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TARAGO RAIL CORRIDOR AND TARAGO AREA
DETAILED SITE INVESTIGATION ADDENDUM

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DETAILED SITE INVESTIGATION ADDENDUM

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ABBREVIATIONS

Abbreviation	Description
%	per cent
°C	Degrees Celsius
µg/L	micrograms per Litre
µS/cm	Micro siemens per centimetre
m	metre(s)
bgl	below ground level
mg/kg	milligrams per Kilogram
mg/L	milligrams per Litre
mm	millimetre
mV	milli volts
ppm	parts per million
ADWG	Australian Drinking Water Guidelines
ANZECC	Australian and New Zealand Environment and Conservation Council
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene (Monocyclic Aromatic Hydrocarbons)
CH	Chainage
CLM Act	NSW Contaminated Land Management Act 1997
CoC	Chain of Custody
DO	Dissolved Oxygen
DP	Deposited Plan
DQI	Data Quality Indicator
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
Eurofins	Eurofins Environment Testing
HIL	Health Investigation Level
LOR	Limit of Reporting
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Fe: Iron, Ni: Nickel, Pb: Lead, Zn:Zinc, Hg: Mercury
NATA	National Association of Testing Authorities
ND	Not Detected
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
n	Number of Samples
OCPs	Organochlorine Pesticides
OPPs	Organophosphorus Pesticides
ORP	Oxidation reduction potential
PCBs	Polychlorinated Biphenyls
pH	A measure of acidity, hydrogen ion activity
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
RRE	Resource Recovery Exemption
SAQP	Sampling Analysis and Quality Plan
TDS	Total Dissolved Solids
UCL	Upper Confidence Limit
US EPA	United States Environmental Protection Agency
XRF	X-Ray Fluorescence
-	On tables is "not calculated", "no criteria" or "not applicable"

EXECUTIVE SUMMARY

Ramboll Australia Pty Ltd (Ramboll) was engaged by John Holland Rail Pty Limited (JHR) on behalf of Transport for NSW (TfNSW) to assess contaminant impacts from the former Woodlawn Mines Ore Concentrate Loadout Complex (the Loadout Complex) which was identified as having been historically located within the Goulburn – Bombala rail corridor at Tarago, New South Wales (NSW), Australia.

A Detailed Site Investigation (DSI) was prepared by Ramboll in July 2020 (Ramboll 2020, the DSI). The DSI was reviewed by the site auditor and NSW Environmental Protection Authority (EPA) who provided comment that data gaps remained regarding onsite impacts within the Loadout Facility and that further investigation was warranted to confirm the extent of offsite contaminant migration via surface water.

This report is an addendum to the DSI. Additional investigation reported herein comprises supplementary water, sediment and soil investigations carried out at the Tarago Rail Corridor and Tarago area to address EPA and site auditor comments. The objectives were to:

- further investigate the extent of offsite contaminant migration via surface water from three culverts which direct surface water beneath the rail formation onsite
- further assess contaminants within the footprint of the former Loadout Complex
- characterise contaminated material to be generated onsite during remediation
- to assess concentrations of contaminants of potential concern associated with rail corridors that had not previously been considered; organochlorine / organophosphate pesticides (OCPs/OPPs) and polychlorinated biphenyls (PCBs).

Summarily the additional investigations comprised:

- surface water and co-located sediment sampling at representative locations upstream and downstream of the site and laboratory analysis for total and dissolved metals
- measurement of metal concentrations in sediment along drainage lines downgradient of the site using field-portable X-ray Fluorescence (XRF), analytical samples were collected were sediments were saturated
- supplementary intrusive assessment of soil within the footprint of former Loadout Complex and measurement of lead using XRF
- laboratory characterisation of contaminant concentrations in materials to be generated during remediation
- review of existing OCP / OPP and PCB results from samples collected within the rail formation, surrounding the rail formation and sediments along drainage lines
- consolidation of the above results with existing data obtained during previous investigations
- assessment of results against adopted Tier 1 assessment criteria
- assessment of data quality and reliability
- refinement of the conceptual site model.

Key findings were:

- risks to human health from offsite migration of contaminants in surface water are considered to be low and acceptable
- risks to ecology from offsite migration of contaminants in surface water appear limited to the offsite dam downstream of the northern culvert. Elevated concentrations of copper and zinc observed in the Mulwaree River are consistent with background concentrations
- potential risks to human health from offsite migration of contaminants in sediment around the Boyd Street causeway and the area adjacent/downstream of Braidwood Road have been identified however an additional contaminant source appears to have contributed to impacts downstream of Braidwood Road

- potential risks to ecology from offsite migration of contaminants in sediment have been identified downstream of the southern, middle and northern rail culverts. Site specific ecological risk assessment in these areas should occur to define requirements for remediation
- lead concentrations in soils at depth around the footprint of the former Loadout Complex exceed human health and ecological criteria however are unlikely to present a risk due to positioning beneath clay capping
- risks associated with OCP, OPP and PCB at and originating from the site are considered to be low and acceptable.

Recommendations include:

- site specific human health risk assessment or remediation of lead in sediment around the Boyd Street Causeway and in the drainage swale adjacent/downstream of Braidwood Road should occur
- site specific ecological risk assessment of copper, zinc and to a lesser extent lead in sediment downstream of the site should occur to define remedial requirements
- ongoing monitoring of surface water and sediment should occur on a quarterly basis and preferably after rainfall. This should include analysis for both total and dissolved metals in order to accurately assess potential human health and ecological risks.

1. INTRODUCTION

Ramboll Australia Pty Ltd (Ramboll) was engaged by John Holland Rail Pty Limited (JHR) on behalf of Transport for NSW (TfNSW) to assess contaminant impacts from the former Woodlawn Mines Ore Concentrate Loadout Complex (the Loadout Complex) which was identified as having been historically located within the Goulburn – Bombala rail corridor at Tarago, New South Wales (NSW), Australia.

A Detailed Site Investigation (DSI) was prepared by Ramboll in July 2020 (Ramboll 2020, the DSI). A Detailed Site Investigation (DSI) was prepared by Ramboll in July 2020 (Ramboll 2020, the DSI). The DSI was reviewed by the site auditor and NSW Environmental Protection Authority (EPA) who provided comment that data gaps remained regarding onsite impacts within the Loadout Facility and that further investigation was warranted to confirm the extent of offsite contaminant migration via surface water.

This document presents the findings from additional surface water, sediment and soil investigations carried out at the Tarago Rail Corridor and Tarago area to address EPA and auditor comments and is presented as an addendum to the DSI prepared by Ramboll in July 2020.

1.1 Background

Lead and to a lesser extent zinc and copper have been identified in soils within the Goulburn – Bombala rail corridor at Tarago in the vicinity of the former Woodlawn Mines Ore Concentrate Loadout Complex (the Loadout Complex). The load out complex was identified as having been historically located within the rail corridor at this location and investigations have identified lead and to a lesser extent zinc and copper in soils within the corridor.

Ramboll has completed a DSI of the rail corridor to characterise the extent of contamination present. Additional investigation comprising assessment of contamination to surrounding private and public properties has been completed. Information relating to the site and offsite public land has been presented in the DSI. Private property reports have been presented under separate covers.

In November 2019, based on the investigations completed, the site was notified to the NSW Environment Protection Authority (EPA) under Section 60 of the *Contaminated Land Management Act 1997* (CLM Act) and on 25 March 2020 the NSW EPA declared the site to be significantly contaminated under Section 11 of the CLM Act (Declaration Number: 20201102; Area Number 3455). The site was published on the EPA's list of notified sites as "contamination is regulated by the EPA under the CLM Act". The declaration defines the substance of concern ("the Contaminant") in soil as lead described as follows:

- lead concentrations in soil within the rail corridor (Lot 22 DP1202608) exceed national guideline values for the protection of human health and the environment
- lead contamination has impacted adjacent land at 106 Goulburn Street, Tarago (Lot 1 DP816626), with soil found to contain lead at concentrations exceeding national guideline values for the protection of human health and the environment
- there are complete exposure pathways to lead for occupants of 106 Goulburn Street, as well as potentially complete exposure pathways for persons working within the rail corridor
- there are potentially complete exposure pathways for onsite and offsite ecological receptors.

A voluntary management proposal (VMP) was prepared to define how the Contaminant and associated risks would be managed and this was approved by the NSW EPA on 28 May 2020. Principal features of the VMP as relate to assessment of the Contaminant are described in **Table 1-1**.

Table 1-1 VMP Principle Features

Item	Current status
P1. Appoint a NSW EPA auditor accredited under the Contamination Land Management Act 1997	A NSW EPA accredited auditor has been engaged.
P2. Collate and review data from third parties in relation to the Contaminant in soil and water in the Tarago area	Previous communication with nearby industry identified periodic monitoring of the environment surrounding the site had occurred. This data was not made available for review.
P3. Undertake delineation of the Contaminant within the site and at the Loadout Complex	At the site, the Contaminant has been delineated through a series of investigations, refer to **Section 2**. The DSI (Ramboll 2020) identified data gaps pertaining to delineation of the Contaminant at depth within the footprint of the former Loadout Complex. Included in this DSI Addendum are the results of subsequent delineation sampling undertaken at the Loadout Complex during September 2020.
P4. Install groundwater monitoring wells to assess impacts to groundwater from the Contaminant originating from the site	Groundwater monitoring wells were installed in March 2020 and assessment of groundwater conditions were included in the DSI (Ramboll 2020).
P5. Assess the potential migration from the site of the Contaminant in surface waters and sediments	Assessment of surface water and sediment were included in the DSI (Ramboll 2020) however, the extent of offsite contaminant migration via surface water had not been determined. Included in this DSI Addendum are the results of subsequent surface water and sediment sampling.
P6. Prepare a Detailed Site Investigation report	A DSI has been prepared (Ramboll 2020). Recommendations included further assessment to confirm the extent of offsite contaminant migration via surface water and to delineate the Contaminant at depth within the footprint of the former loadout complex buildings. These recommendations are assessed in this DSI addendum.

1.2 Objectives

The objectives of this DSI Addendum were to further investigate the extent of offsite contaminant migration via surface water and further assess the loadout complex building footprint as recommended in the DSI.

Additional objectives were to characterise contaminated material to be generated onsite during remediation and to assess concentrations of contaminants of potential concern associated with rail corridors that had not previously been considered; organochlorine / organophosphate pesticides (OCPs/OPPs) and polychlorinated biphenyls (PCBs).

1.3 Scope of Work

The scope of work performed to meet the objective(s) of the DSI Addendum comprised:

- surface water and co-located sediment sampling at representative locations upstream and downstream of the site and laboratory analysis for total and dissolved metals
- measurement of metal concentrations in sediment along drainage lines downgradient of the site using field-portable X-ray Fluorescence (XRF), analytical samples were collected were sediments were saturated
- supplementary intrusive assessment of soil within the footprint of former Loadout Complex and measurement of lead using XRF
- laboratory characterisation of contaminant concentrations in materials to be generated during remediation
- review of existing OCP / OPP and PCB results from samples collected within the rail formation, surrounding the rail formation and sediments along drainage lines
- consolidation of the above results with existing data obtained during previous investigations
- assessment of results against adopted Tier 1 assessment criteria
- assessment of data quality and reliability
- refinement of the conceptual site model.

2. PREVIOUS INVESTIGATIONS

Previous investigations completed at the site are presented in the following documents:

- 'Tarago – Rail Siding Extension, Preliminary Contaminated Site Assessment' dated June 2015 by McMahon Earth Science (McMahon 2015)
- 'August 2019 Surface Water Monitoring - Tarago Loop Extension' dated 29 August 2019 by Ramboll (Ramboll 2019)
- 'Tarago Loop Extension Further Intrusive Assessment and Lead Management Plan' dated 11 September 2019 by Ramboll (Ramboll 2019a)
- 'Tarago Crossing Loop Extension Short-Term Lead Management Plan' dated 11 September 2019 by Ramboll (Ramboll 2019b)
- 'Tarago Loop Extension Preliminary Human Health Risk Assessment Ramboll' dated 17 October 2019 by Ramboll (Ramboll 2019c)
- 'Tarago Rail Corridor Environmental Site Assessment' dated 18 October 2019 by Ramboll (Ramboll 2019d)
- 'Tarago Loop Extension: Interim Lead Management Plan' dated 16 December 2019 by Ramboll (Ramboll 2019e)
- 'Tarago Loop Extension Remedial Action Plan' dated 16 December 2019 by Ramboll (Ramboll 2019f)
- 'Tarago Rail Corridor Environmental Data Gap Assessment' DRAFT dated 30 January 2020 by Ramboll (Ramboll 2020a)
- 'Rail Sleeper Waste Classification, Tarago Loop Extension' dated 26 March 2020 by Ramboll (Ramboll 2020b)
- 'Tarago Air Quality Monitoring Report April 2020' dated 21 May 2020 by Ramboll (Ramboll 2020c)
- 'Tarago Air Quality Monitoring Report May 2020' dated 3 June 2020 by Ramboll (Ramboll 2020d).

The DSI supplemented the assessments described above with further assessment of contamination at or originating from the site in soil, dust, surface water, groundwater, paint, tank water and tank sediment.

Key findings of the DSI were:

- Lead has been delineated onsite within the rail formation, adjacent shallow soils and drainage lines. Investigation within the footprint of the former Loadout Complex identified contamination at depth though this is considered unlikely to present a risk to human health or the environment
- Lead has not impacted groundwater. All contaminant concentrations measured in groundwater at all locations tested were reported below the Australian Drinking Water Guidelines and guidelines relevant for potable use. Some metals in groundwater exceed criteria relevant to protection of ecology. Impacts to groundwater from site contamination are considered to be low and acceptable and no further investigation is warranted.
- Offsite migration of lead and other metals has occurred via surface water. Deposition of elevated metal concentrations in surficial soils appears to have occurred in land immediately east of the site and across Boyd Street onto other nearby properties.
- Surface water impacts to the Mulwaree River are not evident.
- Offsite migration of lead has occurred in airborne dust. Elevated concentrations of lead in rainwater tank sediment and internal dust were identified in close proximity of the site indicating limited offsite migration of contaminants in air borne dust has occurred. Dust monitoring is ongoing however early data suggests migration of lead in dust from the site is now low.
- All contaminant concentrations measured in rainwater tank water at all locations tested were below the Australian Drinking Water Guidelines and guidelines relevant for all potable use.

Based on risks from metals rainwater tank water is considered suitable for all potable uses and unimpacted by contamination from the site.

- High metal concentrations have been identified in local public road reserves and (with the exception of Boyd Street) appear to be unrelated to the rail corridor.

Key recommendations were:

- Further investigation is recommended to confirm the extent of offsite contaminant migration via surface water and to delineate lead at depth within the footprint of the former Loadout Complex.
- Remediation is required onsite and offsite to address risks associated with lead.
- An Action Plan should be developed to mitigate risks associated with site contamination until remediation can occur.
- Ongoing monitoring of surface water and air quality should occur until a long-term remedial strategy is implemented and proven to be effective.

Where elevated contaminant concentrations were identified in tank sediment or internal dust and were considered to have originated from the site, cleaning and validation works were offered to affected stakeholders. In order to maintain confidentiality for the Tarago community, specific identifiers for private property assessment are excluded from the DSI and DSI Addendum.

3. SAMPLING AND ANALYSIS QUALITY PLAN

Sampling and Analysis Quality Plans (SAQPs) including data quality objectives were defined for surface water sampling, soil and sediment sampling and characterisation of materials to be generated during remediation (SAQP for Resource Recovery (RRE)). The SAQPs were prepared prior to the commencement of fieldwork and are attached in **Appendix 2.** Supplementary assessment of the former Loadout Complex was planned through email correspondence with the site auditor and was completed in accordance with relevant guidance and standards.

4. QUALITY ASSURANCE AND QUALITY CONTROL

A quality assurance/quality control (QA/QC) assessment was completed for the field investigations and is presented in **Table 4-1** and **Table 4-2**. An assessment was made of data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations and a summary is provided in **Table 4-3**.

Table 4-1 Sampling and Analysis Methodology Assessment

Sampling Methodology	**Ramboll's Assessment**			
	Surface Water[1]	**Sediment[1]**	**Load Out Complex**	**Characterisation of Materials to be Generated During Remediation**
Sampling Pattern, Density and Locations	Surface water sampling targeted conditions upstream and downstream of three culverts which direct surface water beneath the rail formation onsite. Surface water at the site only occurs after rainfall and is received by the surrounding environment as follows: • water passing through the northern culvert discharges to an adjacent agricultural property and during high rainfall events to a dam on the agricultural property • water passing through the middle culvert discharges across a causeway on Boyd Street to an adjacent vacant block • water passing through the southern culvert discharges beneath Goulburn Street to agricultural land and a tributary to the Mulwaree River (approximately 550m east of site). During the October 2020 sampling round, three additional locations SW_BR001, SW_BR001 were sampled; (SW10) was added within the Mulwaree River, downstream of the drainage line and ephemeral creek that extends from the middle culvert.	Analytical sediment samples were co-located with surface water samples as prescribed in the Surface Water SAQP and analysed by the laboratory for Al, As, Ba, Be, Cd, Cr 3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn. XRF measurement of metals within sediments occurred along drainage lines and ephemeral creek beds located downgradient of the northern, middle and southern culverts. In the event of saturated sediments, laboratory analysis was conducted for metals. Samples targeted the transportation of sediment via surface water flow down-stream of the rail formation from the three culverts and results were assessed in conjunction with existing sediment data collected from drainage lines (where relevant). The data is considered adequate to determine the extent of offsite contaminant migration via surface water deposition of sediment.	Field portable XRF measurements were collected in general accordance with the sampling plan, from various depths across six test pits located within the footprint of the former Loadout Complex. The six test pits supplement an existing four locations, totaling seven locations within the footprint and three locations between the southern end of the building footprint and the rail line and this is considered adequate to characterise the extent of contamination.	Composite samples were collected from 10 locations along a 750 m^3 stockpile comprising fouled ballast impacted by ore concentrate. An additional 10 composite samples were collected from test pits located within impacted soils adjacent the rail formation. Test pit locations were selected based on elevated metals concentrations reported during initial investigations. Composite samples were submitted for laboratory analysis of pH, EC, moisture content, total organic carbon, total sulfur and metal(loid)s; As, Be, B, Cd, Co, Cu, Cr, Pb, Mn, Hg, Mo, Ni, Sb, Se, Sn, V, Zn. Composite sampling was initially undertaken to facilitate application of a Resource Recovery Exemption (RRE) however data obtained during the investigation is considered suitable for informing remedial options more generally.

Sampling Methodology	Ramboll's Assessment			
	Surface Water[1]	**Sediment[1]**	**Load Out Complex**	**Characterisation of Materials to be Generated During Remediation**
	All locations were sampled (where surface water was encountered). Surface water samples were collected upstream and downstream of each culvert and within receiving water bodies (Mulwaree River).This sampling program is considered adequate to assess offsite contaminant migration via surface water as representative onsite and offsite locations were sampled .			
Sample Depths	Surface water samples were collected from a minimum depth of 100 mm below the water surface where practical.	Sediment samples were collected at the surface between approximately 0.0-0.1 mbgl. XRF measurements were taken from sediment directly at the ground surface.	Field portable XRF measurements were collected from soils at various depths until readings were recorded below site criteria (2,200 mg/kg (Ramboll 2020)). Samples were collected in-situ where possible however, for safety reasons samples greater than half a meter in depth were collected from spoil within the excavator bucket.	For test pits, final depths were determined through field portable XRF measurement of lead which occurred in-situ until concentrations fell below site acceptance criteria (2,200 mg/kg (Ramboll 2020)).
Sample Collection Method	All samples were collected by personnel trained and experienced in the collection of surface water samples for analysis, using standard industry techniques for sample collection. All samples were collected from the designated depth where possible, using dedicated disposable equipment (i.e. syringes) or a pond sampler. Surface water samples were collected into laboratory provided sampling containers (dosed with the correct preservative), with field filtration for dissolved metals (0.45 µm) and analysed for total and dissolved metals; Al, As, Ba, Be, Cd, Cr 3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn.	Field portable XRF measurement were collected from surficial sediment by placing the instrument directly onto the ground surface following the clearing of debris. Sediment samples for laboratory analysis were collected either by using a disposable bailer cut down to create a 'push tube' or by using a pond sampler. Each push tube was used only once and discarded after use. The pond sampler was decontaminated between sampling locations. Samples were placed into laboratory supplied sampling containers for laboratory analysis of total metals;	Soil samples collected for confirmatory laboratory analysis were collected into laboratory supplied sampling containers for analysis of lead only.	Generally, sampling comprised: • collection of five sub-samples per sampling location (each approximately 1 kg) • homogenizing and sample reduction through three rounds of coning and quartering as described in AS1141.3.1, to achieve a sample mass of approximately 0.6 kg • sample collection for laboratory analyses.

Sampling Methodology	Ramboll's Assessment			
	Surface Water[1]	**Sediment**[1]	**Load Out Complex**	**Characterisation of Materials to be Generated During Remediation**
		Al, As, Ba, Be, Cd, Cr3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn.		
Decontamination Procedures	Field parameters were recorded after analytical samples had been collected to minimise disturbance of sediments. Non disposable sampling equipment was decontaminated between sampling locations by rinsing with Decon®90 solution and potable water.	Analytical samples were collected into laboratory supplied sampling containers using dedicated disposable sampling equipment or a pond sampler. The pond sampler was decontaminated between sampling locations by rinsing with Decon®90 solution and potable water. For field XRF measurements, the analyzer window of the XRF was cleaned regularly to prevent cross contamination and measurement of reference material was collected (silicon dioxide, SiO_2).	Measurement of blank reference material (silicon dioxide, SiO_2) was completed prior to the commencement of fieldwork and repeated every 10 samples. This ensured that cross-contamination of samples was not occurring. The analyser window was cleaned regularly to prevent cross contamination.	The hand trowel and plywood board used for coning and quartering of the composite samples was brushed clean of residual material and rinsed with potable water between sampling locations.
Sample Storage and Handling	Samples were collected into laboratory supplied bottles dosed with the correct preservative (where applicable). The samples were stored in an ice filled cooler in the field and during transit to the laboratory.			
Chain of Custody	All analytical samples were submitted to the laboratory under chain of custody conditions.			
Calibration of Field Equipment	The water quality meter was rented from an equipment hire company. The water quality meter was calibrated prior to hire and the calibration certificate is provided in **Appendix 4**.	Field portable XRF measurements were collected using a calibrated instrument (calibration certificates provided in **Appendix 4**). Field calibration occurred using blank/certified reference materials.		

[1]Previous investigation concluded contaminants of concern at and originating from the site are limited to metals. On this basis other contaminants previously assessed in surface water and sediment were excluded.

Table 4-2 Field and Laboratory QA/QC

Data quality indicator	Ramboll's Assessment			
	Surface Water	**Sediment / Soil**	**Load Out Complex**	**Characterisation of Materials to be Generated During Remediation**
Field Quality Control Samples	A total of seven intra-laboratory and two inter-laboratory duplicate samples have been collected as part of the surface water monitoring program between August 2019 and August 2020 equaling a rate of 17.95% and 35.12%, respectively. This is exceeds minimum targeted intra and inter-laboratory duplicate densities of 5% and so is considered appropriate.	Two intra-laboratory and one inter-laboratory duplicate samples were submitted for a total of 20 primary samples, equaling a rate of 10% and 5%, respectively. This is equal to or greater than the minimum targeted intra and inter-laboratory duplicate densities of 5% and so is considered appropriate.	Two laboratory QA samples were collected for a total of 27 field portable XRF measurements.	Two intra-laboratory duplicate samples were submitted for a total of 20 primary samples, equalling a rate of 10%. No inter-laboratory samples were analysed.
Field Quality Control Results	For the assessment of RPDs, it is noted that concentrations close to the laboratory limit of reporting (LOR) will have higher RPDs. As such, RPDs where concentrations were < 10 x LOR were discounted from assessment. The acceptance criteria for RPDs of sample pairs > 10 x LOR was 30% . For the assessment of XRF / laboratory correlations an acceptance criteria of 0.7 was adopted for data to be considered screening level. Where a higher contaminant concentration was reported in a duplicate sample, that concentration was adopted in the site investigation as a conservative approach.			
	Intra-laboratory and inter-laboratory duplicate results are presented in **Table VIII**, **Appendix 5**. Relative Percentage Differences (RPDs) were below the above criterion except for: • SW1/T1_131020 RPD for Al 71.1%, Cd 54.5% and Mn 86.4% The high RPD values were generally the result of low-level detections close to the laboratory limit of reporting (LOR). Guideline value exceedances were generally reported in both the primary and duplicate sample. Therefore, high RPD values are not considered to affect the validity of the data collected. Results for all trip blank samples found no detectable concentrations.	Intra-laboratory and inter-laboratory duplicate results are presented in **Table IX**, **Appendix 5**. RPDs were below the criterion except for: • SED7/SED_D01_020420 RPD for Cd 60.6% • SED1/DUP01 RPD for Pb 51.9% The high RPD values are likely the result of sample heterogeneity. Higher duplicate values were adopted as a conservative approach however, guideline value exceedances were generally reported in both the primary and duplicate sample. The performance of XRF samples was assessed through correlation of XRF results against laboratory duplicates separately for copper lead and zinc. Correlation curves are presented as	Laboratory QA results are presented in **Table IX**, **Appendix 5**. RPDs were below the criterion except for: • LO_TP02_1.1m XRF/LO_TP02_1.1m laboratory for Pb 198.9 % The field portable XRF takes measurements on a relatively small sample area of few millimetres in size. The effective analysis depth (depth from which 99% of the XRF signal originates) can also vary based on organic carbon content, soil moisture and other soil variables. The effect of this is that the volume of soil measured by field portable XRF is relatively small compared with soil volume sampled for laboratory analysis. Therefore, small scale heterogeneity is averaged (diluted) to lower concentrations in a	Intra-laboratory duplicate results are presented in **Table IX**, **Appendix 5.** No inter-laboratory samples were submitted for analysis. RPDs were below the criterion except for: • RRE_SP08 / RRE_DUP1 for Pb 70.5% and Se 40.0% • RRE_TP08 / RRE_DUP2 for sulphur 96.3%, total organic carbon 68.0%, Sb 61.9% and V 33.0% Composite samples were collected through three rounds of coning and quartering and the high RPD values are likely the result of sample heterogeneity. Where high RPD values were detected, the higher contaminant concentration was reported in the primary sample.

Data quality indicator	Ramboll's Assessment			
	Surface Water	**Sediment / Soil**	**Load Out Complex**	**Characterisation of Materials to be Generated During Remediation**
	The results for the trip spike samples indicated that the spike recoveries were achieved (acceptance limit 70% to 130%).	**Figure 1 – 3**, **Appendix 5**. In summary, the correlations (R^2) were: • R^2 Cu: 0.90 • R^2 Pb: 0.80 • R^2 Zn: 0.80[1]	homogenised laboratory sample of larger volume (as deeper and wider soil area is sampled for laboratory measurement).	Results for the rinsate sample collected from the hand trowel used to cone and quarter samples reported no detectable concentrations.
NATA Registered Laboratory and NATA Endorsed Methods	Eurofins and ALS were the primary and secondary analytical laboratories, respectively. Laboratory certificates are NATA stamped			
Analytical Methods	A summary of analytical methods was included in the laboratory certificates.			
Holding Times	Review of the CoC and laboratory certificates indicate that holding times were met.			
Practical Quantitation Limit (PQL)	PQLs for all analytes were below the adopted guideline values.			
Laboratory Quality Control Samples	Laboratory quality assurance testing was undertaken at appropriate frequencies.			
Laboratory Quality Control Results	Results are contained within the laboratory certificates attached in **Appendix 6**.			

Table 4-3 QA/QC Assessment

	Ramboll's Comments			
Data Quality Indicator	**Surface Water**	**Sediment**	**Loadout Complex**	**Characterisation of Materials to be Generated During Remediation**
Completeness: The completeness of the data set was judged by	Co-located sampling of surface water and sediment occurred upstream and downstream of the three culverts which receive surface water runoff from site and upstream and downstream of the discharge point to the Mulwaree River. Additional XRF measurement of sediments occurred along drainage lines and ephemeral creek beds downstream of the site.		Test pitting and field portable XRF measurements occurred in general accordance with the sampling plan.	All locations sampled as per the SAQP.

[1] Moisture content may affect the accuracy of XRF measurement particularly where moisture is > 20% (US EPA 2007). XRF analyses of sediment samples was replaced with laboratory analyses at locations where excess moisture was visibly observed (eg: at locations where co-located surface water samples were collected). An XRF measurement was collected at one location where excess moisture was observed (XP6003) however for the purpose of site characterisation laboratory duplicates at this location were relied upon to characterise contaminant concentrations. The XP6003 XRF measurement was also discounted from calculation of correlations above.

	Ramboll's Comments			
Data Quality Indicator	**Surface Water**	**Sediment**	**Loadout Complex**	**Characterisation of Materials to be Generated During Remediation**
Comparability: Comparability to existing field data was maintained by	The data collected during the routine monitoring event is considered to be comparable to previous results as the sampling protocols, analysis methods, quality control methods and monitoring locations are consistent with prior events. XRF measurements were completed by experienced Ramboll personnel using a calibrated instrument.		The investigation was completed by experience Ramboll personnel. Field portable XRF measurements were completed using a calibrated instrument.	The field investigation was completed by experienced Ramboll personnel using standard operating procedures. Laboratory analysis was undertaken by NATA registered laboratories using accredited analytical methods.
Representativeness: The representativeness of the field data was judged by	In the field, representativeness was achieved by completing the sampling plans described in **Appendix 2**.			
Precision: The degree to which data generated from replicate or repetitive measurements differ from one another due to random ss. Precision of field data was maintained by	In the field, Ramboll achieved precision by using standard operating procedures for the collection of analytical samples and by collecting duplicate and triplicate samples for analysis. Laboratory quality control results indicate precision was achieved at the primary and secondary laboratory.		Field portable XRF measurements were collected by an experiment environmental scientist holding a NSW EPA licence required for field based XRF testing. Field portable XRF measurements were collected from soil in-situ (where possible) and measurements were taken by placing the field portable XRF directly on to the soil. As moisture is known to effect measured concentrations, visibly dry surfaces were chosen for measurement.	Composite samples were collected by suitably experienced Ramboll personnel. After completion of coning and quartering samples were placed into laboratory supplied sampling containers and stored in chilled coolers in the field and during transportation to the laboratory. Samples were transported to the laboratory under chain of custody conditions.
Accuracy: Accuracy in the collection of field data was controlled by	In the field, Ramboll achieved accuracy by using Ramboll's standard operating procedures for the collection of surface water and sediment samples. Laboratory quality control results indicate accuracy was achieved at the primary and secondary laboratory.		Appropriate sampling methodologies utilised and complied with. Works completed in accordance with US EPA 2007, Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment.	Appropriate sampling methodologies utilised and complied with. Works completed in accordance with AS 4482.1 – 1997 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil, Part 1: Non-volatile and semi-volatile compounds* and AS 1141.3.1–2012 *Methods for Sampling and Testing Aggregates.*

In general, the DQIs outlined above have been met and Ramboll considers that the data is of suitable quality to meet the project objectives.

5. PRELIMINARY CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) is a site-specific qualitative description of the source(s) of contamination, the pathway(s) by which contaminants may migrate through the environmental media, and the populations (human and/or ecological) that may potentially be exposed. This relationship is commonly known as a Source-Pathway-Receptor ("SPR") linkage. Where one or more elements of the SPR linkage are missing, the exposure pathway is considered to be incomplete and no further assessment is required. Where this linkage is found to be complete, it does not indicate that health or environmental risk is present, but rather triggers further investigation of risk. This CSM is presented in the DSI and identifies SPR linkages prior to the assessment of data obtained during additional investigations under this DSI Addendum.

5.1 Sources of Contamination

The primary source of contamination was identified as the ore concentrate from the former Loadout Complex that has been deposited within the rail formation and adjacent shallow soils. Secondary sources were identified as:

- surface water and sediment in drainage lines onsite and in the local offsite receiving environment
- dust that has accumulated within buildings and as sediment in rainwater tanks close to the site.

Sources considered within this CSM are those clearly related to site as defined above. Lead contamination that has been identified but which is not related to the site includes impacts on the haul route between the mine and the rail corridor and on Mulwaree Street. Additionally, several instances of localised lead contamination that was geographically separated from the site were identified on private properties. At some of these properties lead based paint was identified in poor condition and lead is generally known to be a cheap and useful metal found frequently in the environment and older homes (NSW EPA 2020). Lead contamination that has been identified but which is not related to the site has been provided to TfNSW which is communicating these findings to relevant stakeholders. Where it is reasonable to conclude that contamination has not originated from site, that contamination has been excluded from further consideration.

5.2 Chemicals of Concern

Chemicals of concern are limited to metals associated with historical mining practices and include lead, copper and zinc.

5.3 Receptors

The receptors identified in this CSM were based on a current and future use of the site and surrounding land, which currently includes residential and a range of community uses.

The human receptors identified were:

- onsite workers (including intrusive maintenance and construction workers)
- users of Tarago Train Station
- the owners of the Station Masters Cottage
- other local residents
- a range of community facilities including the Public School, Preschool and Townhall
- workers in adjacent public road reserves.

The ecological receptors identified were:

- onsite ecology
- offsite ecology including crops and livestock
- ecological receptors in the Mulwaree River.

5.4 SPR Linkages

An assessment of the SPR linkages for the Contaminant onsite (including the former loadout complex) is summarised in **Table 5-1**.

Table 5-1: Exposure Assessment Summary

Exposure Route	Potentially Complete SPR? (Yes / No / Potential)							
	Onsite Workers	**Onsite Ecology**	**Residents**	**Community Activities**	**Offsite Workers**	**Offsite Ecology**	**Irrigation and Livestock**	**Justification**
Soil and Sediment								
Direct Contact	P	P	P[1]	N	P	P	P	Concentrations in soils exceed onsite assessment criteria however management measures have been defined to mitigate risks to onsite workers (Ramboll 2019f). Potential remains for impacts to onsite ecology. Concentrations in sediment / soil offsite exceed human health and ecological criteria.
Inhalation	P	P	P[1]	N	P	P	P	
Incidental Ingestion	P	P	P[1]	N	P	P	P	
Root Uptake	N/A	P	N/A	N/A	N/A	N/A	N/A	
Surface Water								
Direct Contact	N	P	N	N	N	P	P	Flow was not observed in any of the drains or culverts present at the site. However, flow is likely upon rainfall, which can mobilise contaminated soils into the local waterway where aquatic ecological receptors may become exposed.
Incidental Ingestion	N	P	N	N	N	P	P	
Root Uptake	N/A	P	N/A	N/A	N/A	P	N/A	
Migration to groundwater	N	P	N	N	N	P	P	
Groundwater								
Potable use including drinking	N	N/A	N	N	N	N/A	N/A	Concentrations in groundwater reported below human health criteria. Some metals exceed ecological criteria onsite though not defined offsite and do not appear to discharge to the receiving Mulwaree River so ecological exposure considered unlikely.
Direct Contact	N	N	N	N	N	N	N	
Incidental Ingestion	N	N	N	N	N	N	N	
Root Uptake	N/A	N	N/A	N/A	N/A	N	N	
Dust								
Direct Contact	N	N/A	P	N	N	N/A	N/A	Contaminant migration via airborne dust has occurred to several local houses and lead exceeds assessment criteria.
Inhalation	N	N/A	P	N	N	N/A	N/A	
Incidental Ingestion	N	N/A	P	N	N	N/A	N/A	
Rain Tank Water								
Potable use including drinking	N/A	N/A	N	N	N/A	N	N	Rain tank water reported below criteria.
Direct Contact	N/A	N/A	N	N	N/A	N	N	
Incidental Ingestion	N/A	N/A	N	N	N/A	N	N	
Root Uptake	N/A	N/A	N	N	N/A	N	N	
Rain Tank Sediment								
Direct Contact	N/A	N/A	P	N	N/A	P	N	Contaminant migration via airborne dust has occurred and concentrations in tank sediment exceeds criteria for soil at some houses. Exposure to sediment could occur if sediment is discharged to the ground when cleaning tanks.
Inhalation	N/A	N/A	P	N	N/A	P	N	
Incidental Ingestion	N/A	N/A	P	N	N/A	P	N	

[1]Potential for complete exposure pathways between the Contaminant in soil and offsite residents is limited to one property zoned for though not currently developed for residential use.

6. TIER 1 ASSESSMENT CRITERIA

6.1 Surface Water

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

- National Environment Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (NEPM, 2013)
- National Health and Medical Research Council (NHMRC) (2001) National Resource Management Ministerial Council (NRMMC) Australian Drinking Water Guidelines 6, Version 3.5 updated August 2018, (ADWG 2011)
- National Health and Medical Research Council (NHMRC), National Resource Management Ministerial Council (NRMMC) Guidelines for Managing Risks in Recreational Water (NHMRC, 2008)
- Department of Environment and Conservation (DEC) Guidelines for the Assessment and Management of Groundwater Contamination (DEC, 2007)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) (available at www.waterquality.gov.au/anz-guidelines)
- Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000)

Assessment criteria adopted for surface water are summarised in

Table 6-1.

ANZECC (2000) guidelines state that where exceedances are observed for ecological values the guidelines can be corrected for water hardness (freshwater ecosystems only). If exceedances remain when assessing values against guidelines where the hardness correction factor has been applied, further assessment of dissolved metals against the corrected guideline may occur (ANZECC 2000).

Table 6-1: Surface Water Investigation Levels (ug/L)

Contaminant	95% Freshwater (ANZG 2018)	Corrected for Hardness (ANZECC 2000)	Drinking Water (ADWG 2011)	Irrigation Short-term Trigger Value (ANZECC 2000)	Stock Water (ANZECC 2000)
Heavy Metals					
Aluminium	55[a]	-	-	20,000	5,000
Arsenic	24[b]	-	10	2,000	500-5,000
Barium	-	-	2,000	-	-
Beryllium	-	-	60	500	-
Cadmium	0.2	0.54[g]	2	50	10
Chromium	1.0[c]	2.5[g]	50[c]	1,000	1,000
Cobalt	1.4	-	-	100	1,000
Copper	1.4	3.5[g]	2,000	5,000	400-5,000
Iron	-	-	-	10,000	not sufficiently toxic
Lead	3.4	-	10	5,000	100
Manganese	1,900	-	500	10,000	not sufficiently toxic
Mercury	0.06[d, e]	-	1	2	2
Nickel	11	27.5[g]	20	2,000	1,000
Zinc	8	20[g]	-	5,000	20,000

blank cell denoted with – indicates no criterion available.

[a] Aluminium guidelines for pH > 6.5, based on the pH of groundwater measured at the site and surrounding area.

[b] Guideline value for arsenic (III).

[c] Guideline value for chromium (VI).

[d] Guideline value for inorganic mercury.

[e] 99% species protection level DGV has been adopted to account for the bioaccumulating nature of this contaminant.

[f] Guideline value for m-xylene. Guideline values also exist for both o-xylene and p-xylene as per ANZG (2018). The default guideline value for m-xylene guideline has been adopted as it is the most conservative

[g] Hardness correction factor applied to the threshold value as detailed in ANZECC 2000.

6.2 Sediment

The sediment default guideline values (DGV) indicate the concentrations below which there is a low risk of unacceptable effects occurring, while the 'upper' guideline values (GV-high), provide an indication of concentrations at which toxicity-related adverse effects may already be occurring. As such, the GV-high value should only be used as an indicator of potential high-level toxicity problems, not as a guideline value to ensure protection of ecosystems.

Sediment DGVs were generally used to assess sediments located within ephemeral creek beds and sampling locations with permanent standing water. Sediment located within open drainage lines adjacent the road verge were assessed against soil criteria for recreational / public open space as detailed in **Section 6.3**. These locations are mostly dry and therefore likely to be dominated by terrestrial organisms rather than aquatic fauna. It is possible that soil elevated with contaminants may be carried to the downstream waterways where there are permanent flows and hence aquatic ecological risks may be present.

The criteria proposed for the assessment of sediment contamination are sourced from the default guideline values in ANZG (2018) and are summarised in **Table 6-2**.

Table 6-2: Sediment Assessment Criteria – Ecological Investigation Criteria (mg/kg)

Contaminant	Sediment DGV	GV-High
Heavy Metals		
Aluminium	-	-
Arsenic	20	70
Barium	-	-
Beryllium	-	-
Cadmium	1.5	10
Chromium	80	370
Cobalt	-	-
Copper	65	270
Iron	-	-
Lead	50	220
Manganese	-	-
Mercury	0.15	1.0
Nickel	21	52
Zinc	200	410

The DGV was derived using a ranking of both observed field and laboratory ecotoxicity-effects and represents the 10th percentiles of that data distribution. GV-high represents the median of that data distribution to provide an upper guideline value. Effects on sediment biota are rarely seen for concentrations below the DGV, while effects are more frequently evident above the GV-high value.

Sediment results were assessed against Tier 1 assessment criteria to identify contaminant migration from three culverts which direct surface water beneath the rail formation. The culverts are identified as follows:

- the southern culvert located at CH 262.660 directs a local water course through the rail corridor. This water course is an unnamed tributary to the Mulwaree River. Water discharging from site flows (after high rainfall events only) under the Goulburn Street bridge and through agricultural land before discharging to the River
- the middle culvert located at CH 262.354 directs water to a shallow pond within the corridor and then offsite through a causeway on Boyd Street. From the Boyd Street causeway surface water is partly directed into a drain along the eastern side of Boyd Street and partly discharges into an adjacent paddock
- the northern culvert is located at CH 262.040 and directs water along an informal flow path to a dam on an adjacent agricultural property.

Sediment DGVs were used to assess sediment in areas frequented with water (i.e. samples SED1_UP to SED10) or locations characterised as main tributaries to the Mulwaree River (Creek1 to Creek6 and SED_BR002 to XP6005). Sediment within open drainage lines adjacent the road verge were assessed against EILs for recreational land use as detailed in **Section 6.3**. These locations were determined to be mostly dry and therefore likely to be dominated by terrestrial organisms rather than aquatic fauna.

Results from sediment sampling completed during October 2020 were assessed in conjunction with existing sediment and soil data to determine the extent of offsite contaminant migration via surface water deposition of sediment. Previous results included in the assessment are as follows:

- field portable XRF measurements from seven locations along the ephemeral creek bed extending from the southern culvert (sampled 30 June 2020)

- field portable XRF measurements from five locations along the Boyd Street drainage swale, measured as part of the broader assessment of the vacant lot
- laboratory analytical results from one location (P6_HA05) located within the ephemeral creek bed east of Braidwood Road, sampled as part of the broader assessment of the sports ground
- XRF and laboratory QA results from three locations along the Boyd Street causeway (XBOYDSTW2, XBOYDSTW1 and XBOYDSTE1) sampled as part of the DSI.

Sediment samples were assessed against guideline values defined in **Table 6-3**.

Table 6-3 Guideline Summary

Guideline Used	Sample ID	Justification
Sediment DGV	SED_BR002, XP6001, XP6002, P6_HA05, XP6003, XP6004, XP6005, SED1_UP, SED8, SED9, SED10, Creek 1, Creek 1a, Creek 2, Creek 3, Creek 4, Creek 5	Located within main tributaries of the Mulwaree River outside of the rail corridor and downgradient of the middle and southern culverts within ephemeral creek beds. Use of sediment DGVs at these locations is considered a conservative approach.
Sediment DGV High	SED1, SED2, SED3, SED4, SED5, SED6, SED7	Small pools of aquatic ecology generally located within the rail corridor. Considered to hold little to no ecological value.
HIL C / EIL Public Open Space	XBOYDSTW2, XBOYDSTW1, XBOYDSTE1, BOYD1, BOY2, BOYD3, BOYD4, BOYD5, XBOYD001, XBOYD002, XBOYD003, XBR001, XBR002, XBR003, XBR004, XBR005, XBR006, XBR007, XBR008, XBR009, XBR010, XBR011, XBR012, XBR013, XBR014, SED_BR001	Located within drainage lines directly adjacent the road verge. These locations are mostly dry and therefore likely to be dominated by terrestrial organisms rather than aquatic fauna.

Sediment assessment against the criteria detailed above is provided in **Table III** and **Table IV**, **Appendix 5**. Exceedances are presented on **Figure 3a** and **Figure 3b**, **Appendix 1.**

6.3 Soil

The criteria proposed for the assessment of soil contamination were sourced from the following references:

- National Environment Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (NEPM, 2013)
- 'Tarago Loop Extension Preliminary Human Health Risk Assessment Ramboll' dated 17 October 2019 by Ramboll (Ramboll 2019c).

The NEPM (2013) provides health-based soil investigation levels (HILs) and ecological-based investigation levels (EILs) for various land uses. Based on the current and future use of the site, and the surrounding land, the guidelines adopted for the DSI Addendum are as follows:

- HIL C – Health investigation level for recreational / open space such as parks, playgrounds, playing fields, secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate. HIL C criteria was used for the assessment of offsite soils located within drainage lines adjacent the road verge.
- HIL D – Health investigation level for commercial / industrial such as shops, offices, factories and industrial sites. The HILs are applicable for assessing human health risk via all relevant

pathways of exposure. The HILs are generic to all soil types and apply generally to a depth of 3 m below the surface for industrial use. HIL D criteria was used for the assessment of soils within the rail corridor, including the former Loadout Complex.

- EIL for urban recreational and public open space and EIL for commercial / industrial use – ecological investigations levels applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties and generally apply to the top 2 m of soil. EIL calculations are included in **Appendix 6**. The average of five locations was used. Commercial / industrial EILs were applied within the rail corridor and open space EILs were applied in public areas downstream of the site.

The human health and ecological criteria adopted for soils are provided in **Table 6-4**.

Table 6-4: Soil Assessment Criteria – Human Health and Ecological Investigation Levels (mg/kg)

Contaminant	HIL C – Recreational / Public Open Space	HIL D – Commercial / Industrial	EIL – Urban Residential and Public Open Space	EIL -Commercial / Industrial
Heavy Metals				
Aluminium	-	-	-	-
Arsenic	300	3,000	100	160
Barium	-	-	-	-
Beryllium	90	500		
Cadmium	90	900	-	-
Chromium	300[a]	3,600[a]	424[b,f]	710[b,c]
Cobalt	300	4,000	-	-
Copper	17,000	240,000	125[f]	160[c]
Iron	-	-	-	-
Lead	600	2,200[d]	1,100	1,800
Manganese	19,000	60,000	-	-
Mercury	80[e]	730[e]	-	-
Nickel	1,200	6,000	194[f]	340[c]
Zinc	30,000	400,000	308[f]	370[c]

[a] *HIL for chromium (VI)*
[b] *EIL for chromium (III)*
[c] *Site specific EIL (Ramboll 2019d)*
[d] *Site specific HIL (Ramboll 2019c)*
[e] *HIL for inorganic mercury*
[f] *Site specific EIL (updated for the DSI Addendum)*

7. RESULTS

7.1 Surface Water

7.1.1 Monitoring Events

A total of eight routine monitoring events have been completed between August 2019 and October 2020. Surface water monitoring events were completed after a period of rainfall (when possible) as this is the only occasion where surface water is present in the drainage channels. A summary of monitoring events is outlined in **Table 7-1**. A photographic log is presented as **Appendix 8**.

Table 7-1 below includes information on rainfall conditions precedent to each monitoring event. The table includes comparison of the rainfall falling over the 48 hour period preceeding the sampling event to the design rainfall events for the Mulwarree catchment (Wollondilly and Mulwaree Rivers Flood Study WMA Water 2016) in order to provide an indication of the significance of the rainfall event. Average monthly rainfall data compared to actual monthly rainfall data is also included to indicate the general climate conditions in the month of sampling.

Table 7-1: Assessment of Rainfall Preceding Surface Water Monitoring against Critical Duration Design Rainfall for the Mulwaree Catchment

Event	Max Rainfall over 48hr Critical Duration (mm)	Rainfall in 48 hrs preceding monitoring events (mm)					
		13-Aug-19	24-Sep-19	29-Jan-20	1-Apr-20	11-Aug-20	13-Oct-20
< 10% AEP	< 126	0	0	0	0	-	0
10% AEP	126	-	-	-	-	-	-
5% AEP	147	-	-	-	-	-	-
2% AEP	175	-	-	-	-	163	-
1% AEP	197	-	-	-	-	-	-
Monthly Rainfall Observed (mm)		19	41.2	22	79.2*	157.8	94.4
Average Monthly Rainfall (mm)		42.9	44	49	40.4*	42.9	44
Comment		Dry month, dry conditions precedent	Average rainfall month, dry conditions predecent	Dry month, dry conditions precedent	Wet month, dry conditions precedent	Wet month, high rainfall event predecent	Wet month. Dry conditions precedent

Notes: All rainfall data was sourced from the Australian Bureau of Meteorology. Daily rainfall was sourced from the closest weather station with rainfall records preceding each monitoring event (Lake Bathurst, Windellama and Goulburn Airport). Monthly averages and records were sourced from the closest weather station with a complete record (Goulburn Airport). Monthly observations and averages are for rainfall in the calendar month in which each monitoring event occurred except for the 1 April 2020 event for which March data is presented. Based on this the monthly data is not a direct representation of rainfall preceding monitoring though is considered an sufficiently as an indicator of general conditions around each monitoring event

The monitoring data presented in Table XX includes quarterly events through 2019 - 2021 and so is considered representative of the effects of recent seasonal variability.

Rainfall measured in August 2019, September 2019 and January 2020 was lower than the monthly average though rainfall measured in the April, August and October 2020 exceeded the monthly averages. This indicates that monitoring has occurred across a dry period at the end of 2019 and a wet period from April 2020 onward. Further, average monthly rainfalls are based on a 25 year data set and so integrate effects of longer weather cycles such as El Nino. The monitoring data is considered representative of the effects of potential rainfall totals.Rainfall preceding the August 2020 monitoring event (163.4 mm Windellama) fell between Design Rainfalls for 5% and 2% Annual Exceedance Probability events. That is there is a 2 – 5% chance that the critical duration event preceding the August 2020 monitoring will be repeated in future years. The monitoring data is considered representative of the effects of high rainfall events.

It is considered that the effects of seasonal variability, total rainfall and high rainfall events on contaminant migration in surface water from the site are adequately represented. Within this context the surface water monitoring data is considered adequately representative of the effects of potential meteorology to inform assessment of associated risks to human health and the environment.

7.1.2 Physico-Chemical Results

Surface water physico-chemical parameters were measured in the field during the majority of sampling rounds. The surface water parameters are summarised in **Table 7-2** and presented in **Table I**, **Appendix 5**.

Surface water pH ranged between 5.75 and 8.92 but was generally characteristic of neutral conditions. Slightly acidic conditions were reported during early April 2020 at SW1 (pH 6.35) and SW3 (pH 6.23). Moderately acidic conditions were reported at SW4 (pH 5.75) during late April 2020.

EC measurements ranged between 94.7 µS/cm and 2342 µS/cm but were generally characteristic of freshwater conditions. Fresh to brackish conditions (>700 µS/cm) were recorded at offsite locations SW7, SW8, SW9 and SW10 only.

ORP measurements generally ranged between 56.0 mV and 263.1 mV indicating oxidising conditions. Reducing conditions (-3.0 mV) were reported during October 2020 at SW5 only.

