flowing Moderatley Turbid	Light Brown
RBSW01	17/03/2021	10:39 AM	Tim Gunns	http://www.gocanvas.com/values/10399770178	6.5	55	85.3	37.8	181.3	32.9	29.5	Flowing Moderatley Turbid	
RBAD1	17/03/2021	11:51 AM	Tim Gunns	http://www.gocanvas.com/values/10399771254	7.5	1479.2	98.9	15.2	750.2	840.3	32.6	Flowing Slightly Turbid	
RBSWDS	17/03/2021	3:15 PM	Tim Gunns	http://www.gocanvas.com/values/10400580897	6.8	128.6	93.9	37.2	179.2	74.9	31	Flowing Moderatley Turbid No Odour	
RBSW2US	17/03/2021	5:44 PM	Tim Gunns	http://www.gocanvas.com/values/10400581042	7.2	82.8	106.8	3.9	163.8	46.7	33	Flowing Clear No Odour Algae	
RBSWDS	18/03/2021	4:24 PM	Tim Gunns	http://www.gocanvas.com/values/10411253022	6.6	134.8	83.1	28.3	178	79.5	30.4	Flowing Moderatley Turbid	
RBAD1	18/03/2021	4:50 PM	Tim Gunns	http://www.gocanvas.com/values/10411253251	7.5	1427.2	98.9	13	162.1	822.5	31.7	Flowing Slightly Turbid	
RBSW04	18/03/2021	4:59 PM	Tim Gunns	http://www.gocanvas.com/values/10411253668	6.6	150.1	79.6	25.6	174	88.7	30.2	Flowing Moderatley Turbid No Odour	
RBSW2US	18/03/2021	5:23 PM	Tim Gunns	http://www.gocanvas.com/values/10411253780	7.2	83.1	104.1	3.5	151.4	49	30.4	Flowing Clear No Odour Algae	
RBSW01	18/03/2021	5:47 PM	Tim Gunns	http://www.gocanvas.com/values/10411254554	6.6	46.1	82.1	76.8	159.6	27.3	30.2	Flowing Slightly Turbid No Odour	
RBAD1	19/03/2021	2:59 PM	Tim Gunns	http://www.gocanvas.com/values/10421617843	6.7	1409.5	50.6	13.3	163.1	824.3	30.7	Pools	
RBSW04	19/03/2021	3:25 PM	Tim Gunns	http://www.gocanvas.com/values/10421617972	6.6	52.9	90.9	25.6	159.1	32	28.8	Flowing Moderatley Turbid	

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBSWDS	19/03/2021	4:03 PM	Tim Gunns	http://www.gocanvas.com/values/10421618018	6.8	55.2	91.5	22.4	182.4	33.2	29.2	Flowing Moderately Turbid No Odour	
RBAD1	19/03/2021	5:02 PM	Tim Gunns	http://www.gocanvas.com/values/10421618040	6.9	1412	99.5	31.8	157.4	818.1	31.4	Flowing Slightly Turbid	
RBSW2US	19/03/2021	5:29 PM	Tim Gunns	http://www.gocanvas.com/values/10421619217	7.1	73.2	96.9	6.6	155.6	44.1	29.2	Flowing Clear	
RBSW01	19/03/2021	6:02 PM	Tim Gunns	http://www.gocanvas.com/values/10421619502	6.9	50.4	101	15.8	184.3	30.3	29.2	Flowing Slightly Turbid Moderately Turbid No Odour	
RBSW01	20/03/2021	2:47 PM	Tim Gunns	http://www.gocanvas.com/values/10430770358	6.2	50.1	85.6	10.6	149.1	30.2	28.5	Flowing Moderately Turbid	
RBSW2US	20/03/2021	3:23 PM	Tim Gunns	http://www.gocanvas.com/values/10430770515	6.3	65.1	100.9	4.9	164.5	39.9	28.2	Flowing Clear No Odour Algae	
RBAD1	20/03/2021	4:19 PM	Tim Gunns	http://www.gocanvas.com/values/10430770636	7.3	1423.4	100.5	16.9	164.5	836.1	30.6	Flowing Slightly Turbid	
RBSW04	20/03/2021	4:41 PM	Tim Gunns	http://www.gocanvas.com/values/10430770966	6.5	164	92.2	15.8	162.9	99.9	28.5	Flowing Slightly Turbid No Odour	
RBSWDS	20/03/2021	5:17 PM	Tim Gunns	http://www.gocanvas.com/values/10430771019	6.6	119.5	91.1	17.8	162.1	72.9	28.4	Flowing Moderately Turbid No Odour	
RBSWDS	21/03/2021	11:36 AM	Tim Gunns	http://www.gocanvas.com/values/10433914075	6.1	81.4	90.7	15.6	148.6	49.5	28.9	Flowing Moderately Turbid No Odour	Light Brown
FE1	21/03/2021	10:54 AM	Tim Gunns	http://www.gocanvas.com/values/10433914137	7.2	1460.3	98.2	16.9	153.1	849.1	31.2	Pools Slightly Turbid No Odour Hydrocarbon Sheen	Light Orange

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBSW2US	21/03/2021	12:23 PM	Tim Gunns	http://www.gocanvas.com/values/10433914197	7.7	82.7	123.6	4.6	135.9	48.1	31.3	Flowing Clear Algae Plant Material	Clear
RBSW01	21/03/2021	8:35 AM	Tim Gunns	http://www.gocanvas.com/values/10433655180	5.7	61.9	92.6	9.6	178.1	38.6	27.1	Flowing Slightly Turbid No Odour	
RBAD1	21/03/2021	9:05 AM	Tim Gunns	http://www.gocanvas.com/values/10433655210	6.7	1428.6	101.4	23.8	199.9	844.5	30.2	Flowing Slightly Turbid No Odour	
RBSW04	21/03/2021	9:22 AM	Tim Gunns		6.4	131.1	83.7	15.5	28.1	79.8	28.1	Flowing Moderatley Turbid No Odour	
RBSW01	22/03/2021	3:21 PM	Tim Gunns	http://www.gocanvas.com/values/10437489076	6.2	80.5	103	12.4	145.5	44.6	31.6	Flowing Slightly Turbid No Odour	Light Brown
RBAD1	22/03/2021	4:21 PM	Tim Gunns	http://www.gocanvas.com/values/10437489219	7.5	1463.6	99.4	40.7	134.2	843.9	31.7	Flowing Moderatley Turbid No Odour	Light Orange
RBSW2US	22/03/2021	3:55 PM	Tim Gunns	http://www.gocanvas.com/values/10437489564	6.9	94.9	117.2	3.3	145.4	53.3	34.9	Flowing Clear Algae	Clear
RBSW04	22/03/2021	4:25 PM	Tim Gunns	http://www.gocanvas.com/values/10437489954	6.8	207.8	92	14.4	158.5	119.7	31.7	Flowing Moderatley Turbid No Odour	Light Brown
RBSWDS	22/03/2021	5:28 PM	Tim Gunns	http://www.gocanvas.com/values/10437490336	6.7	146.2	95.3	14.8	146.9	83.9	32	Flowing Moderatley Turbid No Odour	Light Brown
RBSW04	23/03/2021	7:30 AM	Tim Gunns	http://www.gocanvas.com/values/10445521270	6.3	211.9	89.5	14.9	192.5	123.6	31	Flowing Slightly Turbid No Odour	Light Brown
RBAD1	23/03/2021	7:20 AM	Tim Gunns	http://www.gocanvas.com/values/10447088679	7.1	1460.1	99.3	18.5	165.9	844.1	31.5	Flowing Slightly Turbid No Odour	Light Orange

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBSW2US	23/03/2021	2:46 PM	Tim Gunns	http://www.gocanvas.com/values/10447629580	7.7	94.9	115.7	5.2	121.6	50.2	34.2	Flowing Clear No Odour Algae	Clear
RBSWDS	23/03/2021	2:01 PM	Tim Gunns	http://www.gocanvas.com/values/10447629738	6.8	186.7	94.9	18.4	175.1	106.5	32.3	Flowing Moderately Turbid No Odour	Light Brown
RBSW01	23/03/2021	3:43 PM	Tim Gunns	http://www.gocanvas.com/values/10447629760	7	79.9	101.1	16.3	177.1	45.7	32.2	Flowing Moderately Turbid	Light Brown
RBAD1	24/03/2021	7:15 AM	Tim Gunns	http://www.gocanvas.com/values/10456982211	6.8	1434.8	100.8	20.1	162.5	834.7	31.1	Flowing Slightly Turbid No Odour	Light Orange
RBSW04	24/03/2021	7:23 AM	Tim Gunns	http://www.gocanvas.com/values/10456983395	6.7	237.8	88.3	15.7	172.7	139	30.8	Flowing Moderately Turbid No Odour	Light Brown
RBSWDS	24/03/2021	7:58 AM	Tim Gunns	http://www.gocanvas.com/values/10456984518	6.6	199.8	90.6	17.3	177	116.8	30.8	Flowing Moderately Turbid No Odour	Light Brown
RBSW2US	24/03/2021	8:41 AM	Tim Gunns	http://www.gocanvas.com/values/10456987825	6.5	53.3	87.4	9.6	175.9	32.2	29.1	Flowing Clear Algae Plant Material	Clear
RBSW01	24/03/2021	9:10 AM	Tim Gunns	http://www.gocanvas.com/values/10456988823	6.6	84.6	92.6	16.7	168.5	49.5	30.8	Flowing Moderately Turbid No Odour	Light Brown
RBSW01	25/03/2021	7:24 AM	Other	http://www.gocanvas.com/values/10466896357	0	0	0	0	0	0	0	Flowing Moderately Turbid No Odour	Light Brown
RBSWDS	25/03/2021	10:31 AM	Tim Gunns	http://www.gocanvas.com/values/10468911097	6.5	144.8	91.6	16.8	107.1	83.9	31.4	Flowing Moderately Turbid No Odour	Light Brown
RBAD1	25/03/2021	11:46 AM	Tim Gunns	http://www.gocanvas.com/values/10468912527	7.4	1429.4	100.9	34.4	122.2	817.4	32.2	Flowing Slightly Turbid	Light Orange

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBSW04	25/03/2021	11:55 AM	Tim Gunns	http://www.gocanvas.com/values/10468913334	6.8	206.6	87.6	17.2	146.3	118.5	32	Flowing Moderately Turbid	Light Brown
RBSW2US	25/03/2021	12:34 PM	Tim Gunns	http://www.gocanvas.com/values/10468914187	7.5	80.9	120.7	5.2	116.3	45.8	32.9	Flowing Clear No Odour Algae Plant Material	Clear
RBSW01	25/03/2021	1:07 PM	Tim Gunns	http://www.gocanvas.com/values/10468915081	6.7	55.4	89.2	16	140	32.1	31.4	Flowing Moderately Turbid No Odour	Light Brown
RBSW01	26/03/2021	7:28 AM	Other	http://www.gocanvas.com/values/10478839119	6.5	62.2	75.1	10.8	14707	0	29.8	Flowing	Light Brown
RBAD1	26/03/2021	7:58 AM	Other	http://www.gocanvas.com/values/10478839284	7.6	1425.1	99.2	35	148.2	0	31.3	Flowing	Light Brown
RBSW04	26/03/2021	8:25 AM	Other	http://www.gocanvas.com/values/10478839431	6.7	341.2	69.9	13.8	163.1	0	30.1	Flowing	Light Brown
RBSWDS	26/03/2021	9:11 AM	Other	http://www.gocanvas.com/values/10478840130	6.9	158.8	90.7	34.7	155.6	0	30.5	Flowing	Light Brown
RBSW2US	26/03/2021	11:30 AM	Shaun Hill	http://www.gocanvas.com/values/10480689533	5.3	81.2	108.3	3.6	214.5	0	31.6	Flowing Clear No Odour	Clear
RBSW01	27/03/2021	7:20 AM	Shaun Hill	http://www.gocanvas.com/values/10488244724	6	65.7	81.9	11	179.2	0	30	Flowing Moderately Turbid No Odour	Moderate Brown
RBAD1	27/03/2021	8:11 AM	Shaun Hill	http://www.gocanvas.com/values/10488998858	7.5	1424.4	99.8	18.3	149	0.8	31.4	Flowing Slightly Turbid No Odour	Light Brown
RBSW04	27/03/2021	8:31 AM	Shaun Hill	http://www.gocanvas.com/values/10488998929	6.7	219.4	89	14	156.9	0.1	29.6	Flowing Moderately Turbid No Odour	Moderate Brown
RBSWDS	27/03/2021	9:20 AM	Shaun Hill	http://www.gocanvas.com/values/10489002851	6.8	183.3	88.4	13.3	164.7	0.1	30.2	Flowing Moderately Turbid No Odour	Moderate Brown

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBSW2US	27/03/2021	10:22 AM	Shaun Hill	http://www.gocanvas.com/values/10489007389	7.1	89.2	119.4	2.9	147.3	0.1	30.4	Flowing Clear No Odour	Clear
RBSW01	28/03/2021	7:33 AM	Shaun Hill	http://www.gocanvas.com/values/10492892257	6.2	97.1	84.6	12.4	144.8	0	30.3	Flowing Moderately Turbid No Odour	Moderate Brown
RBAD1	28/03/2021	8:09 AM	Shaun Hill	http://www.gocanvas.com/values/10492892744	7.3	1496.3	98.5	26.7	167.8	0.9	31.4	Flowing Slightly Turbid No Odour	Light Brown
RBSW04	28/03/2021	8:38 AM	Shaun Hill	http://www.gocanvas.com/values/10492892812	6.7	254.7	92.7	14.6	173.4	0.2	29.9	Flowing Moderately Turbid No Odour	Moderate Brown
RBSWDS	28/03/2021	9:44 AM	Shaun Hill	http://www.gocanvas.com/values/10492895473	6.7	247.4	92.2	12.4	167.3	0.1	30.2	Flowing Moderately Turbid No Odour	Moderate Brown
RBSW2US	28/03/2021	11:14 AM	Shaun Hill	http://www.gocanvas.com/values/10493037084	7.6	100.5	124.1	11.6	136.2	0.1	30.7	Flowing Clear No Odour	Clear
RBSW01	29/03/2021	7:25 AM	Other	http://www.gocanvas.com/values/10495409249	6.6	69.6	83.9	19.7	149	0	28.5	Flowing	Light Brown
RBAD1	29/03/2021	8:06 AM	Other	http://www.gocanvas.com/values/10495409293	7.5	1380.3	95.6	27.3	146.8	0	30.9	Flowing	Light Brown
RBSW04	29/03/2021	8:22 AM	Other	http://www.gocanvas.com/values/10495409315	6.8	364.4	60.7	22	127.6	0	28.5	Flowing	Light Brown
RBSWDS	29/03/2021	9:12 AM	Other	http://www.gocanvas.com/values/10495409409	6.7	164.4	88.9	38.1	141.1	0	29	Flowing	Light Brown
RBSW2US	29/03/2021	10:37 AM	Other	http://www.gocanvas.com/values/10505905267	7.1	76.7	108.2	3.8	156.6	0	29.3	Flowing	Light Brown
RBSW01	30/03/2021	7:31 AM	Shaun Hill	http://www.gocanvas.com/values/10505905604	6	68.4	86	10.4	156.1	0	29.4	Flowing Moderately Turbid No Odour	Moderate Brown
RBAD1	30/03/2021	8:01 AM	Shaun Hill	http://www.gocanvas.com/values/10505905640	7.9	1422.1	97.5	18.7	166.1	0.8	30.7	Flowing Slightly Turbid No Odour	Light Brown

Sample Location ID	Date	Time	Name	Photo	pH (Units)	EC (µs/cm)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp (°C)	Description	Colour
RBSW2US	30/03/2021	12:46 PM	Shaun Hill	http://www.gocanvas.com/values/10506335373	8.7	90.3	139	2.7	97.3	0.1	2.7	Flowing Clear No Odour	Clear
RBSW04	30/03/2021	8:24 AM	Shaun Hill	http://www.gocanvas.com/values/10506336116	6.8	216.7	92.6	12.6	168.2	0.1	28.4	Flowing Moderately Turbid No Odour	Moderate Brown
RBSWDS	30/03/2021	9:07 AM	Other	http://www.gocanvas.com/values/10506336820	6.7	188.5	92	16.9	177.8	0.1	28.7	Flowing Moderately Turbid No Odour	Moderate Brown
RBSW01	31/03/2021	7:42 AM	Shaun Hill	http://www.gocanvas.com/values/10517069804	6.7	77.9	85.7	22.9	164.8	0	22.9	Flowing Moderately Turbid No Odour	Moderate Brown
RBAD1	31/03/2021	9:19 AM	Other	http://www.gocanvas.com/values/10517069903	7.4	1421.2	96.1	12.5	144.3	0.8	30.9	Flowing Clear No Odour	Clear
RBSW04	31/03/2021	9:51 AM	Shaun Hill	http://www.gocanvas.com/values/10517070028	6.9	220.1	95.2	16.2	163.3	0.1	29.5	Flowing Moderately Turbid No Odour	Moderate Brown
RBSWDS	31/03/2021	10:49 AM	Shaun Hill	http://www.gocanvas.com/values/10517462239	6.9	217.4	93	11	163	0.1	30.5	Flowing Moderately Turbid No Odour	Moderate Brown
RBSW2US	31/03/2021	1:06 PM	Shaun Hill	http://www.gocanvas.com/values/10517545927	8.9	78.4	138.9	2.9	87.6	0	32.8	Flowing Clear No Odour	Clear

ATTACHMENT C

PHOTOLOG

WDL246-01 Sample Locations – Wet Season 2020/2021



Image 1: View southeast towards sample location RBSW02US during wet season. Note flooding on access road.



Image 2: View south towards sample location RBSWDS during wet season. Note complete inundation of flood plain.



Image 3: View southeast towards sample location RBSW01 during wet season. Note complete inundation of flood plain.



Image 4: View west towards discharge location RBAD1 sample location RBSW04 during wet season. Note complete inundation of flood plain.

ATTACHMENT D

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 1	RBSW01	2/01/2021	5.28	0	147	289	189.1	0	28.9
	RBAD1	2/01/2021	6.71	1958	144.2	177	27.5	1253	29.1
	RBSW04	2/01/2021	6.7	84	120.3	174	105.4	54	28.3
	RBSWDS	2/01/2021	5.91	66	121.8	142	144.9	42	28.7
	RBSW2US	2/01/2021	-	-	-	-	-	-	-
	RBSW01	3/01/2021	6.49	6	100	1219	181	3	27.5
	RBAD1	3/01/2021	6.71	1958	144.2	177	27.5	1253	29.1
	RBSW04	3/01/2021	7.37	77	112.6	1078	113.1	49	28.8
	RBSWDS	3/01/2021	7.29	38	117.9	1182	122.7	24	28.9
	RBSW2US	3/01/2021	-	-	-	-	-	-	-
	RBSW01	4/01/2021	5.01	5	113.7	1709	211.6	2	19.4
	RBAD1	4/01/2021	7.37	1670	143.1	1160	20.6	1084	29.6
	RBSW04	4/01/2021	4.59	76	131.7	2490	227.3	48	30.7
	RBSWDS	4/01/2021	6.08	40	136.9	240	139.8	26	31
	RBSW2US	4/01/2021	-	-	-	-	-	-	-
	RBSW01	5/01/2021	6.3	0	215.5	3398	113.9	0	30.2
	RBAD1	5/01/2021	5.82	1711	156.6	26	190.9	1121	30.4
	RBSW04	5/01/2021	6.06	151	173.5	2733	120.4	97	31.4
	RBSWDS	5/01/2021	6.18	97	165.4	1894	1163	63	31.3
	RBSW2US	5/01/2021	-	-	-	-	-	-	-
RBSW01	6/01/2021	6.37	0	260.7	3560	107.8	0	31.7	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 1	RBSW01	6/01/2021	6.75	1678	183	2739	79.5	1090	31.3
	RBSW04	6/01/2021	6.43	157	132.6	1058	114.6	100	32.3
	RBSWDS	6/01/2021	6.22	106	145.6	1023	113.8	69	32.8
	RBSW2US	6/01/2021	-	-	-	-	-	-	-
	RBSW01	7/01/2021	6.25	1	153.2	1809	12.6	1	28.4
	RBAD1	7/01/2021	6.75	1733	254.1	1876	71.5	1140	31
	RBSW04	7/01/2021	5.82	138	148.8	1904	113.7	89	30.4
	RBSWDS	7/01/2021	5.59	0	121	1801	156.5	0	30.6
	RBSW2US	7/01/2021	-	-	-	-	-	-	-
	RBSW01	8/01/2021	5.87	0	172.1	1576	125.7	0	30.1
	RBAD1	8/01/2021	6.77	1675	241.7	1722	100.9	1090	31.4
	RBSW04	8/01/2021	6.02	148	155.7	1738	137.3	91	31.1
	RBSWDS	8/01/2021	6.04	96	158.7	1628	113.7	62	31.9
	RBSW2US	8/01/2021	-	-	-	-	-	-	-
	RBSW01	9/01/2021	6.52	93	173.4	763	58	59	29.3
	RBAD1	9/01/2021	7.23	1721	230.1	894	45.8	1114	30.8
	RBSW04	9/01/2021	6.67	218	150.2	695	78.7	141	30.3
	RBSWDS	9/01/2021	6.66	159	147.3	437	82.7	103	30.5
	RBSW2US	9/01/2021	-	-	-	-	-	-	-
RBSW01	10/01/2021	6.74	40	191.7	286	88.8	26	28.6	
RBAD1	10/01/2021	6.39	1055	131.3	302	101.4	685	28.1	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 1	RBSW01	10/01/2021	7.09	27	153.4	366	94.9	17	29.5
	RBSWDS	10/01/2021	6.57	29	151.3	373	105.9	18	30.2
	RBSW2US	10/01/2021	-	-	-	-	-	-	-
Event 2	RBSW01	8/02/2021	5.8	0	42.9	143	143.6	0	28.5
	RBSW04	8/02/2021	6.4	105	54.1	152	195.7	67	27.6
	RBSWDS	8/02/2021	5.9	32	41.1	220	134.6	21	29.7
	RBSW2US	8/02/2021	6.3	9	62.9	82	129.6	5	29.7
	RBAD1	8/02/2021	6.8	1385	67.2	86	101.6	894	29.6
	RBSW01	9/02/2021	6.6	0	59.5	31.3	163.2	0	28.4
	RBAD1	9/02/2021	6.6	1544	53.3	40.3	104.9	997	29.5
	RBSW04	9/02/2021	6.5	67	40.4	38.2	125.7	43	30.7
	RBSWDS	9/02/2021	6.3	40	47.2	39.7	158.4	26	29.5
	RBSW2US	9/02/2021	6.9	31	52.6	14.1	159.5	20	31.4
	RBSW01	10/02/2021	6.9	27	50.7	34.2	129	18	29.3
	RBAD1	10/02/2021	-	-	-	-	-	-	-
	RBSW04	10/02/2021	6.5	49	52	45.3	60.6	31	30.6
	RBSWDS	10/02/2021	6.9	27	52.3	47.6	116.3	17	31.1
	RBSW2US	10/02/2021	7.7	32	153.7	18.8	86	20	34
	RBSW01	11/02/2021	6.7	0	74.9	30.5	100.5	0	30.3
	RBAD1	11/02/2021	7.1	1366	92.6	37.7	76.2	887	31.1
RBSW04	11/02/2021	6.7	27	85.1	37	110.6	16	30.6	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 2	RBSW01	11/02/2021	6.7	15	97.1	37.3	97	9	31.3
	RBSW2US	11/02/2021	7.1	5	126.5	16	107.4	3	31.4
	RBSW01	12/02/2021	6.8	18	73.1	27.5	135.9	11	28.7
	RBAD1	12/02/2021	6.2	1364	87.8	43.2	91.7	886	29.5
	RBSW04	12/02/2021	6.1	44	56.9	22.7	140.9	27	30.3
	RBSWDS	12/02/2021	6.1	24	62.2	23.3	103.6	15	30.6
	RBSW2US	12/02/2021	6.7	10	99.4	13.4	104.6	6	32.2
	RBSW01	13/02/2021	-	-	-	-	-	-	-
	RBAD1	13/02/2021	-	-	-	-	-	-	-
	RBSW04	13/02/2021	-	-	-	-	-	-	-
	RBSWDS	13/02/2021	-	-	-	-	-	-	-
	RBSW2US	13/02/2021	-	-	-	-	-	-	-
	RBSW01	14/02/2021	6.3	18	73.1	27.5	135.9	11	28.7
	RBAD1	14/02/2021	6.4	1364	87.8	43.2	91.7	886	29.5
	RBSW04	14/02/2021	-	-	-	-	-	-	-
	RBSWDS	14/02/2021	-	-	-	-	-	-	-
	RBSW2US	14/02/2021	-	-	-	-	-	-	-
	RBSW01	15/02/2021	7.7	0	-	17.3	127.6	0	33.6
	RBSW04	15/02/2021	-	-	-	-	-	-	-
	RBSWDS	15/02/2021	-	-	-	-	-	-	-
RBSW2US	15/02/2021	-	-	-	-	-	-	-	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 2	RBSW01	15/02/2021	-	-	-	-	-	-	-
	RBSW01	16/02/2021	-	-	-	-	-	-	-
	RBAD1	16/02/2021	-	-	-	-	-	-	-
	RBSW04	16/02/2021	-	-	-	-	-	-	-
	RBSWDS	16/02/2021	-	-	-	-	-	-	-
	RBSW2US	16/02/2021	-	-	-	-	-	-	-
	RBSW01	17/02/2021	9.9	122	-	17.6	105.2	78	30
	RBAD1	17/02/2021	9.4	896	-	38.5	61.8	583	30
	RBSW04	17/02/2021	9.2	154	-	21	105.8	100	30.6
	RBSWDS	17/02/2021	8.5	120	-	18	93.4	78	30.7
	RBSW2US	17/02/2021	-	-	-	-	-	-	-
	RBSW01	18/02/2021	10.5	100	-	16.3	115.5	65	29.6
	RBAD1	18/02/2021	9.5	741	-	23.4	57.3	480	29.6
	RBSW04	18/02/2021	9.1	109	-	15.9	111.5	69	30.1
	RBSW04	18/02/2021	8.4	118	-	24.5	92.9	76	29.9
	RBSWDS	18/02/2021	-	-	-	-	-	-	-
	RBSW2US	18/02/2021	-	-	-	-	-	-	-
	RBSW01	19/02/2021	10.9	85	-	24.2	75.2	55	27.5
	RBAD1	19/02/2021	10.3	735	-	22.4	49.8	476	28.5
RBSW04	19/02/2021	-	115	-	33.4	95.7	74	28.8	
RBSWDS	19/02/2021	9.1	109	-	28.4	95.6	70	28.6	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 3	RBSW01	19/02/2021	-	-	-	-	-	-	-
	RBSW02*	24/02/2021	7.0	125	96.2	9.5	89.6	80	30.4
	RBSW04	24/02/2021	7.0	80	105	9.9	155.4	52	29.1
Event 4	RBAD1	24/02/2021	7.2	332	98.2	45	93.8	212	30.4
	RBSW01	4/03/2021	7.4	1366.9	100.8	7.5	138.4	716.6	32.1
	RBSW04	4/03/2021	6.6	221.8	90.4	12.3	159.9	127.7	31.8
	RBSWDS	4/03/2021	6.8	214.7	89		154.5	121.5	32.8
	RBSW01	4/03/2021	6.8	89.3	186	16.7	186	0	32.9
	RBSW2US	4/03/2021	8.7	68.8	135.9	4.1	116.4	0	34.4
	RBSW04	4/03/2021	5.4	265.4	104.3	25.5	184.5	144.1	35.3
	RBAD1	4/03/2021	7.6	1378.8	104.5	19.7	137	776	33
	RBSW01	4/03/2021	7.1	83	110.4	17.2	151.2	44.5	36.2
	RBSW2US	4/03/2021	8.7	81.6	131.9	3.6	77.4	42.6	37.8
Event 5	RBSWDS	4/03/2021	6.9	253.8	104.4	13.7	153.5	136.3	36
	RBAD1	17/03/2021	7.5	1479.2	98.9	15.2	750.2	840.3	32.6
	RBSW01	17/03/2021	6.5	55	85.3	37.8	181.3	32.9	29.5
	RBSW04	17/03/2021	6.7	141.8	92.6	37.8	162	83.8	30.3
	RBSW2US	17/03/2021	7.2	82.8	106.8	3.9	163.8	46.7	33
	RBSWDS	17/03/2021	6.8	128.6	93.9	37.2	179.2	74.9	31
	RBAD1	18/03/2021	7.5	1427.2	98.9	13	162.1	822.5	31.7
RBSW01	18/03/2021	6.6	46.1	82.1	76.8	159.6	27.3	30.2	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 5	RBSW04	18/03/2021	6.6	150.1	79.6	25.6	174	88.7	30.2
	RBSW2US	18/03/2021	7.2	83.1	104.1	3.5	151.4	49	30.4
	RBSWDS	18/03/2021	6.6	134.8	83.1	28.3	178	79.5	30.4
	RBSW01	19/03/2021	6.7	1409.5	50.6	13.3	163.1	824.3	30.7
	RBAD1	19/03/2021	6.9	1412	99.5	31.8	157.4	818.1	31.4
	RBSW01	19/03/2021	6.9	50.4	101	15.8	184.3	30.3	29.2
	RBSW04	19/03/2021	6.6	52.9	90.9	25.6	159.1	32	28.8
	RBSW2US	19/03/2021	7.1	73.2	96.9	6.6	155.6	44.1	29.2
	RBSWDS	19/03/2021	6.8	55.2	91.5	22.4	182.4	33.2	29.2
	RBAD1	20/03/2021	7.3	1423.4	100.5	16.9	164.5	836.1	30.6
	RBSW01	20/03/2021	6.2	50.1	85.6	10.6	149.1	30.2	28.5
	RBSW04	20/03/2021	6.5	164	92.2	15.8	162.9	99.9	28.5
	RBSW2US	20/03/2021	6.3	65.1	100.9	4.9	164.5	39.9	28.2
	RBSWDS	20/03/2021	6.6	119.5	91.1	17.8	162.1	72.9	28.4
	RBAD1	21/03/2021	6.7	1428.6	101.4	23.8	199.9	844.5	30.2
	RBSW01	21/03/2021	5.7	61.9	92.6	9.6	178.1	38.6	27.1
	RBSW04	21/03/2021	6.4	131.1	83.7	15.5	28.1	79.8	28.1
	RBSW2US	21/03/2021	7.7	82.7	123.6	4.6	135.9	48.1	31.3
	RBSWDS	21/03/2021	6.1	81.4	90.7	15.6	148.6	49.5	28.9
	RBSW01	22/03/2021	6.2	80.5	103	12.4	145.5	44.6	31.6
RBAD1	22/03/2021	7.5	1463.6	99.4	40.7	134.2	843.9	31.7	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 5	RBSW2US	22/03/2021	6.9	94.9	117.2	3.3	145.4	53.3	34.9
	RBSW04	22/03/2021	6.8	207.8	92	14.4	158.5	119.7	31.7
	RBSWDS	22/03/2021	6.7	146.2	95.3	14.8	146.9	83.9	32
	RBSW01	23/03/2021	6.3	211.9	89.5	14.9	192.5	123.6	31
	RBAD1	23/03/2021	7.1	1460.1	99.3	18.5	165.9	844.1	31.5
	RBSW2US	23/03/2021	7.7	94.9	115.7	5.2	121.6	50.2	34.2
	RBSWDS	23/03/2021	6.8	186.7	94.9	18.4	175.1	106.5	32.3
	RBSW01	23/03/2021	7	79.9	101.1	16.3	177.1	45.7	32.2
	RBAD1	24/03/2021	6.8	1434.8	100.8	20.1	162.5	834.7	31.1
	RBSW04	24/03/2021	6.7	237.8	88.3	15.7	172.7	139	30.8
	RBSWDS	24/03/2021	6.6	199.8	90.6	17.3	177	116.8	30.8
	RBSW2US	24/03/2021	6.5	53.3	87.4	9.6	175.9	32.2	29.1
	RBSW01	24/03/2021	6.6	84.6	92.6	16.7	168.5	49.5	30.8
	RBSWDS	25/03/2021	6.5	144.8	91.6	16.8	107.1	83.9	31.4
	RBAD1	25/03/2021	7.4	1429.4	100.9	34.4	122.2	817.4	32.2
	RBSW04	25/03/2021	6.8	206.6	87.6	17.2	146.3	118.5	32
	RBSW2US	25/03/2021	7.5	80.9	120.7	5.2	116.3	45.8	32.9
	RBSW01	25/03/2021	6.7	55.4	89.2	16	140	32.1	31.4
	RBSW01	26/03/2021	6.5	62.2	75.1	10.8	14707	0	29.8
	RBAD1	26/03/2021	7.6	1425.1	99.2	35	148.2	0	31.3
RBSW04	26/03/2021	6.7	341.2	69.9	13.8	163.1	0	30.1	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 5	RBSWDS	26/03/2021	6.9	158.8	90.7	34.7	155.6	0	30.5
	RBSW2US	26/03/2021	5.3	81.2	108.3	3.6	214.5	0	31.6
	RBSW01	27/03/2021	6	65.7	81.9	11	179.2	0	30
	RBSW01	27/03/2021	7.5	1424.4	99.8	18.3	149	0.8	31.4
	RBSW04	27/03/2021	6.7	219.4	89	14	156.9	0.1	29.6
	RBSWDS	27/03/2021	6.8	183.3	88.4	13.3	164.7	0.1	30.2
	RBSW2US	27/03/2021	7.1	89.2	119.4	2.9	147.3	0.1	30.4
	RBSW01	28/03/2021	6.2	97.1	84.6	12.4	144.8	0	30.3
	RBAD1	28/03/2021	7.3	1496.3	98.5	26.7	167.8	0.9	31.4
	RBSW04	28/03/2021	6.7	254.7	92.7	14.6	173.4	0.2	29.9
	RBSWDS	28/03/2021	6.7	247.4	92.2	12.4	167.3	0.1	30.2
	RBSW2US	28/03/2021	7.6	100.5	124.1	11.6	136.2	0.1	30.7
	RBSW01	29/03/2021	6.6	69.6	83.9	19.7	149	0	28.5
	RBAD1	29/03/2021	7.5	1380.3	95.6	27.3	146.8	0	30.9
	RBSW04	29/03/2021	6.8	364.4	60.7	22	127.6	0	28.5
	RBSWDS	29/03/2021	6.7	164.4	88.9	38.1	141.1	0	29
	RBSW2US	29/03/2021	7.1	76.7	108.2	3.8	156.6	0	29.3
	RBSW01	30/03/2021	6	68.4	86	10.4	156.1	0	29.4
	RBAD1	30/03/2021	7.9	1422.1	97.5	18.7	166.1	0.8	30.7
	RBSW2US	30/03/2021	8.7	90.3	139	2.7	97.3	0.1	2.7
RBSW04	30/03/2021	6.8	216.7	92.6	12.6	168.2	0.1	28.4	

WDL Surface Water Monitoring Data
Table D1: Physical Parameters (Field)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC ($\mu\text{S}/\text{cm}$)	DO (%)	Turbidity	ORP	TDS	Temp
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or >9.5	--	< 10	--	--	--	--
Event 5	RBSWDS	30/03/2021	6.7	188.5	92	16.9	177.8	0.1	28.7
	RBSW01	31/03/2021	6.7	77.9	85.7	22.9	164.8	0	22.9
	RBAD1	31/03/2021	7.4	1421.2	96.1	12.5	144.3	0.8	30.9
	RBSW01	31/03/2021	6.9	220.1	95.2	16.2	163.3	0.1	29.5
	RBSWDS	31/03/2021	6.9	217.4	93	11	163	0.1	30.5
	RBSW2US	31/03/2021	8.9	78.4	138.9	2.9	87.6	0	32.8

* RBSW02 used as alternative accessible upstream monitoring location during the 24/2/21 discharge event.

WDL Surface Water Monitoring Data
Table D2: Physical Parameters (Lab)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC (µS/cm)	TDS (mg/l)	TSS (mg/l)	Turbidity (NTU)	Colour
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or > 9.5	--	< 10	--	--	--
Event 1	RBSW01	6/01/2021	6.2	44	29	23	12	47
	RBAD1	6/01/2021	7	4000	1500	1.4	4	< 2
	RBSW04	6/01/2021	6.3	230	140	13	9.9	56
	RBSWDS	6/01/2021	6.3	170	140	29	14	41
Event 2	RBSW01	10/02/2021	6.4	38	20	7.4	78	990
	RBSW04	10/02/2021	6.6	110	68	19	24	52
	RBSWDS	10/02/2021	6.2	92	72	23	28	49
	RBSW2US	10/02/2021	6.9	93	58	5.6	9	26
	RBSW04	17/02/2021	6.7	97	60	4.8	10	38
	RBSWDS	17/02/2021	6.7	81	60	7	12	39
Event 4	RBSW01	15/02/2021	6.5	29	20	3.2	8.5	35
	RBSW01	4/03/2021	7.2	84	54	16	14	26
	RBSW04	4/03/2021	7.1	210	170	15	11	22
	RBSWDS	4/03/2021	7.1	200	110	6.6	12	25
	RBSW2US	4/03/2021	8.3	73	40	2.8	4.8	31
Event 5	RBAD1	4/03/2021	7.5	1200	790	6.6	5.1	8.1
	RBSW01	17/03/2021	6.7	45	530	25	35	45
	RBSW04	17/03/2021	4.1	150	310	24	38	35
	RBSWDS	17/03/2021	6.9	100	1200	23	35	37
	RBSW2US	17/03/2021	-	-	630	-	-	31
	RBAD1	17/03/2021	7.4	1300	2900	< 1	8.2	11

WDL Surface Water Monitoring Data
Table D2: Physical Parameters (Lab)

Discharge Event	Sample Location	Date Sampled	pH (Units)	EC ($\mu\text{S}/\text{cm}$)	TDS (mg/l)	TSS (mg/l)	Turbidity (NTU)	Colour
	Trigger Value (RBAD1)		< 6.0 or > 8.0	250	< 85 or > 120	2-15	--	--
	Trigger Value (RBSW04 / RBSWDS)		< 4.5 or > 9.5	--	< 10	--	--	--
Event 5	RBSW01	25/03/2021	6.3	49	120	9.7	13	29
	RBSW04	25/03/2021	6.3	180	150	8	13	21
	RBSWDS	25/03/2021	6.4	120	130	6.7	12	21
	RBSW2US	25/03/2021	6.5	68	150	< 1	5.2	16
	RBAD1	25/03/2021	6.6	1100	920	9.8	9.7	16
	RBSW01	31/03/2021	6.4	74	160	110	36	23
	RBSW04	31/03/2021	6.5	180	460	14	12	21
	RBSWDS	31/03/2021	6.5	230	40	11	11	21
	RBSW2US	31/03/2021	6.7	73	-	3.6	4.4	24
	RBAD1	31/03/2021	6.8	1300	650	2.6	4.5	6

* Laboratory samples not collected during 24/2/21 (Event 3) discharge event.

WDL Surface Water Monitoring Data
Table D3: General Parameters (Lab)

Discharge Event	Sample Location	Date Sampled	Cyanide (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Total Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Total N (mg/L)	Total P (mg/L)
	Trigger Value (RBSW04 / RBSWDS)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2	0.01
Event 1	RBSW01	6/01/2021	< 0.005	0.6	2	0.7	3.2	< 20	< 10	< 20	< 20	< 5	5.4	0.6	0.01	0.4	0.4	0.02
	RBAD1	6/01/2021	0.006	21	11	140	210	26	< 10	< 20	26	740	280	0.9	0.43	3	3	0.02
	RBSW04	6/01/2021	< 0.005	2	2.6	11	17	< 20	< 10	< 20	< 20	63	22	0.6	0.09	0.53	0.54	0.01
	RBSWDS	6/01/2021	< 0.005	1.8	2.4	8.1	14	< 20	< 10	< 20	< 20	65	63	< 0.5	0.13	0.5	0.51	0.01
Event 2	RBSW01	10/02/2021	-	< 5	< 5	< 5	< 5	-	-	-	-	-	-	0.6	0.04	0.15	< 0.2	0.3
	RBSW04	10/02/2021	< 0.005	1.3	2	4.5	9	< 20	< 10	< 20	< 20	44	29	< 0.5	0.04	0.15	0.07	1.05
	RBSWDS	10/02/2021	< 0.005	1.2	1.9	3.7	8	< 20	< 10	< 20	< 20	32	31	< 0.5	0.04	0.12	0.04	0.82
	RBSW2US	10/02/2021	< 0.005	0.5	1.2	1.8	14	< 20	< 10	< 20	< 20	6.2	24	< 0.5	< 0.01	0.3	0.02	1.11
	RBSW04	17/02/2021	< 0.005	1.2	1.9	3.4	6.7	< 20	< 10	< 20	< 20	47	23	0.8	0.28	0.51	1.61	0.5
	RBSWDS	17/02/2021	< 0.005	1.4	1.9	3	6.5	< 20	< 10	< 20	< 20	53	23	0.6	0.15	0.46	1.26	0.13
Event 4	RBSW01	15/02/2021	< 0.005	0.5	1.7	1.1	3	< 20	< 10	< 20	< 20	< 5	8.2	< 0.5	0.02	0.09	1.2	< 0.01
	RBSW01	4/03/2021	0.022	0.8	1.2	1.7	8.7	< 20	< 10	< 20	< 20	< 5	32	< 0.5	< 0.01	0.47	1.67	0.02
	RBSW04	4/03/2021	0.01	2.3	1.8	9.5	17	< 20	< 10	< 20	< 20	44	39	< 0.5	0.11	0.97	2.57	0.02
	RBSWDS	4/03/2021	< 0.005	2.2	1.7	8.9	17	< 20	< 10	< 20	< 20	39	38	< 0.5	0.09	0.83	1.84	0.01
	RBSW2US	4/03/2021	< 0.005	< 0.5	0.9	1.9	8.9	< 20	< 10	< 20	< 20	< 5	30	< 0.5	0.02	0.05	1.36	0.01
Event 5	RBAD1	4/03/2021	< 0.005	11	6.3	74	89	23	< 10	< 20	23	390	100	< 0.5	1.1	4.7	5.3	0.01
	RBSW01	17/03/2021	0.006	< 0.5	1.3	0.9	5.5	< 20	< 10	< 20	< 20	< 5	19	< 0.5	0.03	< 0.02	< 0.2	0.34
	RBSW04	17/03/2021	0.005	1.9	1.7	7.2	13	< 20	< 10	< 20	< 20	43	16	< 0.5	0.07	0.31	1.01	0.31
	RBSWDS	17/03/2021	< 0.005	1.1	1.4	3.9	11	< 20	< 10	< 20	< 20	34	66	< 0.5	0.05	0.71	1.41	0.39
	RBSW2US	17/03/2021	< 0.005	-	-	-	-	-	-	-	-	-	-	< 0.5	0.03	1.3	2	0.57
	RBAD1	17/03/2021	< 0.005	12	5.7	85	110	24	< 10	< 20	24	400	120	< 0.5	1.1	4.8	7	0.8
RBSW01	25/03/2021	< 0.005	1.3	1.1	1.4	5.5	< 20	< 10	< 20	< 20	7.2	21	< 0.5	0.02	0.04	< 0.2	< 0.5	

WDL Surface Water Monitoring Data
Table D3: General Parameters (Lab)

Discharge Event	Sample Location	Date Sampled	Cyanide (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Hydroxide (mg/L)	Total Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Total N (mg/L)	Total P (mg/L)
	Trigger Value (RBSW04 / RBSWDS)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2	0.01
Event 5	RBSW04	25/03/2021	< 0.005	2	1.6	8.9	15	< 20	< 10	< 20	< 20	46	19	< 0.5	0.17	0.47	0.47	< 0.5
	RBSWDS	25/03/2021	< 0.005	1.4	1.3	5.4	11	< 20	< 10	< 20	< 20	31	15	< 0.5	0.05	0.24	0.24	< 0.5
	RBSW2US	25/03/2021	< 0.005	< 0.5	0.9	1.6	9.9	< 20	< 10	< 20	< 20	6.4	20	< 0.5	< 0.01	0.02	0.7	< 0.5
	RBAD1	25/03/2021	< 0.005	11	6.5	83	97	27	< 10	< 20	27	420	120	< 0.5	0.97	4.3	5.3	< 0.5
	RBSW01	31/03/2021	< 0.005	0.5	1.1	1.2	8.1	< 20	< 10	< 20	< 20	5.5	21	< 0.5	0.02	0.22	0.22	< 0.5
	RBSW04	31/03/2021	< 0.005	2.1	1.6	8.7	16	< 20	< 10	< 20	< 20	46	30	< 0.5	0.07	0.61	0.63	< 0.5
	RBSWDS	31/03/2021	< 0.005	2	1.6	10	18	< 20	< 10	< 20	< 20	50	26	< 0.5	0.1	0.6	0.61	< 0.5
	RBSW2US	31/03/2021	< 0.005	< 0.5	0.9	1.6	9.5	< 20	< 10	< 20	< 20	7.5	11	< 0.5	0.01	< 0.02	< 0.2	< 0.5
	RBAD1	31/03/2021	< 0.005	12	6.5	85	97	25	< 10	< 20	25	410	130	< 0.5	0.77	4.2	5.1	< 0.5

* Laboratory samples not collected during 24/2/21 (Event 3) discharge event.