Table 7-2 Surface Water Physico-chemical Parameters

Sample ID	No. of Recordings		Temperature	SPC	pH	DO	ORP	TDS	Comments
			°C	µS/cm	pH units	mg/L	mV	mg/L	
Onsite									
SW1	3	Minimum	7.8	206.1	6.4	2.7	115.0	133.9	Dry during January 2020.
		Maximum	17.4	678.0	7.7	11.0	169.5	434.0	
		Average	11.9	486.4	7.2	6.5	136.5	312.0	
SW1-UP	3	Minimum	8.0	205.6	7.1	2.6	94.0	133.3	Dry during January 2020. Parameters not recorded during September 2019.
		Maximum	19.9	673.0	7.4	10.6	170.7	431.0	
		Average	13.3	487.5	7.3	6.0	139.6	312.8	
SW2	4	Minimum	7.3	213.3	6.5	3.3	96.0	137.8	Dry during January 2020. Parameters not recorded during September 2019.
		Maximum	17.5	650.0	8.3	10.6	185.9	416.0	
		Average	11.6	456.6	7.5	5.9	157.5	294.7	
SW3	3	Minimum	8.9	142.5	6.2	4.8	137.0	92.3	Dry during January 2020. Parameters not recorded during September 2019.
		Maximum	21.8	245.0	8.0	9.4	178.0	159.0	
		Average	14.1	205.5	7.2	6.5	163.2	133.4	
SW4	5	Minimum	7.4	128.2	5.8	3.5	107.0	99.5	Dry during January 2020. Parameters not recorded during September 2019.
		Maximum	20.3	388.3	8.8	10.4	263.1	251.8	
		Average	12.4	254.8	7.4	6.9	189.8	186.1	
SW5	2	Minimum	11.2	117.9	7.3	4.1	-3.0	76.7	Dry during January and April 2020.
		Maximum	12.0	187.0	8.4	7.9	163.2	121.0	
		Average	11.6	152.5	7.8	6.0	80.1	98.9	
SW6	1	---	8.3	168.3	7.47	9.61	187.0	109.2	Dry during January and April 2020.
Offsite									
SW7	4	Minimum	12.5	94.7	7.2	4.5	56.0	61.8	---
		Maximum	23.1	2342.0	8.9	8.5	114.2	396.6	
		Average	18.8	804.4	7.8	6.5	90.8	180.6	
SW8	4	Minimum	9.1	170.5	7.2	4.4	84.0	107.9	---
		Maximum	23.6	1007.0	8.5	9.3	124.0	656.5	
		Average	17.7	612.6	7.8	6.6	113.3	395.8	
SW9	4	Minimum	8.9	125.3	7.6	6.3	83.0	115.7	---
		Maximum	25.0	852.0	8.4	16.8	173.6	812.5	
		Average	18.4	384.3	8.0	11.0	120.1	430.2	
SW10	1	---	16.02	881	7.19	3.58	79.0	564.0	---

7.1.3 Analytical Results

Surface water analytical results are summarised in **Table 7-3.** Tabulated results are included in **Table II**, **Appendix 5**. Surface water analytical reports are included in **Appendix 6**.

Table 7-3 Surface Water Analytical Results Summary – Metals

Analyte	No. of Samples	No. of Detects	Min.	Max.	Average	Drinking Water (ADWG 2011)	Irrigation Short-term Trigger Value (ANZECC 2000)	Stock Water (ANZECC 2000)		
						Total Metals with Hardness Correction Factor Applied	Dissolved Metals with Hardness Correction Factor Applied[1]			
Aluminum	30	22	< 0.05	11	1.141	N/A	N/A	0	0	**1** 13 October 2020: SW5
Arsenic	34	21	< 0.001	0.016	0.003	0	0	**1** 29 January 2020: SW7	0	0
Barium	31	30	0.02	0.36	0.086	0	0	0	0	0
Beryllium	34	0	< 0.001	< 0.001	-	0	0	0	0	0
Cadmium	34	21	< 0.0002	0.04	0.006	**17** 29 January 2020: SW7 1-2 April 2020: SW1, SW2, SW3, SW4, SW7 30 April 2020: SW4 10-11 August 2020: SW3, SW4, SW5, SW6, SW7 13 October 2020: SW1, SW2, SW3, SW4, SW5	**13** 6 August 2019: SW4 24 September 2019: SW2, SW3, SW4 11 August 2020: SW3, SW4, SW5, SW6, SW7 13 October 2020: SW2, SW3, SW4, SW5	**9** 1 April 2020: SW3, SW4 30 April 2020: SW4 11 August 2020: SW4, SW6 13 October 2020: SW1, SW3, SW4, SW5	**21** 29 January 2020: SW7 1-2 April 2020: SW1, SW2, SW3, SW4, SW7 30 April 2020: SW2, SW4 10-11 August 2020: SW3, SW4, SW5, SW6, SW7, SW8, SW9 13 October 2020: SW1, SW2, SW3, SW4, SW5, SW7	**4** 1 April 2020: SW3, SW4 30 April 2020: SW4 13 October 2020: SW4
Chromium	31	19	< 0.001	0.011	0.002	**3** 11 August 2020: SW5, SW6, 13 October 2020: SW5	**2** 11 August 2020: SW5, SW6	0	0	0
Cobalt	34	13	< 0.001	0.014	0.005	N/A	N/A	0	0	0
Copper	32	25	< 0.001	0.31	0.054	**22** 29 January 2020: SW7 1-2 April 2020: SW1, SW2, SW3, SW4, SW7 30 April 2020: SW2, SW4 10-11 August 2020: SW2, SW3, SW4, SW5, SW6, SW7, SW8, SW9 12-13 October 2020: SW1, SW2, SW3, SW4, SW5, SW7	**16** 6 August 2019: SW4 24 September 2019: SW2, SW3, SW4 29 January 2020: SW7 10-11 August 2020: SW3, SW4, SW5, SW6, SW7, SW8, SW9 12-13 October 2020: SW3, SW4, SW5, SW7	0	0	0
Iron	30	28	0.02	8.9	1.461	0	N/A	0	0	0
Lead	39	31	< 0.001	0.17	0.027	**16** 24 September 2019: SW3, SW4 29 January 2020: SW7 1-2 April 2020: SW1, SW2, SW3, SW4, SW7 30 April 2020: SW4 10-11 August 2020: SW4, SW6, SW7 12-13 October 2020: SW1, SW3, SW4, SW5,	**5** 29 January 2020: SW7 24 September 2020: SW2, SW4 13 October 2020: SW3, SW4	**19** 6 August 2019: SW4 24 September 2019: SW3, SW4 29 January 2020: SW7 1-2 April 2020: SW1, SW2, SW3, SW4, SW7 30 April 2020: SW4 11 August 2020: SW3, SW4, SW6, SW7 12-13 October 2020: SW1, SW3, SW4, SW5, SW7	0	**2** 1 April 2020: SW3 30 April 2020: SW4
Manganese	34	33	0.012	1.9	0.279	N/A	N/A	**6** 29 January 2020: SW7 1-2 April 2020: SW1, SW3, SW8 30 April 2020: SW4 13 October 2020: SW1	0	0
Mercury	34	0	< 0.0001	< 0.0001	-	0	0	0	0	0
Nickel	34	29	< 0.001	0.12	0.012	**5** 1 April 2020: SW3, SW4 30 April 2020: SW4 11 August 2020: SW6 13 October 2020: SW4	**1** 13 October 2020: SW4	**5** 1-2 April 2020: SW3, SW4 30 April 2020: SW4 11 August 2020: SW6 13 October 2020: SW4	0	0

Analyte	No. of Samples	No. of Detects	Min.	Max.	Average	Drinking Water (ADWG 2011)	Irrigation Short-term Trigger Value (ANZECC 2000)	Stock Water (ANZECC 2000)		
						Total Metals with Hardness Correction Factor Applied	Dissolved Metals with Hardness Correction Factor Applied[1]			
Zinc	34	32	< 0.005	7	0.689	**24** 29 January 2020: SW7 1-2 April 2020: SW1, SW2, SW3, SW4, SW7, SW8 30 April 2020: SW2, SW4 10-11 August 2020: SW1, SW2, SW3, SW4, SW5, SW6, SW7, SW8, SW9 12-13 October 2020: SW1, SW2, SW3, SW4, SW5, SW7	**20** 6 August 2019: SW4 24 September 2019: SW2, SW3, SW4 29 January 2020: SW7 10-11 August 2020: SW1, SW3, SW4, SW5, SW6, SW7, SW8, SW9 12-13 October 2020: SW1, SW2, SW3, SW4, SW5, SW7	0	**1** 30 April 2020: SW4	0

[1] Dissolved concentration compared against hardness corrected trigger values per flow chart presented in Table 3.4.3 (ANZECC 2000)

7.1.4 Additional Observations

During the October 2020 monitoring event, surface water was observed at two sediment sampling locations, one within a drainage line (SW_BR001) and one within an ephemeral creek (SW_BR002) extending east off Braidwood Road. Surface water samples at these locations were collected opportunistically based on observation of water to further inform assessment of metals in surface water from the site. Samples were analysed metals and reported a total lead concentration above the human health guideline value at SW_BR002. Concentrations of total copper and zinc exceeded the ecological guideline value (95% protection) at both locations.

7.2 Sediment

7.2.1 Human health

7.2.1.1 Middle Culvert

Lead concentrations above the human health guideline value of 600 mg/kg (HIL C) were identified at four locations within the drainage line extending east from the middle culvert (BOYD1, BOYD2, XBOYD002, XBOYD003). Lead exceedances decreased in magnitude with increasing distance from the site. All other metals at all locations around and downstream of the middle culvert were reported below adopted human health assessment criteria.

7.2.1.2 Northern Culvert

Downgradient of the northern culvert, sediments located within the open drainage line adjacent Braidwood Road did not exceed the adopted human health guideline value (HIL C) for any analyte tested.

7.2.2 Ecology

7.2.2.1 Upgradient

SED1_UP located upgradient of the site shows no impact from the site. Metal concentrations were all reported below sediment DGVs.

7.2.2.2 Onsite

DGV-High exceedances were reported at the southern culvert (SED1, SED2), the middle culvert (SED3, SED4) and the downgradient side of the northern culvert (SED6, SED7) as summarised in **Table 7-4.**

Table 7-4 Onsite Sediment Analytical Results Summary - Metals

Analyte	No. of Samples	No. of Detects	Min.	Max.	Average	No. > Sediment DGV-High
Aluminium	14	14	4400	28000	10,700.0	0
Arsenic	14	14	2.9	37	15.4	0
Barium	14	14	53	240	114.4	0
Beryllium	14	0	0	0	-	0
Cadmium	14	14	0.5	8.2	4.4	0
Chromium	14	14	8.1	25	38.7	0
Cobalt	14	5	5.4	11	7.9	0
Copper	14	13	13	600	185.4	**3** 1 April 2020: SED2, SED4 13 October 2020: SED2
Iron	14	14	6600	24000	15,021.4	0
Lead	21	20	24	4700	795.4	**11** 1 April 2020: SED1, SED2, SED4 11 August 2020: SED1, SED2, SED3, SED4, SED6 13 October 2020: SED1, SED2, SED3
Manganese	14	13	61	640	206.1	0
Mercury	14	2	0.1	0.3	0.5	0
Nickel	14	9	6.9	17	14.9	0
Zinc	14	14	81	2400	784.1	**10** 1-2 April 2020: SED1, SED2, SED4, SED6, SED7 12-13 October: SED1, SED2, SED4, SED6, SED7

7.2.2.3 Southern Culvert

Creek1a and Creek 1 to Creek 6, located downgradient of the southern culvert, exceeded the adopted sediment DGV for copper, lead and zinc with the highest concentrations generally reported within 100 m of the site.

7.2.2.4 Middle Culvert

Sediment within the drainage line (XBOYDSTW2 to XBR002) and within the ephemeral creek bed (SED_BR002 to XP6005) downgradient of the middle culvert exceeded respective EIL and sediment DGV guidelines for a number of metals including lead, copper and zinc. The highest metal concentrations were reported at SED_BR002. Lead concentrations at this location exceeded the sedimented DVG by more than 35-times.

7.2.2.5 Northern Culvert

Zinc concentrations at SED7, located adjacent the northern culvert, exceeded the sediment GV-High of 410 mg/kg. Downgradient of SED7, the concentration of zinc at two isolated locations XBR010 and XBR011, located within the drainage line adjacent the road verge, exceeded the adopted EIL value for recreational land use (310 mg/kg).

7.2.2.6 Mulwaree River

Sediment within the Mulwaree River shows no impact from the site. Metal concentrations were all reported below sediment DGVs.

7.3 Loadout Complex

Assessment of soils within the footprint of the former Load Out Complex was completed on 19 August 2020 and comprised the advancement of a further six test pits (LO_TP01 to LO_TP06) to supplement existing locations. Sampling locations and Tier 1 assessment criteria exceedances are presented on **Figure 4**, **Appendix 1**. Results are summarised **Table 7-5** and tabulated in **Table V**, **Appendix 4**. Testpit logs are presented as **Appendix 8**.

Lead concentrations were reported above human health and ecological guideline values at three locations as follows:

- LO_TP02 at 1.1 m bgl (5,700 ppm) and 1.3 m bgl (6,900 ppm)
- LO_TP03 at 1.6 m bgl (3,662 ppm)
- MW2_1.0 at 1.0 m bgl (3,600 mg/kg), sampling completed by Ramboll 18 May 2020

Results indicate that lead contamination is present at depth beneath a clay capping layer approximately 1 m thick. During test pitting completed in August 2020, foreign material (i.e. plastic, metal, wire and glass) was noted at LO_TP03 and LO_TP05 at depths consistent with elevated lead concentrations. The highest lead concentration was reported at LO_TP02 at 1.3 m bgl.

Table 7-5 Results Summary Former Load Out Complex (mg/kg)

Depth (m)	Analyte	No. of Samples	No. of Detects	Minimum	Maximum	Average	No > HIL D	No > EIL
0.0 – 0.5	Lead	17	16	ND	380	94.2	0	0
0.5 – 1.0		13	12	< 5	3,600	615.7	**1**	**1**
1.0 – 1.5		12	12	8	6,900	1,382.8	**2**	**2**
1.5 – 2.0		4	4	29	3,662	963.0	**1**	**1**
>2.0		3	3	42	200	127.3	0	0

7.4 Characterisation of Materials to be Generated During Remediation

During August 2020, twenty composite samples were collected from materials located within the rail corridor to facilitate application of a Resource Recovery Exception (RRE). The RRE application was negated however data obtained during the investigation is considered suitable for informing remedial options more generally and a summary of results is provided in **Table 7-6**. Complete results are provided in **Table VI**, **Appendix 5.** Exceedances of site assessment criteria are presented in **Figure 5**, **Appendix 1.**

Table 7-6 Onsite Soil Analytical Results Summary

Analyte	No. of Samples	No. of Detects	Minimum	Maximum	Average	No > HIL D	No > EIL
Inorganics							
Conductivity	20	20	29	1100	465.9	--	--
pH	20	20	4	8.3	5.4	--	--
Sulphur	20	20	79	16000	4888.0	--	--
Total Organic Carbon	20	19	< 0.1	6.5	1.5	--	--
Total Metals							
Antimony	20	14	< 10	55	24.4	--	--
Arsenic	20	20	14	190	83.9	0	**3**
Beryllium	20	0	< 2	0	--	0	--
Boron	20	0	< 20	0	--	0	--
Cadmium	20	20	1.8	170	14.9	0	--
Chromium	20	20	12	130	48.6	0	0
Cobalt	20	13	< 5	30	12.4	0	--
Copper	20	20	240	4,100	1,210.5	0	**20**
Lead[1]	20	20	230	19,000	5,046.0	**14**	**14**
Manganese	20	20	70	1,100	501.5	0	--
Mercury	20	19	< 0.1	2.9	0.7	0	--
Molybdenum	20	14	< 5	20	9.0	--	--
Nickel	20	19	< 5	85	30.2	0	0
Selenium	20	17	< 2	27	13.1	0	--
Tin	20	18	< 10	400	72.6	--	--
Vanadium	20	20	30	93	62.1	--	--
Zinc	20	20	550	12,000	1,784.0	0	**20**

[1] indicates site-specific guideline value adopted from HHRA (Ramboll 2019c)

7.5 Additional Contaminants of Potential Concern

Further consideration of eleven existing samples was carried out with respect for Contaminants of Potential Concern (CoPC) generally associated with rail corridors including OCPs/OPPs and PCBs. No detections were made above the laboratory limit of reporting in any of the samples.

A summary is provided in **Table 7-7**, complete tabulated results are included in **Table VII, Appendix 5**.

Table 7-7: CoPC Assessment

Analyte	No. of Samples	No. of Detects	Minimum	Maximum	Average
Organochlorine Pesticides					
DDT+DDE+DDD	11	0	< 0.05	< 0.05	-
Aldrin and Dieldrin – Total	11	0	< 0.05	< 0.05	-
Chlordanes – Total	11	0	< 0.1	< 0.1	-
Endosulfan Sulphate	11	0	< 0.05	< 0.05	-
Endrin	11	0	< 0.05	< 0.05	-
Heptachlor	11	0	< 0.05	< 0.05	-
HCB	11	0	< 0.05	< 0.05	-
Methoxychlor	11	0	< 0.2	< 0.2	-
Toxaphene	11	0	< 1	< 1	-
Organophosphorus Pesticides					
Chlorpyrifos	11	0	< 0.2	< 0.2	-
Polychlorinated Biphenyls					
PCBs – Total	11	0	< 0.1	< 1	-

All units are in mg/kg unless stated otherwise

8. DISCUSSION

8.1 Surface Water

8.1.1 Lead

8.1.2 Concentration Trends on and near site

Figure 8-1 describes total lead concentrations in surface water upstream and downstream of three onsite rail culverts across multiple monitoring rounds from August 2019 – October 2020. The ADWG assessment criteria for lead has been conservatively included to inform consideration of potential human health risks. The standard ANZECC criteria for 95% species protection and a hardness corrected criterion have been conservatively included to inform consideration of potential ecological risks. Rainfall is presented across the same period.

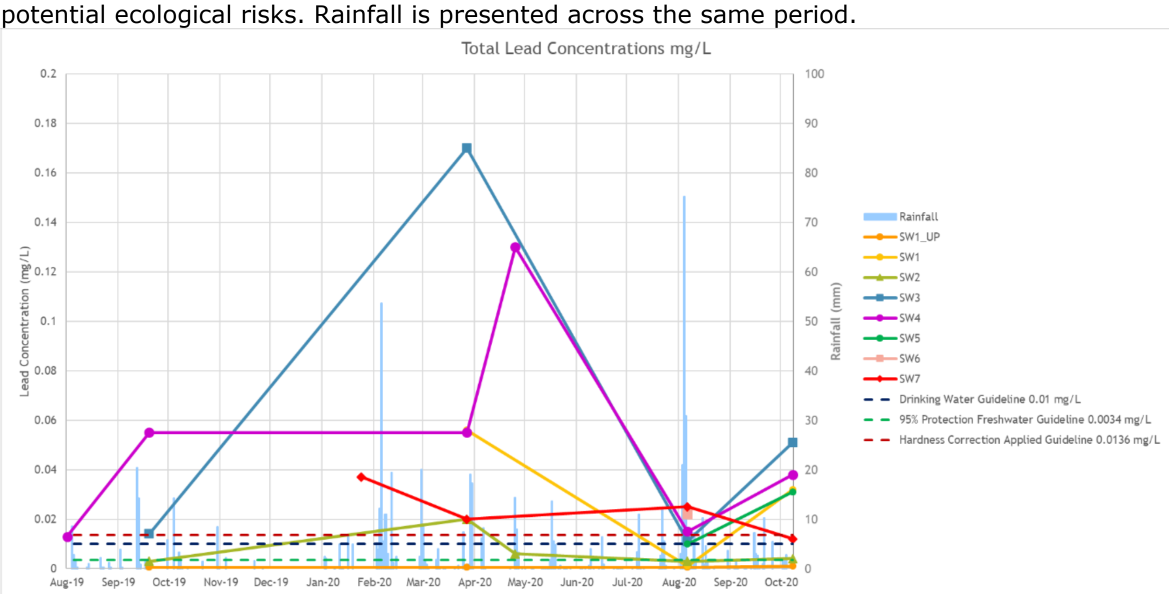


Figure 8-1: Total Lead Concentration Trends, Upgradient and Onsite

SW1_UP (upstream and offsite) reported consistent lead concentrations below the human health and ecological guideline value throughout the course of monitoring.

Concentrations decreased at all onsite locations and increased slightly at the dam downstream of the northern culvert (SW7) following high rainfall in August 2020. The absence of elevated lead concentrations in surface water upstream from the site and presence of elevated lead at the site indicates previously identified site contamination is affecting surface water discharging from the site. The increase at SW7 indicates offsite migration of lead in surface water occurred during high rainfall.

8.1.2.1 Human Health Risks from Lead in Surface Water

In October 2020 total lead concentrations exceeded the human health guideline (from the ADWG) at all locations sampled onsite and in the dam downstream of the northern culvert. The highest concentrations reported either side of the middle culvert (at SW3 and SW4) which is located in the most contaminated area of the site. This does not indicate risks to human health onsite or users of the dam downstream as water is not used for human consumption from either of these sources.

However, the presence of these lead concentrations could result in increase of total lead concentrations in the Mulwaree River.

Figure 8-2 presents lead concentrations across multiple monitoring rounds from February – October 2020 in the Mulwaree River upstream and downstream of where site water would be expected to discharge. Rainfall is presented across the same period.

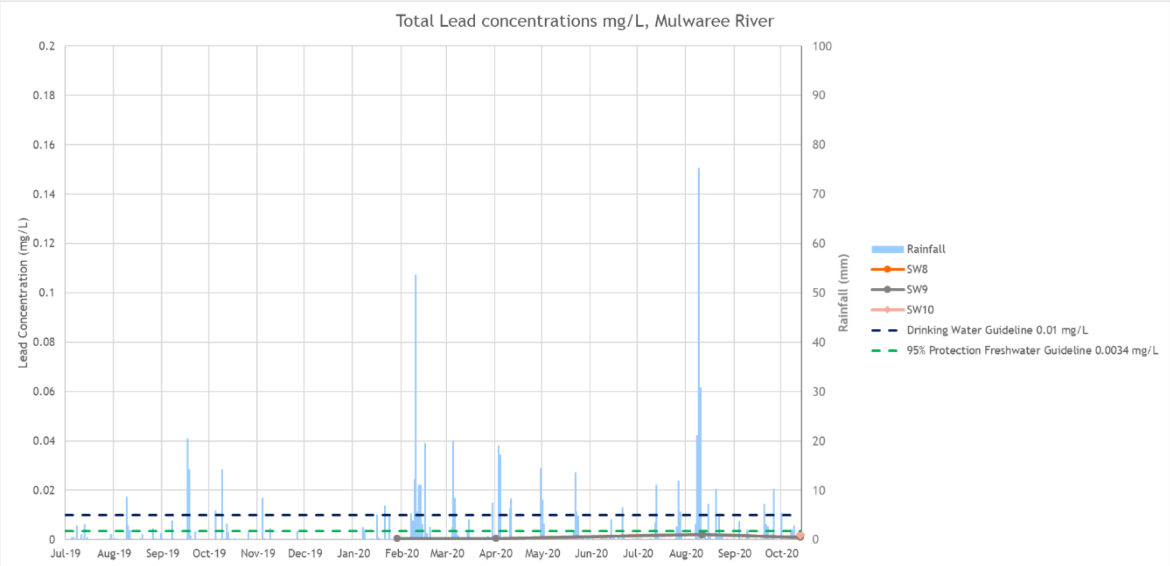


Figure 8-2: Total Lead Concentrations, Mulwaree River

Lead concentrations were reported below drinking water guidelines and adopted ecological assessment criteria in all samples. Surface water within the Mulwaree River showed little to no change in total lead concentration as a result of high rainfall in August 2020. Risks to human health associated with lead in surface water from the site are considered to be low and acceptable.

8.1.2.2 Ecological Risks from Lead in Surface Water

Following exceedances of total lead concentrations against both the ecological guideline value for 95% species protection and the hardness corrected value, dissolved lead concentrations for onsite locations were assessed against the hardness corrected guideline value of 0.036 mg/L as shown in **Figure 8-3**.

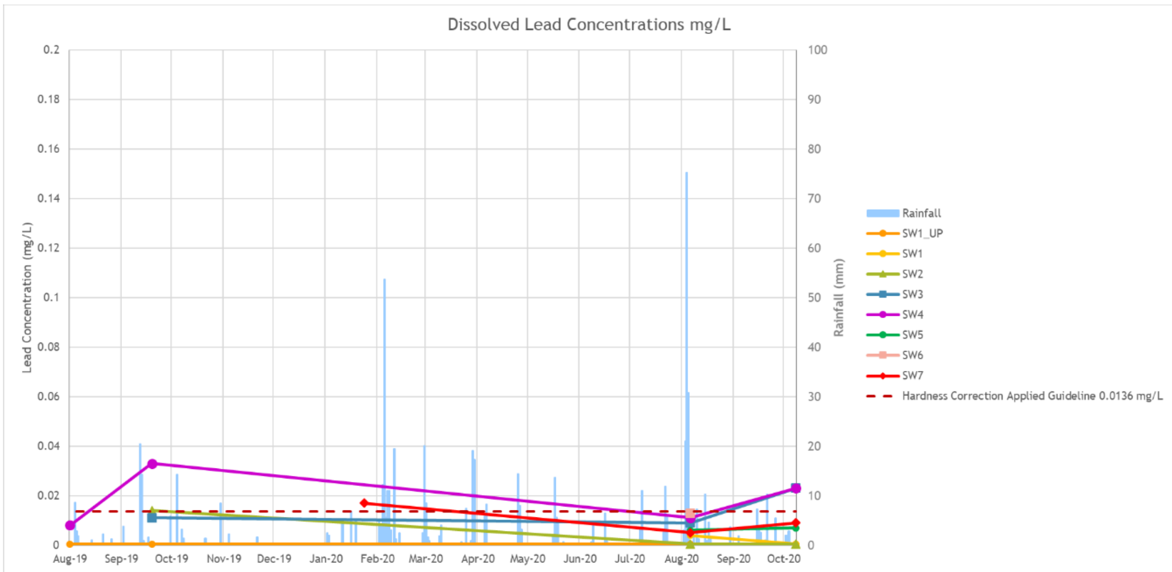


Figure 8-3: Dissolved Lead Concentration Trends, Upgradient and Onsite

During October 2020, dissolved lead concentrations exceeded the ecological hardness corrected value at SW3 and SW4 only. The framework for assessing ecological risk from metals in surface water (ANZECC 2000) includes provision for assessment of metal speciation and/or bioavailability where dissolved concentrations exceed hardness corrected assessment criteria. Such assessment could be completed however remediation of contaminated soils in the area around SW3 and SW4 are expected to lead to reduced concentrations in surface water.

8.1.3 Copper

8.1.3.1 Concentration Trends On and Near Site

Figure 8-4 describes total copper concentrations in surface water upstream and downstream of the three onsite rail culverts across multiple monitoring rounds from August 2019 – October 2020. Rainfall is presented across the same period. The copper concentration range (0 – 0.2 mg/L) was selected to facilitate consideration of temporal trends and screening against adopted ecological assessment criteria. The drinking water guideline (2 mg/L) and the concentration observed at SW4 30 April 2020 (0.31 mg/L) fall outside the figure extent.

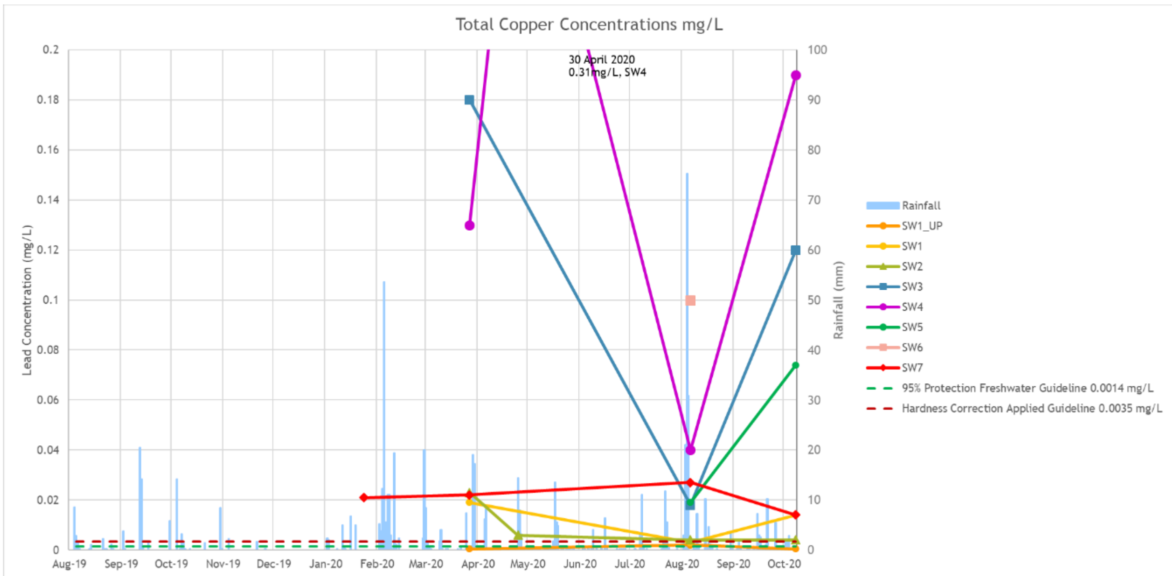


Figure 8-4: Total Copper Concentrations, Upgradient and Onsite

Total copper concentrations follow a similar trend to lead. Highest concentrations were reported at SW3 and SW4. Decreased concentrations were observed at onsite locations and increased concentrations were observed in the dam downstream of the northern culvert (SW7) after high rainfall in August 2020.

Figure 8-5 presents total copper concentrations in the Mulwaree River upstream and downstream of where site water would be expected to enter across multiple monitoring rounds from February – October 2020. Rainfall is presented across the same period.

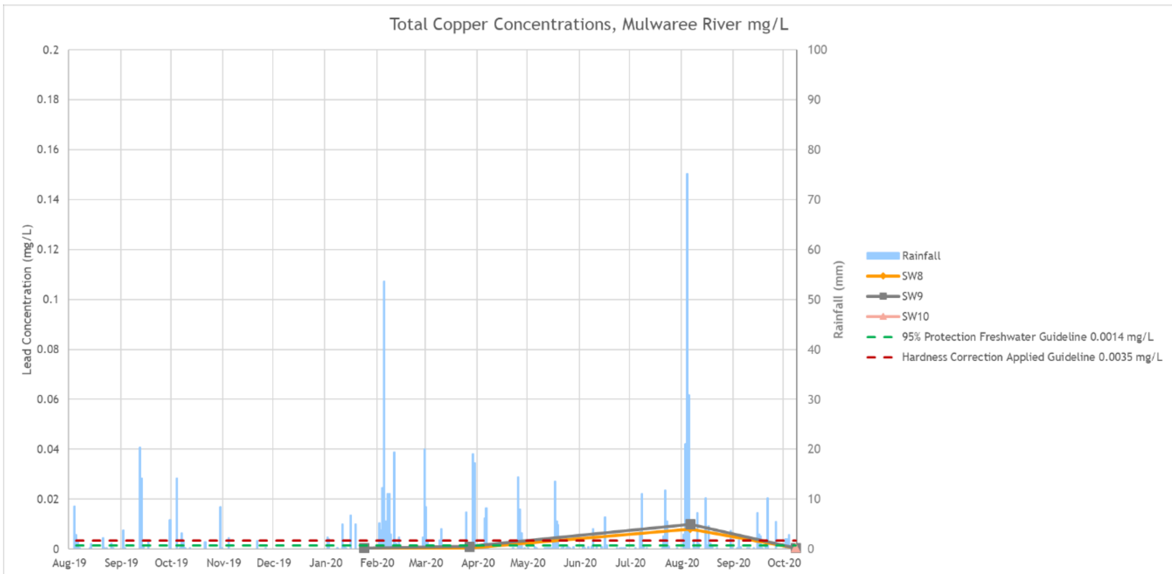


Figure 8-5: Total Copper Concentrations, Mulwaree River

Total copper concentrations within the Mulwaree River increased after heavy rainfall in August 2020. This trend however was observed at both the upgradient (SW9) and downgradient (SW8) locations. A relationship between copper in surface water from the site and in the Mulwaree River was not identified. Rather, the consistency between copper concentrations upstream and downstream of site discharge may indicate an upstream contaminant source more directly affects copper concentrations in the Mulwaree River.

8.1.3.2 Human Health Risks from Copper in Surface Water

The maximum copper concentration in surface water (SW4 0.31 mg/L) is lower than the ADWG (2 mg/L) and on this basis risks to human health associated with copper in surface water from the site are considered to be low and acceptable.

8.1.3.3 Ecological Risks from Copper in Surface Water

As presented in **Figure 8-6** total copper concentrations onsite and in the offsite dam downstream of the northern culvert (SW7) exceed hardness corrected ecological assessment criteria.

Dissolved copper concentrations for onsite surface water locations were assessed against the hardness corrected value of 0.0035 mg/L as shown in **Table II, Appendix 5**.

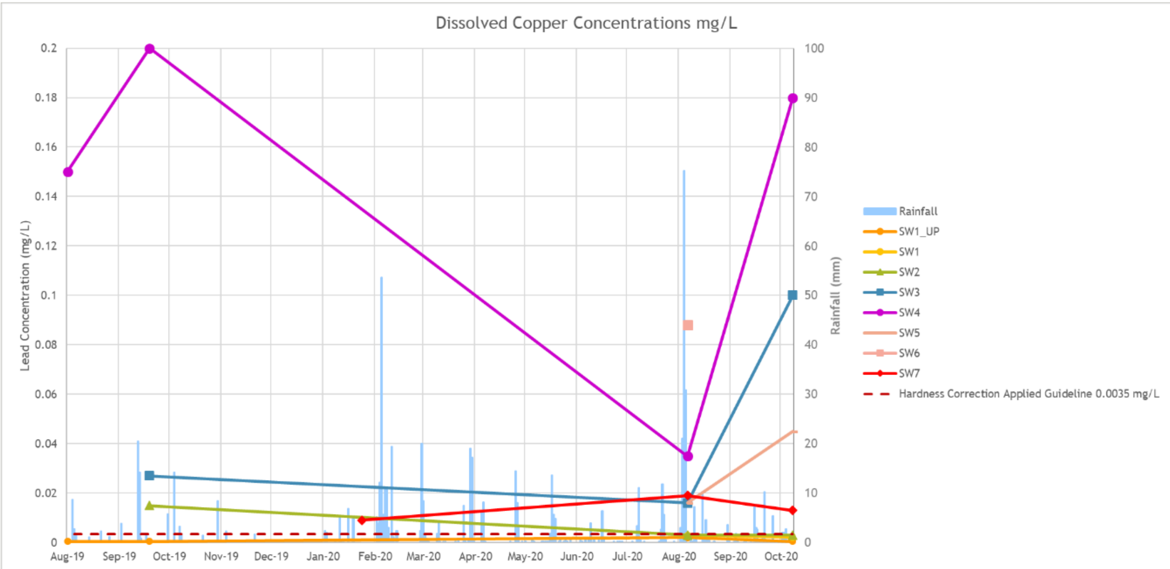


Figure 8-6: Dissolved Copper Concentrations, Upgradient and Onsite

Dissolved copper exceeded hardness corrected ecological assessment criteria around the middle and northern culverts and in the downstream offsite dam. Based on the degree and extent of copper exceeding ecological criteria in surface water assessment of metal speciation and/or bioavailability may be warranted to determine if/where remediation may be required.

As discussed in **Section 8.1.3** copper concentrations in the Mulwaree River were elevated though a relationship with site contamination was not identified. The concentrations observed in the Mulwaree River are presented in **Table II, Appendix 5** and exceed hardness corrected ecological criteria however as they appear unrelated to the site recommendations for further assessment are not provided.

8.1.4 Zinc

8.1.5 Concentration Trends On and Near Site

Figure 8-7 describes total zinc concentrations in surface water upstream and downstream of the three onsite rail culverts across multiple monitoring rounds from August 2019 – October 2020. Rainfall is presented across the same period. The zinc concentration range (0 – 4 mg/L) was selected to facilitate consideration of temporal trends and screening against adopted ecological assessment criteria.

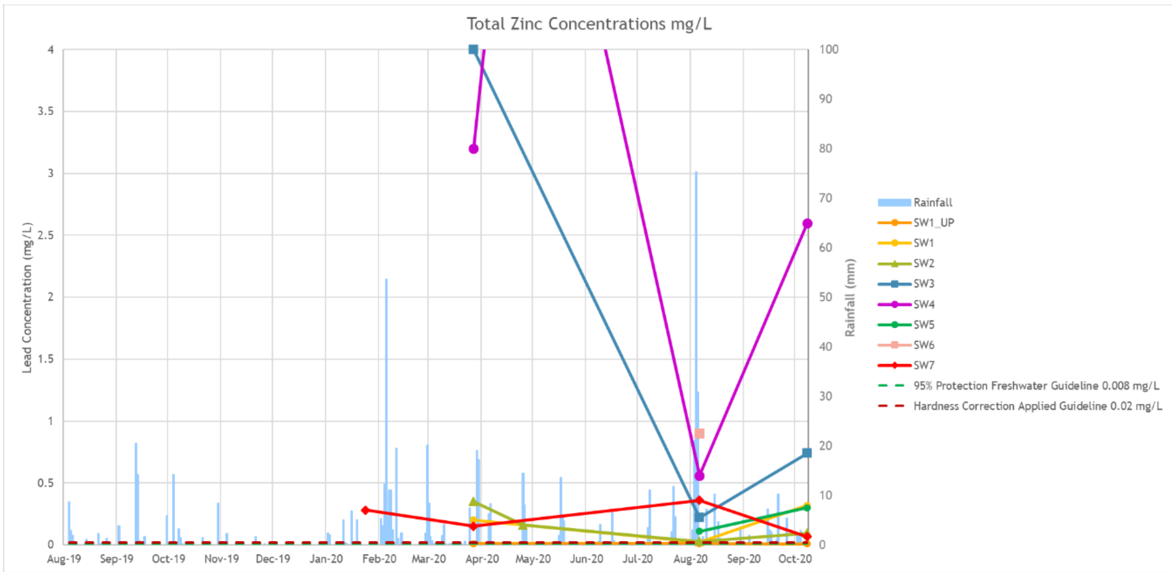


Figure 8-7: Total Zinc Concentration Trends

Total zinc concentrations follow a similar trend to copper and lead. Highest concentrations were reported at SW3 and SW4. Decreased concentrations were observed at onsite locations and increased concentrations were observed in the dam downstream of the northern culvert (SW7) after high rainfall in August 2020.

Figure 8-8 presents total zinc concentrations in the Mulwaree River upstream and downstream of where site water would be expected to enter across multiple monitoring rounds from February – October 2020. Rainfall is presented across the same period.

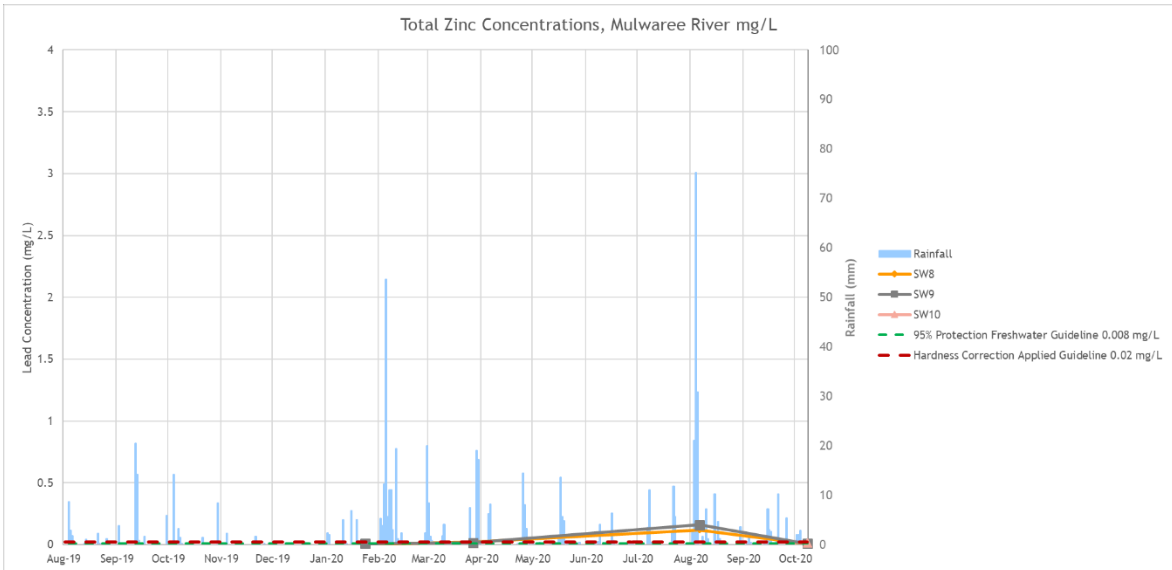


Figure 8-8: Zinc Concentration Trends, Mulwaree River

Total zinc concentrations within the Mulwaree River increased after heavy rainfall in August 2020. Similar to copper, this trend was observed at both the upgradient (SW9) and downgradient (SW8) locations. A relationship between zinc in surface water from the site and in the Mulwaree River was not identified. Rather, the consistency between zinc concentrations upstream and downstream of site discharge may indicate an upstream contaminant source more directly affects zinc concentrations in the Mulwaree River.

8.1.6 Human Health Risk from Zinc in Surface Water

Health guidelines adopted for zinc were limited to an aesthetic criterion of 3 mg/L as presented in the ADWG. In October 2020 total zinc concentrations at all locations were reported below this criteria and risks to human health associated with zinc in site surface water are considered to be low and acceptable.

8.1.7 Ecological Risks from Zinc in Surface Water

Following exceedances of total zinc concentrations against both the ecological guideline value for 95% species protection and the hardness corrected value, dissolved zinc concentrations for onsite and Mulwaree River locations were assessed against the hardness corrected guideline value as shown in **Figure 8-9**.

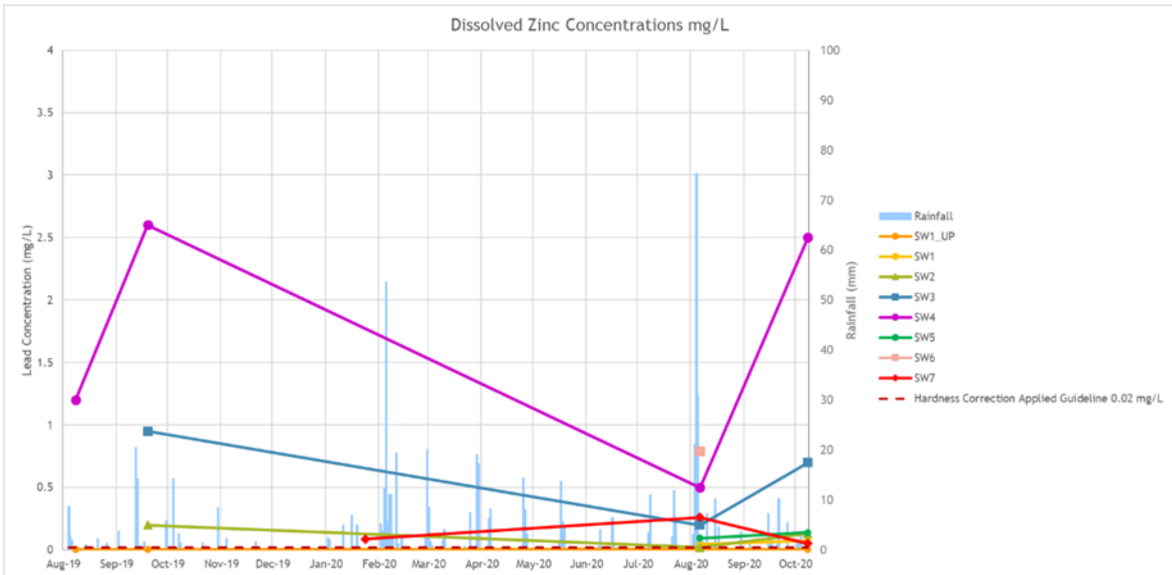


Figure 8-9: Dissolved Zinc Concentration Trends

Exceedances were reported at all onsite locations indicating a potential risk to onsite ecology. The heavy industrial site use and highly disturbed condition of the site indicate the site holds little ecological value however potential remains for elevated concentrations of zinc to migrate offsite during heavy rainfall events. Further, the elevated concentration at SW7 in August 2020 indicates localised offsite migration following rainfall in August 2020 appears to have occurred to the dam downstream of the northern culvert (SW7).

Based on the degree and extent of zinc exceeding ecological criteria in surface water assessment of metal speciation and/or bioavailability may be warranted to determine if/where remediation may be required.

Figure 8-10 presents dissolved zinc concentrations in the Mulwaree River upstream and downstream of where site water would be expected to enter across multiple monitoring rounds from February – October 2020. Rainfall is presented across the same period.

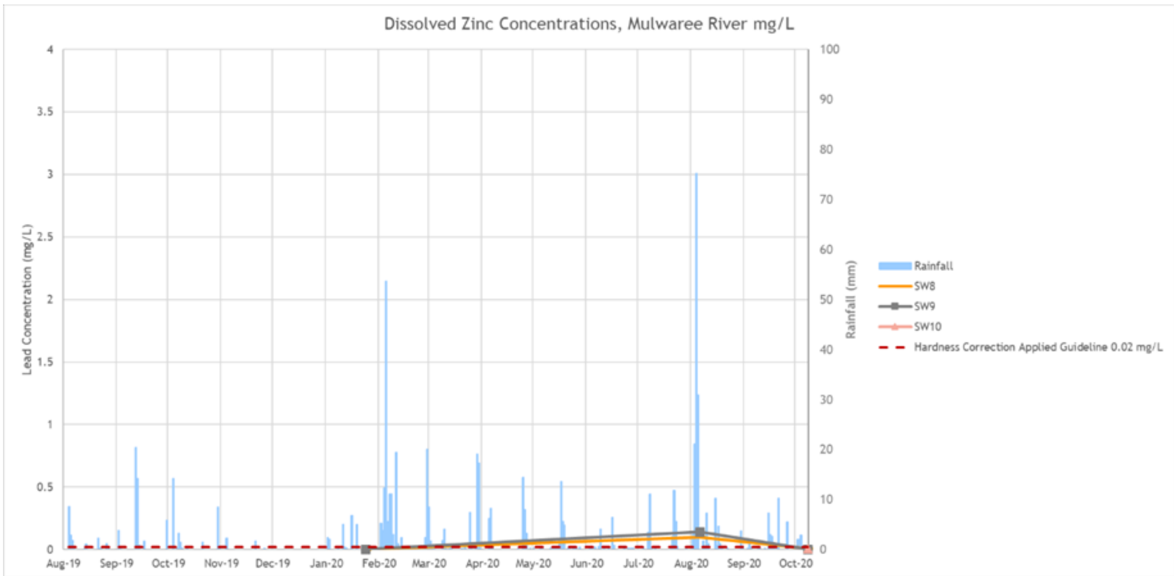


Figure 8-10: Dissolved Zinc Concentration Trends, Mulwaree River

As discussed in **Section 8.1.4** zinc concentrations in the Mulwaree River were elevated though a relationship with site contamination was not identified. The concentrations observed in the Mulwaree River are presented in **Table II, Appendix 5** and exceed hardness corrected ecological criteria however as they appear unrelated to the site, recommendations for further assessment are not provided.

8.2 Sediment

8.2.1 Southern Culvert

Copper lead and zinc concentrations in sediment downstream of the southern rail culvert are presented on **Figure 3a**, **Appendix 1**.

All concentrations were reported below adopted human health assessment criteria.

Copper was reported above adopted ecological assessment criteria at locations within 100 m of the site (Creek 1 and Creek 2). Lead and zinc exceeded adopted ecological assessment criteria at all locations (Creek 1 – Creek 6), located within the ephemeral creek bed, exceeded the adopted sediment DGV for copper, lead and zinc with concentrations generally decreasing away from the site.

Based on the degree and extent of copper, lead and zinc in sediment from the site exceeding Tier 1 criteria, site specific ecological risk assessment is considered warranted to more accurately characterise risks and associated drivers for remediation.

8.2.2 Middle Culvert

Copper lead and zinc concentrations in sediment downstream of the middle rail culvert are presented on **Figure 3b**, **Appendix 1**. The contaminant distribution indicates that offsite migration of contaminated soils has occurred across a concrete causeway on Boyd Street, along drains on Boyd Street and Braidwood Road and into a drainage swale / ephemeral creek bed located north of the sports ground. Lead concentrations generally decrease away from the site.

Lead was reported above the adopted human health assessment criteria at the Boyd Street causeway (XBOYDSTW1) and in the Boyd Street drain (BOYD1, BOYD2, XBOYD02 and XBOYD03).

Lead was also reported above the human health assessment criteria adjacent / downstream of Braidwood Road (SED_BR002) and P6_HA05. Due to low concentrations at XBOYD003, XBR001 and XBR002, this lead contribution appears potentially related to a source other than the site[2].

Guidance endorsed by the NSW EPA makes provision for contaminant risks to be assessed through calculation of the 95% upper confidence limit (95% UCL) of the mean concentration. The 95% UCL is a value that, when calculated repeatedly for randomly drawn subsets of site data, equals or exceeds the true mean 95 percent of the time. The 95% UCL is only relevant where:

1. the standard deviation of the results should be less than 50% of the relevant investigation or screening level, and
2. no single value should exceed 250% of the relevant investigation or screening level.

The maximum lead concentration excluding the Boyd Street Causeway and the area adjacent/downstream of Braidwood Road was 800 mg/kg (< 250% of the guideline) and the standard deviation was 302 mg/kg (50% of the guideline). The standard deviation is not less than 50% of the guideline however exceeds only marginally. The 95% UCL was therefore considered relevant and was calculated at 509 mg/kg and below the adopted guideline. Calculations are presented as **Table XI**, **Appendix 4**). Within this context risks to human health from lead in sediment downstream of the middle culvert excluding the area around the Boyd Street Causeway and the area adjacent/downstream of Braidwood Rd are considered to be low and acceptable. Soils with elevated lead concentrations in the area around the Boyd Street Causeway and the area adjacent/downstream of Braidwood Rd require further site specific risk assessment to inform the need for remediation.

Elevated concentrations above the adopted sediment DGV criteria were reported at five locations north of the sports ground. At three of these locations contaminant concentrations also exceeded sediment GV-high criteria. The highest concentration of 1,900 mg/kg was north of the sports ground (SED_BR002) and adjacent (downstream) of Braidwood Road. Based on the degree and extent of these exceedances, site specific ecological risk assessment is considered warranted to more accurately characterise risks and associated drivers for remediation.

8.2.3 Northern Culvert

Downgradient of the northern culvert, contaminant concentrations were reported below human health assessment criteria[3].

Zinc concentrations in sediment exceeded ecological criteria in the offsite dam (SW7) and at two locations along the drainage line adjacent Braidwood Road (XBR010 and XBR011.

8.2.4 Mulwaree River

All contaminant concentrations in sediments collect from the Mulwaree River were reported below adopted human health and ecological assessment criteria.

8.3 Loadout Complex

The distribution and degree of lead in test pits targeting the loadout complex indicates that contamination remains at the former site surface in this area, now approximately 1 m bgl. The extent of contamination to the south, east and north has been accurately characterised. Some uncertainty remains in the extent to the west.

[2] Contaminant impacts on private property downstream of the middle culvert are assessed further in separate reports.

[3] Contaminant impacts on private property downstream of the northern culvert are assessed further in separate reports.

8.4 Additional Contaminants of Potential Concern

Concentrations of OCP, OPP, PCB were reported as non-detect in all samples. Within this context risks to human health and the environment associated with these contaminants at the site are considered to be low and acceptable.

9. UPDATED CONCEPTUAL SITE MODEL

This is a revision to the preliminary CSM presented in **Section 5**. The updated CSM does not include the material to be generated as part of remediation. The update CSM incorporates all available data, including data presented in the DSI.

9.1 Sources of the Contaminant

The primary source of contamination was identified as the ore concentrate from the former Loadout Complex that has been deposited within the rail formation and adjacent shallow soils. Secondary sources were identified as:

- surface water and sediment in drainage lines onsite and in the local offsite receiving environment
- dust that has accumulated within buildings and as sediment in rainwater tanks close to the site. This source has been remediated to the extent practical through cleaning and validation of properties where impacts were identified and where property owners consented to cleaning works occurring.

Sources considered within this CSM are those clearly related to site as defined above. Lead contamination that has been identified but which is not related to the site includes impacts on the haul route between the mine and the rail corridor and on Mulwaree Street. Additionally, several instances of localised lead contamination that was geographically separated from the site were identified on private properties. At some of these properties lead based paint was identified in poor condition and lead is generally known to be a cheap and useful metal found frequently in the environment and older homes (NSW EPA 2020). The sue and distribution of copper and zinc within the built environment is similarly widespread. Contamination that has been identified but which is not related to the site should be considered further by the polluters, property owners and relevant regulatory stakeholders. Where it is reasonable to conclude that contamination has not originated from site, that contamination has been excluded from further consideration.

9.2 Chemicals of Concern

Chemicals of concern are limited to copper, lead and zinc at or originating from the site. Concentrations of OCP/OPP and PCBs were not identified above the laboratory limit of reporting in the ten samples collected and are therefore not considered a contaminant of concern.

9.3 Receptors

The receptors identified in this CSM were based on a current use of the site and surrounding land, which currently includes residential and a range of community uses.

The human receptors identified were:

- onsite workers (including intrusive maintenance and construction workers)
- users of Tarago Train Station
- the owners of the Station Masters Cottage
- other local residents
- a range of community facilities including the Public School, Preschool and Townhall
- workers in adjacent public road reserves.

For lead exposure, the most sensitive receptors are females of reproductive capacity and infants/children.

The ecological receptors identified were:

- onsite terrestrial/aquatic ecology
- offsite terrestrial ecology including crops and livestock
- aquatic ecology of the Mulwaree River.

9.4 Transport Mechanisms

Identified transport mechanisms by which contaminants of concern may migrate from the source of contamination are outlined in **Table 9-1**.

Table 9-1 Contaminant Transport Mechanisms

Transport	Comment	Likelihood
Onsite direct contact, inhalation, incidental ingestion	Rail workers in contaminated areas exposed to soil and dust	Potential
Offsite transport of contaminated sediment and surface water via surface water runoff	Movement of surface water and sediment from the site occurs during high rainfall events. Root uptake of dissolved metals expected.	Confirmed
Offsite transport of contaminated dust in air	Movement of contaminants in airborne dusts from the site has occurred.	Confirmed

9.5 SPR Linkages

In order for a receptor to be exposed to a contaminant derived from a site, there must be an exposure pathway linking the source of contamination and the exposed receptor. An exposure pathway is described as the course a chemical or physical agent takes from the source to the exposed receptor and generally includes the following elements (US EPA 1989):

- a source and mechanism of chemical release
- a retention or transport medium (or media where chemicals are transferred between media)
- a point of potential human and/or ecological contact with the contaminated media
- exposure route (e.g. ingestion, inhalation) at the point of exposure.

An evaluation of source-pathway-receptor linkages is provided in **Table 9-2**.

Table 9-2: Updated Exposure Assessment Summary

Exposure Route	Complete SPR Linkage? (Yes / No / Potential)							
	Onsite Workers	Onsite Ecology	Residents	Community Activities	Offsite Workers	Offsite Ecology	Irrigation and Livestock	Justification
Onsite Soil and Sediment								
Direct Contact	**Potential**	**Potential**	**Potential[1]**	No	N/A	N/A	N/A	Concentrations in soils exceed onsite assessment criteria however management measures have been defined to mitigate risks to onsite workers (Ramboll 2019f). Potential remains for impacts to onsite ecology. Ecological risks are considered low due to the rail corridor holding little to no ecological significance. Contamination in soils at depth within the footprint of the former Loadout Complex exceed human health and ecological criteria however are unlikely to present a risk to human health or ecology due to positioning beneath clay capping. Dust migration from the site could impact on the adjoing resident. Dust generation is being managed on site and demonstrates low and acceptable levels of lead migration in dust from the site.
Inhalation	**Potential**	**Potential**	**Potential[1]**	No	N/A	N/A	N/A	
Incidental Ingestion	**Potential**	**Potential**	**Potential[1]**	No	N/A	N/A	N/A	
Root Uptake	N/A	**Potential**	N/A	N/A	N/A	N/A	N/A	
Offsite Soil and Sediment								
Direct Contact	N/A	N/A	**Potential**	**Potential**	**Potential**	**Yes**	**Potential**	Concentrations in soil and sediment offsite exceed human health and ecological criteria.
Inhalation	N/A	N/A	**Potential**	**Potential**	**Potential**	**Yes**	**Potential**	
Incidental Ingestion	N/A	N/A	**Potential**	**Potential**	**Potential**	**Yes**	**Potential**	
Root Uptake	N/A	N/A	N/A	N/A	N/A	**Yes**	**Potential**	
Surface Water								
Direct Contact	No	**Yes**	No	No	No	**Yes**	No	Concentrations of copper, lead and zinc were observed in a dam downstream of the site at concentrations which may present a risk to ecology. Elevated concentrations of copper and zinc were also observed in the Mulwaree River though appear unrelated to site.
Incidental Ingestion	No	**Yes**	No	No	No	**Yes**	No	
Root Uptake	N/A	**Yes**	N/A	N/A	N/A	**Yes**	No	
Migration to groundwater	No	No	No	No	No	**Yes**	No	
Groundwater								
Potable use including drinking	No	N/A	No	No	No	N/A	N/A	Concentrations of metals in groundwater were reported below human health criteria. Some metals exceed ecological criteria onsite though not defined offsite and do not appear to discharge to the receiving Mulwaree River so ecological exposure is considered unlikely.
Direct Contact	No	No	No	No	No	No	No	
Incidental Ingestion	No	No	No	No	No	No	No	
Root Uptake	N/A	No	N/A	N/A	N/A	No	No	
Dust								
Direct Contact	No	N/A	**Potential**	No	No	N/A	N/A	Elevated concentrations of lead in internal dust were identified in close proximity of the site indicating limited offsite migration of contaminants in air borne dust has occurred. Dust monitoring is ongoing however early data suggests migration of lead in dust from the site is now low.
Inhalation	No	N/A	**Potential**	No	No	N/A	N/A	
Incidental Ingestion	No	N/A	**Potential**	No	No	N/A	N/A	
Rain Tank Water								
Potable use including drinking	N/A	N/A	No	No	N/A	No	No	Rain tank water reported contaminant concentrations below criteria.
Direct Contact	N/A	N/A	No	No	N/A	No	No	
Incidental Ingestion	N/A	N/A	No	No	N/A	No	No	
Root Uptake	N/A	N/A	No	No	N/A	No	No	
Rain Tank Sediment								
Direct Contact	N/A	N/A	**Potential**	No	N/A	**Potential**	No	Contaminant migration via airborne dust has occurred and concentrations in tank sediment exceeded criteria for soil at some houses. Where identified (and where permitted) tank sediment with elevated contaminant concentrations from the site was removed.
Inhalation	N/A	N/A	**Potential**	No	N/A	**Potential**	No	
Incidental Ingestion	N/A	N/A	**Potential**	No	N/A	**Potential**	No	

[1]*Potentially complete exposure pathways between the Contaminant in soil and offsite residents are limited to approved (though not current) use of one residential property*

10. CONCLUSIONS AND RECOMMENDATIONS

The objectives of this DSI Addendum were to investigate data gaps identified in the DSI as follows:

- Further investigate the extent of offsite contaminant migration via surface water from three culverts which direct surface water beneath the rail formation onsite
- Further assess contaminants within the footprint of the former Loadout Complex
- Characterise contaminated material to be generated onsite during remediation
- To assess concentrations of contaminants of potential concern associated with rail corridors that had not previously been considered; organochlorine / organophosphate pesticides (OCPs/OPPs) and polychlorinated biphenyls (PCBs).

Key findings were:

- Risks to human health from offsite migration of contaminants in surface water are considered to be low and acceptable
- Risks to ecology from offsite migration of contaminants in surface water appear limited to the offsite dam downstream of the northern culvert. Concentrations of lead, copper and zinc observed in the Mulwaree River are consistent with background concentrations and do not indicate impacts from the site
- Potential risks to human health from offsite migration of contaminants in sediment around the Boyd Street causeway and the area adjacent/downstream of Braidwood Road have been identified however an additional contaminant source appears to have contributed to impacts downstream of Braidwood Road.
- Potential risks to ecology from offsite migration of contaminants in sediment have been identified downstream of the southern, middle and northern rail culverts.
- Lead concentrations in soils at depth around the footprint of the former Loadout Complex exceed human health and ecological criteria however are unlikely to present a risk due to positioning beneath clay capping
- Risks associated with OCP, OPP and PCB at and originating from the site are considered to be low and acceptable.

Recommendations include:

- Site specific human health risk assessment of lead in sediment around the Boyd Street Causeway and in the drainage swale adjacent/downstream of Braidwood Road should be undertaken to assess the requirement for remediation
- Site specific ecological risk assessment of copper, zinc and to a lesser extent lead in sediment downstream of the site be undertaken to assess risks and the need for remediation
- Monitoring of surface water and sediment should continue on a quarterly basis and preferably after rainfall. This should include analysis for both total and dissolved metals in order to accurately assess potential human health and ecological risks.

11. LIMITATIONS

Ramboll Australia Pty Ltd (Ramboll) prepared this report in accordance with its engagement with John Holland Rail and in accordance with our understanding and interpretation of current regulatory standards.

A representative program of sampling and laboratory analyses was undertaken as part of this investigation, based on past and present known uses of the site. While every care has been taken, concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. We cannot therefore preclude the presence of materials that may be hazardous. Site conditions may change over time. This report is based on conditions encountered at the Site at the time of the report and Ramboll disclaims responsibility for any changes that may have occurred after this time.

The conclusions presented in this report represent Ramboll's professional judgment based on information made available during the course of this assignment and are true and correct to the best of Ramboll's knowledge as at the date of the assessment.

Ramboll did not independently verify all of the written or oral information provided to Ramboll during the course of this investigation. While Ramboll has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to Ramboll was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

11.1 User Reliance

This report has been prepared exclusively for John Holland Rail and may not be relied upon by any other person or entity without Ramboll's express written permission.

12. REFERENCES

ANZECC. (2000). *Australia and New Zealand Environment and Conservation Council, Guidelines for Fresh and Marine Water Quality.*

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

BOM. (2018). *Australian Groundwater Explorer.*

DEC. (2007). *Department of Environment and Conservation NSW, Guidelines for the Assessment and Management of Groundwater Contamination.*

DECCW. (2010). *UPSS Regulation - Sensitive Zones Map.*

Department of Environment and Heritage Protection. (2012). *Guidelines for Contaminated Land Professionals.*

Friebel, E. &. (2011). *Health Screening Levels for petroleum hydrocarbons in soil and groundwater. CRC Care Technical Report no.10.* Adelaide, Australia: CRC for Contamination Assessment and Remediation of the Environment.

JBS&G. (2017). *Stage 2 Remedial Action Plan, Former Newcastle Gasworks Chatham Road, Hamilton North, NSW.*

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1).* NEPC.

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

NHMRC. (2008). *National Health and Medical Research Council Guidelines for Managing Risk in Recreational Waters.*

NHMRC. (2008). *National Health and Medical Research Council Guidelines for Managing Risks in Recreational Waters.*

NHMRC. (2018). *National Health and Medical Research Council, Australian Drinking Water Guidelines.*

NSW EPA. (1995). *Sampling Design Guidelines.*

NSW EPA. (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.*

NSW EPA. (2017). *Guidelines for the Site Auditor Scheme (3rd Edition).*

OEH. (2011). *Guidelines for Consultants Reporting on Contaminated Sites.*

OEH. (2011). *Office of Environment and Heritage, Contaminated Sites: Guidelines for Consultants reporting on Contaminated Sites.*

WHO. (2008). *World Health Organisation (WHO) Guidelines for Drinking-water Quality, third edition.*

NIWA Taihoro Nukurangi (2013) Updating nitrate toxicity effects on freshwater species, prepared for Ministry of Building, Innovation and Employement: Funded by Envirolink

Ramboll (2019a) *Tarago Loop Extension Further Intrusive Assessment and Lead Management Plan*

Ramboll (2019b) *Tarago Loop Extension Short Term Lead Management Plan*

Ramboll (2019c) *Tarago Loop Extension Preliminary Human Health Risk Assessment*

Ramboll (2019d) *August 2019 Surface Water Monitoring – Tarago Rail Loop Expansion*

Ramboll (2019e) *September 2019 Surface Water Monitoring – Tarago Rail Loop Expansion*

Ramboll (2019f) *Tarago Loop Extension Remedial Action Plan*

Ramboll (2019g) *Tarago Loop Extension Interim Lead Management Plan*

Ramboll (2019h) Tarago Rail Corridor Environmental Site Assessment

Ramboll (2020) Tarago Rail Corridor and Tarago Area Detailed Site Investigation Revision 3

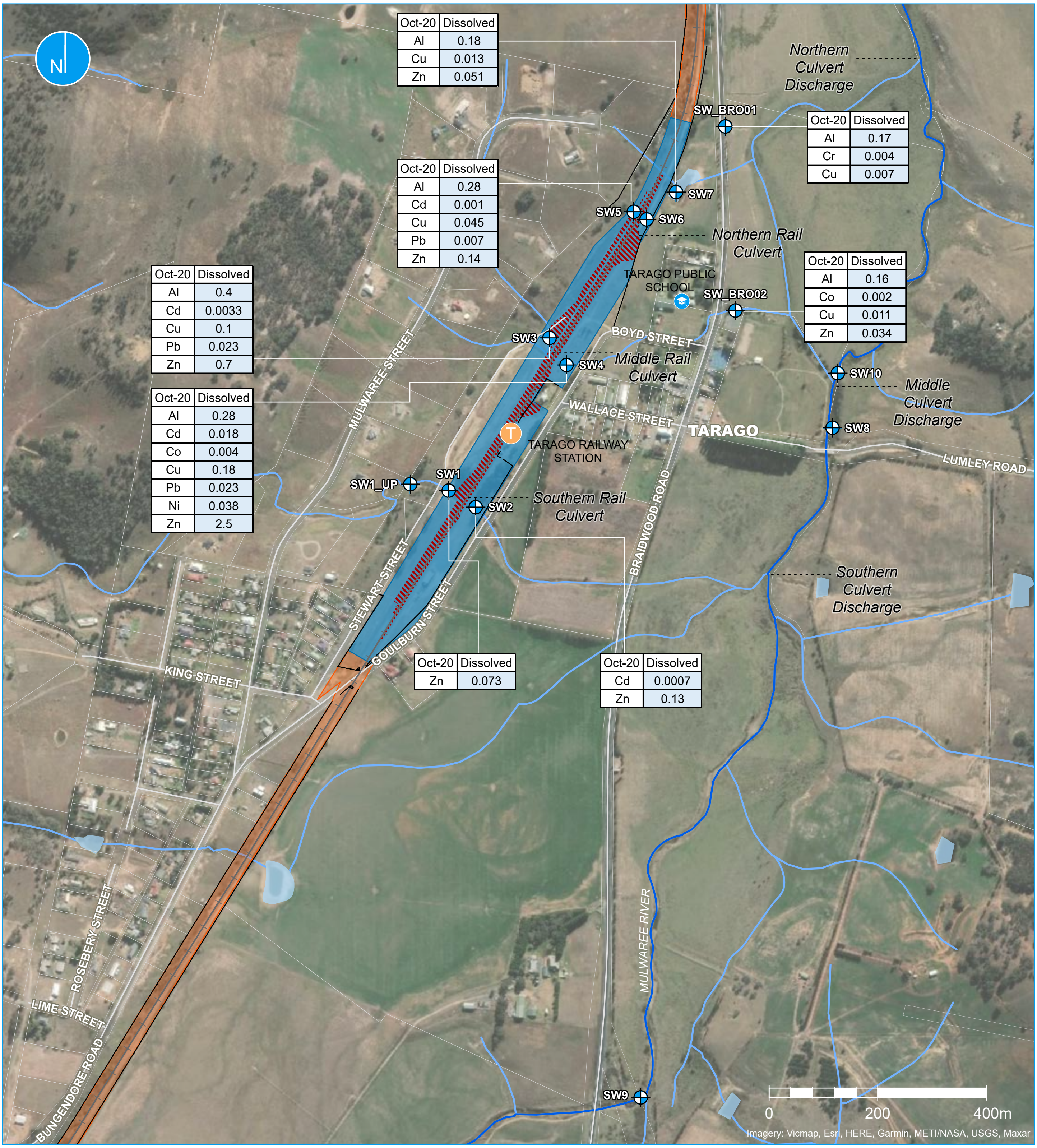
Ramboll (2020a) Tarago Rail Corridor Lead Contamination – Assessment of Public Spaces by Field Portable XRF

US EPA (1989) Risk Assessment Guidance for Superfund Volume 1, Human Health Evaluation Manual (Part A)

US EPA (2007) Field Portable X-Ray Fluoresence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment

APPENDIX 1
FIGURES

Figure 1 | Locality Plan



RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P021_DSladdendum | F005_SurfaceWaterSamples_V04 | 11/02/2021

A4
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Legend

- Surface water sampling location
- Rail corridor
- Rail corridor fence
- Area of lead exceedance (within rail corridor)
- Indicative surface water flow path (ie: not ephemeral)
- Indicative ephemeral surface water flow path

Surface water sample criteria

Contaminant	95% Protection (ANZG 2018)
Al	>0.055 mg/L
Cd	>0.00054 mg/L
Cr	>0.0025 mg/L
Co	>0.0014 mg/L
Cu	>0.0035 mg/L
Pb	>0.0136 mg/L
Ni	>0.0275 mg/L
Zn	>0.02 mg/L

Note: Hardness correction factor applied to the threshold value of Cd, Cr, Cu, Pb, Ni, Zn.

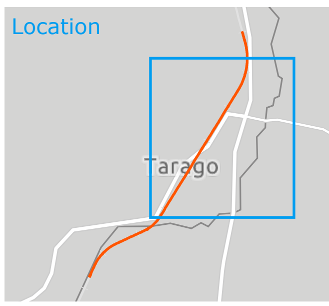

Figure 2 | Surface Water Monitoring

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_F021_DSIaddendum | F002_XRFSed2_V06 | 11/02/2021

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Legend

- Site boundary/rail corridor
- Hauling route
- Indicative drainage line
- Indicative surface water flow path (ie: not ephemeral)
- Indicative ephemeral surface water flow path
- Sediment sample

Sediment assessment criteria

Contaminant	Sediment DGV	Sediment GV-High
Cu	>65 mg/kg	>270 mg/kg
Pb	>50 mg/kg	>220 mg/kg
Zn	>200 mg/kg	>410 mg/kg

Soil assessment criteria

Contaminant	HIL C (NEPM 2013)	Site Specific EIL
Cu	>17,000 mg/kg	>125 mg/kg
Pb	>600 mg/kg	>1,100 mg/kg
Zn	>30,000 mg/kg	>308 mg/kg

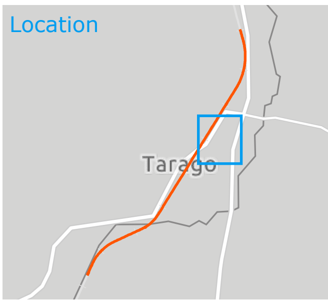
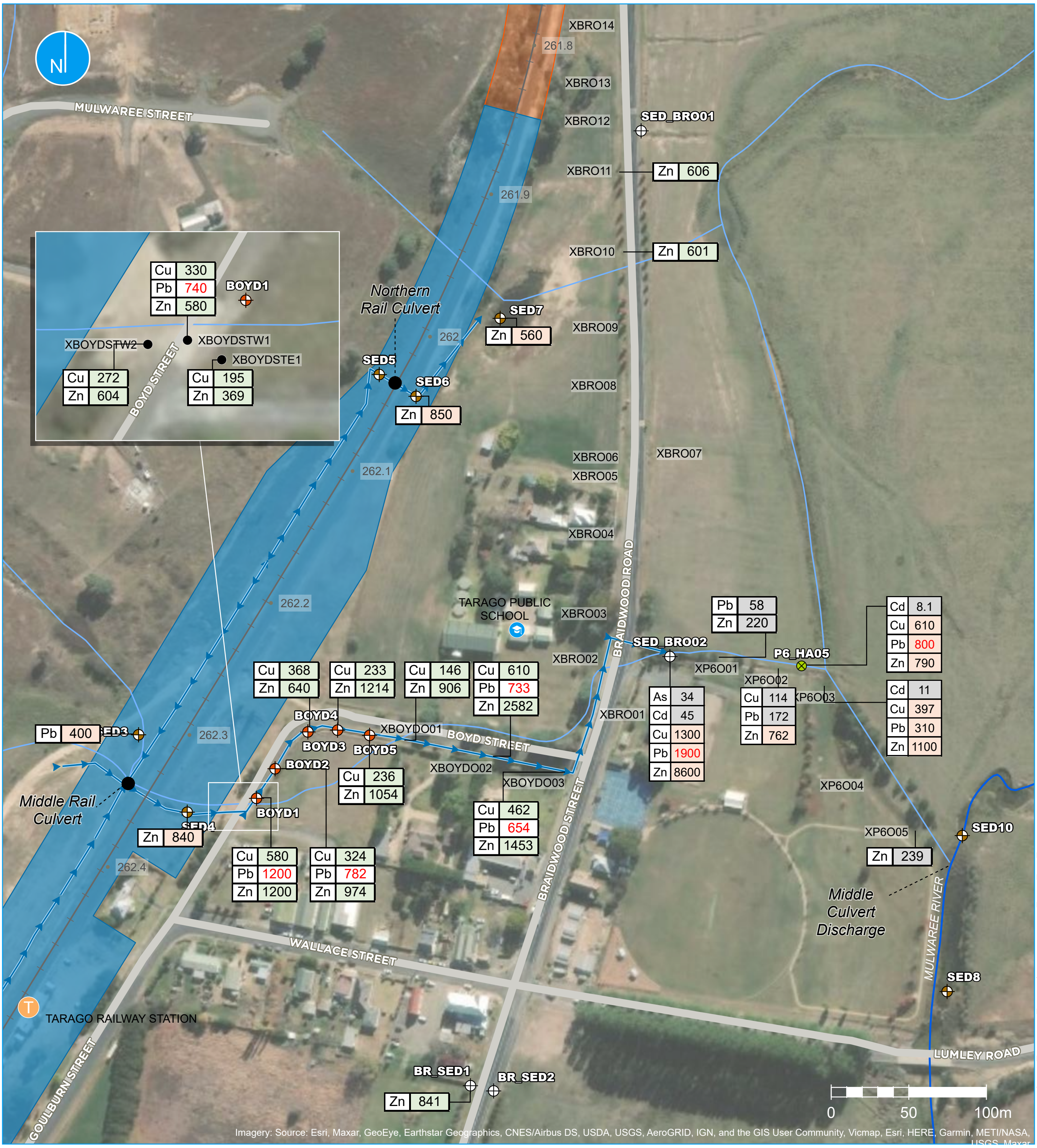


Figure 3a | Offsite contaminant migration through surface water – southern rail culvert



RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P021_DSIaddendum | F001_XRFSed1_V07 | 11/02/2021

A4
1:3,500

Legend

- Site boundary/rail corridor
- Indicative drainage line
- Indicative surface water flow path (ie: not ephemeral)
- Indicative ephemeral surface water flow path
- Sediment sample
- Hand auger sample
- Soil sample
- XRF sample

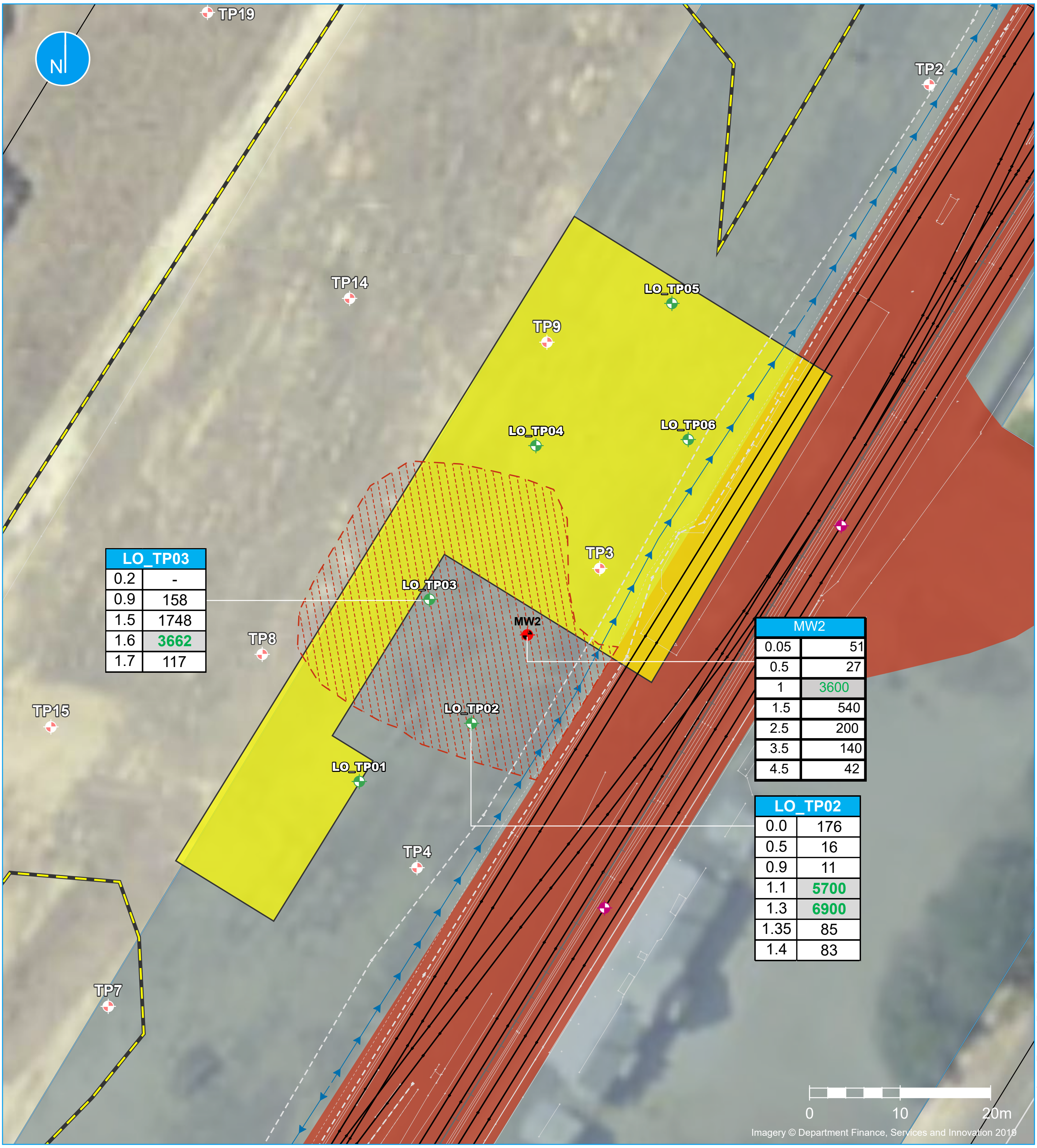
Sediment assessment criteria

Contaminant	Sediment DGV	Sediment GV-High
As	>20 mg/kg	>70 mg/kg
Cd	>1.5 mg/kg	>10 mg/kg
Cu	>65 mg/kg	>270 mg/kg
Pb	>50 mg/kg	>220 mg/kg
Zn	>200 mg/kg	>410 mg/kg

Soil assessment criteria

Contaminant	HIL C (NEPM 2013)	Site Specific EIL
Cu	>17,000 mg/kg	>125 mg/kg
Pb	>600 mg/kg	>1,100 mg/kg
Zn	>30,000 mg/kg	>308 mg/kg

Figure 3b | Offsite contaminant migration through surface water – middle and norther rail culverts



LO_TP03	
0.2	-
0.9	158
1.5	1748
1.6	3662
1.7	117

MW2	
0.05	51
0.5	27
1	3600
1.5	540
2.5	200
3.5	140
4.5	42

LO_TP02	
0.0	176
0.5	16
0.9	11
1.1	5700
1.3	6900
1.35	85
1.4	83

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P021_DSIaddendum | F003_TPs_Loadout_V02 | 27/10/2020

A4
1:600

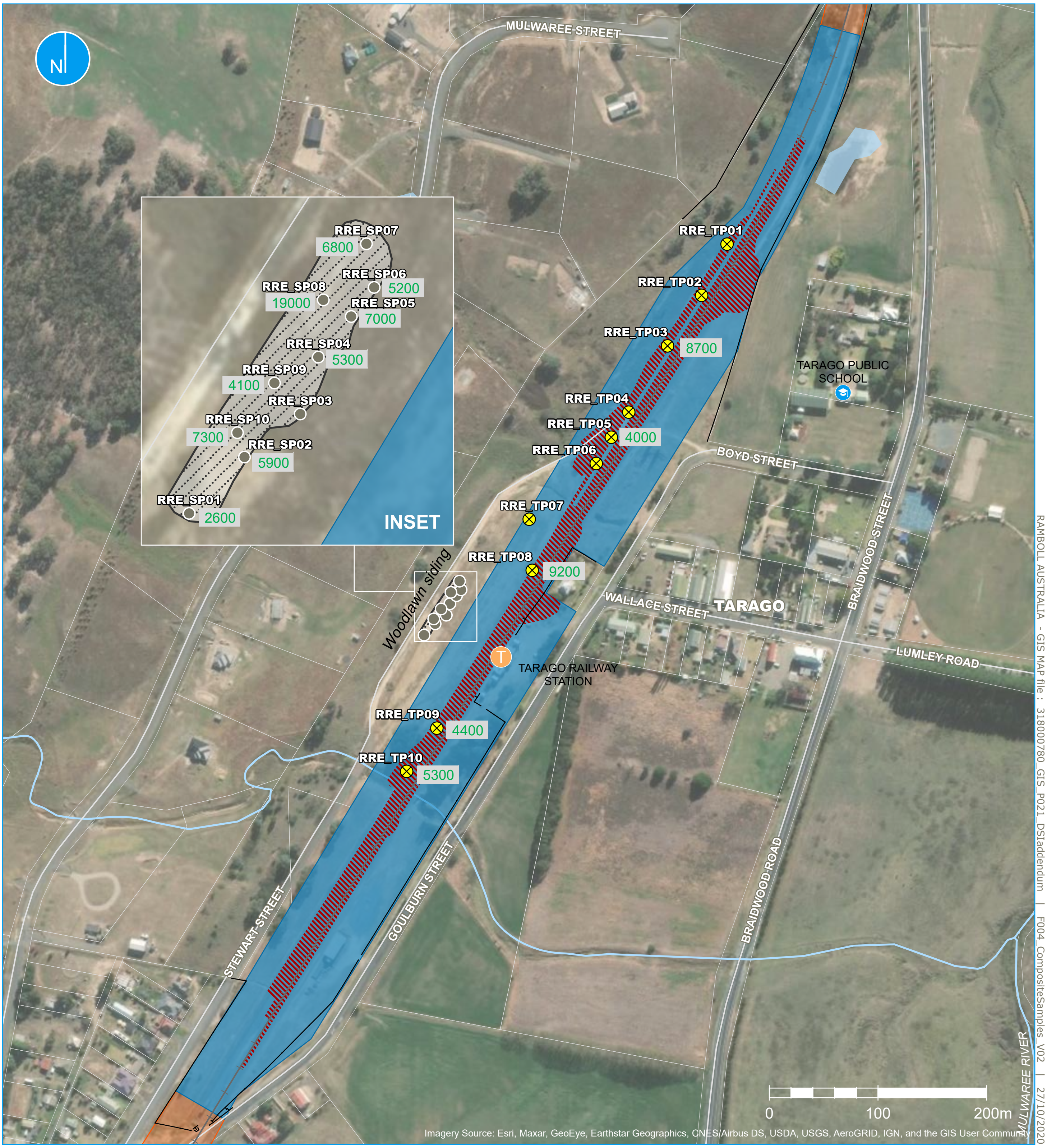
Legend

- Former loadout complex building footprint
- Former loadout road (approximate)
- Site boundary
- Surface water flow (indicative)
- Lead impacted area
- Indicative lead impacted area
- Loadout complex testpit (March 2020)
- Loadout complex testpit (August 2020)
- Groundwater monitoring location

Lead exceedance criteria

Sample depth (m)	Site Specific Human Health	EIL Commercial/Ind. (NEPM 2013)
	>2200 mg/kg	>1800 mg/kg

Figure 4 | Loadout complex sampling locations



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Legend

- Site boundary
- Rail corridor
- Rail corridor fence
- Area of lead contamination within the rail corridor
- Stockpile (JHR)

Composite sampling (Ramboll 2020)

- Stockpile sample
- Test pit
- 400 Lead (mg/kg)

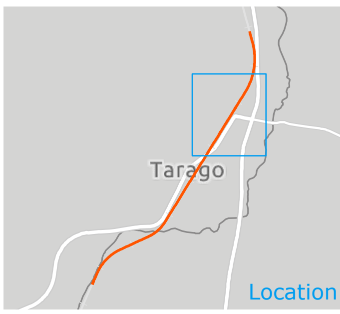

Figure 5 | Charaterisation of Remediation Spoil

APPENDIX 2
SAQPS

Intended for
John Holland Rail Pty Ltd

Document type
Plan

Date
August 2020

Project Number
Sampling Analysis and Quality Plan (SAQP) – Surface Water Monitoring

SAMPLING ANALYSIS AND QUALITY PLAN (SAQP) – SURFACE WATER MONITORING

TARAGO LEAD MANAGEMENT

Bright ideas. Sustainable change.

TARAGO LEAD MANAGEMENT
SAMPLING ANALYSIS AND QUALITY PLAN (SAQP) – SURFACE WATER MONITORING

Project name	**Tarago Lead Management**
Project no.	**318000780-T24-01**
Recipient	**John Holland Rail Pty Ltd**
Document type	**Plan**
Version	**0**
Date	**6/08/2020**
Prepared by	**Stephen Cadman/Jordyn Kirsch**
Checked by	**Stephen Maxwell**
Approved by	**Fiona Robinson**
Description	**This document comprises the Sampling Analysis and Quality Plan (SAQP) for surface water monitoring associated with management of lead contamination from the Tarago rail corridor.**

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APPENDICES

Appendix 1

Figures

1. INTRODUCTION

1.1 Preamble

Ramboll Australia Pty Ltd (Ramboll) was engaged by John Holland Rail Pty Limited (JHR) on behalf of Transport for NSW (TfN) to complete periodic surface water monitoring upstream and downstream of contamination within the Goulburn – Bombala rail corridor at Tarago, New South Wales, Australia.

1.2 Background

The site is identified as part Lot 22 Deposited Plan (DP) 1202608 and is located in Tarago, NSW. The site occupies an area of approximately three hectares and is located approximately 32 km south of Goulburn.

The Woodlawn Mines Ore Concentrate Load-Out Complex operated within the Goulburn – Bombala rail corridor at Tarago from the 1970s – 1990s. Concentrates were produced at the Woodlawn Mine approximately 6.5 km west and included a zinc concentrate consisting mainly of sphalerite (zinc sulphide), a lead concentrate of galena (lead sulphide) and copper concentrates of chalcopyrite (copper iron sulphide).

An extensive body of work has been completed to characterise contaminant impacts associated with historic operation of the site. This work has included assessment of soil, groundwater and surface water across the site and assessment of soil, groundwater, surface water and airborne dust within the surrounding area. Recent assessments identified contaminants within approximately 900 lineal meters of the rail formation at Tarago. This area is herein referred to as the 'site' and is presented on **Figure 1**, **Appendix 1**.

Offsite contaminant migration in surface water appears limited to three culverts which pass beneath the rail formation onsite. Contaminants of potential concern (CoPC) relevant to receiving surface waters appear limited to metals (aluminium, cadmium, copper, lead, nickel, zinc) which exceed the adopted relevant health and/or ecological assessment criteria.

1.3 Regulation

On 25 March 2020 the NSW Environment Protection Authority (NSW EPA) declared the site as significantly contaminated under Section 11 of the Contaminated Land Management Act 1997 (Declaration Number 20201103). Transport for NSW is currently managing the contamination under a Voluntary Management Proposal (VMP) which includes further assessment of site contamination and remediation to address the potential risks to human health and the environment posed by the contamination.

1.4 Objective

The objective of the surface water monitoring is to collect reliable water quality data, providing a data continuum which forms a basis for assessment of impacts from the site on surrounding surface water receptors.

2. SITE IDENTIFICATION

The site locality is shown in **Figure 1,** Error! Reference source not found..

The site details are presented in **Table 2-1.**

Table 2-1: Site Identification

Information	Description
Street Address:	Accessed from Stewart Street and Goulburn Street Tarago NSW
Identifier:	Part Lot 1 DP 595856
Site Area:	Approximately 7.5 ha
Local Government:	Goulburn Mulwaree Shire
Owner:	Transport for NSW
Current Site Use:	Forms part of the Goulburn to Bombala rail line and the Country Regional rail Network (CRN)

3. REGULATORY REQUIREMENTS

This SAQP has been prepared in general accordance with the following guidance documents:

1. Australia and New Zealand Environment and Conservation Council, *Guidelines for Fresh and Marine Water Quality* (ANZECC, 2018)
2. National Environment Protection Council (NEPC), *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013* (NEPM, 2013)
3. NSW EPA, Contaminated Sites: *Guidelines for Consultants Reporting on Contaminated Lands* (NSW EPA 2020)
4. NSW EPA, *Guidelines for the Site Auditor Scheme (3rd Edition)* (NSW EPA, 2017)

4. SUMMARY OF CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) was prepared as part of a Detailed Site Investigation prepared by Ramboll (2020). The CSM provides a summary of the source-pathway-receptor linkages for surface water and sediment and is summarised in **Table 4-1**.

Table 4-1 Conceptual Site Model Summary

Exposure Pathway	Onsite Workers	Onsite Ecology	Residents	Community Activities	Offsite Workers	Offsite Ecology	Irrigation and Livestock
Surface Water							
Direct contact	N	**P**	N	N	N	**P**	**P**
Incidental ingestion	N	**P**	N	N	N	**P**	**P**
Root uptake	N/A	**P**	N/A	N/A	N/A	**P**	N/A
Migration to groundwater	N	**P**	N	N	N	**P**	**P**
Sediment							
Direct Contact	**P**	**P**	**P**[1]	N	**P**	**P**	**P**
Inhalation	**P**	**P**	**P**[1]	N	**P**	**P**	**P**
Incidental Ingestion	**P**	**P**	**P**[1]	N	**P**	**P**	**P**
Root Uptake	N/A	**P**	N/A	N/A	N/A	N/A	N/A

[1]Potentially complete exposure pathways between the Contaminant in soil and offsite residents are limited to approved (though not current) use of one residential property.

5. SITE ACCEPTANCE CRITERIA

The assessment criteria proposed for surface water was sourced from the following references:

1. National Environment Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (NEPM, 2013)
2. National Health and Medical Research Council (NHMRC) (2001) National Resource Management Ministerial Council (NRMMC) Australian Drinking Water Guidelines 6, Version 3.5 updated August 2018, (ADWG 2011)
3. National Health and Medical Research Council (NHMRC), National Resource Management Ministerial Council (NRMMC) Guidelines for Managing Risks in Recreational Water (NHMRC, 2008).
4. Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) (available at www.waterquality.gov.au/anz-guidelines).
5. Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian
6. New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000)

Based on the review of potential beneficial uses of surface water, the criteria for protection of aquatic ecosystems and recreational use will be adopted. The adopted criteria are presented in **Table 5-1**. Dissolved metals will be assessed against ecological criteria (95% Freshwater (ANZG 2018)) while total metals will be assessed against all other criteria.

Table 5-1: Surface Water Investigation Levels (µg/L)

Contaminant	95% Freshwater (ANZG 2018)	Recreational[g]	Irrigation Short-term Trigger Value (ANZECC 2000)	Stock Water (ANZECC 2000)
Heavy Metals				
Aluminium	55[a]	-	20,000	5,000
Arsenic	24[b]	100	2,000	500-5,000
Barium	-	20	-	-
Beryllium	-	6	500	-
Cadmium	0.2	20	50	10
Chromium	1.0[c]	500	1,000	1,000
Cobalt	1.4	-	100	1,000
Copper	1.4	20,000	5,000	400-5,000
Iron	-	-	10,000	not sufficiently toxic
Lead	3.4	100	5,000	100
Manganese	1,900	5000	10,000	not sufficiently toxic
Mercury	0.06[d, e]	10	2	2
Nickel	11	200	2,000	1,000
Zinc	8	-	5,000	20,000
Inorganics				
Ammonia (as N)	900	-	-	-
Nitrate	-	500,000	-	-
Nitrite	-	-	-	-
Total nitrogen	-	-	25,000-125,000	-

Total phosphate (as P)	-	-	800-12,000	-
BTEXN				
Benzene	950	10	-	-
Toluene	180	8000	-	-
Ethylbenzene	80	3000	-	-
Total xylenes	75[f]	6000	-	-
Naphthalene	16	-	-	-

blank cell denoted with – indicates no criterion available.

[a] Aluminium guidelines for pH > 6.5, based on the pH of groundwater measured at the site and surrounding area.

[b] Guideline value for arsenic (III).

[c] Guideline value for chromium (VI).

[d] Guideline value for inorganic mercury.

[e] 99% species protection level DGV has been adopted to account for the bioaccumulating nature of this contaminant.

[f] Guideline value for m-xylene. Guideline values also exist for both o-xylene and p-xylene as per ANZG (2018). The default guideline value for m-xylene guideline has been adopted as it is the most conservative.

[g] Recreational investigation values calculated by multiplying drinking water guidelines (ADWG 2018) by 10 as recommended in NHMRC (2008) Guidelines for Managing Risks in Recreational Water

The criteria proposed for the assessment of sediment contamination are sourced from the default guideline values in ANZG (2018). The adopted assessment criteria for sediment are summarised in **Table 5-2**.

Table 5-2: Sediment Assessment Criteria – Ecological Investigation Criteria (mg/kg)

Contaminant	Sediment DGV	GV-High
Aluminium	-	-
Arsenic	20	70
Barium	-	-
Beryllium	-	-
Cadmium	1.5	10
Chromium	80	370
Cobalt	-	-
Copper	65	270
Iron	-	-
Lead	50	220
Manganese	-	-
Mercury	0.15	1.0
Nickel	21	52
Zinc	200	410

The DGV was derived using a ranking of both observed field and laboratory ecotoxicity-effects and represents the 10th percentiles of that data distribution.

GV-high represents the median of that data distribution to provide an upper guideline value. Effects on sediment biota are rarely seen for concentrations below the DGV, while effects are more frequently evident above the GV-high value.

6. DATA QUALITY OBJECTIVES

To achieve the objectives and purpose of the surface water monitoring program, both the field and laboratory programs must result in data that is representative of the conditions at the site. As such, specific Data Quality Objectives (DQOs) have been developed for the tasks to be completed to validate the remediation of the site. The DQO process is a systematic, seven step process that defines the criteria that the validation sampling should satisfy in accordance with the *Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (NSW EPA 2017).

The seven step DQOs process comprises:

1. Step 1: State the problem;
2. Step 2: Identify the decisions/ goal of the study;
3. Step 3: Identify the information inputs;
4. Step 4: Define the boundaries of the study;
5. Step 5: Develop the decision rules or analytical approach;
6. Step 6: Specify the performance or acceptance criteria;
7. Step 7: Develop the plan for obtaining data.

The seven step DQO process has been completed for surface water monitoring to be completed before, during and after site remediation.

6.1 Step 1: State the problem

Due to historic loadout of ore concentrate surface water flow over ore impacted soils has been identified to result in migration of total and dissolved metal concentrations from the site. Elevated concentrations can impact on surface water and sediments off site. Remediation of the site is proposed however the extent of remediation required for impacted sediments is not known. The site has been declared significantly contaminated land by the NSW EPA and a VMP has been prepared to describe how associated risks to human health and the environment will be managed.

Concurrently, Ramboll has worked under engagement to JHR to assess risks associated with site contamination and provide management advice to mitigate associated risks.

6.1.1 Contaminants of Concern

Contaminant of Concern relevant to receiving surface waters appear limited to metals (aluminium, cadmium, copper, lead, nickel, zinc) which exceed the adopted relevant health and/or ecological assessment criteria.

Historical observations are summarised on **Figure 1**, **Appendix 1** and show lead concentrations in surface water above the freshwater ecosystems criteria and above the stock watering criteria, with the higher lead concentrations reported in SW3, SW4 and SW1 located within the area of known lead impact in the rail corridor. Upstream samples, SW1_UP and SW9, and SW8 located downstream of the Mulwaree River tributary did not report lead concentrations above the laboratory limit of reporting. Lead concentrations in sediment followed a similar distribution to the surface water samples, with the highest lead concentrations reported in SED1, SED2 and SED4 above the GV-high criterion. Other heavy metals were variably reported above the adopted criteria for surface waters and sediments, with the highest concentrations generally reported in sample locations within the area of known lead impact (SW1, SW3 and SW4).

6.2 Step 2: Identify the decisions / goal of the study

The goal of the study is to assess the migration of metal(loid) contamination from the site in surface waters and the impact of migration to surface waters and sediments off site.

Based on the decision-making process for assessing urban redevelopment sites, detailed in the *NSW Site Auditor Guidelines, 3rd Edition 2017*, the following decisions must be made with respect to the targeted validation goals:

1. Is the data collected of sufficient quality to meet the project objectives?
2. Is the data reliable?
3. What is the fate and transport of contaminant offsite?
4. What are the potential risks to human health and the environment?

6.3 Step 3: Identify the information inputs

Inputs to the decisions will be sourced from:

1. Review of historical surface water monitoring and sediment results
2. Physico-chemical properties collected for each of the 10 surface water sampling locations
3. Sampling of surface water and analysis for contaminants of concern
4. Analytical results for metal(loid)s for each of the 10 sampling locations (surface water and co-located sediment)
5. Quality Assurance / Quality Control data review
6. Comparison of the above samples to the site acceptance criteria outlined in **Section 5**.
7. All sample analyses conducted using National Association of Testing Authorities (NATA) registered methods in accordance with ANZECC (1996) and NEPC (1999) guidelines
8. All samples appropriately preserved and handled in accordance with the sampling methodology
9. PQLs less that the adopted assessment criteria

6.4 Step 4: Definition of the Study Boundary

The spatial boundaries are shown on **Figure 1** and include:

1. Three tributaries of the Mulwaree River, one located approximately 100 m west of the rail corridor at CH. 262.600, one adjacent to a culvert on the western side of the rail line at CH 262.600 and one adjacent a culvert on the eastern side of the rail line at CH 262.600.
2. Four locations adjacent to culverts, one western side of the rail line at CH 262.300, one on the eastern side of the rail line at CH 262.300, one on the western side of the rail line at CH 262.000 and one on the eastern side of the rail line at CH 262.000.
3. The dam located downgradient from the site northern rail culvert forming part Lot A DP 440822, and two locations along the Mulwaree River

The vertical boundaries are limited to surface waters and co-located sediment.

The temporal boundary includes historical surface water and sediment results as well as data collected under this SAQP comprising quarterly monitoring events over pre-remediation, remediation and post-remediation periods. Two post remediation surface water monitoring events will be included in the validation report.

Sediment sampling will be completed on one occasion.

6.5 Step 5: Develop the decision rules or analytical approach

The decisions rules for this investigation are as follows:

1. Has contaminant migration via surface water been adequately assessed?

2. Have contaminant impacts to surface water and sediment off site been adequately assessed?
3. Is the data reliable?
4. Does the data define clear presence / absence of unacceptable risk when assessed against Tier 1 criteria?
5. If Tier 1 assessment of risk is not clear, then does Tier 2 / Tier 3 risk assessment define absence of unacceptable risk?
6. Are there any remaining data gaps?

6.6 Step 6: Specify the performance or acceptance criteria

6.6.1 The tolerable limits on decision errors are as follows:

1. Probability that 95% of data will satisfy the DQIs, therefore a limit on decision error will be 5% that a conclusive statement may be incorrect:

1.1. A 5% probability of a false negative (i.e. assessing that the average concentration of contaminants of concern are less than the assessment criteria when they are not); and
1.2. A 5% probability of a false positive (i.e. assessing that the average concentration of contaminants of concern are more than the assessment criteria when they are not).

The potential for significant errors will be minimised by:

1. Completion of QA/QC measures of the investigation data to assess if the data satisfies the DQIs.
2. Assessment of whether appropriate sampling and analytical densities were completed for the purposes of the investigation.
3. Ensuring that the criteria set for the investigation were appropriate for the land use.

DQIs have been established to set acceptance limits on field and laboratory data collected as part of the investigation and are discussed further below.

6.6.2 Evaluation of Analytical Data

Acceptable limits and the manner of addressing possible decision errors for laboratory analysis associated with water quality monitoring and verification of imported materials are outlined below.

Accuracy: Accuracy is defined as the nearness of a result to the true value, where all random errors have been statistically removed. Internal accuracy is measured using percent recovery '%R' and external accuracy is measured using the Relative Percent Difference '%RPD'.

Internal accuracy will be tested utilising:

Surrogates	Surrogates are QC monitoring spikes, which are added to all field and QA/QC samples at the beginning of the sample extraction process in the laboratory, where applicable. Surrogates are closely related to the organic target analytes being measured, are to be spiked at similar concentrations, and are not normally found in the natural environment;
Laboratory control samples	An externally prepared and supplied reference material containing representative analytes under investigation. These will be undertaken at a frequency of one per analytical batch.
Matrix spikes	Field samples which are injected with a known concentration of contaminant and then tested to determine the potential for adsorption onto the matrix. These will be undertaken at a frequency of 5%.

Recovery data shall be categorised into one of the following control limits:

- 70%-130%R confirming acceptable data, note that there are some larger %R for intractable substances.

External accuracy will be determined by the submission of inter-laboratory duplicates at a frequency of 5%. Data will be analysed in accordance with the following control limits:

- 70%-130%R confirming acceptable data, note that there are some larger %R for intractable substances.

Any data which does not conform to these acceptance criteria will be examined for determination of suitability for the purpose of site characterisation.

Precision: The degree to which data generated from replicate or repetitive measurements differ from one another due to random errors. Precision is measured using the standard deviation 'SD' or Relative Percent Difference '%RPD'.

Internal precision will be determined by the undertaking of laboratory duplicates, where two sub samples from a submitted sample are analysed. These will be undertaken at a frequency of 10%. A RPD analysis is calculated and results compared to:

- 70%-130%R confirming acceptable data, note that there are some larger %R for intractable substances.

Any data which does not conform to these acceptance criteria will be examined for determination of suitability for the purpose of site characterisation.

External precision will be determined by the submission of intra-laboratory duplicates at a frequency of 5%. The external duplicate samples are to be obtained by mixing and then splitting the primary sample to create two identical sub samples. Field duplicate samples are to be labelled with a unique identification that does not reveal the association between the primary and duplicate samples e.g., QA1.

It must be noted that significant variation in duplicate results is often observed (particularly for solid matrix samples) due to sample heterogeneity or concentrations reported near the Practical Quantification Limit (PQL).

A RPD analysis is calculated and results compared to:

- 70%-130%R confirming acceptable data, note that there are some larger %R for intractable substances.

Any data which does not conform to these acceptance criteria will be examined for determination of suitability for the purpose of site characterisation.

Blank samples will be submitted with the analytical samples and analysed for the contaminants of concern One field blank will be collected and analysed per matrix type for each batch samples/each day.

The laboratory will additionally undertake a method blank with each analytical batch of samples. Laboratory method blank analyses are to be below the PQLs. Results shall be examined, and any positive results shall be examined. Positive blank results may not be subtracted from sample results.

Positive results may be acceptable if sample analyte concentrations are significantly greater than the amount reported in the blank (ten times for laboratory reagents such as methylene chloride, chloroform, and acetone etc., and five times for all other analytes). Alternatively, the laboratory PQL may be raised to accommodate blank anomalies provided that regulatory guidelines are not compromised by any adjustment made to the PQL.

Completeness: The completeness of the data set shall be judged as:

1. The percentage of data retrieved from the field compared to the proposed scope of works. The acceptance criterion is 95%.
2. The percentage of data regarded as acceptable based on the above data quality objectives. 95% of the retrieved data must be reliable.
3. The reliability of data based on cumulative sub-standard performance of data quality objectives.
4. All PQLs are below adopted assessment criteria.

Where two or more data quality objectives indicate less reliability than what the acceptance criteria dictates, the data will be considered with uncertainty.

Representativeness: Sufficient samples must have been collected.

Samples must be collected and preserved in accordance with the sampling methodology proposed in Step 7 to ensure that the sample is representative of the assessed stratum.

Comparability: The data must show little to no inconsistencies with results and field observations and include likely associates e.g. TPH C6-C9 and BTEX.