WDL Surface Water Monitoring Data
Table D4: Heavy Metals Filtered (µg/l)

Discharge Event	Sample Location	Date Sampled	Al	Sb	As	Ba	Be	Bo	Cd	Cr	Co	Cu	Fe	Pb	Mn	Mo	Ni	Se	Au	Sn	U	Zn
	Trigger Value (RBSW04 / RBSWDS)		27	9	0.8	--	--	90	0.06	0.01	1.4	1	300	1	1200	34	8	5	--	3	0.5	2.4
Event 1	RBSW01	6/01/2021	38	<5	<1	<20	<1	<50	0.01	<1	<1	<1	230	<1	12	<5	<1	<1	<0.01	<5	<0.1	<5
	RBAD1	6/01/2021	<1	<5	<1	30	<1	60	0.02	<1	2	<1	140	<1	270	<5	1	<1	<0.01	<5	<0.1	<5
	RBSW04	6/01/2021	61	<5	<1	<20	<1	<50	<0.01	<1	<1	<1	220	<1	28	<5	<1	<1	<0.01	<5	<0.1	<5
	RBSWDS	6/01/2021	59	<5	<1	<20	<1	<50	<0.01	<1	<1	<1	250	<1	24	<5	<1	<1	<0.01	<5	<0.1	<5
Event 2	RBSW01	10/02/2021	860	<5	2	<20	<1	<50	<0.01	<1	<1	3	450	<1	6.2	7	1	3	0.04	<5	0.2	<5
	RBSW04	10/02/2021	900	<5	<1	<20	<1	<50	0.06	2	<1	<1	590	<1	24	<5	<1	1	0.02	<5	<0.1	<5
	RBSWDS	10/02/2021	1000	<5	<1	<20	<1	<50	0.03	1	<1	<1	640	<1	25	<5	<1	1	0.02	<5	<0.1	<5
	RBSW2US	10/02/2021	250	<5	<1	<20	<1	<50	0.01	1	<1	<1	200	<1	11	<5	<1	<1	<0.01	<5	<0.1	<5
	RBSW04	17/02/2021	360	<5	2	<20	<1	<50	0.02	1	3	<1	340	<1	55	<5	1	<1	<0.01	<5	<0.1	<5
	RBSWDS	17/02/2021	410	<5	2	<20	<1	<50	<0.01	1	1	<1	350	<1	34	<5	1	<1	0.01	<5	<0.1	<5
RBSW01	15/02/2021	120	<5	2	<20	<1	<50	<0.01	<1	<1	<1	270	<1	7.5	<5	<1	<1	<0.01	<5	<0.1	<5	
Event 4	RBSW01	4/03/2021	<1	<5	2	<20	<1	<50	<0.01	<1	<1	<1	100	<1	12	<5	<1	2	<0.01	<5	<0.1	20
	RBSW04	4/03/2021	<1	<5	2	<20	<1	<50	<0.01	<1	2	<1	<50	<1	110	<5	<1	<1	<0.01	<5	<0.1	17
	RBSWDS	4/03/2021	<1	<5	4	<20	<1	<50	<0.01	<1	<1	1	70	<1	79	<5	1	<1	<0.01	<5	<0.1	19
	RBSW2US	4/03/2021	<1	<5	2	<20	<1	<50	<0.01	<1	<1	<1	110	<1	6	<5	<1	<1	<0.01	<5	<0.1	<5
	RBAD1	4/03/2021	<1	<5	4	40	<1	<50	<0.01	<1	14	1	<50	<1	950	<5	6	2	<0.01	<5	<0.1	10
Event 5	RBSW01	17/03/2021	9	<5	<1	<20	<1	<50	<0.01	<1	<1	<1	100	<1	9.6	<5	<1	<1	<0.01	<5	<0.1	<5
	RBSW04	17/03/2021	4	<5	<1	<20	<1	80	0.01	<1	<1	<1	<50	<1	65	<5	<1	<1	<0.01	<5	<0.1	<5
	RBSWDS	17/03/2021	<1	<5	<1	<20	<1	70	0.03	<1	<1	<1	<50	<1	37	<5	<1	<1	<0.01	<5	<0.1	<5
	RBSW2US	17/03/2021	3	<5	<1	<20	<1	50	<0.01	<1	<1	<1	60	<1	4.7	<5	<1	<1	<0.01	<5	<0.1	10
	RBAD1	17/03/2021	5	<5	<1	40	<1	170	0.03	<1	9	<1	<50	<1	1100	<5	5	<1	0.02	<5	<0.1	5
	RBSW01	25/03/2021	76	<5	<1	70	<1	<50	0.01	<1	<1	<1	130	<1	4	<5	<1	<1	<0.01	<5	<0.1	27

WDL Surface Water Monitoring Data
Table D4: Heavy Metals Filtered (µg/l)

Discharge Event	Sample Location	Date Sampled	Al	Sb	As	Ba	Be	Bo	Cd	Cr	Co	Cu	Fe	Pb	Mn	Mo	Ni	Se	Au	Sn	U	Zn
	Trigger Value (RBSW04 / RBSWDS)		27	9	0.8	--	--	90	0.06	0.01	1.4	1	300	1	1200	34	8	5	--	3	0.5	2.4
Event 5	RBSW04	25/03/2021	3	<5	<1	70	<1	50	<0.01	<1	<1	<1	<50	<1	82	<5	<1	<1	<0.01	<5	<0.1	16
	RBSWDS	25/03/2021	16	<5	<1	70	<1	<50	<0.01	<1	<1	<1	110	<1	29	<5	<1	<1	<0.01	<5	<0.1	15
	RBSW2US	25/03/2021	15	<5	<1	70	<1	<50	<0.01	<1	<1	<1	100	<1	6.2	<5	<1	<1	<0.01	<5	<0.1	7
	RBAD1	25/03/2021	3	<5	<1	50	<1	170	0.02	<1	6	<1	<50	<1	840	<5	5	1	<0.01	<5	<0.1	12
	RBSW01	31/03/2021	30	<5	<1	<20	<1	<50	<0.01	<1	<1	<1	100	<1	8.9	<5	<1	<1	<0.01	<5	<0.1	<5
	RBSW04	31/03/2021	4	<5	<1	<20	<1	<50	<0.01	<1	<1	<1	60	<1	78	<5	<1	<1	<0.01	<5	<0.1	5
	RBSWDS	31/03/2021	3	<5	<1	<20	<1	<50	<0.01	<1	<1	<1	80	<1	73	<5	<1	<1	<0.01	<5	<0.1	19
	RBSW2US	31/03/2021	17	<5	<1	<20	<1	<50	<0.01	<1	<1	<1	70	<1	4.7	<5	<1	<1	<0.01	<5	<0.1	<5
	RBAD1	31/03/2021	<1	<5	<1	30	<1	150	0.01	<1	5	<1	0<50	<1	790	<5	4	<1	<0.01	<5	<0.1	<5

* Laboratory samples not collected during 24/2/21 (Event 3) discharge event.

ATTACHMENT E

NRR Services Pty Ltd
18,109 Holt Street
Eagle Farm
QLD 4009



NATA Accredited
Accreditation Number 1261
Site Number 20794

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: **Tim Gunns**

Report **767973-W**
 Project name **NATHAN RIVER PROJECT**
 Project ID **NRR ROUTINE DEC 2020**
 Received Date **Jan 18, 2021**

Client Sample ID			RBSW01	RBAD1	RBSW04	RBSWDS
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			B21-Ja15526	B21-Ja15527	B21-Ja15528	B21-Ja15529
Date Sampled			Jan 06, 2021	Jan 06, 2021	Jan 06, 2021	Jan 06, 2021
Test/Reference	LOR	Unit				
Acidity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10	< 10
Ammonia (as N)	0.01	mg/L	0.01	0.43	0.09	0.13
Ammonium Ion (as NH ₄)	0.01	mg/L	0.05	0.56	0.11	0.17
Chloride	1	mg/L	5.4	280	22	63
Colour(Pt/Co) true	2	Pt/Co unit	47	< 2	56	41
Conductivity (at 25°C)	10	uS/cm	44	4000	230	170
Cyanide (total)	0.005	mg/L	< 0.005	0.006	< 0.005	< 0.005
Fluoride (Total)	0.5	mg/L	0.6	0.9	0.6	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.40	3.0	0.54	0.51
Nitrate (as N)	0.02	mg/L	0.40	3.0	0.53	0.50
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
pH (at 25 °C)	0.1	pH Units	6.2	7.0	6.3	6.3
Phosphate total (as P)	0.01	mg/L	0.02	0.02	0.01	0.01
Sulphate (as SO ₄)	5	mg/L	< 5	740	63	65
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	29	1500	140	140
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	< 0.2	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	0.4	3	0.54	0.51
Total Suspended Solids Dried at 103–105°C	1	mg/L	23	1.4	13	29
Turbidity	1	NTU	12	4.0	9.9	14
Hardness mg equivalent CaCO ₃ /L	5	mg/L	< 5	640	49	38
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	26	< 20	< 20
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	< 20	26	< 20	< 20
Heavy Metals						
Aluminium	0.001	mg/L	0.90	0.042	1.4	1.6
Aluminium (filtered)	0.001	mg/L	0.038	< 0.001	0.061	0.059
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Barium	0.02	mg/L	< 0.02	0.03	< 0.02	< 0.02
Barium (filtered)	0.02	mg/L	< 0.02	0.03	< 0.02	< 0.02
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			RBSW01	RBAD1	RBSW04	RBSWDS
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			B21-Ja15526	B21-Ja15527	B21-Ja15528	B21-Ja15529
Date Sampled			Jan 06, 2021	Jan 06, 2021	Jan 06, 2021	Jan 06, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron	0.05	mg/L	< 0.05	0.07	< 0.05	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	0.06	< 0.05	< 0.05
Cadmium	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Cadmium (filtered)	0.00001	mg/L	0.00001	0.00002	< 0.00001	< 0.00001
Chromium	0.001	mg/L	< 0.001	< 0.001	0.001	0.002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	0.002	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	0.002	< 0.001	< 0.001
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iron	0.05	mg/L	0.71	0.20	0.84	0.99
Iron (filtered)	0.05	mg/L	0.23	0.14	0.22	0.25
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese	0.0001	mg/L	0.014	0.28	0.030	0.027
Manganese (filtered)	0.0001	mg/L	0.012	0.27	0.028	0.024
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Molybdenum	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	< 0.001	0.001	< 0.001	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	0.001	< 0.001	< 0.001
Selenium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Selenium (filtered)	0.001	mg/L	< 0.001	0.001	< 0.001	< 0.001
Silver	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver (filtered)	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Zinc	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Alkali Metals						
Calcium	0.5	mg/L	0.6	21	2.0	1.8
Magnesium	0.5	mg/L	0.7	140	11	8.1
Potassium	0.5	mg/L	2.0	11	2.6	2.4
Sodium	0.5	mg/L	3.2	210	17	14

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
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Jan 20, 2021	14 Days
Ammonium Ion (as NH ₄) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Jan 18, 2021	28 Days
Colour(Pt/Co) true - Method: APHA 2120C – Spectrophotometric Single-wavelength Method	Melbourne	Jan 20, 2021	2 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Jan 20, 2021	28 Days
Cyanide (total) - Method: LTM-INO-4020 Total Free WAD Cyanide by CFA	Melbourne	Jan 20, 2021	14 Days
Fluoride (Total) - Method: APHA 4500 F-C Fluoride by Ion Selective Electrode	Melbourne	Jan 20, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Jan 20, 2021	0 Hours
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Jan 20, 2021	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Jan 20, 2021	2 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS - Method: LTM-MET-3050 Mercury in Waters Soils and Sediment by CVAAS	Sydney	Jan 20, 2021	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 21, 2021	180 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 19, 2021	180 Days
Metals M8 filtered - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 19, 2021	28 Days
Eurofins Suite B19D: Total N, TKN, NO _x , NO ₂ , NO ₃ , Total P			
Ammonia (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Jan 20, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Jan 20, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Jan 20, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Jan 20, 2021	2 Days
Phosphate total (as P) - Method: LTM-INO-4040 Phosphate by CFA	Melbourne	Jan 20, 2021	28 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	Jan 20, 2021	7 Days
Eurofins Suite B11E: Cl/SO ₄ /Alkalinity			
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Jan 20, 2021	28 Days
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Jan 20, 2021	28 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Jan 20, 2021	14 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Jan 20, 2021	7 Days
Eurofins Suite B11D: Na/K/Ca/Mg and Hardness			

Description	Testing Site	Extracted	Holding Time
Hardness mg equivalent CaCO ₃ /L - Method: APHA 2340B Hardness by Calculation	Melbourne	Jan 20, 2021	28 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Jan 20, 2021	180 Days

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						
Colour(Pt/Co) true	Pt/Co unit	< 2		2	Pass	
Cyanide (total)	mg/L	< 0.005		0.005	Pass	
Fluoride (Total)	mg/L	< 0.5		0.5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10		10	Pass	
Method Blank						
Heavy Metals						
Aluminium (filtered)	mg/L	< 0.001		0.001	Pass	
Antimony (filtered)	mg/L	< 0.005		0.005	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	
Boron (filtered)	mg/L	< 0.05		0.05	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	< 0.0001		0.0001	Pass	
Mercury (filtered)	mg/L	< 0.0001		0.0001	Pass	
Molybdenum (filtered)	mg/L	< 0.005		0.005	Pass	
Nickel (filtered)	mg/L	< 0.001		0.001	Pass	
Selenium (filtered)	mg/L	< 0.001		0.001	Pass	
Silver (filtered)	mg/L	< 0.00001		0.00001	Pass	
Tin (filtered)	mg/L	< 0.005		0.005	Pass	
Uranium (filtered)	mg/L	< 0.0001		0.0001	Pass	
Zinc (filtered)	mg/L	< 0.005		0.005	Pass	
Method Blank						
Alkali Metals						
Calcium	mg/L	< 0.5		0.5	Pass	
Magnesium	mg/L	< 0.5		0.5	Pass	
Potassium	mg/L	< 0.5		0.5	Pass	
Sodium	mg/L	< 0.5		0.5	Pass	
LCS - % Recovery						
Acidity (as CaCO ₃)	%	109		70-130	Pass	
Colour(Pt/Co) true	%	89		70-130	Pass	
Cyanide (total)	%	101		70-130	Pass	
Fluoride (Total)	%	120		70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	99		70-130	Pass	
LCS - % Recovery						
Heavy Metals						
Aluminium (filtered)	%	104		80-120	Pass	
Antimony (filtered)	%	104		80-120	Pass	
Arsenic (filtered)	%	111		80-120	Pass	
Barium (filtered)	%	107		80-120	Pass	
Beryllium (filtered)	%	103		80-120	Pass	
Boron (filtered)	%	103		80-120	Pass	
Cadmium (filtered)	%	110		80-120	Pass	
Chromium (filtered)	%	100		80-120	Pass	
Cobalt (filtered)	%	100		80-120	Pass	
Copper (filtered)	%	99		80-120	Pass	
Iron (filtered)	%	106		80-120	Pass	

Test		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Lead (filtered)		%	98			80-120	Pass		
Manganese (filtered)		%	99			80-120	Pass		
Mercury (filtered)		%	106			80-120	Pass		
Molybdenum (filtered)		%	111			80-120	Pass		
Nickel (filtered)		%	106			80-120	Pass		
Selenium (filtered)		%	105			80-120	Pass		
Silver (filtered)		%	111			80-120	Pass		
Tin (filtered)		%	101			80-120	Pass		
Uranium (filtered)		%	107			80-120	Pass		
Zinc (filtered)		%	105			80-120	Pass		
LCS - % Recovery									
Alkali Metals									
Calcium		%	107			80-120	Pass		
Magnesium		%	106			80-120	Pass		
Potassium		%	92			80-120	Pass		
Sodium		%	106			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Turbidity	B21-Ja15529	CP	NTU	14	16	13	30%	Pass	

Comments**Sample Integrity**

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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

Authorised By

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
John Nguyen	Senior Analyst-Metal (NSW)
Scott Beddoes	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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NRR Services Pty Ltd
18,109 Holt Street
Eagle Farm
QLD 4009



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: **Tim Gunns**

Report **773566-W**
Project name **NATHAN RIVER PROJECT**
Project ID **DISCHARGE EVENT 2/1**
Received Date **Feb 12, 2021**

Client Sample ID			RBSW04 Water M21-Fe24855 Feb 10, 2021	RBSWDS Water M21-Fe24856 Feb 10, 2021	RBSW2US Water M21-Fe24857 Feb 10, 2021
Sample Matrix					
Eurofins Sample No.					
Date Sampled					
Test/Reference	LOR	Unit			
Acidity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10
Ammonia (as N)	0.01	mg/L	0.04	0.04	< 0.01
Ammonium Ion (as N)	0.01	mg/L	0.04	0.04	0.01
Chloride	1	mg/L	29	31	24
Colour(Pt/Co) true	2	Pt/Co unit	52	49	26
Conductivity (at 25°C)	10	uS/cm	110	92	93
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Fluoride (Total)	0.5	mg/L	< 0.5	< 0.5	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.15	0.12	0.31
Nitrate (as N)	0.02	mg/L	0.15	0.12	0.30
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02
pH (at 25 °C)	0.1	pH Units	6.6	6.2	6.9
Phosphate total (as P)	0.01	mg/L	0.07	0.04	0.02
Sulphate (as SO ₄)	5	mg/L	44	32	6.2
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	68	72	58
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.9	0.7	0.8
Total Nitrogen (as N)*	0.2	mg/L	1.05	0.82	1.11
Total Suspended Solids Dried at 103–105°C	1	mg/L	19	23	5.6
Turbidity	1	NTU	24	28	9.0
Hardness mg equivalent CaCO ₃ /L	1	mg/L	22	18	8.9
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20
Heavy Metals					
Aluminium	0.001	mg/L	1.2	0.98	0.40
Aluminium (filtered)	0.001	mg/L	0.90	1.0	0.25
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	< 0.001	< 0.001	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Barium	0.02	mg/L	< 0.02	< 0.02	< 0.02
Barium (filtered)	0.02	mg/L	< 0.02	< 0.02	< 0.02
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001

Client Sample ID			RBSW04	RBSWDS	RBSW2US
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M21-Fe24855	M21-Fe24856	M21-Fe24857
Date Sampled			Feb 10, 2021	Feb 10, 2021	Feb 10, 2021
Test/Reference	LOR	Unit			
Heavy Metals					
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Boron	0.05	mg/L	< 0.05	< 0.05	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05
Cadmium	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001
Cadmium (filtered)	0.00001	mg/L	0.00006	0.00003	0.00001
Chromium	0.001	mg/L	0.002	0.002	0.002
Chromium (filtered)	0.001	mg/L	0.002	0.001	0.001
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	0.002	0.002	0.002
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Iron	0.05	mg/L	1.2	1.1	0.44
Iron (filtered)	0.05	mg/L	0.59	0.64	0.20
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Manganese	0.0001	mg/L	0.033	0.031	0.018
Manganese (filtered)	0.0001	mg/L	0.024	0.025	0.011
Molybdenum	0.005	mg/L	< 0.005	< 0.005	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Selenium	0.001	mg/L	< 0.001	< 0.001	< 0.001
Selenium (filtered)	0.001	mg/L	0.001	0.001	< 0.001
Silver	0.00001	mg/L	0.00002	0.00003	< 0.00001
Silver (filtered)	0.00001	mg/L	0.00002	0.00002	< 0.00001
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Uranium	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Uranium (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Zinc	0.005	mg/L	0.006	0.007	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Alkali Metals					
Calcium	0.5	mg/L	1.3	1.2	0.5
Magnesium	0.5	mg/L	4.5	3.7	1.8
Potassium	0.5	mg/L	2.0	1.9	1.2
Sodium	0.5	mg/L	9.0	8.0	14

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
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Feb 12, 2021	14 Days
Ammonium Ion (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Feb 12, 2021	28 Days
Colour(Pt/Co) true - Method: APHA 2120C – Spectrophotometric Single-wavelength Method	Melbourne	Feb 12, 2021	2 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Feb 12, 2021	28 Days
Cyanide (total) - Method: LTM-INO-4020 Total Free WAD Cyanide by CFA	Melbourne	Feb 12, 2021	14 Days
Fluoride (Total) - Method: APHA 4500 F-C Fluoride by Ion Selective Electrode	Melbourne	Feb 12, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Feb 12, 2021	0 Hours
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Feb 12, 2021	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Feb 12, 2021	2 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Feb 15, 2021	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Feb 15, 2021	180 Days
Eurofins Suite B19D: Total N, TKN, NO_x, NO₂, NO₃, Total P			
Ammonia (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Feb 12, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 12, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 12, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 12, 2021	2 Days
Phosphate total (as P) - Method: LTM-INO-4040 Phosphate by CFA	Melbourne	Feb 12, 2021	28 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	Feb 12, 2021	7 Days
Eurofins Suite B11E: Cl/SO₄/Alkalinity			
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Feb 12, 2021	28 Days
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Feb 12, 2021	28 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Feb 12, 2021	14 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Feb 12, 2021	7 Days
Eurofins Suite B11D: Na/K/Ca/Mg and Hardness			
Hardness mg equivalent CaCO ₃ /L - Method: E020.1 Hardness in water	Sydney	Feb 15, 2021	28 Days
Alkali Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Feb 15, 2021	180 Days

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							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Ammonium Ion (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25°C)	uS/cm	< 10			10	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Fluoride (Total)	mg/L	< 0.5			0.5	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	
Sulphate (as SO ₄)	mg/L	< 5			5	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							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO ₃)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.001			0.001	Pass	
Aluminium (filtered)	mg/L	< 0.001			0.001	Pass	
Antimony	mg/L	< 0.005			0.005	Pass	
Antimony (filtered)	mg/L	< 0.005			0.005	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium	mg/L	< 0.02			0.02	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.0001			0.0001	Pass	
Molybdenum	mg/L	< 0.005			0.005	Pass	
Molybdenum (filtered)	mg/L	< 0.005			0.005	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver	mg/L	< 0.00001			0.00001	Pass	
Tin	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium	mg/L	< 0.0001			0.0001	Pass	
Uranium (filtered)	mg/L	< 0.0001			0.0001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Acidity (as CaCO ₃)	%	109			70-130	Pass	
Ammonia (as N)	%	102			70-130	Pass	
Chloride	%	113			70-130	Pass	
Conductivity (at 25°C)	%	88			70-130	Pass	
Cyanide (total)	%	94			70-130	Pass	
Fluoride (Total)	%	119			70-130	Pass	
Nitrate & Nitrite (as N)	%	97			70-130	Pass	
Nitrate (as N)	%	97			70-130	Pass	
Nitrite (as N)	%	111			70-130	Pass	
Phosphate total (as P)	%	104			70-130	Pass	
Sulphate (as SO ₄)	%	109			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	91			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	111			70-130	Pass	
Total Suspended Solids Dried at 103–105°C	%	104			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO ₃)	%	124			70-130	Pass	
Total Alkalinity (as CaCO ₃)	%	125			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	98			80-120	Pass	
Aluminium (filtered)	%	112			80-120	Pass	
Antimony	%	104			80-120	Pass	
Antimony (filtered)	%	111			80-120	Pass	
Arsenic	%	102			80-120	Pass	
Arsenic (filtered)	%	110			80-120	Pass	
Barium	%	102			80-120	Pass	
Barium (filtered)	%	112			80-120	Pass	
Beryllium	%	87			80-120	Pass	
Beryllium (filtered)	%	89			80-120	Pass	
Boron	%	87			80-120	Pass	
Boron (filtered)	%	107			80-120	Pass	
Cadmium	%	103			80-120	Pass	
Cadmium (filtered)	%	111			80-120	Pass	
Chromium	%	102			80-120	Pass	
Chromium (filtered)	%	113			80-120	Pass	
Cobalt	%	101			80-120	Pass	
Cobalt (filtered)	%	113			80-120	Pass	
Copper	%	98			80-120	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Copper (filtered)	%	113			80-120	Pass		
Iron	%	102			80-120	Pass		
Iron (filtered)	%	117			80-120	Pass		
Lead	%	98			80-120	Pass		
Lead (filtered)	%	113			80-120	Pass		
Manganese	%	102			80-120	Pass		
Manganese (filtered)	%	112			80-120	Pass		
Molybdenum	%	111			80-120	Pass		
Molybdenum (filtered)	%	114			80-120	Pass		
Nickel	%	100			80-120	Pass		
Nickel (filtered)	%	113			80-120	Pass		
Selenium	%	97			80-120	Pass		
Selenium (filtered)	%	114			80-120	Pass		
Silver	%	103			80-120	Pass		
Silver (filtered)	%	111			80-120	Pass		
Tin	%	103			80-120	Pass		
Tin (filtered)	%	107			80-120	Pass		
Uranium	%	99			80-120	Pass		
Uranium (filtered)	%	107			80-120	Pass		
Zinc	%	98			80-120	Pass		
Zinc (filtered)	%	115			80-120	Pass		
LCS - % Recovery								
Alkali Metals								
Calcium	%	99			80-120	Pass		
Magnesium	%	97			80-120	Pass		
Potassium	%	98			80-120	Pass		
Sodium	%	97			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Ammonia (as N)	M21-Fe20695	NCP	%	99		70-130	Pass	
Ammonium Ion (as N)	M21-Fe16679	NCP	%	116		70-130	Pass	
Nitrate & Nitrite (as N)	M21-Fe20695	NCP	%	100		70-130	Pass	
Nitrate (as N)	M21-Fe20695	NCP	%	100		70-130	Pass	
Nitrite (as N)	M21-Fe20695	NCP	%	110		70-130	Pass	
Phosphate total (as P)	S21-Fe13956	NCP	%	104		70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M21-Fe15078	NCP	%	97		70-130	Pass	
Total Suspended Solids Dried at 103-105°C	M21-Fe06575	NCP	%	98		70-130	Pass	
Spike - % Recovery								
Alkalinity (speciated)				Result 1				
Bicarbonate Alkalinity (as CaCO3)	B21-Fe22227	NCP	%	70		70-130	Pass	
Total Alkalinity (as CaCO3)	B21-Fe22227	NCP	%	70		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Aluminium	S21-Fe16237	NCP	%	84		75-125	Pass	
Aluminium (filtered)	P21-Fe16497	NCP	%	102		75-125	Pass	
Antimony	S21-Fe16237	NCP	%	83		75-125	Pass	
Antimony (filtered)	P21-Fe16497	NCP	%	110		75-125	Pass	
Arsenic	S21-Fe16237	NCP	%	107		75-125	Pass	
Arsenic (filtered)	P21-Fe16497	NCP	%	114		75-125	Pass	
Barium	S21-Fe16237	NCP	%	104		75-125	Pass	
Barium (filtered)	P21-Fe16497	NCP	%	110		75-125	Pass	
Beryllium	S21-Fe16237	NCP	%	93		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Boron	S21-Fe16237	NCP	%	102			75-125	Pass	
Cadmium	S21-Fe16237	NCP	%	106			75-125	Pass	
Cadmium (filtered)	P21-Fe16497	NCP	%	99			75-125	Pass	
Chromium	S21-Fe16237	NCP	%	101			75-125	Pass	
Chromium (filtered)	P21-Fe16497	NCP	%	95			75-125	Pass	
Cobalt	S21-Fe16237	NCP	%	105			75-125	Pass	
Cobalt (filtered)	P21-Fe16497	NCP	%	91			75-125	Pass	
Copper	S21-Fe16237	NCP	%	98			75-125	Pass	
Copper (filtered)	P21-Fe16497	NCP	%	85			75-125	Pass	
Iron	S21-Fe16148	NCP	%	103			75-125	Pass	
Iron (filtered)	P21-Fe16497	NCP	%	97			75-125	Pass	
Lead	S21-Fe16237	NCP	%	104			75-125	Pass	
Lead (filtered)	P21-Fe16497	NCP	%	91			75-125	Pass	
Manganese	S21-Fe16148	NCP	%	104			75-125	Pass	
Manganese (filtered)	P21-Fe16497	NCP	%	97			75-125	Pass	
Molybdenum	S21-Fe16237	NCP	%	115			75-125	Pass	
Molybdenum (filtered)	P21-Fe16497	NCP	%	108			75-125	Pass	
Nickel	S21-Fe16237	NCP	%	99			75-125	Pass	
Nickel (filtered)	P21-Fe16497	NCP	%	88			75-125	Pass	
Selenium	S21-Fe16237	NCP	%	115			75-125	Pass	
Selenium (filtered)	P21-Fe16497	NCP	%	113			75-125	Pass	
Silver	S21-Fe16237	NCP	%	104			75-125	Pass	
Silver (filtered)	P21-Fe16497	NCP	%	100			75-125	Pass	
Tin (filtered)	P21-Fe16497	NCP	%	106			75-125	Pass	
Uranium	S21-Fe16237	NCP	%	106			75-125	Pass	
Uranium (filtered)	P21-Fe16497	NCP	%	89			75-125	Pass	
Zinc	S21-Fe16237	NCP	%	90			75-125	Pass	
Zinc (filtered)	P21-Fe16497	NCP	%	84			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	S21-Fe16148	NCP	%	108			75-125	Pass	
Magnesium	S21-Fe16148	NCP	%	99			75-125	Pass	
Potassium	S21-Fe16148	NCP	%	100			75-125	Pass	
Sodium	S21-Fe16148	NCP	%	100			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M21-Fe20695	NCP	mg/L	0.05	0.04	20	30%	Pass	
Ammonium Ion (as N)	M21-Fe20695	NCP	mg/L	0.05	0.04	20	30%	Pass	
Chloride	P21-Fe17186	NCP	mg/L	480	610	24	30%	Pass	
Conductivity (at 25°C)	M21-Fe21476	NCP	uS/cm	1100	1000	5.0	30%	Pass	
Cyanide (total)	B21-Fe19555	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Fluoride (Total)	B21-Fe15950	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate & Nitrite (as N)	M21-Fe20695	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrate (as N)	M21-Fe20695	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Nitrite (as N)	M21-Fe20695	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M21-Fe21476	NCP	pH Units	7.5	7.5	pass	30%	Pass	
Phosphate total (as P)	S21-Fe13966	NCP	mg/L	0.28	0.28	1.0	30%	Pass	
Sulphate (as SO4)	P21-Fe17186	NCP	mg/L	8.3	35	23	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	M21-Fe17643	NCP	mg/L	6300	4800	28	30%	Pass	
Total Kjeldahl Nitrogen (as N)	S21-Fe11453	NCP	mg/L	6.0	5.6	6.8	30%	Pass	
Total Suspended Solids Dried at 103–105°C	M21-Fe06575	NCP	mg/L	76	81	7.0	30%	Pass	
Hardness mg equivalent CaCO3/L	S21-Fe16145	NCP	mg/L	180	190	4.0	30%	Pass	

Duplicate								
Alkalinity (speciated)				Result 1	Result 2	RPD		
Bicarbonate Alkalinity (as CaCO ₃)	M21-Fe11608	NCP	mg/L	220	200	6.0	30%	Pass
Carbonate Alkalinity (as CaCO ₃)	M21-Fe11608	NCP	mg/L	< 10	< 10	<1	30%	Pass
Hydroxide Alkalinity (as CaCO ₃)	M21-Fe11608	NCP	mg/L	< 20	< 20	<1	30%	Pass
Total Alkalinity (as CaCO ₃)	M21-Fe11608	NCP	mg/L	220	200	6.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Aluminium	S21-Fe16401	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Aluminium (filtered)	S21-Fe16136	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Antimony	S21-Fe16401	NCP	mg/L	0.009	0.009	1.0	30%	Pass
Antimony (filtered)	S21-Fe16136	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic	S21-Fe16401	NCP	mg/L	0.009	0.009	2.0	30%	Pass
Arsenic (filtered)	S21-Fe16136	NCP	mg/L	0.003	0.004	5.0	30%	Pass
Barium	S21-Fe16401	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Barium (filtered)	S21-Fe16136	NCP	mg/L	0.17	0.16	3.0	30%	Pass
Beryllium	S21-Fe16401	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Beryllium (filtered)	S21-Fe16136	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Boron	S21-Fe16401	NCP	mg/L	0.44	0.45	3.0	30%	Pass
Boron (filtered)	S21-Fe16136	NCP	mg/L	0.12	0.11	12	30%	Pass
Cadmium	S21-Fe16401	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Cadmium (filtered)	S21-Fe16136	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium	S21-Fe16401	NCP	mg/L	0.002	0.002	10	30%	Pass
Chromium (filtered)	S21-Fe16136	NCP	mg/L	0.003	0.003	<1	30%	Pass
Cobalt	S21-Fe16401	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	S21-Fe16136	NCP	mg/L	0.036	0.036	2.0	30%	Pass
Copper	S21-Fe16401	NCP	mg/L	0.003	0.003	20	30%	Pass
Copper (filtered)	S21-Fe16136	NCP	mg/L	0.003	0.003	<1	30%	Pass
Iron	S21-Fe16401	NCP	mg/L	0.07	0.06	7.0	30%	Pass
Iron (filtered)	S21-Fe16136	NCP	mg/L	0.33	0.32	4.0	30%	Pass
Lead	S21-Fe16401	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Lead (filtered)	S21-Fe16136	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese	S21-Fe16401	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Manganese (filtered)	S21-Fe16136	NCP	mg/L	2.2	2.1	4.0	30%	Pass
Molybdenum	S21-Fe16401	NCP	mg/L	0.11	0.11	1.0	30%	Pass
Molybdenum (filtered)	S21-Fe16136	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Nickel	S21-Fe16401	NCP	mg/L	0.021	0.021	1.0	30%	Pass
Nickel (filtered)	S21-Fe16136	NCP	mg/L	0.023	0.022	4.0	30%	Pass
Selenium	S21-Fe16401	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Selenium (filtered)	S21-Fe16136	NCP	mg/L	0.002	0.002	2.0	30%	Pass
Silver	S21-Fe16401	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Silver (filtered)	S21-Fe16136	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin	S21-Fe16401	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin (filtered)	S21-Fe16136	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium	S21-Fe16401	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium (filtered)	S21-Fe16136	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc	S21-Fe16401	NCP	mg/L	0.11	0.11	1.0	30%	Pass
Zinc (filtered)	S21-Fe16136	NCP	mg/L	0.054	0.052	4.0	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	S21-Fe16145	NCP	mg/L	52	54	5.0	30%	Pass
Magnesium	S21-Fe16145	NCP	mg/L	13	14	4.0	30%	Pass
Potassium	S21-Fe16145	NCP	mg/L	2.9	3.0	3.0	30%	Pass
Sodium	S21-Fe16145	NCP	mg/L	120	120	3.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Turbidity	M21-Fe24857	CP	NTU	9.0	8.7	3.0	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

Authorised by:

Michael Morrison	Analytical Services Manager
John Nguyen	Senior Analyst-Metal (NSW)
Scott Beddoes	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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NRR Services Pty Ltd
18,109 Holt Street
Eagle Farm
QLD 4009



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Accreditation Number 1261
Site Number 1254

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 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: **Shaun Hill**

Report **774157-W**
 Project name **NORTHERN RIVER PROJECT**
 Project ID **DISCHARGE EVENT 2/1RBSW01**
 Received Date **Feb 16, 2021**

Client Sample ID			Water
Sample Matrix			M21-Fe29974
Eurofins Sample No.			Feb 10, 2021
Date Sampled			
Test/Reference	LOR	Unit	
Acidity (as CaCO ₃)	10	mg/L	< 10
Ammonia (as N)	0.01	mg/L	0.04
Ammonium Ion (as N)	0.01	mg/L	0.04
Colour(Pt/Co) true	2	Pt/Co unit	990
Conductivity (at 25°C)	10	uS/cm	38
Fluoride (Total)	0.5	mg/L	0.6
Nitrate & Nitrite (as N)	0.05	mg/L	0.15
Nitrate (as N)	0.02	mg/L	0.15
Nitrite (as N)	0.02	mg/L	< 0.02
pH (at 25 °C)	0.1	pH Units	6.4
Phosphate total (as P)	0.01	mg/L	0.30
Phosphorus reactive (as P)	0.01	mg/L	0.31
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	20
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	< 0.2
Total Suspended Solids Dried at 103–105°C	1	mg/L	7.4
Turbidity	1	NTU	78
Hardness mg equivalent CaCO ₃ /L	5	mg/L	< 5
Heavy Metals			
Aluminium	0.001	mg/L	1.1
Aluminium (filtered)	0.001	mg/L	0.86
Antimony	0.005	mg/L	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005
Arsenic	0.001	mg/L	0.001
Arsenic (filtered)	0.001	mg/L	0.002
Barium	0.02	mg/L	< 0.02
Barium (filtered)	0.02	mg/L	< 0.02
Beryllium	0.001	mg/L	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron	0.05	mg/L	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium	0.00001	mg/L	< 0.00001
Cadmium (filtered)	0.00001	mg/L	< 0.00001
Chromium	0.001	mg/L	0.001
Chromium (filtered)	0.001	mg/L	< 0.001

Client Sample ID			Water
Sample Matrix			M21-Fe29974
Eurofins Sample No.			Feb 10, 2021
Date Sampled			
Test/Reference	LOR	Unit	
Heavy Metals			
Cobalt	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001
Copper	0.001	mg/L	0.002
Copper (filtered)	0.001	mg/L	0.003
Iron	0.05	mg/L	0.84
Iron (filtered)	0.05	mg/L	0.45
Lead	0.001	mg/L	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001
Manganese	0.0001	mg/L	0.0094
Manganese (filtered)	0.0001	mg/L	0.0062
Molybdenum	0.005	mg/L	0.007
Molybdenum (filtered)	0.005	mg/L	0.007
Nickel	0.001	mg/L	< 0.001
Nickel (filtered)	0.001	mg/L	0.001
Selenium	0.001	mg/L	0.002
Selenium (filtered)	0.001	mg/L	0.003
Silver	0.00001	mg/L	0.00005
Silver (filtered)	0.00001	mg/L	0.00004
Tin	0.005	mg/L	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005
Uranium	0.0001	mg/L	0.0001
Uranium (filtered)	0.0001	mg/L	0.0002
Zinc	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005
Alkali Metals			
Calcium	0.5	mg/L	< 5
Magnesium	0.5	mg/L	< 5
Potassium	0.5	mg/L	< 5
Sodium	0.5	mg/L	< 5

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
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Feb 16, 2021	14 Days
Ammonium Ion (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Feb 16, 2021	28 Days
Colour(Pt/Co) true - Method: APHA 2120C – Spectrophotometric Single-wavelength Method	Melbourne	Feb 16, 2021	2 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Feb 16, 2021	28 Days
Fluoride (Total) - Method: APHA 4500 F-C Fluoride by Ion Selective Electrode	Melbourne	Feb 16, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Feb 16, 2021	0 Hours
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Feb 16, 2021	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Feb 16, 2021	2 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Feb 17, 2021	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Feb 17, 2021	180 Days
Eurofins Suite B19E: Total N, TKN, NO_x, NO₂, NO₃, NH₃, Total P, Reactive P			
Ammonia (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Feb 16, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 16, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 16, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 16, 2021	2 Days
Phosphate total (as P) - Method: LTM-INO-4040 Phosphate by CFA	Melbourne	Feb 16, 2021	28 Days
Phosphorus reactive (as P) - Method: APHA 4500-P	Melbourne	Feb 16, 2021	2 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	Feb 16, 2021	7 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Feb 16, 2021	7 Days
Eurofins Suite B11D: Na/K/Ca/Mg and Hardness			
Hardness mg equivalent CaCO ₃ /L - Method: APHA 2340B Hardness by Calculation	Melbourne	Feb 16, 2021	28 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Feb 16, 2021	180 Days

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							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Ammonium Ion (as N)	mg/L	< 0.01			0.01	Pass	
Colour(Pt/Co) true	Pt/Co unit	< 2			2	Pass	
Conductivity (at 25°C)	uS/cm	< 10			10	Pass	
Fluoride (Total)	mg/L	< 0.5			0.5	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							
Aluminium	mg/L	< 0.001			0.001	Pass	
Aluminium (filtered)	mg/L	< 0.001			0.001	Pass	
Antimony	mg/L	< 0.005			0.005	Pass	
Antimony (filtered)	mg/L	< 0.005			0.005	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium	mg/L	< 0.02			0.02	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium	mg/L	< 0.00001			0.00001	Pass	
Cadmium (filtered)	mg/L	0.00001			0.00001	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.0001			0.0001	Pass	
Manganese (filtered)	mg/L	< 0.0001			0.0001	Pass	
Molybdenum	mg/L	< 0.005			0.005	Pass	
Molybdenum (filtered)	mg/L	< 0.005			0.005	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver	mg/L	< 0.00001			0.00001	Pass	
Silver (filtered)	mg/L	< 0.00001			0.00001	Pass	
Tin	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Uranium	mg/L	< 0.0001			0.0001	Pass	
Uranium (filtered)	mg/L	< 0.0001			0.0001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Acidity (as CaCO ₃)	%	114			70-130	Pass	
Ammonia (as N)	%	105			70-130	Pass	
Conductivity (at 25°C)	%	99			70-130	Pass	
Fluoride (Total)	%	106			70-130	Pass	
Nitrate & Nitrite (as N)	%	84			70-130	Pass	
Nitrate (as N)	%	84			70-130	Pass	
Nitrite (as N)	%	111			70-130	Pass	
Phosphate total (as P)	%	103			70-130	Pass	
Phosphorus reactive (as P)	%	115			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	110			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	123			70-130	Pass	
Total Suspended Solids Dried at 103–105°C	%	108			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	93			80-120	Pass	
Aluminium (filtered)	%	90			80-120	Pass	
Antimony	%	93			80-120	Pass	
Antimony (filtered)	%	89			80-120	Pass	
Arsenic	%	92			80-120	Pass	
Arsenic (filtered)	%	89			80-120	Pass	
Barium	%	94			80-120	Pass	
Barium (filtered)	%	93			80-120	Pass	
Beryllium	%	82			80-120	Pass	
Beryllium (filtered)	%	91			80-120	Pass	
Boron	%	92			80-120	Pass	
Boron (filtered)	%	89			80-120	Pass	
Cadmium	%	92			80-120	Pass	
Cadmium (filtered)	%	93			80-120	Pass	
Chromium	%	93			80-120	Pass	
Chromium (filtered)	%	91			80-120	Pass	
Cobalt	%	109			80-120	Pass	
Cobalt (filtered)	%	89			80-120	Pass	
Copper	%	93			80-120	Pass	
Copper (filtered)	%	90			80-120	Pass	
Iron	%	96			80-120	Pass	
Iron (filtered)	%	91			80-120	Pass	
Lead	%	99			80-120	Pass	
Lead (filtered)	%	91			80-120	Pass	
Manganese	%	94			80-120	Pass	
Manganese (filtered)	%	91			80-120	Pass	
Molybdenum	%	101			80-120	Pass	
Molybdenum (filtered)	%	92			80-120	Pass	
Nickel	%	93			80-120	Pass	