Decision Error Protocol

If the data received is not in accordance with the defined acceptable limits outlined in Step 6, it may be considered to be an estimate or be rejected. Determination of whether this data may be used or if re-sampling is required will be based on the following considerations:

1. Closeness of the result to the guideline concentrations.
2. Specific contaminant of concern (e.g. response to carcinogens may be more conservative).
3. The area of site and the potential lateral and vertical extent of questionable information.
5. Whether the uncertainty can be effectively incorporated into site management controls.

6.7 Step 7: Develop a plan for obtaining data

The overall design of the sampling plan considers migration of surface water and sediment from the site. Further detail is provided in **Section 7**.

7. SAMPLING PLAN

The sampling plan for surface water quality will be based on quarterly monitoring events over pre-remediation, remediation and post-remediation periods. Two post remediation surface water monitoring events will be included in the validation report.

Sediment sampling at co-located surface water locations will be completed on one occasion.

Surface water sampling will target conditions upstream and downstream of three culverts which direct surface water beneath the rail formation onsite. Surface water at the site only occurs after rainfall and is received to the surrounding environment as follows:

1. Water passing through the northern culvert discharges to an adjacent agricultural property and during high rainfall events to a dam on the agricultural property.
2. Water passing through the middle culvert discharges across a causeway on Boyd Street to an adjacent vacant block.
3. Water passing through the southern culvert discharges beneath Goulburn Street to agricultural land in a tributary to the Mulwaree River (approximately 550m east of site)

Co-located surface water and sediment samples will be collected upstream and downstream of each culvert and in receiving water bodies as shown on **Figure 1**.

Surface water samples will be analysed for total and dissolved metals (Al, As, Ba, Be, Cd, Cr 3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn). Sediment samples will be co-located with surface water monitoring locations and be analysed for total metals only (Al, As, Ba, Be, Cd, Cr 3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn).

7.1.1 Surface Water Sampling Locations

The co-located surface water and sediment sampling locations are shown on **Figure 1**, **Appendix 1** and are summarised in **Table 7-1.**

Table 7-1 Surface Water Sampling Locations

Sample Designation Surface Water / Sediment	Location
SW1 – UP / SED1	Intended as an up-gradient sample, located on a western tributary of the Mulwaree River, approximately 100 m west of the rail corridor at CH. 262.600.
SW1 / SED1	Adjacent to a culvert on the western side of the rail line at CH 262.600 on tributary of Mulwaree River.
SW2 / SED2	Adjacent to a culvert on the eastern side of the rail line at CH 262.600 on tributary of Mulwaree River.
SW3 / SED3	Adjacent to a culvert on the western side of the rail line at CH 262.300.
SW4 / SED4	Adjacent to a culvert on the eastern side of the rail line at CH 262.300.
SW5 / SED5	Adjacent to a culvert on the western side of the rail line at CH 262.000.
SW6 / SED6	Adjacent to a culvert on the eastern side of the rail line at CH 262.000.
SW7 / SED7	A dam located downgradient from the site northern rail culvert forming part Lot A DP 440822
SW8 / SED8	Mulwaree River adjacent Lumley Road
SW9 / SED9	Mulwaree River off Braidwood Road

7.1.2 Water Quality Monitoring Performance Criteria

Surface water sampling will be completed in accordance with performance criteria defined in **Table 7-2**.

Table 7-2 Performance Criteria

Category	Validation Criteria
Accuracy: Accuracy in the collection of field data will be controlled by:	1. Calibrated measurement equipment used. The water quality meter will be calibrated by the technical rental company prior to use. 2. Appropriate sampling methodologies utilised and complied with. Works to be completed with regard for AS NZS 5667.6-1998 Water quality - Sampling - Guidance on sampling of rivers and streams. 3. Collection of one intra-laboratory duplicate for surface water and one intra-laboratory duplicate for sediment. 4. Rinsate samples are not proposed to be collected due to surface water samples being collected directly into dedicated sampling containers (or field filtered using single use syringes and filters) using disposable nitrile gloves. Sediment samples will be collected using plastic tubing (bailers) cut down to act as disposable sediment core samplers.
Precision: The degree to which data generated from replicate or repetitive measurements differ from one another due to random errors. Precision of field data will be maintained by:	1. A new pair of disposable nitrile gloves to handle each sample. 2. Samples will be placed immediately into laboratory supplied and appropriately preserved sampling vessels. 3. Samples will be stored in chilled, insulated containers with ice for transportation to the laboratory. 4. Sample numbers, preservation and analytical requirements will be recorded on chain of custody documents. 5. Samples will be transported to the laboratory under chain of custody conditions.
Completeness: The completeness of the data set shall be judged by:	1. All locations sampled as outlined in **Sections 7.1.1** and **Figure 1, Appendix 1.** 2. Sampling completed by experienced personnel. 3. Field documentation completed correctly.
Representativeness: The representativeness of the field data will be judged by:	1. Non-disposable sampling equipment, such as the grab sampler and water quality meter, will be thoroughly decontaminated between locations using Decon 90 solution and deionised rinsate water. 2. At each location, a pair of disposable nitrile gloves will be worn while sampling and handling the sample; gloves will be replaced between each successive sample. 3. Surface water analytical samples will be collected directly into the sampling vessels using an extendable pole sampler where appropriate.
Comparability: Comparability to existing field data will be maintained by:	1. Use of the same appropriate sampling methodologies. 2. Same sampling depths for surface water (where practical). 3. Field water quality parameters will be obtained using a calibrated water quality meter and recorded on a field sheet, comprising pH, temperature, total dissolved solids (TDS), dissolved oxygen (DO), redox potential and electrical conductivity (EC). 4. Samples for dissolved metal analysis will collected in dedicated disposable 50 mL plastic syringes and field filtered through 0.45 µm filters directly into a sample bottle containing acid preservative. 5. Visual and olfactory observations will also be recorded on the field sheet. 6. Photographs will be taken of sampling location conditions at the time of sampling.

8. REPORTING

8.1 Surface Water Monitoring Report

Following the cessation of surface water sampling, a report will be prepared documenting the completed sampling, trend analysis, quality assurance / quality control and laboratory reports.

The report shall include the following:

1. Executive summary
2. Introduction
3. Objectives and scope of work
4. Summary of completed field sampling and laboratory analysis
5. QA/QC review
6. Mann-Kendall trend analysis
7. Conclusions

8.2 Sediment Reporting

Following sediment sampling a detailed site investigation report will be prepared in general accordance with the National Environment Protection (Assessment of Site Contamination) Amendment Measure (NEPC 2013) and Consultants reporting on contaminated sites - Contaminated Land Guidelines (NSW EPA 2020). The report will include:

1. Summary review of previous investigations, preliminary CSM and SAQP as presented here-in
2. Assessment of data against site specific human health and Tier 1 ecological criteria
3. Development of a revised CSM
4. Summary assessment of the degree and extent of remediation (if required)
5. Conclusions.

9. REFERENCES

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

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) (available at www.waterquality.gov.au/anz-guidelines)

Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000 Australian New Zealand Guidelines for Fresh and Marine Water Quality

Department of Environment and Conservation (DEC) Guidelines for the Assessment and Management of Groundwater Contamination (DEC, 2007).

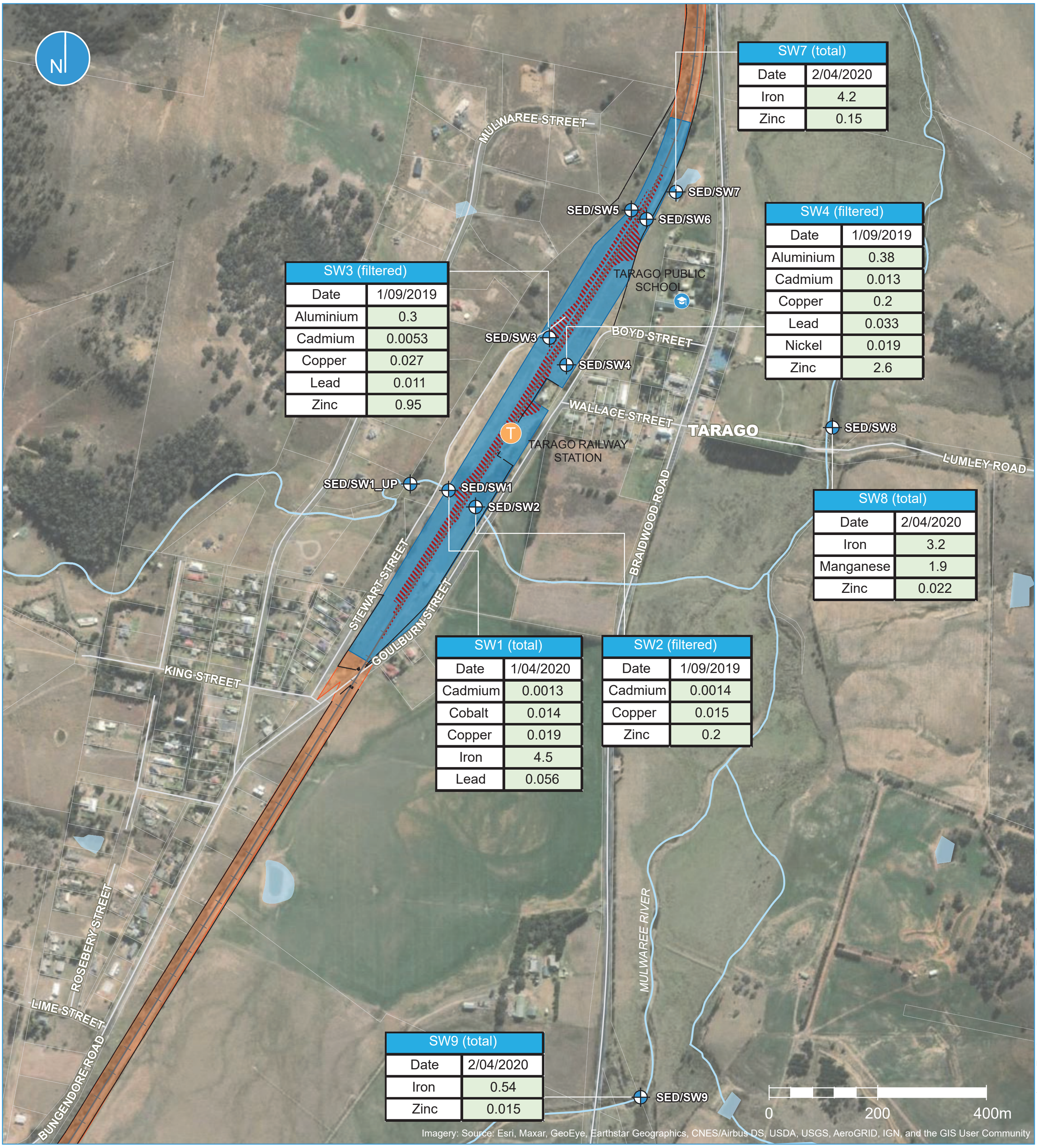
NEPM 2013. *National Environment Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure 1999,* as amended 2013.

NSW EPA 1995. *Sampling Design Guidelines.*

NSW EPA 2017. *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*.

NSW OEH 2011. *Guidelines for Consultants Reporting on Contaminated Sites.*

APPENDIX 1
FIGURES



SW7 (total)	
Date	2/04/2020
Iron	4.2
Zinc	0.15

SW4 (filtered)	
Date	1/09/2019
Aluminium	0.38
Cadmium	0.013
Copper	0.2
Lead	0.033
Nickel	0.019
Zinc	2.6

SW3 (filtered)	
Date	1/09/2019
Aluminium	0.3
Cadmium	0.0053
Copper	0.027
Lead	0.011
Zinc	0.95

SW8 (total)	
Date	2/04/2020
Iron	3.2
Manganese	1.9
Zinc	0.022

SW1 (total)	
Date	1/04/2020
Cadmium	0.0013
Cobalt	0.014
Copper	0.019
Iron	4.5
Lead	0.056

SW2 (filtered)	
Date	1/09/2019
Cadmium	0.0014
Copper	0.015
Zinc	0.2

SW9 (total)	
Date	2/04/2020
Iron	0.54
Zinc	0.015

A4
1:10,000

Legend

- Surface water and sediment sampling locations (co-located)
- Rail corridor
- Rail corridor fence
- Area of lead exceedance (within rail corridor)

Exceedances (surface water)

Contaminant (mg/L)	> ANZG 2018 Freshwater Ecosystems
Aluminium	0.055
Cadmium	0.0002
Cobalt	0.09
Copper	0.0014
Iron	0.3
Lead	0.0034
Manganese	1.9
Nickel	0.011
Zinc	0.008

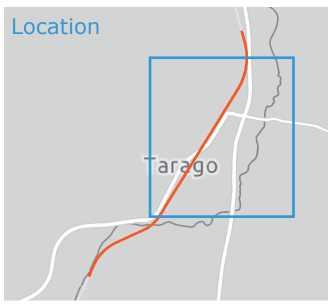


Figure 1 | Surface water and sediment sampling locations

Intended for
John Holland Rail Pty Ltd

Document type
Plan

Date
August 2020

Project Number
Sampling Analysis and Quality Plan (SAQP) - Resource Recovery

SAMPLING ANALYSIS AND QUALITY PLAN (SAQP) – RESOURCE RECOVERY

TARAGO LEAD MANAGEMENT

Bright ideas. Sustainable change.

TARAGO LEAD MANAGEMENT
SAMPLING ANALYSIS AND QUALITY PLAN (SAQP) – RESOURCE RECOVERY

Project name	**Tarago Lead Management**
Project no.	**318000780-T24-06**
Recipient	**John Holland Rail Pty Ltd**
Document type	**Plan**
Version	**0**
Date	**06/08/2020**
Prepared by	**Jordyn Kirsch**
Checked by	**Annette Nolan/Stephen Maxwell**
Approved by	**Fiona Robinson**
Description	**This document presents a Sampling Analysis and Quality Plan for waste characterisation of ore impacted material located within, and stockpiled adjacent to, the Goulburn – Bombala rail corridor at Tarago for the purpose of applying for a resource recovery exemption.**

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APPENDICES

1. INTRODUCTION

1.1 Preamble

Ramboll Australia Pty Ltd (Ramboll) was engaged by John Holland Rail Pty Limited (JHR) on behalf of Transport for NSW (TfN) to complete additional sampling of ore contaminated material located within, and stockpiled adjacent to, the Goulburn – Bombala rail corridor at Tarago, approximately 32 km south of Goulburn, New South Wales (NSW).

1.2 Background

The Woodlawn Mines Ore Concentrate Load-Out Complex (the Loadout Complex) operated within the Goulburn – Bombala rail corridor at Tarago from the 1970s – 1990s. Concentrates were produced at the Woodlawn Mine approximately 8 km west of site and included a zinc concentrate consisting mainly of sphalerite (zinc sulfide), a lead concentrate of galena (lead sulfide) and copper concentrates of chalcopyrite (copper iron sulfide).

The area of investigation comprises a 750 m^3 contaminated stockpile located north east of the Tarago Railway Station as shown on **Figure 1**, **Appendix 1**, as well as approximately 1000 lineal metres of ore impacted material located within the rail corridor, illustrated with red shading in **Figures 2a – 2e**, **Appendix 1**.

An extensive body of work has been completed to characterise contaminant impacts associated with historic operation of the Loadout Complex. Contaminants (mainly lead) have been identified within the rail formation at Tarago. Recent assessment has included soil, groundwater and surface water across the site and assessment of soil, groundwater, surface water and airborne dust within the surrounding area.

1.3 Regulation

On 25 March 2020, the NSW Environment Protection Authority (NSW EPA) declared the site as significantly contaminated under Section 11 of the Contaminated Land Management Act 1997 (Declaration Number 20201103). The declaration defines the substance of concern ("the Contaminant") in soil as lead described as follows:

1. lead concentrations in soil within the rail corridor (Lot 22 DP1202608) exceed national guideline values for the protection of human health and the environment
2. lead contamination has impacted adjacent land at 106 Goulburn Street, Tarago (Lot 1 DP816626), with soil found to contain lead at concentrations exceeding national guideline values for the protection of human health and the environment
3. there are complete exposure pathways to lead for occupants of 106 Goulburn Street, as well as potentially complete exposure pathways for persons working within the rail corridor and
4. there are potentially complete exposure pathways for onsite and offsite ecological receptors.

A voluntary management proposal (VMP) was prepared to define how the Contaminant and associated risks would be managed and this was approved by the NSW EPA on 28 May 2020.

1.4 Objective

The objective of this SAQP is to detail sampling proposed for characterisation of ore impacted materials within the rail corridor. Beneficial re-use of the ore impacted soils within the former Woodlawn Mine is being considered and detailed characterisation is required to support an application for resource recovery exemption to facilitate the re-use.

2. SITE DECRIPTION

The area of investigation comprises a 750 m^3 contaminated stockpile located northeast of the Tarago Railway Station as shown on **Figure 1**, **Appendix 1**, as well as approximately 1000 lineal metres of ore impacted material located within the rail corridor, illustrated with red shading in **Figures 2a – 2e**, **Appendix 1**. Details are presented in **Table 2-1.**

Table 2-1: Site Identification

Information	Description
Street Address:	Accessed from Stewart Street and Goulburn Street Tarago NSW
Identifier:	Part Lot 22 DP 1202608 and Part Lot 1 DP 595856
Site Area:	Approximately 7.5 ha
Local Government:	Goulburn Mulwaree Shire
Owner:	Transport for NSW
Current Site Use:	Forms part of the Goulburn to Bombala rail line and the Country Regional Rail Network (CRN)

3. REGULATORY REQUIREMENTS

This SAQP has been prepared in general accordance with the following guidance documents:

1. National Environment Protection Council (NEPC), *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013* (NEPM, 2013).
2. NSW Office of Environment and Heritage, Contaminated Sites: *Guidelines for Consultants Reporting on Contaminated Lands* (NSW EPA 2020).
3. NSW EPA, *Guidelines for the Site Auditor Scheme (3rd Edition)* (NSW EPA, 2017).
4. NSW EPA, *Guidelines on Resource Recovery Orders and Exemptions for the land application of waste materials as fill* (NSW EPA, 2017).
5. US EPA 2007, Method 6200, *Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment.*
6. Standards Australia AS4482.1 - 2005, *Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds.*
7. Standards Australia AS 1141.3.1 – 2012, *Methods for Sampling and Testing Aggregates.*

4. PREVIOUS INVESTIGATIONS

Previous investigations of contaminant impacts within and originating from the rail corridor at Tarago are consolidated in the Tarago Rail Corridor and Tarago Area, Detailed Site Investigation Ramboll (2020). Key findings of this investigation included:

1. The Contaminant has been delineated onsite within the rail formation, adjacent shallow soils and drainage lines. Investigation within the footprint of the former Loadout Complex buildings identified localised Contaminant at depth though this is considered unlikely to present a risk to human health or the environment.
2. The Contaminant has not impacted groundwater. All contaminant concentrations measured in groundwater at all locations tested were reported below the Australian Drinking Water Guidelines and guidelines relevant for potable use. Some metals in groundwater exceed criteria relevant to protection of ecology. Impacts to groundwater from site contamination are considered to be low and acceptable and no further investigation is warranted.
3. Offsite migration of the Contaminant and other metals has occurred via surface water. Deposition of elevated metal concentrations in surficial soils appears to have occurred in land immediately east of the site and across Boyd Street onto other nearby properties.

A focus on lead as the Contaminant is supported by assessment of a broad range of other potential contaminants of concern commonly associated with rail corridor land use.

A summary of the assessment of PCOPCs identified for the rail corridor at Tarago is presented as **Table 4-1** below.

Table 4-1: Previous investigation results summary from site soils - TRH, BTEXN PAH, metals, OCP, OPP, PCB, asbestos

Analyte	Asbestos	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1.2.3.cd)pyrene	Dibenz(a.h)anthracene	Benzo(g.h.i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (half LOR)	Benzo(a)pyrene TEQ (LOR)	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX (F1)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene (F2)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	OCP	OPP	PCB
Number of Samples (n)	30	35	35	35	35	197	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	30	30	35	35	35	30	30	30	30	30	30	30	30	10	14	10
Detections	0	31	33	26	31	196	16	35	8	3	0	0	0	1	0	2	4	4	0	0	0	4	3	0	3	7	4	4	4	0	0	7	18	9	13	2	0	0	0	0	0	0	0	0	0
Minimum (mg/kg)	n/a	2	0.4	5	5	5	5	5	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	20	20	50	100	100	100	50	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.2	0.5
Maximum (mg/kg)	n/a	150	15	57	1700	184000	17	2800	0.6	1.7	0.3	0.3	0.3	1.3	0.3	1.2	1	0.7	0.3	0.25	0.25	0.7	0.6	0.25	0.6	6	0.8	1.1	1.4	10	10	125	1700	840	506	92	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.5

n/a – non applicable

5. DATA QUALITY OBJECTIVES

To achieve the objectives of the investigation, both the field and laboratory programs must result in data that is representative of the waste to be removed. As such, specific Data Quality Objectives (DQOs) have been developed for the tasks to be completed under the waste characterisation. The DQO process is a systematic, seven step process that defines the criteria the investigation should satisfy in accordance with the *Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (NSW EPA 2017).

The seven step DQOs process comprises:

Step 1: State the problem;

Step 2: Identify the decisions/ goal of the study;

Step 3: Identify the information inputs;

Step 4: Define the boundaries of the study;

Step 5: Develop the decision rules or analytical approach;

Step 6: Specify the performance or acceptance criteria;

Step 7: Develop the plan for obtaining data.

5.1 Step 1: State the problem

In-situ waste characterisation has been completed on ore impacted material at the area of assessment. The waste classification indicated that metals associated with ore concentrate are the primary contaminates of concern. Further investigation is required to characterise waste in accordance with Guidelines on Resource Recovery Order and Exemptions (NSW EPA 2017) in order to prepare a Remedial Options Assessment, which will consider the return of impacted materials to the site of origin - Woodlawn Mine[1].

5.2 Step 2: Identify the decisions/ goal of the study

Goals of the study are:

1. To determine characterisation based on contaminant concentrations present in material once excavated.
2. To determine material suitability for return to Woodlawn Mine.

Decisions to be made in relation to data quality include:

1. Does the data meet the Data Quality Indicators of completeness comparability, precision, accuracy, representativeness and sensitivity?
2. Is the data collected of sufficient quality to meet the project objectives?

5.3 Step 3: Identify the information inputs

Inputs to the decisions include:

1. Historical data from previous investigations completed by Ramboll on the area of assessment and surrounding land.

[1] Geotechnical parameters may also need to be assessed to inform consideration of the suitability of waste materials for the proposed use. These parameters are not yet known and so have been excluded from this SAQP.

2. Laboratory analysis of composite soil samples as per Table 1 of the Guidelines on Resource Recovery Order and Exceptions (NSW EPA 2017).
3. Additional analyses of soils by field portable XRF to offset uncertainty associated with laboratory test method previously identified in samples with lead > 6,000 mg/kg.

5.4 Step 4: Definition of the Study Boundary

The study boundaries have been identified as follows:

The spatial boundaries comprise the extent of the Residual Material from Woodlawn Ore Transport, including the contaminated stockpile and lead impacted material within the rail corridor, as illustrated in red in **Figure 2a-2e**, **Appendix 1**.

The vertical boundary extends from ground surface to the depth of lead impact determined using a field portable XRF. The vertical boundary of the stockpile extends from the surface of the stockpile to the depth of lead impacted material below.

The temporal boundary is limited to the time at which the characterisation was completed.

5.5 Step 5: Develop the decision rules or analytical approach

1. If it is determined that the data generated through the investigation are reliable, complete, comparable, accurate and representative then the information will be used to address the objectives;
2. If it is determined that the data generated through the investigation are not suitable, comprehensive or reliable for use in achieving the goals of the study, then further investigations may be required to reduce uncertainties; and
3. If it is determined that insufficient information is available to make conclusions on the assessment, then further information may be required.

5.6 Step 6: Specify the performance or acceptance criteria

The tolerable limits on decision errors are as follows:

1. A 5% probability of a false negative; and
2. A 5% of a false positive.

The potential for significant decision errors will be minimised by:

1. Completion of QA/QC measures of the investigation data to assess if the data satisfies the DQIs.
2. Assessment of whether appropriate sampling and analytical densities were completed for the purposes of the investigation.
3. Completion of sampling by suitably qualified and experienced environmental professionals in general accordance with NSW EPA 2017 *Guidelines on Resource Recovery Orders and Exemptions for land application of waste as fill* and US EPA 2007, Method 6200, *Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*.
4. Daily system checks and internal calibration as recommended by the field portable XRF manual.
5. Measurement of a blank reference material (silicon dioxide, SiO_2) – this will be done at the start of the day and repeated every 10 samples. This will help mitigate potential inaccuracies associated with cross-contamination of samples. The analyser window will also be cleaned regularly to prevent cross-contamination.
6. Certified reference materials (CRMs) will be measured to check instrument response and calibration. This will be conducted every 20 samples.

7. Precision – the precision of the field portable XRF results can be improved by extending the dwell time of the measurement. A dwell of 60 seconds is considered to provide sufficient precision for the sampling program. The analyser precision will be calculated using data from the CRM samples. The following equation provided by USEPA (2007) will be used:

$$Precision\ RSD = \frac{Standard\ Deviation}{Mean\ concentration} \times 100$$

5.6.1 Evaluation of Analytical Data

Acceptable limits for field portable XRF measurements will be determined through development of correlations for each COPC with laboratory analysis. Section 9.7 of the USEPA XRF test method (USEPA 2007) prescribes that the R^2 value for the results should be 0.7 or greater for the field portable XRF data to be considered for screening level data. If the R^2 is 0.9 or greater and inferential statistics indicate the field portable XRF data and the confirmatory data are statistically equivalent at a 99% confidence level, the data could potentially meet definitive level data criteria.

Acceptable limits and the manner of addressing possible decision errors for laboratory analysis associated are outlined below.

Accuracy: defined as the nearness of a result to the true value, where all random errors have been statistically removed. Internal accuracy is measured using percent recovery '%R' and external accuracy is measured using the Relative Percent Difference 'RPD'.

Internal accuracy: will be tested utilising laboratory control samples (LCS). LCS involves analysis of externally prepared and supplied reference materials containing the analytes under investigation. These will be analysed by the laboratory at a frequency of one sample per batch.

External accuracy: will be determined by the submission of inter-laboratory duplicates at a frequency of 5%. Data will be analysed in accordance with the following control limits:

- 70%-130%R confirming acceptable data, noting there are some larger %R for intractable substances.

Any data that does not conform to these acceptance criteria will be examined for determination of suitability for the purpose of site characterisation.

Precision: The degree to which data generated from replicate or repetitive measurements differ from one another due to random errors. Precision is measured using the standard deviation 'SD' or Relative Percent Difference 'RPD'.

Internal laboratory analytical precision will be assessed by sub-sampling primary samples to create laboratory duplicates. Internal precision will be assessed through relative percentage difference (RPD) between laboratory duplicates and primary samples. Recovery limits will be defined in accordance with the laboratory's NATA certified methods, though will be based on 70%-130% RPD. These will be undertaken at a frequency of 10%.

External precision: will be determined by the submission of intra-laboratory duplicates at a frequency of 5%. The external duplicate samples are to be obtained by mixing and then splitting the primary sample to create two identical sub samples. Field duplicate samples are to be labelled with a unique identification that does not reveal the association between the primary and duplicate samples e.g., QA1.

It must be noted that significant variation in duplicate results is often observed (particularly for solid matrix samples) due to sample heterogeneity or concentrations reported near the Practical Quantification Limit (PQL).

RPD analysis is calculated and results are compared to:

- 70%-130%R confirming acceptable data, note that there are some larger %R for intractable substances.

Any data that does not conform to these acceptance criteria will be examined for determination of suitability for the purpose of waste characterisation.

Completeness: The completeness of the data set shall be judged as:

1. The percentage of data retrieved from the field compared to the proposed scope of works. The acceptance criterion is 95%.
2. The percentage of data regarded as acceptable based on the above data quality objectives. 95% of the retrieved data must be reliable.
3. The reliability of data based on cumulative sub-standard performance of data quality objectives.
4. All PQLs are below adopted assessment criteria.

Where two or more data quality objectives indicate less reliability than what the acceptance criteria dictates, the data will be considered with uncertainty.

Representativeness: Sufficient samples must have been collected.

Samples must be collected and preserved in accordance with the sampling methodology proposed in Step 7 to ensure that the sample is representative of the assessed stratum.

Comparability: The data must show little to no inconsistencies with results and field observations and include likely associates e.g. TPH C6-C9 and BTEX.

Decision Error Protocol

If the data received are not in accordance with the defined acceptable limits outlined in Step 6, it may be considered an estimate or may be rejected. Determination of whether this data may be used or if re-sampling is required will be based on the following considerations:

1. Closeness of the result to the guideline concentrations.
2. Specific contaminant of concern (e.g. response to carcinogens may be more conservative).
3. The area of the site and the potential lateral and vertical extent of questionable information.
4. Whether the uncertainty can be effectively incorporated into site management controls.

5.7 Step 7: Develop a plan for obtaining data

Data collection relating to the investigation are presented by task in **Section 6**.

6. SAMPLING PLAN

The sampling plan for the waste characterisation will comprise:

1. Collection of up to 10 composite samples from a 750 m^3 stockpile comprising fouled ballast impacted by ore concentrate. An excavator will be used to pull down 10 sample pads in equal increments around the walls of the stockpile so that composite sampling may be completed on the fresh face.
2. Collection of 10 composite samples from test pits located within impacted soils adjacent the rail formation (locations selected based on elevated metals concentrations reported during initial investigations, see **Figures 2a – 2e**). Composite samples will be collected from spoil generated from the test pit and field portable XRF measurements will be collected at the base of the test pit to confirm a sufficient depth has been achieved (depth of lead impact).
3. Field portable XRF measurement of all composite samples collected to confirm laboratory analysis.
4. Laboratory analysis of 20 composite samples (plus QA) for pH, electrical conductivity, moisture content, total organic carbon, total sulfur and metal(loid)s; Sb, As, Be, B, Cd, Co, Cu, Cr, Pb, Mn, Hg, Mo, Ni, Se, Sn, V, Zn, as outlined in Table 1 of the NSW EPA 2017, *Guidelines on Resource Recovery Order and Exemptions.*

6.1.1 Composite Sampling

Composite sampling of the contaminated stockpile and test pit spoil will be completed in general accordance with AS 4482.1 – 1997 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil, Part 1: Non-volatile and semi-volatile compounds* and AS 1141.3.1 – 2012 *Methods for Sampling and Testing Aggregates.*

Sampling of the stockpile will include:

1. Removal of stabilised sand stockpile using a small excavator with a wide mud-bucket
2. Scraping of soil from the stockpile face to a minimum depth of 0.2m
3. Back blading as described in AS1141.3.1 to create a sampling pad
4. Collection of five sub-samples (each approximately 1 kg) from the stockpile face and sampling pad
5. Homogenising and sample reduction through three rounds of coning and quartering as described in AS1141.3.1 to achieve a sample mass of approximately 0.6 kg
6. Sample collection for laboratory analyses

The sampling pad will then be replaced in the exposed stockpile face, lead concentrations will be measured in underlying soils to ensure contaminated material has been appropriately replaced in the stockpile and the open face will be recovered with stabilised sand. This process will be applied at ten locations on approximately even spacing around the perimeter of the stockpile.

Sampling of the test pits will include:

1. Progressive removal of soils on approximate 0.05 m using a small excavator with wide mud-bucket across an area of approximately 2 m2 (nominal 2 m length x 1 m wide)
2. Measurement of lead concentrations in exposed soils by field portable XRF until lead concentrations fall below site acceptance criteria (2200 mg/kg (Ramboll 2020))
3. Collection of five sub-samples (each approximately 1 kg) from the stockpile face and sampling pad
4. Homogenising and sample reduction through three rounds of coning and quartering as described in AS1141.3.1 to achieve a sample mass of approximately 0.6 kg
5. Sample collection for laboratory analyses

Spoil will be replaced in the excavation after sampling.

6.1.2 Soil Sampling Criteria

In field analyses and soil sampling will be completed in accordance with performance criteria defined for all analytical data (**Section 5.6.1**) and those defined in **Table 6-1**.

Table 6-1 Performance Criteria

Category	Validation Criteria
Accuracy: Accuracy in the collection of field data will be controlled by:	Appropriate sampling methodologies utilised and complied with. Works to be completed in accordance with NSW EPA 2017, *Guidelines on Resource Recovery Orders and Exemptions for land application of waste as fill* and US EPA 2007, Method 6200, *Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*.
Precision: The degree to which data generated from replicate or repetitive measurements differ from one another due to random errors.	In the field, precision will be maintained by: 1. Using standard operating procedures for the collection of soil samples. 2. Collection of soil samples by suitably experienced environmental scientists. 3. Use of disposable nitrile rubber gloves between sampling locations. 4. Placement of soil samples directly into laboratory supplied (and appropriately preserved) sampling containers. 5. Collection of intra-laboratory and inter-laboratory duplicate samples at a rate of 1 in 20 primary samples. 6. Collection of one rinsate sample on reusable sampling equipment at the end of each day. 7. Recording of sample identification and analytical requirements on chain of custody documents. 8. Samples transported to the laboratory under chain of custody conditions to a laboratory with NATA accreditation for the analytical methods prescribed. 9. XRF readings collected by an experienced scientist holding a NSW EPA license required for field based XRF testing. In the laboratory, precision will be assessed using blind duplicate samples and split duplicates.
Completeness: The completeness of the data set shall be judged by:	1. All locations sampled as outlined in **Section 6** and on **Figure 2a -2e**, **Appendix 1**. 2. Sampling completed by experienced personnel. 3. Field documentation completed correctly.
Representativeness: The representativeness of the field data will be judged by:	1. Non-disposable sampling equipment, such as the hand auger, will be thoroughly decontaminated between locations using Decon®90 solution and deionised rinsate water. 2. At each location, a pair of disposable nitrile gloves will be worn while sampling and handling the sample; gloves will be replaced between each successive sample. 3. Soil analytical samples will be collected directly into the sampling containers following size reduction and splitting.
Comparability: Comparability to existing field data will be maintained by:	1. Use of the same appropriate sampling methodologies. 2. Same sampling depths will be used (where practical). 3. Analytical samples will be collected for submission to the laboratory. 4. Photographs will be taken of sampling location conditions at the time of sampling.

6.1.3 Soil Sampling Methods

The test methods outlined in **Table 6-2** are prescribed in the NSW EPA 2017, *Guidelines on Resource Recovery Orders and Exemptions for land application of waste as fill* and must be used for waste characterisation.

Table 6-2: Laboratory Analytical Methods

Analyte	Sample Preparation / Digestion	Sample Digestion	Test Method
Metal(loid)s (Sb, As, Be, B, Cd, Co, Cu, Cr, Pb, Mn, Mo, Ni, Se, Sn, V, Zn)	Size reduction and splitting techniques	US EPA 3051A (or equivalent method)	US EPA 6010D (or equivalent method) reported as mg/kg dry weight
Total Organic Carbon	N/A	N/A	Methods 6B2 or 6B3 in Rayment & Lyons (2011) Soil Chemical Methods – Australasia (or equivalent method)
Total Sulfur	N/A	N/A	Method 10A1 in Rayment & Lyons (2011) Soil Chemical Methods – Australasia (or equivalent method)
Moisture Content	N/A	N/A	US EPA 90001 (or equivalent method)
Mercury	Pre-treatment (as required) using a separate moisture test in order to calculate dry weight. Cold vapour atomic absorption spectroscopy using US EPA7471B (or equivalent method) – preparation and analytical method.	N/A	Cold vapour atomic absorption spectroscopy using US EPA7471B (or equivalent method) – preparation and analytical method. Reporting as mg/kg dry weight.
Electrical Conductivity	N/A	N/A	Method 3A1 in Rayment & Lyons (2011) Soil Chemical Methods – Australasia (or equivalent method)
pH	N/A	N/A	Method 4A1 or (where the waste contains high concentrations of soluble salts) method 4B1 in Rayment & Lyons (2011) Soil Chemical Methods – Australasia (or equivalent method)

7. REPORTING

Results from the waste characterisation will be included in a Resource Recovery Exemption (RRE) application that will be prepared in general accordance with the NSW EPA (2017) *Guidelines on Resource Recovery Orders and Exemptions for land application of waste as fill*. The RRE will include:

1. Contact details
2. Background information about the waste
3. Characterisation of the waste
4. Mixing or blending of the waste
5. Proposed use of application
6. Information on the receiving environment
7. Quality assurance and quality controls
8. Specifications and standards

8. REFERENCES

NEPM 2013. *National Environment Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure 1999,* as amended 2013.

NSW EPA 1995. *Sampling Design Guidelines.*

NSW EPA 2017. *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*.

NSW EPA 2017. *Guidelines on Resource Recovery Orders and Exemptions for land application of waste as fill*

NSW EPA 2020. *Consultants reporting on contaminated sites - Contaminated Land Guidelines*

US EPA 2007. *Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*

Ramboll (2019) *Tarago Rail Corridor Environmental Site Assessment*

Ramboll (2020) *Tarago Rail Corridor and Tarago Area, Detailed Site Investigation*

Standards Australia *AS 1141.3.1 – 2012 Methods for Sampling and Testing Aggregates, Method 3.1: Sampling – Aggregates*

Standards Australia *AS 4482.1 – 2005 Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil Part 1: Non-volatile and semi-volatile compounds*

APPENDIX 1
FIGURES

Legend

- Site boundary
- Approximate location of contaminated stockpile
- Rail corridor
- Rail corridor fence

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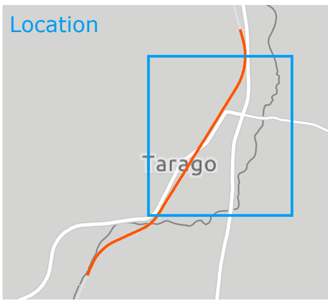
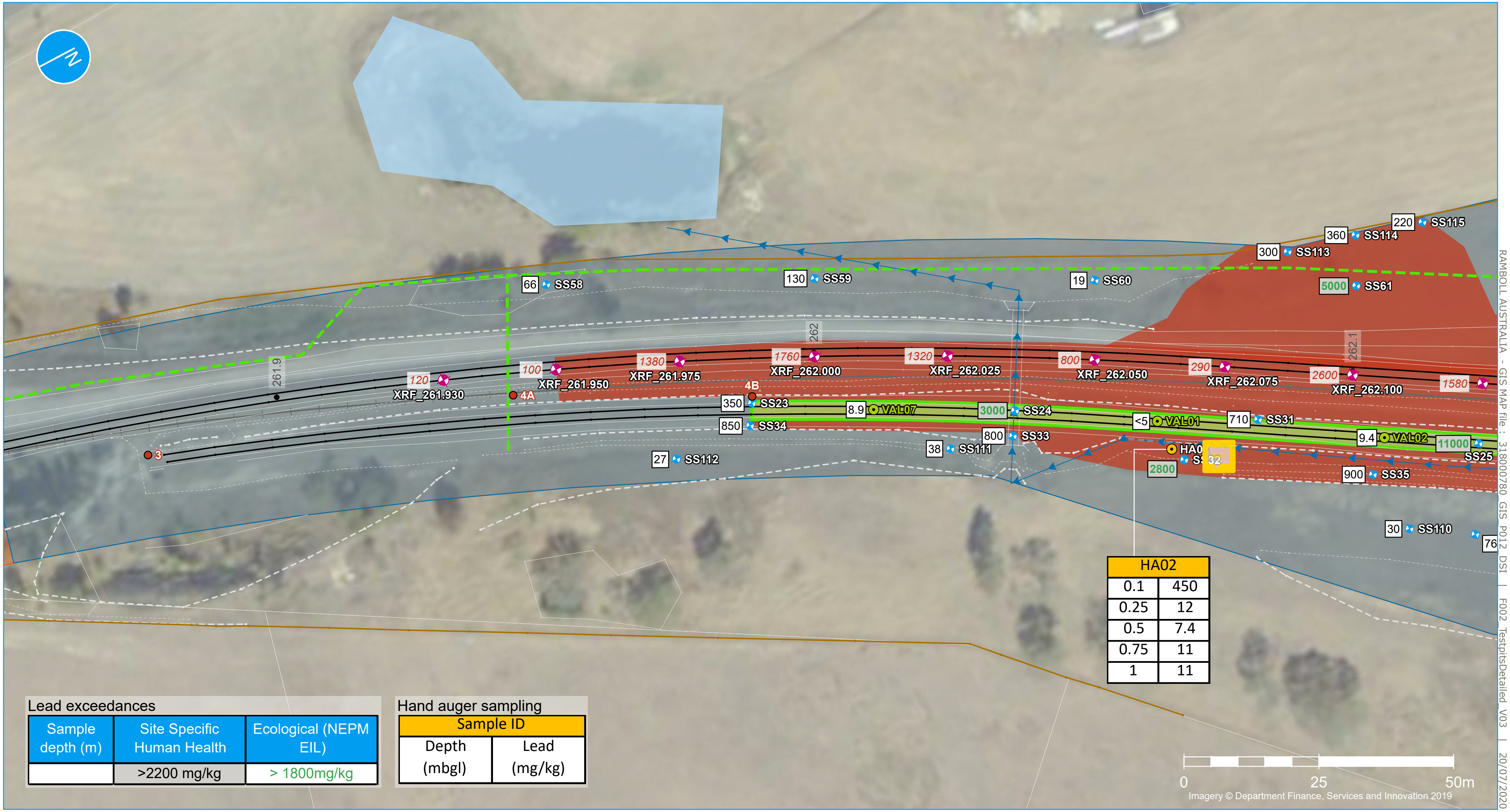


Figure 1 | Locality Plan



HA02	
0.1	450
0.25	12
0.5	7.4
0.75	11
1	11

Lead exceedances

Sample depth (m)	Site Specific Human Health	Ecological (NEPM EIL)
	>2200 mg/kg	> 1800mg/kg

Hand auger sampling

Sample ID	
Depth (mbgl)	Lead (mg/kg)

Legend

Site boundary
Rail corridor fence
0.1km chainage point
Signal trench (approximate)
Surface water flow (indicative)

Survey lines
Rail track
Top of bank
Bottom of bank
Other elements

X-Ray fluorescence sampling (Ramboll 2019, 2020)
Previous sampling location (McMahon)
Shallow soil (Ramboll 2019)
Hand auger (Ramboll 2019)
1200 Lead concentration for XRF sample (mg/kg)
Validation sample (Ramboll 2019)

Lead impacted area
Area of excavation during loop extension (no further excavation proposed)

Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.
Data relating to impacts on private properties has not been presented to maintain privacy for affected parties. Data for TP1 – TP9 and TP15 from the Woodlawn siding is presented in Appendix 3, Table H2 – H3. Data for TP1 – TP20 from the Loadout Complex Footprint is presented in Appendix 3, Table 7.

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Location

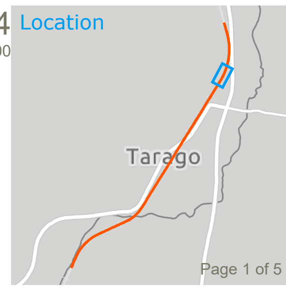
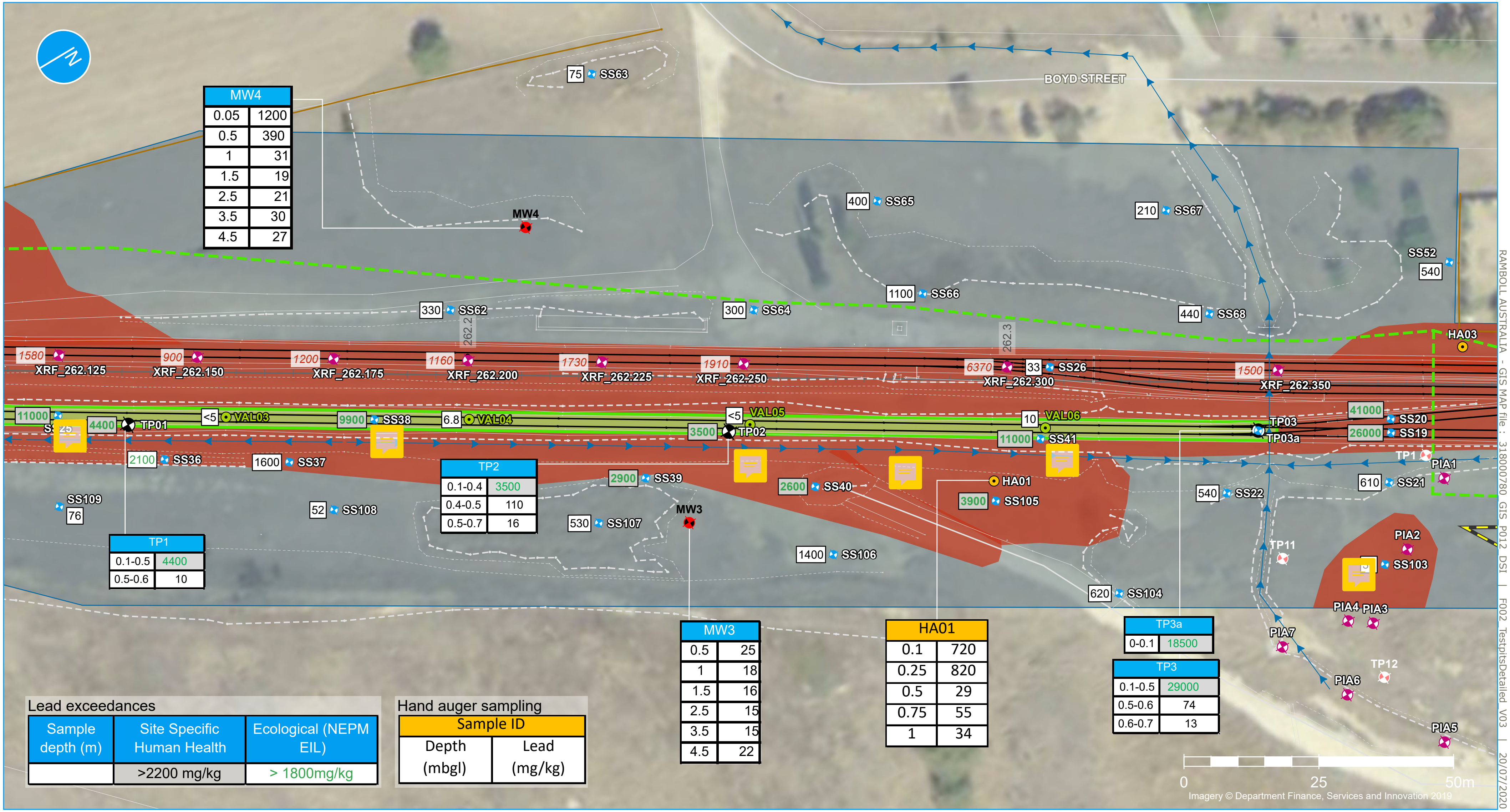


Figure 2a | Site Plan



Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Signal trench (approximate)
- Surface water flow (indicative)

Survey lines
- Rail track
- Top of bank
- Bottom of bank
- Other elements

- X-Ray fluorescence sampling (Ramboll 2019, 2020)
- Shallow soil (Ramboll 2019)
- Test pit (Ramboll 2019)
- Hand auger (Ramboll 2019)
- 1200 Lead concentration for XRF sample (mg/kg)
- Validation sample (Ramboll 2019)
- Groundwater monitoring location
- Test pit (loadout complex)

- Lead impacted area
- Area of excavation during loop extension (no further excavation proposed)
- Former loadout road (approximate)

Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.
Data relating to impacts on private properties has not been presented to maintain privacy for affected parties. Data for TP1 – TP9 and TP15 from the Woodlawn siding is presented in Appendix 3, Table H2 – H3. Data for TP1 – TP20 from the Loadout Complex Footprint is presented in Appendix 3, Table 7.

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Location

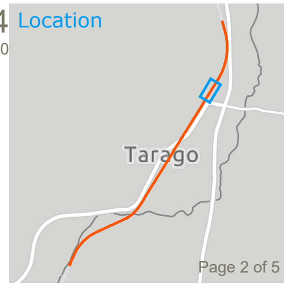
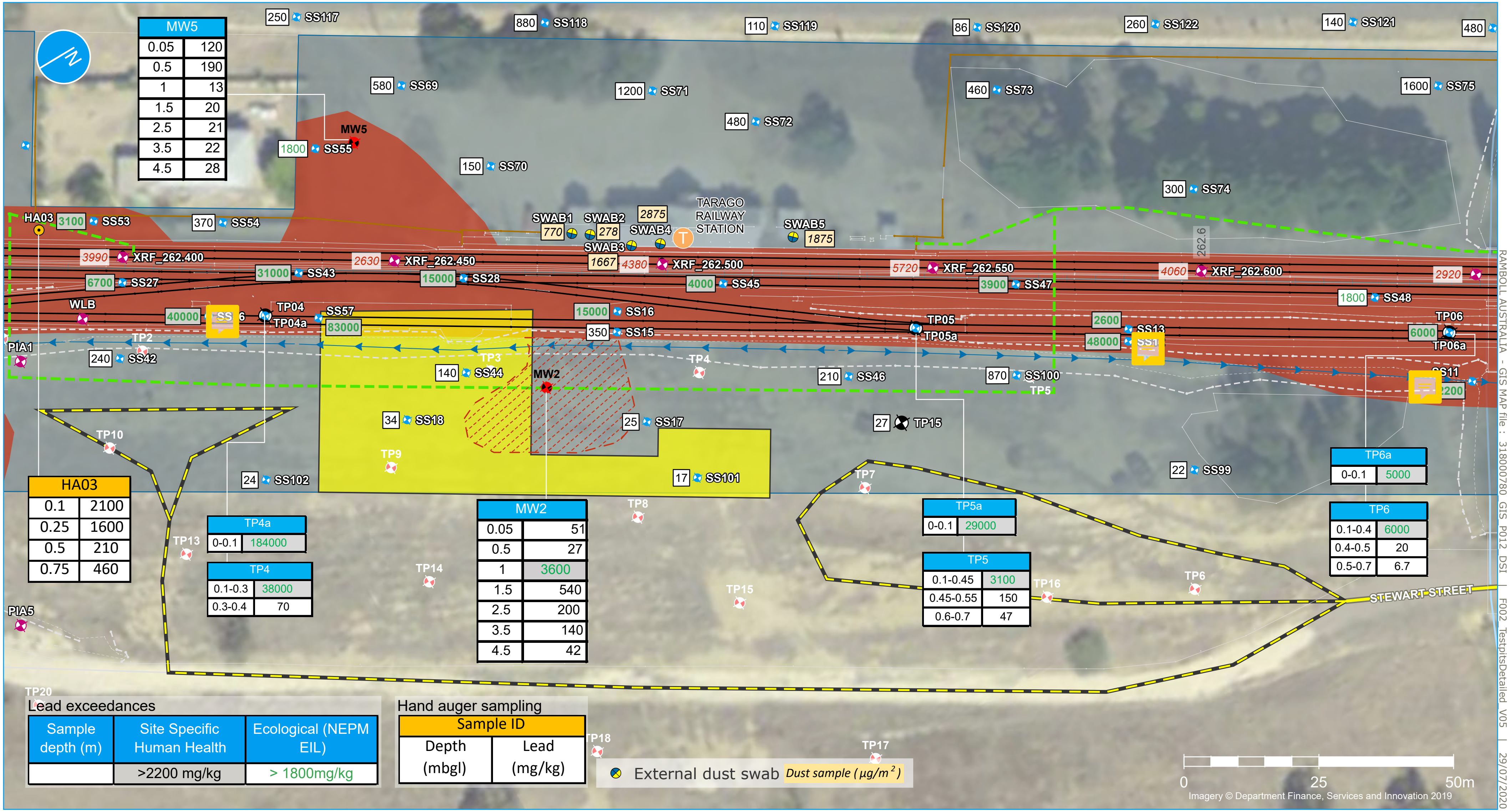


Figure 2b | Site Plan



Legend

Site boundary
Rail corridor fence
0.1km chainage point
Signal trench (approximate)
Surface water flow (indicative)

Survey lines
Rail track
Top of bank
Bottom of bank
Other elements

X-Ray fluorescence sampling (Ramboll 2019, 2020)
Shallow soil (Ramboll 2019)
Test pit (Ramboll 2019)
Hand auger (Ramboll 2019)
1200 Lead concentration for XRF sample (mg/kg)
Groundwater monitoring location
Test pit (loadout complex)

Lead impacted area
Indicative lead impacted area
Former loadout road (approximate)
Former loadout complex building footprint
Haul route

Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.
Data relating to impacts on private properties has not been presented to maintain privacy for affected parties. Data for TP1 – TP9 and TP15 from the Woodlawn siding is presented in Appendix 3, Table H2 – H3. Data for TP1 – TP20 from the Loadout Complex Footprint is presented in Appendix 3, Table 7.