Test		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel (filtered)		%	91			80-120	Pass	
Selenium		%	95			80-120	Pass	
Selenium (filtered)		%	87			80-120	Pass	
Silver		%	94			80-120	Pass	
Silver (filtered)		%	89			80-120	Pass	
Tin		%	93			80-120	Pass	
Tin (filtered)		%	87			80-120	Pass	
Uranium		%	105			80-120	Pass	
Uranium (filtered)		%	87			80-120	Pass	
Zinc		%	94			80-120	Pass	
Zinc (filtered)		%	117			80-120	Pass	
LCS - % Recovery								
Alkali Metals								
Calcium		%	97			80-120	Pass	
Magnesium		%	93			80-120	Pass	
Potassium		%	90			80-120	Pass	
Sodium		%	88			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Ammonia (as N)	M21-Fe10677	NCP	%	101		70-130	Pass	
Nitrate & Nitrite (as N)	M21-Fe10677	NCP	%	94		70-130	Pass	
Nitrate (as N)	M21-Fe10677	NCP	%	94		70-130	Pass	
Nitrite (as N)	M21-Fe10677	NCP	%	109		70-130	Pass	
Phosphate total (as P)	M21-Fe23286	NCP	%	106		70-130	Pass	
Total Suspended Solids Dried at 103-105°C	M21-Fe19949	NCP	%	99		70-130	Pass	
Spike - % Recovery								
				Result 1				
Heavy Metals								
Aluminium	S21-Fe30895	NCP	%	102		75-125	Pass	
Aluminium (filtered)	S21-Fe20669	NCP	%	75		75-125	Pass	
Antimony	S21-Fe30895	NCP	%	105		75-125	Pass	
Antimony (filtered)	S21-Fe20669	NCP	%	85		75-125	Pass	
Arsenic	S21-Fe30895	NCP	%	106		75-125	Pass	
Arsenic (filtered)	S21-Fe20669	NCP	%	87		75-125	Pass	
Barium	S21-Fe30895	NCP	%	102		75-125	Pass	
Barium (filtered)	S21-Fe20669	NCP	%	85		75-125	Pass	
Beryllium	S21-Fe30895	NCP	%	77		75-125	Pass	
Beryllium (filtered)	S21-Fe20669	NCP	%	88		75-125	Pass	
Boron	S21-Fe30895	NCP	%	108		75-125	Pass	
Boron (filtered)	S21-Fe20669	NCP	%	75		75-125	Pass	
Cadmium	S21-Fe30895	NCP	%	96		75-125	Pass	
Cadmium (filtered)	S21-Fe20669	NCP	%	87		75-125	Pass	
Chromium	S21-Fe30895	NCP	%	96		75-125	Pass	
Chromium (filtered)	S21-Fe20669	NCP	%	83		75-125	Pass	
Cobalt	B21-Fe27863	NCP	%	98		75-125	Pass	
Cobalt (filtered)	S21-Fe20669	NCP	%	81		75-125	Pass	
Copper	S21-Fe30895	NCP	%	88		75-125	Pass	
Copper (filtered)	S21-Fe20669	NCP	%	81		75-125	Pass	
Iron	S21-Fe30895	NCP	%	109		75-125	Pass	
Iron (filtered)	S21-Fe20669	NCP	%	77		75-125	Pass	
Lead	S21-Fe30895	NCP	%	97		75-125	Pass	
Lead (filtered)	S21-Fe20669	NCP	%	85		75-125	Pass	
Manganese	S21-Fe30895	NCP	%	109		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Manganese (filtered)	S21-Fe20669	NCP	%	80			75-125	Pass	
Molybdenum	S21-Fe30895	NCP	%	117			75-125	Pass	
Molybdenum (filtered)	S21-Fe20669	NCP	%	88			75-125	Pass	
Nickel	S21-Fe30895	NCP	%	91			75-125	Pass	
Nickel (filtered)	S21-Fe20669	NCP	%	82			75-125	Pass	
Selenium	S21-Fe30895	NCP	%	104			75-125	Pass	
Selenium (filtered)	S21-Fe20669	NCP	%	81			75-125	Pass	
Silver	S21-Fe30895	NCP	%	97			75-125	Pass	
Silver (filtered)	S21-Fe20669	NCP	%	87			75-125	Pass	
Tin (filtered)	S21-Fe20669	NCP	%	86			75-125	Pass	
Uranium	B21-Fe27863	NCP	%	100			75-125	Pass	
Uranium (filtered)	S21-Fe20669	NCP	%	82			75-125	Pass	
Zinc	S21-Fe30895	NCP	%	94			75-125	Pass	
Zinc (filtered)	S21-Fe20669	NCP	%	83			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	B21-Fe27721	NCP	%	104			75-125	Pass	
Magnesium	B21-Fe27721	NCP	%	97			75-125	Pass	
Potassium	B21-Fe27721	NCP	%	92			75-125	Pass	
Sodium	B21-Fe27721	NCP	%	98			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Colour(Pt/Co) true	M21-Fe29974	CP	Pt/Co unit	990	980	<1	30%	Pass	
Conductivity (at 25°C)	B21-Fe27861	NCP	uS/cm	990	980	1.0	30%	Pass	
Fluoride (Total)	M21-Fe29974	CP	mg/L	0.6	0.6	9.6	30%	Pass	
Nitrate & Nitrite (as N)	S21-Fe27732	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrate (as N)	S21-Fe27732	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Nitrite (as N)	S21-Fe27732	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	B21-Fe27861	NCP	pH Units	7.3	7.3	pass	30%	Pass	
Phosphate total (as P)	S21-Fe21370	NCP	mg/L	1.7	1.6	3.0	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	B21-Fe27871	NCP	mg/L	980	1000	6.5	30%	Pass	
Total Suspended Solids Dried at 103–105°C	M21-Fe19949	NCP	mg/L	30	25	19	30%	Pass	
Turbidity	B21-Fe25175	NCP	NTU	5.2	5.2	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S21-Fe30895	NCP	mg/L	1.1	1.3	15	30%	Pass	
Aluminium (filtered)	S21-Fe30856	NCP	mg/L	0.15	0.15	1.0	30%	Pass	
Antimony	S21-Fe30895	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Antimony (filtered)	S21-Fe30856	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic	S21-Fe30895	NCP	mg/L	0.004	0.004	3.0	30%	Pass	
Arsenic (filtered)	S21-Fe30856	NCP	mg/L	0.003	0.003	2.0	30%	Pass	
Barium	S21-Fe30895	NCP	mg/L	0.17	0.18	4.0	30%	Pass	
Barium (filtered)	S21-Fe30856	NCP	mg/L	0.04	0.04	1.0	30%	Pass	
Beryllium	S21-Fe30895	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Beryllium (filtered)	S21-Fe30856	NCP	mg/L	**	**	7.0	30%	Pass	
Boron	S21-Fe30895	NCP	mg/L	0.88	0.87	1.0	30%	Pass	
Boron (filtered)	S21-Fe30856	NCP	mg/L	4.5	4.5	<1	30%	Pass	
Cadmium	S21-Fe30895	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Cadmium (filtered)	S21-Fe30856	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S21-Fe30895	NCP	mg/L	0.007	0.007	5.0	30%	Pass	
Chromium (filtered)	S21-Fe30856	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Cobalt	B21-Fe27863	NCP	mg/L	0.002	0.002	1.0	30%	Pass
Cobalt (filtered)	S21-Fe30856	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper	S21-Fe30895	NCP	mg/L	0.012	0.014	11	30%	Pass
Copper (filtered)	S21-Fe30856	NCP	mg/L	0.003	0.003	2.0	30%	Pass
Iron	S21-Fe30895	NCP	mg/L	6.3	7.1	11	30%	Pass
Iron (filtered)	S21-Fe30856	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Lead	S21-Fe30895	NCP	mg/L	0.004	0.011	100	30%	Fail Q15
Lead (filtered)	S21-Fe30856	NCP	mg/L	0.001	0.002	52	30%	Fail Q15
Manganese	S21-Fe30895	NCP	mg/L	0.64	0.67	4.0	30%	Pass
Manganese (filtered)	S21-Fe30856	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Molybdenum	S21-Fe30895	NCP	mg/L	0.024	0.023	3.0	30%	Pass
Molybdenum (filtered)	S21-Fe30856	NCP	mg/L	0.010	0.010	2.0	30%	Pass
Nickel	S21-Fe30895	NCP	mg/L	0.004	0.004	2.0	30%	Pass
Nickel (filtered)	S21-Fe30856	NCP	mg/L	0.013	0.014	3.0	30%	Pass
Selenium	S21-Fe30895	NCP	mg/L	0.002	0.002	1.0	30%	Pass
Selenium (filtered)	S21-Fe30856	NCP	mg/L	0.002	0.003	19	30%	Pass
Silver	S21-Fe30895	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Silver (filtered)	S21-Fe30856	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin	S21-Fe30895	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin (filtered)	S21-Fe30856	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium	B21-Fe27863	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium (filtered)	S21-Fe30856	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc	S21-Fe30895	NCP	mg/L	0.24	0.27	10	30%	Pass
Zinc (filtered)	S21-Fe30856	NCP	mg/L	0.025	0.030	15	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	B21-Fe27721	NCP	mg/L	200	220	10	30%	Pass
Magnesium	B21-Fe27721	NCP	mg/L	190	200	6.0	30%	Pass
Potassium	B21-Fe27721	NCP	mg/L	6.9	7.1	2.0	30%	Pass
Sodium	B21-Fe27721	NCP	mg/L	1800	2000	8.0	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
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
John Nguyen	Senior Analyst-Metal (NSW)
Scott Beddoes	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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NRR Services Pty Ltd
18,109 Holt Street
Eagle Farm
QLD 4009



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The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: **Tim Gunns**

Report **774976-W-V3**
Project name **DISCHARGE EVENT 2/2**
Received Date **Feb 19, 2021**

Client Sample ID			RBSW04	RBSWDS	RBSW01
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M21-Fe37213	M21-Fe37214	M21-Fe37781
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 15, 2021
Test/Reference	LOR	Unit			
Acidity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10
Ammonia (as N)	0.01	mg/L	0.28	0.15	0.02
Ammonium Ion (as N)	0.01	mg/L	0.30	0.16	-
Chloride	1	mg/L	23	23	8.2
Colour(Pt/Co) true	2	Pt/Co unit	38	39	35
Conductivity (at 25°C)	10	uS/cm	97	81	29
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Fluoride (Total)	0.5	mg/L	0.8	0.6	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.51	0.46	0.10
Nitrate (as N)	0.02	mg/L	0.51	0.46	0.09
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02
pH (at 25 °C)	0.1	pH Units	6.7	6.7	6.5
Phosphate total (as P)	0.01	mg/L	0.50	0.13	< 0.01
Sulphate (as SO ₄)	5	mg/L	47	53	< 5
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	60	60	20
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.1	0.8	1.1
Total Nitrogen (as N)*	0.2	mg/L	1.61	1.26	1.2
Total Suspended Solids Dried at 103–105°C	1	mg/L	4.8	7.0	3.2
Turbidity	1	NTU	10	12	8.5
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	< 10	-
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	-
Total Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	-
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	-	-	< 20
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	-	-	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	-	-	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	-	-	< 20
Heavy Metals					
Aluminium	0.001	mg/L	0.36	0.50	0.18
Aluminium (filtered)	0.001	mg/L	0.36	0.41	0.12
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	0.002	0.002	0.002
Arsenic (filtered)	0.001	mg/L	0.002	0.002	0.002
Barium	0.02	mg/L	< 0.02	< 0.02	< 0.02

Client Sample ID			RBSW04	RBSWDS	RBSW01
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M21-Fe37213	M21-Fe37214	M21-Fe37781
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 15, 2021
Test/Reference	LOR	Unit			
Heavy Metals					
Barium (filtered)	0.02	mg/L	< 0.02	< 0.02	< 0.02
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Boron	0.05	mg/L	< 0.05	< 0.05	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05
Cadmium	0.00001	mg/L	0.00001	< 0.00001	< 0.00001
Cadmium (filtered)	0.00001	mg/L	0.00002	< 0.00001	< 0.00001
Chromium	0.001	mg/L	< 0.001	0.001	< 0.001
Chromium (filtered)	0.001	mg/L	0.001	0.001	< 0.001
Cobalt	0.001	mg/L	0.003	0.002	< 0.001
Cobalt (filtered)	0.001	mg/L	0.003	0.001	< 0.001
Copper	0.001	mg/L	0.002	0.002	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Iron	0.05	mg/L	0.60	0.68	0.28
Iron (filtered)	0.05	mg/L	0.34	0.35	0.27
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Manganese	0.0001	mg/L	0.070	0.046	0.0089
Manganese (filtered)	0.0001	mg/L	0.055	0.034	0.0075
Molybdenum	0.005	mg/L	< 0.005	< 0.005	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	0.001	< 0.001	< 0.001
Nickel (filtered)	0.001	mg/L	0.001	0.001	< 0.001
Selenium	0.001	mg/L	0.001	< 0.001	< 0.001
Selenium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Silver	0.00001	mg/L	0.00003	0.00003	0.00001
Silver (filtered)	0.00001	mg/L	< 0.00001	0.00001	< 0.00001
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Uranium	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Uranium (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Zinc	0.005	mg/L	0.012	0.011	0.015
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Alkali Metals					
Calcium	0.5	mg/L	1.2	1.4	0.5
Magnesium	0.5	mg/L	3.4	3.0	1.1
Potassium	0.5	mg/L	1.9	1.9	1.7
Sodium	0.5	mg/L	6.7	6.5	3.0
Hardness Set					
Hardness mg equivalent CaCO3/L	5	mg/L	17	16	5.7

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
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Feb 20, 2021	14 Days
Ammonium Ion (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Feb 19, 2021	28 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Feb 20, 2021	28 Days
Colour(Pt/Co) true - Method: APHA 2120C – Spectrophotometric Single-wavelength Method	Melbourne	Feb 20, 2021	2 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Feb 20, 2021	28 Days
Cyanide (total) - Method: LTM-INO-4020 Total Free WAD Cyanide by CFA	Melbourne	Feb 20, 2021	14 Days
Fluoride (Total) - Method: APHA 4500 F-C Fluoride by Ion Selective Electrode	Melbourne	Feb 20, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Feb 20, 2021	0 Hours
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Feb 20, 2021	28 Days
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Feb 24, 2021	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Feb 22, 2021	2 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Feb 20, 2021	14 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Feb 24, 2021	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Feb 23, 2021	180 Days
Hardness Set			
Calcium - Method:	Melbourne	Feb 20, 2021	180 Days
Magnesium - Method:	Melbourne	Feb 20, 2021	180 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Feb 20, 2021	180 Days
Hardness mg equivalent CaCO ₃ /L - Method:	Melbourne	Feb 20, 2021	28 Days
Eurofins Suite B19D: Total N, TKN, NO _x , NO ₂ , NO ₃ , Total P			
Ammonia (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Feb 20, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 20, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 20, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Feb 20, 2021	2 Days
Phosphate total (as P) - Method: LTM-INO-4040 Phosphate by CFA	Melbourne	Feb 20, 2021	28 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	Feb 20, 2021	7 Days

Description

Total Dissolved Solids Dried at 180°C ± 2°C

- Method: LTM-INO-4170 Total Dissolved Solids in Water

Testing Site

Melbourne

Extracted

Feb 20, 2021

Holding Time

7 Days

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							
Acidity (as CaCO ₃)	mg/L	< 10			10	Pass	
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Ammonium Ion (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Colour(Pt/Co) true	Pt/Co unit	< 2			2	Pass	
Conductivity (at 25°C)	uS/cm	< 10			10	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Fluoride (Total)	mg/L	< 0.5			0.5	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	
Sulphate (as SO ₄)	mg/L	< 5			5	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							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO ₃)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.001			0.001	Pass	
Antimony	mg/L	< 0.005			0.005	Pass	
Antimony (filtered)	mg/L	< 0.005			0.005	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium	mg/L	< 0.02			0.02	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.00001			0.00001	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.0001			0.0001	Pass	
Molybdenum	mg/L	< 0.005			0.005	Pass	
Molybdenum (filtered)	mg/L	< 0.005			0.005	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Nickel (filtered)	mg/L	< 0.001		0.001	Pass	
Selenium	mg/L	< 0.001		0.001	Pass	
Selenium (filtered)	mg/L	< 0.001		0.001	Pass	
Silver	mg/L	< 0.00001		0.00001	Pass	
Silver (filtered)	mg/L	< 0.00001		0.00001	Pass	
Tin	mg/L	< 0.005		0.005	Pass	
Tin (filtered)	mg/L	< 0.005		0.005	Pass	
Uranium	mg/L	< 0.0001		0.0001	Pass	
Uranium (filtered)	mg/L	< 0.0001		0.0001	Pass	
Zinc	mg/L	< 0.005		0.005	Pass	
Zinc (filtered)	mg/L	< 0.005		0.005	Pass	
Method Blank						
Alkali Metals						
Calcium	mg/L	< 0.5		0.5	Pass	
Magnesium	mg/L	< 0.5		0.5	Pass	
Potassium	mg/L	< 0.5		0.5	Pass	
Sodium	mg/L	< 0.5		0.5	Pass	
LCS - % Recovery						
Acidity (as CaCO ₃)	%	93		70-130	Pass	
Ammonia (as N)	%	91		70-130	Pass	
Chloride	%	108		70-130	Pass	
Colour(Pt/Co) true	%	96		70-130	Pass	
Conductivity (at 25°C)	%	86		70-130	Pass	
Cyanide (total)	%	86		70-130	Pass	
Fluoride (Total)	%	116		70-130	Pass	
Nitrate & Nitrite (as N)	%	99		70-130	Pass	
Nitrate (as N)	%	99		70-130	Pass	
Nitrite (as N)	%	108		70-130	Pass	
Phosphate total (as P)	%	108		70-130	Pass	
Sulphate (as SO ₄)	%	109		70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	106		70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	112		70-130	Pass	
Total Suspended Solids Dried at 103–105°C	%	95		70-130	Pass	
LCS - % Recovery						
Alkalinity (speciated)						
Carbonate Alkalinity (as CaCO ₃)	%	100		70-130	Pass	
Total Alkalinity (as CaCO ₃)	%	100		70-130	Pass	
LCS - % Recovery						
Heavy Metals						
Aluminium	%	94		80-120	Pass	
Aluminium (filtered)	%	101		80-120	Pass	
Antimony	%	106		80-120	Pass	
Antimony (filtered)	%	99		80-120	Pass	
Arsenic	%	92		80-120	Pass	
Arsenic (filtered)	%	98		80-120	Pass	
Barium	%	92		80-120	Pass	
Barium (filtered)	%	99		80-120	Pass	
Beryllium	%	91		80-120	Pass	
Beryllium (filtered)	%	97		80-120	Pass	
Boron	%	104		80-120	Pass	
Boron (filtered)	%	102		80-120	Pass	
Cadmium	%	97		80-120	Pass	
Cadmium (filtered)	%	100		80-120	Pass	
Chromium	%	98		80-120	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Chromium (filtered)	%	102			80-120	Pass		
Cobalt	%	98			80-120	Pass		
Cobalt (filtered)	%	102			80-120	Pass		
Copper	%	97			80-120	Pass		
Copper (filtered)	%	104			80-120	Pass		
Iron	%	103			80-120	Pass		
Iron (filtered)	%	102			80-120	Pass		
Lead	%	101			80-120	Pass		
Lead (filtered)	%	100			80-120	Pass		
Manganese	%	95			80-120	Pass		
Manganese (filtered)	%	100			80-120	Pass		
Molybdenum	%	108			80-120	Pass		
Molybdenum (filtered)	%	114			80-120	Pass		
Nickel	%	97			80-120	Pass		
Nickel (filtered)	%	103			80-120	Pass		
Selenium	%	105			80-120	Pass		
Selenium (filtered)	%	99			80-120	Pass		
Silver	%	96			80-120	Pass		
Silver (filtered)	%	102			80-120	Pass		
Tin	%	95			80-120	Pass		
Tin (filtered)	%	99			80-120	Pass		
Uranium	%	107			80-120	Pass		
Uranium (filtered)	%	96			80-120	Pass		
Zinc	%	96			80-120	Pass		
Zinc (filtered)	%	101			80-120	Pass		
LCS - % Recovery								
Alkali Metals								
Calcium	%	90			80-120	Pass		
Magnesium	%	93			80-120	Pass		
Potassium	%	89			80-120	Pass		
Sodium	%	83			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Ammonia (as N)	B21-Fe30959	NCP	%	97		70-130	Pass	
Cyanide (total)	M21-Fe37785	NCP	%	113		70-130	Pass	
Nitrate & Nitrite (as N)	B21-Fe30959	NCP	%	101		70-130	Pass	
Nitrate (as N)	B21-Fe30959	NCP	%	101		70-130	Pass	
Nitrite (as N)	B21-Fe30959	NCP	%	108		70-130	Pass	
Sulphate (as SO4)	S21-Fe33374	NCP	%	14		70-130	Fail	Q08
Total Kjeldahl Nitrogen (as N)	M21-Fe11553	NCP	%	103		70-130	Pass	
Total Suspended Solids Dried at 103-105°C	M21-Fe23244	NCP	%	104		70-130	Pass	
Spike - % Recovery								
Alkalinity (speciated)								
				Result 1				
Carbonate Alkalinity (as CaCO3)	B21-Fe31697	NCP	%	76		70-130	Pass	
Total Alkalinity (as CaCO3)	B21-Fe31697	NCP	%	78		70-130	Pass	
Spike - % Recovery								
Heavy Metals								
				Result 1				
Aluminium	S21-Fe29706	NCP	%	91		75-125	Pass	
Aluminium (filtered)	M21-Fe37213	CP	%	83		75-125	Pass	
Antimony (filtered)	M21-Fe37213	CP	%	97		75-125	Pass	
Arsenic	S21-Fe29706	NCP	%	89		75-125	Pass	
Arsenic (filtered)	M21-Fe37213	CP	%	97		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Barium	S21-Fe29706	NCP	%	89			75-125	Pass	
Barium (filtered)	M21-Fe37213	CP	%	96			75-125	Pass	
Beryllium	S21-Fe29706	NCP	%	88			75-125	Pass	
Beryllium (filtered)	M21-Fe37213	CP	%	81			75-125	Pass	
Boron	S21-Fe29706	NCP	%	102			75-125	Pass	
Boron (filtered)	M21-Fe37213	CP	%	96			75-125	Pass	
Cadmium	S21-Fe29706	NCP	%	92			75-125	Pass	
Cadmium (filtered)	M21-Fe37213	CP	%	99			75-125	Pass	
Chromium	S21-Fe29706	NCP	%	95			75-125	Pass	
Chromium (filtered)	S21-Fe31762	NCP	%	85			75-125	Pass	
Cobalt	S21-Fe29706	NCP	%	96			75-125	Pass	
Cobalt (filtered)	M21-Fe37213	CP	%	94			75-125	Pass	
Copper	S21-Fe29706	NCP	%	95			75-125	Pass	
Copper (filtered)	M21-Fe37213	CP	%	93			75-125	Pass	
Iron	S21-Fe29706	NCP	%	100			75-125	Pass	
Iron (filtered)	S21-Fe39022	NCP	%	97			75-125	Pass	
Lead	S21-Fe29706	NCP	%	96			75-125	Pass	
Lead (filtered)	M21-Fe37213	CP	%	100			75-125	Pass	
Manganese	S21-Fe29706	NCP	%	92			75-125	Pass	
Manganese (filtered)	M21-Fe37213	CP	%	76			75-125	Pass	
Molybdenum	S21-Fe29706	NCP	%	105			75-125	Pass	
Molybdenum (filtered)	S21-Fe31762	NCP	%	93			75-125	Pass	
Nickel	S21-Fe29706	NCP	%	95			75-125	Pass	
Nickel (filtered)	S21-Fe39022	NCP	%	92			75-125	Pass	
Selenium	S21-Fe29706	NCP	%	97			75-125	Pass	
Selenium (filtered)	M21-Fe37213	CP	%	101			75-125	Pass	
Silver	S21-Fe29706	NCP	%	93			75-125	Pass	
Silver (filtered)	M21-Fe37213	CP	%	104			75-125	Pass	
Tin (filtered)	M21-Fe37213	CP	%	96			75-125	Pass	
Uranium	S21-Fe29706	NCP	%	104			75-125	Pass	
Uranium (filtered)	M21-Fe37213	CP	%	98			75-125	Pass	
Zinc	S21-Fe29706	NCP	%	92			75-125	Pass	
Zinc (filtered)	S21-Fe39022	NCP	%	93			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	B21-Fe34177	NCP	%	104			75-125	Pass	
Magnesium	B21-Fe34177	NCP	%	104			75-125	Pass	
Potassium	B21-Fe34177	NCP	%	95			75-125	Pass	
Sodium	B21-Fe34177	NCP	%	109			75-125	Pass	
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	M21-Fe39424	NCP	%	107			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M21-Fe37781	CP	%	92			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	M21-Fe37794	NCP	%	109			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Acidity (as CaCO3)	B21-Fe30961	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Ammonia (as N)	B21-Fe30959	NCP	mg/L	0.30	0.29	6.0	30%	Pass	
Ammonium Ion (as N)	B21-Fe30959	NCP	mg/L	0.32	0.30	6.0	30%	Pass	
Conductivity (at 25°C)	M21-Fe32503	NCP	uS/cm	6800	5900	16	30%	Pass	
Cyanide (total)	M21-Fe35251	NCP	mg/L	0.014	0.014	2.0	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Fluoride (Total)	M21-Fe35423	NCP	mg/L	1.9	2.1	8.0	30%	Pass	
Nitrate & Nitrite (as N)	B21-Fe30959	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrate (as N)	B21-Fe30959	NCP	mg/L	0.02	< 0.02	10	30%	Pass	
Nitrite (as N)	B21-Fe30959	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	M21-Fe35871	NCP	pH Units	7.5	7.5	pass	30%	Pass	
Phosphate total (as P)	M21-Fe32503	NCP	mg/L	10	12	12	30%	Pass	
Sulphate (as SO4)	M21-Fe35565	NCP	mg/L	350	360	2.0	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	B21-Fe23128	NCP	mg/L	60000	56000	6.6	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M21-Fe23544	NCP	mg/L	160	170	6.1	30%	Pass	
Total Suspended Solids Dried at 103–105°C	M21-Fe23244	NCP	mg/L	1600	1300	23	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	B21-Fe31696	NCP	mg/L	1200	1200	1.0	30%	Pass	
Carbonate Alkalinity (as CaCO3)	B21-Fe31696	NCP	mg/L	130	130	2.0	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	B21-Fe31696	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	B21-Fe31696	NCP	mg/L	1300	1300	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S21-Fe31893	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic	S21-Fe31893	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium	S21-Fe31893	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Beryllium	S21-Fe31893	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron	S21-Fe31893	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium	S21-Fe31893	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S21-Fe31893	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	S21-Fe31893	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	S21-Fe31414	NCP	mg/L	0.002	0.002	28	30%	Pass	
Iron	S21-Fe31893	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead	S21-Fe31893	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese	S21-Fe31893	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Molybdenum	S21-Fe31893	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel	S21-Fe31893	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Selenium	S21-Fe31893	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver	S21-Fe31893	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin	S21-Fe31893	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Uranium	S21-Fe31893	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc	S21-Fe31893	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	B21-Fe34177	NCP	mg/L	81	77	6.0	30%	Pass	
Magnesium	B21-Fe34177	NCP	mg/L	170	160	7.0	30%	Pass	
Potassium	B21-Fe34177	NCP	mg/L	54	51	5.0	30%	Pass	
Sodium	B21-Fe34177	NCP	mg/L	1400	1300	6.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Colour(Pt/Co) true	M21-Fe37214	CP	Pt/Co unit	39	39	<1	30%	Pass	
Turbidity	M21-Fe37214	CP	NTU	12	12	4.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M21-Fe37780	NCP	mg/L	17	20	15	30%	Pass	

Duplicate										
Heavy Metals					Result 1	Result 2	RPD			
Antimony	M21-Fe37778	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass		

Comments

V2: This report has been amended with samples migrated as per updated COC

This report has been revised (V3) following repeat analysis. Filtered metals results for client samples have now been replaced by the repeat results.

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
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
John Nguyen	Senior Analyst-Metal (NSW)
Scott Beddoes	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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NRR Services Pty Ltd
18,109 Holt Street
Eagle Farm
QLD 4009



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: **Tim Gunns**

Report **778953-W-V2**
Project name **NATHAN RIVER PROJECT**
Project ID **DISCHARGE EVENT 3**
Received Date **Mar 09, 2021**

Client Sample ID			RBSW01	RBSW04	RBSWDS	RBSW2US
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma16238	M21-Ma16239	M21-Ma16240	M21-Ma16241
Date Sampled			Mar 05, 2021	Mar 05, 2021	Mar 05, 2021	Mar 05, 2021
Test/Reference	LOR	Unit				
Acidity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10	< 10
Ammonia (as N)	0.01	mg/L	< 0.01	0.11	0.09	0.02
Ammonium Ion (as NH ₄)	0.01	mg/L	< 0.01	0.15	0.12	0.02
Chloride	1	mg/L	32	39	38	30
Colour(Pt/Co) true	2	Pt/Co unit	26	22	25	31
Conductivity (at 25°C)	10	uS/cm	84	210	200	73
Cyanide (total)	0.005	mg/L	0.022	0.010	< 0.005	< 0.005
Fluoride (Total)	0.5	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.47	0.97	0.84	0.06
Nitrate (as N)	0.02	mg/L	0.47	0.97	0.83	0.05
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
pH (at 25 °C)	0.1	pH Units	7.2	7.1	7.1	8.3
Phosphate total (as P)	0.01	mg/L	0.02	0.02	0.01	0.01
Sulphate (as SO ₄)	5	mg/L	< 5	44	39	< 5
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	54	170	110	40
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.2	1.6	1.0	1.3
Total Nitrogen (as N)*	0.2	mg/L	1.67	2.57	1.84	1.36
Total Suspended Solids Dried at 103–105°C	1	mg/L	16	15	6.6	2.8
Turbidity	1	NTU	14	11	12	4.8
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Heavy Metals						
Aluminium	0.05	mg/L	0.36	0.26	0.27	0.12
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	0.001	0.001	0.002	0.002
Arsenic (filtered)	0.001	mg/L	^{R05} 0.002	^{R05} 0.002	^{R05} 0.004	0.002
Barium	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Barium (filtered)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			RBSW01	RBSW04	RBSWDS	RBSW2US
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma16238	M21-Ma16239	M21-Ma16240	M21-Ma16241
Date Sampled			Mar 05, 2021	Mar 05, 2021	Mar 05, 2021	Mar 05, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Boron	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	0.001	0.001	0.001	0.001
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	0.001	0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	0.002	< 0.001	< 0.001
Copper	0.001	mg/L	0.002	0.001	0.001	0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	0.001	< 0.001
Iron	0.05	mg/L	1.1	0.92	1.2	0.38
Iron (filtered)	0.05	mg/L	0.10	< 0.05	0.07	0.11
Lead	0.001	mg/L	0.002	0.001	0.002	0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese	0.005	mg/L	0.021	0.096	0.098	0.017
Manganese (filtered)	0.005	mg/L	0.012	^{R05} 0.11	0.079	0.006
Molybdenum	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	< 0.001	0.001	< 0.001
Selenium	0.001	mg/L	< 0.001	0.001	< 0.001	< 0.001
Selenium (filtered)	0.001	mg/L	0.002	< 0.001	< 0.001	< 0.001
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.005	mg/L	0.020	0.017	0.014	0.008
Zinc (filtered)	0.005	mg/L	^{R05} 0.020	^{R05} 0.017	^{R05} 0.019	< 0.005
Alkali Metals						
Calcium	0.5	mg/L	0.8	2.3	2.2	< 0.5
Magnesium	0.5	mg/L	1.7	9.5	8.9	1.9
Potassium	0.5	mg/L	1.2	1.8	1.7	0.9
Sodium	0.5	mg/L	8.7	17	17	8.9
Hardness Set						
Hardness mg equivalent CaCO ₃ /L	5	mg/L	9.0	45	42	8.7

Client Sample ID			RBAD1
Sample Matrix			Water
Eurofins Sample No.			M21-Ma16242
Date Sampled			Mar 05, 2021
Test/Reference	LOR	Unit	
Acidity (as CaCO ₃)	10	mg/L	< 10
Ammonia (as N)	0.01	mg/L	1.1
Ammonium Ion (as NH ₄)	0.01	mg/L	1.4
Chloride	1	mg/L	100
Colour(Pt/Co) true	2	Pt/Co unit	8.1
Conductivity (at 25°C)	10	uS/cm	1200
Cyanide (total)	0.005	mg/L	< 0.005
Fluoride (Total)	0.5	mg/L	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	4.7
Nitrate (as N)	0.02	mg/L	4.7
Nitrite (as N)	0.02	mg/L	0.04
pH (at 25 °C)	0.1	pH Units	7.5
Phosphate total (as P)	0.01	mg/L	0.01
Sulphate (as SO ₄)	5	mg/L	390
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	790
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.6
Total Nitrogen (as N)*	0.2	mg/L	5.3
Total Suspended Solids Dried at 103–105°C	1	mg/L	6.6
Turbidity	1	NTU	5.1
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	23
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	23
Heavy Metals			
Aluminium	0.05	mg/L	0.07
Aluminium (filtered)	0.05	mg/L	< 0.05
Antimony	0.005	mg/L	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005
Arsenic	0.001	mg/L	0.002
Arsenic (filtered)	0.001	mg/L	^{R05} 0.004
Barium	0.02	mg/L	0.04
Barium (filtered)	0.02	mg/L	0.04
Beryllium	0.001	mg/L	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron	0.05	mg/L	0.14
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium	0.0002	mg/L	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt	0.001	mg/L	0.017
Cobalt (filtered)	0.001	mg/L	0.014
Copper	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	0.001
Iron	0.05	mg/L	0.39
Iron (filtered)	0.05	mg/L	< 0.05
Lead	0.001	mg/L	0.002
Lead (filtered)	0.001	mg/L	< 0.001

Client Sample ID			RBAD1
Sample Matrix			Water
Eurofins Sample No.			M21-Ma16242
Date Sampled			Mar 05, 2021
Test/Reference	LOR	Unit	
Heavy Metals			
Manganese	0.005	mg/L	1.1
Manganese (filtered)	0.005	mg/L	0.95
Molybdenum	0.005	mg/L	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel	0.001	mg/L	0.006
Nickel (filtered)	0.001	mg/L	0.006
Selenium	0.001	mg/L	0.002
Selenium (filtered)	0.001	mg/L	0.002
Silver	0.005	mg/L	< 0.005
Silver (filtered)	0.005	mg/L	< 0.005
Tin	0.005	mg/L	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005
Uranium	0.005	mg/L	< 0.005
Uranium (filtered)	0.005	mg/L	< 0.005
Zinc	0.005	mg/L	0.010
Zinc (filtered)	0.005	mg/L	^{R05} 0.01
Alkali Metals			
Calcium	0.5	mg/L	11
Magnesium	0.5	mg/L	74
Potassium	0.5	mg/L	6.3
Sodium	0.5	mg/L	89
Hardness Set			
Hardness mg equivalent CaCO ₃ /L	5	mg/L	330

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
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Mar 09, 2021	14 Days
Ammonium Ion (as NH ₄) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Mar 09, 2021	28 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Mar 09, 2021	28 Days
Colour(Pt/Co) true - Method: APHA 2120C – Spectrophotometric Single-wavelength Method	Melbourne	Mar 10, 2021	2 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Mar 09, 2021	28 Days
Cyanide (total) - Method: LTM-INO-4020 Total Free WAD Cyanide by CFA	Melbourne	Mar 09, 2021	14 Days
Fluoride (Total) - Method: APHA 4500 F-C Fluoride by Ion Selective Electrode	Melbourne	Mar 09, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Mar 09, 2021	0 Hours
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Mar 09, 2021	28 Days
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Mar 09, 2021	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Mar 10, 2021	2 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Mar 09, 2021	14 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Mar 11, 2021	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Mar 16, 2021	180 Days
Hardness Set			
Calcium - Method:	Melbourne	Mar 09, 2021	180 Days
Magnesium - Method:	Melbourne	Mar 09, 2021	180 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Mar 09, 2021	180 Days
Hardness mg equivalent CaCO ₃ /L - Method:	Melbourne	Mar 09, 2021	28 Days
Eurofins Suite B19D: Total N, TKN, NO _x , NO ₂ , NO ₃ , Total P			
Ammonia (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Mar 09, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Mar 09, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Mar 09, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Mar 09, 2021	2 Days
Phosphate total (as P) - Method: LTM-INO-4040 Phosphate by CFA	Melbourne	Mar 09, 2021	28 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	Mar 09, 2021	7 Days

Description

Total Dissolved Solids Dried at 180°C ± 2°C

- Method: LTM-INO-4170 Total Dissolved Solids in Water

Testing Site

Melbourne

Extracted

Mar 09, 2021

Holding Time

7 Days

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							
Acidity (as CaCO ₃)	mg/L	< 10			10	Pass	
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Colour(Pt/Co) true	Pt/Co unit	< 2			2	Pass	
Conductivity (at 25°C)	uS/cm	< 10			10	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Fluoride (Total)	mg/L	< 0.5			0.5	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	
Sulphate (as SO ₄)	mg/L	< 5			5	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							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO ₃)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Antimony	mg/L	< 0.005			0.005	Pass	
Antimony (filtered)	mg/L	< 0.005			0.005	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium	mg/L	< 0.02			0.02	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Molybdenum	mg/L	< 0.005			0.005	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Molybdenum (filtered)	mg/L	< 0.005			0.005	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Silver	mg/L	< 0.005			0.005	Pass	
Silver (filtered)	mg/L	< 0.005			0.005	Pass	
Tin	mg/L	< 0.005			0.005	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Uranium	mg/L	< 0.005			0.005	Pass	
Uranium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Acidity (as CaCO ₃)	%	85			70-130	Pass	
Ammonia (as N)	%	101			70-130	Pass	
Chloride	%	103			70-130	Pass	
Colour(Pt/Co) true	%	102			70-130	Pass	
Conductivity (at 25°C)	%	97			70-130	Pass	
Cyanide (total)	%	94			70-130	Pass	
Fluoride (Total)	%	93			70-130	Pass	
Nitrate & Nitrite (as N)	%	99			70-130	Pass	
Nitrate (as N)	%	99			70-130	Pass	
Nitrite (as N)	%	105			70-130	Pass	
Phosphate total (as P)	%	109			70-130	Pass	
Sulphate (as SO ₄)	%	112			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	94			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	104			70-130	Pass	
Total Suspended Solids Dried at 103–105°C	%	97			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO ₃)	%	104			70-130	Pass	
Total Alkalinity (as CaCO ₃)	%	106			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	99			80-120	Pass	
Aluminium (filtered)	%	97			80-120	Pass	
Antimony	%	99			80-120	Pass	
Antimony (filtered)	%	95			80-120	Pass	
Arsenic	%	97			80-120	Pass	
Arsenic (filtered)	%	96			80-120	Pass	
Barium	%	98			80-120	Pass	
Barium (filtered)	%	96			80-120	Pass	
Beryllium	%	82			80-120	Pass	
Beryllium (filtered)	%	84			80-120	Pass	
Boron	%	99			80-120	Pass	
Boron (filtered)	%	85			80-120	Pass	
Cadmium	%	100			80-120	Pass	

Test		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium (filtered)		%	101			80-120	Pass	
Chromium		%	108			80-120	Pass	
Chromium (filtered)		%	108			80-120	Pass	
Cobalt		%	110			80-120	Pass	
Cobalt (filtered)		%	99			80-120	Pass	
Copper		%	110			80-120	Pass	
Copper (filtered)		%	107			80-120	Pass	
Iron		%	109			80-120	Pass	
Iron (filtered)		%	100			80-120	Pass	
Lead		%	108			80-120	Pass	
Lead (filtered)		%	99			80-120	Pass	
Manganese		%	104			80-120	Pass	
Manganese (filtered)		%	102			80-120	Pass	
Molybdenum		%	113			80-120	Pass	
Molybdenum (filtered)		%	99			80-120	Pass	
Nickel		%	109			80-120	Pass	
Nickel (filtered)		%	98			80-120	Pass	
Selenium		%	110			80-120	Pass	
Selenium (filtered)		%	98			80-120	Pass	
Silver		%	104			80-120	Pass	
Silver (filtered)		%	102			80-120	Pass	
Tin		%	104			80-120	Pass	
Tin (filtered)		%	94			80-120	Pass	
Uranium		%	111			80-120	Pass	
Uranium (filtered)		%	100			80-120	Pass	
Zinc		%	112			80-120	Pass	
Zinc (filtered)		%	104			80-120	Pass	
LCS - % Recovery								
Alkali Metals								
Calcium		%	103			80-120	Pass	
Magnesium		%	102			80-120	Pass	
Potassium		%	94			80-120	Pass	
Sodium		%	105			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Ammonia (as N)	B21-Ma15102	NCP	%	100		70-130	Pass	
Nitrate & Nitrite (as N)	B21-Ma15102	NCP	%	87		70-130	Pass	
Nitrate (as N)	B21-Ma15102	NCP	%	87		70-130	Pass	
Nitrite (as N)	B21-Ma15102	NCP	%	105		70-130	Pass	
Phosphate total (as P)	B21-Ma07371	NCP	%	103		70-130	Pass	
Total Kjeldahl Nitrogen (as N)	B21-Ma04160	NCP	%	75		70-130	Pass	
Total Suspended Solids Dried at 103-105°C	B21-Ma09502	NCP	%	90		70-130	Pass	
Spike - % Recovery								
Heavy Metals								
				Result 1				
Aluminium	B21-Ma14495	NCP	%	100		75-125	Pass	
Aluminium (filtered)	S21-Ma20544	NCP	%	91		75-125	Pass	
Antimony	B21-Ma14495	NCP	%	101		75-125	Pass	
Antimony (filtered)	S21-Ma20544	NCP	%	94		75-125	Pass	
Arsenic	B21-Ma14495	NCP	%	98		75-125	Pass	
Arsenic (filtered)	S21-Ma20544	NCP	%	92		75-125	Pass	
Barium	B21-Ma14495	NCP	%	98		75-125	Pass	
Barium (filtered)	S21-Ma20544	NCP	%	80		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Beryllium	B21-Ma14495	NCP	%	85			75-125	Pass	
Beryllium (filtered)	S21-Ma19377	NCP	%	75			75-125	Pass	
Boron	B21-Ma14495	NCP	%	111			75-125	Pass	
Boron (filtered)	S21-Ma20544	NCP	%	83			75-125	Pass	
Cadmium	B21-Ma14495	NCP	%	101			75-125	Pass	
Cadmium (filtered)	S21-Ma20544	NCP	%	95			75-125	Pass	
Chromium	B21-Ma14495	NCP	%	107			75-125	Pass	
Chromium (filtered)	S21-Ma20544	NCP	%	102			75-125	Pass	
Cobalt	B21-Ma14495	NCP	%	106			75-125	Pass	
Cobalt (filtered)	S21-Ma20544	NCP	%	102			75-125	Pass	
Copper	B21-Ma14495	NCP	%	105			75-125	Pass	
Copper (filtered)	S21-Ma20544	NCP	%	102			75-125	Pass	
Iron	B21-Ma14495	NCP	%	111			75-125	Pass	
Iron (filtered)	S21-Ma20544	NCP	%	100			75-125	Pass	
Lead	B21-Ma14495	NCP	%	108			75-125	Pass	
Lead (filtered)	S21-Ma20544	NCP	%	100			75-125	Pass	
Manganese	B21-Ma14495	NCP	%	110			75-125	Pass	
Manganese (filtered)	S21-Ma20544	NCP	%	92			75-125	Pass	
Molybdenum	S21-Ma13982	NCP	%	119			75-125	Pass	
Molybdenum (filtered)	S21-Ma20544	NCP	%	103			75-125	Pass	
Nickel	B21-Ma14495	NCP	%	106			75-125	Pass	
Nickel (filtered)	S21-Ma20544	NCP	%	100			75-125	Pass	
Selenium	B21-Ma14495	NCP	%	111			75-125	Pass	
Selenium (filtered)	S21-Ma20544	NCP	%	98			75-125	Pass	
Silver	B21-Ma14495	NCP	%	102			75-125	Pass	
Silver (filtered)	S21-Ma20544	NCP	%	96			75-125	Pass	
Tin (filtered)	S21-Ma20544	NCP	%	93			75-125	Pass	
Uranium	B21-Ma14495	NCP	%	112			75-125	Pass	
Uranium (filtered)	S21-Ma20544	NCP	%	97			75-125	Pass	
Zinc	B21-Ma14495	NCP	%	106			75-125	Pass	
Zinc (filtered)	S21-Ma20544	NCP	%	97			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M21-Ma16241	CP	%	82			75-125	Pass	
Magnesium	M21-Ma16241	CP	%	82			75-125	Pass	
Potassium	M21-Ma16241	CP	%	78			75-125	Pass	
Sodium	M21-Ma16241	CP	%	83			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Acidity (as CaCO ₃)	S21-Ma08953	NCP	mg/L	140	100	27	30%	Pass	
Ammonia (as N)	B21-Ma15102	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Chloride	M21-Ma11023	NCP	mg/L	170	180	7.0	30%	Pass	
Colour(Pt/Co) true	B21-Ma11241	NCP	Pt/Co unit	1200	1200	<1	30%	Pass	
Conductivity (at 25°C)	B21-Ma07042	NCP	uS/cm	49000	48000	1.0	30%	Pass	
Fluoride (Total)	M21-Ma16426	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate & Nitrite (as N)	B21-Ma15102	NCP	mg/L	2.0	2.0	<1	30%	Pass	
Nitrate (as N)	B21-Ma15102	NCP	mg/L	2.0	2.0	<1	30%	Pass	
Nitrite (as N)	B21-Ma15102	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	B21-Ma07042	NCP	pH Units	7.3	7.3	pass	30%	Pass	
Phosphate total (as P)	M21-Ma11306	NCP	mg/L	0.18	0.04	13	30%	Pass	
Sulphate (as SO ₄)	M21-Ma11023	NCP	mg/L	1400	1400	24	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	B21-Ma11325	NCP	mg/L	250	280	11	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen (as N)	B21-Ma07373	NCP	mg/L	0.6	0.7	12	30%	Pass	
Total Suspended Solids Dried at 103–105°C	B21-Ma09502	NCP	mg/L	180	140	19	30%	Pass	
Turbidity	B21-Ma12089	NCP	NTU	< 1	< 1	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO ₃)	B21-Ma07042	NCP	mg/L	240	230	3.0	30%	Pass	
Carbonate Alkalinity (as CaCO ₃)	B21-Ma07042	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO ₃)	B21-Ma07042	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO ₃)	B21-Ma07042	NCP	mg/L	240	230	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S21-Ma10819	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Aluminium (filtered)	S21-Ma12105	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Antimony	S21-Ma10819	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Antimony (filtered)	S21-Ma12105	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic	S21-Ma10819	NCP	mg/L	0.001	0.002	12	30%	Pass	
Arsenic (filtered)	S21-Ma12105	NCP	mg/L	0.043	0.042	53	30%	Fail	
Barium	S21-Ma10819	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Barium (filtered)	S21-Ma12105	NCP	mg/L	0.08	0.08	<1	30%	Pass	
Beryllium	S21-Ma10819	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Beryllium (filtered)	S21-Ma17608	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron	S21-Ma10819	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Boron (filtered)	S21-Ma12105	NCP	mg/L	0.20	0.20	<1	30%	Pass	
Cadmium	S21-Ma10819	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Cadmium (filtered)	S21-Ma12105	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S21-Ma10819	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chromium (filtered)	S21-Ma12105	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	S21-Ma10819	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	S21-Ma12105	NCP	mg/L	0.003	0.003	9.0	30%	Pass	
Copper	S21-Ma10819	NCP	mg/L	0.002	0.002	3.0	30%	Pass	
Copper (filtered)	S21-Ma12105	NCP	mg/L	0.008	0.008	13	30%	Pass	
Iron	S21-Ma10819	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Iron (filtered)	S21-Ma12105	NCP	mg/L	0.05	0.05	2.0	30%	Pass	
Lead	S21-Ma10819	NCP	mg/L	0.002	0.002	9.0	30%	Pass	
Lead (filtered)	S21-Ma12105	NCP	mg/L	0.003	0.002	6.0	30%	Pass	
Manganese	S21-Ma10819	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Manganese (filtered)	S21-Ma12105	NCP	mg/L	1.6	1.6	1.0	30%	Pass	
Molybdenum	S21-Ma10819	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Molybdenum (filtered)	S21-Ma12105	NCP	mg/L	0.009	0.009	20	30%	Pass	
Nickel	S21-Ma10819	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Nickel (filtered)	S21-Ma12105	NCP	mg/L	0.004	0.004	26	30%	Pass	
Selenium	S21-Ma10819	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Selenium (filtered)	S21-Ma12105	NCP	mg/L	0.001	< 0.001	13	30%	Pass	Q15
Silver	S21-Ma10819	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Silver (filtered)	S21-Ma12105	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin	S21-Ma10819	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin (filtered)	S21-Ma12105	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Uranium	S21-Ma10819	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Uranium (filtered)	S21-Ma12105	NCP	mg/L	0.008	0.007	52	30%	Fail	
Zinc	S21-Ma10819	NCP	mg/L	< 0.005	0.008	55	30%	Fail	Q15
Zinc (filtered)	S21-Ma12105	NCP	mg/L	0.006	< 0.005	4.0	30%	Pass	Q15

Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	M21-Ma12920	NCP	mg/L	48	45	7.0	30%	Pass
Magnesium	M21-Ma12920	NCP	mg/L	8.9	8.3	7.0	30%	Pass
Potassium	M21-Ma12920	NCP	mg/L	6.2	6.0	3.0	30%	Pass
Sodium	M21-Ma12920	NCP	mg/L	54	53	3.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Aluminium (filtered)	M21-Ma16239	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Antimony (filtered)	M21-Ma16239	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic (filtered)	M21-Ma16239	CP	mg/L	0.003	0.004	22	30%	Pass
Barium (filtered)	M21-Ma16239	CP	mg/L	< 0.02	0.08	4.0	30%	Pass
Beryllium (filtered)	M21-Ma16239	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium (filtered)	M21-Ma16239	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	M21-Ma16239	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	M21-Ma16239	CP	mg/L	0.002	0.001	6.0	30%	Pass
Copper (filtered)	M21-Ma16239	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron (filtered)	M21-Ma16239	CP	mg/L	< 0.05	0.05	3.0	30%	Pass
Lead (filtered)	M21-Ma16239	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	M21-Ma16239	CP	mg/L	0.11	0.11	1.0	30%	Pass
Molybdenum (filtered)	M21-Ma16239	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Nickel (filtered)	M21-Ma16239	CP	mg/L	< 0.001	0.001	14	30%	Pass
Selenium (filtered)	M21-Ma16239	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Silver (filtered)	M21-Ma16239	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin (filtered)	M21-Ma16239	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium (filtered)	M21-Ma16239	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc (filtered)	M21-Ma16239	CP	mg/L	0.017	0.024	3.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Aluminium (filtered)	M21-Ma16240	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Antimony (filtered)	M21-Ma16240	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic (filtered)	M21-Ma16240	CP	mg/L	0.004	0.003	47	30%	Fail
Barium (filtered)	M21-Ma16240	CP	mg/L	< 0.02	0.10	5.0	30%	Pass
Beryllium (filtered)	M21-Ma16240	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium (filtered)	M21-Ma16240	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	M21-Ma16240	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	M21-Ma16240	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	M21-Ma16240	CP	mg/L	0.001	< 0.001	34	30%	Fail
Iron (filtered)	M21-Ma16240	CP	mg/L	0.07	0.07	3.0	30%	Pass
Lead (filtered)	M21-Ma16240	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	M21-Ma16240	CP	mg/L	0.079	0.078	<1	30%	Pass
Molybdenum (filtered)	M21-Ma16240	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Nickel (filtered)	M21-Ma16240	CP	mg/L	0.001	< 0.001	31	30%	Fail
Selenium (filtered)	M21-Ma16240	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Silver (filtered)	M21-Ma16240	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin (filtered)	M21-Ma16240	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium (filtered)	M21-Ma16240	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc (filtered)	M21-Ma16240	CP	mg/L	0.019	0.028	4.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Aluminium (filtered)	M21-Ma16241	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Antimony (filtered)	M21-Ma16241	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic (filtered)	M21-Ma16241	CP	mg/L	0.002	0.004	48	30%	Fail
Barium (filtered)	M21-Ma16241	CP	mg/L	< 0.02	0.06	3.0	30%	Pass
Beryllium (filtered)	M21-Ma16241	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium (filtered)	M21-Ma16241	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Chromium (filtered)	M21-Ma16241	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	M21-Ma16241	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	M21-Ma16241	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron (filtered)	M21-Ma16241	CP	mg/L	0.11	0.11	1.0	30%	Pass
Lead (filtered)	M21-Ma16241	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	M21-Ma16241	CP	mg/L	0.006	0.006	2.0	30%	Pass
Molybdenum (filtered)	M21-Ma16241	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Nickel (filtered)	M21-Ma16241	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Selenium (filtered)	M21-Ma16241	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Silver (filtered)	M21-Ma16241	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin (filtered)	M21-Ma16241	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium (filtered)	M21-Ma16241	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc (filtered)	M21-Ma16241	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Aluminium (filtered)	M21-Ma16242	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Antimony (filtered)	M21-Ma16242	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic (filtered)	M21-Ma16242	CP	mg/L	0.004	0.006	55	30%	Fail
Barium (filtered)	M21-Ma16242	CP	mg/L	0.04	0.05	<1	30%	Pass
Beryllium (filtered)	M21-Ma16242	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium (filtered)	M21-Ma16242	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	M21-Ma16242	CP	mg/L	< 0.001	0.002	50	30%	Fail
Cobalt (filtered)	M21-Ma16242	CP	mg/L	0.014	0.013	2.0	30%	Pass
Copper (filtered)	M21-Ma16242	CP	mg/L	0.001	0.002	50	30%	Fail
Iron (filtered)	M21-Ma16242	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Lead (filtered)	M21-Ma16242	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	M21-Ma16242	CP	mg/L	0.95	0.97	1.0	30%	Pass
Molybdenum (filtered)	M21-Ma16242	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Nickel (filtered)	M21-Ma16242	CP	mg/L	0.006	0.006	4.0	30%	Pass
Selenium (filtered)	M21-Ma16242	CP	mg/L	0.002	0.002	1.0	30%	Pass
Silver (filtered)	M21-Ma16242	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin (filtered)	M21-Ma16242	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium (filtered)	M21-Ma16242	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc (filtered)	M21-Ma16242	CP	mg/L	0.01	0.018	10	30%	Pass

Comments

V2: This report has been amended with repeated filtered metals for samples where the filtered metals exceeded the totals originally.

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
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
R05	Theoretically the total result should be greater or equal to the dissolved concentration. However the difference reported is within the uncertainty of the individual tests

Authorised by:

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
John Nguyen	Senior Analyst-Metal (NSW)
Scott Beddoes	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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NRR Services Pty Ltd
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Eagle Farm
QLD 4009



NATA Accredited
Accreditation Number 1261
Site Number 1254

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Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection and proficiency testing scheme providers
reports.

Attention: **Tim Gunns**

Report **783491-W**
Project name **NATHAN RIVER PROJECT**
Project ID **DISCHARGE EVENT 4/2**
Received Date **Mar 29, 2021**

Client Sample ID			RBSW01	RBSW04	RBSWDS	RBSW2US
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma51623	M21-Ma51624	M21-Ma51625	M21-Ma51626
Date Sampled			Mar 25, 2021	Mar 25, 2021	Mar 25, 2021	Mar 25, 2021
Test/Reference	LOR	Unit				
Acidity (as CaCO ₃)	10	mg/L	50	26	29	12
Ammonia (as N)	0.01	mg/L	0.02	0.17	0.05	< 0.01
Ammonium Ion (as NH ₄)	0.01	mg/L	0.03	2.2	0.07	< 0.01
Chloride	1	mg/L	21	19	15	20
Colour(Pt/Co) true	2	Pt/Co unit	29	21	21	16
Conductivity (at 25°C)	10	uS/cm	49	180	120	68
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Fluoride (Total)	0.5	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.06	0.47	0.24	< 0.05
Nitrate (as N)	0.02	mg/L	0.04	0.47	0.24	0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
pH (at 25 °C)	0.1	pH Units	6.3	6.3	6.4	6.5
Phosphate total (as P)	0.01	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Sulphate (as SO ₄)	5	mg/L	7.2	46	31	6.4
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	120	150	130	150
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	< 0.2	0.7
Total Nitrogen (as N)*	0.2	mg/L	< 0.2	0.47	0.24	0.7
Total Suspended Solids Dried at 103–105°C	1	mg/L	9.7	8.0	6.7	< 1
Turbidity	1	NTU	13	13	12	5.2
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Heavy Metals						
Aluminium	0.001	mg/L	0.67	0.72	0.73	0.39
Aluminium (filtered)	0.001	mg/L	0.076	0.003	0.016	0.015
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Barium	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Barium (filtered)	0.02	mg/L	0.07	0.07	0.07	0.07
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			RBSW01	RBSW04	RBSWDS	RBSW2US
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma51623	M21-Ma51624	M21-Ma51625	M21-Ma51626
Date Sampled			Mar 25, 2021	Mar 25, 2021	Mar 25, 2021	Mar 25, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Boron	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	0.05	< 0.05	< 0.05
Cadmium	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Cadmium (filtered)	0.00001	mg/L	0.00001	< 0.00001	< 0.00001	< 0.00001
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iron	0.05	mg/L	0.58	0.65	0.75	0.38
Iron (filtered)	0.05	mg/L	0.13	< 0.05	0.11	0.10
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese	0.0001	mg/L	0.0095	0.098	0.044	0.011
Manganese (filtered)	0.0001	mg/L	0.0040	0.082	0.029	0.0062
Molybdenum	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Selenium	0.001	mg/L	0.001	0.001	< 0.001	< 0.001
Selenium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Silver	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver (filtered)	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	0.0001	mg/L	0.0002	0.0002	0.0001	< 0.0001
Uranium (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Zinc	0.005	mg/L	< 0.005	0.005	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	0.027	0.016	0.015	0.007
Alkali Metals						
Calcium	0.5	mg/L	1.3	2.0	1.4	< 0.5
Magnesium	0.5	mg/L	1.4	8.9	5.4	1.6
Potassium	0.5	mg/L	1.1	1.6	1.3	0.9
Sodium	0.5	mg/L	5.5	15	11	9.9
Hardness Set						
Hardness mg equivalent CaCO3/L	5	mg/L	9.1	42	26	7.8

Client Sample ID			RBAD1
Sample Matrix			Water
Eurofins Sample No.			M21-Ma51627
Date Sampled			Mar 25, 2021
Test/Reference	LOR	Unit	
Acidity (as CaCO ₃)	10	mg/L	24
Ammonia (as N)	0.01	mg/L	0.97
Ammonium Ion (as NH ₄)	0.01	mg/L	1.2
Chloride	1	mg/L	120
Colour(Pt/Co) true	2	Pt/Co unit	16
Conductivity (at 25°C)	10	uS/cm	1100
Cyanide (total)	0.005	mg/L	< 0.005
Fluoride (Total)	0.5	mg/L	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	4.3
Nitrate (as N)	0.02	mg/L	4.3
Nitrite (as N)	0.02	mg/L	0.05
pH (at 25 °C)	0.1	pH Units	6.6
Phosphate total (as P)	0.01	mg/L	< 0.5
Sulphate (as SO ₄)	5	mg/L	420
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	920
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0
Total Nitrogen (as N)*	0.2	mg/L	5.3
Total Suspended Solids Dried at 103–105°C	1	mg/L	9.8
Turbidity	1	NTU	9.7
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	27
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	27
Heavy Metals			
Aluminium	0.001	mg/L	0.13
Aluminium (filtered)	0.001	mg/L	0.003
Antimony	0.005	mg/L	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005
Arsenic	0.001	mg/L	0.001
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium	0.02	mg/L	0.03
Barium (filtered)	0.02	mg/L	0.05
Beryllium	0.001	mg/L	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron	0.05	mg/L	0.17
Boron (filtered)	0.05	mg/L	0.17
Cadmium	0.00001	mg/L	0.00001
Cadmium (filtered)	0.00001	mg/L	0.00002
Chromium	0.001	mg/L	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt	0.001	mg/L	0.007
Cobalt (filtered)	0.001	mg/L	0.006
Copper	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001
Iron	0.05	mg/L	0.29
Iron (filtered)	0.05	mg/L	< 0.05
Lead	0.001	mg/L	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001

Client Sample ID			RBAD1
Sample Matrix			Water
Eurofins Sample No.			M21-Ma51627
Date Sampled			Mar 25, 2021
Test/Reference	LOR	Unit	
Heavy Metals			
Manganese	0.0001	mg/L	0.95
Manganese (filtered)	0.0001	mg/L	0.84
Molybdenum	0.005	mg/L	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel	0.001	mg/L	0.005
Nickel (filtered)	0.001	mg/L	0.005
Selenium	0.001	mg/L	0.002
Selenium (filtered)	0.001	mg/L	0.001
Silver	0.00001	mg/L	< 0.00001
Silver (filtered)	0.00001	mg/L	< 0.00001
Tin	0.005	mg/L	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005
Uranium	0.0001	mg/L	< 0.0001
Uranium (filtered)	0.0001	mg/L	< 0.0001
Zinc	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.012
Alkali Metals			
Calcium	0.5	mg/L	11
Magnesium	0.5	mg/L	83
Potassium	0.5	mg/L	6.5
Sodium	0.5	mg/L	97
Hardness Set			
Hardness mg equivalent CaCO ₃ /L	5	mg/L	370

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
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Mar 29, 2021	14 Days
Ammonium Ion (as NH ₄) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Mar 29, 2021	28 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Mar 29, 2021	28 Days
Colour(Pt/Co) true - Method: APHA 2120C – Spectrophotometric Single-wavelength Method	Melbourne	Mar 29, 2021	2 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Mar 29, 2021	28 Days
Cyanide (total) - Method: LTM-INO-4020 Total Free WAD Cyanide by CFA	Melbourne	Mar 29, 2021	14 Days
Fluoride (Total) - Method: APHA 4500 F-C Fluoride by Ion Selective Electrode	Melbourne	Mar 29, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Mar 29, 2021	0 Hours
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Mar 29, 2021	28 Days
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Mar 29, 2021	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Mar 29, 2021	2 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Mar 29, 2021	14 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Mar 30, 2021	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Mar 30, 2021	180 Days
Hardness Set			
Calcium - Method:	Melbourne	Mar 29, 2021	180 Days
Magnesium - Method:	Melbourne	Mar 29, 2021	180 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Mar 29, 2021	180 Days
Hardness mg equivalent CaCO ₃ /L - Method:	Melbourne	Mar 29, 2021	28 Days
Eurofins Suite B19D: Total N, TKN, NO _x , NO ₂ , NO ₃ , Total P			
Ammonia (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Mar 29, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Mar 29, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Mar 29, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Mar 29, 2021	2 Days
Phosphate total (as P) - Method: LTM-INO-4040 Phosphate by CFA	Melbourne	Mar 29, 2021	28 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	Mar 29, 2021	7 Days

Description

Total Dissolved Solids Dried at 180°C ± 2°C

- Method: LTM-INO-4170 Total Dissolved Solids in Water

Testing Site

Melbourne

Extracted

Mar 29, 2021

Holding Time

7 Days

Internal Quality Control Review and Glossary
General

1. 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.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. 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

1. 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.
2. 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.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. 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.
6. 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.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. 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								
Acidity (as CaCO ₃)	mg/L	< 10			10	Pass		
Chloride	mg/L	< 1			1	Pass		
Colour(Pt/Co) true	Pt/Co unit	< 2			2	Pass		
Cyanide (total)	mg/L	< 0.005			0.005	Pass		
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass		
Sulphate (as SO ₄)	mg/L	< 5			5	Pass		
Turbidity	NTU	< 1			1	Pass		
Method Blank								
Alkali Metals								
Calcium	mg/L	< 0.5			0.5	Pass		
Magnesium	mg/L	< 0.5			0.5	Pass		
Potassium	mg/L	< 0.5			0.5	Pass		
Sodium	mg/L	< 0.5			0.5	Pass		
LCS - % Recovery								
Acidity (as CaCO ₃)	%	93			70-130	Pass		
Colour(Pt/Co) true	%	80			70-130	Pass		
Cyanide (total)	%	90			70-130	Pass		
Total Suspended Solids Dried at 103–105°C	%	106			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Ammonia (as N)	M21-Ma48430	NCP	%	100		70-130	Pass	
Cyanide (total)	S21-Ma45482	NCP	%	101		70-130	Pass	
Nitrate & Nitrite (as N)	M21-Ma48430	NCP	%	91		70-130	Pass	
Nitrate (as N)	M21-Ma48430	NCP	%	91		70-130	Pass	
Nitrite (as N)	M21-Ma48430	NCP	%	102		70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M21-Ma43157	NCP	%	80		70-130	Pass	
Total Suspended Solids Dried at 103–105°C	M21-Ma40162	NCP	%	116		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Antimony (filtered)	S21-Ma51817	NCP	%	90		75-125	Pass	
Arsenic (filtered)	S21-Ma51817	NCP	%	113		75-125	Pass	
Cadmium (filtered)	S21-Ma51817	NCP	%	88		75-125	Pass	
Chromium (filtered)	S21-Ma51817	NCP	%	78		75-125	Pass	
Copper (filtered)	M21-Ma47824	NCP	%	101		75-125	Pass	
Iron (filtered)	S21-Ma51817	NCP	%	82		75-125	Pass	
Manganese (filtered)	S21-Ma51817	NCP	%	77		75-125	Pass	
Molybdenum (filtered)	S21-Ma51817	NCP	%	108		75-125	Pass	
Selenium (filtered)	S21-Ma51817	NCP	%	116		75-125	Pass	
Tin (filtered)	S21-Ma51817	NCP	%	89		75-125	Pass	
Spike - % Recovery								
Alkali Metals				Result 1				
Sodium	S21-Ma19621	NCP	%	91		75-125	Pass	
Spike - % Recovery								
Alkalinity (speciated)				Result 1				
Total Alkalinity (as CaCO ₃)	M21-Ma51624	CP	%	100		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Aluminium	M21-Ma51627	CP	%	95		75-125	Pass	
Antimony	M21-Ma51627	CP	%	98		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Arsenic	M21-Ma51627	CP	%	95			75-125	Pass	
Barium	M21-Ma51627	CP	%	94			75-125	Pass	
Beryllium	M21-Ma51627	CP	%	80			75-125	Pass	
Boron	M21-Ma51627	CP	%	95			75-125	Pass	
Cadmium	M21-Ma51627	CP	%	91			75-125	Pass	
Chromium	M21-Ma51627	CP	%	97			75-125	Pass	
Cobalt	M21-Ma51627	CP	%	92			75-125	Pass	
Copper	M21-Ma51627	CP	%	91			75-125	Pass	
Iron	M21-Ma51627	CP	%	94			75-125	Pass	
Lead	M21-Ma51627	CP	%	91			75-125	Pass	
Manganese	M21-Ma51627	CP	%	80			75-125	Pass	
Molybdenum	M21-Ma51627	CP	%	119			75-125	Pass	
Nickel	M21-Ma51627	CP	%	93			75-125	Pass	
Selenium	M21-Ma51627	CP	%	102			75-125	Pass	
Silver	M21-Ma51627	CP	%	91			75-125	Pass	
Uranium	M21-Ma51627	CP	%	98			75-125	Pass	
Zinc	M21-Ma51627	CP	%	90			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M21-Ma48430	NCP	mg/L	0.23	0.21	6.0	30%	Pass	
Chloride	B21-Ma48491	NCP	mg/L	140	140	2.0	30%	Pass	
Colour(Pt/Co) true	S21-Ma40633	NCP	Pt/Co unit	< 2	< 2	<1	30%	Pass	
Conductivity (at 25°C)	M21-Ma51623	CP	uS/cm	49	49	<1	30%	Pass	
Cyanide (total)	M21-Ma48430	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Fluoride (Total)	B21-Ma45941	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate & Nitrite (as N)	M21-Ma48430	NCP	mg/L	1.2	1.2	2.0	30%	Pass	
Nitrate (as N)	M21-Ma48430	NCP	mg/L	1.2	1.2	2.0	30%	Pass	
Nitrite (as N)	M21-Ma48430	NCP	mg/L	0.03	0.03	15	30%	Pass	
pH (at 25 °C)	M21-Ma51623	CP	pH Units	6.3	6.3	pass	30%	Pass	
Sulphate (as SO4)	B21-Ma48491	NCP	mg/L	28	28	1.0	30%	Pass	
Total Kjeldahl Nitrogen (as N)	S21-Ma45339	NCP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Total Suspended Solids Dried at 103–105°C	M21-Ma40152	NCP	mg/L	14	14	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M21-Ma51623	CP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M21-Ma51623	CP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	M21-Ma51623	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M21-Ma51623	CP	mg/L	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S21-Ma40643	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Aluminium (filtered)	S21-Ma51816	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Antimony	S21-Ma40643	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Antimony (filtered)	S21-Ma51816	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic	S21-Ma40643	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Arsenic (filtered)	S21-Ma51816	NCP	mg/L	0.003	0.003	4.0	30%	Pass	
Barium	S21-Ma40643	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Barium (filtered)	S21-Ma51816	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Beryllium	S21-Ma40643	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Beryllium (filtered)	S21-Ma51816	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron	S21-Ma40643	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Boron (filtered)	S21-Ma51816	NCP	mg/L	3.3	3.0	7.0	30%	Pass	

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Cadmium	S21-Ma40643	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Cadmium (filtered)	S21-Ma51816	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium	S21-Ma40643	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Chromium (filtered)	S21-Ma51816	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt	S21-Ma40643	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	S21-Ma51816	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper	S21-Ma52030	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	M21-Ma47824	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron	S21-Ma40643	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Iron (filtered)	S21-Ma51816	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Lead	S21-Ma40643	NCP	mg/L	0.001	0.002	12	30%	Pass
Lead (filtered)	S21-Ma51816	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese	S21-Ma40643	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Manganese (filtered)	S21-Ma51816	NCP	mg/L	0.005	< 0.005	4.0	30%	Pass
Molybdenum	S21-Ma40643	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Molybdenum (filtered)	S21-Ma51816	NCP	mg/L	0.011	0.010	7.0	30%	Pass
Nickel	S21-Ma40643	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Nickel (filtered)	S21-Ma51816	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Selenium	S21-Ma40643	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Selenium (filtered)	S21-Ma51816	NCP	mg/L	0.002	0.001	25	30%	Pass
Silver	S21-Ma40643	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Silver (filtered)	S21-Ma51816	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin	S21-Ma40643	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Tin (filtered)	S21-Ma51816	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium	S21-Ma40643	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Uranium (filtered)	S21-Ma51816	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc	S21-Ma40643	NCP	mg/L	0.012	0.012	<1	30%	Pass
Zinc (filtered)	S21-Ma51816	NCP	mg/L	0.005	0.006	3.0	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Sodium	S21-Ma19621	NCP	mg/L	40	31	2.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Total Dissolved Solids Dried at 180°C ± 2°C	M21-Ma51624	CP	mg/L	150	110	28	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Phosphate total (as P)	M21-Ma51626	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Turbidity	M21-Ma51627	CP	NTU	9.7	9.3	4.0	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

Authorised by:

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
John Nguyen	Senior Analyst-Metal (NSW)
Scott Beddoes	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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NRR Services Pty Ltd
18,109 Holt Street
Eagle Farm
QLD 4009



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection and proficiency testing scheme providers
reports.

Attention: **Tim Gunns**

Report **785262-W**
Project name **NATHAN RIVER PROJECT**
Project ID **DISCHARGE EVENT 4**
Received Date **Apr 07, 2021**

Client Sample ID			RBSW01	RBSW04	RBSWDS	RBAD1
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ap06829	M21-Ap06830	M21-Ap06831	M21-Ap06833
Date Sampled			Mar 17, 2021	Mar 17, 2021	Mar 17, 2021	Mar 17, 2021
Test/Reference	LOR	Unit				
Acidity (as CaCO ₃)	10	mg/L	18	17	< 10	43
Chloride	1	mg/L	19	16	66	120
Conductivity (at 25°C)	10	uS/cm	45	150	100	1300
pH (at 25 °C)	0.1	pH Units	6.7	4.1	6.9	7.4
Sulphate (as SO ₄)	5	mg/L	< 5	43	34	400
Total Suspended Solids Dried at 103–105°C	1	mg/L	25	24	23	< 1
Turbidity	1	NTU	35	38	35	8.2
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	24
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	24
Alkali Metals						
Calcium	0.5	mg/L	< 0.5	1.9	1.1	12
Magnesium	0.5	mg/L	0.9	7.2	3.9	85
Potassium	0.5	mg/L	1.3	1.7	1.4	5.7
Sodium	0.5	mg/L	5.5	13	11	110
Hardness Set						
Hardness mg equivalent CaCO ₃ /L	5	mg/L	< 5	35	19	380

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
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Apr 07, 2021	14 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Apr 07, 2021	28 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Apr 07, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Apr 07, 2021	0 Hours
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Apr 07, 2021	28 Days
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Apr 07, 2021	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Apr 08, 2021	2 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Apr 07, 2021	14 Days
Hardness Set			
Calcium - Method:	Melbourne	Apr 07, 2021	180 Days
Magnesium - Method:	Melbourne	Apr 07, 2021	180 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Apr 07, 2021	180 Days
Hardness mg equivalent CaCO ₃ /L - Method:	Melbourne	Apr 07, 2021	28 Days

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: NRR Services Pty Ltd
Address: 18,109 Holt Street
Eagle Farm
QLD 4009

Project Name: NATHAN RIVER PROJECT
Project ID: DISCHARGE EVENT 4

Order No.:
Report #: 785262
Phone: 08 6188 8181
Fax:

Received: Apr 7, 2021 1:47 PM
Due: Apr 8, 2021
Priority: 1 Day
Contact Name: Tim Gunns

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail						Acidity (as CaCO3)	Chloride	Conductivity (at 25°C)	HOLD	pH (at 25 °C)	Potassium	Sodium	Sulphate (as SO4)	Total Suspended Solids Dried at 103-105°C	Turbidity	Alkalinity (speciated)	Hardness Set
Melbourne Laboratory - NATA Site # 1254 & 14271						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																	
Mayfield Laboratory																	
External Laboratory																	
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID												
1	RBSW01	Mar 17, 2021		Water	M21-Ap06829	X	X	X		X	X	X	X	X	X	X	X
2	RBSW04	Mar 17, 2021		Water	M21-Ap06830	X	X	X		X	X	X	X	X	X	X	X
3	RBSWDS	Mar 17, 2021		Water	M21-Ap06831	X	X	X		X	X	X	X	X	X	X	X
4	RBSW2US	Mar 17, 2021		Water	M21-Ap06832				X								
5	RBAD1	Mar 17, 2021		Water	M21-Ap06833	X	X	X		X	X	X	X	X	X	X	X
Test Counts						4	4	4	1	4	4	4	4	4	4	4	4

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								
Acidity (as CaCO ₃)		mg/L	< 10			10	Pass	
Chloride		mg/L	< 1			1	Pass	
Conductivity (at 25°C)		uS/cm	< 10			10	Pass	
Sulphate (as SO ₄)		mg/L	< 5			5	Pass	
Turbidity		NTU	< 1			1	Pass	
Method Blank								
Alkali Metals								
Calcium		mg/L	< 0.5			0.5	Pass	
Magnesium		mg/L	< 0.5			0.5	Pass	
Potassium		mg/L	< 0.5			0.5	Pass	
Sodium		mg/L	< 0.5			0.5	Pass	
LCS - % Recovery								
Acidity (as CaCO ₃)		%	112			70-130	Pass	
Chloride		%	109			70-130	Pass	
Conductivity (at 25°C)		%	95			70-130	Pass	
Sulphate (as SO ₄)		%	106			70-130	Pass	
LCS - % Recovery								
Alkalinity (speciated)								
Carbonate Alkalinity (as CaCO ₃)		%	102			70-130	Pass	
Total Alkalinity (as CaCO ₃)		%	105			70-130	Pass	
LCS - % Recovery								
Alkali Metals								
Calcium		%	94			80-120	Pass	
Magnesium		%	97			80-120	Pass	
Potassium		%	91			80-120	Pass	
Sodium		%	99			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Alkalinity (speciated)				Result 1				
Carbonate Alkalinity (as CaCO ₃)	P21-Ma53100	NCP	%	99		70-130	Pass	
Total Alkalinity (as CaCO ₃)	P21-Ma53100	NCP	%	114		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Duplicate								
				Result 1	Result 2	RPD		
Conductivity (at 25°C)	M21-Ap05098	NCP	uS/cm	12000	12000	1.0	30%	Pass
pH (at 25 °C)	M21-Ap05098	NCP	pH Units	8.0	8.0	pass	30%	Pass
Total Suspended Solids Dried at 103–105°C	M21-Ap01520	NCP	mg/L	< 1	< 1	<1	30%	Pass
Turbidity	M21-Ap09098	NCP	NTU	4.4	4.4	<1	30%	Pass
Duplicate								
Alkalinity (speciated)				Result 1	Result 2	RPD		
Bicarbonate Alkalinity (as CaCO ₃)	P21-Ma53096	NCP	mg/L	40	38	6.0	30%	Pass
Carbonate Alkalinity (as CaCO ₃)	P21-Ma53096	NCP	mg/L	< 10	< 10	<1	30%	Pass
Hydroxide Alkalinity (as CaCO ₃)	P21-Ma53096	NCP	mg/L	< 20	< 20	<1	30%	Pass
Total Alkalinity (as CaCO ₃)	P21-Ma53096	NCP	mg/L	40	38	6.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Chloride	M21-Ap06830	CP	mg/L	16	15	6.0	30%	Pass
Sulphate (as SO ₄)	M21-Ap06830	CP	mg/L	43	42	2.0	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

Authorised by:

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Scott Beddoes	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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NRR Services Pty Ltd
18,109 Holt Street
Eagle Farm
QLD 4009



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
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Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection and proficiency testing scheme providers
reports.

Attention: **Tim Gunns**

Report **785544-W**
Project name **NATHAN RIVER PROJECT**
Project ID **DISCHARGE EVENT 4/3**
Received Date **Apr 08, 2021**

Client Sample ID			RBSW01	RBSW04	RBSWDS	RBSW2US
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ap09095	M21-Ap09096	M21-Ap09097	M21-Ap09098
Date Sampled			Mar 31, 2021	Mar 31, 2021	Mar 31, 2021	Mar 31, 2021
Test/Reference	LOR	Unit				
Acidity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10	< 10
Ammonia (as N)	0.01	mg/L	0.02	0.07	0.10	0.01
Ammonium Ion (as NH ₄)	0.01	mg/L	0.03	0.09	0.12	0.02
Chloride	1	mg/L	21	30	26	11
Colour(Pt/Co) true	2	Pt/Co unit	23	21	21	24
Conductivity (at 25°C)	10	uS/cm	74	180	230	73
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Fluoride (Total)	0.5	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	0.22	0.63	0.61	< 0.05
Nitrate (as N)	0.02	mg/L	0.22	0.61	0.60	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
pH (at 25 °C)	0.1	pH Units	6.4	6.5	6.5	6.7
Phosphate total (as P)	0.01	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Sulphate (as SO ₄)	5	mg/L	5.5	46	50	7.5
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	160	460	40	-32
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	< 0.2	< 0.2
Total Nitrogen (as N)*	0.2	mg/L	0.22	0.63	0.61	< 0.2
Total Suspended Solids Dried at 103–105°C	1	mg/L	110	14	11	3.6
Turbidity	1	NTU	36	12	11	4.4
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Heavy Metals						
Aluminium	0.001	mg/L	0.60	0.37	0.24	0.15
Aluminium (filtered)	0.001	mg/L	0.030	0.004	0.003	0.017
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Barium	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Barium (filtered)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			RBSW01	RBSW04	RBSWDS	RBSW2US
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ap09095	M21-Ap09096	M21-Ap09097	M21-Ap09098
Date Sampled			Mar 31, 2021	Mar 31, 2021	Mar 31, 2021	Mar 31, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Boron	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Cadmium	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Cadmium (filtered)	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iron	0.05	mg/L	0.80	0.69	0.62	0.28
Iron (filtered)	0.05	mg/L	0.10	0.06	0.08	0.07
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese	0.0001	mg/L	0.019	0.083	0.076	0.0081
Manganese (filtered)	0.0001	mg/L	0.0089	0.078	0.073	0.0047
Molybdenum	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Selenium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Selenium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Silver	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver (filtered)	0.00001	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Zinc	0.005	mg/L	< 0.005	0.006	0.019	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005	0.005	0.019	< 0.005
Alkali Metals						
Calcium	0.5	mg/L	0.5	2.1	2.0	< 0.5
Magnesium	0.5	mg/L	1.2	8.7	10	1.6
Potassium	0.5	mg/L	1.1	1.6	1.6	0.9
Sodium	0.5	mg/L	8.1	16	18	9.5
Hardness Set						
Hardness mg equivalent CaCO ₃ /L	5	mg/L	6.4	41	46	7.5

Client Sample ID			RBAD1
Sample Matrix			Water
Eurofins Sample No.			M21-Ap09099
Date Sampled			Mar 31, 2021
Test/Reference	LOR	Unit	
Acidity (as CaCO ₃)	10	mg/L	< 10
Ammonia (as N)	0.01	mg/L	0.77
Ammonium Ion (as NH ₄)	0.01	mg/L	0.98
Chloride	1	mg/L	130
Colour(Pt/Co) true	2	Pt/Co unit	6.0
Conductivity (at 25°C)	10	uS/cm	1300
Cyanide (total)	0.005	mg/L	< 0.005
Fluoride (Total)	0.5	mg/L	< 0.5
Nitrate & Nitrite (as N)	0.05	mg/L	4.3
Nitrate (as N)	0.02	mg/L	4.2
Nitrite (as N)	0.02	mg/L	0.04
pH (at 25 °C)	0.1	pH Units	6.8
Phosphate total (as P)	0.01	mg/L	< 0.5
Sulphate (as SO ₄)	5	mg/L	410
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	650
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.8
Total Nitrogen (as N)*	0.2	mg/L	5.1
Total Suspended Solids Dried at 103–105°C	1	mg/L	2.6
Turbidity	1	NTU	4.5
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	25
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	25
Heavy Metals			
Aluminium	0.001	mg/L	0.044
Aluminium (filtered)	0.001	mg/L	< 0.001
Antimony	0.005	mg/L	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005
Arsenic	0.001	mg/L	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium	0.02	mg/L	0.03
Barium (filtered)	0.02	mg/L	0.03
Beryllium	0.001	mg/L	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron	0.05	mg/L	0.16
Boron (filtered)	0.05	mg/L	0.15
Cadmium	0.00001	mg/L	< 0.00001
Cadmium (filtered)	0.00001	mg/L	0.00001
Chromium	0.001	mg/L	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt	0.001	mg/L	0.005
Cobalt (filtered)	0.001	mg/L	0.005
Copper	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001
Iron	0.05	mg/L	0.09
Iron (filtered)	0.05	mg/L	< 0.05
Lead	0.001	mg/L	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001

Client Sample ID			RBAD1
Sample Matrix			Water
Eurofins Sample No.			M21-Ap09099
Date Sampled			Mar 31, 2021
Test/Reference	LOR	Unit	
Heavy Metals			
Manganese	0.0001	mg/L	0.74
Manganese (filtered)	0.0001	mg/L	0.79
Molybdenum	0.005	mg/L	< 0.005
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel	0.001	mg/L	0.004
Nickel (filtered)	0.001	mg/L	0.004
Selenium	0.001	mg/L	0.001
Selenium (filtered)	0.001	mg/L	< 0.001
Silver	0.00001	mg/L	< 0.00001
Silver (filtered)	0.00001	mg/L	< 0.00001
Tin	0.005	mg/L	< 0.005
Tin (filtered)	0.005	mg/L	< 0.005
Uranium	0.0001	mg/L	< 0.0001
Uranium (filtered)	0.0001	mg/L	< 0.0001
Zinc	0.005	mg/L	0.005
Zinc (filtered)	0.005	mg/L	< 0.005
Alkali Metals			
Calcium	0.5	mg/L	12
Magnesium	0.5	mg/L	85
Potassium	0.5	mg/L	6.5
Sodium	0.5	mg/L	97
Hardness Set			
Hardness mg equivalent CaCO ₃ /L	5	mg/L	380

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
Acidity (as CaCO ₃) - Method: LTM-INO-4210 Acidity	Melbourne	Apr 08, 2021	14 Days
Ammonium Ion (as NH ₄) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Apr 08, 2021	28 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Apr 08, 2021	28 Days
Colour(Pt/Co) true - Method: APHA 2120C – Spectrophotometric Single-wavelength Method	Melbourne	Apr 09, 2021	2 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Apr 08, 2021	28 Days
Cyanide (total) - Method: LTM-INO-4020 Total Free WAD Cyanide by CFA	Melbourne	Apr 08, 2021	14 Days
Fluoride (Total) - Method: APHA 4500 F-C Fluoride by Ion Selective Electrode	Melbourne	Apr 09, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Apr 08, 2021	0 Hours
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Apr 08, 2021	28 Days
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Apr 08, 2021	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Apr 08, 2021	2 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Apr 08, 2021	14 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Apr 09, 2021	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Apr 09, 2021	180 Days
Hardness Set			
Calcium - Method:	Melbourne	Apr 08, 2021	180 Days
Magnesium - Method:	Melbourne	Apr 08, 2021	180 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Apr 08, 2021	180 Days
Hardness mg equivalent CaCO ₃ /L - Method:	Melbourne	Apr 08, 2021	28 Days
Eurofins Suite B19D: Total N, TKN, NO _x , NO ₂ , NO ₃ , Total P			
Ammonia (as N) - Method: APHA 4500-NH ₃ Ammonia Nitrogen by FIA	Melbourne	Apr 08, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Apr 08, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Apr 08, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Apr 08, 2021	2 Days
Phosphate total (as P) - Method: LTM-INO-4040 Phosphate by CFA	Melbourne	Apr 08, 2021	28 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	Apr 08, 2021	7 Days

Description

Total Dissolved Solids Dried at 180°C ± 2°C

- Method: LTM-INO-4170 Total Dissolved Solids in Water

Testing Site

Melbourne

Extracted

Apr 08, 2021

Holding Time

7 Days

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									
Turbidity		NTU	< 1			1	Pass		
Method Blank									
Heavy Metals									
Barium (filtered)		mg/L	< 0.02			0.02	Pass		
Boron (filtered)		mg/L	< 0.05			0.05	Pass		
Zinc (filtered)		mg/L	< 0.005			0.005	Pass		
Method Blank									
Alkali Metals									
Calcium		mg/L	< 0.5			0.5	Pass		
Magnesium		mg/L	< 0.5			0.5	Pass		
Potassium		mg/L	< 0.5			0.5	Pass		
Sodium		mg/L	< 0.5			0.5	Pass		
LCS - % Recovery									
Phosphate total (as P)		%	86			70-130	Pass		
LCS - % Recovery									
Heavy Metals									
Barium (filtered)		%	87			80-120	Pass		
Boron (filtered)		%	95			80-120	Pass		
Zinc (filtered)		%	92			80-120	Pass		
LCS - % Recovery									
Alkali Metals									
Calcium		%	101			80-120	Pass		
Magnesium		%	96			80-120	Pass		
Potassium		%	90			80-120	Pass		
Sodium		%	84			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Barium (filtered)	M21-Ap09095	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Boron (filtered)	M21-Ap09095	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Barium (filtered)	M21-Ap09096	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Boron (filtered)	M21-Ap09096	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc (filtered)	M21-Ap09096	CP	mg/L	0.005	0.005	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Barium (filtered)	M21-Ap09097	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Boron (filtered)	M21-Ap09097	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Turbidity	M21-Ap09098	CP	NTU	4.4	4.4	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Boron (filtered)	M21-Ap09098	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc (filtered)	M21-Ap09098	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Barium (filtered)	M21-Ap09099	CP	mg/L	0.03	0.03	2.0	30%	Pass	
Boron (filtered)	M21-Ap09099	CP	mg/L	0.15	0.15	2.0	30%	Pass	
Zinc (filtered)	M21-Ap09099	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

Authorised by:

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
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Scott Beddoes	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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ATTACHMENT F



**Nathan River Mine
Aquatic Macroinvertebrate Assessment
April 2021**



**Prepared for Nathan River Resources
Pty Ltd**

Document Control Summary

Document Revisions

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1. Introduction and scope of work

Freshwater Ecology Pty Ltd (FE) was engaged by Nathan River Resources (NRR) to conduct the biological monitoring for the Nathan River Mine in accordance with the Water Management and Monitoring Plan (NRR 2019).