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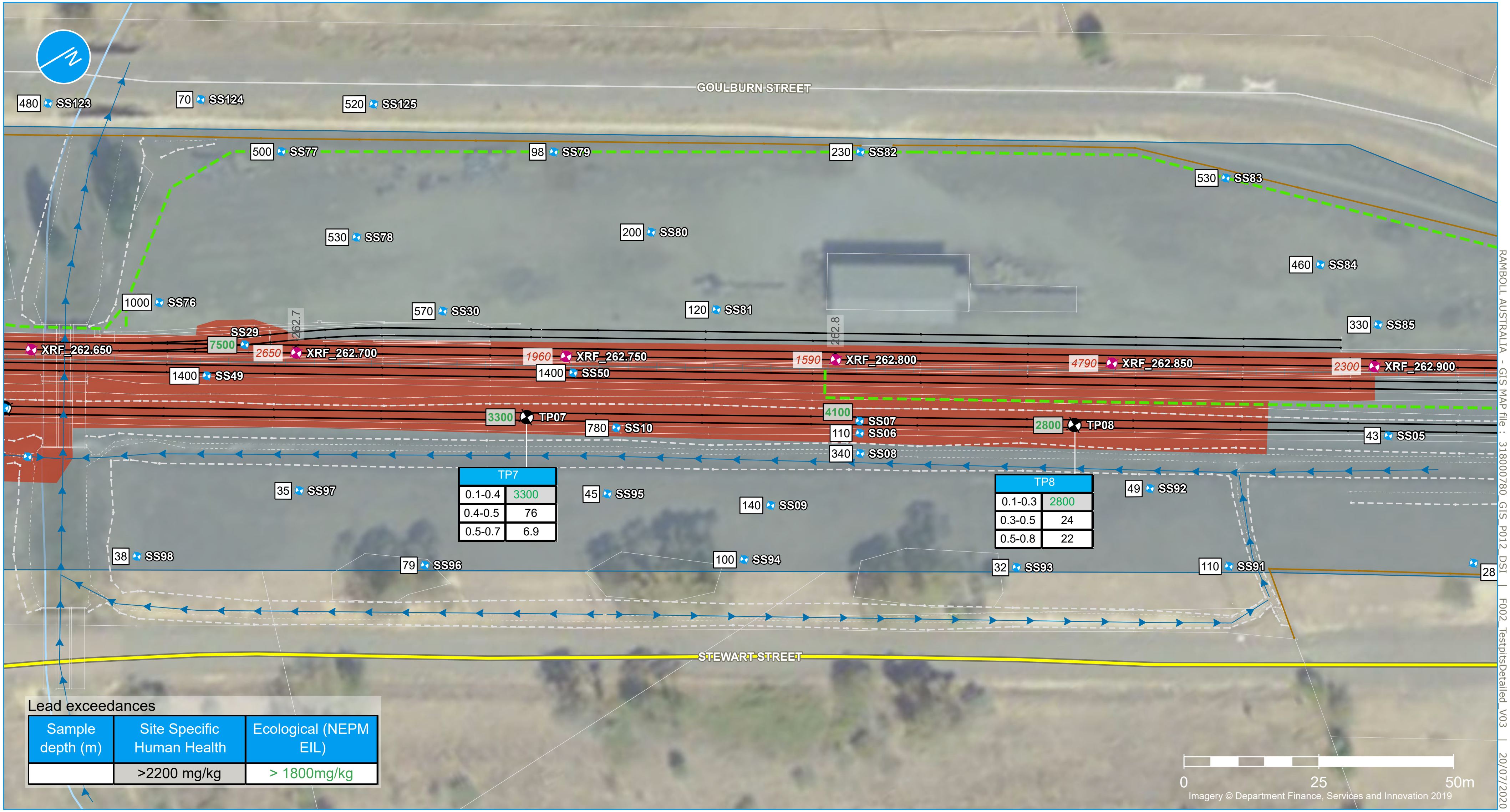
Figure 2c | Site Plan



Legend

Site boundary
Rail corridor fence
0.1km chainage point
Signal trench (approximate)
Surface water flow (indicative)

Survey lines
Rail track
Top of bank
Bottom of bank
Other elements

X-Ray fluorescence sampling (Ramboll 2019, 2020)
Shallow soil (Ramboll 2019)
Test pit (Ramboll 2019)
1200 Lead concentration for XRF sample (mg/kg)

Lead impacted area
Haul route

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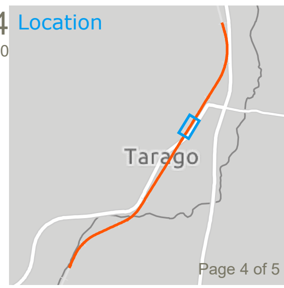
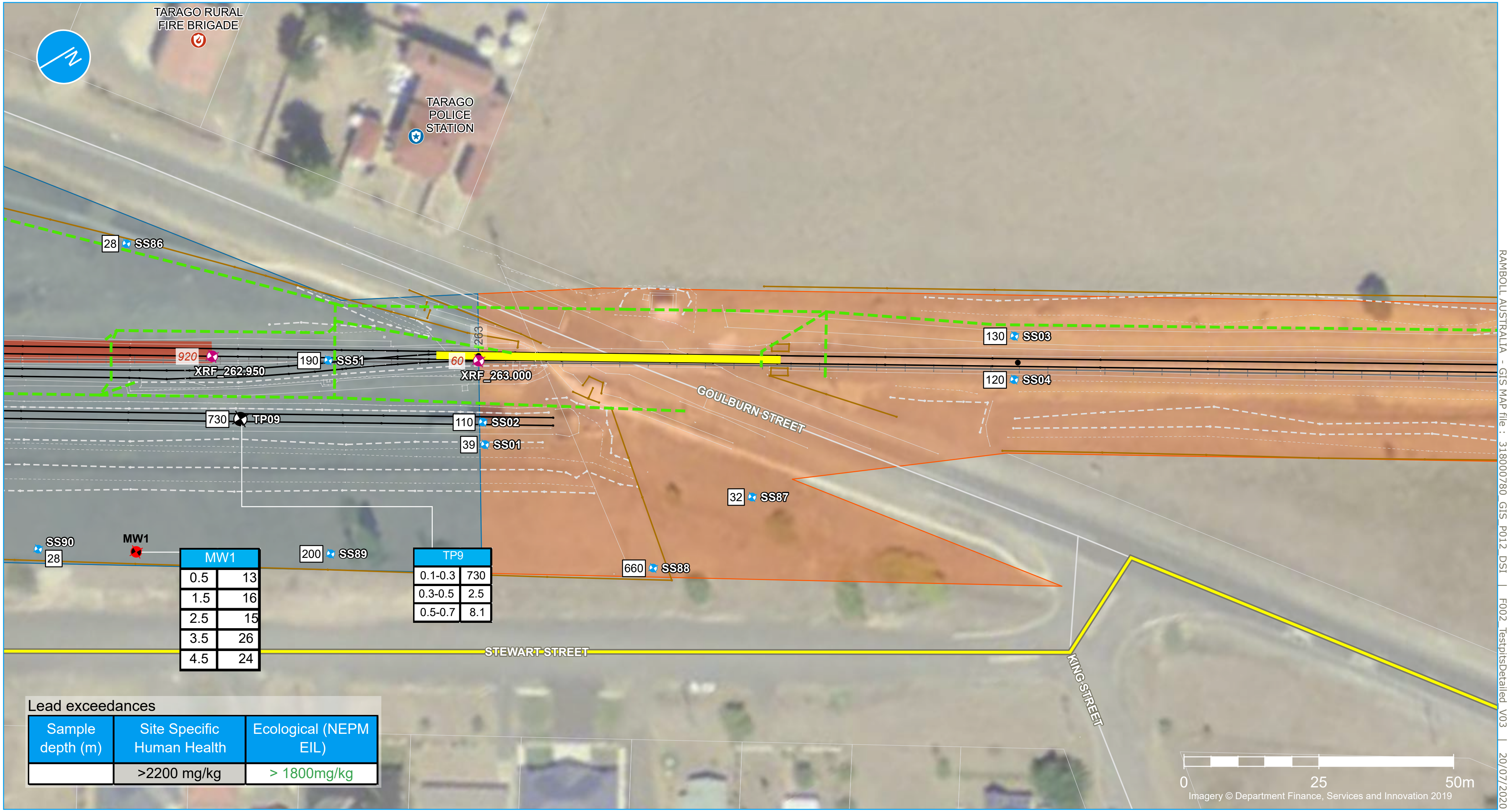


Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.
Data relating to impacts on private properties has not been presented to maintain privacy for affected parties. Data for TP1 – TP9 and TP15 from the Woodlawn siding is presented in Appendix 3, Table H2 – H3. Data for TP1 – TP20 from the Loadout Complex Footprint is presented in Appendix 3, Table 7.

Figure 2d | Site Plan



MW1	
0.5	13
1.5	16
2.5	15
3.5	26
4.5	24

TP9	
0.1-0.3	730
0.3-0.5	2.5
0.5-0.7	8.1

Lead exceedances

Sample depth (m)	Site Specific Human Health	Ecological (NEPM EIL)
	>2200 mg/kg	> 1800mg/kg

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P012_DSI | F002_TestpitsDetailed_V03 | 20/07/2020

Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Goulburn Street level crossing
- Signal trench (approximate)
- Surface water flow (indicative)

Survey lines

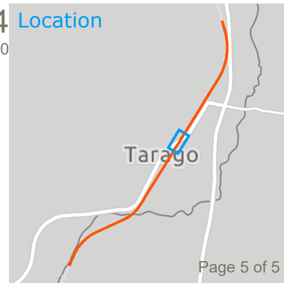
- Rail track
- Top of bank
- Bottom of bank
- Other elements

- X-Ray fluorescence sampling (Ramboll 2019, 2020)
- Shallow soil (Ramboll 2019)
- Test pit (Ramboll 2019)
- 1200 Lead concentration for XRF sample (mg/kg)
- Groundwater monitoring location

- Lead impacted area
- Haul route

A4
1:1,000

Location



Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.
Data relating to impacts on private properties has not been presented to maintain privacy for affected parties. Data for TP1 – TP9 and TP15 from the Woodlawn siding is presented in Appendix 3, Table H2 – H3. Data for TP1 – TP20 from the Loadout Complex Footprint is presented in Appendix 3, Table 7.

Figure 2e | Site Plan

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P016_T21_InterimActionPlan | F003_SurfaceWaterSamples_V01 | 23/07/2020

A4
1:10,000

Legend

- Surface water sampling location
- Site boundary
- Rail corridor
- Rail corridor fence
- Area of lead exceedance (within rail corridor)

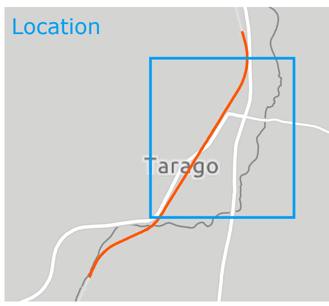


Figure 3 | Surface water sampling locations

Legend

A4
1:5,000

- Site boundary
- Rail corridor
- Rail corridor fence
- Area of lead contamination within the rail corridor

Sampling locations

- Deposited dust and lead (from dust deposition guage)
- TSP and lead (from high volume air samper)
- Continuous PM10 and PM2.5 (from particle counter)
- Regional meteorological monitoring from DPIE Air quality monitoring station (see location inset)

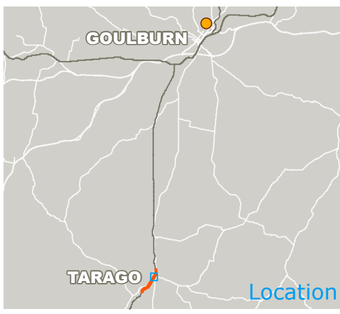


Figure 4 | Air quality monitoring locations

APPENDIX 3
CALIBRATION CERTIFICATES

Multi-Parameter Water Quality Meter Calibration

Instrument: Horiba U-50 Series
Control Unit Serial No: WVM29BTT
Sensor Probe Unit Serial No: WSMJCJ88

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Solution	Standard Solution	Solution Model No.	Instrument Reading
pH	pH 4 AUTO CAL SOLN	4.01 pH units	100-4	4.00 pH units
Conductivity	pH 4 AUTO CAL SOLN	4.49 mS/cm	100-4	4.48 mS/cm
Turbidity	pH 4 AUTO CAL SOLN	0.0 NTU	100-4	0.0 NTU
DO	Ambient Air	9.09 mg/L	N/A	11.01 mg/L DO
Depth	Ambient Air	0.00 m	N/A	0.00 m

Calibrated by: **Jake Bourke**

Calibration date: **31/08/2020**

Next calibration due: 03/11/2020

Multi Parameter Water Meter

Instrument YSI Pro DSS
Serial No. 18D102529

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	x	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. EC		2.76mS		333787	2.74mS
2. Temp		21.0°C		Testo	20.6°C
3. pH 4		pH 4.00		330734	pH 4.01
4. pH 7		pH 7.00		330737	pH 6.98
5. pH10		pH 10.00		332474	pH 9.87
6. DO		0.00ppm		1904288592	0.00ppm
7. mV		231.8mV		346052/342074	230.6mV
8.Tubidity		20NTU		335947	18.7NTU

Calibrated by: Remy Tarasin

Calibration date: 23/04/2020

Next calibration due: 23/05/2020

PAS

Soil QC Sheet

Revision Date: Oct 2011

Certificate of Calibration

Serial Number: 86956
Resolution: 180.98

Model: XL2t 800
Escale: 7.08

Software: 8.4I.10
Source: Tube

Date of Q.C.: 25-August-2020
Inspector: Dave

60 second analysis time per filter, all switched on

Elements that are in BLUE BOLD should be detected

Elements not in BLUE BOLD need not be detected but record if present

NIST HIGH 2710	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	707	507	978	543.605	99.145	OK	
Sb	38.4	-100	110	23.235	21.06	OK	< LOD
Sn	NR	-100	100	11.99	15.225	OK	< LOD
Cd	21.8	-10	50	17.765	9.49	OK	
Ag	35.3	0	60	29.465	9.005	OK	
Pd	NR	-70	70	0.015	6.94	OK	< LOD
Zr	NR	0	0	112.95	13.6	0	
Sr	330	280	380	296.025	10.095	OK	
Rb	120	80	160	112.33	6.91	OK	
Pb	5532	5400	5832	5547.2	86.08	OK	
Se	NR	-30	30	1.79	6.34	OK	< LOD
As	626	510	750	652.5	74.7	OK	
Hg	32.6	0	50	16.4	11.6	OK	< LOD
Zn	6952	6700	7250	6962.1	119.9	OK	
W	93	0	400	83.4	91.7	OK	< LOD
Cu	2950	2700	3250	2958.6	90.9	OK	
Ni	14.3	0	105	26.11	32.78	OK	< LOD
Co	10	-270	270	2.53	0	OK	
Fe	33800	30420	37180	34121.31	473.76	OK	
Mn	10100	9500	12000	10129.3	326.3	OK	
Cr	39	-100	120	45.285	44.72	OK	< LOD
Ti	N/A			3231.625	248.62		

SiO2 (Blank)	Expected**	Low	High	Measured	Err	Pass	<LOD?
Ba	0	-200	200	-111.91	68.505	OK	< LOD
Sb	0	-120	80	-6.045	15.34	OK	< LOD
Sn	0	-120	70	7.005	7.005	OK	< LOD
Cd	0	-50	50	-4.045	9.49	OK	< LOD
Ag	0	-30	30	0.585	6.13	OK	< LOD
Pd	0	-50	50	-0.25	5.13	OK	< LOD
Zr	0	-10	10	1.59	0	OK	
Sr	0	-10	10	1.14	2.355	OK	< LOD
Rb	<210	-10	210	-0.88	1.74	OK	< LOD
Pb	0	-10	10	0.43	6.36	OK	< LOD
Se	0	-20	20	-1.22	2.3	OK	< LOD
As	0	-10	10	0.41	5.195	OK	< LOD
Hg	0	-10	10	-0.915	4.26	OK	< LOD
Zn	0	-10	10	4.28	0.00	OK	
W	0	-60	60	-2.98	28.17	OK	< LOD
Cu	0	-20	20	-6.885	0.00	OK	< LOD
Ni	0	-70	70	-10.465	25	OK	< LOD
Co	0	-50	50	-12.635	14.28	OK	< LOD
Fe	0	-50	50	32.445	30.77	OK	< LOD
Mn	0	-100	300	-15.53	37.035	OK	< LOD
Cr	0	-120	120	5.045	30.055	OK	< LOD
Ti	0	-700	700	-50.38	64.225	OK	< LOD

NIST LOW 2709	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	968	638	1238	649.36	86.955	OK	
Sb	7.9	-90	100	-3.235	18.16	OK	< LOD
Sn	NR	-100	100	6.905	13.19	OK	< LOD
Cd	0.38	-60	60	-3.82	11.22	OK	< LOD
Ag	0.41	-40	40	-0.81	7.24	OK	< LOD
Pd	NR	-60	60	0.675	6.09	OK	< LOD
Zr	160	120	200	133.82	11.495	OK	
Sr	231	180	300	197.125	7.26	OK	
Rb	96	0	0	77.75	4.90	0	0
Pb	18.9	0	35	13.29	8.675	OK	
Se	1.57	-30	30	1.77	3.14	OK	< LOD
As	17.7	0	35	10.02	7.51	OK	< LOD
Hg	1.4	-10	10	0.1	0.0	OK	
Zn	106	50	160	87.64	14.56	OK	
W	2	-80	80	-3.35	38.13	OK	< LOD
Cu	34.6	0	60	33.09	18.80	OK	
Ni	88	0	125	40.75	26.39	OK	
Co	13.4	-250	280	147.22	96.61	OK	
Fe	35000	25000	35000	26821.015	362.3	OK	
Mn	538	0	700	399.3	82.5	OK	
Cr	130	30	200	109.5	40.5	OK	
Ti	N/A			4000.8	235.5		

RCRA	Expected**	Low	High	Measured	Err	Pass	<LOD?
Ba	0	0	0	657.715	97.365	0	0
Sb	0	0	0	16.185	21.54	0	0
Sn	0	0	0	23.165	16.115	0	0
Cd	500	400	600	458.87	18.795	OK	
Ag	500	400	600	431.015	15.21	OK	
Pd	0	0	0	11.43	7.445	0	0
Zr	0	0	0	248.46	14.31	0	0
Sr	NA	0	0	172.94	7.665	0	0
Rb	NA	0	0	77.615	5.535	0	0
Pb	500	400	600	494.79	30.505	OK	
Se	500	400	600	422.025	17.68	OK	
As	500	400	600	503.075	31.085	OK	
Hg	NA	0	0	-0.695	7.53	0	0
Zn	NA	0	0	78.63	16.29	0	0
W	0	0	0	9.08	45.965	0	0
Cu	NA	0	0	62.53	23.685	0	0
Ni	NA	0	0	4.39	30.91	0	0
Co	NA	0	0	284.39	140.01	0	0
Fe	NA	0	0	46165.33	525.99	0	0
Mn	NA	0	0	851.95	119.945	0	0
Cr (variable)	500	0	0	398.11	51.43	0	0
Ti	0	0	0	4665.325	253.99	0	0

GBW 07411	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	550	320	800	560.76	97.355	OK	
Sb	9	-80	100	-5.045	20.43	OK	< LOD
Sn	NR	-120	120	41.055	15.285	OK	
Cd	28	0	47	33.75	13.205	OK	
Ag	5	-35	47	3.085	8.26	OK	< LOD
Pd	NR	-60	60	-0.895	6.795	OK	< LOD
Zr	192	25	359	166.805	13.25	OK	
Sr	130	95	159	116.655	6.7	OK	
Rb	111	61	116	95.99	6.14	OK	
Pb	2700	2324	2900	2648.16	58.575	OK	
Se	1	-10	15	-1.50	4.65	OK	< LOD
As	205	127	283	176.02	49.64	OK	
Hg	0	-10	50	5.66	8.41	OK	< LOD
Zn	3800	2711	4880	3589.02	84.04	OK	
W	7	-184	184	-48.51	65.61	OK	< LOD
Cu	65	42	80	74.61	25.82	OK	
Ni	24	-35	117	17.70	31.30	OK	< LOD
Co	12	-232	232	27.475	0	OK	
Fe	0	0	60000	53573.47	576.435	OK	
Mn	9700	4561	10643	9829.0	316.2	OK	
Cr	60	-317	380	54.3	45.7	OK	< LOD
Ti	4100	3283	4917	4848.0	277.3	OK	

TILL4	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	395	195	610	449.075	89.005	OK	
Sb	1	-100	100	0	0	OK	< LOD
Sn	NR	-100	100	16.165	13.825	OK	< LOD
Cd	NR	-70	70	2.37	11.755	OK	< LOD
Ag	NR	-50	50	-0.825	7.525	OK	< LOD
Pd	NR	-60	60	2.525	6.375	OK	< LOD
Zr	385	185	585	351.26	14.245	OK	
Sr	109	50	150	107.635	5.91	OK	
Rb	161	100	210	136.34	6.41	OK	
Pb	50	28	70	44.97	10.855	OK	
Se	NR	-15	15	2.63	3.71	OK	< LOD
As	111	80	140	107.13	12.52	OK	
Hg	NR	-15	15	4.9	7.5	OK	< LOD
Zn	70	45	95	67.66	15.30	OK	
W	204	130	280	196.59	51.62	OK	
Cu	237	200	280	227.15	28.42	OK	
Ni	17	-50	90	-11.04	26.03	OK	< LOD
Co	8	-300	300	214.55	110.735	OK	
Fe	39700	29700	49700	32896.945	414.225	OK	
Mn	490	300	600	423.4	88.0	OK	
Cr	53	-50	150	25.6	37.1	OK	< LOD
Ti	4840	3870	5808	5516.7	252.7	OK	

This certificate is issued in accordance with Thermo Fisher Scientific factory specifications.
The measurements were found to be within specification limits at the time of manufacture and calibration.

Standards are traceable to National Institute of Standards & Technology (NIST) standards.
**** - Not Certified**

Signed:

Dave Scattergood
Service Manager

Certificate of Calibration

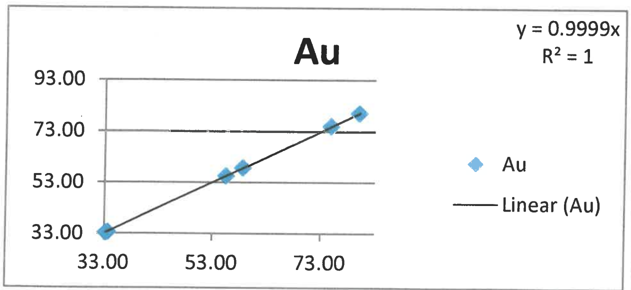
PM Alloy QC

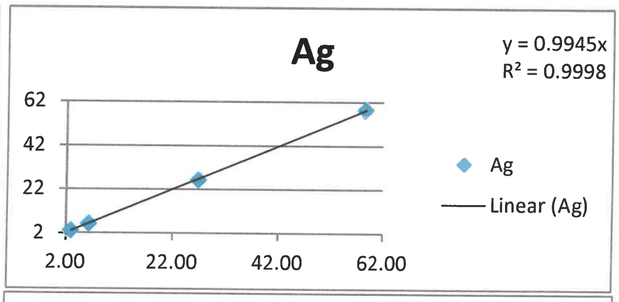
Serial #: 86956 | Model: XL2t 800 | Software: 8.4I.10 | Date of Q.C.: 25-Jun-20

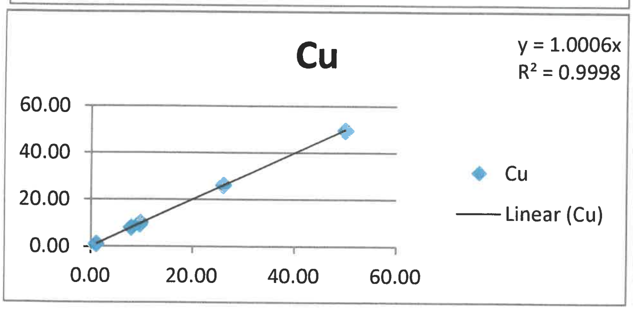
Res: 175.88 | Escale: 7.08 | Source: X-ray tube | Inspector: Dave S

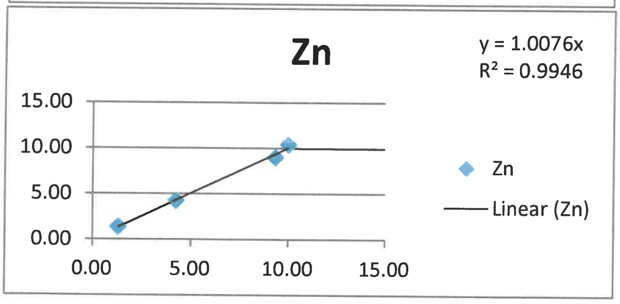
3 x 20 second analysis times

Standard	Element	Certified	Measured	Absolute Err	Cert Error %
0744-16	Au	55.54	55.57	0.39	0.03
	Ag	26.27	26.91	0.32	0.64
	Cu	10.25	9.84	0.22	-0.41
	Zn	1.38	1.30	0.11	-0.08
	Pd	6.56	6.38	0.16	-0.18
	Ni				
0734-16	Au	33.52	33.74	0.36	0.22
	Ag	6.24	6.34	0.14	0.10
	Cu	49.82	49.93	0.34	0.11
	Zn	10.42	9.98	0.18	-0.44
	Pd				
	Ni				
0732-16	Au	33.33	33.27	0.36	-0.06
	Ag	58.61	58.70	0.41	0.09
	Cu	8.06	8.03	0.21	-0.03
	Zn				
	Pd				
	Ni				
0743-16	Au	80.15	80.19	0.38	0.04
	Ag				
	Cu	1.05	1.10	0.10	0.05
	Zn	4.27	4.26	0.15	-0.01
	Pd				
	Ni	14.53	14.43	0.25	-0.10
0704-16	Au	75.07	74.98	0.40	-0.09
	Ag	3.00	2.97	0.12	-0.03
	Cu	9.40	9.73	0.21	0.33
	Zn				
	Pd	12.53	12.32	0.23	-0.21
	Ni				
0715-16	Au	58.69	58.65	0.36	-0.04
	Ag				
	Cu	26.32	26.06	0.29	-0.26
	Zn	9.00	9.32	0.19	0.32
	Pd				
	Ni	5.99	5.97	0.17	-0.02









PAS portable analytical solutions

Certificate of Calibration

XL2/3 Alloy Main QC Sheet
Revision: A
Revision Date: August 11, 2011

Serial Number: 86956
Resolution: 179.53

Model: XL2t 800
Escale: 7.08

Software: 8.41.10
Source: X-ray tube

Date of Q.C.: 13-Feb-20
Inspector: Rachelle W.

30 second analysis times

Elements that are in BLUE BOLD should be detected

Elements not in BLUE BOLD need not be detected but record if present

			Certified	Low	High	Measured	Err	OK
	Pure Fe	Fe	99.9	99	100	99.97	0.19	OK
	Pure Fe	Fe	99.9	99	100	99.97	0.23	OK
	Pure Fe	Fe	99.9	99	100	99.91	0.24	OK
	Pure Fe	Fe	99.9	99	100	99.97	0.23	OK
	Pure Fe	Fe	99.9	99	100	99.91	0.24	OK
	Pure Ta	Ta	99.9	97	100	99.99	0.75	OK
	Pure Ta	Ta	99.9	97	100	99.99	0.82	OK
	Pure Ta	Ta	99.9	97	100	99.97	0.65	OK
	Pure Ta	Ta	99.9	97	100	99.99	0.82	OK
	Pure Ta	Ta	99.9	97	100	99.97	0.65	OK
	Pure Sn	Sn	99.9	97	100	99.99	0.99	OK
	Pure Sn	Sn	99.9	97	100	99.99	1.26	OK
	Pure Sn	Sn	99.9	97	100	99.99	1.32	OK
	Pure Sn	Sn	99.9	97	100	99.99	1.26	OK
	Pure Sn	Sn	99.9	97	100	99.99	1.32	OK
	Pure Cu	Cu	99.9	99	100	99.99	0.15	OK
	Pure Cu	Cu	99.9	99	100	99.97	0.14	OK
	Pure Cu	Cu	99.9	99	100	99.99	0.12	OK
	Pure Cu	Cu	99.9	99	100	99.97	0.14	OK
	Pure Cu	Cu	99.9	99	100	99.99	0.12	OK
	Pure Ni	Ni	99.9	99	100	99.98	0.18	OK
	Pure Ni	Ni	99.9	99	100	99.98	0.16	OK
	Pure Ni	Ni	99.9	99	100	99.99	0.19	OK
	Pure Ni	Ni	99.9	99	100	99.98	0.16	OK
	Pure Ni	Ni	99.9	99	100	99.99	0.19	OK
	Pure Ti	Ti	99.9	99	100	99.99	0.23	OK
	Pure Ti	Ti	99.9	99	100	99.99	0.23	OK
	Pure Ti	Ti	99.9	99	100	99.99	0.26	OK
	Pure Ti	Ti	99.9	99	100	99.99	0.23	OK
	Pure Ti	Ti	99.9	99	100	99.99	0.26	OK
BS 187A	20Cb3	Nb	0.57	0.47	0.67	0.51	0.02	OK
	20Cb3	Mo	2.06	1.83	2.28	2.01	0.05	OK
	20Cb3	Cu	3.10	2.85	3.35	3.02	0.11	OK
	20Cb3	Ni	33.06	31.40	35.40	33.21	0.25	OK
	20Cb3	Fe	40.19	38.2	42.2	39.95	0.23	OK
	20Cb3	Mn	0.52	0.42	0.65	0.59	0.11	OK
	20Cb3	Cr	19.75	19.35	20.35	20.07	0.16	OK
IARM 86C	CDA 836	Sn	4.37	3.46	5.38	4.45	0.09	OK
	CDA 836	Pb	5.03	4.68	5.44	5.08	0.14	OK
	CDA 836	Zn	5.38	4.79	6.08	5.40	0.23	OK
	CDA 836	Cu	84.6	82.60	86.60	84.41	0.23	OK
	CDA 836	Ni	0.27	0.10	0.40	0.25	0.04	OK
IARM 69B	Hast X	Mo	8.78	8.20	9.37	8.76	0.10	OK
	Hast X	Nb	0.11	0.02	0.17	0.09	0.02	OK
	Hast X	W	0.78	0.58	0.98	0.75	0.08	OK
	Hast X	Ni	47.37	45.37	49.33	47.72	0.26	OK
	Hast X	Co	1.58	1.40	1.82	1.54	0.12	OK
	Hast X	Fe	17.84	16.93	18.76	17.80	0.20	OK
	Hast X	Mn	0.68	0.41	1.11	0.70	0.11	OK
	Hast X	Cr	21.90	21.04	22.77	22.45	0.20	OK
IARM 6D	SS321	Mo	0.36	0.29	0.44	0.41	0.03	OK
	SS321	Nb	0.04	0.01	0.06	0.04	0.01	OK
	SS321	Cu	0.30	0.15	0.5	0.33	0.06	OK
	SS321	Ni	9.42	9	9.8	9.36	0.19	OK
	SS321	Fe	69.40	68.4	70.4	69.61	0.28	OK
	SS321	Mn	1.52	1.25	1.85	1.49	0.12	OK
	SS321	Cr	17.45	17.1	18	17.52	0.15	OK
	SS321	Ti	0.63	0.43	0.83	0.71	0.08	OK
IARM 95C	Stellite 6B	Mo	1.37	1.24	1.5	1.38	0.04	OK
	Stellite 6B	W	3.96	3.66	4.26	3.92	0.14	OK
	Stellite 6B	Ni	2.88	2.58	3.18	2.73	0.13	OK
	Stellite 6B	Co	57.00	56.1	60.1	57.22	0.32	OK
	Stellite 6B	Fe	2.47	2.07	2.87	2.42	0.11	OK
	Stellite 6B	Mn	1.55	1.16	1.96	1.54	0.11	OK
	Stellite 6B	Cr	29.00	28.4	30.4	28.58	0.21	OK
IARM 35F	1.25Cr 1Mo	Mo	0.48	0.44	0.54	0.50	0.03	OK
	1.25Cr 1Mo	Cu	0.03	0.00	0.20	0.02	0.02	OK
	1.25Cr 1Mo	Fe	97.00	95.94	98.04	97.03	0.20	OK
	1.25Cr 1Mo	Mn	0.50	0.29	0.69	0.47	0.07	OK
	1.25Cr 1Mo	Cr	1.16	0.96	1.37	1.16	0.05	OK
IARM 44C	M2	Mo	5.00	4.76	5.3	4.92	0.07	OK
	M2	W	6.00	5.5	6.57	5.90	0.17	OK
	M2	Co	0.25	-0.06	0.59	0.10	0.14	OK
	M2	Fe	80.9	78.9	82.9	81.13	0.27	OK
	M2	Cr	4.06	3.67	4.5	4.16	0.10	OK
	M2	V	1.92	1.46	2.35	1.92	0.10	OK
IARM 177B	6-2-4-2	Zr	3.97	3.87	4.07	4.01	0.06	OK
	6-2-4-2	Mo	1.93	1.73	2.13	1.94	0.04	OK
	6-2-4-2	Sn	1.95	1.75	2.15	1.96	0.04	OK

This certificate is issued in accordance with Thermo Fisher Scientific factory specifications.
The measurements were found to be within specification limits at the time of manufacture and calibration.
Standards are traceable to National Institute of Standards & Technology (NIST) standards.
**** - Not Certified**

This certificate is valid for 2 years from the "Date of QC" indicated at the top of this page

Signed:

Dave Scattergood
Service Manager

PAS portable analytical solutions

Customer: Ramboll **Model:** XL2 800

Serial #: 86956 **Date:** 12/10/2020

Packing List

Part#	Description	Qty	Delivered
XL2 800	Niton Analyser	1	
420-002	XL3, 6 Cell Battery Pack 7.8Ah	2	
420-003	Battery Charger, Base and Power cable	1	
179-051	Case Lock	1	
179-727	Mini USB Cable	1	
	Soil Standards Set	1	
410-002	XL2, USD NDT USB	1	
	Following items in Document Wallet:-		
1187-1555	Prolene Kapton Windows	10	

All good received and in good condition:

Signed: ______________________

Print: ______________________

Date: ______________________

Portable Analytical Solutions Pty Ltd
Ground Floor, Fortunity Building, 155 The Entrance Road, Erina NSW 2250
PO Box 4185, Copacabana NSW 2251 Australia
Ph: +61 (0)2 4381 2844
Fax: +61 (0)2 8088 4386

APPENDIX 4
RESULTS

Table I: Field Physico-Chemical Parameters

RAMBOLL

Sample Location	Sample Date	Time	Sample Depth (mm below surface)	Temperature (ºC)	Spec Conductivity (µScm-¹)	pH	Dissolved Oxygen (mg/L)	Redox (mV)	TDS (ppm)	Comments
SW1_UP										
SW1_UP	13-Aug-19	7:45	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	Not recorded
SW1_UP	24-Sep-19	*Not recorded*	100	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	Clear/slightly brown. Frogs audible.
SW1_UP	29-Jan-20	---	---	---	---	---	---	---	---	DRY
SW1_UP	1-Apr-20	13:25	200	19.94	584	7.05	4.72	154.0	374.0	Clear. No turbidity. No odour. No flow.
SW1_UP	11-Aug-20	*Not recorded*	100	8.0	205.6	7.43	10.55	170.7	133.3	Clear to slightly brown. Flowing.
SW1_UP	13-Oct-20	7:37	400	11.9	673	7.39	2.6	94.0	431.0	Water clear/brown, flowing.
SW1										
SW1	29-Jan-20	---	---	---	---	---	---	---	---	DRY
SW1	1-Apr-20	12:45	100	17.4	575	6.35	5.88	115.0	368.0	Clear to brown, low/no turbidity, minor suspended solids. No odour. No flow.
SW1	11-Aug-20	Not recorded	100	7.8	206.1	7.44	11.00	169.5	133.9	Brown, slightly turbid, continuous flow.
SW1	13-Oct-20	7:35	50	10.38	678	7.7	2.71	125.0	434.0	Water flowing, turbid, yellow/brown, water level shallow.
SW2										
SW2	24-Sep-19	*Not recorded*	Surface. Shallow water.	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	Clear.
SW2	29-Jan-20	---	---	---	---	---	---	---	---	DRY
SW2	1-Apr-20	13:50	100	17.5	358	7.25	3.84	163.0	233.0	Brown, low-medium turbidity, some suspended solids. No odour. No flow.
SW2	30-Apr-20	17:40	50	9.8	605	6.54	3.32	185.9	391.9	Collected at Goulburn Street footbridge. Clear, not flowing.
SW2	11-Aug-20	*Not recorded*	100	7.3	213.3	8.13	10.59	185.2	137.8	Clear to slightly turbid. Flowing.
SW2	13-Oct-20	8:15am	200	11.8	650	8.27	5.92	96.0	416.0	Water clear, flowing, water level low.
SW3										
SW3	24-Sep-19	*Not recorded*	50	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	Moderate turbidity. Frogs audible.
SW3	29-Jan-20	---	---	---	---	---	---	---	---	DRY
SW3	1-Apr-20	14:20	100	21.8	245	6.23	5.24	178.0	159.0	Brown to yellow, medium turbidity, some brown matter at surface.
SW3	11-Aug-20	*Not recorded*	100	8.9	142.5	7.43	9.43	174.7	92.3	Brown to clear.
SW3	13-Oct-20	8:36	100	11.63	229	7.96	4.84	137.0	149.0	Water clear/brown to slightly turbid, flowing.
SW4										
SW4	6-Aug-19	11:35	100	12.4	128.2	8.8	9.74	200.0	*Not recorded*	Stagnant pond, clear to slightly yellow.
SW4	24-Sep-19	*Not recorded*	100	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	*Not recorded*	Turbid. Frogs audible.
SW4	29-Jan-20	---	---	---	---	---	---	---	---	DRY
SW4	1-Apr-20	15:00	200	20.33	297	6.73	5.24	168.0	193.0	Light brown, low turbidity. No odour. No flow.
SW4	30-Apr-20	17:30	50	9	388.3	5.75	3.53	263.1	251.8	Collected at Boyd Street culvert. Flowing.
SW4	11-Aug-20	*Not recorded*	100	7.4	153.4	7.69	10.42	210.9	99.5	Brown, slightly turbid, full but flow not evident.
SW4	13-Oct-20	8:50	300	13.1	307	8.19	5.73	107.0	200.0	Water flowing, turbid, brown, no odour.
SW5										
SW5	29-Jan-20	---	---	---	---	---	---	---	---	DRY
SW5	1-Apr-20	---	---	---	---	---	---	---	---	DRY
SW5	11-Aug-20	*Not recorded*	100	11.2	117.9	7.33	7.94	163.2	76.7	Brown, turbid, flow at culvert evident beneath crushed rock.
SW5	13-Oct-20	9:06	50	11.95	187	8.35	4.06	-3.0	121.0	Water not flowing, very shallow, turbid, light brown, no odour.
SW6										
SW6	29-Jan-20	---	---	---	---	---	---	---	---	DRY
SW6	1-Apr-20	---	---	---	---	---	---	---	---	DRY
SW6	11-Aug-20	*Not recorded*	50	8.3	168.3	7.47	9.61	187.0	109.2	Brown, slightly turbid. Not flowing.
SW6	13-Oct-20	---	---	---	---	---	---	---	---	DRY
SW7										
SW7	29-Jan-20	10:00	50	23.1	609	8.92	8.46	83.0	396.6	Silty, from dam, low level water.
SW7	2-Apr-20	*Not recorded*	10	18.1	2342	7.23	4.45	114.2	152.1	Highly turbid.
SW7	11-Aug-20	*Not recorded*	100	12.5	94.7	7.26	7.80	109.8	61.8	Brown, turbid.
SW7	12-Oct-20	17:46	200	21.34	172	7.69	5.35	56.0	112.0	Water slightly turbid, brown, not flowing.
SW8										
SW8	29-Jan-20	11:01	100	23.6	1007	7.77	5.22	121.6	656.5	Upstream Lumley Road bridge. Clear, vegetation. Not flowing.
SW8	2-Apr-20	9:30am	10	18	425.7	7.23	4.39	124.0	276.9	Grease at surface, lots of algae growing on plants.
SW8	10-Aug-20	*Not recorded*	100	9.1	170.5	8.53	9.34	123.6	107.9	Water flowing, level high, turbid, sediment sample collected higher up embankment than previous round due to water level.
SW8	12-Oct-20	17:26	200	20.12	847	7.76	7.58	84.0	542.0	Water flowing, clear/brown.
SW9										
SW9	29-Jan-20	12:22	300	25.0	125.3	8.35	16.8	99.4	812.5	Stagnant pond. Algae and fish present. Slightly turbid.
SW9	02-Apr-20	*Not recorded*	10	18.2	381.7	7.62	6.29	124.5	247.7	Non-turbid, slightly brown, not flowing but full.
SW9	10-Aug-20	*Not recorded*	100	8.9	178.2	7.84	10.73	173.6	115.7	High level, brown, slightly turbid, bubbles at surface.
SW9	12-Oct-20	16:47	200	21.39	852	8.17	10.04	83.0	545.0	Water flowing, clear/brown, slightly turbid.
SW10										
SW10	13-Oct-20	12:26	400	16.02	881	7.19	3.58	79.0	564.0	Water flowing, clear/brown, slightly turbid, no odour.

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

Table II: Surface Water Results

RAMBOLL

Guidelines	95% Freshwater (ANZG 2018)	Hardness Correction Value Applied (ANZECC 2000)	Drinking Water (ADWG 2011)	Irrigation Short-term Trigger Value (ANZECC 2000)	Stock Water (ANZECC 2000)														
						Sample Type:		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
						Lab ID		S19-Au17273	S19-Se37061	-	S20-Ap12287	S20-Au23116	S20-Oc25321	-	S20-Ap12286	S20-Au23115	S20-Oc25141	S19-Se37062	-
						Sample date:		13-Aug-19	24-Sep-19	29-Jan-20	1-Apr-20	11-Aug-20	13-Oct-20	29-Jan-20	1-Apr-20	11-Aug-20	13-Oct-20	24-Sep-19	29-Jan-20
						Sample ID:		SW1-UP	SW1-UP	SW1_UP	SW1-UP	SW1_UP	SW1_UP	SW1	SW1	SW1	SW1	SW2	SW2
						Project Name:		Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring
						Project No:		318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780
						Sample Location		Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop
						Sampling Method:		Grab Sample	Grab Sample	-	Grab Sample	Grab Sample	Grab Sample	-	Grab Sample	Grab Sample	Grab Sample	Grab Sample	-
						Sample Description:		Not recorded.	Clear/slightly brown.	DRY	Clear. No turbidity. No odour.	Clear to slightly brown. Flowing.	Water clear/brown, flowing.	DRY	Clear to brown, low/no turbidity, minor suspendid solids. No odour.	Brown, slightly turbid, continuous flow.	Water flowing, turbid, yellow/borwn, water level shallow.	Clear.	DRY
Analyte grouping/Analyte						**Units**	**LOR**												
Dissolved and Total Metals																			
Aluminium	0.055[a]	-	-	20	5	mg/L	0.05	-	-	-	< 0.05	0.85	< 0.05	-	0.13	0.88	*0.61*	-	-
Dissolved Aluminium	0.055[a]	-	-	20	5	mg/L	0.05	< 0.05	< 0.05	-	-	0.45	< 0.05	-	-	*0.54*	< 0.05	< 0.05	-
Arsenic	0.024[b]	-	0.01	2	0.5-5	mg/L	0.001	-	-	-	< 0.001	< 0.001	< 0.001	-	0.004	< 0.001	0.004	-	-
Dissolved Arsenic	0.024[b]	-	0.01	2	0.5-5	mg/L	0.001	< 0.001	<0.001	-	-	< 0.001	< 0.001	-	-	< 0.001	< 0.001	< 0.001	-
Barium	-	-	2	-	-	mg/L	0.001	-	-	-	0.1	0.05	0.1	-	0.15	0.04	0.36	-	-
Dissolved Barium	-	-	2	-	-	mg/L	0.001	0.1	0.1	-	-	0.04	0.1	-	-	0.04	0.11	0.07	-
Beryllium	-	-	0.06	0.5	-	mg/L	0.001	-	-	-	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	-	-
Dissolved Beryllium	-	-	0.06	0.5	-	mg/L	0.001	< 0.001	<0.001	-	-	< 0.001	< 0.001	-	-	< 0.001	< 0.001	< 0.001	-
Boron	-	-	-	-	-	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Boron	-	-	-	-	-	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.0002	0.00054[g]	0.002	0.05	0.01	mg/L	0.0002	-	-	-	< 0.0002	< 0.0002	< 0.0002	-	0.0013	< 0.0002	*0.0021*	-	-
Dissolved Cadmium	0.0002	0.00054[g]	0.002	0.05	0.01	mg/L	0.0002	< 0.0002	<0.0002	-	-	< 0.0002	< 0.0002	-	-	*0.0003*	0.0005	0.0014	-
Chromium	0.001[c]	0.0025[g]	0.05[c]	1	1	mg/L	0.001	-	-	-	< 0.001	0.002	< 0.001	-	< 0.001	*0.002*	0.001	-	-
Dissolved Chromium	0.001[c]	0.0025[g]	0.05[c]	1	1	mg/L	0.001	< 0.001	<0.001	-	-	< 0.001	< 0.001	-	-	0.001	< 0.001	< 0.001	-
Cobalt	0.0014	-	-	0.1	1	mg/L	0.001	-	-	-	< 0.001	< 0.001	< 0.001	-	0.014	< 0.001	*0.007*	-	-
Dissolved Cobalt	0.0014	-	-	0.1	1	mg/L	0.001	< 0.001	<0.001	-	-	< 0.001	< 0.001	-	-	< 0.001	< 0.001	< 0.001	-
Copper	0.0014	0.0035[g]	2	5	0.4-5	mg/L	0.001	-	-	-	< 0.001	0.002	< 0.001	-	0.019	0.003	*0.014*	-	-
Dissolved Copper	0.0014	0.0035[g]	2	5	0.4-5	mg/L	0.001	< 0.001	<0.001	-	-	0.002	< 0.001	-	-	*0.003*	0.002	0.015	-
Iron	-	-	-	10	not sufficiently toxic	mg/L	0.05	-	-	-	0.26	0.93	0.12	-	4.5	0.91	*1.41*	-	-
Dissolved Iron	-	-	-	10	not sufficiently toxic	mg/L	0.05	< 0.05	< 0.05	-	-	0.3	< 0.05	-	-	0.34	< 0.05	< 0.05	-
Lead	0.0034	0.0136[g]	0.01	5	0.1	mg/L	0.001	-	< 0.001	-	< 0.001	< 0.001	0.001	-	0.056	0.001	*0.032*	0.003	-
Dissolved Lead	0.0034	0.0136[g]	0.01	5	0.1	mg/L	0.001	< 0.001	<0.001	-	-	< 0.001	< 0.001	-	-	*0.004*	< 0.001	0.014	-
Manganese	1.9	-	0.5	10	not sufficiently toxic	mg/L	0.005	-	-	-	0.044	0.026	0.022	-	0.76	0.024	*0.706*	-	-
Dissolved Manganese	1.9	-	0.5	10	not sufficiently toxic	mg/L	0.005	< 0.005	*0.005*	-	-	0.02	0.022	-	-	0.018	*0.044*	0.014	-
Mercury	0.00006[d,e]	-	0.001	0.002	0.002	mg/L	0.0001	-	-	-	< 0.0001	< 0.0001	< 0.0001	-	< 0.0001	< 0.0001	< 0.0001	-	-
Dissolved Mercury	0.00006[d,e]	-	0.001	0.002	0.002	mg/L	0.0001	< 0.0001	< 0.0001	-	-	<0.0001	< 0.0001	-	-	< 0.0001	< 0.0001	< 0.0001	-
Nickel	0.011	0.0275[g]	0.02	2	1	mg/L	0.001	-	-	-	< 0.001	0.002	< 0.001	-	0.003	0.002	*0.002*	-	-
Dissolved Nickel	0.011	0.0275[g]	0.02	2	1	mg/L	0.001	< 0.001	<0.001	-	-	0.002	< 0.001	-	-	0.002	< 0.001	< 0.001	-
Selenium	-	-	-	-	-	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Selenium	-	-	-	-	-	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	0.008	0.02[g]	-	5	20	mg/L	0.005	-	-	-	0.011	0.011	0.009	-	0.2	0.02	*0.32*	-	-
Dissolved Zinc	0.008	0.02[g]	-	5	20	mg/L	0.005	< 0.005	<0.005	-	-	0.008	< 0.005	-	-	*0.045*	0.073	0.2	-

- indicates no criterion available or not analysed
LOR = Limit of Reporting
Concentrations below the LOR noted as <value
The LOR for mercury exceeds the ecological criteria for 95% protection freshwater ecosystems however concentrations reported as <LOR are considered acceptable as mercury is not a contaminant of concern at the site.
Details of Guideline values are presented in **Section 6** of report (**Table 6-1**)
Concentrations *underlined and in italics* adopted the higher duplicate value
Concentration in a grey box exceed the ecological criteria of 95% protection freshwater ecosytems
Concentrations in a dark grey box exceed the criteria of 95% protection freshwater ecosystems and the hardness corrected value
Concentrations in a bold box exceed the human health guideline value for drinking water
Concentrations in blue font exceed the irrigation short term value
Concentrations in **bold font** exceed stock watering criteria
[a] Aluminium guidelines for pH > 6.5, based on the pH of groundwater measured at the site and surrounding area.
[b] Guideline value for arsenic (III).
[c] Guideline value for chromium (VI).
[d] Guideline value for inorganic mercury.
[e] 99% species protection level DGV has been adopted to account for the bioaccumulating nature of this contaminant.
[f] Hardness correction factor applied to the threshold value as detailed in Section 3.4.3 and Table 3.4.4 of ANZECC 2000. For calculations, water hardness was conservatively presumed moderately hard based on the Goulburn Mulwaree Regional State of the Environment Report 2004-2009.