There are six control monitoring sites and seven impact monitoring sites (Table 1). In April 2021 all sites were sampled except for site B5. Site B5 was not accessed due to concerns with wildlife (i.e. wild buffalo and saltwater crocodiles).

Table 1: Location of monitoring sites

Current site ID	Original site ID	Description	Easting (GDA 94)	Northing (GDA 94)
Control sites				
B1	RBSW01	Towns River upstream Control Site.	501960	8323974
B1A	RBSW01-Alt	Towns River upstream Alternate Site.	505263	8325239
B2	RBSW02	Towns River located upstream of Wades Crossing.	507046	8325281
B3	RBSW04	North of F-East Pit on Towns River off the Levee Wall.	509187	8325500
B4	RPDP02US	Towns River upstream (right branch).	509350	8324150
B11	RBSW13	Magaranyi River upstream (Mag 2).	518316	8324677
Impact sites				
B5	RBDP01-01	Towns River Downstream of Levee bank DP01.	510638	8326724
B6	RBDP02-01	Towns River Downstream of levee bank DP02.	511132	8326390
B7	RBDP01-02	Towns River downstream of branch confluence.	511486	8327163
B8	RBSW09	Pandanus Creek downstream of E-East and Storm water basin inputs.	515258	8325132
B9	RBPC	Pandanus Creek downstream of DP03.	516047	8325327
B10	RBMAG1	Magaranyi River left branch (Mag 1).	517840	8325285
B12	RBSW14	Towns River downstream.	522667	8336830

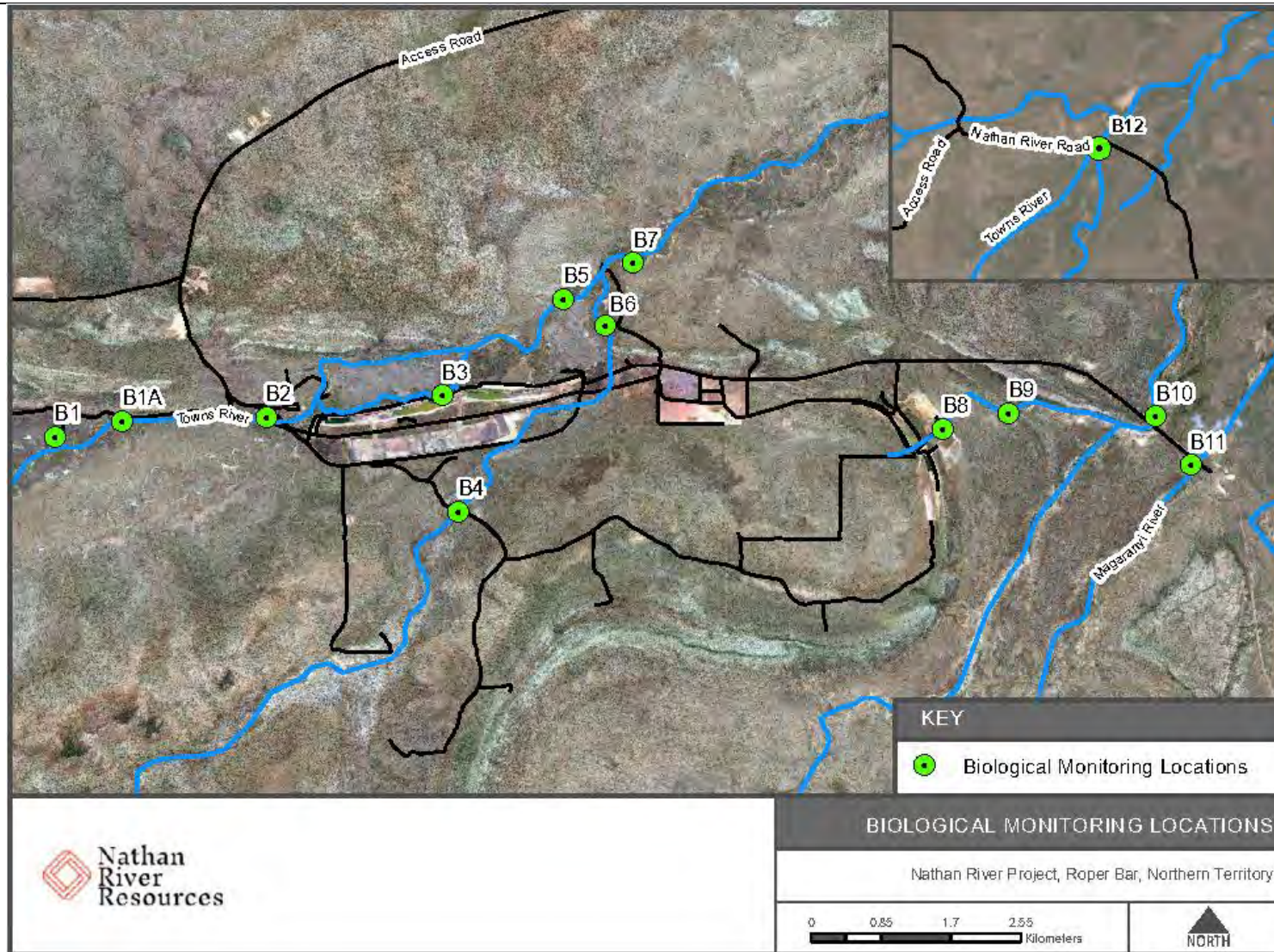


Figure 1: Location of REMP sampling sites

2. Methods

Aquatic habitat and macroinvertebrate sampling was undertaken from the 19th to the 23rd of April 2021.

2.1. Surface water quality

In situ water quality data was recorded using portable multiparameter water quality meters that had been calibrated in accordance with the manufacturer's specifications. Calibrations were regularly checked in the field. Parameters tested *in situ* were: temperature, electrical conductivity (EC), pH, turbidity and dissolved oxygen (DO). *In situ* water quality testing was undertaken in conjunction with macroinvertebrate sampling to assist with the interpretation of results.

2.2. Habitat assessment

An assessment of the habitat for each reach was made. The reach scale habitat assessment included:

- Channel characteristics
- Mesohabitat composition
- Riparian characteristics
- Instream microhabitats present
- Instream wood
- Aquatic macrophytes composition and coverage
- Substrate composition
- Any notable disturbances including bank erosion, cattle access to waterway and barriers associated with nearby road crossings or dams; and
- Other on-site observations, such as presence of filamentous or benthic algae, surface scums, unusual sediment deposits, or fish kills.

2.3. Aquatic macroinvertebrates

Sample Collection

Freshwater macroinvertebrates were sampled following methods outlined in the Northern Territory AUSRIVAS methodology (Lloyd & Cook 2001). At each site, duplicate edge samples were collected each from 10 m of edge habitat. For each sample, a proforma was completed detailing the composition of micro habitats included within the sample. A 250 micron (μm) mesh dip net fitted to a triangular frame (250 mm x 250 mm x 250 mm) was used to collect samples. Samples were collected by disturbing the benthos using a cultivator rake and sweeping the net through the water above the disturbed benthos.

Samples were washed through nested sieves to remove coarse debris. All coarse debris removed was carefully checked for macroinvertebrates, which were collected and placed into the sample for

laboratory analysis, prior to be discarded. Macroinvertebrate samples from the 250 µm sieve were transferred into a one litre jar and preserved in a 70% methylated spirits solution. Sampling equipment was washed and cleared of debris on completion of sample collection to prevent cross contamination between samples and sites. Each jar was labelled with the monitoring site code, replicate number, sampler, habitat, date and time of sampling.

Laboratory

Samples were washed through a series of sieves (10mm, 500µm and 250µm mesh sizes). Any large, conspicuous taxa identified in the 10 mm mesh sieve were added to the contents of the large mesh fraction retained in the field. The contents of the 500µm mesh sieve were retained for macroinvertebrate identification and enumeration, while the 250µm fraction was retained as sample residue for quality assurance purposes. The contents of the 500µm mesh fraction was poured into a Marchant sub-sampler (Marchant 1989) and extractions made randomly from cells (aliquots). . A 200 organism sub-sample is required, however, a slightly larger number (approximately 220 individuals) are typically collected to account for damaged individuals which may not be possible to identify to the the necessary taxonomic level. Macroinvertebrates were generally identified to the family taxonomic level and relative abundance enumerated. Organisms were identified to family level with the exception of lower phyla (e.g. porifera, nematoda), oligochaetes (freshwater worms) and acarina (freshwater mites). Chironomids were identified to sub-family level in accordance with standard AusRivAS protocols (Lloyd & Cook 2001). In accordance with Northern Territory AusRivAS methods microcrustacea (Ostracoda, Cladocera and Copepoda) were excluded from the analysis.

Enumeration and identification of macroinvertebrate samples was conducted by Tara Steele, an experienced AusRivAS accredited taxonomist. Sorting, enumeration and data entry was cross-checked for 10% of the samples by a second experienced AusRivAS accredited taxonomist, Susan Jones.

Data Analysis

The freshwater macroinvertebrate data was used to calculate several community descriptors as identified in the following sections.

Multivariate analysis

Multivariate analysis was required on macroinvertebrate community data to further identify patterns in similarity and dissimilarity between monitoring sites (Clarke & Warwick 2001). The community data was converted to presence / absence and transformed using a Bray-Curtis measure of similarity to eliminate bias in the data and produce a similarity matrix. The similarity matrix was then used to produce:

- non-metric multidimensional scaling (nMDS) ordination of community structure and provide a two dimensional representation of the similarity / dissimilarity among samples; and
- one-way analysis of similarity (ANOSIM) was also performed to test for a statistically significant difference between sample groupings.

Multivariate statistical analysis was performed using Primer v.6 software.

Abundance

Abundance for each sample was estimated by multiplying the totals from each subsample by the percentage of the sample subsampled.

Taxonomic richness

Taxonomic richness was calculated from the number of taxa present at each monitoring site, providing an indication of community diversity. Taxa richness typically increases with ecological condition.

3. Results

3.1. Preceding rainfall

Monthly rainfall at the Ngukurr gauge 014609 (approximately 55 kms north west of the project area) at Ngukurr for the 11 months preceding sampling is presented in Figure 4 along with mean monthly totals between 1910 and 2012 (there was no long term data available from 2012 to 2021).

Typical of the seasons across northern Australia there was no rainfall between June and September. The onset of the wet season brought heavy rainfall with the largest amounts in the months of December, February and March. This succession of events was sufficient to trigger the 2021 biological sampling event. These general patterns are similar to the long term mean annual rainfall trends as evidenced in **Figure 2**.

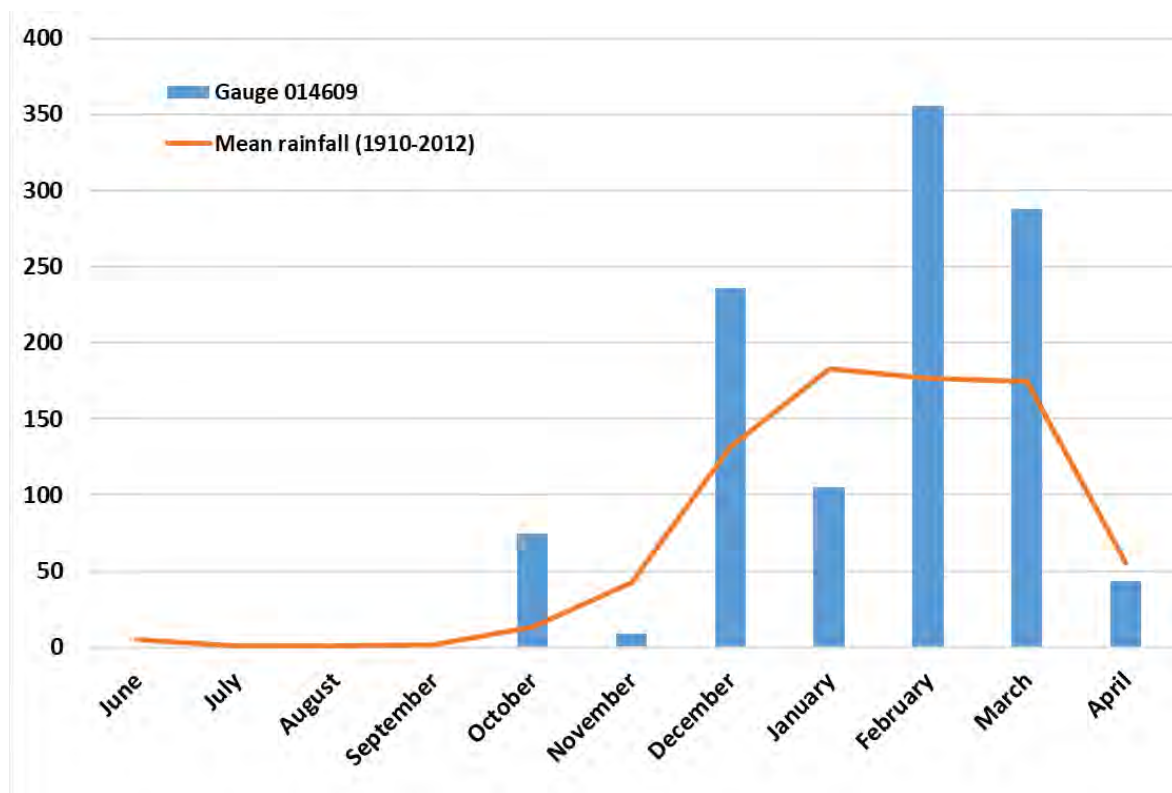


Figure 2: Total monthly rainfall collected at Ngukurr gauge (120304A) in the 11 months preceding sampling and mean monthly averages from 1610-2012

3.2. *In situ* water quality

Physico-chemical water quality measurements for each site are presented in **Table 2**. Key observations on the *in situ* water quality are as follows:

- Temperatures reflected the time of year and day during which sampling was undertaken.
- pH levels were alkaline at all sites ranging from 7.2 to 8.9. The highest pH values were recorded at impact sites B8 and B9 on Pandanus Creek (8.7-8.9), but were also relatively high at control sites B1A and B3 on the Towns River (both 8.5).
- The percentage saturation of dissolved oxygen (DO) ranged from 62% to 149% across all sites. The lower values recorded were generally earlier in the day, suggesting phytoplankton and submerged macrophyte photosynthetic activity may have been the primary driver of DO levels across most sites.
- Electrical conductivity (EC) levels ranged from 79-1,111 microSemen centimetres ($\mu\text{S}/\text{cm}$) across all sites. EC was highest in sites B8 and B9 on Pandanus Creek, and at site B12 the most downstream site on the Towns River. The lowest EC values were recorded for sites B10 and B11 on the Magaranyi River.
- Turbidity levels were relatively low ranging from 0.1 to 28.1 across all sites.

Table 2: *In situ* water quality in April 2021

Site	B1	B1A	B2	B3	B4	B6	B7	B8	B9	B10	B11	B12
Date	19/04/21	22/04/21	23/04/21	22/04/21	22/04/21	21/04/21	19/04/21	21/04/21	20/04/21	20/04/21	20/04/21	21/04/21
Time	15:30	16:43	8:49	12:35	9:15	13:55	9:40	11:20	8:40	11:47	10:24	15:20
Temp	35.6	35.2	27.3	37.3	28.4	34.2	29.4	33.2	25.4	29.1	28.2	34.5
pH	7.8	8.5	7.2	8.5	7.5	8.1	7.5	8.9	8.7	7.3	7.2	7.8
DO %	149	98	62	103	82	115	91	102	84	112	97	101
EC	173	162	179	303	206	386	228	507	468	89	79	1,111
Turb	11.5	0.1	0.3	9.0	2.1	2.0	1.5	18.0	2.0	1.8	28.1	3.0

3.3. Habitat assessment

Site photographs and a detailed habitat assessment for each site are presented in Appendix A. A general summary of habitat trends across all site is provided below:

- The mine site is located on the floodplain (approximately 23 metres above sea level) immediately below a small escarpment (approximately 60 above sea level).
- Sites B1, B1A, B2 and B3 are largely located on relatively shallow reaches of the Towns River. The riparian zone was predominantly grasslands with a light coverage of small trees. The substrate composition of these reaches was variable with relatively large proportions of bedrock, cobble, pebble and gravel, although site B3 had a slightly higher proportion of silt/clay than the other sites.
- Sites B4 and B6 were in a relatively more permanent reach as suggested by the presence of submerged macrophytes. Substrate dominated by silt/clay, with the riparian vegetation dominated by melaluecas.
- Site B7 was located in a reach with a higher proportion of bedrock and a series of deeper pools dissected by shallow bedrock. The riparian habitat was comparable to sites B1, B1A, B2 and B3.
- Sites B8 and B9 on Pandanus Creek appeared to hold water for longer periods than most sites permanent based on the presence of submerged and floating attached macrophytes. The substrate and riparian habitat were similar to sites B4 and B6.
- Site B10 and B11, wide channel with some rocky substrate (i.e. bedrock, cobble, gravel and pebbles) surrounded by large amounts of sand
- Site B12 much further downstream and large stream with mixed substrates but dominated by sand. This site had notably higher EC levels than all other sites.

3.4. Aquatic macroinvertebrates

A total of 5,501 aquatic macroinvertebrate individuals from 47 taxa (mainly family level) were processed from the samples across all sites (Appendix B). When the abundances from the processed samples were extrapolated by the relative proportion of the subsample to the entire sample an estimated 46,129 were collected across all sites. The most diverse order collected was Coleoptera (beetles) with ten taxa recorded, followed by Hemiptera (true bugs), Diptera (true flies), Odonata (damselflies and dragonflies) all of which recorded seven families / sub-families.

The macroinvertebrate community data for the four sites sampled in 2021 is presented in the nMDS ordination plot in Figure 3. The plot has a low stress value of 0.13 indicating that the ordination is a good representation of the data. The ordination plot identified three clusters at the 60% similarity, samples from Pandanus Creek, samples from the distant downstream sites and the final cluster included all sites from the Towns and Magaranyi Rivers. Considering the differences between the general habitat attributes of sites between these clusters these differences are not surprising. An ANOSIM of sites within the Towns and Magaranyi Rivers cluster indicated that there was a statistically significant difference between the community structures between control and impact sites ($p = 0.03$, Global R = 0.259).

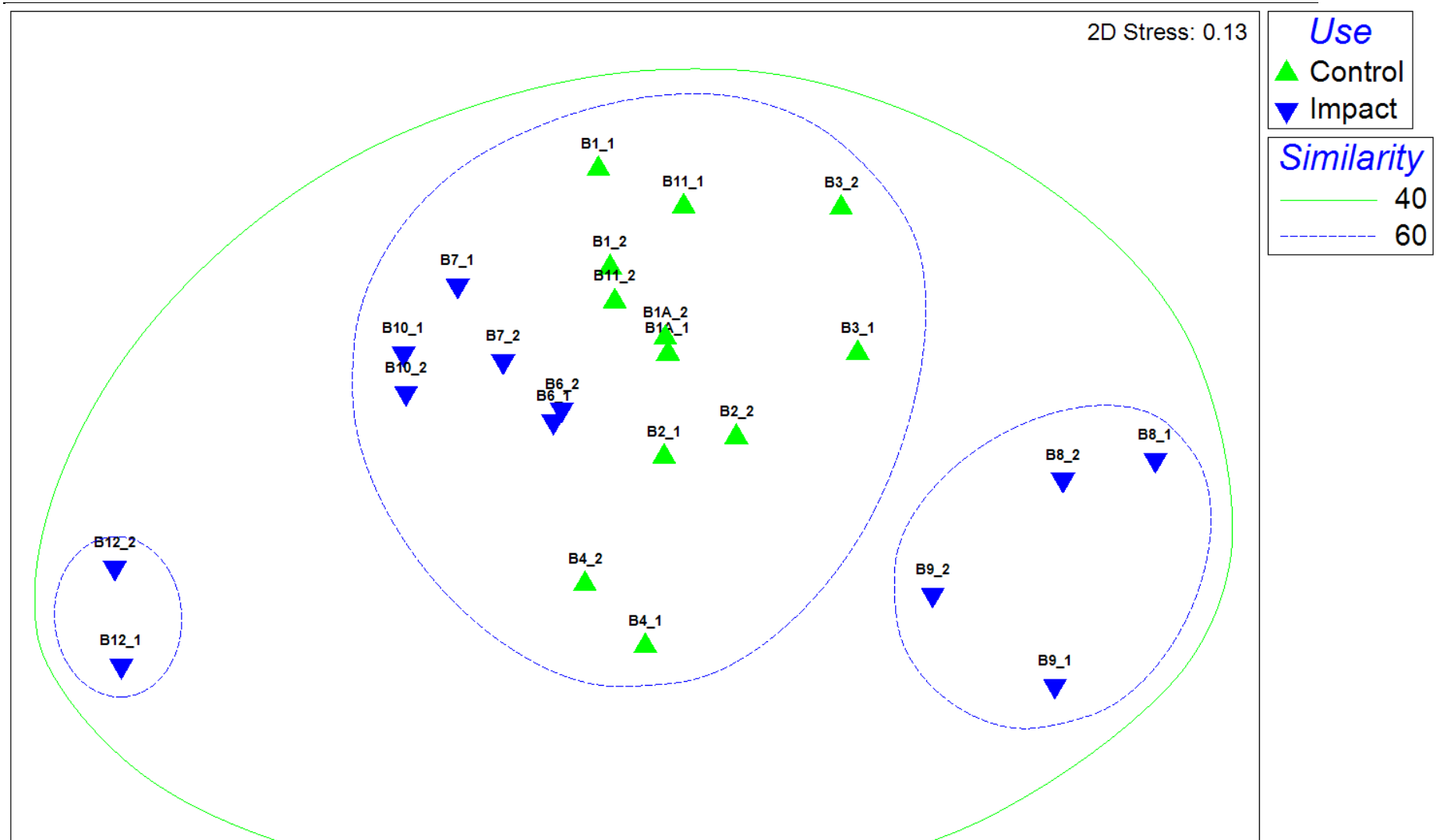


Figure 3: Two-dimensional nMDS ordination plot including cluster analysis at 40 and 60 % similarity levels in April 2021

Macroinvertebrate relative abundance for all sites is presented in **Figure 4**. Abundance values were extrapolated in line with subsampling procedures of the AusRivAS methodology (Lloyd & Cook 2001). Abundance varied across all sites and all samples ranged from 561 to 5,320 with a mean of 1,922 individuals collected. Across all sites just four taxa contributed 71% of the total abundance (Chironominae 24.9%, Tanyponidae 21.5%, Caenidae 15.6% and Baetidae 9.4%). The lowest abundances were recorded in site B2 and B12 samples. The highest abundances were recorded in sites B1 and B1A.

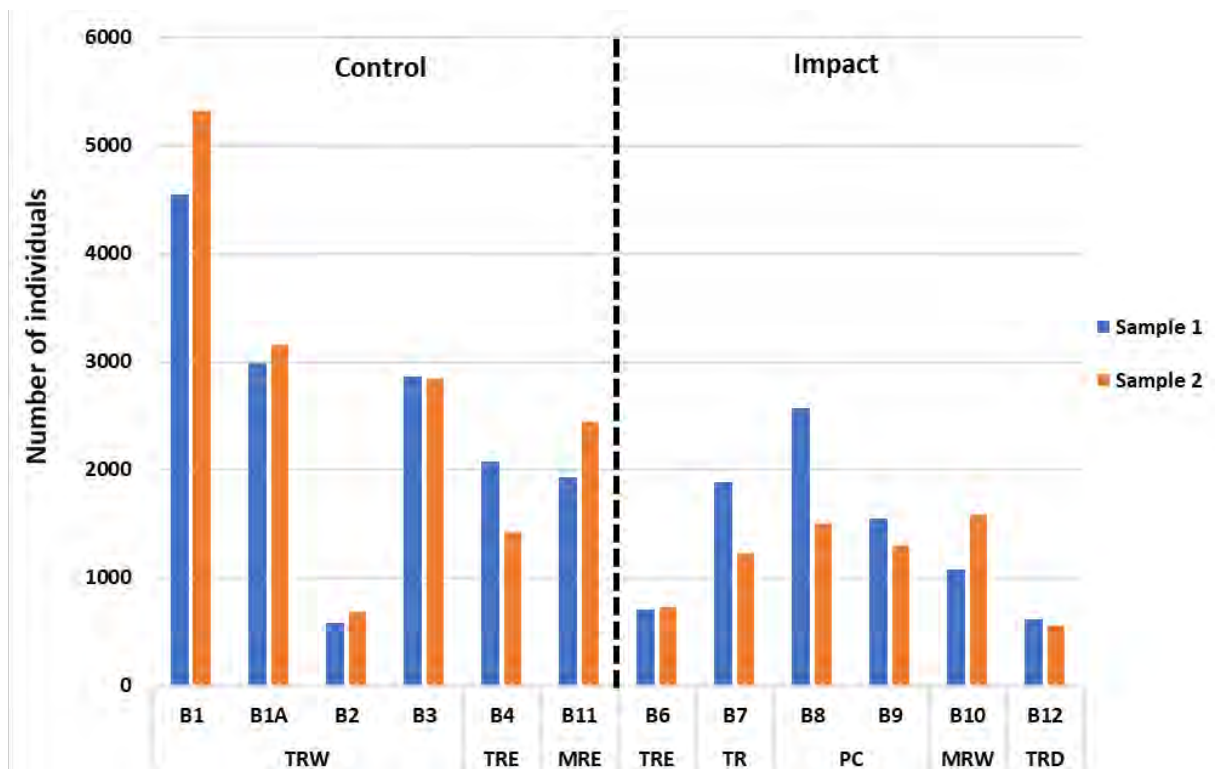


Figure 4: 2021 macroinvertebrate abundances (totals extrapolated from subsamples). TRW – Towns River west branch, TRE - Towns River east branch, MRE - Magaranyi River east branch, PC - Pandanus Creek, MRW - Magaranyi River west, TRD - Towns River downstream.

The number of taxa collected at each site in April 2021 is presented in **Figure 5**. Taxa diversity across all sites and samples ranged from 16 to 25 with a mean value of 21.2 taxa. Across all sites mean taxa richness was slightly higher in control sites (22.8 taxa) then in impact sites (19.5 taxa).

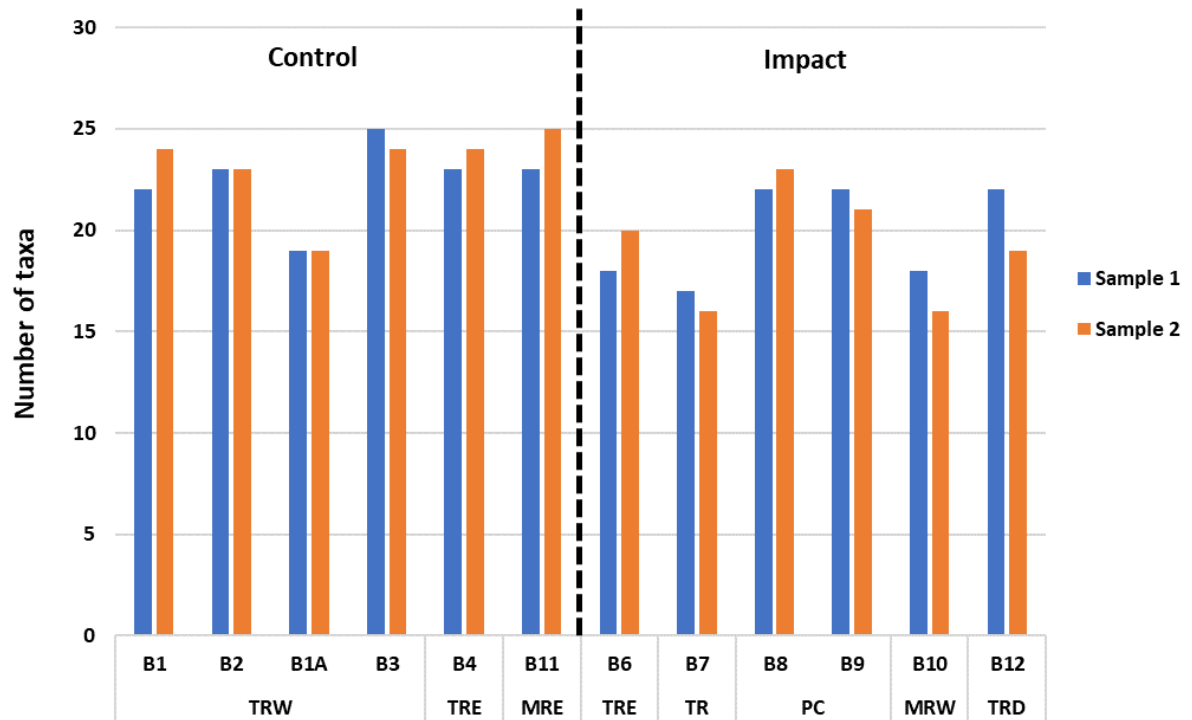


Figure 5: 2021 macroinvertebrate taxa richness (typically family level). TRW – Towns River west branch, TRE - Towns River east branch, MRE - Magaranyi River east branch, PC - Pandanus Creek, MRW - Magaranyi River west, TRD - Towns River downstream.

4. Discussion and conclusions

The current assessment is the first for the biological monitoring for Nathan River Resources. As such, there is no available comparable data against which it can be compared.

In situ water quality values varied across all sites. High pH values (i.e. > 8.5) were recorded in both control and impact sites. Dissolved oxygen levels were generally quite high (i.e. > 80 % for all but one site which was 62%). Electrical conductivity levels were generally low, except at site B12, located approximately 20 km downstream of any mining activities and is tidally influenced. Turbidity also varied across sites but was relatively low (i.e. < 30 NTU). These values are considered typical of waterways across the region following the end of the wet season.

Habitat was variable between sites both at the reach extent (the 100 m length assessed for habitat at the site) and the macroinvertebrate sampling habitat scales (the actual immediate area from which each sample was collected). This appears to be the biggest driver determining the macroinvertebrate assemblages. This was most notable for Pandanus Creek and site B12 on the Towns River. While there was significant overlap between the remaining sites, ANOSIM detected a statistical difference in macroinvertebrate assemblages between control and impact sites. These differences appear to be largely driven by inherent differences in habitat between the sites rather than any impacts associated with mining activities, with the control sites closer to the escarpment and the impact sites being slightly further into the floodplain.



The locations of the biological sampling sites is considered suitable for meeting the compliance requirements for the project. However, considering the inherent physical habitat differences between some of the waterways, emphasis should be placed on comparing any changes in the sites over time rather than simply between control and impact sites. With ongoing annual sampling as planned, a data set will be built that helps ongoing comparisons to test for potential impacts.

Site B5 was not sampled due to concerns of interactions with wildlife (i.e. specifically wild buffalo and estuarine crocodiles). It is recommended that this site be included in future monitoring once safe access or protections (e.g. armed crocodile spotter) are introduced. The use of armed crocodile spotters is common practice across mines in the NT and would provide additional protection for samplers against buffalo/crocodile attack.



5. References



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Appendix A – REMP Monitoring Site Photographs



B1 Towns River 19/04/2021		Co-ordinates (UTM 53L) E 501960 S 8323974	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	1.5 m	Run	10 %
Bankfull stream width	12 m	Shallow pool (<1m)	90 %
Mean water depth	0.2 m	Deep pool (>1m)	-
Maximum water depth	0.8 m	Dry	-
Mean wetted width	1.2 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	5 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	some
Riparian width (right bank)	10 m	Submerged macrophytes	-
Bare ground	40 %	Bank overhang veg	little
Grass	80 %	Trailing bank veg	little
Shrubs	30 %	Blanketing silt	-
Trees < 10 m	10 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	10 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	some	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
In situ water quality		Substrate composition	
Temperature	35.6 °C	Bedrock	-
Conductivity	173 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	149 %	Cobble (64-256 mm)	-
pH	7.8	Pebble (4-64 mm)	5 %
Turbidity	11.5 NTU	Gravel (2-4 mm)	35 %
		Sand (0.05-2 mm)	60 %
		Silt/clay (<0.05 mm)	-



Comments:



B1A Towns River 22/04/2021		Co-ordinates (UTM 53L) E 505263 S 8325239	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	1.5 m	Run	-
Bankfull stream width	12 m	Shallow pool (<1m)	100 %
Mean water depth	0.2 m	Deep pool (>1m)	-
Maximum water depth	0.6 m	Dry	-
Mean wetted width	2.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	4 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	some
Riparian width (right bank)	10 m	Submerged macrophytes	-
Bare ground	40 %	Bank overhang veg	little
Grass	80 %	Trailing bank veg	little
Shrubs	20 %	Blanketing silt	-
Trees < 10 m	40 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	10 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	some	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
In situ water quality		Substrate composition	
Temperature	35.2 °C	Bedrock	-
Conductivity	162 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	98 %	Cobble (64-256 mm)	20 %
pH	8.5	Pebble (4-64 mm)	25 %
Turbidity	0.1 NTU	Gravel (2-4 mm)	20 %
		Sand (0.05-2 mm)	20 %
		Silt/clay (<0.05 mm)	15 %
Comments:			

B2 Towns River 23/04/2021		Co-ordinates (UTM 53L) E 507046 S 8325281	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	1.5 m	Run	-
Bankfull stream width	20 m	Shallow pool (<1m)	80 %
Mean water depth	0.3 m	Deep pool (>1m)	20 %
Maximum water depth	0.8 m	Dry	-
Mean wetted width	5.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	8 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	some
Riparian width (right bank)	10 m	Submerged macrophytes	-
Bare ground	30 %	Bank overhang veg	little
Grass	80 %	Trailing bank veg	little
Shrubs	20 %	Blanketing silt	little
Trees < 10 m	40 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	10 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
In situ water quality		Substrate composition	
Temperature	27.3 °C	Bedrock	-
Conductivity	179 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	62 %	Cobble (64-256 mm)	10 %
pH	7.2	Pebble (4-64 mm)	25 %
Turbidity	0.3 NTU	Gravel (2-4 mm)	15 %
		Sand (0.05-2 mm)	35 %
		Silt/clay (<0.05 mm)	15 %
Comments:			



B3 Towns River 22/04/2021		Co-ordinates (UTM 53L) E 509187 S 8325500	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	1.8 m	Run	-
Bankfull stream width	18 m	Shallow pool (<1m)	90 %
Mean water depth	0.4 m	Deep pool (>1m)	10 %
Maximum water depth	1.0 m	Dry	-
Mean wetted width	4.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	8 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	some
Riparian width (right bank)	10 m	Submerged macrophytes	-
Bare ground	30 %	Bank overhang veg	little
Grass	80 %	Trailing bank veg	little
Shrubs	40 %	Blanketing silt	little
Trees < 10 m	20 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	10 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
In situ water quality		Substrate composition	
Temperature	37.3 °C	Bedrock	20 %
Conductivity	303 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	103 %	Cobble (64-256 mm)	5 %
pH	8.5	Pebble (4-64 mm)	5 %
Turbidity	9.0 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	10 %
		Silt/clay (<0.05 mm)	60 %
Comments:			



B4 Towns River (right branch) 22/04/2021		Co-ordinates (UTM 53L) E 509350 S 8324150	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	0.5 m	Run	-
Bankfull stream width	10 m	Shallow pool (<1m)	100 %
Mean water depth	0.2 m	Deep pool (>1m)	-
Maximum water depth	0.4 m	Dry	-
Mean wetted width	1.5 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	5 m	Periphyton	little
Riparian width (left bank)	10 m	Filamentous algae	moderate
Riparian width (right bank)	10 m	Submerged macrophytes	moderate
Bare ground	5 %	Bank overhang veg	little
Grass	95 %	Trailing bank veg	moderate
Shrubs	20 %	Blanketing silt	little
Trees < 10 m	20 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	10 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	moderate
In situ water quality		Substrate composition	
Temperature	28.4 °C	Bedrock	-
Conductivity	206 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	82 %	Cobble (64-256 mm)	-
pH	7.5	Pebble (4-64 mm)	-
Turbidity	2.1 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	-
		Silt/clay (<0.05 mm)	100 %
Comments:			



B6 Towns River (right branch) 21/04/2021		Co-ordinates (UTM 53L) E 511132 S 8326390	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	0.5 m	Run	-
Bankfull stream width	10 m	Shallow pool (<1m)	100 %
Mean water depth	0.3 m	Deep pool (>1m)	-
Maximum water depth	0.6 m	Dry	-
Mean wetted width	2.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	4 m	Periphyton	little
Riparian width (left bank)	10 m	Filamentous algae	moderate
Riparian width (right bank)	10 m	Submerged macrophytes	moderate
Bare ground	5 %	Bank overhang veg	little
Grass	95 %	Trailing bank veg	moderate
Shrubs	30 %	Blanketing silt	little
Trees < 10 m	20 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	little
Canopy cover	10 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	moderate
In situ water quality		Substrate composition	
Temperature	34.2 °C	Bedrock	-
Conductivity	386 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	115 %	Cobble (64-256 mm)	-
pH	8.1	Pebble (4-64 mm)	-
Turbidity	2.0 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	70 %
		Silt/clay (<0.05 mm)	30 %
Comments:			



B7 Towns River 19/04/2021		Co-ordinates (UTM 53L) E 511486 S 8327163	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	2.0 m	Run	-
Bankfull stream width	20 m	Shallow pool (<1m)	60 %
Mean water depth	0.6 m	Deep pool (>1m)	40 %
Maximum water depth	>1.0 m	Dry	-
Mean wetted width	4.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	5 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	-
Riparian width (right bank)	10 m	Submerged macrophytes	-
Bare ground	20 %	Bank overhang veg	little
Grass	80 %	Trailing bank veg	little
Shrubs	20 %	Blanketing silt	little
Trees < 10 m	20 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	little
Canopy cover	20 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
In situ water quality		Substrate composition	
Temperature	29.4 °C	Bedrock	20 %
Conductivity	228 µS/cm	Boulder (>256 mm)	5 %
Dissolved oxygen	91 %	Cobble (64-256 mm)	10 %
pH	7.5	Pebble (4-64 mm)	-
Turbidity	1.5 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	25 %
		Silt/clay (<0.05 mm)	25 %



Comments: Downstream of branch confluence.

B8 Pandanus Creek 21/04/2021		Co-ordinates (UTM 53L) E 515258 S 8325132	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	0.5 m	Run	-
Bankfull stream width	20 m	Shallow pool (<1m)	20 %
Mean water depth	0.6 m	Deep pool (>1m)	80 %
Maximum water depth	<1.0 m	Dry	-
Mean wetted width	6.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	3 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	moderate
Riparian width (right bank)	10 m	Submerged macrophytes	-
Bare ground	-	Bank overhang veg	little
Grass	100 %	Trailing bank veg	moderate
Shrubs	20 %	Blanketing silt	-
Trees < 10 m	10 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	little
Canopy cover	5 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	moderate
Logs (>15cm diam)	-	Submerged	-
In situ water quality		Substrate composition	
Temperature	33.2 °C	Bedrock	-
Conductivity	507 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	102 %	Cobble (64-256 mm)	-
pH	8.9	Pebble (4-64 mm)	-
Turbidity	18 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	-
		Silt/clay (<0.05 mm)	100 %
Comments:			

B9 Pandanus Creek 20/04/2021		Co-ordinates (UTM 53L) E 516047 S 8325327	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	0.5 m	Run	-
Bankfull stream width	10 m	Shallow pool (<1m)	100 %
Mean water depth	0.3 m	Deep pool (>1m)	-
Maximum water depth	0.6 m	Dry	-
Mean wetted width	4.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	6 m	Periphyton	little
Riparian width (left bank)	10 m	Filamentous algae	moderate
Riparian width (right bank)	10 m	Submerged macrophytes	moderate
Bare ground	-	Bank overhang veg	little
Grass	100 %	Trailing bank veg	some
Shrubs	10 %	Blanketing silt	little
Trees < 10 m	20 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	little
Canopy cover	10 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	moderate
In situ water quality		Substrate composition	
Temperature	25.4 °C	Bedrock	-
Conductivity	468 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	84 %	Cobble (64-256 mm)	-
pH	8.7	Pebble (4-64 mm)	-
Turbidity	2.0 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	15 %
		Silt/clay (<0.05 mm)	85 %
Comments:			

B10 Magaranyi River (left branch) 20/04/2021		Co-ordinates (UTM 53L) E 517840 S 8325285	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	10 %
Bankfull bank height	2.5 m	Run	30 %
Bankfull stream width	50 m	Shallow pool (<1m)	60 %
Mean water depth	0.4 m	Deep pool (>1m)	-
Maximum water depth	0.8 m	Dry	-
Mean wetted width	4.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	8 m	Periphyton	-
Riparian width (left bank)	20 m	Filamentous algae	-
Riparian width (right bank)	20 m	Submerged macrophytes	-
Bare ground	60 %	Bank overhang veg	little
Grass	30 %	Trailing bank veg	little
Shrubs	20 %	Blanketing silt	little
Trees < 10 m	50 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	little
Canopy cover	20 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
In situ water quality		Substrate composition	
Temperature	29.1 °C	Bedrock	-
Conductivity	89 µS/cm	Boulder (>256 mm)	5 %
Dissolved oxygen	111 %	Cobble (64-256 mm)	5 %
pH	7.3	Pebble (4-64 mm)	5 %
Turbidity	1.8 NTU	Gravel (2-4 mm)	10 %
		Sand (0.05-2 mm)	75 %
		Silt/clay (<0.05 mm)	-
Comments:			

B11 Magaranyi River 20/04/2021		Co-ordinates (UTM 53L) E 518316 S 8324677	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	1.8 m	Run	-
Bankfull stream width	30 m	Shallow pool (<1m)	90 %
Mean water depth	0.4 m	Deep pool (>1m)	10 %
Maximum water depth	>1.0 m	Dry	-
Mean wetted width	4.0 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	8 m	Periphyton	-
Riparian width (left bank)	15 m	Filamentous algae	-
Riparian width (right bank)	15 m	Submerged macrophytes	-
Bare ground	60 %	Bank overhang veg	little
Grass	40 %	Trailing bank veg	little
Shrubs	30 %	Blanketing silt	little
Trees < 10 m	40 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	little
Canopy cover	20 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
In situ water quality		Substrate composition	
Temperature	28.2 °C	Bedrock	10 %
Conductivity	79 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	97 %	Cobble (64-256 mm)	10 %
pH	7.2	Pebble (4-64 mm)	10 %
Turbidity	28.1 NTU	Gravel (2-4 mm)	10 %
		Sand (0.05-2 mm)	60 %
		Silt/clay (<0.05 mm)	-
Comments:			

B12 Towns River 21/04/2021		Co-ordinates (UTM 53L) E 522667 S 8336830	
			
Upstream		Downstream	
Channel characteristics		Mesohabitat composition	
Reach length	100 m	Riffle	-
Bankfull bank height	2.0 m	Run	10 %
Bankfull stream width	80 m	Shallow pool (<1m)	90 %
Mean water depth	0.5 m	Deep pool (>1m)	-
Maximum water depth	1.0 m	Dry	-
Mean wetted width	15 m		
Riparian characteristics		Microhabitat present	
Riparian veg height (max)	10 m	Periphyton	-
Riparian width (left bank)	20 m	Filamentous algae	-
Riparian width (right bank)	20 m	Submerged macrophytes	-
Bare ground	60 %	Bank overhang veg	little
Grass	30 %	Trailing bank veg	little
Shrubs	30 %	Blanketing silt	little
Trees < 10 m	60 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	little
Canopy cover	10 %		
Instream wood		Macrophyte coverage	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
In situ water quality		Substrate composition	
Temperature	34.5 °C	Bedrock	10 %
Conductivity	1,111 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	101 %	Cobble (64-256 mm)	5 %
pH	7.8	Pebble (4-64 mm)	20 %
Turbidity	3.0 NTU	Gravel (2-4 mm)	15 %
		Sand (0.05-2 mm)	50 %
		Silt/clay (<0.05 mm)	-
Comments:			

Appendix B – Raw Macroinvertebrate Data

Order	Family/Sub-family	B1_1	B1_2	B1A_1	B1A_2	B2_1	B2_2	B3_1	B3_2	B4_1	B4_2	B6_1	B6_2	B7_1	B7_2	B8_1	B8_2	B9_1	B9_2	B10_1	B10_2	B11_1	B11_2	B12_1	B12_2	
Acarina	Acarina		3							1	2	4	7	1	3		1	3	8	3	1	1	3	2	4	
Bivalvia	Corbiculidae																					1	1			
	Hyriidae	1	1			1																				
Coleoptera	Carabidae																									
	Dytiscidae	1	2	2	1	8	6	1	1	22	18			1	6	6	5	5	7	2	1		1	4	7	
	Elmidae																							2	1	
	Gyrinidae	1	2																							
	Haliplidae																		2	4						
	Hydraenidae	1	1	2	1	2	2	1	1		1		1			1	2	6	5	3	2	5	2			
	Hydrochidae	2	1	3	4	1	1	3	1	2	1						17	12	4	1			2	1		
	Hydrophilidae	1	1			6	2	5	7	1	1	1	2				14	13	3	6		1	1	1		
	Noteridae														1		4	2	1							
	Spercheidae						1	1	2																	
Decapoda	Atyidae																							4	3	
	Palaemonidae													1	1					1		1	1	6	5	
Diptera	Ceratopogonidae	20	17	24	22	18	26	24	22	5	8	16	14	14	21	9	8	2	5	9	4	9	13			
	Chironominae	88	65	53	44	21	47	41	55	18	19	55	68	47	53	100	103	26	39	57	43	112	91	38	50	
	Culicidae	1	2		1	2	1	1	1	1	2				1	3		1					2	1		
	Orthocladiinae											1	2					1	3	3	1	1	1	2	1	
	Tabanidae	4	1	1	1	1		1										1	1	1		2	1			
	Tanyderidae	3	1	3	1	2			1				1	1	3	2					4	1		1	4	2
	Tanypodinae	116	88	67	71	52	41	26	22	45	58	48	41	57	50	25	20	18	21	45	36	43	40	22	14	
Ephemeroptera	Baetidae	6	12	12	10	25	14	40	36	27	36	19	24	34	21	17	12	8	10	53	41	16	22	82	101	
	Caenidae	57	51	47	44	31	25	12	5	40	56	22	30	63	78	2	1	10	16	76	88	39	40	32	47	

(continued)

Order	Family/Sub-family	B1_1	B1_2	B1A_1	B1A_2	B2_1	B2_2	B3_1	B3_2	B4_1	B4_2	B6_1	B6_2	B7_1	B7_2	B8_1	B8_2	B9_1	B9_2	B10_1	B10_2	B11_1	B11_2	B12_1	B12_2	
Gastropoda	Planorbidae					1	1	1		6	5	3	5											2	1	
	Ancylidae							1	2	1	2															
	Thiaridae																							6	4	
	Viviparidae	1	1	1	2		2	3	2										1	3			2	2		
Hemiptera	Micronectidae	4	2	4	4	6	9	5	6	8	5	4	3			2	6		2	29	22	1	5	14	22	
	Gerridae					1	3	1							1	4	3	1	3	1						
	Mesoveliidae										1					2	3									
	Nepidae															1										
	Notonectidae			1		2	3			2	2					1	3	1	3					1		
	Pleidae									6	5					3	2									
	Veliidae								1	2				1		1							1	2		
Odonata	Coenagrionidae	1	2				2	2	1	4	1	2	1	1		4	6	4	4				1			
	Corduliidae	1	2																							
	Epiprocta														2											
	Gomphidae										1										1	1				
	Isostictidae								2	1	1												1	2		
	Libellulidae	1	1	5	4	2	1			1		1	1		1	10	4	5	8						4	4
	Zygoptera								3	5			3	2												
Oligochaeta	Oligochaeta			1	1	6	5	15	19	1	4	8	10	3	6	2	8	1	2					6	7	
Trichoptera	Calamoceratidae																								2	1
	Ecnomidae	2	1	2	1	3	1		1		1	8	6	5	2						2	5	2	6		1
	Hydroptilidae	3	4	7	5	7	5	5	4	2	1	15	12	8	6	5	4	4	4	5	6	3	5	2		
	Leptoceridae	3	3	1	2	4	5	1	1	3	2	2	3	3	2		1				4	3	2	1	12	11

Appendix C – Macroinvertebrate Sample Habitat

% composition	Sample																							
	B1_1	B1_2	B1A_1	B1A_2	B2_1	B2_2	B3_1	B3_2	B4_1	B4_2	B6_1	B6_2	B7_1	B7_2	B8_1	B8_2	B9_1	B9_2	B10_1	B10_2	B11_1	B11_2	B12_1	B12_2
Bedrock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	10
Boulder	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Cobble	0	0	25	20	15	0	0	0	0	0	0	0	10	10	0	0	0	0	0	0	10	15	0	10
Pebble	0	10	20	30	25	30	0	0	0	0	0	0	0	0	0	0	0	0	15	10	20	10	20	25
Gravel	30	40	25	10	20	10	0	0	0	0	0	0	10	0	0	0	0	0	10	10	20	20	20	10
Sand	70	50	20	20	30	40	20	0	0	0	60	80	45	40	0	0	20	10	75	80	40	30	60	45
Silt	0	0	10	20	10	20	80	100	100	100	40	20	30	50	100	100	80	90	0	0	0	20	0	0
Bank - vertical	0	0	0	10	5	0	0	0	0	0	20	10	10	0	0	0	10	10	0	0	20	5	0	0
Bank - angled	100	100	100	90	95	100	100	100	100	100	50	90	90	100	100	100	90	80	100	80	80	95	100	100
Bank - undercut	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	10	0	20	0	0	0	0	
Exposed roots	0	10	10	15	0	0	10	0	10	0	30	50	10	20	20	35	20	10	50	60	60	50	30	60
Detritus	25	45	70	90	50	20	70	60	60	75	25	35	35	35	90	100	10	15	20	10	25	35	70	90
Algae	30	30	100	100	0	0	30	50	100	100	70	70	0	0	100	100	100	100	0	0	0	0	0	0
Shade	50	0	0	0	20	40	0	0	90	75	0	0	50	0	0	0	100	25	10	25	0	10	0	0

Appendix D – Macroinvertebrate QA Certificate



Macroinvertebrate Identification Quality Assurance Certificate

Site Code: B9

Replicate: 2

Habitat: Edge

Identification Date: 6/07/2021

Identifier: TS

Identification Level: Family

QA Date: 12/07/2021

Senior Taxonomist: Susan Jones

Taxonomy	Original Count	QA Count	Comment
Acarina	8	6	
Dytiscidae	7	7	
Haliplidae	4	4	
Hydraenidae	5	5	
Hydrochidae	1	1	
Hydrophilidae	6	6	
Ceratopogonidae	5	5	
Chironominae	39	34	
Orthoclaadiinae	3	3	
Tabanidae	1	1	
Tanypodinae	21	20	
Baetidae	10	10	
Caenidae	16	15	
Viviparidae	3	3	
Gerridae	3	3	
Micronectidae (Corixidae)	2	2	
Notonectidae	3	3	
Coenagrionidae	4	4	
Libellulidae	8	8	
Oligochaeta	2	2	
Hydroptilidae	5	5	

Percentage Correct: 100%

QA Result: Pass

ATTACHMENT G



Sediment Monitoring Report

Roper Bar Mine

Nathan River Resources



DOCUMENT CONTROL RECORD

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Document ID	193503-60
Author(s)	Bill Dwyer and Gisela Lamche

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Rev	Reviewed by	Approved by	Issued to	Date
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ACRONYMS

AS	Australian Standard
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018
DENR	Department of Environment and Natural Resources (Northern Territory) – formerly DLRM
DGV	Default Guideline Values
ISQG	Interim Sediment Quality Guideline
NATA	National Association of Testing Authorities
NRR	Nathan River Resources
NT	Northern Territory
RBM	Roper Bar Mine
ROM	Run Of Mine
SOCS	Sites of Conservation Significance
WDL	Waste Discharge License
WMMP	Water Management and Monitoring Plan

1 INTRODUCTION

The Roper Bar Mine (RBM) is located approximately 720 km south-east of Darwin in the Gulf of Carpentaria (Figure 1-1). The RBM has been in caretaker operations since 2015 when the previous company went into liquidation.

In August 2020 EcOz Environmental Consultants (EcOz) was engaged by Nathan River Resources (NRR) to conduct sediment monitoring on the Roper Bar Mine site (hereby to be referred to as the site).

1.1 Background

The RBM is licenced to conduct controlled discharges of mine site water in accordance with Waste Discharge Licence 246 (WDL246) issued by the Northern Territory Government's Department of Environment and Natural Resources (DENR) under the Northern Territory *Water Act*. As per WDL249, NRR are required to comply with the following levels of protection to the receiving environment:

- 99% species protection for freshwater ecosystems (Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018)
- No change in water/sediment chemical and physical properties beyond natural variation
- No change in biodiversity beyond natural variation.

The area immediately surrounding the mine site including the Towns River, Magaranyi River and Pandanus Creek have a high ecological value, and connect to the Limmen Bight and associated coastal floodplains Site of Conservation Significance (SOCS), which is habitat to the critically endangered Largetooth Sawfish.

WDL246 authorises discharges of water from the site through the Authorised Discharge Point RBAD1, located immediately adjacent to the Towns River and consists of water from the F-East pit 1 (FE1) discharge pipe (see Figure 1-1).

WDL246 requires monitoring of surface and groundwaters, as well as sediments and biological monitoring as per the Nathan River Project Water Management and Monitoring Plan (WMMP). Sediment and biological monitoring are required annually and were scheduled to occur in April 2020 to capture conditions at the end of the wet season. However due to COVID-19 biosecurity restrictions, this monitoring was not able to take place. Following the easing of restrictions in mid-2020, EcOz were able to undertake sediment monitoring in September 2020.

1.2 Purpose and scope

The aim of this report is to characterise the sediment quality at key locations around the site. This report presents the findings of the September 2020 sediment sampling event. It involved sampling nine locations including upstream and downstream of the discharge point to ensure compliance with the requirements of WDL246. Additionally, this report addresses Condition 46 of WDL246 which requires a review of the sediment and biological monitoring programs to assess its capability to assess the environmental impact from the licensed activity and determine if the level of protection for the receiving environment has been achieved by the licensee.

This report presents the following information:

- Details of the sediment monitoring program as per the WMMP
- Sediment monitoring methods undertaken during September 2020
- Field and laboratory results from the September 2020 monitoring event
- An assessment of the sediment monitoring program to fulfil the requirements of Condition 46 of the WDL246.

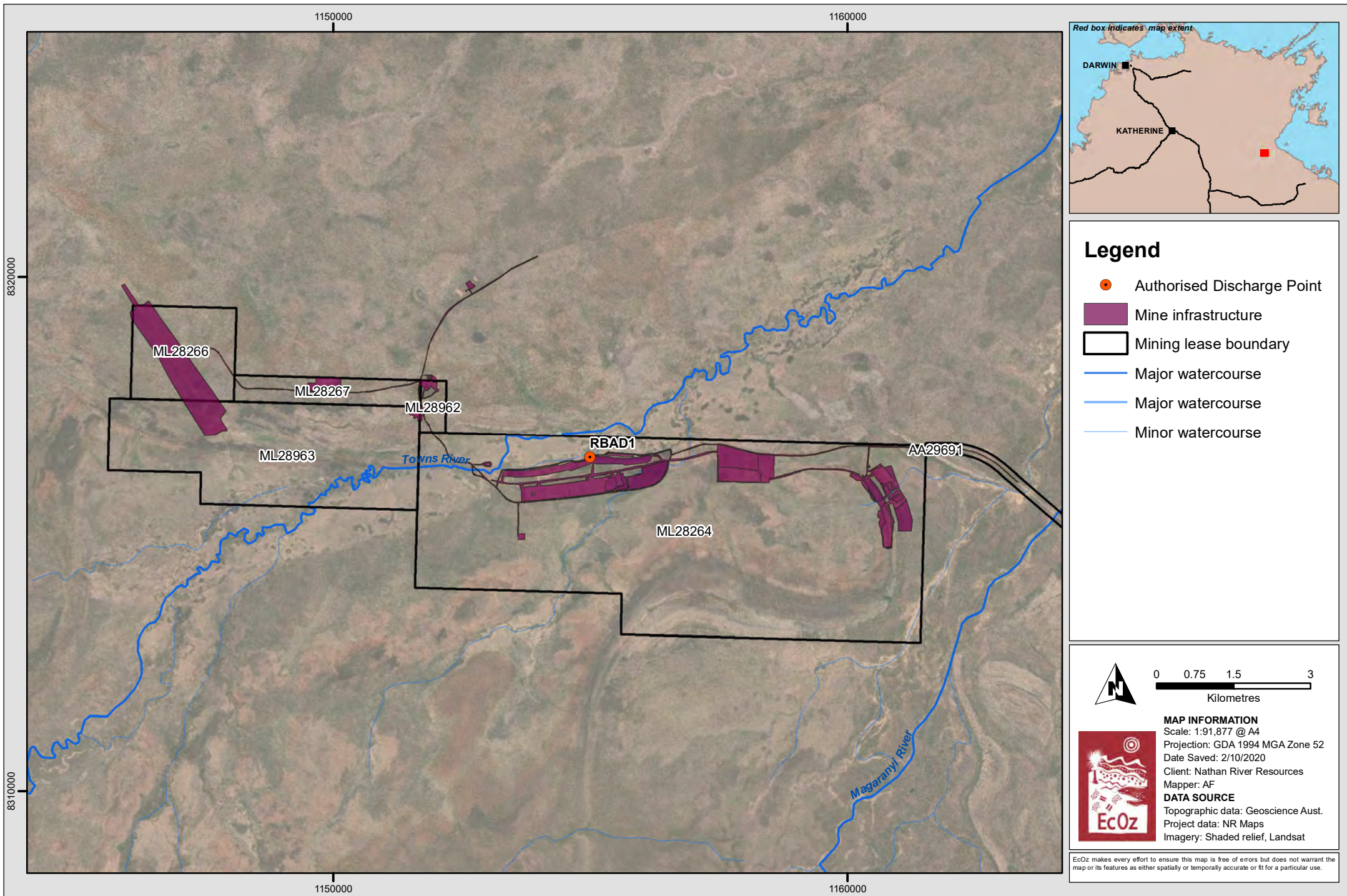


Figure 1-1. Project location and site layout

2 SEDIMENT MONITORING PROGRAM

2.1 Sediment monitoring locations

Sediment samples require collection from nine sites that are located upstream and downstream of the Authorised Discharge Point RBAD1 along the Towns River, and also at upstream and downstream sites on the Magaranyi River and Pandanus Creek. The locations of the sediment sample sites in relation to the mine site are shown in Figure 2-1, and their location coordinates and descriptions are provided in Table 2-1 below.

RBSW14 is the furthest downstream site on the Towns River after the convergence with the Magaranyi River. This site experiences tidal variation and therefore records higher salinities than the remaining sites.

Table 2-1. Sediment monitoring locations and descriptions

Site ID	Latitude	Longitude	Description	Purpose	Frequency
RBSW01	15.15032° S	135.04143° E	Towns River Upstream Control Site	Control (upstream)	Annual
RBSW02	15.14818° S	135.06526° E	Towns River located upstream of Wades Crossing	Impact (downstream)	
RBSW04	15.14256° S	135.08734° E	North of F-East Pit on Towns River off the Levee Wall	Impact (downstream)	
RBSWDS	15.13134° S	135.10321° E	Towns River downstream gauging station	Impact (downstream)	
RBSW08	15.14335° S	135.10738° E	Downstream of ROM pad	Impact (downstream)	
RBSWPU	15.15211° S	135.13860° E	Pandanus Creek Upstream	Control (upstream)	
RBSW09	15.14645° S	135.14436° E	Pandanus Creek Downstream of E-East and Storm water basin inputs	Impact (downstream)	
RBSW13	15.15342° S	135.16995° E	Magaranyi River Upstream	Control (upstream)	
RBSW14	15.04343° S	135.21112° E	Towns River Downstream	Impact (downstream)	

2.2 Sediment monitoring method

Sediment monitoring methods proposed by NRR are based on the Australian Standard – *Guide to the investigation and sampling of sites with potentially contaminated soils* (AS 4482.1-2005). The NRR sediment monitoring methods have been established to allow for repeatable sampling events and comparable data over time. The sediment monitoring method involves the following steps:

- Sediment samples are taken from reasonably straight river reaches and taken from the primary or low flow channel when multiple channels are present.
- Nitrile gloves are worn while sampling with new gloves for each sampling site to avoid cross contamination.

- Five sub-samples are collected (approximately 1 kg at each sub-sample location) from a cross-section of the stream bed between the surface and a depth of 200 mm.
- Sub-samples are evenly spaced across the stream bed at the sampling location.
- Sub-samples are combined and mixed thoroughly in a clean decontaminated bucket.
- A sample is taken from the bucket and placed into laboratory supplied sample jars that are labelled accordingly.
- Field observations are recorded for each sampling location on a Soil Sampling Field Data Sheet (see Appendix A).

2.3 Sediment monitoring analysis parameters

Sediment samples are analysed by a NATA accredited laboratory following each sampling event for the following analysis:

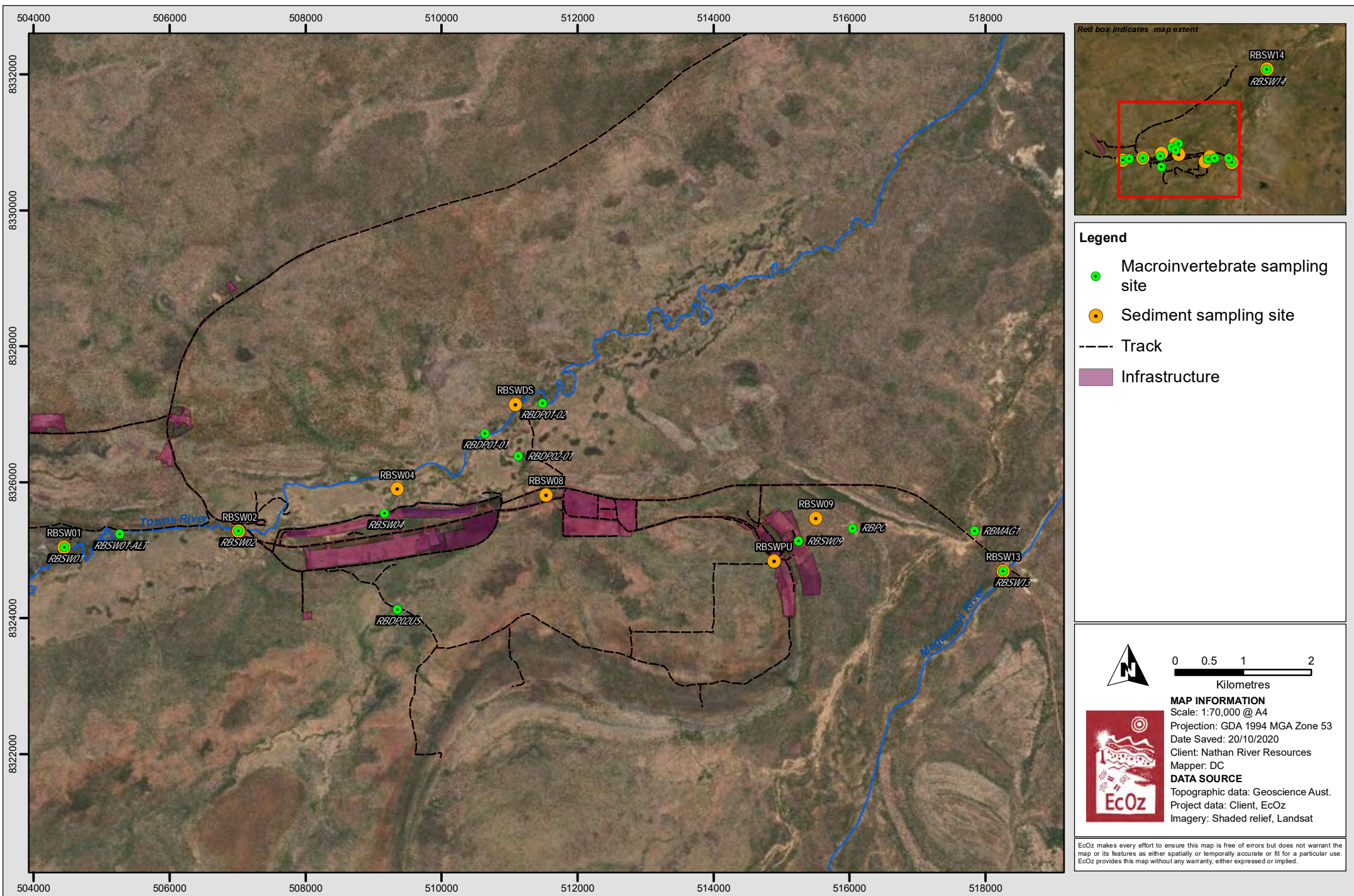
- Electrical conductivity
- pH
- Total Organic Carbon (TOC)
- Metals (Al, As, B, Ba, Cd, Co, Cu, Fe, Li, Pb, P, Mn, Hg, Mo, Ni, Rb, Se, Sr, Ag, U and Zn)
- Major cations and anions (Ca, Mg, K, Na, Cl, CN, SO₄, NO₃, CaCO₃, H₂SO₄)
- Particle Size Distribution (sieve and hydrometer).

2.4 Sediment assessment guidelines

NRR have adopted the precautionary approach to sediment sampling analysis and have chosen to apply the Interim Sediment Quality Guideline (ISQG) values, now referred to as the toxicant default guideline values (DGVs); ANZG 2018). These consist of the upper and lower DGVs for metals and metalloids. Table 2-2 presents the assessment DGVs for sediment samples, which is also referenced in NRR's Water Management and Monitoring Plan.

Table 2-2. Assessment guideline values for sediment samples

Metals	Units	DGV-Low	DGV-High
Antimony	mg/kg	2	25
Arsenic	mg/kg	20	70
Cadmium	mg/kg	1.5	10
Chromium	mg/kg	80	370
Copper	mg/kg	65	270
Lead	mg/kg	50	220
Mercury	mg/kg	0.15	1
Nickel	mg/kg	21	52
Silver	mg/kg	1	3.7
Zinc	mg/kg	200	410



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20072 - Nathan River Resources\01 Project Files\Project Templates\Sediment and macroinvertebrate sampling sites.mxd

Figure 2-1. Map of sample locations

3 SEPTEMBER 2020 SEDIMENT MONITORING

Sediment sampling was undertaken on 1 and 2 September 2020. All stream beds were dry at the time of sampling, with the exception of RBSW14 which had water present in pools (no flowing water was observed). Photos of the sites and sediments are available in Appendix C.

3.1 Sediment monitoring results

Field observations included colour, moisture content, texture, structure and general sample site observations. These are summarised for each sample site in Table 5-1 and are provided with the individual field sheets in Appendix A.

Laboratory analysis results for those analytes with toxicant default guideline values (DGVs) are provided in Table 3-1 below with the remainder of the metals in Table 3-2. Many metals were below their limit of detection, especially the ones that have a toxicant DGV. With regards to the metals that were measured, higher concentrations were recorded at site RBSW02. The physical parameters and major ions distinguished site RBSW14 as different to all other sites through the high electrical conductivity (EC), high pH, higher acid neutralising capacity as well as higher concentrations of all the other major ions (Table 3-3). The particle sizes of the sediment samples taken showed sand as the major component at all sites with clay the second dominating size at RBSW08 and RBSW09 whilst it was gravel at RBSW01, RBSW02 and RBSWPU (Table 3-4 and Table 3-5). The comprehensive laboratory certificates of analysis are provided in Appendix B.

3.2 Discussion of sediment data 2020

The toxicant DGVs as listed in Table 3-1 indicate the concentrations 'below which there is a low risk of unacceptable effects occurring to the aquatic environment'. They should be used, with other lines of evidence, to protect aquatic ecosystems (ANZG 2018). In contrast, the upper guideline values 'provide an indication at which toxicity-related adverse effects might already be observed'. Thus, this high value is intended to be used as indicator of potential high-level toxicity problems, not as guideline value to ensure protection of ecosystems (ANZG 2018).

None of the concentrations reported at any of the sites in September 2020 reached the low sediment assessment guideline value (Table 3-1). In fact, most determinants were below their respective limit of detection. Thus, it appears that the sediments of the dried creek beds do not display signs of contamination at present, or from the operational stage of the mine in 2013/14.

The concentrations of the remaining metals displayed a considerable variability. These baseline data (a small data set) do not allow for the conclusion that the control sites are different from impact sites (please also refer to review of sampling design in section 4). This is also apparent from the triplicate samples taken at site RBSW13, which displayed a considerable range of aluminium and iron concentrations, but also for some of the major ions, i.e. calcium and potassium. The tidal influence at site RBSW14 is apparent from the much higher EC, pH and major ions. It might be debatable whether this site can be included in future statistical analysis due to these differences. However, indication of potential dilution of toxicants at this downstream site might be distinguishable.

It is recommended that sediments are sampled during late wet season recessional flows to determine if concentrations differ from the September 2020 dry season sampling.

Table 3-1. Laboratory results summary for Sediment Toxicant DGV* covered metals

Site ID	Date	pH	Antimony	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Silver	Zinc	Mercury
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sediment Toxicant DGV*			2-25	20-70	1.5-10	80-370	65-270	50-220	21-52	1-4	200-410	0.15-1
RBSW01	02-09-20	6.5	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
RBSW02	02-09-20	5.7	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
RBSW04	02-09-20	5.5	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
RBSWDS	02-09-20	5.8	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
RBSW08	02-09-20	5	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
RBSWPU	02-09-20	5.5	-	<5	<1	-	<5	<5	<2	<2	6	<0.1
RBSW09	02-09-20	5.9	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
RBSW13	02-09-20	5.5	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
RBSW14	01-09-20	8.2	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
Duplicate	02-09-20	5.6	-	<5	<1	-	<5	<5	<2	<2	<5	<0.1
Triplicate	02-09-20	6.3	-	<2	<0.4	-	<5	<5	<5	<0.2	<5	<0.1

*Sediment Toxicant DGV: Toxicant default guideline values for sediment quality (<https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants>, ANZG (2018).

Table 3-2. Remainder metals (not carrying a toxicant default guideline value)

Site ID	Date	Aluminium	Barium	Boron	Cobalt	Iron	Lithium	Manganese	Molybdenum	Selenium	Strontium	Uranium
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RBSW01	02-09-20	590	<10	<50	<2	3390	0.3	24	<2	<5	<2	0.1
RBSW02	02-09-20	1420	20	<50	3	7460	0.5	57	<2	<5	<2	0.3
RBSW04	02-09-20	720	20	<50	<2	5680	0.2	24	<2	<5	<2	0.2
RBSWDS	02-09-20	970	10	<50	2	3750	0.3	38	<2	<5	<2	0.1
RBSW08	02-09-20	840	10	<50	<2	4430	0.5	49	<2	<5	<2	0.3
RBSWPU	02-09-20	560	<10	<50	<2	3520	0.1	46	<2	<5	<2	0.1
RBSW09	02-09-20	1060	20	<50	3	3430	0.5	76	<2	<5	<2	0.2
RBSW13	02-09-20	390	<10	<50	<2	3400	<0.1	9	<2	<5	<2	0.1
RBSW14	01-09-20	500	<10	<50	2	5030	0.4	43	<2	<5	10	0.3
Duplicate	02-09-20	310	<10	<50	<2	1890	0.1	7	<2	<5	<2	<0.1
Triplicate	02-09-20	1200	11	< 10	< 5	3800	< 5	12	< 5	< 2	33	< 10

Table 3-3. Physical parameters and major ions results

Site ID	Date	Electrical Conductivity @ 25°C	pH	TOC	ANC as H ₂ SO ₄	ANC as CaCO ₃	Calcium	Magnesium	Sodium	Potassium	Chloride	Cyanide	Sulfate as SO ₄ ²⁻	Nitrate as N
		µS/cm	pH Unit	%	kg H ₂ SO ₄ equiv./t	% CaCO ₃	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RBSW01	02-09-20	26	6.5	0.15	6.4	0.6	<10	<10	20	20	10	<1	<10	3.9
RBSW02	02-09-20	37	5.7	0.66	7.7	0.8	<10	10	30	50	20	<1	10	4.6
RBSW04	02-09-20	60	5.5	0.39	8.8	0.9	<10	<10	40	20	30	<1	40	1.5
RBSWDS	02-09-20	32	5.8	0.53	8.3	0.8	<10	<10	10	20	<10	<1	<10	0.9
RBSW08	02-09-20	109	5	0.62	7.4	0.8	<10	<10	80	10	100	<1	30	9.3
RBSWPU	02-09-20	20	5.5	0.69	7.7	0.8	<10	<10	<10	<10	<10	<1	<10	1.3
RBSW09	02-09-20	21	5.9	0.52	8.8	0.9	<10	20	20	20	<10	2	<10	0.6
RBSW13	02-09-20	25	5.5	0.44	7.3	0.7	<10	<10	20	<10	20	<1	<10	0.3
RBSW14	01-09-20	3990	8.2	0.6	12.5	1.3	320	590	4150	220	7220	<1	1730	0.4
Duplicate	02-09-20	94	5.6	0.3	7.1	0.7	<10	<10	30	<10	30	<1	<10	0.2
Triplicate	02-09-20	30	6.3	0.2	-	0.1	4200	250	65	94	26	< 5	< 30	-

Table 3-4. Particle size results

Site ID	Date	+75µm	+150µm	+300µm	+425µm	+600µm	+1180µm	+2.36mm	+4.75mm	+9.5mm	+19.0mm	+37.5mm	+75.0mm
		%	%	%	%	%	%	%	%	%	%	%	%
RBSW01	02-09-20	82	56	38	32	28	26	24	18	11	1	<1	<1
RBSW02	02-09-20	64	45	30	27	26	25	23	22	18	<1	<1	<1
RBSW04	02-09-20	84	70	38	25	17	13	11	6	2	<1	<1	<1
RBSWDS	02-09-20	80	69	41	21	10	5	4	2	<1	<1	<1	<1
RBSW08	02-09-20	36	12	2	1	<1	<1	<1	<1	<1	<1	<1	<1
RBSWPU	02-09-20	80	64	42	37	35	34	32	18	<1	<1	<1	<1
RBSW09	02-09-20	66	45	20	11	5	2	2	<1	<1	<1	<1	<1
RBSW13	02-09-20	94	87	40	12	2	<1	<1	<1	<1	<1	<1	<1
RBSW14	01-09-20	94	91	67	37	17	11	8	5	<1	<1	<1	<1
Duplicate	02-09-20	93	84	37	10	2	<1	<1	<1	<1	<1	<1	<1

Table 3-5. Particle size results continued

Site ID	Date	Clay (<2 µm)	Silt (2-60 µm)	Sand (0.06-2.00 mm)	Gravel (>2mm)	Cobbles (>6cm)
		%	%	%	%	%
RBSW01	02-09-20	9	9	57	25	<1
RBSW02	02-09-20	19	11	46	24	<1
RBSW04	02-09-20	9	3	76	12	<1
RBSWDS	02-09-20	11	7	78	4	<1
RBSW08	02-09-20	30	21	49	<1	<1
RBSWPU	02-09-20	8	8	52	32	<1
RBSW09	02-09-20	20	8	70	2	<1
RBSW13	02-09-20	4	1	95	<1	<1
RBSW14	01-09-20	3	2	86	9	<1
Duplicate	02-09-20	5	2	93	<1	<1

4 SEDIMENT MONITORING PROGRAM ASSESSMENT

4.1 Review of sample site location

The current design sets out six impact sites downstream of operational areas complemented by three control sites upstream (see Figure 2-1. Map of sample locations). While the impact sites are all potentially affected by the mining operations, two of the three control sites also appear to be impacted by previous mining operations including:

- RBSWPU: which is on a small ephemeral drainage line that is hardly defined (Pandanus Creek) upstream of the mine infrastructure (Figure 1-1, eastern structure of ML28264, purple colour). It is too near to the disturbed areas to not be impacted and should thus not serve as a reference or control site. It is understood that this creek (Pandanus Creek) was selected in an attempt to monitor in this area using the upstream versus downstream sites design. However, this is considered impossible and both sites are assumed impact sites, albeit likely to differing extent.
- RBSW13: which is located near a road crossing of Magaranyi River, but is likely receiving some impact from the west (Figure 2-1). A site approximately 5 km further upstream would ensure a true control location. However, it is possible that this is either hard to access and/or the upstream area flows less frequently than at the current site. A possible site would be site “MUS” = upstream Magaranyi River as sampled for macroinvertebrates for the Roper Bar Iron Ore Draft EIS (EcOz 2012). Nevertheless, at the current location, the site cannot be classed as control site.

This leaves only one true control site out of the 9 sites selected. This can be improved by moving RBSW13 approximately 5 km upstream. A third control site could be chosen on Yumanji Creek a short distance to the north of RBM, assuming that no development or operation is taking place (or has in the past) in this area.

It is worth noting that site RBSW14 is tidally influenced and thus somewhat different from all other sites and not comparable in all parameters. It is, however, considered an important site as it represents the water and sediment quality that enters the receiving environment.

An assessment of biological monitoring locations, as required under Condition 46, was unable to be undertaken as most locations were dry at the time of sampling. It is proposed to undertake a review of biological monitoring locations as part of the next monitoring round scheduled for April 2021.

4.2 Review of timing of sampling and parameters investigated

The timing of sediment sampling in the WMMP is planned annually during the late wet season (i.e. April), and during the period of recessional flow in the Top End climate. This is considered adequate sampling timing for both, sediments and biological. The fact that sampling in 2020 was delayed to September was unfortunate as creeks and rivers were dry or not flowing, but was a result of events outside of NRRs control.

The field and laboratory parameters measured as part of this sediment monitoring program are consistent with the ANZ Guidelines (2018) and are thus considered best current practice.

4.3 Conclusion

The sediment monitoring program requires some modification by moving two of the control sites as outlined in Section 4.1. It is concluded that the program is then designed well to assess the potential environmental impact of the mining activity and whether the required level of protection is achieved with regards to the sediments of the receiving environment.

5 REFERENCES

- ANZECC (2000). *Australian and New Zealand guidelines for fresh and marine water quality. Volume 1, The guidelines*, October 2000, National Water Quality Management Strategy, Paper No. 4, Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
- ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines
- EcOz (2012): Draft EIS – Appendix S. Baseline Survey: Freshwater Macroinvertebrates. Western Desert Resources Ltd; Roper Bar Iron Ore Project; 26p.
https://ntepa.nt.gov.au/_data/assets/pdf_file/0011/290999/Appendix-S-Macroinvertebrates-Survey-Report.pdf (accessed 7/10/2020).

APPENDIX A SOIL SAMPLING OBSERAVTIONS AND FIELD DATA SHEETS

Table 5-1. Field observation summary

Site ID	Date	Time	Sample type	Depth (m)	Horizon	Colour	Moisture	Texture	Structure	Field observations
RBSW01	02-09-20	0700	Surface	<0.2	A	Light brown/brown	Dry	Fine	Fine/pebbles	Open stretch creek bed - dry. Hard surface (surface crusting) u/s site. Sampled in depositional area. Fine silt/clay. No organic matter, no visible contaminants.
RBSW02	02-09-20	1230	Surface	<0.2	A	Brown	Dry	Clay/rocky material	Clay and peds (~20mm)	Organic matter (leaf litter on surface), very rocky creek bed, difficult to get 0.2 m depth. No observed visual contamination or odour. Downstream of road culvert/drain.
RBSW04	02-09-20	1145	Surface	<0.2	A	Brown	Moderately moist	Silt/sand	Fine silt and peds (~10mm)	Well defined drainage line downstream of F-East Pit, small pool remaining in creek. No sign of contamination, minimal organic matter. Sampled at surface water monitoring site.
RBSWDS	02-09-20	1100	Surface	<0.2	A	Brown	Dry	Fine silt/sand (clay crust)	Surfaces crust, silt & fine sand, clay peds (~20mm)	Well defined creek, no visible signs of contamination or odour. Some organic matter/leaf litter on surface. Surface crust.
RBSW08	02-09-20	1300	Surface	<0.2	A	Red/grey	Dry	Clay-large peds on surface, fine powdery silt underneath	Surface 40mm red clay, underneath grey/light brown	Sampling location repositioned to where surface water samples are taken (~90 m difference). Low depression area - no defined creek line. No visible signs of contamination or odour. Hard clay surface cracking - all dry.
RBSWPU	02-09-20	0900	Surface	<0.2	A	Brown/dark brown	Dry	Fine/silty-lots of pebbles	Fine/pebbles	Very small/narrow creek bed (~2-3 m width) drainage line. No visible surface contamination/odour. Minimal organic matter.
RBSW09	02-09-20	1000	Surface	<0.2	A	Brown	Dry	Fine	Fine/clay-forming peds (~40mm)	Small drainage line ~3-4 m width. Surface crusty-cracking, clay soil, minimal organic matter, no visible evidence of contamination.

Site ID	Date	Time	Sample type	Depth (m)	Horizon	Colour	Moisture	Texture	Structure	Field observations
RBSW13	02-09-20	0810	Surface	<0.2	A	Light brown/brown	Dry	Fine sand	Fine sand	Dry creek bed, sandy surface, coffee rock/sandstone underlain, some organic matter (leaf litter on surface, no visible sign of contaminants).
RBSW14	01-09-20	1600	Surface	<0.2	A	Brown-dark brown/black	Moist	Sandy	Large sandy granules	Organic matter - leaf litter/root matter on surface from prior pooling. Sampled upstream of road crossing. No flow. Pooled on one side - not sampled within water. Salts crusting on surface.