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table II: Surface Water Results

	95% Freshwater (ANZG 2018)	Hardness Correction Value Applied (ANZECC 2000)	Drinking Water (ADWG 2011)	Irrigation Short-term Trigger Value (ANZECC 2000)	Stock Water (ANZECC 2000)	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
						S20-Ap12288	S20-My01341	S20-Au23117	S20-Oc25143	S19-Se37063	-	S20-Ap12289	S20-Au23118	S20-Oc25145	S19-Au07234	S19-Se37064	-	S20-Ap12290
						1-Apr-20	30-Apr-20	11-Aug-20	13-Oct-20	24-Sep-19	29-Jan-20	1-Apr-20	11-Aug-20	13-Oct-20	06-Aug-19	24-Sep-19	29-Jan-20	1-Apr-20
						SW2	SW2	SW2	SW2	SW3	SW3	SW3	SW3	SW3	SW4	SW4	SW4	SW4
						Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring
						318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780
						Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop
						Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	-	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	-	Grab Sample
Guidelines						Brown, low-medium turbidity, some suspended solids. No odour.	Collected at Goulburn Street footbridge. Not flowing.	Clear to slightly turbid. Flowing.	Water clear, flowing, water level low.	Moderate turbidity.	DRY	Brown to yellow, medium turbidity, some brown matter at surface.	Brown to clear.	Water clear/brown to slightly trubid, flowing.	Stagnant pond, clear to slightly yellow.	Turbid.	DRY	Light brown, low turbidity. No odour.
Analyte grouping/Analyte																		
Dissolved and Total Metals																		
Aluminium	0.055[a]	-	-	20	5	0.08	0.06	0.95	< 0.05	-	-	0.92	0.61	0.46	-	-	-	0.18
Dissolved Aluminium	0.055[a]	-	-	20	5	-	-	0.47	< 0.05	0.3	-	-	0.69	0.4	0.17	0.38	-	-
Arsenic	0.024[b]	-	0.01	2	0.5-5	0.002	< 0.001	< 0.001	< 0.001	-	-	0.004	< 0.001	0.003	-	-	-	0.002
Dissolved Arsenic	0.024[b]	-	0.01	2	0.5-5	-	-	< 0.001	< 0.001	<0.001	-	-	< 0.001	0.002	0.001	<0.001	-	-
Barium	-	-	2	-	-	0.1	0.08	0.05	0.11	-	-	0.1	0.05	0.07	-	-	-	0.07
Dissolved Barium	-	-	2	-	-	-	-	0.04	0.11	0.08	-	-	0.05	0.07	0.04	0.05	-	-
Beryllium	-	-	0.06	0.5	-	< 0.001	< 0.001	< 0.001	< 0.001	-	-	< 0.001	< 0.001	< 0.001	-	-	-	< 0.001
Dissolved Beryllium	-	-	0.06	0.5	-	-	-	< 0.001	< 0.001	<0.001	-	-	< 0.001	< 0.001	<0.001	<0.001	-	-
Boron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Boron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	0.0002	0.00054[g]	0.002	0.05	0.01	0.0019	0.0004	< 0.0002	0.0007	-	-	**0.021**	0.0011	0.0036	-	-	-	**0.019**
Dissolved Cadmium	0.0002	0.00054[g]	0.002	0.05	0.01	-	-	< 0.0002	0.0007	0.0053	-	-	0.001	0.0033	*0.0056*	**0.013**	-	-
Chromium	0.001[c]	0.0025[g]	0.05[c]	1	1	0.001	< 0.001	0.002	< 0.001	-	-	0.002	0.001	0.001	-	-	-	< 0.001
Dissolved Chromium	0.001[c]	0.0025[g]	0.05[c]	1	1	-	-	< 0.001	< 0.001	<0.001	-	-	0.001	0.001	<0.001	<0.001	-	-
Cobalt	0.0014	-	-	0.1	1	0.004	0.002	< 0.001	< 0.001	-	-	0.006	< 0.001	< 0.001	-	-	-	0.005
Dissolved Cobalt	0.0014	-	-	0.1	1	-	-	< 0.001	< 0.001	0.005	-	-	< 0.001	< 0.001	<0.001	0.003	-	-
Copper	0.0014	0.0035[g]	2	5	0.4-5	0.023	0.006	0.004	0.004	-	-	0.18	0.018	0.12	-	-	-	0.13
Dissolved Copper	0.0014	0.0035[g]	2	5	0.4-5	-	-	0.003	0.003	0.027	-	-	0.016	0.1	*0.15*	0.2	-	-
Iron	-	-	-	10	not sufficiently toxic	0.94	0.75	1	< 0.05	-	-	1.8	0.6	1.4	-	-	-	0.68
Dissolved Iron	-	-	-	10	not sufficiently toxic	-	-	0.31	< 0.05	0.33	-	-	0.46	1.1	0.22	0.37	-	-
Lead	0.0034	0.0136[g]	0.01	5	0.1	0.02	0.006	0.003	0.004	0.014	-	**0.17**	0.011	0.051	0.013	0.055	-	0.055
Dissolved Lead	0.0034	0.0136[g]	0.01	5	0.1	-	-	< 0.001	< 0.001	0.011	-	-	0.009	0.023	0.008	0.033	-	-
Manganese	1.9	-	0.5	10	not sufficiently toxic	0.41	0.26	0.043	0.017	-	-	0.52	0.017	0.042	-	-	-	0.42
Dissolved Manganese	1.9	-	0.5	10	not sufficiently toxic	-	-	0.015	0.017	0.015	-	-	0.014	0.029	0.015	0.2	-	-
Mercury	0.00006[d,e]	-	0.001	0.002	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	-	< 0.0001	< 0.0001	< 0.0001	-	-	-	< 0.0001
Dissolved Mercury	0.00006[d,e]	-	0.001	0.002	0.002	-	-	< 0.0001	< 0.0001	< 0.0001	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	-
Nickel	0.011	0.0275[g]	0.02	2	1	0.002	< 0.001	0.002	< 0.001	-	-	0.036	0.002	0.011	-	-	-	0.037
Dissolved Nickel	0.011	0.0275[g]	0.02	2	1	-	-	0.002	< 0.001	0.002	-	-	0.002	0.011	0.014	0.019	-	-
Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	0.008	0.02[g]	-	5	20	0.35	0.16	0.028	0.096	-	-	4	0.22	0.74	-	-	-	3.2
Dissolved Zinc	0.008	0.02[g]	-	5	20	-	-	0.02	0.13	0.95	-	-	0.2	0.7	1.2	2.6	-	-

- indicates no criterion available or not analysed
LOR = Limit of Reporting
Concentrations below the LOR noted as <value
The LOR for mercury exceeds the ecological criteria for 95% protection freshwater ecosystems however concentrations reported as <LOR are considered acceptable as mercury is not a contaminant of concern at the site.
Details of Guideline values are presented in **Section 6** of report (**Table 6-1**)
Concentrations *underlined and in italics* adopted the higher duplicate value
Concentration in a grey box exceed the ecological criteria of 95% protection freshwater ecosytems
Concentrations in a dark grey box exceed the criteria of 95% protection freshwater ecosystems and the hardness corrected value
Concentrations in a bold box exceed the human health guideline value for drinking water
Concentrations in blue font exceed the irrigation short term value
Concentrations in **bold font** exceed stock watering criteria
[a] Aluminium guidelines for pH > 6.5, based on the pH of groundwater measured at the site and surrounding area.
[b] Guideline value for arsenic (III).
[c] Guideline value for chromium (VI).
[d] Guideline value for inorganic mercury.
[e] 99% species protection level DGV has been adopted to account for the bioaccumulating nature of this contaminant.
[f] Hardness correction factor applied to the threshold value as detailed in Section 3.4.3 and Table 3.4.4 of ANZECC 2000. For calculations, water hardness was conservatively presumed moderately hard based on the Goulburn Mulwaree Regional State of the Environment Report 2004-2009.

Table II: Surface Water Results

RAMBOLL

	95% Freshwater (ANZG 2018)	Hardness Correction Value Applied (ANZECC 2000)	Drinking Water (ADWG 2011)	Irrigation Short-term Trigger Value (ANZECC 2000)	Stock Water (ANZECC 2000)	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
						S20-My01342	S20-Au23119	S20-Oc25147	-	-	S20-Au23120	S20-Oc25149	-	-	S20-Au23121	-	S20-Ja29060	S20-Ap12291
						30-Apr-20	11-Aug-20	13-Oct-20	29-Jan-20	1-Apr-20	11-Aug-20	13-Oct-20	29-Jan-20	1-Apr-20	11-Aug-20	13-Oct-20	29-Jan-20	2-Apr-20
						SW4	SW4	SW4	SW5	SW5	SW5	SW5	SW6	SW6	SW6	SW6	SW7	SW7
						Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring
						318000780	318000780	318000780	318000780	318000785	318000785	318000785	318000780	318000785	318000785	318000785	318000786	318000786
						Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop
						Grab Sample	Grab Sample	Grab Sample	-	-	Grab Sample	Grab Sample	-	-	Grab Sample	Grab Sample	Grab Sample	Grab Sample
Guidelines						Collected at Boyd Street culvert. Flowing.	Brown, slightly trubid, full but flow not evident.	Water flowing, turbid, brown, no odour.	DRY	DRY	Brown, turbid, flow at culvert evident beneath crushed rock.	Water not flowing, very shallow, turbid, light brown, no odour.	DRY	DRY	Brown, slightly turbid. Not flowing.	DRY	Silty, from dam, low level water.	Highly turbid.
Analyte grouping/Analyte																		
Dissolved and Total Metals																		
Aluminium	0.055[a]	-	-	20	5	0.49	0.59	0.36	-	-	1.8	**11**	-	-	1.8	-	-	*0.29*
Dissolved Aluminium	0.055[a]	-	-	20	5	-	0.63	0.28	-	-	3.2	0.28	-	-	2.4	-	-	-
Arsenic	0.024[b]	-	0.01	2	0.5-5	0.002	< 0.001	0.003	-	-	0.001	0.005	-	-	0.002	-	0.016	0.004
Dissolved Arsenic	0.024[b]	-	0.01	2	0.5-5	-	< 0.001	0.002	-	-	0.001	0.002	-	-	0.001	-	0.011	-
Barium	-	-	2	-	-	0.07	0.05	0.08	-	-	0.03	0.17	-	-	0.06	-	-	0.08
Dissolved Barium	-	-	2	-	-	-	0.04	0.08	-	-	0.03	0.08	-	-	0.05	-	-	-
Beryllium	-	-	0.06	0.5	-	< 0.001	< 0.001	< 0.001	-	-	< 0.001	< 0.001	-	-	< 0.001	-	< 0.001	< 0.001
Dissolved Beryllium	-	-	0.06	0.5	-	-	< 0.001	< 0.001	-	-	< 0.001	< 0.001	-	-	< 0.001	-	< 0.001	-
Boron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	-
Dissolved Boron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	-
Cadmium	0.0002	0.00054[g]	0.002	0.05	0.01	**0.04**	0.003	**0.019**	-	-	0.0009	0.0021	-	-	0.0072	-	0.0016	0.0009
Dissolved Cadmium	0.0002	0.00054[g]	0.002	0.05	0.01	-	0.0029	**0.018**	-	-	0.0009	0.001	-	-	0.0063	-	0.0005	-
Chromium	0.001[c]	0.0025[g]	0.05[c]	1	1	0.001	0.001	0.001	-	-	0.003	0.011	-	-	0.003	-	-	0.001
Dissolved Chromium	0.001[c]	0.0025[g]	0.05[c]	1	1	-	< 0.001	< 0.001	-	-	0.003	< 0.001	-	-	0.003	-	-	-
Cobalt	0.0014	-	-	0.1	1	0.009	0.001	0.004	-	-	< 0.001	0.003	-	-	< 0.001	-	0.002	0.002
Dissolved Cobalt	0.0014	-	-	0.1	1	-	< 0.001	0.004	-	-	< 0.001	0.001	-	-	< 0.001	-	0.002	-
Copper	0.0014	0.0035[g]	2	5	0.4-5	0.31	0.04	0.19	-	-	0.019	0.074	-	-	0.1	-	0.021	0.022
Dissolved Copper	0.0014	0.0035[g]	2	5	0.4-5	-	0.035	0.18	-	-	0.016	0.045	-	-	0.088	-	0.009	-
Iron	-	-	-	10	not sufficiently toxic	0.83	0.57	1.3	-	-	1.5	8.9	-	-	1.4	-	-	4.22
Dissolved Iron	-	-	-	10	not sufficiently toxic	-	0.47	0.89	-	-	1.4	0.54	-	-	1.1	-	-	-
Lead	0.0034	0.0136[g]	0.01	5	0.1	**0.13**	0.015	0.038	-	-	0.01	0.031	-	-	0.022	-	0.037	0.02
Dissolved Lead	0.0034	0.0136[g]	0.01	5	0.1	-	0.011	0.023	-	-	0.006	0.007	-	-	0.013	-	*0.017*	-
Manganese	1.9	-	0.5	10	not sufficiently toxic	0.63	0.045	0.37	-	-	0.012	0.15	-	-	0.018	-	1.1	0.41
Dissolved Manganese	1.9	-	0.5	10	not sufficiently toxic	-	0.041	0.38	-	-	0.008	0.09	-	-	0.013	-	0.68	-
Mercury	0.00006[d,e]	-	0.001	0.002	0.002	< 0.0001	< 0.0001	< 0.0001	-	-	< 0.0001	< 0.0001	-	-	< 0.0001	-	< 0.0001	< 0.0001
Dissolved Mercury	0.00006[d,e]	-	0.001	0.002	0.002	-	< 0.0001	< 0.0001	-	-	< 0.0001	< 0.0001	-	-	< 0.0001	-	< 0.0001	-
Nickel	0.011	0.0275[g]	0.02	2	1	0.12	0.006	0.038	-	-	0.002	0.007	-	-	0.029	-	0.012	0.006
Dissolved Nickel	0.011	0.0275[g]	0.02	2	1	-	0.006	0.038	-	-	0.002	0.003	-	-	0.026	-	0.009	-
Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-
Dissolved Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-
Zinc	0.008	0.02[g]	-	5	20	7	0.56	2.6	-	-	0.11	0.3	-	-	0.9	-	0.28	0.15
Dissolved Zinc	0.008	0.02[g]	-	5	20	-	0.5	2.5	-	-	0.094	0.14	-	-	0.79	-	0.087	-

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Concentrations in a dark grey box exceed the criteria of 95% protection freshwater ecosystems and the hardness corrected value
Concentrations in a bold box exceed the human health guideline value for drinking water
Concentrations in blue font exceed the irrigation short term value
Concentrations in **bold font** exceed stock watering criteria
[a] Aluminium guidelines for pH > 6.5, based on the pH of groundwater measured at the site and surrounding area.
[b] Guideline value for arsenic (III).
[c] Guideline value for chromium (VI).
[d] Guideline value for inorganic mercury.
[e] 99% species protection level DGV has been adopted to account for the bioaccumulating nature of this contaminant.
[f] Hardness correction factor applied to the threshold value as detailed in Section 3.4.3 and Table 3.4.4 of ANZECC 2000. For calculations, water hardness was conservatively presumed moderately hard based on the Goulburn Mulwaree Regional State of the Environment Report 2004-2009.

Table II: Surface Water Results

RAMBOLL

Guidelines	95% Freshwater (ANZG 2018)	Hardness Correction Value Applied (ANZECC 2000)	Drinking Water (ADWG 2011)	Irrigation Short-term Trigger Value (ANZECC 2000)	Stock Water (ANZECC 2000)	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
						S20-Au23122	S20-Oc25163	S20-Ja29061	S20-Ap12292	S20-Au23123	S20-Oc25165	S20-Ja29062	S20-Ap12293	S20-Au23124	S20-Oc25167	S20-Oc25153	S20-Oc25317	S20-Oc25319
						11-Aug-20	12-Oct-20	29-Jan-20	2-Apr-20	10-Aug-20	12-Oct-20	29-Jan-20	2-Apr-20	10-Aug-20	12-Oct-20	13-Oct-20	13-Oct-20	13-Oct-20
						SW7	SW7	SW8	SW8	SW8	SW8	SW9	SW9	SW9	SW9	SW10	SW_BR001	SW_BR002
						Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring	Tarago SW Monitoring
						318000785	318000785	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780	318000780
						Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop
						Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample
						Brown, turbid.	Water slightly trubid, brown, not flowing.	Clear, vegetation. Not flowing.	Grease at surface, lots of algae growing on plants.	Water flowing, level high, turbid.	Water flowing, clear/brown.	Stagnant pond. Algae and fish present. Slightly turbid.	Non-turbid, slightly brown, not flowing but full.	High level, brown, slightly turbid, bubbles at surface.	Water flowing, clear/brown, slightly turbid.	Water flowing, clear/brown, slightly turbid, no odour.	Water slightly turbid, yellow/brown, no odour, not flowing.	Water flowing, turbid, brown, no odour.
Analyte grouping/Analyte																		
Dissolved and Total Metals																		
Aluminium	0.055[a]	-	-	20	5	*1.7*	*0.33*	-	< 0.05	0.72	< 0.05	-	0.05	0.53	< 0.05	< 0.05	0.48	0.38
Dissolved Aluminium	0.055[a]	-	-	20	5	0.95	0.18	-	-	0.41	< 0.05	-	-	0.35	< 0.05	< 0.05	0.17	0.16
Arsenic	0.024[b]	-	0.01	2	0.5-5	0.003	0.005	< 0.001	0.001	< 0.001	0.001	0.001	0.001	< 0.001	0.001	0.001	0.003	0.003
Dissolved Arsenic	0.024[b]	-	0.01	2	0.5-5	0.001	0.004	< 0.001	-	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	0.003	0.002
Barium	-	-	2	-	-	0.04	0.05	-	0.12	0.02	0.08	-	0.08	0.02	0.09	0.1	0.05	< 0.02
Dissolved Barium	-	-	2	-	-	0.03	0.05	-	-	0.02	0.09	-	-	0.02	0.09	0.11	0.05	< 0.02
Beryllium	-	-	0.06	0.5	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Beryllium	-	-	0.06	0.5	-	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Boron	-	-	-	-	-	-	-	< 0.05	-	-	-	< 0.05	-	-	-	-	-	-
Dissolved Boron	-	-	-	-	-	-	-	< 0.05	-	-	-	< 0.05	-	-	-	-	-	-
Cadmium	0.0002	0.00054[g]	0.002	0.05	0.01	0.0014	0.0003	< 0.0002	< 0.0002	0.0003	< 0.0002	< 0.0002	< 0.0002	0.0004	< 0.0002	< 0.0002	0.0002	0.0005
Dissolved Cadmium	0.0002	0.00054[g]	0.002	0.05	0.01	0.001	< 0.0002	< 0.0002	-	0.0002	< 0.0002	< 0.0002	-	0.0004	< 0.0002	< 0.0002	< 0.0002	0.0003
Chromium	0.001[c]	0.0025[g]	0.05[c]	1	1	0.002	0.001	-	< 0.001	0.001	< 0.001	-	< 0.001	0.002	< 0.001	< 0.001	0.005	0.001
Dissolved Chromium	0.001[c]	0.0025[g]	0.05[c]	1	1	0.002	< 0.001	-	-	0.001	< 0.001	-	-	< 0.001	< 0.001	< 0.001	0.004	< 0.001
Cobalt	0.0014	-	-	0.1	1	< 0.001	< 0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002
Dissolved Cobalt	0.0014	-	-	0.1	1	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.001	0.002
Copper	0.0014	0.0035[g]	2	5	0.4-5	0.027	0.014	< 0.001	< 0.001	0.008	< 0.001	< 0.001	0.001	0.01	< 0.001	< 0.001	0.008	0.016
Dissolved Copper	0.0014	0.0035[g]	2	5	0.4-5	0.019	0.013	< 0.001	-	0.007	< 0.001	< 0.001	-	0.008	< 0.001	< 0.001	0.007	0.011
Iron	-	-	-	10	not sufficiently toxic	1.8	3	-	3.2	0.76	0.51	-	0.54	0.6	0.15	0.55	0.43	4
Dissolved Iron	-	-	-	10	not sufficiently toxic	0.57	2.4	-	-	0.31	0.15	-	-	0.29	< 0.05	0.11	0.16	2
Lead	0.0034	0.0136[g]	0.01	5	0.1	0.025	0.012	< 0.001	< 0.001	0.002	0.001	< 0.001	< 0.001	0.002	0.001	0.002	0.004	0.011
Dissolved Lead	0.0034	0.0136[g]	0.01	5	0.1	0.005	0.009	< 0.001	-	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.001	0.005
Manganese	1.9	-	0.5	10	not sufficiently toxic	0.032	0.063	0.37	1.9	0.035	0.066	0.19	0.33	0.041	0.03	0.089	0.086	0.2
Dissolved Manganese	1.9	-	0.5	10	not sufficiently toxic	0.028	0.056	0.33	-	0.028	0.064	0.012	-	0.036	0.023	0.089	0.027	0.19
Mercury	0.00006[d,e]	-	0.001	0.002	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dissolved Mercury	0.00006[d,e]	-	0.001	0.002	0.002	< 0.0001	< 0.0001	< 0.0001	-	< 0.0001	< 0.0001	< 0.0001	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel	0.011	0.0275[g]	0.02	2	1	0.003	0.003	0.001	0.002	0.002	0.001	0.002	0.002	0.002	0.001	0.001	0.003	0.006
Dissolved Nickel	0.011	0.0275[g]	0.02	2	1	0.003	0.003	< 0.001	-	0.002	0.001	< 0.001	-	0.002	0.001	< 0.001	0.003	0.006
Selenium	-	-	-	-	-	-	-	< 0.001	-	-	-	< 0.001	-	-	-	-	-	-
Dissolved Selenium	-	-	-	-	-	-	-	< 0.001	-	-	-	< 0.001	-	-	-	-	-	-
Zinc	0.008	0.02[g]	-	5	20	0.36	0.065	< 0.005	0.022	0.12	0.009	0.009	0.015	0.16	0.008	0.013	0.034	0.051
Dissolved Zinc	0.008	0.02[g]	-	5	20	0.26	0.051	< 0.005	-	0.1	0.01	< 0.005	-	0.14	< 0.005	0.006	0.015	0.034

- indicates no criterion available or not analysed
LOR = Limit of Reporting
Concentrations below the LOR noted as <value
The LOR for mercury exceeds the ecological criteria for 95% protection freshwater ecosystems however concentrations reported as <LOR are considered acceptable as mercury is not a contaminant of concern at the site.
Details of Guideline values are presented in **Section 6** of report (**Table 6-1**)
Concentrations *underlined and in italics* adopted the higher duplicate value
Concentration in a grey box exceed the ecological criteria of 95% protection freshwater ecosytems
Concentrations in a dark grey box exceed the criteria of 95% protection freshwater ecosystems and the hardness corrected value
Concentrations in a bold box exceed the human health guideline value for drinking water
Concentrations in blue font exceed the irrigation short term value
Concentrations in **bold font** exceed stock watering criteria
[a] Aluminium guidelines for pH > 6.5, based on the pH of groundwater measured at the site and surrounding area.
[b] Guideline value for arsenic (III).
[c] Guideline value for chromium (VI).
[d] Guideline value for inorganic mercury.
[e] 99% species protection level DGV has been adopted to account for the bioaccumulating nature of this contaminant.
[f] Hardness correction factor applied to the threshold value as detailed in Section 3.4.3 and Table 3.4.4 of ANZECC 2000. For calculations, water hardness was conservatively presumed moderately hard based on the Goulburn Mulwaree Regional State of the Environment Report 2004-2009.

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table III: Sediment Results

RAMBOLL

	Sediment DGV[A]	Sediment GV-High[A]			Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Sediment
Sample Type:					Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Sediment
Site:					Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Ephemeral creek bed	Upgradient
Lab Sample number:					---	---	---	---	---	---	---	S20-Oc25318	---	---	M20-Jn34830	M20-Ma43808	---	---	---	S20-Ap12275
Sample date:					30-06-20	30-06-20	30-06-20	30-06-20	30-06-20	30-06-20	30-06-20	13-10-20	13-10-20	13-10-20	25-03-20	25-03-20	13-10-20	13-10-20	13-10-20	1-Apr-20
Sample ID:					Creek 1	Creek 1a	Creek 2	Creek 3	Creek 4	Creek 5	Creek 6	SED_BR002	XP6O01	XP6O02	P6_HA5_0.0	P6_HA5_0.15	XP6O03	XP6O04	XP6O05	SED1_UP
Project Name:					DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
Sampling Method:					Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Sediment Sampler	Field Portable XRF	Field Portable XRF	Hand Auger	Hand Auger	Field Portable XRF	Field Portable XRF	Field Portable XRF	Direct
												---	---	---	Duplicate analysis	---	Duplicated collected	---	---	
Analyte grouping/Analyte			**Units**	**LOR**																
Moisture																				
Moisture Content (dried @ 103°C)			%	--	--	--	--	--	--	--	--	64	---	---	*11*	16	---	---	---	-
Metals																				
Aluminium	--	--	mg/kg	10	--	--	--	--	--	--	--	20000	-	-	*13000*	---	*17000*	-	-	12000
Arsenic	20	70	mg/kg	2	<LOD	12	20	<LOD	12	<LOD	<LOD	34	-	-	*18*	---	*11*	-	-	8.6
Barium	--	--	mg/kg	10	132	<LOD	356	<LOD	<LOD	<LOD	<LOD	180	<LOD	<LOD	*140*	---	*200*	<LOD	<LOD	65
Beryllium	--	--	mg/kg	2	--	--	--	--	--	--	--	< 2	-	-	*< 2*	---	-	-	-	< 2
Cadmium	1.5	10	mg/kg	0.4	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	45	<LOD	<LOD	*8.1*	---	*11*	<LOD	<LOD	< 0.4
Chromium	80	370	mg/kg	5	<LOD	<LOD	24	<LOD	<LOD	<LOD	<LOD	21	-	-	*21*	---	*16*	-	-	20
Cobalt	--	--	mg/kg	5	<LOD	<LOD	<LOD	<LOD	130	<LOD	<LOD	13	<LOD	<LOD	*7.3*	---	*8.1*	<LOD	<LOD	5.5
Copper	65	270	mg/kg	5	76	63	71	54	42	34	31	1300	37	114	*610*	---	*397*	<LOD	31.45	10
Iron	--	--	mg/kg	20	10622	13219	18468	9981	18417	11702	10848	20000	3306	11576.16	*23000*	---	*23400*	10318	10643	23000
Lead	50	220	mg/kg	5	309	226	206	133	121	69	84	1900	58	171.92	*800*	160	*310*	22	30	18
Manganese	--	--	mg/kg	5	166	502	236	157	240	226	112	68	81	284.01	*260*	---	*160*	338	340	56
Mercury	0.15	1	mg/kg	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.2	<LOD	<LOD	*< 0.1*	---	<LOD	<LOD	<LOD	< 0.1
Nickel	21	52	mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	54	<LOD	<LOD	*15*	---	*18*	<LOD	<LOD	8.6
Zinc	200	410	mg/kg	5	514	663	857	890	522	405	367	8600	220	761.98	*790*	---	*1100*	175	239	20

LOR = Limit of Reporting
LOD = Limit of Detection
Concentrations below the LOR / LOD noted as <value
Concentrations *underlined and in italics* adopted the higher duplicate value
Concnetrations in grey box exceed sediment DGV
Concentrations in orange box exceed sediment DGV-High

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table III: Sediment Results

	Sediment DGV[A]	Sediment GV-High[A]	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
			Upgradient	Upgradient	Rail corridor	Rail corridor	Rail corridor	Rail corridor	Rail corridor	Rail corridor	Rail corridor	Rail corridor	Rail corridor	Tarago	Tarago	Tarago	Rail corridor	Rail corridor	Rail corridor
			S20-Au23105	S20-Oc25320	S20-Ap12274	S20-Au23104	S20-Oc25142	S20-Ap12276 / S20-Jn50647	S20-Au23106	S20-Oc25144	S20-Ap12277 / S20-Jn50648	S20-Au23107	S20-Oc25146	S20-Ap12278 / S20-Jn50649	S20-Au23108	S20-Oc25148	S20-Ap12279	S20-Au23109	S20-Oc25150
			11-Aug-20	13-Oct-20	1-Apr-20	11-Aug-20	13-Oct-20	1-Apr-20	11-Aug-20	13-Oct-20	1-Apr-20	11-Aug-20	13-Oct-20	1-Apr-20	11-Aug-20	13-Oct-20	1-Apr-20	11-Aug-20	13-Oct-20
			SED1-UP	SED1-UP	SED1	SED1	SED1	SED2	SED2	SED2	SED3	SED3	SED3	SED4	SED4	SED4	SED5	SED5	SED5
			DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
Analyte grouping/Analyte																			
Moisture																			
Moisture Content (dried @ 103°C)			-	18	-	-	44	-	-	-		-	-	-	-	27	-	-	21
Metals																			
Aluminium	--	--	-	12000	9200	-	*21000*	8300	-	14000	13000	-	10000	9200	-	28000	4400	-	7800
Arsenic	20	70	-	16	19	-	9.7	18	-	18	5.1	-	11	37	-	5.1	2.9	-	6.4
Barium	--	--	-	49	120	-	*170*	85	-	110	200	-	110	150	-	240	64	-	98
Beryllium	--	--	-	< 2	< 2	-	< 2	< 2	-	< 2	< 2	-	< 2	< 2	-	< 2	< 2	-	< 2
Cadmium	1.5	10	-	< 0.4	2.6	-	7.2	7.2	-	6.2	3	-	1.8	5	-	8.2	0.6	-	0.5
Chromium	80	370	-	29	16	-	*25*	14	-	22	16	-	16	17	-	23	8.3	-	14
Cobalt	--	--	-	6.3	9.5	-	*7.6*	6.1	-	11	< 5	-	< 5	< 5	-	5.4	< 5	-	< 5
Copper	65	270	-	12	200	-	*247*	490	-	320	58	-	140	600	-	160	14	-	13
Iron	--	--	-	37000	17000	-	*19000*	16000	-	24000	15000	-	19000	17000	-	18000	6600	-	18000
Lead	50	220	23	29	4700	1700	*740*	1600	340	1000	130	630	400	2600	1600	130	39	24	27
Manganese	--	--	-	70	290	-	120	280	-	640	120	-	97	140	-	220	280	-	200
Mercury	0.15	1	-	< 0.1	< 0.1	-	< 0.1	0.1	-	< 0.1	< 0.1	-	< 0.1	0.3	-	< 0.1	< 0.1	-	< 0.1
Nickel	21	52	-	8.8	9.8	-	*14*	8.7	-	14	7.6	-	8.7	9.8	-	17	< 5	-	< 5
Zinc	200	410	-	24	610	-	*1100*	2400	-	2400	320	-	290	750	-	840	100	-	81

LOR = Limit of Reporting
LOD = Limit of Detection
Concentrations below the LOR / LOD noted a
Concentrations *underlined and in italics* adop
Concnetrations in grey box exceed sediment
Concentrations in orange box exceed sedime

Table III: Sediment Results

RAMBOLL

	Sediment DGV[A]	Sediment GV-High[A]	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
			Rail corridor	Rail corridor	Rail corridor	Adjacent rail corridor	Adjacent rail corridor	Adjacent rail corridor	Mulwaree River	Mulwaree River	Mulwaree River	Mulwaree River	Mulwaree River	Mulwaree River	Mulwaree River
			S20-Ap12280	S20-Au23110	-	S20-Ap12281	S20-Au23111	S20-Oc25164	S20-Ap12282	S20-Au23112	S20-Oc25166	S20-Ap12283	S20-Au23113	S20-Oc25168	S20-Oc25154
			1-Apr-20	11-Aug-20	13-Oct-20	2-Apr-20	11-Aug-20	12-Oct-20	2-Apr-20	10-Aug-20	12-Oct-20	2-Apr-20	20-Aug-20	12-Oct-20	13-Oct-20
			SED6	SED6	SED6	SED7	SED7	SED7	SED8	SED8	SED8	SED9	SED9	SED9	SED10
			DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
Analyte grouping/Analyte															
Moisture															
Moisture Content (dried @ 103°C)			-	-	-	-	-	32	-	-	26	-	-	17	32
Metals															
Aluminium	--	--	6500	-	*5100*	5200	-	8100	8500	-	16000	12000	-	3400	13000
Arsenic	20	70	10	-	*5.7*	6.4	-	6.3	4.8	-	7.8	3.6	-	16	4.3
Barium	--	--	63	-	*53*	60	-	78	93	-	130	96	-	58	110
Beryllium	--	--	< 2	-	*< 2*	< 2	-	< 2	< 2	-	< 2	< 2	-	< 2	< 2
Cadmium	1.5	10	3.3	-	*2.1*	4.6	-	3.3	0.4	-	< 0.4	0.5	-	< 0.4	0.6
Chromium	80	370	9.6	-	*11*	8.1	-	10	12	-	16	17	-	13	14
Cobalt	--	--	< 5	-	*2*	< 5	-	< 5	6.3	-	< 5	5.5	-	11	< 5
Copper	65	270	59	-	*40*	190	-	42	12	-	10	13	-	12	15
Iron	--	--	9200	-	*15000*	7600	-	8900	10000	-	14000	14000	-	28000	12000
Lead	50	220	88	290	*59*	210	56	180	20	15	23	19	24	23	26
Manganese	--	--	91	-	*136*	140	-	61	76	-	130	400	-	380	160
Mercury	0.15	1	< 0.1	-	<LOD	< 0.1	-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	< 0.1	< 0.1
Nickel	21	52	6.9	-	*4*	< 5	-	< 5	6.6	-	7.3	8.4	-	8.9	7.1
Zinc	200	410	470	-	*850*	580	-	560	94	-	70	140	-	70	140

LOR = Limit of Reporting
LOD = Limit of Detection
Concentrations below the LOR / LOD noted a
Concentrations *underlined and in italics* adop
Concnetrations in grey box exceed sediment
Concentrations in orange box exceed sedime

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table IV: Sediment Results (Drainage Lines)

RAMBOLL

	NEPM 2013 HIL C Open Space	NEPM 2013 EIL Residential / public Open Space	**Sample Type:**		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
			Site:		Boyd Street	Boyd Street	Boyd Street	Boyd Street	Boyd Street	Boyd Street	Boyd Street	Boyd Street	Boyd Street	Boyd Street	Boyd Street	Braidwood Road	Braidwood Road	Braidwood Road
			Lab Sample number:		---	S20-Jn26497	---	---	---	---	---	---	---	---	---	---	---	---
			Sample date:		18-03-20	18-03-20	18-03-20	30-06-20	30-06-20	30-06-20	30-06-20	30-06-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20
			Sample ID:		XBOYDSTW2	XBOYDSTW1	XBOYDSTE1	BOYD1	BOYD2	BOYD3	BOYD4	BOYD5	XBOYDO01	XBOYDO02	XBOYDO03	XBRO01	XBRO02	XBRO03
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
			Sampling Method:		Field Portable XRF	Sediment Sampler	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF
			Comments:		---	Duplicate collected	---	---	---	---	---	---	Duplicates collected	Duplicates collected	---	---	---	---
Analyte grouping/Analyte			**Units**	**LOR**														
Moisture																		
					---		--	--	--	--	--	--						
Metals																		
Aluminium			mg/kg	10	---	11000	--	--	--	--	--	--	*7700*	*14000*	-	-	-	-
Arsenic	300	100	mg/kg	2	45.6	15	<LOD	*21*	<LOD	<LOD	45	27	*14*	*15*	-	-	-	-
Barium			mg/kg	2	924.35	170	665.38	--	--	--	--	--	447.16	*180*	<LOD	930.01	808.69	588.94
Beryllium	90		mg/kg	10	---	< 2	--	--	--	--	--	--	<LOD	*< 2*	-	-	-	-
Cadmium	90		mg/kg	0.4	<LOD	3.8	<LOD	--	--	--	--	--	*2.5*	*20*	<LOD	24.63	<LOD	<LOD
Chromium	300	424	mg/kg	5	16.84	14	<LOD	--	--	--	--	--	*26*	*13*	-	-	-	-
Cobalt	300		mg/kg	5	<LOD	5.2	<LOD	--	--	--	--	--	140.83	*20*	<LOD	<LOD	<LOD	<LOD
Copper	17000	125	mg/kg	5	**272.2**	**330**	**195.21**	***580***	**324**	**368**	**233**	**236**	***146***	***610***	**461.82**	<LOD	52.66	48.39
Iron			mg/kg	5	17106.94	19000	11842.94	--	--	--	--	--	*27700*	*16000*	16241.07	5355.59	11204.85	9208.56
Lead	600	1100	mg/kg	5	363.84	*740*	459.09	*1200*	782	484	337	329	*249*	*733*	653.74	31.11	28.72	12.73
Manganese	19000		mg/kg	0.1	296.78	450	402.67	--	--	--	--	--	*380*	847.76	899.62	121.76	321.78	103.09
Mercury	80		mg/kg	5	<LOD	< 0.1	<LOD	--	--	--	--	--	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Nickel	1200	194	mg/kg	5	<LOD	9.6	<LOD	--	--	--	--	--	*12*	*22*	<LOD	<LOD	<LOD	<LOD
Zinc	30000	308	mg/kg	2	**604.04**	**580**	**368.63**	***1200***	**974**	**640**	**1214**	**1054**	**905.69**	**2581.7**	**1453.34**	61.38	240.64	45.17

LOR = Limit of Reporting
LOD = Limit of Detection
Concentrations below the LOR / LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'C' for Urban Residential and Open Public Space
Concentration in **bold green font** exceed the adopted EIL for Open Space and Recreational Land Use

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table IV: Sediment Results (Drainage Lines)

	NEPM 2013 HIL C Open Space	NEPM 2013 EIL Residential / public Open Space																
			Sample Type:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
			Site:		Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road	Braidwood Road
			Lab Sample number:		---	---	---	---	---	---	---	---	---	---	---	S20-Oc25316	---	---
			Sample date:		13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	13-10-20	12-10-20	12-10-20
			Sample ID:		XBRO04	XBRO05	XBRO06	XBRO07	XBRO08	XBRO09	XBRO10	XBRO11	XBRO12	XBRO13	XBRO14	SED_BR001	BR_SED1	BR_SED2
			Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
			Sampling Method:		Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Field Portable XRF	Sediment Sampler	Hand Auger	Hand Auger
			Comments:		---	---	---	---	---	---	---	---	---	---	---			
Analyte grouping/Analyte			**Units**	**LOR**														
Moisture																		
																30	-	-
Metals																		
Aluminium			mg/kg	10	-	-	-	-	-	-	-	-	-	-	-	10000	-	-
Arsenic	300	100	mg/kg	2	-	-	-	-	-	-	-	-	-	-	-	9.6	-	-
Barium			mg/kg	2	458.69	<LOD	233.81	<LOD	<LOD	524.69	<LOD	<LOD	484.8	<LOD	1167.84	84	<LOD	<LOD
Beryllium	90		mg/kg	10	-	-	-	-	-	-	-	-	-	-	-	< 2	-	-
Cadmium	90		mg/kg	0.4	<LOD	<LOD	17.97	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	51.79	< 0.4	<LOD	<LOD
Chromium	300	424	mg/kg	5	-	-	-	-	-	-	-	-	-	-	-	18	-	-
Cobalt	300		mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	120.52	7.5	<LOD	<LOD
Copper	17000	125	mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	26.05	<LOD	<LOD	<LOD	36.63	14	89.23	<LOD
Iron			mg/kg	5	13557.85	9488.67	10800.38	8168.78	7362.36	8417.44	6330.73	2274.46	7121.88	14810.29	11969.66	22000	16718.04	4360.83
Lead	600	1100	mg/kg	5	34.03	22.67	16.55	31.04	61.07	35.32	40.95	15.3	<LOD	31.93	<LOD	35	97.31	22.88
Manganese	19000		mg/kg	0.1	470.44	240.72	133.08	211.53	182.18	<LOD	270.99	185.79	233.97	704.16	738.6	310	431.88	101.89
Mercury	80		mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	< 0.1	<LOD	<LOD
Nickel	1200	194	mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	5.2	<LOD	<LOD
Zinc	30000	308	mg/kg	2	151.88	150.19	28.24	39.65	152.64	70.42	**601**	**606**	182.44	187.54	69.08	93	**841.15**	210.1

LOR = Limit of Reporting
LOD = Limit of Detection
Concentrations below the LOR / LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'C' for Urban Residential and Open Public Space
Concentration in **bold green font** exceed the adopted EIL for Open Space and Recreational Land Use

Table V: Soil Results (Former Loudout Complex)

	NEPM 2013 HIL D Commercial Industrail	NEPM 2013 EIL Commercial Industrial															
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex
			Lab Sample number:		S19-Jl39934	S19-Jl39997	S19-Jl39998	S19-Au39089	S19-Se37045	S20-Ap02702	S20-Ap02703	S20-Ap02704	S20-Ap44309	S20-Ap44310	S20-Ap44311	S20-Ap44312	S20-Ap44313
			Sample date:		26-07-19	26-07-19	26-07-19	27-08-20	22-09-19	31-03-20	31-03-20	31-03-20	31-03-20	31-03-20	31-03-20	31-03-20	31-03-20
			Sample ID:		SS15	SS17	SS18	SS44	SS101	TP3_0.0-0.1	TP3_0.5-0.6	TP3_0.6-0.7	TP3_1.5-1.6	TP4_0.0-0.1	P4_0.5-0.6	TP4_1.0-1.1	TP4_1.9-2.0
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Direct	Direct	Direct	Direct	Direct	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit
Analyte grouping/Analyte			**Units**	**LOR**													
Moisture																	
103°C)			%	1	-	-	-	-	-	7.6	4.2	9.5	10	9.7	8.8	7.3	8
Metals																	
Lead	2200*	1800	mg/kg	5	350	25	34	140	17	29	1100	< 5	44	380	170	90	29

Details of Guideline values are presented in **Section 6** of report (**Table 6-3**)
LOR= Limit of Reporting
Concentrations below the LOR / LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'D' for
Concentration in **green font** exceed the adopted EIL for Commerical Industrial land use

Table V: Soil Results (Former Loudout Complex)

	NEPM 2013 HIL D Commercial Industrail	NEPM 2013 EIL Commercial Industrial																
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex
			Lab Sample number:		S20-Ap02719	S20-Ap02720	S20-Ap02721	M20-Ma43435	M20-Ma43436	M20-Ma43437	M20-Ma43438	M20-Ma43439	MW2_4.5	N/A	N/A	N/A	N/A
			Sample date:		31-03-20	31-03-20	31-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	19-08-20	19-08-20	19-08-20	19-08-20
			Sample ID:		TP9_0.0-0.1	TP9_0.5-0.6	TP9_1.2-1.3	MW2_0-0.05	MW2_1.0	MW2_1.5	MW2_2.5	MW2_3.5	MW2_4.5	LO_TP01_0.0	LO_TP01_0.5	LO_TP01_1.0	LO_TP01_1.3
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addnedum	DSI Addnedum	DSI Addnedum	DSI Addnedum	DSI Addnedum	DSI Addnedum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Test Pit	Test Pit	Test Pit	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Test Pit	Test Pit	Test Pit	Test Pit
Analyte grouping/Analyte			**Units**	**LOR**													
Moisture																	
103°C)			%	1	8.8	7.6	7.3	< 1	5.5	4.9	4.4	7	7.9	-	-	-	-
Metals																	
Lead	2200*	1800	mg/kg	5	40	140	1200	51	3600	540	200	140	42	31	96	50	58

Details of Guideline values are presented in **Section 6** of report (**Table 6-3**)
LOR= Limit of Reporting
Concentrations below the LOR / LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'D' for
Concentration in **green font** exceed the adopted EIL for Commerical Industrial land use

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table V: Soil Results (Former Loudout Complex)

	NEPM 2013 HIL D Commercial Industrail	NEPM 2013 EIL Commercial Industrial															
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex
			Lab Sample number:		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Sample date:		19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20
			Sample ID:		LO_TP02_0.0	LO_TP02_0.5	LO_TP02_0.9	LO_TP02_1.1	LO_TP02_1.3	LO_TP02_1.35	LO_TP02_1.4	LO_TP03_0.9	LO_TP03_1.5	LO_TP03_1.6	LO_TP03_1.7	LO_TP04_0.25	LO_TP04_0.7
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit
Analyte grouping/Analyte			**Units**	**LOR**													
Moisture																	
103°C)			%	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																	
Lead	2200*	1800	mg/kg	5	176	16	11	*5700*	6900	85	83	158	1748	3662	117	18	199

Details of Guideline values are presented in **Section 6** of report (**Table 6-3**)
LOR= Limit of Reporting
Concentrations below the LOR / LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'D' for
Concentration in **green font** exceed the adopted EIL for Commerical Industrial land use

Table V: Soil Results (Former Loudout Complex)

	NEPM 2013 HIL D Commercial Industrail	NEPM 2013 EIL Commercial Industrial											
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex	Former Loadout Complex
			Lab Sample number:		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Sample date:		19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20
			Sample ID:		LO_TP05_0.3	LO_TP05_0.7	LO_TP05_0.85	LO_TP05_1.1	LO_TP05_1.4	LO_TP06_0.05	LO_TP06_0.5	LO_TP06_0.7	LO_TP06_1.2
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit
Analyte grouping/Analyte			**Units**	**LOR**									
Moisture													
103°C)			%	1	-	-	-	-	-	-	-	-	-
Metals													
Lead	2200*	1800	mg/kg	5	90	883	605	150	8	14	ND	273	31

Details of Guideline values are presented in **Section 6** of report (**Table 6-3**)
LOR= Limit of Reporting
Concentrations below the LOR / LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'D' for
Concentration in **green font** exceed the adopted EIL for Commerical Industrial land use

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table VI: Characterisation of Materials to be Generated during Remediation

	NEPM 2013 HIL D Commercial Industrial	NEPM 2013 EIL Commercial Industrial												
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor
			Lab Sample number:		S20-Au35780	S20-Au35781	S20-Au35782	S20-Au35783	S20-Au35784	S20-Au35785	S20-Au35786	S20-Au35787	S20-Au35788	S20-Au35789
			Sample date:		19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20
			Sample ID:		RRE_SP01	RRE_SP02	RRE_SP03	RRE_SP04	RRE_SP05	RRE_SP06	RRE_SP07	RRE_SP08	RRE_SP09	RRE_SP10
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample
Analyte grouping/Analyte			**Units**	**LOR**										
Miscellaneous														
Moisture Content (dried @ 103°C)			%	1	6.4	7.1	7	6.1	5.3	6.3	8.1	9	7.9	9.5
Conductivity (1:5 aqueous extract at 25°C as rec.)			uS/cm	10	170	540	91	970	620	1100	970	1100	410	730
pH (1:5 Aqueous extract at 25°C as rec.)			pH Units	0.1	7.4	4.3	8.3	6.4	4.4	4.4	5.3	4	4.4	4.2
Sulphur			mg/kg	5	910	4300	460	14000	3900	11000	8600	16000	5900	4100
Total Organic Carbon			%	0.1	0.5	0.6	1.8	1.2	1.5	0.5	2.3	0.7	< 0.1	0.5
Metals														
Antimony			mg/kg	10	< 10	19	24	23	31	23	25	39	10	32
Arsenic	3000	160	mg/kg	2	21	70	48	130	**190**	150	130	**190**	49	**170**
Beryllium	500		mg/kg	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Boron	300000		mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	900		mg/kg	0.4	2.9	7	1.8	10	8.2	25	10	6	3.3	4.6
Chromium	3600	710	mg/kg	5	25	59	24	60	58	130	79	*81*	37	71
Cobalt	4000		mg/kg	5	7.4	14	30	8.3	11	14	12	*12*	8.4	11
Copper	240000	160	mg/kg	5	**510**	**960**	**450**	**2100**	**1700**	**2200**	**1900**	**1600**	**700**	**1200**
Lead	2200*	1800	mg/kg	5	**2600**	**5900**	1300	**5300**	**7000**	**5200**	**6800**	**19000**	**4100**	**7300**
Manganese	19000		mg/kg	5	340	640	520	550	630	970	680	710	540	1100
Mercury	730		mg/kg	0.1	0.2	0.5	0.2	0.7	1.2	1.2	1.1	1.6	0.4	0.6
Molybdenum			mg/kg	5	< 5	< 5	< 5	6.7	8.5	5.8	6.4	7.3	5.4	< 5
Nickel	6000	340	mg/kg	5	10	29	18	32	22	45	75	40	18	28
Selenium	10000		mg/kg	2	4.3	9.5	< 2	19	23	18	17	27	8.1	15
Tin			mg/kg	10	15	30	23	49	190	140	120	80	28	47
Vanadium			mg/kg	10	52	64	58	64	78	77	69	89	34	93
Zinc	400000	370	mg/kg	5	**550**	**1700**	**2100**	**1400**	**1500**	**2800**	**1500**	***1400***	**1100**	**1300**

Details of Guideline values are presented in **Section 6** of report (**Table 6-3**)
LOR = Limit of Reporting
Concentrations below the LOR noted as <value
Concentrations in a grey box exceed the adopted HIL 'D' for Commercial Industrial land use
Concentration in **bold green font** exceed the adopted EIL for Commercial Industrial land use

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table VI: Characterisation of Materials to be Generated during Remediation

RAMBOLL

	NEPM 2013 HIL D Commercial Industrial	NEPM 2013 EIL Commercial Industrial												
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor
			Lab Sample number:		S20-Au35790	S20-Au35791	S20-Au35792	S20-Au35793	S20-Au35794	S20-Au35795	S20-Au35796	S20-Au35797	S20-Au35798	S20-Au35799
			Sample date:		19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20
			Sample ID:		RRE_TP01	RRE_TP02	RRE_TP03	RRE_TP04	RRE_TP05	RRE_TP06	RRE_TP07	RRE_TP08	RRE_TP09	RRE_TP10
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample
Analyte grouping/Analyte			**Units**	**LOR**										
Miscellaneous														
Moisture Content (dried @ 103°C)			%	1	4.3	6.1	14	7.6	10	9.3	11	14	13	9.3
Conductivity (1:5 aqueous extract at 25°C as rec.)			uS/cm	10	33	53	220	250	620	300	74	1000	29	38
pH (1:5 Aqueous extract at 25°C as rec.)			pH Units	0.1	6.7	6.1	4.9	5.2	4.2	6.5	5.7	5.1	5	5
Sulphur			mg/kg	5	79	260	2200	1700	3600	450	2900	12000	3400	2000
Total Organic Carbon			%	0.1	0.3	0.3	1.4	1.5	2.2	0.4	2.7	6.5	1.9	2
Metals														
Antimony			mg/kg	10	< 10	< 10	18	< 10	11	< 10	< 10	55	14	18
Arsenic	3000	160	mg/kg	2	15	14	130	25	77	31	40	79	52	66
Beryllium	500		mg/kg	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Boron	300000		mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	900		mg/kg	0.4	5.5	7.3	9.6	5.5	3.5	8	4	170	2.4	2.5
Chromium	3600	710	mg/kg	5	31	12	24	15	34	12	52	130	19	19
Cobalt	4000		mg/kg	5	7.5	< 5	< 5	< 5	< 5	< 5	8.2	18	< 5	< 5
Copper	240000	160	mg/kg	5	**490**	**280**	**1200**	**670**	**830**	**240**	**580**	**4100**	**1200**	**1300**
Lead	2200*	1800	mg/kg	5	570	820	**8700**	1600	**4000**	230	1600	**9200**	**4400**	**5300**
Manganese	19000		mg/kg	5	420	530	150	150	230	70	690	720	170	220
Mercury	730		mg/kg	0.1	0.2	0.1	2.9	0.5	0.3	< 0.1	0.2	0.9	0.4	0.4
Molybdenum			mg/kg	5	< 5	5.3	12	10	12	20	< 5	*5.6*	9.5	11
Nickel	6000	340	mg/kg	5	12	22	85	11	11	< 5	19	79	8.9	8.1
Selenium	10000		mg/kg	2	< 2	< 2	23	3.9	7.7	2.9	2.8	*16*	12	14
Tin			mg/kg	10	< 10	11	400	24	13	< 10	10	54	34	38
Vanadium			mg/kg	10	76	30	58	43	69	53	45	67	50	72
Zinc	400000	370	mg/kg	5	**810**	**770**	**1500**	**1100**	**600**	**1100**	**1300**	**12000**	**570**	**580**

Details of Guideline values are presented in **Section 6** of report (**Table 6-3**)
LOR = Limit of Reporting
Concentrations below the LOR noted as <value
Concentrations in a grey box exceed the adopted HIL 'D' for Commercial Industrial land use
Concentration in **bold green font** exceed the adopted EIL for Commercial Industrial land use

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table VIb: XRF Measurements within Test Pits

	NEPM 2013 HIL D Commercial Industrail	NEPM 2013 EIL Commercial Industrial															
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor
			Lab Sample number:		-	-	-	-	-	-	-	-	-	-	-	-	-
			Sample date:		19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20
			Sample ID:		RRE_TP01_0.0	RRE_TP01_0.05	RRE_TP01_0.10	RRE_TP01_0.15	RRE_TP01_0.20	RRE_TP01_0.30	RRE_TP02_0.0	RRE_TP02_0.05	RRE_TP02_0.10	RRE_TP02_0.15	RRE_TP02_0.2	RRE_TP02_0.25	RRE_TP03_0.0
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit
Analyte grouping/Analyte			**Units**	**LOR**													
Metals																	
Lead	2200*	1800	mg/kg	5	150	48	<6	<6	<6	<6	1091	**2172**	2785	1941	1206	75	2099

LOD= Limit of Detection
Concentrations below the LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'D' for
Concentration in **green font** exceed the adopted EIL for Commerical Industrial land use

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table VIb: XRF Measurements within Test Pits