Soil Sampling Field Data Sheet

PROJECT: E220072		DATE and TIME: 1.9.20 16:00	
SITE ID: RBSW14 (TOWN'S RIVER DIS.)		SAMPLERS NAME: S. BARBER	
PHOTO NOS: RBSW14		GRID ZONE (circle): 52 (53)	
Longitude (decimal degrees) S 15.04343°		Latitude (decimal degrees) E 135.2112°	
SOIL DESCRIPTION: EASTING: 0522713 NORTHING: 8336875			
SAMPLE TYPE (circle): Surface / Auger / Coring / Pit / Other: <0.2m Depth.			
SAMPLE EQUIPMENT USED^: TROWEL (PLASTIC)			
DEPTH (m): <0.2m	HORIZON*: A	COLOUR#: Brown - DARK BROWN / BLK	
MOISTURE (circle): Wet / Moist / Moderately Moist / Dry		FIELD pH:	
FIELD TEXTURE*: SANDY			
MOTTLES*: N/A			
STRUCTURE*: LARGE SANDY GRANULES			
DISTINCTIVE FEATURES (if relevant)*:			
Cutans:		Voids (cracks/pores):	
Strength:		Stickiness:	
Plasticity:		Condition when dry:	
Water repellence:		Pans:	
Segregations:		Carbonate (effervescence with acid):	
Roots (size/abundance):		Other:	
OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):			
ORGANIC MATTER - LEAF LITTER / ROOT MATTER ON SURFACE FROM PREVIOUS POOLING. SAMPLES U/S OF ROAD CROSSING. NO FLOW OBSERVED. POOLS ON ONE SIDE - NOT SAMPLED WITHIN WATER - CROCODILE 20m U/S.			
LABORATORY SAMPLES SALTS CRUSTING ON SURFACE - TITRAL			
Analytes Requested	Containers Used	QA/QC Samples Collected (circle)	
pH / EC TOC METALS MAJOR IONS & PSD	2x SOIL SAMPLE BAGS (500ml) 1x ASS BAG 1x JAR (250 ml).	N/A Duplicate Split Blank	

^ Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit

* See Australian Soil and Land Survey Field Handbook, 3rd Edition, 2009:

- p148 – 158 for Horizon codes
- p161 – 170 for Field Texture
- p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
- p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
- p182 – 204 for Other Distinctive Features

Use Munsell Soil Colour Chart



Soil Sampling Field Data Sheet

PROJECT: E220072		DATE and TIME: 2-9-20 7AM.	
SITE ID: RBSW01		SAMPLERS NAME: S. BARBER	
PHOTO-NOs: U/S TOWNS RIVER		GRID ZONE (circle): 52 (53)	
Longitude (decimal degrees) S 15-15032°		Latitude (decimal degrees) 135-04143° E	
SOIL DESCRIPTION:			
SAMPLE TYPE (circle): <u>Surface</u> / Auger / Coring / Pit / Other:			
SAMPLE EQUIPMENT USED [^] : TROWEL (PLASTIC)			
DEPTH (m): < 200 mm	HORIZON*: A	COLOUR#: LIGHT BROWN / BROWN	
MOISTURE (circle): Wet / Moist / Moderately Moist / <u>Dry</u>			FIELD pH:
FIELD TEXTURE*: FINE			
MOTTLES*: N/A			
STRUCTURE*: FINE MATRICAL / PEBBLES.			
DISTINCTIVE FEATURES (if relevant)*:			
Cutans:		Voids (cracks/pores):	
Strength:		Stickiness:	
Plasticity:		Condition when dry: DUSTY / FINE SILT	
Water repellence:		Pans:	
Segregations:		Carbonate (effervescence with acid):	
Roots (size/abundance): NIL		Other:	
OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):			
OPEN STREAM CREEK BED - DRY. HARD SURFACE (SURFACE CRUSTING) U/S SITE - SAMPLED IN DEPOSITIONAL AREA. U. FINE SILT/CLAY MATRICAL NO ORGANIC MATTER, NO VISIBLE CONTAMINANTS.			
LABORATORY SAMPLES			
Analytes Requested	Containers Used	QA/QC Samples Collected (circle)	
PH/EC; TOC; METALS; MAJOR IONS & PSD	2x SOIL SAMPLE BAGS 1x ASS BAG 1x JAR (250ml)	N/A Duplicate Split Blank	

[^] Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit

* See Australian Soil and Land Survey Field Handbook, 3rd Edition, 2009:

- p148 – 158 for Horizon codes
- p161 – 170 for Field Texture
- p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
- p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
- p182 – 204 for Other Distinctive Features

Use Munsell Soil Colour Chart



Soil Sampling Field Data Sheet

PROJECT: E220072	DATE and TIME: 2-9-20 8:10 AM
SITE ID: RBSW13	SAMPLERS NAME: S. BARBER
PHOTO NOS: (u/s MAGARANYI Rv.)	GRID ZONE (circle): 52 153
Longitude (decimal degrees) 15.15342° S	Latitude (decimal degrees) 135.16995° E

SOIL DESCRIPTION:

SAMPLE TYPE (circle): Surface / Auger / Coring / Pit / Other:

SAMPLE EQUIPMENT USED[^]: TROWEL (PLASTIC)

DEPTH (m): < 200 mm HORIZON*: A COLOUR#: LIGHT BROWN) BROWN

MOISTURE (circle): Wet / Moist / Moderately Moist / Dry FIELD pH:

FIELD TEXTURE*: FINE SAND

MOTTLES*: NIL

STRUCTURE*: FINE SAND

DISTINCTIVE FEATURES (if relevant)*:

Cutans:	Voids (cracks/pores):
Strength:	Stickiness:
Plasticity:	Condition when dry:
Water repellence:	Pans:
Segregations:	Carbonate (effervescence with acid):
Roots (size/abundance): NIL	Other:

OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):

DRY CK BED, SANDY SURFACE, COFFEE ROCK / SANDSTONE UNDERLAIN, SOME ORGANIC MATTER (LEAF LITTER ON SURFACE), NO VISIBLE SIGNS OF CONTAMINANTS.

LABORATORY SAMPLES

Analytes Requested	Containers Used	QA/QC Samples Collected (circle) YES
PH/EC ; TOC ; METALS ; MAJOR IONS ; PSD	1 x SS BAGS 3 x ASS " 3 x JAR 250ml	Duplicate DUF Split TRI Blank

[^] Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit

* See Australian Soil and Land Survey Field Handbook, 3rd Edition, 2009:

- p148 – 158 for Horizon codes
- p161 – 170 for Field Texture
- p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
- p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
- p182 – 204 for Other Distinctive Features

Use Munsell Soil Colour Chart



Soil Sampling Field Data Sheet

PROJECT: EZ 20072	DATE and TIME: 2-9-20 9AM.
SITE ID: RBSWPU	SAMPLERS NAME: S. BARBER
PHOTO-NOs: U/S PANDAWUS CK.	GRID ZONE (circle): 52 (53)
Longitude (decimal degrees) 15.15211° S	Latitude (decimal degrees) 135.13860° E

SOIL DESCRIPTION:

SAMPLE TYPE (circle): Surface / Auger / Coring / Pit / Other:

SAMPLE EQUIPMENT USED[^]: Trowel (Plastic)

DEPTH (m): < 200 m HORIZON*: A COLOUR#: Brown / Dark Brown

MOISTURE (circle): Wet / Moist / Moderately Moist / Dry FIELD pH:

FIELD TEXTURE*: FINE / SILTY - LOTS OF PEBBLES

MOTTLES*: NIL

STRUCTURE*: FINE / PEBBLES

DISTINCTIVE FEATURES (if relevant)*:

Cutans:	Voids (cracks/pores): SURFACE CRUST
Strength:	Stickiness:
Plasticity:	Condition when dry: DUSTY / FINE
Water repellence:	Pans:
Segregations:	Carbonate (effervescence with acid):
Roots (size/abundance): NIL	Other:

OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):

V. SMALL / NARROW CREEK BED (~2-3m WIDTH) DRAINAGE LINE.
NO VISIBLE SURFACE CONTAMINANTS / ODOUR, MINIMAL ORGANIC MATTER.

LABORATORY SAMPLES

Analytes Requested	Containers Used	QA/QC Samples Collected (circle)
PH / EC ; TOC ; METALS ; MAJOR IONS ; PSD	2x SS BAGS 1x ASS BAG 1x JAR 250ml.	NIL Duplicate Split Blank

[^] Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit
^{*} See Australian Soil and Land Survey Field Handbook, 3rd Edition, 2009:
 - p148 – 158 for Horizon codes
 - p161 – 170 for Field Texture
 - p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
 - p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
 - p182 – 204 for Other Distinctive Features

[#] Use Munsell Soil Colour Chart



Soil Sampling Field Data Sheet

PROJECT: E220072		DATE and TIME: 2.9.20 10 AM	
SITE ID: RBSW09		SAMPLERS NAME: S. BARBER	
PHOTO-NOs: PANDANUS CK D/S		GRID ZONE (circle): 52 (53)	
Longitude (decimal degrees) 15.14645° S		Latitude (decimal degrees) 135.14436° E	
SOIL DESCRIPTION:			
SAMPLE TYPE (circle): <u>Surface</u> / Auger / Coring / Pit / Other:			
SAMPLE EQUIPMENT USED [^] : TROWEL (PLASTIC)			
DEPTH (m): 200 mm	HORIZON*: A	COLOUR#: BROWN	
MOISTURE (circle): Wet / Moist / Moderately Moist / <u>Dry</u>			FIELD pH:
FIELD TEXTURE*: FINE			
MOTTLES*: NIL			
STRUCTURE*: FINE / CLAY / FORMING PEDDOLS. (~2mm)			
DISTINCTIVE FEATURES (if relevant)*:			
Cutans:		Voids (cracks/pores): SURFACE CRUST	
Strength:		Stickiness:	
Plasticity:		Condition when dry: DUTY	
Water repellence:		Pans:	
Segregations:		Carbonate (effervescence with acid):	
Roots (size/abundance): NIL.		Other:	
OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):			
SMALL DRAINAGE LINE ~ 3-4m WIDTH. SURFACE CRUST-CRACKING, CLAY SOIL, MINIMAL ORGANIC MATTER, NO VISIBLE SURFACE CONTAMINATION OR ODOUR. ~ 300m WALK TO CK. NO WATER AT ALL.			
LABORATORY SAMPLES			
Analytes Requested	Containers Used	QA/QC Samples Collected (circle)	
PH/EC ; TOC ; MOMMS ; MAJOR IONS ; PSD	2 x SS BAGS 1 x ASS BAG 1 x JAR 150ml	Duplicate Split Blank	

[^] Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit

* See *Australian Soil and Land Survey Field Handbook*, 3rd Edition, 2009:

- p148 – 158 for Horizon codes
- p161 – 170 for Field Texture
- p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
- p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
- p182 – 204 for Other Distinctive Features

Use Munsell Soil Colour Chart



Soil Sampling Field Data Sheet

PROJECT: E220072		DATE and TIME: 2.9.20 11 Am	
SITE ID: RBSWDS		SAMPLERS NAME: S. BARBER	
PHOTO NOS: Tarns Rv. D/S - GAUGING STN.		GRID ZONE (circle): 52 (53)	
Longitude (decimal degrees) 15.13134° (S)		Latitude (decimal degrees) 135.10321° E	
SOIL DESCRIPTION:			
SAMPLE TYPE (circle): Surface / Auger / Coring / Pit / Other:			
SAMPLE EQUIPMENT USED [^] : HAND TROWEL (PLASTIC)			
DEPTH (m): 0.2 m	HORIZON*: A	COLOUR#: Brown	
MOISTURE (circle): Wet / Moist / Moderately Moist / (Dry)			FIELD pH:
FIELD TEXTURE*: FINE SILT/SAND/CLAY CRUST.			
MOTTLES*: NIL			
STRUCTURE*: SURFACE CRUST, SILT & FINE SANDS., CLAY PEDICULE ~ 1mm			
DISTINCTIVE FEATURES (if relevant)*:			
Cutans:		Voids (cracks/pores): SURFACE CRUST	
Strength:		Stickiness:	
Plasticity:		Condition when dry:	
Water repellence:		Pans:	
Segregations:		Carbonate (effervescence with acid):	
Roots (size/abundance): NIL		Other:	
OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):			
WELL DEFINED CREEK, NO VISIBLE SIGNS OF CONTAMINATION OR ODOUR. SOME ORGANIC MATTER / LITTER ON SURFACE. SURFACE CRUST GAUGING STN.			
LABORATORY SAMPLES			
Analytes Requested	Containers Used	QA/QC Samples Collected (circle)	
pH/EC; TOC; MBMS; MAJOR IONS; PSD	2 x ASS BAGS 1 x ASS " 1 x JAR (250 ml)	Duplicate Split Blank	

[^] Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit

* See Australian Soil and Land Survey Field Handbook, 3rd Edition, 2009:

- p148 – 158 for Horizon codes
- p161 – 170 for Field Texture
- p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
- p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
- p182 – 204 for Other Distinctive Features

Use Munsell Soil Colour Chart



Soil Sampling Field Data Sheet

PROJECT: E220072		DATE and TIME: 2.9.20 11:45 AM	
SITE ID: RBSW04		SAMPLERS NAME: S. BARBER	
PHOTO NOS: D/S F-EAST PIT.		GRID ZONE (circle): 52 / 53	
Longitude (decimal degrees) 15.14453° S		Latitude (decimal degrees) 135.08673° E	
SOIL DESCRIPTION:			
SAMPLE TYPE (circle): Surface / Auger / Coring / Pit / Other:			
SAMPLE EQUIPMENT USED [^] : TROWEL (PLASTIC)			
DEPTH (m): < 0.2m	HORIZON*: A	COLOUR#: BROWN	
MOISTURE (circle): Wet / Moist / Moderately Moist / Dry		FIELD pH:	
FIELD TEXTURE*: SILT/SAND			
MOTTLES*: ML			
STRUCTURE*: FINE SAND & PODOCICLES - (~ 1cm DIAMETER)			
DISTINCTIVE FEATURES (if relevant)*:			
Cutans:		Voids (cracks/pores): SURFACE CRACKS.	
Strength:		Stickiness:	
Plasticity:		Condition when dry:	
Water repellence:		Pans:	
Segregations:		Carbonate (effervescence with acid):	
Roots (size/abundance): NIL		Other:	
OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):			
WELL DEFINED DRAINAGE LINE D/S OF F-EAST PIT, SMALL POOL REMAINING W IN CK. NO SIGNS OF CONTAMINATION, MINIMAL ORGANIC MATTER. SAMPLED 2 SW MONITORING SITE.			
LABORATORY SAMPLES			
Analytes Requested	Containers Used	QA/QC Samples Collected (circle)	
PH/EC ; TOC ; NEMAC ; MAJOR IONS ; PSD	2x SS BAGS 1x ASS BAG 1x JAR 250 mL	Duplicate Split Blank	

[^] Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit

* See Australian Soil and Land Survey Field Handbook, 3rd Edition, 2009:

- p148 – 158 for Horizon codes
- p161 – 170 for Field Texture
- p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
- p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
- p182 – 204 for Other Distinctive Features

Use Munsell Soil Colour Chart



Soil Sampling Field Data Sheet

PROJECT: E220072		DATE and TIME: 2.9.20 12:30 pm	
SITE ID: RBSW02		SAMPLERS NAME: S. BARBER	
PHOTO NOS: D/S IMPACT ROADS		GRID ZONE (circle): 52 (53)	
Longitude (decimal degrees) 15.14818 ° S		Latitude (decimal degrees) 135.06526 ° E	
SOIL DESCRIPTION:			
SAMPLE TYPE (circle): <u>Surface</u> / Auger / Coring / Pit / Other:			
SAMPLE EQUIPMENT USED [^] : HAND TROWEL (PLASTIC)			
DEPTH (m): 0.2 (~0.15)		HORIZON*: A	COLOUR#: Brown
MOISTURE (circle): Wet / Moist / Moderately Moist / <u>Dry</u>			FIELD pH:
FIELD TEXTURE*: CLAY / ROCKY MATERIAL			
MOTTLES*: NIL			
STRUCTURE*: CLAY W PODS ~ 2 INCHES.			
DISTINCTIVE FEATURES (if relevant)*:			
Cutans:		Voids (cracks/pores): SURFACE CRUST	
Strength:		Stickiness:	
Plasticity:		Condition when dry:	
Water repellence:		Pans:	
Segregations:		Carbonate (effervescence with acid):	
Roots (size/abundance): NIL		Other:	
OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):			
ORGANIC MATTER (LEAF LITTER ON SURFACE), V. ROCKY CLAY BED, DIFFICULT TO GET 0.2m DEPTH. NO OBSERVED VISUAL CONTAMINATION OR ODOUR. D/S OF ROAD CULVERT / DRAIN.			
LABORATORY SAMPLES			
Analytes Requested		Containers Used	QA/QC Samples Collected (circle)
PH/EC ; TOC ; MOMMS ; MAJOR IONS ; PSD		2 x 55 BAGS 1 x 455 BAG 1 x JAR (250ml)	Duplicate Split Blank

[^] Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit

* See *Australian Soil and Land Survey Field Handbook*, 3rd Edition, 2009:

- p148 – 158 for Horizon codes
- p161 – 170 for Field Texture
- p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
- p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
- p182 – 204 for Other Distinctive Features

Use Munsell Soil Colour Chart



Soil Sampling Field Data Sheet

PROJECT: <u>EZ 20072</u>		DATE and TIME: <u>2.9.20</u> <u>13100</u>	
SITE ID: <u>RBSW08</u>		SAMPLERS NAME: <u>S. BARBER</u>	
PHOTO NOS: <u>D/S ROM</u>		GRID ZONE (circle): 52 <u>(53)</u>	
Longitude (decimal degrees) <u>15.14335° S</u>		Latitude (decimal degrees) <u>135.10738° E</u>	
SOIL DESCRIPTION:			
SAMPLE TYPE (circle): <u>Surface</u> / Auger / Coring / Pit / Other:			
SAMPLE EQUIPMENT USED [^] : <u>HAND TROWEL (PLASTIC)</u>			
DEPTH (m): <u><math>0.2m</math> (<u>~150mm</u>)</u>		HORIZON*: <u>A</u>	COLOUR#: <u>RED (GREY)</u>
MOISTURE (circle): Wet / Moist / Moderately Moist / <u>Dry</u>		FIELD pH:	
FIELD TEXTURE*: <u>CLAY - LARGE PEDS ON SURFACE, FINE SILT UNDERBATH, (POWDERY)</u>			
MOTTLES*: <u>N/A</u>			
STRUCTURE*: <u>SURFACE 2 INCHES RED CLAY, UNDERBATH GREY/LIGHT BROWN</u>			
DISTINCTIVE FEATURES (if relevant)*:			
Cutans:		Voids (cracks/pores): <u>SURFACE CRUST (2" THICK)</u>	
Strength:		Stickiness:	
Plasticity:		Condition when dry:	
Water repellence:		Pans:	
Segregations:		Carbonate (effervescence with acid):	
Roots (size/abundance): <u>NIL</u>		Other:	
OTHER RELEVANT DETAILS (e.g. shells, organic material, sulfurous, hydrocarbon or other odour, visible contamination):			
<u>LOCATION REPOSITIONED TO WHERE SW SAMPLES ARE TAKEN (~90m DIFF). LOW DEPRESSION AREA - NO DEFINED CK LINE. NO VISIBLE SIGNS OF CONTAMINATION OR ODOUR. HARD CLAY - SURFACE CRACKING - ALL DRY.</u>			
LABORATORY SAMPLES			
Analytes Requested		Containers Used	QA/QC Samples Collected (circle)
<u>PH/EC; TOC; MEMMS; MASSUR IONS; PSD</u>		<u>2 x 55 BAGS 1 x 155 BAG 1 x JAR (250ml)</u>	<u>Duplicate Split Blank</u>

[^] Equipment used to collect sample, such as hand trowel, type sediment corer (piston, push etc), backhoe to dig pit

* See *Australian Soil and Land Survey Field Handbook*, 3rd Edition, 2009:

- p148 – 158 for Horizon codes
- p161 – 170 for Field Texture
- p159 – 161 for Mottles; include type, abundance, size, contrast, colour and distinctness of boundaries
- p171 – 181 for Structure; include grade of pedality, size of peds, and type of pedality
- p182 – 204 for Other Distinctive Features

Use Munsell Soil Colour Chart

APPENDIX B LABORATORY CERTIFICATES

CERTIFICATE OF ANALYSIS

Work Order	: ES2031380	Page	: 1 of 8
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Contact	: Customer Services ES
Address	: PO BOX 381	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
	DARWIN NT, AUSTRALIA 0801		
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Project	: EZ20072 Sediment Sampling September 2020	Date Samples Received	: 09-Sep-2020 08:30
Order number	: EZ20072	Date Analysis Commenced	: 09-Sep-2020
C-O-C number	: ----	Issue Date	: 17-Sep-2020 21:29
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 10		
No. of samples analysed	: 10		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Aleksandar Vujkovic	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA150H: Soil Particle Density required for Hydrometer analysis according to AS 1289.3.5.1 2006 was not requested by the client. Typical sediment SPD values used for calculations and consequently NATA endorsement does not apply to hydrometer results.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	RBSW01	RBSW02	RBSW04	RBSWDS	RBSW08
Client sampling date / time				02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	
Compound	CAS Number	LOR	Unit	ES2031380-001	ES2031380-002	ES2031380-003	ES2031380-004	ES2031380-005	
				Result	Result	Result	Result	Result	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	6.5	5.7	5.5	5.8	5.0	
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm	26	37	60	32	109	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.4	7.7	8.8	8.3	7.4	
ANC as CaCO3	----	0.1	% CaCO3	0.6	0.8	0.9	0.8	0.8	
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%	0.4	1.8	3.0	0.7	1.4	
EA150: Particle Sizing									
+75µm	----	1	%	82	64	84	80	36	
+150µm	----	1	%	56	45	70	69	12	
+300µm	----	1	%	38	30	38	41	2	
+425µm	----	1	%	32	27	25	21	1	
+600µm	----	1	%	28	26	17	10	<1	
+1180µm	----	1	%	26	25	13	5	<1	
+2.36mm	----	1	%	24	23	11	4	<1	
+4.75mm	----	1	%	18	22	6	2	<1	
+9.5mm	----	1	%	11	18	2	<1	<1	
+19.0mm	----	1	%	1	<1	<1	<1	<1	
+37.5mm	----	1	%	<1	<1	<1	<1	<1	
+75.0mm	----	1	%	<1	<1	<1	<1	<1	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	9	19	9	11	30	
Silt (2-60 µm)	----	1	%	9	11	3	7	21	
Sand (0.06-2.00 mm)	----	1	%	57	46	76	78	49	
Gravel (>2mm)	----	1	%	25	24	12	4	<1	
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1	
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	10	40	<10	30	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg	10	20	30	<10	100	
ED093S: Soluble Major Cations									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	RBSW01	RBSW02	RBSW04	RBSWDS	RBSW08
Client sampling date / time				02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	
Compound	CAS Number	LOR	Unit	ES2031380-001	ES2031380-002	ES2031380-003	ES2031380-004	ES2031380-005	
				Result	Result	Result	Result	Result	
ED093S: Soluble Major Cations - Continued									
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	<10	
Magnesium	7439-95-4	10	mg/kg	<10	10	<10	<10	<10	
Sodium	7440-23-5	10	mg/kg	20	30	40	10	80	
Potassium	7440-09-7	10	mg/kg	20	50	20	20	10	
EG005(ED093)T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	590	1420	720	970	840	
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5	
Barium	7440-39-3	10	mg/kg	<10	20	20	10	10	
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1	
Cobalt	7440-48-4	2	mg/kg	<2	3	<2	2	<2	
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5	
Iron	7439-89-6	50	mg/kg	3390	7460	5680	3750	4430	
Lead	7439-92-1	5	mg/kg	<5	<5	<5	<5	<5	
Manganese	7439-96-5	5	mg/kg	24	57	24	38	49	
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2	
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2	
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5	
Silver	7440-22-4	2	mg/kg	<2	<2	<2	<2	<2	
Strontium	7440-24-6	2	mg/kg	<2	<2	<2	<2	<2	
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	<5	
EG020T: Total Metals by ICP-MS									
Uranium	7440-61-1	0.1	mg/kg	0.1	0.3	0.2	0.1	0.3	
Lithium	7439-93-2	0.1	mg/kg	0.3	0.5	0.2	0.3	0.5	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	<1	<1	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	0.2	0.2	0.1	0.1	0.2	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	3.9	4.6	1.5	0.9	9.3	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	4.1	4.8	1.6	1.0	9.5	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	RBSW01	RBSW02	RBSW04	RBSWDS	RBSW08
Client sampling date / time					02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		ES2031380-001	ES2031380-002	ES2031380-003	ES2031380-004	ES2031380-005
					Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg		69	79	63	58	62
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		0.15	0.66	0.39	0.53	0.62



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID			RBSWPU	RBSW09	RBSW13	RBSW14	Duplicate
		Client sampling date / time			02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	01-Sep-2020 00:00	02-Sep-2020 00:00
Compound	CAS Number	LOR	Unit	ES2031380-006	ES2031380-007	ES2031380-008	ES2031380-009	ES2031380-010	
				Result	Result	Result	Result	Result	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	5.5	5.9	5.5	8.2	5.6	
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm	20	21	25	3990	94	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.7	8.8	7.3	12.5	7.1	
ANC as CaCO3	----	0.1	% CaCO3	0.8	0.9	0.7	1.3	0.7	
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%	0.8	2.1	1.1	20.9	1.1	
EA150: Particle Sizing									
+75µm	----	1	%	80	66	94	94	93	
+150µm	----	1	%	64	45	87	91	84	
+300µm	----	1	%	42	20	40	67	37	
+425µm	----	1	%	37	11	12	37	10	
+600µm	----	1	%	35	5	2	17	2	
+1180µm	----	1	%	34	2	<1	11	<1	
+2.36mm	----	1	%	32	2	<1	8	<1	
+4.75mm	----	1	%	18	<1	<1	5	<1	
+9.5mm	----	1	%	<1	<1	<1	<1	<1	
+19.0mm	----	1	%	<1	<1	<1	<1	<1	
+37.5mm	----	1	%	<1	<1	<1	<1	<1	
+75.0mm	----	1	%	<1	<1	<1	<1	<1	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	8	20	4	3	5	
Silt (2-60 µm)	----	1	%	8	8	1	2	2	
Sand (0.06-2.00 mm)	----	1	%	52	70	95	86	93	
Gravel (>2mm)	----	1	%	32	2	<1	9	<1	
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1	
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	<10	<10	1730	<10	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg	<10	<10	20	7220	30	
ED093S: Soluble Major Cations									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	RBSWPU	RBSW09	RBSW13	RBSW14	Duplicate
Client sampling date / time				02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	01-Sep-2020 00:00	02-Sep-2020 00:00	
Compound	CAS Number	LOR	Unit	ES2031380-006	ES2031380-007	ES2031380-008	ES2031380-009	ES2031380-010	
				Result	Result	Result	Result	Result	
ED093S: Soluble Major Cations - Continued									
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	320	<10	
Magnesium	7439-95-4	10	mg/kg	<10	20	<10	590	<10	
Sodium	7440-23-5	10	mg/kg	<10	20	20	4150	30	
Potassium	7440-09-7	10	mg/kg	<10	20	<10	220	<10	
EG005(ED093)T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	560	1060	390	500	310	
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5	
Barium	7440-39-3	10	mg/kg	<10	20	<10	<10	<10	
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1	
Cobalt	7440-48-4	2	mg/kg	<2	3	<2	2	<2	
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5	
Iron	7439-89-6	50	mg/kg	3520	3430	3400	5030	1890	
Lead	7439-92-1	5	mg/kg	<5	<5	<5	<5	<5	
Manganese	7439-96-5	5	mg/kg	46	76	9	43	7	
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2	
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2	
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5	
Silver	7440-22-4	2	mg/kg	<2	<2	<2	<2	<2	
Strontium	7440-24-6	2	mg/kg	<2	<2	<2	10	<2	
Zinc	7440-66-6	5	mg/kg	6	<5	<5	<5	<5	
EG020T: Total Metals by ICP-MS									
Uranium	7440-61-1	0.1	mg/kg	0.1	0.2	0.1	0.3	<0.1	
Lithium	7439-93-2	0.1	mg/kg	0.1	0.5	<0.1	0.4	0.1	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	1	mg/kg	<1	2	<1	<1	<1	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	0.1	0.2	<0.1	0.1	<0.1	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	1.3	0.6	0.3	0.4	0.2	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	1.4	0.8	0.3	0.5	0.2	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	RBSWPU	RBSW09	RBSW13	RBSW14	Duplicate
Client sampling date / time				02-Sep-2020 00:00	02-Sep-2020 00:00	02-Sep-2020 00:00	01-Sep-2020 00:00	02-Sep-2020 00:00	
Compound	CAS Number	LOR	Unit	ES2031380-006	ES2031380-007	ES2031380-008	ES2031380-009	ES2031380-010	
				Result	Result	Result	Result	Result	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	50	52	29	57	40	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	0.69	0.52	0.44	0.60	0.30	

Ecoz P/L
 Level 3 , Winlow House, 75 Woods St
 Darwin
 NT 0800



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: **Corinne Hutchinson**

Report **743496-S**
 Project name **SEDIMENT SAMPLING SEPTEMBER 2020**
 Project ID **E220072**
 Received Date **Sep 10, 2020**

Client Sample ID			TRIPLICATE
Sample Matrix			Soil
Eurofins Sample No.			S20-Se19714
Date Sampled			Sep 02, 2020
Test/Reference	LOR	Unit	
Chloride	5	mg/kg	26
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	30
Cyanide (total)	5	mg/kg	< 5
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	6.3
Sulphate (as SO4)	30	mg/kg	< 30
Total Organic Carbon	0.1	%	0.2
Phosphorus	5	mg/kg	< 40
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	0.10
% Moisture	1	%	< 1
Particle Size by Sieve analysis*			
<63 Micron	0.1	% w/w	< 0.1
>2000 Micron	0.1	% w/w	1.1
1000-2000 Micron	0.1	% w/w	1.2
125-250 Micron	0.1	% w/w	30
250-500 Micron	0.1	% w/w	53
500-1000 Micron	0.1	% w/w	13
63-125 Micron	0.1	% w/w	2.0
Heavy Metals			
Aluminium	10	mg/kg	1200
Arsenic	2	mg/kg	< 2
Barium	10	mg/kg	11
Boron	10	mg/kg	< 10
Cadmium	0.4	mg/kg	< 0.4
Cobalt	5	mg/kg	< 5
Copper	5	mg/kg	< 5
Iron	20	mg/kg	3800
Lead	5	mg/kg	< 5
Lithium	5	mg/kg	< 5
Manganese	5	mg/kg	12
Mercury	0.1	mg/kg	< 0.1
Molybdenum	5	mg/kg	< 5
Nickel	5	mg/kg	< 5
Selenium	2	mg/kg	< 2
Silver	0.2	mg/kg	< 0.2
Strontium	10	mg/kg	33

Client Sample ID			TRIPLICATE
Sample Matrix			Soil
Eurofins Sample No.			S20-Se19714
Date Sampled			Sep 02, 2020
Test/Reference	LOR	Unit	
Heavy Metals			
Uranium	10	mg/kg	< 10
Zinc	5	mg/kg	< 5
Alkali Metals			
Calcium	5	mg/kg	4200
Magnesium	5	mg/kg	250
Potassium	5	mg/kg	94
Sodium	5	mg/kg	65

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
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Sep 14, 2020	28 Days
Conductivity (1:5 aqueous extract at 25°C as rec.) - Method: LTM-INO-4030 Conductivity	Melbourne	Sep 14, 2020	7 Days
Cyanide (total) - Method: LTM-INO-4020 Total Free WAD Cyanide by CFA	Melbourne	Sep 14, 2020	14 Days
pH (1:5 Aqueous extract at 25°C as rec.) - Method: LTM-GEN-7090 pH in soil by ISE	Melbourne	Sep 14, 2020	7 Days
Sulphate (as SO₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Sep 14, 2020	28 Days
Total Organic Carbon - Method: LTM-INO-4060 Total Organic Carbon in water and soil	Melbourne	Sep 15, 2020	28 Days
Phosphorus - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon and Phosphorus by ICP-AES	Melbourne	Sep 14, 2020	180 Days
Acid Neutralising Capacity (ANCbt) - Method: Acid Neutralising Capacity (Acid reacted and Back-Titration) - Method 19A2	Brisbane	Sep 14, 2020	0 Days
Particle Size by Sieve analysis* - Method: AS1289.C6.1-1977 Determination of Particle Size by Sieving	Melbourne	Sep 14, 2020	28 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Sep 14, 2020	180 Days
Eurofins Suite B11C: Na/K/Ca/Mg - Method: LTM-MET-3010 Alkali Metals by ICP-AES	Melbourne	Sep 14, 2020	180 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Sep 11, 2020	14 Days

Australia

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

Sydney
Unit F3, Building F
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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
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Kewdale WA 6105
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NATA # 1261
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Mayfield East NSW 2304
PO Box 60 Wickham 2293
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Auckland
35 O'Rorke Road
Penrose, Auckland 1061
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Phone : 0800 856 450
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ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name:	Ecoz P/L	Order No.:		Received:	Sep 10, 2020 4:03 PM
Address:	Level 3 , Winlow House, 75 Woods St Darwin NT 0800	Report #:	743496	Due:	Sep 17, 2020
Project Name:	SEDIMENT SAMPLING SEPTEMBER 2020	Phone:	08 8981 1100	Priority:	5 Day
Project ID:	E220072	Fax:		Contact Name:	Corinne Hutchinson

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail						Acid Neutralising Capacity (ANCb)	Aluminium	Arsenic	Barium	Boron	Cadmium	Chloride	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Cyanide (total)	Iron	Lead	Lithium	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Phosphorus	Selenium	Silver	Strontium	Sulphate (as SO4)	Total Organic Carbon	Uranium	Zinc	Particle Size by Sieve analysis*	USA Leaching Procedure	Moisture Set	Eurofins Suite B11C: Na/K/Ca/Mg			
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Sydney Laboratory - NATA Site # 18217																																					X		
Brisbane Laboratory - NATA Site # 20794						X																																	
Perth Laboratory - NATA Site # 23736																																							
Newcastle Laboratory																																							
External Laboratory																																							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																		
1	TRIPLICATE	Sep 02, 2020		Soil	S20-Se19714	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2	TRIPLICATE	Sep 02, 2020		US Leachate	S20-Se19715		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X				X	X			X				
Test Counts						1	2	2	2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	1	1	2	2	2	1	1	2	2	1	1	1	1	1		

Internal Quality Control Review and Glossary
General

1. 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.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. 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

1. 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.
2. 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.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. 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.
6. 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.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. 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							
Chloride	mg/kg	< 5			5	Pass	
Cyanide (total)	mg/kg	< 5			5	Pass	
Sulphate (as SO4)	mg/kg	< 30			30	Pass	
Total Organic Carbon	%	0.1			0.1	Pass	
Phosphorus	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/kg	< 10			10	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Iron	mg/kg	< 20			20	Pass	
Lead	mg/kg	< 5			5	Pass	
Lithium	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Molybdenum	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Silver	mg/kg	< 0.2			0.2	Pass	
Strontium	mg/kg	< 10			10	Pass	
Uranium	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/kg	< 5			5	Pass	
Magnesium	mg/kg	< 5			5	Pass	
Potassium	mg/kg	< 5			5	Pass	
Sodium	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Chloride	%	107			70-130	Pass	
Cyanide (total)	%	75			70-130	Pass	
Sulphate (as SO4)	%	107			70-130	Pass	
Total Organic Carbon	%	100			70-130	Pass	
Acid Neutralising Capacity (ANCbt)	%	103			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	90			80-120	Pass	
Arsenic	%	89			80-120	Pass	
Barium	%	90			80-120	Pass	
Boron	%	82			80-120	Pass	
Cadmium	%	100			80-120	Pass	
Cobalt	%	101			80-120	Pass	
Copper	%	93			80-120	Pass	
Iron	%	97			80-120	Pass	
Lead	%	88			80-120	Pass	
Lithium	%	83			80-120	Pass	
Manganese	%	94			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury			%	100			80-120	Pass	
Molybdenum			%	88			80-120	Pass	
Nickel			%	90			80-120	Pass	
Selenium			%	91			80-120	Pass	
Silver			%	102			80-120	Pass	
Strontium			%	88			80-120	Pass	
Uranium			%	87			80-120	Pass	
Zinc			%	90			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Cyanide (total)	M20-Se21624	NCP	%	47			70-130	Fail	Q08
Spike - % Recovery									
Heavy Metals									
				Result 1					
Arsenic	M20-Se24708	NCP	%	97			75-125	Pass	
Barium	M20-Se24708	NCP	%	68			75-125	Fail	Q08
Boron	M20-Se24708	NCP	%	76			75-125	Pass	
Cadmium	M20-Se24708	NCP	%	95			75-125	Pass	
Cobalt	M20-Se24708	NCP	%	115			75-125	Pass	
Copper	M20-Se24708	NCP	%	101			75-125	Pass	
Lead	M20-Se24708	NCP	%	100			75-125	Pass	
Lithium	M20-Se24708	NCP	%	89			75-125	Pass	
Manganese	M20-Se24708	NCP	%	98			75-125	Pass	
Mercury	M20-Se24708	NCP	%	104			75-125	Pass	
Molybdenum	M20-Se24708	NCP	%	104			75-125	Pass	
Nickel	M20-Se24708	NCP	%	103			75-125	Pass	
Selenium	M20-Se24708	NCP	%	96			75-125	Pass	
Silver	M20-Se24708	NCP	%	97			75-125	Pass	
Strontium	M20-Se24708	NCP	%	101			75-125	Pass	
Uranium	M20-Se24708	NCP	%	110			75-125	Pass	
Zinc	M20-Se24708	NCP	%	100			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Chloride	B20-Se18554	NCP	mg/kg	34	36	6.0	30%	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	S20-Se19714	CP	uS/cm	30	30	<1	30%	Pass	
Cyanide (total)	M20-Se22170	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	M20-Se23034	NCP	pH Units	8.3	8.5	pass	30%	Pass	
Sulphate (as SO4)	B20-Se18554	NCP	mg/kg	< 30	< 30	<1	30%	Pass	
Total Organic Carbon	P20-Se08064	NCP	%	< 0.1	< 0.1	<1	30%	Pass	
Phosphorus	B20-Se18554	NCP	mg/kg	72	81	12	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P20-Se23533	NCP	% CaCO3	n/a	n/a	n/a	30%	Pass	
% Moisture	M20-Se20141	NCP	%	4.8	5.0	2.0	30%	Pass	
Duplicate									
Heavy Metals									
				Result 1	Result 2	RPD			
Aluminium	B20-Se18554	NCP	mg/kg	1300	1700	24	30%	Pass	
Arsenic	B20-Se18554	NCP	mg/kg	2.3	3.9	52	30%	Fail	Q15
Barium	B20-Se18554	NCP	mg/kg	15	< 10	47	30%	Fail	Q15
Boron	B20-Se18554	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	B20-Se18554	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Cobalt	B20-Se18554	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	B20-Se18554	NCP	mg/kg	< 5	< 5	<1	30%	Pass	

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Iron	B20-Se18554	NCP	mg/kg	8200	10000	20	30%	Pass
Lead	B20-Se18554	NCP	mg/kg	< 5	6.2	28	30%	Pass
Lithium	B20-Se18554	NCP	mg/kg	< 5	< 5	<1	30%	Pass
Manganese	B20-Se18554	NCP	mg/kg	44	33	27	30%	Pass
Mercury	B20-Se18554	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Molybdenum	B20-Se18554	NCP	mg/kg	< 5	< 5	<1	30%	Pass
Nickel	B20-Se18554	NCP	mg/kg	< 5	< 5	<1	30%	Pass
Selenium	B20-Se18554	NCP	mg/kg	< 2	< 2	<1	30%	Pass
Silver	B20-Se18554	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Strontium	B20-Se18554	NCP	mg/kg	< 10	< 10	<1	30%	Pass
Uranium	B20-Se18554	NCP	mg/kg	< 10	< 10	<1	30%	Pass
Zinc	B20-Se18554	NCP	mg/kg	29	32	11	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	B20-Se18554	NCP	mg/kg	240	230	3.0	30%	Pass
Magnesium	B20-Se18554	NCP	mg/kg	260	280	7.0	30%	Pass
Potassium	B20-Se18554	NCP	mg/kg	150	130	12	30%	Pass
Sodium	B20-Se18554	NCP	mg/kg	56	59	6.0	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
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Myles Clark	Senior Analyst-SPOCAS (QLD)
Scott Beddoes	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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APPENDIX C PHOTOS FROM SITES SAMPLED IN SEPTEMBER 2020

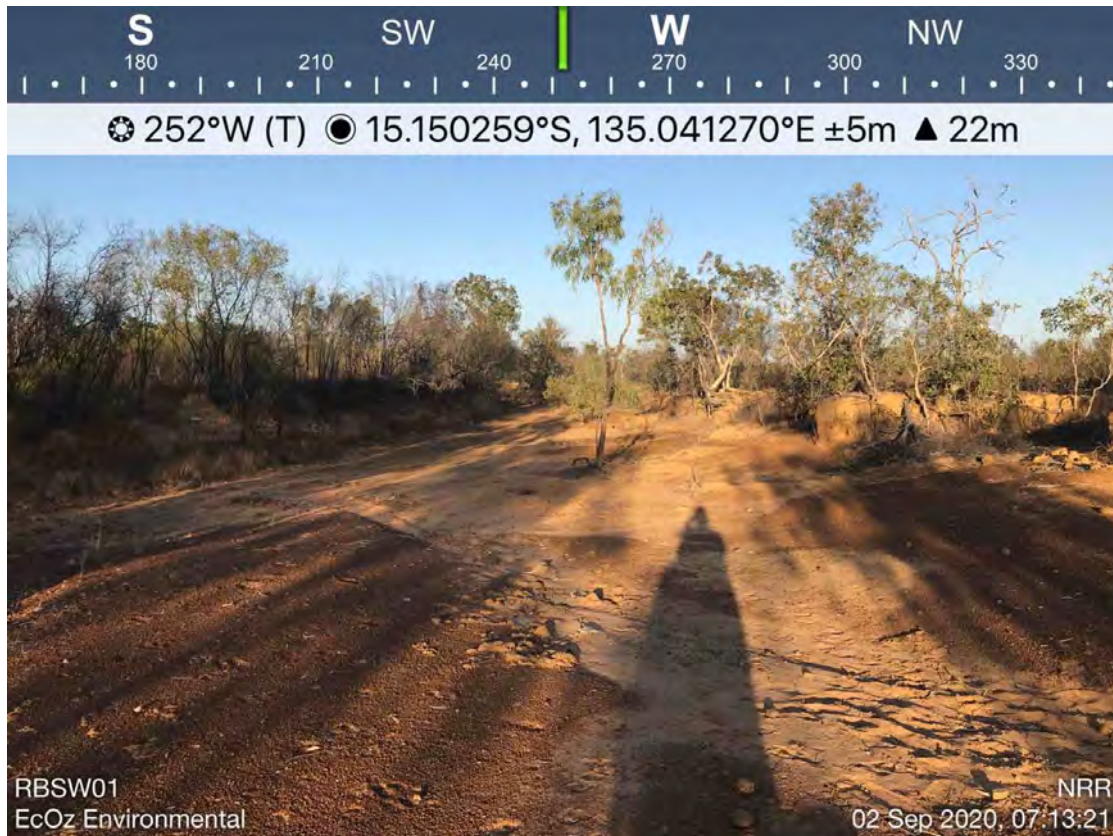


Plate 1 RBSW01 Towns River Upstream Control Site (Control)



Plate 2 Sediment sampled at RBSW01



Plate 3 RBSW02 Towns River upstream of Wades Crossing (Impact)



Plate 4 Sediment sampled at RBSW02



Plate 5 RBSW04 North of F-East Pit on Towns River off the Levee Wall (Impact)



Plate 6 Sediment sampled at RBSW04



Plate 7 RBSWDS Towns River downstream gauging station (Impact)



Plate 8 Sediment sampled at RBSWDS



Plate 9 RBSW08 Downstream of ROM pad (Impact)



Plate 10 Sediment sampled at RBSW08



Plate 11 RBSWPU Pandanus Creek upstream (Control)