RAMBOLL

	NEPM 2013 HIL D Commercial Industrail	NEPM 2013 EIL Commercial Industrial															
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor
			Lab Sample number:		-	-	-	-	-	-	-	-	-	-	-	-	-
			Sample date:		19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20
			Sample ID:		RRE_TP03_0.05	RRE_TP03_0.10	RRE_TP04_0.0	RRE_TP04_0.05	RRE_TP04_0.1	RRE_TP05_0.0	RRE_TP05_0.05	RRE_TP05_0.10	RRE_TP05_0.15	RRE_TP06_0.0	RRE_TP06_0.05	RRE_TP06_0.10	RRE_TP07_0.0
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit
Analyte grouping/Analyte			**Units**	**LOR**													
Metals																	
Lead	2200*	1800	mg/kg	5	2231	1353	774	4867	73	1093	4681	4725	17	718	12300	67	4078

LOD= Limit of Detection
Concentrations below the LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'D' for
Concentration in **green font** exceed the adopted EIL for Commerical Industrial land use

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table VIb: XRF Measurements within Test Pits

	NEPM 2013 HIL D Commercial Industrail	NEPM 2013 EIL Commercial Industrial														
			Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor
			Lab Sample number:		-	-	-	-	-	-	-	-	-	-	-	-
			Sample date:		19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20	19-Aug-20
			Sample ID:		RRE_TP07_0.05	RRE_TP07_0.10	RRE_TP08_0.0	RRE_TP08_0.05	RRE_TP08_0.1	RRE_TP08_0.15	RRE_TP08_0.20	RRE_TP09_0.0	RRE_TP09_0.05	RRE_TP10_0.0	RRE_TP10_0.05	RRE_TP10_0.1
			Project Name:		DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit
Analyte grouping/Analyte			**Units**	**LOR**												
Metals																
Lead	2200*	1800	mg/kg	5	19	12	6003	3577	9862	18500	293	4762	67	3715	9523	29

LOD= Limit of Detection
Concentrations below the LOD noted as <value
Concentrations in a grey box exceed the adoped HIL 'D' for
Concentration in **green font** exceed the adopted EIL for Commerical Industrial land use

Table VII: Contaminants of Potential Concern

Sample Type:			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Sediment	Sediment	Sediment	Sediment
Site:			Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor
Lab Sample number:			S20-Jn50651	S20-Jn50652	S20-Jn50653	S20-Jn50654	S20-Jn50656	S20-Jn50657	S20-Jn50658	S20-Jn50647	S20-Jn50648	S20-Jn50649	S20-Jn50650
Sample date:			29-06-20	29-06-20	29-06-20	29-06-20	18-03-20	19-03-20	19-03-20	01-04-20	01-04-20	01-04-20	01-04-20
Sample ID:			TP3A	TP4A	TP5A	TP6A	MW2_0-0.05	MW4_0-0.05	MW5_0-0.05	SED2	SED3	SED4	SED6
Project Name:			DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
Sampling Method:			Direct	Direct	Direct	Direct	Auger	Auger	Auger	Push Tube	Push Tube	Push Tube	Push Tube
Analyte grouping/Analyte	**Units**	**LOR**											
Organochlorine Pesticides													
4.4'-DDD	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin and Dieldrin (Total)*	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chlordanes - Total	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.05	< 0.05	< 0.05	< 0.2	< 0.2	< 0.2	< 0.2
Toxaphene	mg/kg	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vic EPA IWRG 621 OCP (Total)*	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.2	< 0.2	< 0.2	< 0.2
Vic EPA IWRG 621 Other OCP (Total)*	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.2	< 0.2	< 0.2	< 0.2
Organophosphorus Pesticides													
Azinphos-methyl	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	mg/kg	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Demeton-O	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-S	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
EPN	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5
Methyl parathion	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	mg/kg	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Naled	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5
Omethoate	mg/kg	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Phorate	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	mg/kg	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Polychlorinated Biphenyls													
Aroclor-1016	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1221	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1232	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1242	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1248	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1254	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1260	mg/kg	0.5	< 0.5	< 1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.5	< 0.5
Total PCB*	mg/kg	0.5	< 0.5	< 1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.5	< 0.5

LOR= Limit of Reporting
Concentrations below the LOR noted as <value

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table VIII: Surface Water QA Results

Sample Type:			Surface Water	Surface Water	**RPD %**	Surface Water	Surface Water	**RPD %**	Surface Water	Surface Water	**RPD %**
Duplicate Type:			Intra-Laboratory Duplicate			Intra-Laboratory Duplicate			Intra-Laboratory Duplicate		
Lab ID			S19-Au07234	S19-Au07235		S19-Au17273	S19-Au17284		S19-Se37061	S19-Se37065	
Sample date:			06-Aug-19	06-Aug-19		13-Aug-19	13-Aug-19		24-Sep-19	24-Sep-19	
Sample ID:			SW04	SW04A		SW1-UP	D01_130819		SW1_UP	D02_240919	
Project Name:			Tarago SW Monitoring	Tarago SW Monitoring		Tarago SW Monitoring	Tarago SW Monitoring		Tarago SW Monitoring	Tarago SW Monitoring	
Project No:			318000780	318000780		318000780	318000780		318000780	318000780	
Sample Location			Tarago Rail Loop	Tarago Rail Loop		Tarago Rail Loop	Tarago Rail Loop		Tarago Rail Loop	Tarago Rail Loop	
Sampling Method:			Grab Sample	Grab Sample		Grab Sample	Grab Sample		Grab Sample	Grab Sample	
Sample Description:			Stagnant pond, clear to slightly yellow.	Stagnant pond, clear to slightly yellow.		Not Recorded.	Not Recorded.		Clear/slightly brown.	Clear/slightly brown.	
Analyte grouping/Analyte	**Units**	**LOR**									
Dissolved and Total Metals	mg/L										
Aluminium	mg/L	0.05	-	-	NC	-	-	-	-	-	-
Aluminium (filtered)	mg/L	0.05	0.17	0.08	72.0	< 0.05	< 0.05	NC	< 0.05	< 0.05	NC
Arsenic	mg/L	0.001	-	-	NC	-	-	-	-	-	-
Arsenic (filtered)	mg/L	0.001	0.001	< 0.001	NC	< 0.001	< 0.001	NC	<0.001	< 0.001	NC
Barium	mg/L	0.001	-	-	NC	-	-	-	-	-	-
Barium (filtered)	mg/L	0.001	0.04	0.04	0.0	0.1	0.1	0.0	0.1	0.1	0.0
Beryllium	mg/L	0.001	-	-	NC	-	-	-	-	-	-
Beryllium (filtered)	mg/L	0.001	<0.001	< 0.001	NC	< 0.001	< 0.001	NC	<0.001	< 0.001	NC
Boron	mg/L	0.05	-	-	-	-	-	-	-	-	-
Boron (filtered)	mg/L	0.05	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.0002	-	-	NC	-	-	-	-	-	-
Cadmium (filtered)	mg/L	0.0002	0.0055	0.0056	1.8	< 0.0002	< 0.0002	NC	<0.0002	< 0.0002	NC
Chromium	mg/L	0.001	-	-	NC	-	-	-	-	-	-
Chromium (filtered)	mg/L	0.001	0.001	< 0.001	NC	< 0.001	< 0.001	NC	<0.001	< 0.001	NC
Cobalt	mg/L	0.001	-	-	NC	-	-	-	-	-	-
Cobalt (filtered)	mg/L	0.001	<0.001	< 0.001	NC	< 0.001	< 0.001	NC	<0.001	< 0.001	NC
Copper	mg/L	0.001	-	-	NC	-	-	-	-	-	-
Copper (filtered)	mg/L	0.001	0.14	0.15	6.9	< 0.001	< 0.001	NC	<0.001	< 0.001	NC
Iron	mg/L	0.05	-	-	NC	-	-	-	-	-	-
Iron (filtered)	mg/L	0.05	0.22	0.14	44.4	< 0.05	< 0.05	NC	< 0.05	< 0.05	NC
Lead	mg/L	0.001	0.013	0.012	8.0	-	-	-	< 0.001	< 0.001	NC
Lead (filtered)	mg/L	0.001	0.008	0.008	0.0	< 0.001	< 0.001	NC	<0.001	< 0.001	NC
Manganese	mg/L	0.005	-	-	NC	-	-	-	-	-	-
Manganese (filtered)	mg/L	0.005	0.015	0.014	6.9	< 0.005	< 0.005	NC	<0.005	0.005	NC
Mercury	mg/L	0.0001	-	-	NC	-	-	NC	-	-	-
Mercury (filtered)	mg/L	0.0001	< 0.0001	< 0.0001	NC	< 0.0001	< 0.0001	NC	< 0.0001	< 0.0001	NC
Nickel	mg/L	0.001	-	-	NC	-	-	-	-	-	-
Nickel (filtered)	mg/L	0.001	0.014	0.014	0.0	< 0.001	< 0.001	NC	<0.001	< 0.001	NC
Selenium	mg/L	0.001	-	-	-	-	-	-	-	-	-
Selenium (filtered)	mg/L	0.001	-	-	-	-	-	-	-	-	-
Zinc	mg/L	0.005	-	-	NC	-	-	-	-	-	-
Zinc (filtered)	mg/L	0.005	1.2	1.2	0.0	< 0.005	< 0.005	NC	<0.005	< 0.005	NC

- indicates no criterion available or not analysed
LOR = Limit of Reporting
Concentrations below the LOR noted as <value
Grey boxes indicate exceedance or RPD criterion: >30% where results are >10 x LOR

Table VIII: Surface Water QA Results

Sample Type:			Surface Water	Surface Water	**RPD %**	Surface Water	Surface Water	**RPD %**	Surface Water	Surface Water	**RPD %**
Duplicate Type:			Intra-Laboratory Duplicate			Intra-Laboratory Duplicate			Inter-Laboratory Duplicate		
Lab ID			S20-Ja29060	S20-Ja29063		S20-Ap12291	S20-Ap12294		S20-Ap12291	ES2012327001	
Sample date:			29-Jan-20	29-Jan-20		2-Apr-20	2-Apr-20		2-Apr-20	2-Apr-20	
Sample ID:			SW7	D01_290220		SW7	D01_020420		SW7	T01_020420	
Project Name:			Tarago SW Monitoring	Tarago SW Monitoring		Tarago SW Monitoring	Tarago SW Monitoring		Tarago SW Monitoring	Tarago SW Monitoring	
Project No:			318000780	318000780		318000780	318000780		318000780	318000780	
Sample Location			Tarago Rail Loop	Tarago Rail Loop		Tarago Rail Loop	Tarago Rail Loop		Tarago Rail Loop	Tarago Rail Loop	
Sampling Method:			Grab Sample	Grab Sample		Grab Sample	Grab Sample		Grab Sample	Grab Sample	
Sample Description:			Silty, from dam, low level water.	Silty, from dam, low level water.		Highly turbid.	Highly turbid.		Highly turbid.	Highly turbid.	
Analyte grouping/Analyte	**Units**	**LOR**									
Dissolved and Total Metals											
Aluminium	mg/L	0.05	-	-	-	0.21	0.17	21.1	0.21	0.29	32.0
Aluminium (filtered)	mg/L	0.05	-	-	-	-	-	NC	-	-	-
Arsenic	mg/L	0.001	0.016	0.015	6.5	0.003	0.004	28.6	0.003	0.004	28.6
Arsenic (filtered)	mg/L	0.001	0.011	0.011	0.0	-	-	NC	-	-	-
Barium	mg/L	0.001	-	-	-	0.08	0.08	0.0	0.08	0.076	5.1
Barium (filtered)	mg/L	0.001	-	-	-	-	-	NC	-	-	-
Beryllium	mg/L	0.001	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	< 0.001	<0.001	NC
Beryllium (filtered)	mg/L	0.001	< 0.001	< 0.001	NC	-	-	NC	-	-	-
Boron	mg/L	0.05	< 0.05	< 0.05	NC	-	-	-	-	-	-
Boron (filtered)	mg/L	0.05	< 0.05	< 0.05	NC	-	-	-	-	-	-
Cadmium	mg/L	0.0002	0.0016	0.0015	6.5	0.0009	0.0009	0.0	0.0009	0.0009	0.0
Cadmium (filtered)	mg/L	0.0002	0.0005	0.0005	0.0	-	-	NC	-	-	-
Chromium	mg/L	0.001	-	-	-	0.001	< 0.001	NC	0.001	<0.001	NC
Chromium (filtered)	mg/L	0.001	-	-	-	-	-	NC	-	-	-
Cobalt	mg/L	0.001	0.002	0.002	0.0	0.002	0.002	0.0	0.002	0.002	0.0
Cobalt (filtered)	mg/L	0.001	0.002	0.002	0.0	-	-	NC	-	-	-
Copper	mg/L	0.001	0.021	0.019	10.0	0.022	0.018	20.0	0.022	0.020	9.5
Copper (filtered)	mg/L	0.001	0.008	0.009	11.8	-	-	NC	-	-	-
Iron	mg/L	0.05	-	-	-	4.2	4.2	0.0	4.2	4.22	0.5
Iron (filtered)	mg/L	0.05	-	-	-	-	-	NC	-	-	-
Lead	mg/L	0.001	0.04	0.037	7.8	0.02	0.017	16.2	0.02	0.019	5.1
Lead (filtered)	mg/L	0.001	0.017	0.017	0.0	-	-	NC	-	-	-
Manganese	mg/L	0.005	1.1	1.1	0.0	0.41	0.41	0.0	0.41	0.392	4.5
Manganese (filtered)	mg/L	0.005	0.68	0.64	6.1	-	-	NC	-	-	-
Mercury	mg/L	0.0001	< 0.0001	< 0.0001	NC	< 0.0001	< 0.0001	NC	< 0.0001	<0.0001	NC
Mercury (filtered)	mg/L	0.0001	< 0.0001	< 0.0001	NC	-	-	NC	-	-	-
Nickel	mg/L	0.001	0.012	0.012	0.0	0.006	0.005	18.2	0.006	0.005	18.2
Nickel (filtered)	mg/L	0.001	0.009	0.009	0.0	-	-	NC	-	-	-
Selenium	mg/L	0.001	0.001	0.001	0.0	-	-	-	-	-	-
Selenium (filtered)	mg/L	0.001	0.001	< 0.001	NC	-	-	-	-	-	-
Zinc	mg/L	0.005	0.28	0.26	7.4	0.15	0.13	14.3	0.15	0.144	4.1
Zinc (filtered)	mg/L	0.005	0.087	0.079	9.6	-	-	NC	-	-	-

- indicates no criterion available or not analysed

LOR = Limit of Reporting

Concentrations below the LOR noted as <value

Grey boxes indicate exceedance or RPD criterion: >30% where results are >10 x LOR

Table VIII: Surface Water QA Results

	Sample Type:		Surface Water	Surface Water	RPD %	Surface Water	Surface Water	RPD %	Surface Water	Surface Water	RPD %
	Duplicate Type:		Intra-Laboratory Duplicate			Intra-Laboratory Duplicate			Inter-Laboratory Duplicate		
	Lab ID		S20-Au23115	S20-Au23125		S20-Oc25141	S20-Oc25155		S20-Oc25141	ES2036245-001	
	Sample date:		11-Aug-20	11-Aug-20		13-Oct-20	13-Oct-20		13-Oct-20	13-Oct-20	
	Sample ID:		SW1	DUP01		SW1	D1_131020		SW1	T1_131020	
	Project Name:		Tarago SW Monitoring	Tarago SW Monitoring		Tarago SW Monitoring	Tarago SW Monitoring		Tarago SW Monitoring	Tarago SW Monitoring	
	Project No:		318000780	318000780		318000780	318000780		318000780	318000780	
	Sample Location		Tarago Rail Loop	Tarago Rail Loop		Tarago Rail Loop	Tarago Rail Loop		Tarago Rail Loop	Tarago Rail Loop	
	Sampling Method:		Grab Sample	Grab Sample		Grab Sample	Grab Sample		Grab Sample	Grab Sample	
	Sample Description:		Brown, slightly turbid, continuous flow.	Brown, slightly turbid, continuous flow.		Water flowing, turbid, yellow/brown, water level shallow.	Water flowing, turbid, yellow/brown, water level shallow.		Water flowing, turbid, yellow/brown, water level shallow.	Water flowing, turbid, yellow/brown, water level shallow.	
Analyte grouping/Analyte	**Units**	**LOR**									
Dissolved and Total Metals											
Aluminium	mg/L	0.05	0.88	0.83	5.8	0.29	0.12	82.9	0.29	0.61	71.1
Aluminium (filtered)	mg/L	0.05	0.53	0.54	1.9	< 0.05	< 0.05	NC	< 0.05	<0.01	NC
Arsenic	mg/L	0.001	< 0.001	< 0.001	NC	0.004	0.002	66.7	0.004	0.002	66.7
Arsenic (filtered)	mg/L	0.001	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	< 0.001	<0.001	NC
Barium	mg/L	0.001	0.04	0.04	0.0	0.36	0.25	36.1	0.36	0.276	26.4
Barium (filtered)	mg/L	0.001	0.04	0.04	0.0	0.11	0.11	0.0	0.11	0.091	18.9
Beryllium	mg/L	0.001	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	< 0.001	<0.001	NC
Beryllium (filtered)	mg/L	0.001	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	< 0.001	<0.001	NC
Boron	mg/L	0.05	-	-	NC	-	-	NC	-	-	NC
Boron (filtered)	mg/L	0.05	-	-	NC	-	-	NC	-	-	NC
Cadmium	mg/L	0.0002	< 0.0002	< 0.0002	NC	0.0012	0.0011	8.7	0.0012	0.0021	54.5
Cadmium (filtered)	mg/L	0.0002	< 0.0002	0.0003	NC	0.0005	0.0005	0.0	0.0005	0.0004	22.2
Chromium	mg/L	0.001	0.001	0.002	66.7	0.001	< 0.001	NC	0.001	<0.001	NC
Chromium (filtered)	mg/L	0.001	0.001	< 0.001	NC	< 0.001	< 0.001	NC	< 0.001	<0.001	NC
Cobalt	mg/L	0.001	< 0.001	< 0.001	NC	0.003	0.002	40.0	0.003	0.007	80.0
Cobalt (filtered)	mg/L	0.001	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	< 0.001	<0.001	NC
Copper	mg/L	0.001	0.003	0.003	0.0	0.011	0.009	20.0	0.011	0.014	24.0
Copper (filtered)	mg/L	0.001	0.002	0.003	40.0	0.002	0.002	0.0	0.002	0.001	66.7
Iron	mg/L	0.05	0.91	0.89	2.2	0.85	0.61	32.9	0.85	1.41	49.6
Iron (filtered)	mg/L	0.05	0.34	0.34	0.0	< 0.05	< 0.05	NC	< 0.05	<0.05	NC
Lead	mg/L	0.001	0.001	< 0.001	NC	0.028	0.012	80.0	0.028	0.032	13.3
Lead (filtered)	mg/L	0.001	< 0.001	0.004	NC	< 0.001	< 0.001	NC	< 0.001	<0.001	NC
Manganese	mg/L	0.005	0.024	0.023	4.3	0.28	0.22	24.0	0.28	0.706	86.4
Manganese (filtered)	mg/L	0.005	0.018	0.018	0.0	0.043	0.044	2.3	0.043	0.039	9.8
Mercury	mg/L	0.0001	< 0.0001	< 0.0001	NC	< 0.0001	< 0.0001	NC	< 0.0001	<0.0001	NC
Mercury (filtered)	mg/L	0.0001	< 0.0001	< 0.0001	NC	< 0.0001	< 0.0001	NC	< 0.0001	<0.0001	NC
Nickel	mg/L	0.001	0.002	0.002	0.0	0.001	0.001	0.0	0.001	0.002	66.7
Nickel (filtered)	mg/L	0.001	0.002	0.002	0.0	< 0.001	< 0.001	NC	< 0.001	<0.001	NC
Selenium	mg/L	0.001	-	-	NC	-	-	NC	-	-	NC
Selenium (filtered)	mg/L	0.001	-	-	NC	-	-	NC	-	-	NC
Zinc	mg/L	0.005	0.02	0.017	16.2	0.21	0.18	15.4	0.21	0.32	41.5
Zinc (filtered)	mg/L	0.005	0.011	0.045	121.4	0.073	0.074	1.4	0.073	0.062	16.3

- indicates no criterion available or not analysed

LOR = Limit of Reporting

Concentrations below the LOR noted as <value

Grey boxes indicate exceedance or RPD criterion: >30% where results are >10 x LOR

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table IX: Sediment and Soil QA Results

	Sample Type:		Sediment	Sediment	**RPD %**	Sediment	Sediment	**RPD %**	Sediment	Sediment	**RPD %**
	Duplicate Type:		Intra-Laboratory Duplicate			Intra-Laboratory Duplicate			Intra-Laboratory Duplicate		
	Lab Sample number:		M20-Jn34830	M20-Jn34830		S20-Jn26497	M20-Jn34831		S20-Ap12281	S20-Ap12284	
	Sample date:		25-March-2020	25-March-2020		18-March-2020	18-March-2020		02-April-2020	02-April-2020	
	Sample ID:		P6_HA5_0.0	P6_HA5_0.0		XBOIDSTW1	XBOIDSTW1		SED7	SED_D01_020420	
	Project Name:		DSI Addendum	DSI Addendum		DSI Addendum	DSI Addendum		DSI Addendum	DSI Addendum	
	Sampling Method:		Hand Auger	Hand Auger		Direct	Direct		Disposable Bailer	Disposable Bailer	
Analyte grouping/Analyte	**Units**	**LOR**									
Miscellaneous											
Moisture Content (dried @ 103°C)	%	1	10	11	-	-	-	-	-	-	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	10	-	-	-	-	-	-	-	-	-
pH (1:5 Aqueous extract at 25°C as rec.)	pH Units	0.1	-	-	-	-	-	-	-	-	-
Sulphur	mg/kg	5	-	-	-	-	-	-	-	-	-
Total Organic Carbon	%	0.1	-	-	-	-	-	-	-	-	-
Metals											
Aluminium	mg/kg	20	-	13000	NC	11000	11000	0.0	5200	8300	45.9
Antimony	mg/kg	10	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	2	-	18	NC	15	15	0.0	6.4	8.5	28.2
Barium	mg/kg	10	-	140	NC	170	170	0.0	60	90	40.0
Beryllium	mg/kg	2	-	< 2	NC	< 2	< 2	NC	< 2	< 2	NC
Boron	mg/kg	10		-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.4	-	8.1	NC	3.8	3.8	0.0	4.6	8.6	60.6
Chromium	mg/kg	5	-	21	NC	14	14	0.0	8.1	10	21.0
Cobalt	mg/kg	5	-	7.3	NC	5.2	< 5	NC	< 5	< 5	NC
Copper	mg/kg	5	-	610	NC	330	330	0.0	190	300	44.9
Iron	mg/kg	20	-	23000	NC	19000	18000	5.4	7600	9500	22.2
Lead	mg/kg	5	430	800	60.2	730	740	1.4	210	300	35.3
Manganese	mg/kg	5	-	260	NC	450	450	0.0	140	210	40.0
Mercury	mg/kg	0.1	-	< 0.1	NC	< 0.1	< 0.1	NC	< 0.1	< 0.1	NC
Molybdenum	mg/kg	5	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	5	-	15	NC	9.6	9.5	1.0	< 5	6.2	NC
Selenium	mg/kg	2	-	-	-	-	-	-	-	-	-
Tin	mg/kg	10	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	10	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	5	-	790	NC	580	570	1.7	580	770	28.1

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Grey boxes indicate exceedance or RPD criterion: >30% where results are >10 x LOR

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table IX: Sediment and Soil QA Results

RAMBOLL

Sample Type:			Sediment	Sediment	**RPD %**	Soil	Soil	**RPD %**	Soil	Soil	**RPD %**
Duplicate Type:			Intra-Laboratory Duplicate			Intra-Laboratory Duplicate			Intra-Laboratory Duplicate		
Lab Sample number:			S20-Au23104	S20-Au23114		S20-Au35787	S20-Au35801		S20-Au35797	S20-Au35802	
Sample date:			11-August-2020	11-August-2020		19-August-2020	19-August-2020		19-August-2020	19-August-2020	
Sample ID:			SED1	DUP01		RRE_SP08	RRE_DUP1		RRE_TP08	RRE_DUP2	
Project Name:			DSI Addendum	DSI Addendum		DSI Addendum	DSI Addendum		DSI Addendum	DSI Addendum	
Sampling Method:			Disposable Bailer	Disposable Bailer		Composite Sample	Composite Sample		Composite Sample	Composite Sample	
Analyte grouping/Analyte	**Units**	**LOR**									
Miscellaneous											
Moisture Content (dried @ 103°C)	%	1	-	-	-	9	10	10.5	14	18	25.0
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	10	-	-	-	1100	1000	9.5	1000	1200	18.2
pH (1:5 Aqueous extract at 25°C as rec.)	pH Units	0.1	-	-	-	4	4	0.0	5.1	5.1	0.0
Sulphur	mg/kg	5	-	-	-	16000	12000	28.6	12000	4200	96.3
Total Organic Carbon	%	0.1	-	-	-	0.7	0.5	33.3	6.5	3.2	68.0
Metals											
Aluminium	mg/kg	20	-	-	-	-	-	-	-	-	-
Antimony	mg/kg	10	-	-	-	39	28	32.8	55	29	61.9
Arsenic	mg/kg	2	-	-	-	190	130	37.5	79	60	27.3
Barium	mg/kg	10	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	2	-	-	-	< 2	< 2	NC	< 2	< 2	NC
Boron	mg/kg	10	-	-	-	< 10	< 10	NC	< 10	< 10	NC
Cadmium	mg/kg	0.4	-	-	-	6	5.6	6.9	170	140	19.4
Chromium	mg/kg	5	-	-	-	77	81	5.1	130	120	8.0
Cobalt	mg/kg	5	-	-	-	10	12	18.2	18	9.6	60.9
Copper	mg/kg	5	-	-	-	1600	1300	20.7	4100	3400	18.7
Iron	mg/kg	20	-	-	-	-	-	-	-	-	-
Lead	mg/kg	5	1700	1000	51.9	19000	9100	70.5	9200	9000	2.2
Manganese	mg/kg	5	-	-	-	710	660	7.3	720	520	32.3
Mercury	mg/kg	0.1	-	-	-	1.6	1	46.2	0.9	0.9	0.0
Molybdenum	mg/kg	5	-	-	-	7.3	5.2	33.6	< 5	5.6	NC
Nickel	mg/kg	5	-	-	-	40	37	7.8	79	61	25.7
Selenium	mg/kg	2	-	-	-	27	18	40.0	15	16	6.5
Tin	mg/kg	10	-	-	-	80	62	25.4	54	53	1.9
Vanadium	mg/kg	10	-	-	-	89	76	15.8	67	48	33.0
Zinc	mg/kg	5	-	-	-	1300	1400	7.4	12000	8600	33.0

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LOR = Limit of Reporting
Concentrations below the LOR noted as <value
Grey boxes indicate exceedance or RPD criterion: >30% where results are >10 x LOR

Table IX: Sediment and Soil QA Results

RAMBOLL

			Sediment	Sediment	RPD %	Sediment	Sediment	RPD %
	Duplicate Type:		Intra-Laboratory Duplicate			Intra-Laboratory Duplicate		
	Lab Sample number:		S20-Oc25142	S20-Oc25156		S20-Oc25142	ES2036245002	
	Sample date:		13-October-2020	13-October-2020		13-October-2020	13-October-2020	
	Sample ID:		SED1	D1_SED_131020		SED1	T1_SED_131020	
	Project Name:		DSI Addendum	DSI Addendum		DSI Addendum	DSI Addendum	
	Sampling Method:		Pond Sampler	Pond Sampler		Pond Sampler	Pond Sampler	
Analyte grouping/Analyte	**Units**	**LOR**						
Miscellaneous								
Moisture Content (dried @ 103°C)	%	1	-	-	-	-	-	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	10	-	-	-	-	-	-
pH (1:5 Aqueous extract at 25°C as rec.)	pH Units	0.1	-	-	-	-	-	-
Sulphur	mg/kg	5	-	-	-	-	-	-
Total Organic Carbon	%	0.1	-	-	-	-	-	-
Metals								
Aluminium	mg/kg	20	19000	21000	10.0	19000	13300	35.3
Antimony	mg/kg	10	-	-	-	-	-	-
Arsenic	mg/kg	2	9.7	9.4	3.1	9.7	9	7.5
Barium	mg/kg	10	130	170	26.7	130	120	8.0
Beryllium	mg/kg	2	< 2	< 2	NC	< 2	<1	NC
Boron	mg/kg	10	-	-	-	-	-	-
Cadmium	mg/kg	0.4	7.2	5.6	25.0	7.2	7	2.8
Chromium	mg/kg	5	21	25	17.4	21	19	10.0
Cobalt	mg/kg	5	6.9	7.6	9.7	6.9	7	1.4
Copper	mg/kg	5	190	240	23.3	190	247	26.1
Iron	mg/kg	20	15000	19000	23.5	15000	14300	4.8
Lead	mg/kg	5	610	740	19.3	610	634	3.9
Manganese	mg/kg	5	120	120	0.0	120	117	2.5
Mercury	mg/kg	0.1	< 0.1	< 0.1	NC	< 0.1	<0.1	NC
Molybdenum	mg/kg	5	-	-	-	-	-	-
Nickel	mg/kg	5	13	14	7.4	13	12	8.0
Selenium	mg/kg	2	-	-	-	-	-	-
Tin	mg/kg	10	-	-	-	-	-	-
Vanadium	mg/kg	10	-	-	-	-	-	-
Zinc	mg/kg	5	1000	1100	9.5	1000	1110	10.4

- indicates no criterion available or not analysed
LOR = Limit of Reporting
Concentrations below the LOR noted as <value
Grey boxes indicate exceedance or RPD criterion: >30% where results are >10 x LOR

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table X: Rinsate Results

Sample Type:		RINSATE	RINSATE
Site:		Rail Corridor	Rail Corridor
Lab Sample number:		S20-Au35803	S20-Oc25162
Sample date:		19-08-20	13-10-20
Sample ID:		RRE_RINSATE	RIN_131020
Project Name:		DSI Addendum	DSI Addendum
Sample collected from:		Hand Trowel	Pond Sampler

Analyte grouping/Analyte	Units	LOR		
Metals				
Aluminium	mg/L	0.05	-	< 0.05
Antimony	mg/L	0.005	< 0.005	-
Arsenic	mg/L	0.001	< 0.001	< 0.05
Barium	mg/L	0.001	-	< 0.001
Beryllium	mg/L	0.001	< 0.001	< 0.02
Boron	mg/L	0.05	< 0.05	< 0.001
Cadmium	mg/L	0.0002	< 0.0002	< 0.0002
Chromium	mg/L	0.001	< 0.001	< 0.001
Cobalt	mg/L	0.001	< 0.001	< 0.001
Copper	mg/L	0.001	< 0.001	< 0.001
Iron	mg/L	0.05	-	< 0.05
Lead	mg/L	0.001	< 0.001	< 0.001
Manganese	mg/L	0.005	< 0.005	< 0.005
Mercury	mg/L	0.0001	< 0.0001	< 0.0001
Molybdenum	mg/L	0.005	< 0.005	-
Nickel	mg/L	0.001	< 0.001	< 0.001
Selenium	mg/L	0.001	< 0.001	-
Tin	mg/L	0.005	< 0.005	-
Vanadium	mg/L	0.005	< 0.005	-
Zinc	mg/L	0.005	< 0.005	< 0.005

LOR = Limit of Reporting
Concentrations below the LOR noted as <value

Table XI: UCL Calculations

UCL Statistics for Uncensored Full

User Selected Options	
Date/Time of Computation	ProUCL 5.123-Oct-20 1:37:48 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics

Total Number of Observations	29
Minimum	21.93
Maximum	1200
SD	302
Coefficient of Variation	0.73

Normal GOF Test

Shapiro Wilk Test Statistic	0.945
5% Shapiro Wilk Critical Value	0.926
Lilliefors Test Statistic	0.0972
5% Lilliefors Critical Value	0.161

Data appear Normal at 5% Significa

Assuming Normal Distributi

95% Normal UCL

95% Student's-t UCL	509.3

Gamma GOF Test

Client: John Holland Rail
Job No: 318000780
Project Name: DSI Addendum

Table XII: XRF QA

XRF I.D	Lab I.d.	Moisture	Copper - XRF	Error	Copper - Lab	Lead - XRF
SED6	D2_SED_131020	29%	0	23.57	40	18.44
SED6	T2_SED_131020	25%	0	23.57	38	18.44
XBOYD001	D3_SED_131020	5%	130.11	23.97	110	165.23
XBOYD001	T3_SED_131020	3%	130.11	23.97	146	165.23
XBOYD002	D4_SED_131020	19%	426.41	32.24	560	530
XBOYD002	T4_SED_131020	21%	426.41	32.24	610	530
P42_HA01_0.0-0.05	D1_S_131020	7%	22.24	22.24	9.7	13.89
P42_HA03_0.0-0.05	D2_S_131020	12%	39.07	15.66	44	104.35
P42_HA06_0.0-0.05	D3_S_131020	9%	**196.6**	24.23	330	**428.06**
P42_HA13_0.0-0.05	D1_S_141020	26%	**114.02**	17.53	110	**330.14**
P42_HA20_0.0-0.05	D2_S_141020	12%	44.99	17.93	55	234
P42_HA21_0.0-0.05	D3_S_141020	5%	**312.03**	28.37	250	**1046.94**
P42_HA01_0.0-0.05	T1_S_131020	10%	22.24	22.24	**14**	13.89
P42_HA03_0.0-0.05	T2_S_131020	10%	39.07	15.66	**48**	104.35
P42_HA06_0.2	T3_S_131020	16%	20.87	20.87	**18**	10.51
P42_HA13_0.0-0.05	T1_S_141020	32%	**114.02**	17.53	**133**	**330.14**
P42_HA20_0.0-0.05	T2_S_141020	17%	44.99	17.93	**41**	234
P42_HA21_0.0-0.05	T3_S_141020	8%	**312.03**	28.37	**249**	**1046.94**

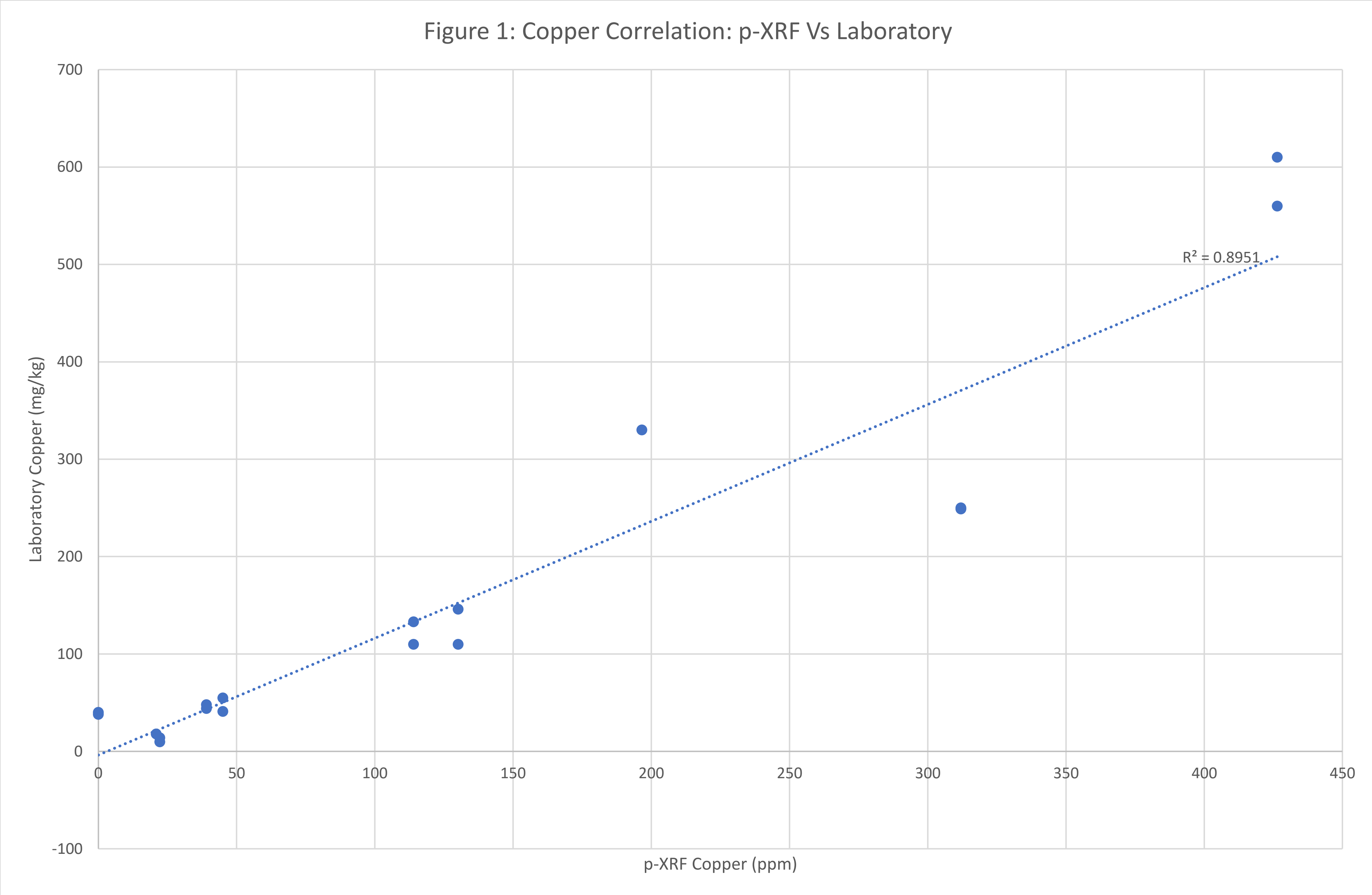

Figure 1: Copper Correlation: p-XRF Vs Laboratory
Laboratory Copper (mg/kg)
p-XRF Copper (ppm)
R² = 0.8951
700
600
500
400
300
200
100
0
-100
0
50
100
150
200
250
300
350
400
450

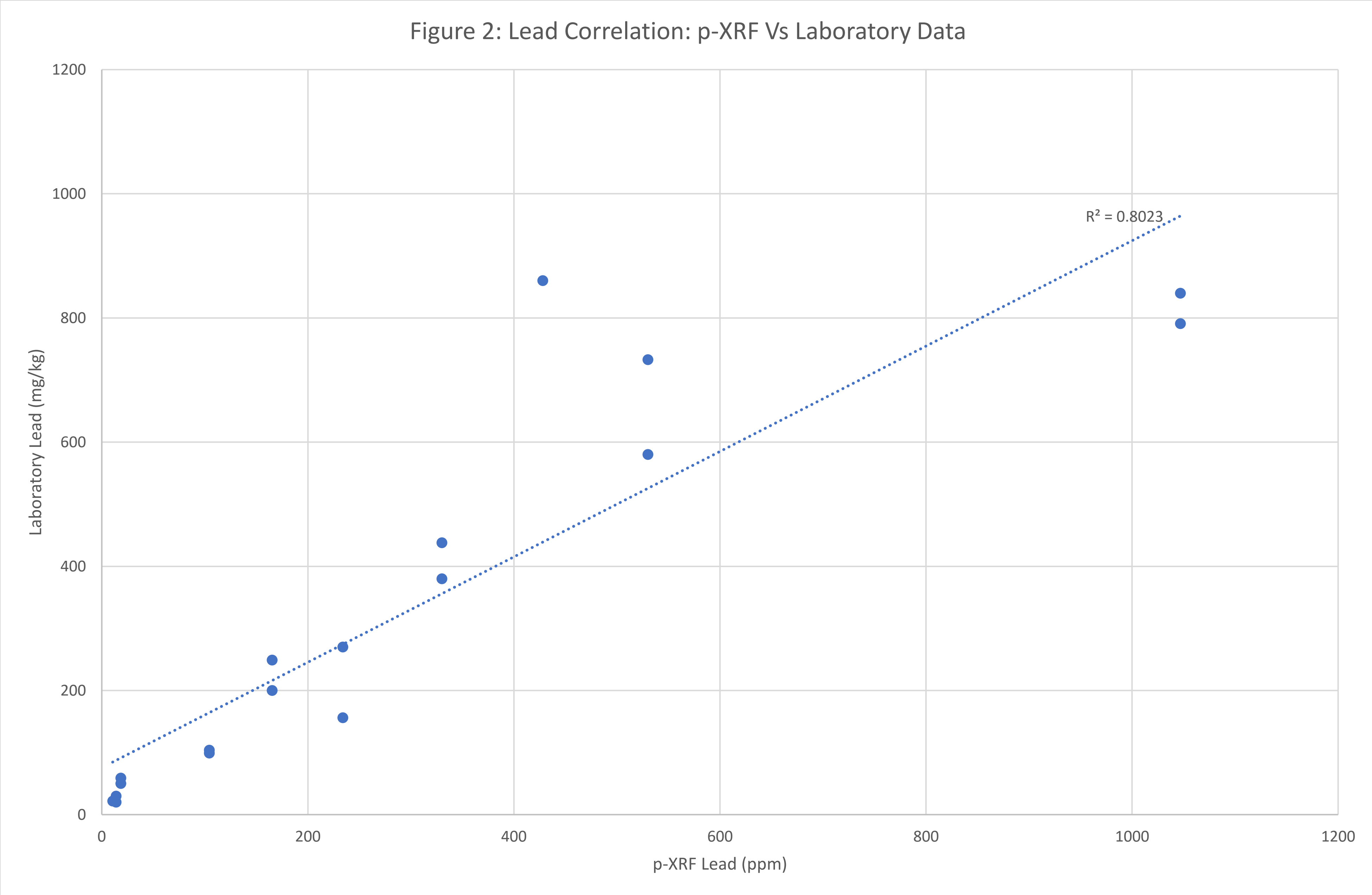
Figure 2: Lead Correlation: p-XRF Vs Laboratory Data
$R^2 = 0.8023$
Laboratory Lead (mg/kg)
p-XRF Lead (ppm)
0
200
400
600
800
1000
1200

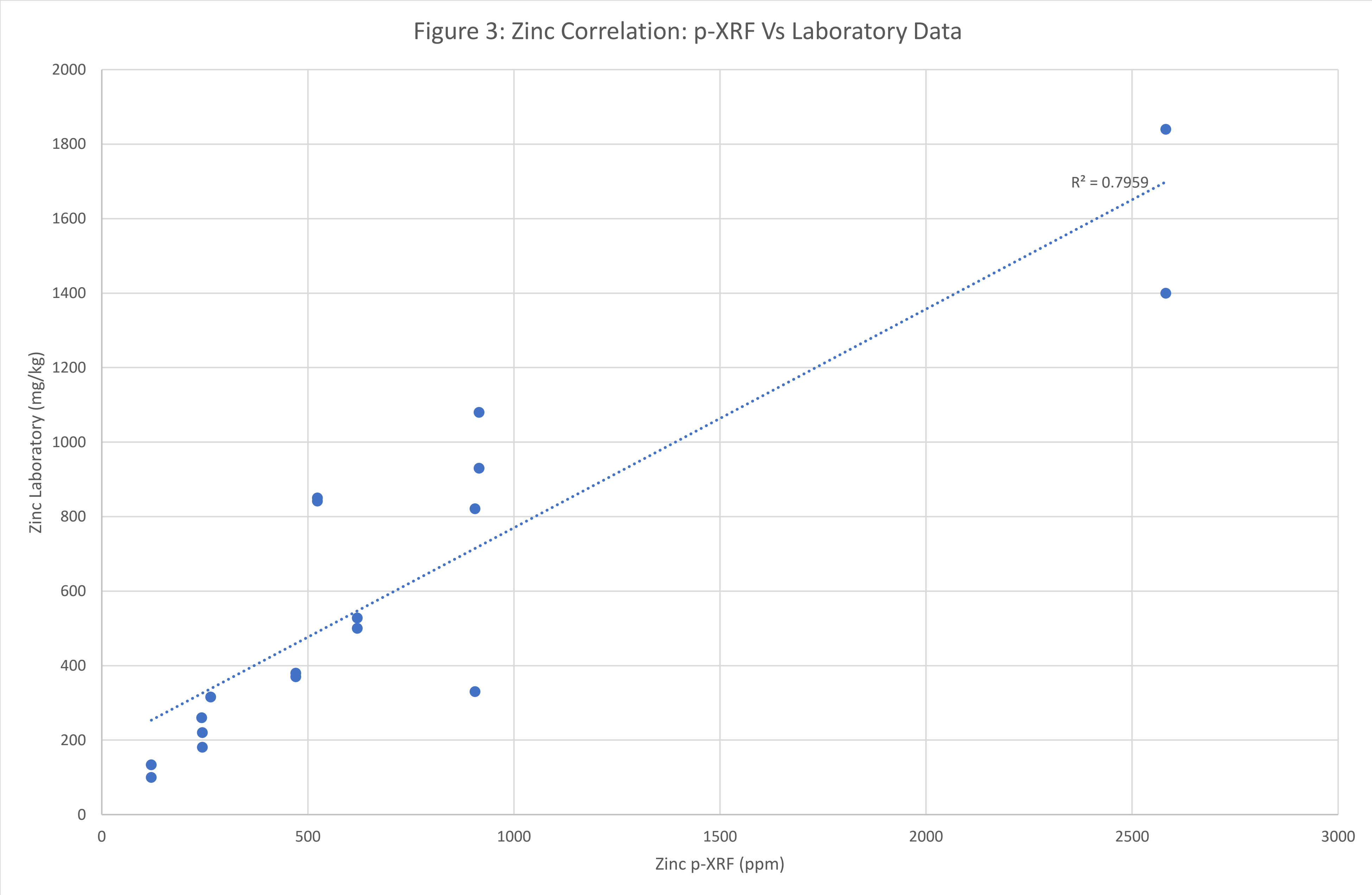
Figure 3: Zinc Correlation: p-XRF Vs Laboratory Data
R² = 0.7959
Zinc Laboratory (mg/kg)
Zinc p-XRF (ppm)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
0
500
1000
1500
2000
2500
3000

APPENDIX 5
LABORATORY REPORTS

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

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

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

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

Company	Ramboll	Project №	318000780	Project Manager	Stephen Maxwell
Address	50 Glebe Road the Junction	Project Name	Rail Loop Lead Management	EDD Format (ESdat, EQuIS, Custom)	Excel and PDF
Contact Name	Stephen Maxwell				
Phone №					
Special Directions					
Purchase Order					
Quote ID №	180813RAMN_1				

Sampler(s)	Jake Bourke, Thomas Frank
Handed over by	Jake Bourke
Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Email for Results	smaxwell@ramboll.com, jbourke@ramboll.com, jblackwell@ramboll.com

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
☐ Other ( )
* Surcharges apply

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	SW1	13/10/20	W	X	X									
2	SED1	13/10/20	S	X										
3	SW2	13/10/20	W	X	X									
4	SED2	13/10/20	S	X										
5	SW3	13/10/20	W	X	X									
6	SED3	13/10/20	S	X										
7	SW4	13/10/20	W	X	X									
8	SED4	13/10/20	S	X										
9	SW5	13/10/20	W	X	X									
10	SED5	13/10/20	S	X										
			Total Counts	10	5									

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date __/__/__	Time __:__
Eurofins | mgt Laboratory Use Only	Received By	Lena D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	[signature]	Date 14/10/20	Time 4:40 PM	Temperature	1.43 °C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date __/__/__	Time __:__	Report №	750569

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

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

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

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

Company	Ramboll	Project №	318000780	Project Manager	Stephen Maxwell
Address	50 Glebe Road the Junction	Project Name	Rail Loop Lead Management	EDD Format (ESdat, EQuIS, Custom)	Excel and PDF
Contact Name	Stephen Maxwell			Sampler(s)	Jake Bourke, Thomas Frank
Phone №				Handed over by	Jake Bourke
Special Directions				Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Purchase Order				Email for Results	smaxwell@ramboll.com, jbourke@ramboll.com, jblackwell@ramboll.com
Quote ID №	180813RAMN_1				

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing.

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
* Surcharges apply
☐ Other ( )

Containers: 1L Plastic, 250mL Plastic, 125mL Plastic, 200mL Amber Glass, 40mL VOA vial, 500mL PFAS Bottle, Jar (Glass or HDPE), Other (Asbestos AS4964, WA Guidelines)

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Sample Comments / Dangerous Goods Hazard Warning
1	SW6	13/10/20	W	X	X	
2	SED6	13/10/20	S	X		
3	SW10	13/10/20	W	X	X	
4	SED10	13/10/20	S	X		
5	D1_13120	13/10/20	W	X	X	
6	D1_SED_131020	13/10/20	S	X		
7	T1_131020	13/10/20	W	X	X	Please forward to ALS
8	T1_SED_131020	13/10/20	S	X		Please forward to ALS
9	D2_SED_131020	13/10/20	S	X		
10	T2_SED_131020	13/10/20	S	X		Please forward to ALS
			Total Counts	10	4	

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date __/__/__	Time __:__
Eurofins | mgt Laboratory Use Only	Received By	Leue D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	[signature]	Date 14/10/20	Time 4:10 PM	Temperature	1.43°C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date __/__/__	Time __:__	Report №	750569

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

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

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

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

Company	Ramboll	Project №	318000780	Project Manager	Stephen Maxwell	Sampler(s)	Jake Bourke, Thomas Frank
Address	50 Glebe Road the Junction	Project Name	Rail Loop Lead Management	EDD Format (ESdat, EQuIS, Custom)	Excel and PDF	Handed over by	Jake Bourke
Contact Name	Stephen Maxwell					Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Phone №						Email for Results	smaxwell@ramboll.com, jbourke@ramboll.com, jblackwell@ramboll.com
Special Directions							
Purchase Order							
Quote ID №	180813RAMN_1						

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing.

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
☐ Other ( )
* Surcharges apply

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh.mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	D3_SED_131020	13/10/20	S	X										
2	T3_SED_131020	13/10/20	S	X										Please forward to ALS
3	D4_SED_131020	13/10/20	S	X										
4	T4_SED_131020	13/10/20	S	X										Please forward to ALS
5	D5_SED_131020	13/10/20	S	X										
6	T5_SED_131020	13/10/20	S	X										Please forward to ALS
7	D6_SED_131020	13/10/20	S	X										
8	T6_SED_131020	13/10/20	S	X										Please forward to ALS
9	RIN_131020	13/10/20	S	X										
10														
	Total Counts			9										

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name	Signature	Date __/__/__	Time __:__	
Eurofins | mgt Laboratory Use Only	Received By: Leua D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date 14/10/20	Time 4:10 PM	Temperature 1.43 °C		
	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date __/__/__	Time __:__	Report № 750569		

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

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

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

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

Company	Ramboll	Project №	318000780	Project Manager	Stephen Maxwell
Address	50 Glebe Road the Junction	Project Name	Rail Loop Lead Management	EDD Format (ESdat, EQuIS, Custom)	Excel and PDF
Contact Name	Stephen Maxwell				
Phone №					
Special Directions					
Purchase Order					
Quote ID №	180813RAMN_1				

Sampler(s)	Jake Bourke, Thomas Frank
Handed over by	Jake Bourke
Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Email for Results	smaxwell@ramboll.com, jbourke@ramboll.com, jblackwell@ramboll.com

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	SW7	12/10/20	W	X	X									
2	SED7	12/10/20	S	X										
3	SW8	12/10/20	W	X	X									
4	SED8	12/10/20	S	X										
5	SW9	12/10/20	W	X	X									
6	SED9	12/10/20	S	X										
7														
8														
9														
10														
	Total Counts			6	3									

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
* Surcharges apply
☐ Other ( )

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature	Date	__/__/__	Time	__:__
Eurofins | mgt Laboratory Use Only	Received By	Lena D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date 14/10/20	Time	4:10 PM	Temperature	1.3 °C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date __/__/__	Time	__:__	Report №	750569

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

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

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

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

Company	Ramboll	**Project №**	318000780	**Project Manager**	Stephen Maxwell	**Sampler(s)**	Jake Bourke, Thomas Frank
Address	50 Glebe Road the Junction	**Project Name**	Rail Loop Lead Management	**EDD Format (ESdat, EQuIS, Custom)**	Excel and PDF	**Handed over by**	Jake Bourke
Contact Name	Stephen Maxwell					**Email for Invoice**	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Phone №						**Email for Results**	smaxwell@ramboll.com, jbourke@ramboll.com, jblackwell@ramboll.com
Special Directions							
Purchase Order							
Quote ID №	180813RAMN_1						

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing.