Plate 12 Sediment sampled at RBSWPU

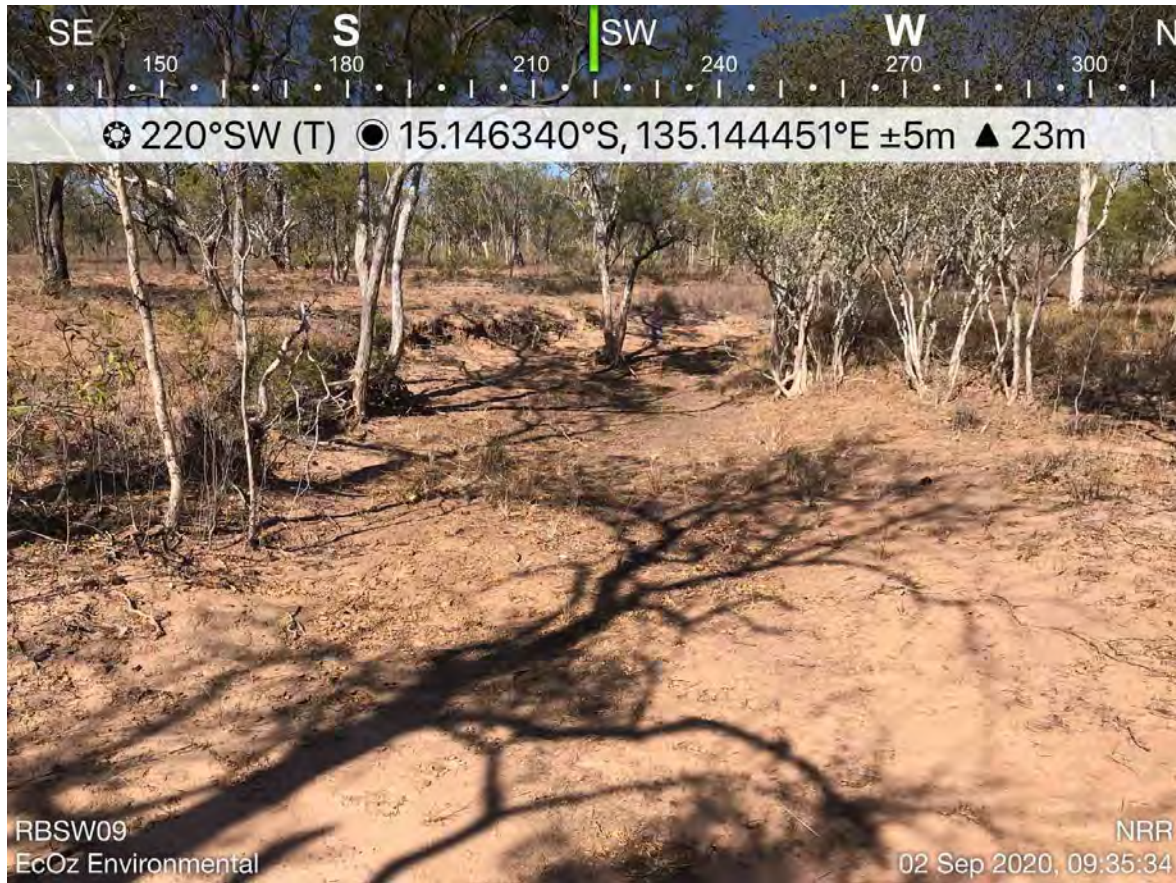


Plate 13 RBSW09 Pandanus Creek downstream of E-East (Impact)



Plate 14 Sediment sampled at RBSW09



Plate 15 RBSW13 Magaranyi River upstream (Control)



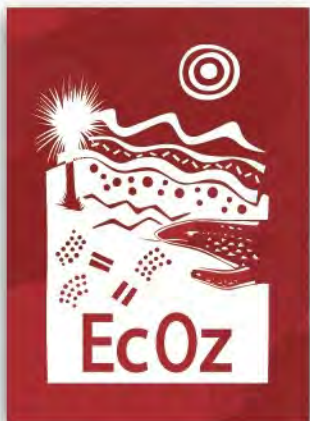
Plate 16 Sediment sampled at RBSW13



Plate 17 RBSW14 Towns River upstream (Control)



Plate 18 Sediment sampled at RBSW14



EcOz Environmental Consultants

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QMS Certification Services



QMS Certification Services



QMS Certification Services

ATTACHMENT H

WDL Conformance Table

Location	Analyte	Category	Date	Actual Cause	Potential Cause	Risk of Environmental Harm	Corrective Actions	Notes
RBSW04 / RBSWDS	Turbidity (Field)	Three Consecutive Occasions	17 - 18 Feb 2021	Turbidity above trigger at RBSW01	n/a	None, turbidity measurements were within background levels observed upstream.	n/a	
RBSW04 / RBSWDS	Total Nitrogen	Three Times Trigger Value	17/02/2021	TN was detected >3x TV at RBSW01	Mine water discharge	None, TN concentrations were within natural background variation observed upstream.	n/a	RBSW01 sampled 15/2/21
			4/03/2021	TN was detected >3x TV at RBSW01	Mine water discharge	None, TN concentrations were within natural background variation observed upstream.	n/a	
			17/03/2021	TN was detected >3x TV at RBSW01	Mine water discharge	None, TN concentrations were within natural background variation observed upstream.	n/a	
			31/03/2021	Combination of elevated upstream concentration (>TV) and water discharge	Mine water discharge	None, TN concentrations were within natural background variation observed upstream.	n/a	
RBSW04 / RBSWDS	Total Phosphorous	Three Times Trigger Value	10/02/2021	Combination of elevated upstream concentration (>3xTV) and water discharge	Mine water discharge	None, TP concentrations within range of concentrations observed upstream in the Towns River System.	n/a	
RBSW04 / RBSWDS	Total Phosphorous	Three Times Trigger Value	17/02/2021	Could not be determined as RBAD1 not sampled.	Mine water discharge	None, TP concentrations within range of concentrations observed upstream in the Towns River System.	n/a	

WDL Conformance Table

Location	Analyte	Category	Date	Actual Cause	Potential Cause	Risk of Environmental Harm	Corrective Actions	Notes
RBSW04 / RBSWDS	Total Phosphorous	Three Times Trigger Value	17/03/2021	Elevated background concentrations of TP (>3x TV) upstream	Mine water discharge	None, TP concentrations within range of concentrations observed upstream in the Towns River System.	n/a	
RBSW04 / RBSWDS	Al	Three Times Trigger Value	17/02/2021	Elevated background concentrations of Al (>3x TV) upstream	n/a	None, Al concentrations within range of concentrations observed upstream in the Towns River System.	n/a	RBSW01 sampled 15/2
RBSW04 / RBSWDS	Cr	Three Times Trigger Value	10/02/2021	Natural background concentrations	n/a	None, Cr concentrations within range of concentrations observed upstream in the Towns River System.	n/a	Cr not detected in discharge water during all sample events.
RBSW04 / RBSWDS	Cr	Three Times Trigger Value	17/02/2021	Natural background concentrations	n/a	None, Cr concentrations within range of concentrations observed upstream in the Towns River System.	n/a	Cr not detected in discharge water during all sample events.
RBSW04 / RBSWDS	Zn	Three Times Trigger Value	4/03/2021	TN was detected >3x TV at RBSW01	n/a	None, Zn concentrations within range of concentrations observed upstream in the Towns River System.	n/a	
RBSW04 / RBSWDS	Zn	Three Times Trigger Value	4/03/2021	TN was detected >3x TV at RBSW01	n/a	None, Zn concentrations within range of concentrations observed upstream in the Towns River System.	n/a	

ATTACHMENT I



INVESTIGATION REPORT

UNLICENCED DISCHARGE EVENT

13 – 16 FEBRUARY 2021

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ATTACHMENTS

Attachment A: S39 NTEPA Notification

Attachment B: Photolog

Attachment C: Field Sampling Sheets

Attachment D: Remote Logging Data Graphs and Comparison

1.0 INTRODUCTION

The Northern Territory Environment Protection Authority (NTEPA) have requested Nathan River Resources (NRR) provide an updated investigation report into the unauthorised discharge of water into the Towns River between 13 February and 16 February 2021.

This investigation report supersedes the report sent to the NTEPA via email on 23 February 2021 and contains new information obtained after the submission of the original report.

Objectives of this investigation report are to:

- Provide an updated Section 39 of WDL246-01 notification (Attachment A);
- Review the incident, its causes and contributing factors;
- Review available water quality monitoring data;
- Assess potential for environmental harm arising from the incident; and
- Address specific questions from NTEPA arising from the incident.

2.0 INCIDENT DETAILS

2.1 Summary

A significant rain event on 12 February 2021 resulted in extensive flooding of the Towns River and inflow of surface water into active mining pits FE2 and FE3. Between 13 and 16 February 2021, water was discharged from FE2 and FE3 through three discharge points into the Towns River (Figure 1 and Attachment B).

This discharge was not consistent with WDL246-01 which stipulates water discharge from site into the Towns River must be sourced from FE1 and discharged through authorised discharge point RBAD1.

A summary of key events is provided in the table below:

Date	Details
12 February 2021	– A rain event totalling 93mm fell in the afternoon of 12 February which resulted in flooding of the Towns River, inflow of water into the active mining pits (FE2 and FE3) and restricted access to the mine.
13 February 2021	– A dewatering meeting was held which concluded that additional pumping capacity was required to dewater FE2 and FE3 more efficiently. – Following the meeting, the dewatering team was directed to discharge directly into the Towns River from FE2 and FE3 through two unauthorised discharge points.
14 February 2021	– Submersible pumps were transferred from FE1 to FE2 to facilitate dewatering. Water from these pumps was discharged into the Towns River at a third location.
15-16 February 2021	– The Sustainability Manager was notified of the incident in the afternoon of 15 February and inspection undertaken out on the morning of 16 February. – The Sustainability Manager directed the dewatering team to turn off the pumps dewatering FE2 and FE3 and divert the pipes from these pits through licenced discharge point RBAD1.
20 February 2021	– All pipes from FE2 and FE3 were redirected into FE1 and all discharge into Towns River ceased

2.2 Location

Discharge into the Towns River occurred at three locations adjacent to FE2 and FE3 with discharge water sourced from these pits. Location coordinates are provided below:

1. -15.147695, 135.072175
2. -15.146023, 135.084318
3. -15.145899, 135.084871

2.3 Notification

NRR's Environmental Technician notified the Sustainability Manager at approximately 1745 on 15 February 2021. In accordance with Condition 38 of WDL246-01, the incident was reported within 24 hours at 1618 on 16 February 2021. Notification was sent via email to NTEPA (waste@nt.gov.au).

2.4 Causes and Contributing Factors

Actual Causes

- a. **13 February:** A pipe (160 mm poly pipe) dewatering FE3 into FE1 was cut, so discharge occurred directly over the flood protection levy into the Towns River (-15.147695, 135.072175) approximately 1.5 km west of licenced discharge point RBAD1. The pump used was discharging at approximately 50 l/s.
- b. **13 February:** A second pipe (160 mm poly pipe) was moved to dewater FE2 directly into the Towns River (-15.146023, 135.084318), approximately 280 m west of licenced discharge point RBAD1. The pump used was discharging at approximately 80 l/s.
- c. **14 February:** Two 90 kw submersible pumps were transferred from FE1 into FE2. A 315 mm poly pipe was relocated to discharge directly into the Towns River (-15.145899, 135.084871), approximately 220 m west of licenced discharge point RBAD1. These pumps were discharging at approximately 290 l/s.
- d. Discharge from the above three locations continued intermittently from the afternoon of 13 to the morning of 16 February 2021. Unfortunately pump times and flow rates were not recorded and NRR are unable to specify exact timings of events. During this time there was also a 100 mm poly pipe discharging from FE1 through licenced discharge point RBAD1.
- e. Pipes were redirected in the afternoon of 16 February at the request of the Sustainability Manager so water from FE2 and FE3 discharged through authorised discharge point RBAD1. The volume of water discharged from FE2 and FE3 over the duration of the incident is unknown.

Potential Causes and Contributing Factors

- a. A dewatering meeting attended by senior management, members of the dewatering team, maintenance team and pump supplier was held at approximately 12 pm on 13 February 2021. It concluded that additional pumping capacity was required to dewater FE2 and FE3 more efficiently.
- b. Following the above meeting, the dewatering crew supervisor understood he had permission to discharge directly into the Towns River outside of authorised discharge point RBAD1.

- c. Access to the mine was cut by extensive flooding with light vehicle traffic restricted. Only the dewatering crew were able to access the mine and as such, the Environmental Technician was not able to collect all WDL monitoring samples between 13 February and 16 February 2021.
- d. The Senior Environmental Advisor was on rostered break for the duration of the incident and was not able to direct the Environmental Technician. Limited direction was given to the Technician during the incident.
- e. The water quality meter used was found to be faulty. The new water quality meter had not arrived at the time of the incident.

2.5 Mitigating Actions

The following actions were undertaken to minimise environmental harm:

- On 16 February 2021, once aware of the incident, the Sustainability Manager instructed the dewatering team to repair cut pipes and redirect discharge through authorised discharge point RBAD1; and
- Some field measurements were undertaken at accessible locations on 14 and 15 February 2021 including FE2, FE3, RBAD1 and an alternative upstream location to RBSW01.

2.6 Corrective Actions

The following corrective actions have or will be undertaken to ensure the non-compliance does not reoccur:

- The dewatering crew supervisor who cut the pipes was stood down pending investigation into the incident. Based on investigations, their employment has now been terminated;
- A Water Discharge Procedure has been prepared to ensure awareness of WDL246-01 requirements;
- The Environmental Technician has been made aware of the need to undertake sampling during such incidents to assess for potential environmental harm; and
- A back-to-back Environmental Advisor position has been established to ensure there is always a senior environmental presence on site.

3.0 ENVIRONMENTAL MONITORING RECORDS

3.1 Data Availability

Field and Laboratory Samples

As noted previously, a significant rain event occurred on Friday 12 February which resulted in extensive flooding of the Towns River and restricted access to the mine pits and WDL compliance monitoring locations. All field, laboratory and rainfall data for February was submitted to the NT EPA on 9 March 2021.

Available field and laboratory analytical data collected over the duration of incident is summarised in the Table below. Available monitoring field sheets are presented in Attachment C.

Date	Monitoring Locations	Sample Collected	Comments
13/02/21	RBAD1	X	- No samples collected due to flooding and mine access restrictions.
	RBSW01	X	
	RBSW04	X	
	RBSWDS	X	
	RBSW2US	X	
14/02/21	RBAD1	✓ (Field)	<ul style="list-style-type: none"> - Sample RBSW01 collected from only accessible alternate location near RBSW02. - Additional field measurements collected from FE2 and FE2 (discharge water source). - All other sample locations inaccessible due to flooding.
	RBSW01	✓ (Field)	
	RBSW04	X	
	RBSWDS	X	
	RBSW2US	X	
15/02/21	RBAD1	X	<ul style="list-style-type: none"> - Sample RBSW01 collected from only accessible alternate location near RBSW02. - All other sample locations, excluding RBAD1 inaccessible due to flooding.
	RBSW01	✓ (Field / Lab Sample)	
	RBSW04	X	
	RBSWDS	X	
	RBSW2US	X	
16/02/21	RBAD1	X	- Sample locations unable to be sampled..
	RBSW01	X	
	RBSW04	X	
	RBSWDS	X	
	RBSW2US	X	
	RBSW2US	X	

Remote Logger Data

Remote logging data is available for the incident period and was provided to the NT EPA on 9 March 2021.

4.0 SURFACE WATER ASSESSMENT

4.1 Discharge Trigger Values

Discharge trigger values are detailed in Appendix 2 of the WDL246-01 and are based on ANZG (2018) 99% species protection for lowland tropical rivers in Northern Australia. In lieu of a suitable dataset to calculate site specific criteria, trigger values for physical parameters are adopted from ANZG (2018) for lowland tropical rivers in Northern Australia.

4.2 Flow Data

Review of flow data from upstream logger RBSWUS indicates flow rate of the Towns River ranged from approximately 32 kl/s on 13 February 2021 before slowly decreasing to 10 kl/s on 16 February (Attachment D).

4.3 Physical Parameters

pH

pH in FE2 and FE3 (source of unauthorised discharge water) ranged between 6.3 and 6.5 and is within adopted WDL trigger values. This is consistent with a pH of 6.3 recorded upstream at RBSW01. No available downstream data was available for the duration of the incident (Table 1).

Electrical Conductivity

Electrical conductivity of water within FE2 and FE3 ranged between 3 $\mu\text{s}/\text{cm}$ and 846 $\mu\text{s}/\text{cm}$.

EC measured at upstream logging station RBSWUS ranged between 15 $\mu\text{s}/\text{cm}$ and 41 $\mu\text{s}/\text{cm}$. This was generally mirrored at downstream logging station RBSWDS, where EC ranged between 21 $\mu\text{s}/\text{cm}$ and 84 $\mu\text{s}/\text{cm}$ over the duration of the incident, well within the licence trigger values.

Dissolved Oxygen

Dissolved oxygen (DO) in FE2 and FE3 was above the adopted trigger value, ranging between 138 % to 245 %. Due to equipment error at the time of sampling, these results are not considered reliable.

Turbidity

Turbidity of water within FE2 and FE3 ranged between 34 and 100 NTU. Turbidity of water upstream was also above the upper trigger value at 17.3 NTU.

4.4 Nutrients

Laboratory analytical samples were not collected during the discharge event except for upstream sample RBSW01 (alternate location). Total nitrogen was detected at 1.3 mg/l while Total Phosphorus was below laboratory detection limits (Table 2)

4.5 Dissolved Heavy Metals

Laboratory analytical samples were not collected during the discharge event except for upstream sample RBSW01 (alternate location) where elevated concentrations of aluminium, arsenic, iron and manganese were detected (Table 3).

5.0 DISCUSSION

5.1 Logger Data: Flow Rate and EC

Based on a recent discharge event undertaken between 17 March to 22 March 2021, a minimum flow rate of 3 kl/s to 4 kl/s (recorded at upstream logger station RBSWUS) is required to achieve sufficient dilution of potential contaminants discharged at ~ 290 l/s, within 250 m at downstream sampling locations RBSW04 and RBSWDS. A comparison of flow rate and EC data between the two events is provided in Attachment D. Raw logger data from March 2021 will be submitted with this report in excel format.

At the time of the incident, the site was experiencing a flood event, with flow rate of water within the Towns River ranging between 11 kl/s to 32 kl/s. Considering approximate intermittent discharge rates from FE2 and FE3 (maximum possible ~ 470 l/s) and the flow rate of water in Towns River at the time

of discharge, it is reasonable to assume potential contaminants would be sufficiently diluted within a short distance from the discharge point.

This is supported by a review of available drone imagery and photographs taken by site personnel that shows a turbid plume from the discharge point adjacent to FE3. The plume appears to be quickly dispersed within ~150 m of the discharge point.

5.2 Physical Parameters

In lieu of sufficient water quality data over the duration of the discharge event, physical parameters measured in FE2 and FE3 on 14 February 2021 have been used to assess the quality of water discharged from these pits.

- pH was within the range detected at upstream sample location RBSW01 (alternate location);
- Turbidity of water within FE2 and FE3 were elevated but within range of previously recorded during wet season flows at upstream sample locations RBSW01 and RBSW02;
- Electrical conductivity was detected at levels above trigger values in FE2 but less than is typically discharged from FE1 through discharge point RBAD1; and
- Dissolved oxygen values cannot be reliably used due to equipment error with the water quality meter.

5.3 Risk of Material Environmental Harm

Using a weight of evidence approach, the risk of material environmental harm arising from this incident is considered low, given;

- Little variance in EC between upstream logging station RBSWUS (max 41 $\mu\text{s}/\text{cm}$) and downstream logging station RBSWDS (max 84 $\mu\text{s}/\text{cm}$), indicating potential contaminants had been sufficiently diluted before reaching RBSWDS;
- Flow rate of floodwaters within the Towns River at the time of the incident (11 kl/s to 32 kl/s) were many times greater than the minimum flow rate required (3 kl/s to 4kl/s) to achieve appropriate dilution of contaminants observed under normal/authorised discharge events;
- The quality of water within FE2 and FE3 (source of water discharged), apart from turbidity, was comparable to water typically discharged from FE1 under authorised discharge events; and
- Imagery collected over the duration of the events show that turbid discharge water is rapidly diluted in floodwaters.

Further assessment of potential impact will be assessed as part of the sediment and biological sampling programs. Results will be available in the WDL Monitoring Report to be submitted to NTEPA 1 August 2021.

6.0 CONCLUSIONS

Investigations into incident identified several actual and potential contributing factors that to the unauthorised discharge of water from mine pits FE2 and FE3 directly into the Towns River. Numerous mitigating and corrective actions have or will be implemented to ensure this incident does not occur again. These include:

- Preparation of a Water Discharge Procedure to ensure awareness of WDL requirements;
- Staffing changes in the dewatering team
- Training improvements to ensure environmental staff has been made aware of the need to undertake sampling during such incidents to assess for potential environmental harm; and
- A back-to-back Environmental Advisor position has been established to ensure there is always a senior environmental presence on site.

As discussed in Section 5.3 above, review of available environmental monitoring data including field measurements, laboratory analytical results and remote logging data suggests the risk of environmental harm from the incident was likely negligible.

FIGURES

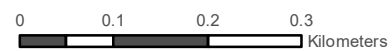


KEY

- Authorised Discharge Point
- Unauthorised Discharge Point

UNAUTHORISED DISCHARGE LOCATIONS

Unauthorised Discharge Event February 2021
 Nathan River Project, Roper Bar, Northern Territory



TABLES



Table 1: Summary of Surface Water Field Data - Physical Parameters

Unauthorised Discharge Event - February 2021

Nathan River Project, Roper Bar, NT

	Criteria 1	Criteria 2	Units	Sample ID	RBSW01	RBSW01	RBAD1	FE2	FE3	FE3
	WDL246-01	WDL246-01		Type	Water	Water	Water	Water	Water	Water
				Date	14/02/2021	15/02/2021	14/02/2021	14/02/2021	14/02/2021	14/02/2021
pH	< 6.0 or > 8.0	< 4.5 or > 9.5	pH Units		6.3	7.7	6.4	6.3	6.1	6.5
Electrical Conductivity	250	-	µS/cm		0*	0*	0*	3	846	64
Turbidity	2-15	-	NTU		23.0	17.3	23.4	99.9	66.2	33.7
Dissolved Oxygen	<85 or >120	<10	%		192.7**	0**	145.3**	158.6**	245.4**	138.1**

Notes:

Criteria 1: WDL246-01 for RBSW04 and RBSWDS (ANZG, 2018 Lowland Topical Rivers N. Australia)

Criteria 2: WDL246-01 for RBAD1

- : Assessment criteria not available

Bold/red indicates exceedance of Criteria 1

Bold/blue indicates exceedance of Criteria 2

*0 reading for EC indicated very low/non-detected on WQM used

** Low reliability values due to equipment error

Table 3: Summary of Surface Water Analytical Data - Heavy Metals (Dissolved)

Unauthorised Discharge Event - February 2021

Nathan River Project, Roper Bar, NT

	Criteria 1	Units	Sample ID	RBSW01
	WDL246		Type	Water
			Date	15/02/2021
Aluminium (filtered)	27	µg/L		120
Antimony (filtered)	9	µg/L		<5
Arsenic (filtered)	1	µg/L		2
Barium (filtered)	-	-		<20
Beryllium (filtered)	-	-		<1
Boron (filtered)	90	µg/L		<50
Cadmium (filtered)	0	µg/L		<0.01
Chromium (filtered)	-	-		<1
Cobalt (filtered)	1	µg/L		<1
Copper (filtered)	1	µg/L		<1
Iron (filtered)	300	µg/L		270
Lead (filtered)	1	µg/L		<1
Manganese (filtered)	1,200	µg/L		7.50
Molybdenum (filtered)	34	µg/L		<5
Nickel (filtered)	8	µg/L		<1
Selenium (filtered)	5	µg/L		<1
Silver (filtered)	-	µg/L		<0.01
Tin (filtered)	3	-		<5
Uranium (filtered)	1	µg/L		<0.1
Zinc (filtered)	2	µg/L		<5

Notes:

Criteria 1: WDL246-01 for RBSW04 and RBSWDS (ANZG, 2018 Lowland Topical Rivers N. Australia)

- : Assessment criteria not available

Bold/red indicates exceedance of assessment criteria

ATTACHMENT A

Condition 39 WDL246-01 Non-Compliance Reporting

Section 39.1: When the non-compliance was detected and by whom.

NRR's Environmental Technician notified the Sustainability Manager at approximately 1745 on 15 February 2021. In accordance with Condition 38 of WDL246-01, the incident was reported within 24 hours at 1618 on 16 February 2021. Notification was sent via email to NTEPA (waste@nt.gov.au).

Section 39.2: The time and date of the non-compliance

Statements obtained from the worker involved indicate the non-compliance commenced in the afternoon of 13 February and continued until the morning of 16 February. Exact timings could not be ascertained.

Section 39.3: The actual and potential causes and contributing factors to the non-compliance.

1. Actual Causes

- a) **13 February:** A pipe (160 mm poly pipe) dewatering FE3 into FE1 was cut, so discharge occurred directly over the flood protection levy into the Towns River (-15.147695, 135.072175) approximately 1.5km west of licenced discharge point RBAD1. The pump used was a 50/150 discharging at approximately 50 l/s.
- b) **13 February:** A second pipe (160 mm poly pipe) was moved to dewater FE2 directly into the Towns River (-15.146023, 135.084318), approximately 280 m west of licenced discharge point RBAD1. The pump used was a 100/100 discharging at approximately 80 l/s.
- c) **14 February:** Two 90kw submersible pumps were transferred from FE1 into FE2. A 315 mm poly pipe was installed along the levy bank to discharge directly into the Towns River at a third unauthorised discharge point located approximately 220 m west of RBAD1.
- d) Discharge from the above three locations continued intermittently from the afternoon of 13 to the morning of 16 February 2021. During this time there was also a 100 mm poly pipe discharging from FE4.
- e) The pipes were redirected in the afternoon of 16 February at the request of the Sustainability Manager so that FE2 and FE3 discharged through authorised discharge point RBAD1. The volume of water discharged from FE2 and FE3 over the duration of the incident is unknown.

2. Potential Causes and Contributing Factors.

- a) A dewatering meeting attended by senior management, members of the dewatering team, maintenance team and pump supplier was held at approximately 12pm on 13 February 2021. It was concluded that additional pumping capacity was required to dewater FE2 and FE3 more efficiently.
- b) Following the above meeting, the dewatering crew supervisor believed he had permission to discharge directly into the Towns River outside of authorised discharge point RBAD1 despite been aware of the WDL and its requirements.

- c) Access to the mine was cut by extensive flooding with light vehicle traffic restricted. Only the dewatering crew were able to access the mine and as such, the environmental technician was not able to collect WDL monitoring samples between 13 February and 16 February 2021.
- d) The Senior Environmental advisor was on rostered break for the duration of the incident and was not able to direct the Environmental Technician. Limited direction was given to the technician during the incident.
- e) The water quality meter used was found to have been faulty. The new water quality meter had not arrived at the time of the incident.

Section 39.4: The risk of environmental harm arising from the non-compliance.

Using a weight of evidence approach, the risk of environmental harm arising from this incident is considered negligible given;

- Little variance in EC between upstream logging station RBSWUS and downstream logging station RBSWDS, indicating potential contaminants had been sufficiently diluted before reaching RBSWDS;
- Flow rate of floodwaters within the Towns River at the time of the incident (11 kl/s to 32 kl/s) were many times greater than the minimum flow rate required (3 kl/s to 4kl/s) to achieve appropriate dilution of contaminants observed under normal/authorised discharge events;
- The quality of water within FE2 and FE3 (source of water discharged), apart from turbidity, was comparable to water typically discharged from FE1 under authorised discharge events; and
- Imagery collected over the duration of the events show that turbid discharge water is rapidly diluted in floodwaters.

Section 39.5: The action(s) that have or will be undertaken to mitigate any environmental harm arising from the non-compliance.

The following actions were undertaken to minimise environmental harm:

- On 16 February 2021, the Sustainability Manager instructed the dewatering team to repair cut pipes and redirect discharge through authorised discharge point RBAD1; and
- Some field measurements were undertaken at accessible locations on 14 and 15 February 2021 including FE2, FE3, RBAD1 and an alternative upstream location to RBSW01; and

Section 39.6: Corrective actions that have or will be undertaken to ensure the non-compliance does not reoccur.

The following corrective actions have or will be undertaken to ensure the non-compliance does not reoccur:

- The dewatering team member who cut the pipes was stood down pending investigation into the incident. Based on investigations, their employment has now been terminated;
- A water discharge procedure will be completed and distributed to senior management and the dewatering team to ensure awareness of WDL246-01 requirements;

- The Environmental Technician has been made aware of the need to undertake sampling during such incidents to assess for potential environmental harm; and
- Recruitment has begun for a back-to-back Environmental Advisor to ensure there is always an environmental presence on site.

Section 39.7: If no action was taken, why no action was taken.

Compliance sampling as required under WDL246-01 was not undertaken or only partially undertaken due to access to the mine and compliance sampling locations restricted due to flooding. Attempts were made to sample accessible locations; however, limited sample collection cannot be fully explained apart from the lack of direction given to, and relative inexperience of the Environmental Technician.

Section 39.7: A date when the investigation report will be submitted to the Administering Agency.

This incident investigation report will be submitted to the NT EPA by end of March 2021.

ATTACHMENT B



Image 1: View of unauthorised discharge point 1. 14/2/21 3:19 pm.



Image 2: View of unauthorised discharge point 2. 16/2/21 7:10 am.



Image 3: View of unauthorised discharge point 3. 16/2/21 7:12 am.



Image 4: Relocation of 2 x 90KW pumps from FE1 to FE2 14/2/21 ~5:20 pm.



Image 5: View of unauthorised discharge point 1. 14/2/21 ~5:20 pm. Note dilution of turbid plume.

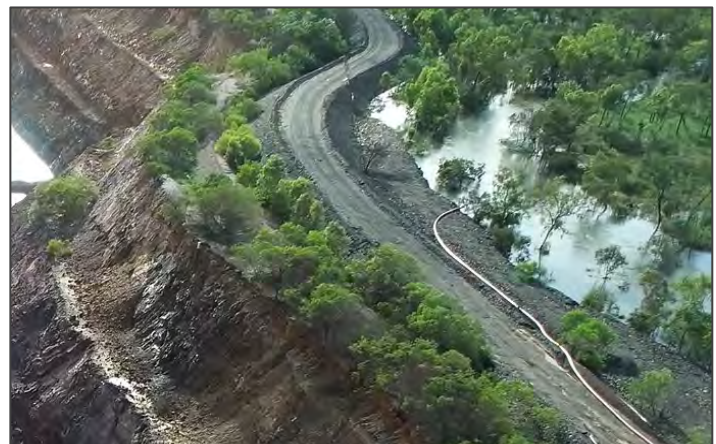


Image 6: View of unauthorised discharge point 2. 14/2/21 ~5:20 pm.

ATTACHMENT C

Site Details

Sample Location ID

FE2

Time

02:28 PM

Date

14/02/2021

Name

Shaun Hill

Sampling Type

Discharge

Field Parameters

pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp ($^{\circ}\text{C}$)
6.3	3.0	158.6	99.9	119.6	522.0	33.6

Comments / Observations

Description

Pools

No Odour

Colour

Dark Brown

Photo

Sample Details

Primary Sample ID

FE2

Analysis Required

Routine Surface Water Suite

Site Details

Sample Location ID

FE3

Time

02:10 PM

Date

14/02/2021

Name

Shaun Hill

Sampling Type

Discharge

Field Parameters

pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp ($^{\circ}\text{C}$)
6.1	846.0	245.4	66.2	62.1	549.0	34.9

Comments / Observations

Description

Pools
Very Turbid
No Odour

Colour

Moderate Pink

Photo



Sample Details

Primary Sample ID

FE3

Analysis Required

Routine Surface Water Suite

Site Details

Sample Location ID

FE3

Time

04:48 PM

Date

14/02/2021

Name

Shaun Hill

Sampling Type

Discharge

Field Parameters

pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp ($^{\circ}\text{C}$)
6.5	66.0	138.1	33.7	75.1	42.0	34.7

Comments / Observations

Description

Flowing
Slightly Turbid
No Odour

Colour

Light Brown

Photo



Sample Details

Primary Sample ID

FE3

Analysis Required

Routine Surface Water Suite

Site Details

Sample Location ID

RBAD1

Date

14/02/2021

Sampling Type

Discharge

Time

05:06 PM

Name

Shaun Hill

Field Parameters

pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp ($^{\circ}\text{C}$)
6.4	0.0	145.3	23.4	120.8	0.0	34.5

Comments / Observations

Description

Flowing
Slightly Turbid
No Odour

Colour

Light Brown

Photo



Sample Details

Primary Sample ID

RBAD1

Analysis Required

Routine Surface Water Suite

Site Details

Sample Location ID

RBSW01

Time

11:07 AM

Date

14/02/2021

Name

Shaun Hill

Sampling Type

Discharge

Field Parameters

pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp ($^{\circ}\text{C}$)
6.3	0.0	192.7	23.0	104.8	0.0	30.7

Comments / Observations

Description

Flowing

Slightly Turbid

No Odour

Other Comments

Sample taken at container crossing due to flooding

Colour

Light Brown

Photo



Sample Details

Primary Sample ID

RBSW01

Analysis Required

Routine Surface Water Suite

Site Details

Sample Location ID

RBSW01

Time

11:40 AM

Date

15/02/2021

Name

Shaun Hill

Sampling Type

Discharge

Field Parameters

pH (Units)	EC ($\mu\text{s}/\text{cm}$)	DO (%)	Turbidity (NTU)	ORP (mV)	TDS (mg/L)	Temp ($^{\circ}\text{C}$)
7.7	0.0	0.0	17.3	127.6	0.0	33.6

Comments / Observations

Description

Flowing
Slightly Turbid
No Odour

Colour

Light Yellow

Photo



Sample Details

Primary Sample ID

RBSW01

Bottles

500ml Green Inorganics

60ml Blue Cyanide

60ml Red Metals x 2

60ml Purple Preserved Inorganics

Analysis Required

Routine Surface Water Suite

ATTACHMENT D

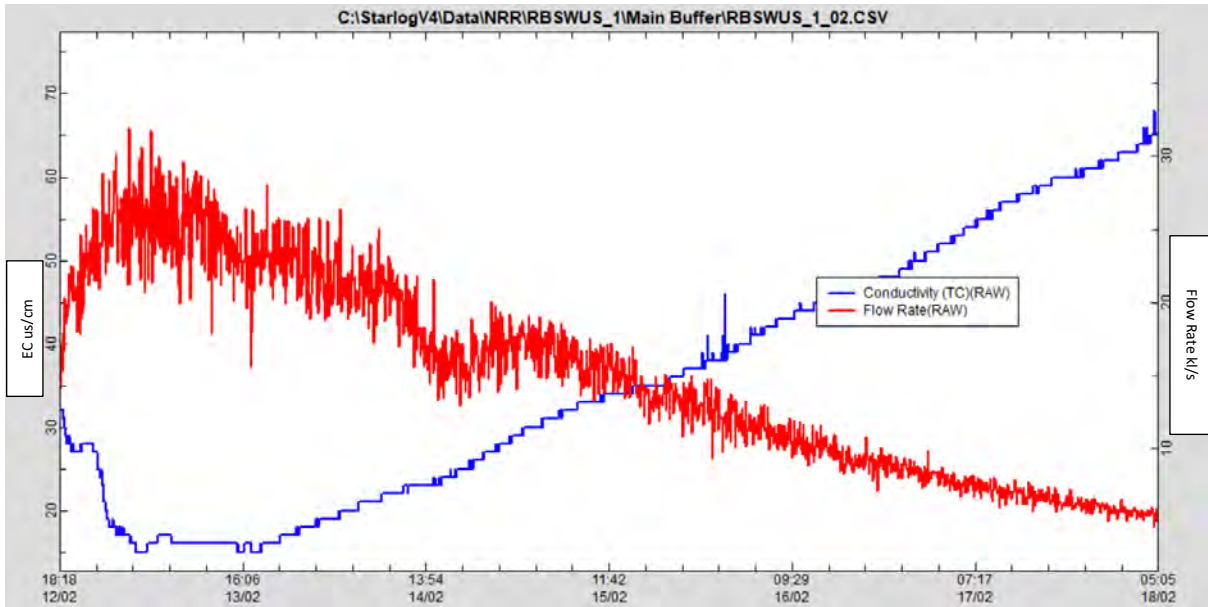


Plate 1: Flowrate and EC at upstream logging station RBSWUS. Note EC ranged between 15 $\mu\text{s/cm}$ and 41 $\mu\text{s/cm}$ over the duration of the incident. Minimum flow rate recorded was approximately 10 KL/s .

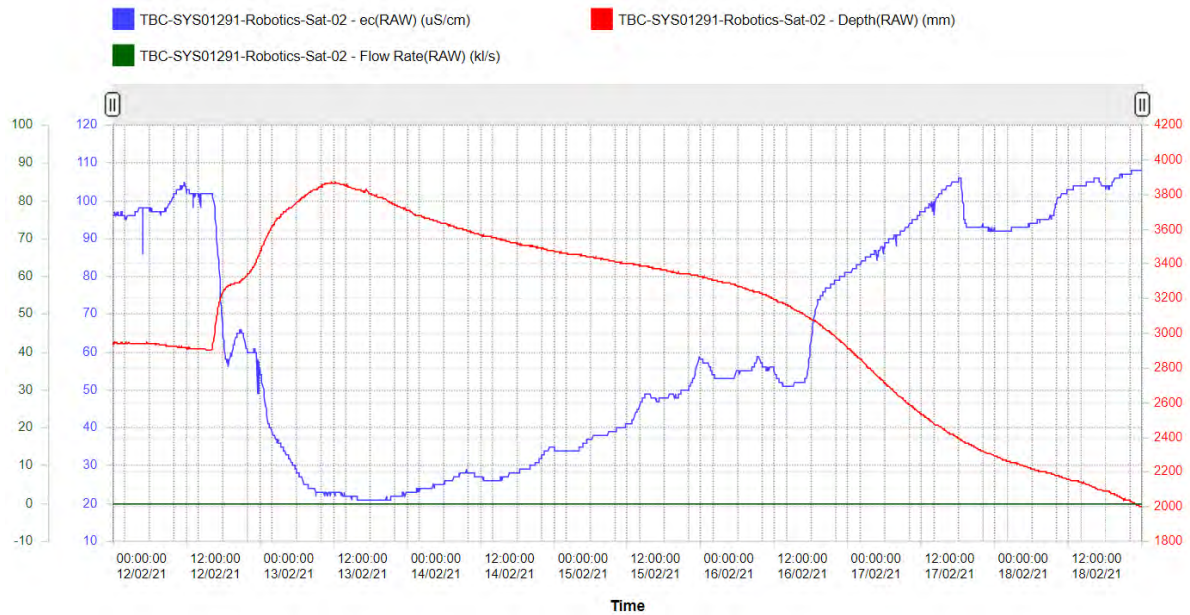


Plate 2: Electrical conductivity and depth at downstream logger RBSWDS. Flow rate probe is non-functional. Note EC range between 21 $\mu\text{s/cm}$ and 84 $\mu\text{s/cm}$ over the duration of the incident.

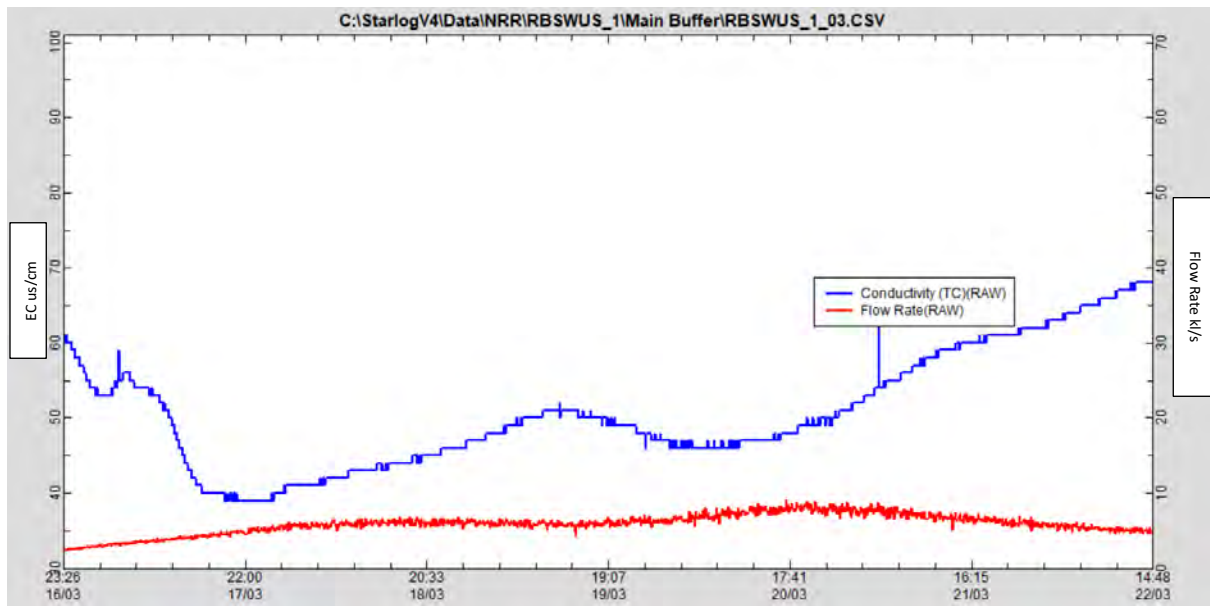


Plate 3: Comparative example from a recent discharge from 17 to 22 March 2021 from upstream logging station RBSWUS. A flowrate of approximately 3 kl/s – 4 kl/s was required to achieve sufficient dilution within 250 m of RBAD1 at RBSW04 at a discharge rate of 420 l/s .

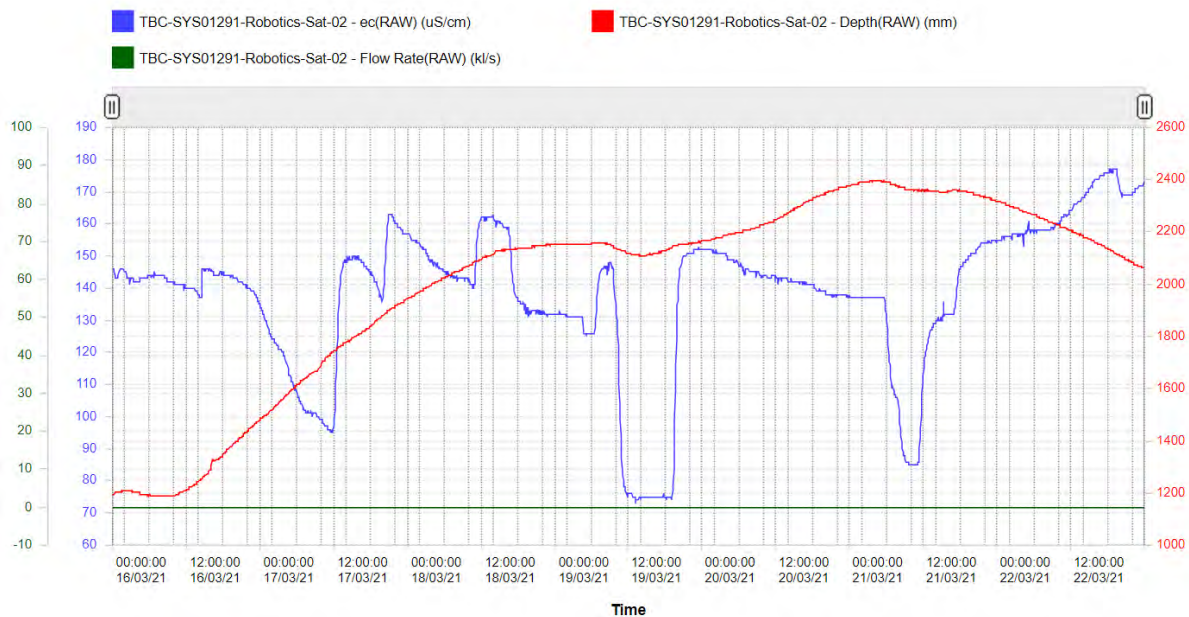


Plate 4: Electrical conductivity and depth at downstream logger RBSWDS. Flow rate probe is non-functional. A maximum EC of 178 $\mu\text{S}/\text{cm}$ was recorded during the March discharge. A maximum flow rate recorded during the discharge at RBSWUS was 9 kl/s .