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
* Surcharges apply
☐ Other ( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	SED_BRO01	13/10/20	W	X	X									Please report as SW_BRO01
2	SED_BRO01	13/10/20	S	X										
3	SED_BRO02	13/10/20	W	X	X									Please report as SW_BRO02
4	SED_BRO02	13/10/20	S	X										
5	SW1-UP	13/10/20	S	X	X									Marked incorrectly as SED1-UP. Please report as SW1-UP
6	SED1-UP	13/10/20	S	X										
7														
8														
9														
10														
			Total Counts	6	3									

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date	__/__/__	Time	__:__
Eurofins | mgt Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Report №	

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

#AU04_Enviro_Sample_NSW

From:	Jake Bourke <JBOURKE@ramboll.com>
Sent:	Thursday, 15 October 2020 11:57 AM
To:	#AU04_Enviro_Sample_NSW
Cc:	Stephen Maxwell
Subject:	RE: Eurofins Sample Receipt Advice - Report 750569 : Site RAIL LOOP LEAD MANAGEMENT (318000780)
Attachments:	318000780_COC_SWM_October_amended.xlsx
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Luca,

Please find attached amended COC for this report number to include analysis for the extra samples (SED_BR001,SED_BR002,SED1_UP). Please note comments on COC for water samples for these sample ID's to be reported as SW_BRO01, SW_BRO02, and SW1-UP.

There were no samples taken for SW6,SED6,D6_SED_131020 so these have been removed from the amended COC.

Thanks

Kind regards
Jake Bourke
Consultant

D +61 (467) 580473
M +61 467 580 473
jbourke@ramboll.com

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

From: EnviroSampleNSW@eurofins.com <EnviroSampleNSW@eurofins.com>
Sent: Thursday, 15 October 2020 10:27 AM
To: Stephen Maxwell <SMAXWELL@ramboll.com>
Cc: Jake Bourke <JBOURKE@ramboll.com>
Subject: Eurofins Sample Receipt Advice - Report 750569 : Site RAIL LOOP LEAD MANAGEMENT (318000780)

Dear Valued Client,

Splits sent to ALS for analysis.

SW6,SED6,D6_SED_131020 Not rcvd by Lab, analysis cancelled

Rcvd extra samples both water and soil jars logged on HOLD SED_BR001,SED_BR002,SED1_UP

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

Regards

Luca Dominici
Sample Receipt

Eurofins | Environmental Testing
Unit F3, Parkview Building
16 Mars Road
LANE COVE WEST NSW 2066
AUSTRALIA
Phone: +61 02 9900 8421
Email: EnviroSampleNSW@eurofins.com
Website:environment.eurofins.com.au

EnviroNote 1098 - Melbourne PFAS Accreditation
EnviroNote 1103 - NATA Accreditation for Dioxins

Sample Receipt Advice

Company name:	Ramboll Australia Pty Ltd
Contact name:	Stephen Maxwell
Project name:	RAIL LOOP LEAD MANAGEMENT
Project ID:	318000780
Turnaround time:	5 Day
Date/Time received	Oct 14, 2020 4:10 PM
Eurofins reference	750569

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✓ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Splits sent to ALS for analysis.|

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Andrew Black on phone : (+61) 2 9900 8490 or by email: AndrewBlack@eurofins.com

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

Note: A copy of these results will also be delivered to the general Ramboll Australia Pty Ltd email address.

Australia

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

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

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

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

Newcastle
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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: RAIL LOOP LEAD MANAGEMENT
Project ID: 318000780

Order No.:
Report #: 750569
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Oct 14, 2020 4:10 PM
Due: Oct 21, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
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	SW1	Oct 13, 2020		Water	S20-Oc25141	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	SED1	Oct 13, 2020		Soil	S20-Oc25142	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
3	SW2	Oct 13, 2020		Water	S20-Oc25143	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	
4	SED2	Oct 13, 2020		Soil	S20-Oc25144	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
5	SW3	Oct 13, 2020		Water	S20-Oc25145	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	
6	SED3	Oct 13, 2020		Soil	S20-Oc25146	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
7	SW4	Oct 13, 2020		Water	S20-Oc25147	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	
8	SED4	Oct 13, 2020		Soil	S20-Oc25148	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
9	SW5	Oct 13, 2020		Water	S20-Oc25149	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	

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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
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Project Name: RAIL LOOP LEAD MANAGEMENT
Project ID: 318000780

Order No.:
Report #: 750569
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Oct 14, 2020 4:10 PM
Due: Oct 21, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
Perth Laboratory - NATA Site # 23736																																			
Mayfield Laboratory																																			
External Laboratory																																			
10	SED5	Oct 13, 2020		Soil	S20-Oc25150	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
11	SW6	Oct 13, 2020		Water	S20-Oc25151											X																			
12	SED6	Oct 13, 2020		Soil	S20-Oc25152											X																			
13	SW10	Oct 13, 2020		Water	S20-Oc25153	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	
14	SED10	Oct 13, 2020		Soil	S20-Oc25154	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
15	D1_13120	Oct 13, 2020		Water	S20-Oc25155	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	
16	D1_SED_131020	Oct 13, 2020		Soil	S20-Oc25156	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
17	D2_SED_131020	Oct 13, 2020		Soil	S20-Oc25157	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
18	D3_SED_131020	Oct 13, 2020		Soil	S20-Oc25158	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Oct 14, 2020 4:10 PM
Address:	Level 3/100 Pacific Highway	**Report #:**	750569	**Due:**	Oct 21, 2020
	North Sydney	**Phone:**	02 9954 8118	**Priority:**	5 Day
	NSW 2060	**Fax:**	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	RAIL LOOP LEAD MANAGEMENT				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
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Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
Perth Laboratory - NATA Site # 23736																																			
Mayfield Laboratory																																			
External Laboratory																																			
19	D4_SED_131020	Oct 13, 2020		Soil	S20-Oc25159	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
20	D5_SED_131020	Oct 13, 2020		Soil	S20-Oc25160	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
21	D6_SED_131020	Oct 13, 2020		Soil	S20-Oc25161											X																			
22	RIN_131020	Oct 13, 2020		Water	S20-Oc25162	X		X		X		X		X			X		X		X		X		X		X		X		X		X		
23	SW7	Oct 12, 2020		Water	S20-Oc25163	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	
24	SED7	Oct 12, 2020		Soil	S20-Oc25164	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
25	SW8	Oct 12, 2020		Water	S20-Oc25165	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	
26	SED8	Oct 12, 2020		Soil	S20-Oc25166	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
27	SW9	Oct 12, 2020		Water	S20-Oc25167	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	

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Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
Perth Laboratory - NATA Site # 23736																																			
Mayfield Laboratory																																			
External Laboratory																																			
28	SED9	Oct 12, 2020		Soil	S20-Oc25168	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
29	SED_BR001	Oct 12, 2020		Soil	S20-Oc25316	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
30	SW_BR001	Oct 12, 2020		Water	S20-Oc25317	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	
31	SED_BR002	Oct 12, 2020		Soil	S20-Oc25318	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
32	SW_BR002	Oct 12, 2020		Water	S20-Oc25319	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	
33	SED1_UP	Oct 12, 2020		Soil	S20-Oc25320	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
34	SW1_UP	Oct 12, 2020		Water	S20-Oc25321	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	
Test Counts						31	13	31	13	31	13	31	13	31	13	3	31	13	31	13	31	13	31	13	31	13	31	13	31	13	31	13	31	13	17

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Certificate of Analysis

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

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention:	**Stephen Maxwell**
Report	**750569-S**
Project name	RAIL LOOP LEAD MANAGEMENT
Project ID	318000780
Received Date	Oct 14, 2020

Client Sample ID			SED1	SED2	SED3	SED4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Oc25142	S20-Oc25144	S20-Oc25146	S20-Oc25148
Date Sampled			Oct 13, 2020	Oct 13, 2020	Oct 13, 2020	Oct 13, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	20	mg/kg	19000	14000	10000	28000
Arsenic	2	mg/kg	9.7	18	11	5.1
Barium	10	mg/kg	130	110	110	240
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	7.2	6.2	1.8	8.2
Chromium	5	mg/kg	21	22	16	23
Cobalt	5	mg/kg	6.9	11	< 5	5.4
Copper	5	mg/kg	190	320	140	160
Iron	20	mg/kg	15000	24000	19000	18000
Lead	5	mg/kg	610	1000	400	130
Manganese	5	mg/kg	120	640	97	220
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	13	14	8.7	17
Zinc	5	mg/kg	1000	2400	290	840
% Moisture	1	%	44	38	20	27

Client Sample ID			SED5	SED10	D1_SED_131020	D2_SED_131020
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Oc25150	S20-Oc25154	S20-Oc25156	S20-Oc25157
Date Sampled			Oct 13, 2020	Oct 13, 2020	Oct 13, 2020	Oct 13, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	20	mg/kg	7800	13000	21000	5100
Arsenic	2	mg/kg	6.4	4.3	9.4	5.7
Barium	10	mg/kg	98	110	170	53
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	0.5	0.6	5.6	2.1
Chromium	5	mg/kg	14	14	25	11
Cobalt	5	mg/kg	< 5	< 5	7.6	< 5
Copper	5	mg/kg	13	15	240	40
Iron	20	mg/kg	18000	12000	19000	15000
Lead	5	mg/kg	27	26	740	50

Client Sample ID			SED5	SED10	D1_SED_131020	D2_SED_131020
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Oc25150**	**S20-Oc25154**	**S20-Oc25156**	**S20-Oc25157**
Date Sampled			Oct 13, 2020	Oct 13, 2020	Oct 13, 2020	Oct 13, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Manganese	5	mg/kg	200	160	120	110
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	7.1	14	< 5
Zinc	5	mg/kg	81	140	1100	850
% Moisture	1	%	21	32	48	29

Client Sample ID			D3_SED_131020	D4_SED_131020	D5_SED_131020	SED7
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Oc25158**	**S20-Oc25159**	**S20-Oc25160**	**S20-Oc25164**
Date Sampled			Oct 13, 2020	Oct 13, 2020	Oct 13, 2020	Oct 12, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	20	mg/kg	6300	14000	17000	8100
Arsenic	2	mg/kg	12	15	11	6.3
Barium	10	mg/kg	46	180	200	78
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	2.5	20	11	3.3
Chromium	5	mg/kg	19	13	16	10.0
Cobalt	5	mg/kg	10	12	8.1	< 5
Copper	5	mg/kg	110	560	350	42
Iron	20	mg/kg	23000	16000	22000	8900
Lead	5	mg/kg	200	580	310	180
Manganese	5	mg/kg	380	590	160	61
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	8.0	17	18	< 5
Zinc	5	mg/kg	330	1400	1100	560
% Moisture	1	%	4.5	19	64	32

Client Sample ID			SED8	SED9	SED_BR001	SED_BR002
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Oc25166**	**S20-Oc25168**	**S20-Oc25316**	**S20-Oc25318**
Date Sampled			Oct 12, 2020	Oct 12, 2020	Oct 12, 2020	Oct 12, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	20	mg/kg	16000	3400	10000	20000
Arsenic	2	mg/kg	7.8	16	9.6	34
Barium	10	mg/kg	130	58	84	180
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	45
Chromium	5	mg/kg	16	13	18	21
Cobalt	5	mg/kg	< 5	11	7.5	13
Copper	5	mg/kg	10	12	14	1300
Iron	20	mg/kg	14000	28000	22000	20000

Client Sample ID			SED8	SED9	SED_BR001	SED_BR002
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Oc25166	S20-Oc25168	S20-Oc25316	S20-Oc25318
Date Sampled			Oct 12, 2020	Oct 12, 2020	Oct 12, 2020	Oct 12, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	23	23	35	1900
Manganese	5	mg/kg	130	380	310	68
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.2
Nickel	5	mg/kg	7.3	8.9	5.2	54
Zinc	5	mg/kg	70	70	93	8600
% Moisture	1	%	26	17	30	64

Client Sample ID			SED1_UP
Sample Matrix			Soil
Eurofins Sample No.			S20-Oc25320
Date Sampled			Oct 12, 2020
Test/Reference	LOR	Unit	
Heavy Metals			
Aluminium	20	mg/kg	12000
Arsenic	2	mg/kg	16
Barium	10	mg/kg	49
Beryllium	2	mg/kg	< 2
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	29
Cobalt	5	mg/kg	6.3
Copper	5	mg/kg	12
Iron	20	mg/kg	37000
Lead	5	mg/kg	29
Manganese	5	mg/kg	70
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	8.8
Zinc	5	mg/kg	24
% Moisture	1	%	18

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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
Heavy Metals	Sydney	Oct 15, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Oct 15, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Oct 14, 2020 4:10 PM
Address:	Level 3/100 Pacific Highway	**Report #:**	750569	**Due:**	Oct 21, 2020
	North Sydney	**Phone:**	02 9954 8118	**Priority:**	5 Day
	NSW 2060	**Fax:**	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	RAIL LOOP LEAD MANAGEMENT				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
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	SW1	Oct 13, 2020		Water	S20-Oc25141	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	SED1	Oct 13, 2020		Soil	S20-Oc25142	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
3	SW2	Oct 13, 2020		Water	S20-Oc25143	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	
4	SED2	Oct 13, 2020		Soil	S20-Oc25144	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
5	SW3	Oct 13, 2020		Water	S20-Oc25145	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	
6	SED3	Oct 13, 2020		Soil	S20-Oc25146	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
7	SW4	Oct 13, 2020		Water	S20-Oc25147	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	
8	SED4	Oct 13, 2020		Soil	S20-Oc25148	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
9	SW5	Oct 13, 2020		Water	S20-Oc25149	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	

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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: RAIL LOOP LEAD MANAGEMENT
Project ID: 318000780

Order No.:
Report #: 750569
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Oct 14, 2020 4:10 PM
Due: Oct 21, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
Perth Laboratory - NATA Site # 23736																																			
Mayfield Laboratory																																			
External Laboratory																																			
10	SED5	Oct 13, 2020		Soil	S20-Oc25150	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
11	SW6	Oct 13, 2020		Water	S20-Oc25151											X																			
12	SED6	Oct 13, 2020		Soil	S20-Oc25152											X																			
13	SW10	Oct 13, 2020		Water	S20-Oc25153	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	
14	SED10	Oct 13, 2020		Soil	S20-Oc25154	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
15	D1_13120	Oct 13, 2020		Water	S20-Oc25155	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	
16	D1_SED_131020	Oct 13, 2020		Soil	S20-Oc25156	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
17	D2_SED_131020	Oct 13, 2020		Soil	S20-Oc25157	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
18	D3_SED_131020	Oct 13, 2020		Soil	S20-Oc25158	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X

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Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

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Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
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External Laboratory																																			
19	D4_SED_131020	Oct 13, 2020		Soil	S20-Oc25159	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
20	D5_SED_131020	Oct 13, 2020		Soil	S20-Oc25160	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
21	D6_SED_131020	Oct 13, 2020		Soil	S20-Oc25161											X																			
22	RIN_131020	Oct 13, 2020		Water	S20-Oc25162	X		X		X		X		X			X		X		X		X		X		X		X		X		X		
23	SW7	Oct 12, 2020		Water	S20-Oc25163	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	
24	SED7	Oct 12, 2020		Soil	S20-Oc25164	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
25	SW8	Oct 12, 2020		Water	S20-Oc25165	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	
26	SED8	Oct 12, 2020		Soil	S20-Oc25166	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
27	SW9	Oct 12, 2020		Water	S20-Oc25167	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	

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Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
Perth Laboratory - NATA Site # 23736																																			
Mayfield Laboratory																																			
External Laboratory																																			
28	SED9	Oct 12, 2020		Soil	S20-Oc25168	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
29	SED_BR001	Oct 12, 2020		Soil	S20-Oc25316	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
30	SW_BR001	Oct 12, 2020		Water	S20-Oc25317	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	
31	SED_BR002	Oct 12, 2020		Soil	S20-Oc25318	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
32	SW_BR002	Oct 12, 2020		Water	S20-Oc25319	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	
33	SED1_UP	Oct 12, 2020		Soil	S20-Oc25320	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
34	SW1_UP	Oct 12, 2020		Water	S20-Oc25321	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	
Test Counts						31	13	31	13	31	13	31	13	31	13	3	31	13	31	13	31	13	31	13	31	13	31	13	31	13	31	13	31	13	17

Environment Testing

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.

eurofins Environment Testing

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Aluminium			mg/kg	< 20			20	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Barium			mg/kg	< 10			10	Pass	
Beryllium			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	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	
Manganese			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Aluminium			%	105			80-120	Pass	
Arsenic			%	107			80-120	Pass	
Barium			%	106			80-120	Pass	
Beryllium			%	99			80-120	Pass	
Cadmium			%	103			80-120	Pass	
Chromium			%	102			80-120	Pass	
Cobalt			%	103			80-120	Pass	
Copper			%	101			80-120	Pass	
Iron			%	104			80-120	Pass	
Lead			%	101			80-120	Pass	
Manganese			%	102			80-120	Pass	
Mercury			%	101			80-120	Pass	
Nickel			%	101			80-120	Pass	
Zinc			%	99			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	S20-Oc27867	NCP	%	90			75-125	Pass	
Barium	S20-Oc27018	NCP	%	94			75-125	Pass	
Copper	S20-Oc27018	NCP	%	91			75-125	Pass	
Lead	S20-Oc27018	NCP	%	93			75-125	Pass	
Manganese	S20-Oc20672	NCP	%	84			75-125	Pass	
Zinc	S20-Oc27018	NCP	%	87			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S20-Oc25158	CP	%	113			75-125	Pass	
Beryllium	S20-Oc25158	CP	%	109			75-125	Pass	
Cadmium	S20-Oc25158	CP	%	125			75-125	Pass	
Chromium	S20-Oc25158	CP	%	106			75-125	Pass	
Cobalt	S20-Oc25158	CP	%	101			75-125	Pass	
Iron	S20-Oc25158	CP	%	118			75-125	Pass	
Mercury	S20-Oc25158	CP	%	108			75-125	Pass	
Nickel	S20-Oc25158	CP	%	103			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Oc25142	CP	%	44	50	12	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S20-Oc25157	CP	mg/kg	5100	4600	11	30%	Pass	
Arsenic	S20-Oc25157	CP	mg/kg	5.7	4.6	21	30%	Pass	
Barium	S20-Oc25157	CP	mg/kg	53	45	16	30%	Pass	
Beryllium	S20-Oc25157	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	S20-Oc25157	CP	mg/kg	2.1	1.6	28	30%	Pass	
Chromium	S20-Oc25157	CP	mg/kg	11	10	4.0	30%	Pass	
Cobalt	S20-Oc25157	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	S20-Oc25157	CP	mg/kg	40	34	16	30%	Pass	
Iron	S20-Oc25157	CP	mg/kg	15000	11000	27	30%	Pass	
Lead	S20-Oc25157	CP	mg/kg	50	44	14	30%	Pass	
Manganese	S20-Oc25157	CP	mg/kg	110	93	19	30%	Pass	
Mercury	S20-Oc25157	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S20-Oc25157	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S20-Oc25157	CP	mg/kg	850	770	10	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Oc25160	CP	%	64	56	13	30%	Pass	

Environment Testing

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

Asim Khan	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

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.

eurofins

Environment Testing

Certificate of Analysis

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.

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

Attention: **Stephen Maxwell**

Report **750569-W**
Project name RAIL LOOP LEAD MANAGEMENT
Project ID 318000780
Received Date Oct 14, 2020

Client Sample ID			**SW1**	**SW2**	**SW3**	**SW4**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S20-Oc25141**	**S20-Oc25143**	**S20-Oc25145**	**S20-Oc25147**
Date Sampled			**Oct 13, 2020**	**Oct 13, 2020**	**Oct 13, 2020**	**Oct 13, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	0.05	mg/L	0.29	< 0.05	0.46	0.36
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	0.40	0.28
Arsenic	0.001	mg/L	0.004	< 0.001	0.003	0.003
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	0.002	0.002
Barium	0.02	mg/L	0.36	0.11	0.07	0.08
Barium (filtered)	0.02	mg/L	0.11	0.11	0.07	0.08
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
Cadmium	0.0002	mg/L	0.0012	0.0007	0.0036	0.019
Cadmium (filtered)	0.0002	mg/L	0.0005	0.0007	0.0033	0.018
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	0.003	< 0.001	< 0.001	0.004
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.004
Copper	0.001	mg/L	0.011	0.004	0.12	0.19
Copper (filtered)	0.001	mg/L	0.002	0.003	0.10	0.18
Iron	0.05	mg/L	0.85	< 0.05	1.4	1.3
Iron (filtered)	0.05	mg/L	< 0.05	< 0.05	1.1	0.89
Lead	0.001	mg/L	0.028	0.004	0.051	0.038
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	0.023	0.023
Manganese	0.005	mg/L	0.28	0.017	0.042	0.37
Manganese (filtered)	0.005	mg/L	0.043	0.017	0.029	0.38
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
Nickel	0.001	mg/L	0.001	< 0.001	0.011	0.038
Nickel (filtered)	0.001	mg/L	< 0.001	< 0.001	0.011	0.038
Zinc	0.005	mg/L	0.21	0.096	0.74	2.6
Zinc (filtered)	0.005	mg/L	0.073	0.13	0.70	2.5

Client Sample ID			SW5	SW10	D1_13120	RIN_131020
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			S20-Oc25149	S20-Oc25153	S20-Oc25155	S20-Oc25162
Date Sampled			Oct 13, 2020	Oct 13, 2020	Oct 13, 2020	Oct 13, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	0.05	mg/L	11	< 0.05	0.12	< 0.05
Aluminium (filtered)	0.05	mg/L	0.28	< 0.05	< 0.05	-
Arsenic	0.001	mg/L	0.005	0.001	0.002	< 0.001
Arsenic (filtered)	0.001	mg/L	0.002	< 0.001	< 0.001	-
Barium	0.02	mg/L	0.17	0.10	0.25	< 0.02
Barium (filtered)	0.02	mg/L	0.08	0.11	0.11	-
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	-
Cadmium	0.0002	mg/L	0.0021	< 0.0002	0.0011	< 0.0002
Cadmium (filtered)	0.0002	mg/L	0.0010	< 0.0002	0.0005	-
Chromium	0.001	mg/L	0.011	< 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	< 0.001	0.002	< 0.001
Cobalt (filtered)	0.001	mg/L	0.001	< 0.001	< 0.001	-
Copper	0.001	mg/L	0.074	< 0.001	0.009	< 0.001
Copper (filtered)	0.001	mg/L	0.045	< 0.001	0.002	-
Iron	0.05	mg/L	8.9	0.55	0.61	< 0.05
Iron (filtered)	0.05	mg/L	0.54	0.11	< 0.05	-
Lead	0.001	mg/L	0.031	0.002	0.012	< 0.001
Lead (filtered)	0.001	mg/L	0.007	< 0.001	< 0.001	-
Manganese	0.005	mg/L	0.15	0.089	0.22	< 0.005
Manganese (filtered)	0.005	mg/L	0.090	0.089	0.044	-
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	-
Nickel	0.001	mg/L	0.007	0.001	0.001	< 0.001
Nickel (filtered)	0.001	mg/L	0.003	< 0.001	< 0.001	-
Zinc	0.005	mg/L	0.30	0.013	0.18	< 0.005
Zinc (filtered)	0.005	mg/L	0.14	0.006	0.074	-

Client Sample ID			SW7	SW8	SW9	SW_BR001
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			S20-Oc25163	S20-Oc25165	S20-Oc25167	S20-Oc25317
Date Sampled			Oct 12, 2020	Oct 12, 2020	Oct 12, 2020	Oct 12, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	0.05	mg/L	0.33	< 0.05	< 0.05	0.48
Aluminium (filtered)	0.05	mg/L	0.18	< 0.05	< 0.05	0.17
Arsenic	0.001	mg/L	0.005	0.001	0.001	0.003
Arsenic (filtered)	0.001	mg/L	0.004	< 0.001	< 0.001	0.003
Barium	0.02	mg/L	0.05	0.08	0.09	0.05
Barium (filtered)	0.02	mg/L	0.05	0.09	0.09	0.05
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
Cadmium	0.0002	mg/L	0.0003	< 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	0.005
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.004
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			SW7	SW8	SW9	SW_BR001
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			S20-Oc25163	S20-Oc25165	S20-Oc25167	S20-Oc25317
Date Sampled			Oct 12, 2020	Oct 12, 2020	Oct 12, 2020	Oct 12, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	0.014	< 0.001	< 0.001	0.008
Copper (filtered)	0.001	mg/L	0.013	< 0.001	< 0.001	0.007
Iron	0.05	mg/L	3.0	0.51	0.15	0.43
Iron (filtered)	0.05	mg/L	2.4	0.15	< 0.05	0.16
Lead	0.001	mg/L	0.012	0.001	0.001	0.004
Lead (filtered)	0.001	mg/L	0.009	< 0.001	< 0.001	< 0.001
Manganese	0.005	mg/L	0.063	0.066	0.030	0.086
Manganese (filtered)	0.005	mg/L	0.056	0.064	0.023	0.027
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
Nickel	0.001	mg/L	0.003	0.001	0.001	0.003
Nickel (filtered)	0.001	mg/L	0.003	0.001	0.001	0.003
Zinc	0.005	mg/L	0.065	0.009	0.008	0.034
Zinc (filtered)	0.005	mg/L	0.051	0.010	< 0.005	0.015

Client Sample ID			SW_BR002	SW1_UP
Sample Matrix			Water	Water
Eurofins Sample No.			S20-Oc25319	S20-Oc25321
Date Sampled			Oct 12, 2020	Oct 12, 2020
Test/Reference	LOR	Unit		
Heavy Metals				
Aluminium	0.05	mg/L	0.38	< 0.05
Aluminium (filtered)	0.05	mg/L	0.16	< 0.05
Arsenic	0.001	mg/L	0.003	< 0.001
Arsenic (filtered)	0.001	mg/L	0.002	< 0.001
Barium	0.02	mg/L	< 0.02	0.10
Barium (filtered)	0.02	mg/L	< 0.02	0.10
Beryllium	0.001	mg/L	< 0.001	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001
Cadmium	0.0002	mg/L	0.0005	< 0.0002
Cadmium (filtered)	0.0002	mg/L	0.0003	< 0.0002
Chromium	0.001	mg/L	0.001	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001
Cobalt	0.001	mg/L	0.002	< 0.001
Cobalt (filtered)	0.001	mg/L	0.002	< 0.001
Copper	0.001	mg/L	0.016	< 0.001
Copper (filtered)	0.001	mg/L	0.011	< 0.001
Iron	0.05	mg/L	4.0	0.12
Iron (filtered)	0.05	mg/L	2.0	< 0.05
Lead	0.001	mg/L	0.011	0.001
Lead (filtered)	0.001	mg/L	0.005	< 0.001
Manganese	0.005	mg/L	0.20	0.022
Manganese (filtered)	0.005	mg/L	0.19	0.022
Mercury	0.0001	mg/L	< 0.0001	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001
Nickel	0.001	mg/L	0.006	< 0.001
Nickel (filtered)	0.001	mg/L	0.006	< 0.001

Client Sample ID			SW_BR002	SW1_UP
Sample Matrix			Water	Water
Eurofins Sample No.			S20-Oc25319	S20-Oc25321
Date Sampled			Oct 12, 2020	Oct 12, 2020
Test/Reference	LOR	Unit		
Heavy Metals				
Zinc	0.005	mg/L	0.051	0.009
Zinc (filtered)	0.005	mg/L	0.034	< 0.005

Environment Testing

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
Heavy Metals	Sydney	Oct 16, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Sydney	Oct 15, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Sydney	Oct 15, 2020	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

eurofins Environment Testing

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Oct 14, 2020 4:10 PM
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:** **Phone:** **Fax:**	750569 02 9954 8118 02 9954 8150	**Due:** **Priority:** **Contact Name:**	Oct 21, 2020 5 Day Stephen Maxwell
Project Name:	RAIL LOOP LEAD MANAGEMENT				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
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	SW1	Oct 13, 2020		Water	S20-Oc25141	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	SED1	Oct 13, 2020		Soil	S20-Oc25142	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
3	SW2	Oct 13, 2020		Water	S20-Oc25143	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	
4	SED2	Oct 13, 2020		Soil	S20-Oc25144	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
5	SW3	Oct 13, 2020		Water	S20-Oc25145	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	
6	SED3	Oct 13, 2020		Soil	S20-Oc25146	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
7	SW4	Oct 13, 2020		Water	S20-Oc25147	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	
8	SED4	Oct 13, 2020		Soil	S20-Oc25148	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
9	SW5	Oct 13, 2020		Water	S20-Oc25149	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	

eurofins Environment Testing

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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: RAIL LOOP LEAD MANAGEMENT
Project ID: 318000780

Order No.:
Report #: 750569
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Oct 14, 2020 4:10 PM
Due: Oct 21, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
Perth Laboratory - NATA Site # 23736																																			
Mayfield Laboratory																																			
External Laboratory																																			
10	SED5	Oct 13, 2020		Soil	S20-Oc25150	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
11	SW6	Oct 13, 2020		Water	S20-Oc25151											X																			
12	SED6	Oct 13, 2020		Soil	S20-Oc25152											X																			
13	SW10	Oct 13, 2020		Water	S20-Oc25153	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	
14	SED10	Oct 13, 2020		Soil	S20-Oc25154	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
15	D1_13120	Oct 13, 2020		Water	S20-Oc25155	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	
16	D1_SED_131020	Oct 13, 2020		Soil	S20-Oc25156	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
17	D2_SED_131020	Oct 13, 2020		Soil	S20-Oc25157	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
18	D3_SED_131020	Oct 13, 2020		Soil	S20-Oc25158	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X

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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: RAIL LOOP LEAD MANAGEMENT
Project ID: 318000780

Order No.:
Report #: 750569
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Oct 14, 2020 4:10 PM
Due: Oct 21, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
Perth Laboratory - NATA Site # 23736																																			
Mayfield Laboratory																																			
External Laboratory																																			
19	D4_SED_131020	Oct 13, 2020		Soil	S20-Oc25159	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
20	D5_SED_131020	Oct 13, 2020		Soil	S20-Oc25160	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
21	D6_SED_131020	Oct 13, 2020		Soil	S20-Oc25161											X																			
22	RIN_131020	Oct 13, 2020		Water	S20-Oc25162	X		X		X		X		X			X		X		X		X		X		X		X		X		X		
23	SW7	Oct 12, 2020		Water	S20-Oc25163	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	
24	SED7	Oct 12, 2020		Soil	S20-Oc25164	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
25	SW8	Oct 12, 2020		Water	S20-Oc25165	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	
26	SED8	Oct 12, 2020		Soil	S20-Oc25166	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
27	SW9	Oct 12, 2020		Water	S20-Oc25167	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	

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Contact Name: Stephen Maxwell

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Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	CANCELLED	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																			
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																			
Perth Laboratory - NATA Site # 23736																																			
Mayfield Laboratory																																			
External Laboratory																																			
28	SED9	Oct 12, 2020		Soil	S20-Oc25168	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
29	SED_BR001	Oct 12, 2020		Soil	S20-Oc25316	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
30	SW_BR001	Oct 12, 2020		Water	S20-Oc25317	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	
31	SED_BR002	Oct 12, 2020		Soil	S20-Oc25318	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
32	SW_BR002	Oct 12, 2020		Water	S20-Oc25319	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	
33	SED1_UP	Oct 12, 2020		Soil	S20-Oc25320	X		X		X		X		X			X		X		X		X		X		X		X		X		X		X
34	SW1_UP	Oct 12, 2020		Water	S20-Oc25321	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	
Test Counts						31	13	31	13	31	13	31	13	31	13	3	31	13	31	13	31	13	31	13	31	13	31	13	31	13	31	13	31	13	17

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							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Aluminium (filtered)	mg/L	< 0.05			0.05	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	
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	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	107			80-120	Pass	
Aluminium (filtered)	%	98			80-120	Pass	
Arsenic	%	108			80-120	Pass	
Arsenic (filtered)	%	102			80-120	Pass	
Barium	%	102			80-120	Pass	
Barium (filtered)	%	103			80-120	Pass	
Beryllium	%	94			80-120	Pass	
Beryllium (filtered)	%	97			80-120	Pass	
Cadmium	%	106			80-120	Pass	
Cadmium (filtered)	%	101			80-120	Pass	
Chromium	%	103			80-120	Pass	
Chromium (filtered)	%	100			80-120	Pass	
Cobalt	%	100			80-120	Pass	
Cobalt (filtered)	%	102			80-120	Pass	
Copper	%	99			80-120	Pass	
Copper (filtered)	%	100			80-120	Pass	
Iron	%	104			80-120	Pass	
Iron (filtered)	%	101			80-120	Pass	
Lead	%	102			80-120	Pass	
Lead (filtered)	%	102			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Manganese			%	99			80-120	Pass	
Manganese (filtered)			%	100			80-120	Pass	
Mercury			%	98			80-120	Pass	
Mercury (filtered)			%	106			80-120	Pass	
Nickel			%	102			80-120	Pass	
Nickel (filtered)			%	102			80-120	Pass	
Zinc			%	100			80-120	Pass	
Zinc (filtered)			%	103			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	S20-Oc25321	CP	%	102			75-125	Pass	
Aluminium (filtered)	S20-Oc25321	CP	%	92			75-125	Pass	
Arsenic	S20-Oc25321	CP	%	110			75-125	Pass	
Arsenic (filtered)	S20-Oc25321	CP	%	100			75-125	Pass	
Barium	S20-Oc25321	CP	%	101			75-125	Pass	
Barium (filtered)	S20-Oc25321	CP	%	86			75-125	Pass	
Beryllium	S20-Oc25321	CP	%	104			75-125	Pass	
Beryllium (filtered)	S20-Oc25321	CP	%	94			75-125	Pass	
Cadmium	S20-Oc25321	CP	%	107			75-125	Pass	
Cadmium (filtered)	S20-Oc25321	CP	%	95			75-125	Pass	
Chromium	S20-Oc25321	CP	%	105			75-125	Pass	
Chromium (filtered)	S20-Oc25321	CP	%	95			75-125	Pass	
Cobalt	S20-Oc25321	CP	%	101			75-125	Pass	
Cobalt (filtered)	S20-Oc25321	CP	%	95			75-125	Pass	
Copper	S20-Oc25321	CP	%	99			75-125	Pass	
Copper (filtered)	S20-Oc25321	CP	%	93			75-125	Pass	
Iron	S20-Oc25321	CP	%	103			75-125	Pass	
Iron (filtered)	S20-Oc25321	CP	%	96			75-125	Pass	
Lead	S20-Oc25321	CP	%	103			75-125	Pass	
Lead (filtered)	S20-Oc25321	CP	%	98			75-125	Pass	
Manganese	S20-Oc25321	CP	%	99			75-125	Pass	
Manganese (filtered)	S20-Oc25321	CP	%	91			75-125	Pass	
Mercury	S20-Oc25321	CP	%	100			75-125	Pass	
Mercury (filtered)	S20-Oc25321	CP	%	105			75-125	Pass	
Nickel	S20-Oc25321	CP	%	100			75-125	Pass	
Nickel (filtered)	S20-Oc25321	CP	%	95			75-125	Pass	
Zinc	S20-Oc25321	CP	%	98			75-125	Pass	
Zinc (filtered)	S20-Oc25321	CP	%	95			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S20-Oc25141	CP	mg/L	0.29	0.15	63	30%	Fail	Q15
Aluminium (filtered)	S20-Oc25141	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic	S20-Oc25141	CP	mg/L	0.004	0.002	59	30%	Fail	Q15
Arsenic (filtered)	S20-Oc25141	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium	S20-Oc25141	CP	mg/L	0.36	0.18	68	30%	Fail	Q02
Barium (filtered)	S20-Oc25141	CP	mg/L	0.11	0.11	2.0	30%	Pass	
Beryllium	S20-Oc25141	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Beryllium (filtered)	S20-Oc25141	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	S20-Oc25141	CP	mg/L	0.0012	0.0011	15	30%	Pass	
Cadmium (filtered)	S20-Oc25141	CP	mg/L	0.0005	0.0005	4.0	30%	Pass	
Chromium	S20-Oc25141	CP	mg/L	0.001	< 0.001	76	30%	Fail	Q15

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Chromium (filtered)	S20-Oc25141	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	S20-Oc25141	CP	mg/L	0.003	0.002	49	30%	Fail	Q15
Cobalt (filtered)	S20-Oc25141	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	S20-Oc25141	CP	mg/L	0.011	0.006	61	30%	Fail	Q15
Copper (filtered)	S20-Oc25141	CP	mg/L	0.002	0.002	1.0	30%	Pass	
Iron	S20-Oc25141	CP	mg/L	0.85	0.58	37	30%	Fail	Q15
Iron (filtered)	S20-Oc25141	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead	S20-Oc25141	CP	mg/L	0.028	0.015	60	30%	Fail	Q15
Lead (filtered)	S20-Oc25141	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese	S20-Oc25141	CP	mg/L	0.28	0.18	41	30%	Fail	Q02
Manganese (filtered)	S20-Oc25141	CP	mg/L	0.043	0.044	1.0	30%	Pass	
Mercury	S20-Oc25141	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Mercury (filtered)	S20-Oc25141	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	S20-Oc25141	CP	mg/L	0.001	< 0.001	11	30%	Pass	
Nickel (filtered)	S20-Oc25141	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	S20-Oc25141	CP	mg/L	0.21	0.14	39	30%	Fail	Q02
Zinc (filtered)	S20-Oc25141	CP	mg/L	0.073	0.074	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	S20-Oc25163	CP	mg/L	0.18	0.17	4.0	30%	Pass	
Arsenic (filtered)	S20-Oc25163	CP	mg/L	0.004	0.004	<1	30%	Pass	
Barium (filtered)	S20-Oc25163	CP	mg/L	0.05	0.05	1.0	30%	Pass	
Cadmium (filtered)	S20-Oc25163	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S20-Oc25163	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	S20-Oc25163	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	S20-Oc25163	CP	mg/L	0.013	0.013	2.0	30%	Pass	
Iron (filtered)	S20-Oc25163	CP	mg/L	2.4	2.4	1.0	30%	Pass	
Lead (filtered)	S20-Oc25163	CP	mg/L	0.009	0.009	<1	30%	Pass	
Manganese (filtered)	S20-Oc25163	CP	mg/L	0.056	0.056	1.0	30%	Pass	
Mercury (filtered)	S20-Oc25163	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	S20-Oc25163	CP	mg/L	0.003	0.003	8.0	30%	Pass	
Zinc (filtered)	S20-Oc25163	CP	mg/L	0.051	0.050	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S20-Oc25167	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic	S20-Oc25167	CP	mg/L	0.001	0.001	14	30%	Pass	
Barium	S20-Oc25167	CP	mg/L	0.09	0.09	6.0	30%	Pass	
Beryllium	S20-Oc25167	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	S20-Oc25167	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S20-Oc25167	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	S20-Oc25167	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	S20-Oc25167	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron	S20-Oc25167	CP	mg/L	0.15	0.14	5.0	30%	Pass	
Lead	S20-Oc25167	CP	mg/L	0.001	< 0.001	23	30%	Pass	
Manganese	S20-Oc25167	CP	mg/L	0.030	0.029	5.0	30%	Pass	
Mercury	S20-Oc25167	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	S20-Oc25167	CP	mg/L	0.001	0.001	7.0	30%	Pass	
Zinc	S20-Oc25167	CP	mg/L	0.008	0.006	31	30%	Fail	Q15

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
Q02	The duplicate %RPD is outside the recommended acceptance criteria. Further analysis indicates sample heterogeneity as the cause
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

Asim Khan	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

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.

CERTIFICATE OF ANALYSIS

Work Order	: **ES2036245**	Page	: 1 of 4
Client	: **RAMBOLL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE MAXWELL	Contact	: Loren Schiavon
Address	: EASTPOINT COMPLEX SUITE 19B, LEVEL 2 50 GLEBE ROAD THE JUNCTION NSW 2291	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 318000780 Rail Loop Lead Management	Date Samples Received	: 15-Oct-2020 14:10
Order number	: ----	Date Analysis Commenced	: 20-Oct-2020
C-O-C number	: ----	Issue Date	: 22-Oct-2020 13:34
Sampler	: JAKE BOURKE, THOMAS FRANK		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	T1_SED_131020	T2_SED_131020	T3_SED_131020	T4_SED_131020	T5_SED_131020
			Client sampling date / time	13-Oct-2020 00:00	13-Oct-2020 00:00	13-Oct-2020 00:00	13-Oct-2020 00:00	13-Oct-2020 00:00
Compound	CAS Number	LOR	Unit	ES2036245-002	ES2036245-003	ES2036245-004	ES2036245-005	ES2036245-006
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	46.0	25.0	3.4	21.1	57.9
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	13300	4170	7700	10100	12000
Barium	7440-39-3	10	mg/kg	120	40	50	140	170
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Cobalt	7440-48-4	2	mg/kg	7	2	7	20	8
Iron	7439-89-6	50	mg/kg	14300	11200	27700	14700	23400
Manganese	7439-96-5	5	mg/kg	117	136	312	826	138
Arsenic	7440-38-2	5	mg/kg	9	<5	14	14	11
Cadmium	7440-43-9	1	mg/kg	7	2	2	18	9
Chromium	7440-47-3	2	mg/kg	19	8	26	12	15
Copper	7440-50-8	5	mg/kg	247	38	146	610	397
Lead	7439-92-1	5	mg/kg	634	59	249	733	285
Nickel	7440-02-0	2	mg/kg	12	4	12	22	17
Zinc	7440-66-6	5	mg/kg	1110	842	521	1840	1100
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	T1_131020	----	----	----	----
			Client sampling date / time	13-Oct-2020 00:00	----	----	----	----
				ES2036245-001	--------	--------	--------	--------
				Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	10	µg/L	<10	----	----	----	----
Arsenic	7440-38-2	1	µg/L	<1	----	----	----	----
Beryllium	7440-41-7	1	µg/L	<1	----	----	----	----
Barium	7440-39-3	1	µg/L	**91**	----	----	----	----
Cadmium	7440-43-9	0.1	µg/L	**0.4**	----	----	----	----
Chromium	7440-47-3	1	µg/L	<1	----	----	----	----
Copper	7440-50-8	1	µg/L	**1**	----	----	----	----
Cobalt	7440-48-4	1	µg/L	<1	----	----	----	----
Nickel	7440-02-0	1	µg/L	<1	----	----	----	----
Lead	7439-92-1	1	µg/L	<1	----	----	----	----
Zinc	7440-66-6	5	µg/L	**62**	----	----	----	----
Manganese	7439-96-5	1	µg/L	**39**	----	----	----	----
Iron	7439-89-6	50	µg/L	<50	----	----	----	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	10	µg/L	**610**	----	----	----	----
Arsenic	7440-38-2	1	µg/L	**2**	----	----	----	----
Beryllium	7440-41-7	1	µg/L	<1	----	----	----	----
Barium	7440-39-3	1	µg/L	**276**	----	----	----	----
Cadmium	7440-43-9	0.1	µg/L	**2.1**	----	----	----	----
Chromium	7440-47-3	1	µg/L	<1	----	----	----	----
Copper	7440-50-8	1	µg/L	**14**	----	----	----	----
Cobalt	7440-48-4	1	µg/L	**7**	----	----	----	----
Nickel	7440-02-0	1	µg/L	**2**	----	----	----	----
Lead	7439-92-1	1	µg/L	**32**	----	----	----	----
Zinc	7440-66-6	5	µg/L	**320**	----	----	----	----
Manganese	7439-96-5	1	µg/L	**706**	----	----	----	----
Iron	7439-89-6	50	µg/L	**1410**	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.1	µg/L	<0.1	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	µg/L	<0.1	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **ES2036245**	Page	: 1 of 7
Client	: **RAMBOLL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE MAXWELL	Contact	: Loren Schiavon
Address	: EASTPOINT COMPLEX SUITE 19B, LEVEL 2 50 GLEBE ROAD THE JUNCTION NSW 2291	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 318000780 Rail Loop Lead Management	Date Samples Received	: 15-Oct-2020
Order number	: ----	Date Analysis Commenced	: 20-Oct-2020
C-O-C number	: ----	Issue Date	: 22-Oct-2020
Sampler	: JAKE BOURKE, THOMAS FRANK		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3317408)									
ES2036168-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	1	1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	380	400	5.08	0% - 20%
		EG005T: Chromium	7440-47-3	2	mg/kg	19	22	10.6	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	15	20	29.6	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	20	22	11.7	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	9	11	18.7	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	54	53	1.98	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	28	32	14.8	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	1370	1220	12.1	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	420	429	1.96	0% - 20%
		EG005T: Aluminium	7429-90-5	50	mg/kg	17500	18400	5.14	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	46200	50000	8.03	0% - 20%
ES2036247-045	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	20	20	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	35	28	21.2	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	4	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	9	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	25	25	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	12700	12600	0.272	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3317408) - continued									
ES2036247-045	Anonymous	EG005T: Iron	7439-89-6	50	mg/kg	25800	25400	1.86	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3317413)									
ES2036167-002	Anonymous	EA055: Moisture Content	----	0.1	%	60.6	60.6	0.00	0% - 20%
ES2036247-044	Anonymous	EA055: Moisture Content	----	0.1	%	9.4	8.9	4.99	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3317409)									
ES2036168-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES2036247-045	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3317253)									
ES2036216-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.229	0.229	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.434	0.432	0.585	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.036	0.034	4.55	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	12.8	12.9	0.342	0% - 20%
EW2004678-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.067	0.066	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.609	0.605	0.667	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.09	0.09	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3317230)									
ES2036245-001	T1_131020	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	2.1 µg/L	0.0020	0.00	0% - 20%
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	2 µg/L	0.002	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 3317230) - continued									
ES2036245-001	T1_131020	EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	276 µg/L	0.316	13.4	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	7 µg/L	0.006	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	14 µg/L	0.014	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	32 µg/L	0.032	0.00	0% - 20%
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	706 µg/L	0.698	1.03	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	2 µg/L	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	320 µg/L	0.314	1.90	0% - 20%
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	610 µg/L	0.52	15.4	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1410 µg/L	1.32	6.80	0% - 20%
ES2036123-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.041	0.042	3.77	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.001	0.002	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.121	0.123	1.92	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.11	0.11	0.00	0% - 50%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.32	1.32	0.00	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 3317254)									
ES2036259-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3317244)									
ES2036219-036	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3317408)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	15910 mg/kg	86.0	82.0	119
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	100.0	88.0	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	99.3 mg/kg	101	65.0	136
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	0.5 mg/kg	120	70.0	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	94.6	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	20.2 mg/kg	111	68.0	132
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	11.2 mg/kg	84.6	83.0	117
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	103	89.0	111
EG005T: Iron	7439-89-6	50	mg/kg	<50	33227 mg/kg	102	89.0	112
EG005T: Lead	7439-92-1	5	mg/kg	<5	62.1 mg/kg	94.3	82.0	119
EG005T: Manganese	7439-96-5	5	mg/kg	<5	590 mg/kg	97.3	83.0	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.4 mg/kg	101	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	162 mg/kg	82.2	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3317409)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.0847 mg/kg	76.3	70.0	105

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3317253)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	86.0	80.0	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.8	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	91.8	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	85.7	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	85.8	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	88.9	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	83.0	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	83.6	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	85.4	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	86.0	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	85.2	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	85.0	81.0	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	88.9	82.0	112
EG020T: Total Metals by ICP-MS (QCLot: 3317230)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	97.6	82.0	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 3317230) - continued								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	82.0	114
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	97.6	79.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	84.0	116
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.7	86.0	116
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.4	84.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.2	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.0	85.0	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.7	85.0	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.1	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.3	79.0	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	85.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 3317254)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	103	83.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3317244)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	103	77.0	111

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3317408)							
ES2036168-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	91.5	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	101	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	95.4	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	97.7	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.6	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	72.8	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3317409)							
ES2036168-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	83.2	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3317253)							
ES2036216-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	120	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	121	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	108	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	110	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	116	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	113	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	112	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	113	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	108	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	108	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	109	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3317230)							
ES2036130-076	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.6	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	99.5	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	99.5	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	99.1	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	101	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	95.9	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	103	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	99.6	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	99.4	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3317254)							
ES2036245-001	T1_131020	EG035F: Mercury	7439-97-6	0.01 mg/L	92.3	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3317244)							
ES2036245-001	T1_131020	EG035T: Mercury	7439-97-6	0.01 mg/L	87.6	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2036245**	Page	: 1 of 5
Client	: **RAMBOLL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE MAXWELL	Telephone	: +61 2 8784 8555
Project	: 318000780 Rail Loop Lead Management	Date Samples Received	: 15-Oct-2020
Site	: ----	Issue Date	: 22-Oct-2020
Sampler	: JAKE BOURKE, THOMAS FRANK	No. of samples received	: 6
Order number	: ----	No. of samples analysed	: 6

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
T1_SED_131020,	T2_SED_131020,	**13-Oct-2020**	**----**	----	----	**20-Oct-2020**	27-Oct-2020	✓
T3_SED_131020,	T4_SED_131020,							
T5_SED_131020								
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
T1_SED_131020,	T2_SED_131020,	**13-Oct-2020**	**20-Oct-2020**	11-Apr-2021	✓	**21-Oct-2020**	11-Apr-2021	✓
T3_SED_131020,	T4_SED_131020,							
T5_SED_131020								
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
T1_SED_131020,	T2_SED_131020,	**13-Oct-2020**	**20-Oct-2020**	10-Nov-2020	✓	**22-Oct-2020**	10-Nov-2020	✓
T3_SED_131020,	T4_SED_131020,							
T5_SED_131020								

Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
T1_131020	**13-Oct-2020**	**----**	----	----	**20-Oct-2020**	11-Apr-2021	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
T1_131020	**13-Oct-2020**	**20-Oct-2020**	11-Apr-2021	✓	**20-Oct-2020**	11-Apr-2021	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
T1_131020	**13-Oct-2020**	**----**	----	----	**20-Oct-2020**	10-Nov-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
T1_131020	**13-Oct-2020**	**----**	----	----	**20-Oct-2020**	10-Nov-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

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

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

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

Company	Ramboll	Project №	318000780	Project Manager	Stephen Maxwell	Sampler(s)	Jake Bourke, Thomas Frank
Address	50 Glebe Road the Junction	Project Name	Rail Loop Lead Management	EDD Format (ESdat, EQuIS, Custom)	Excel and PDF	Handed over by	Jake Bourke
Contact Name	Stephen Maxwell					Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Phone №						Email for Results	smaxwell@ramboll.com, jbourke@ramboll.com,
Special Directions							
Purchase Order							
Quote ID №	180813RAMN_1						

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing.

Containers: 1L Plastic; 250mL Plastic; 125mL Plastic; 200mL Amber Glass; 40mL VOA vial; 500mL PFAS Bottle; Jar (Glass or HDPE); Other (Asbestos AS4964, WA Guidelines)

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
* Surcharges apply
☐ Other ( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Sample Comments / Dangerous Goods Hazard Warning
1	SW1	13/10/20	W	X	X	
2	SED1	13/10/20	S	X		
3	SW2	13/10/20	W	X	X	
4	SED2	13/10/20	S	X		
5	SW3	13/10/20	W	X	X	
6	SED3	13/10/20	S	X		
7	SW4	13/10/20	W	X	X	
8	SED4	13/10/20	S	X		
9	SW5	13/10/20	W	X	X	
10	SED5	13/10/20	S	X		
			Total Counts	10	5	

Environmental Division
Sydney
Work Order Reference
ES2036245
Telephone : + 61-2-8784 8555

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date	/ /	Time	:

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QS3009_R7 Modified by: Dr. R Symons Approved by: T. Lakeland Approved on: 17 August 2017

JUSTIN 15/10/20 6-40pm 23.4°C

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

- ☐ Sydney Laboratory — Unit F3 Bld.F, 16 Mars Rd, Lane Cove West, NSW 2066 — 02 9900 8400 — EnviroSampleNSW@eurofins.com
- ☐ Brisbane Laboratory — Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172 — 07 3902 4600 — EnviroSampleQLD@eurofins.com
- ☐ Perth Laboratory — Unit 2, 91 Leach Highway, Kewdale WA 6105 — 08 9251 9600 — EnviroSampleWA@eurofins.com
- ☐ Melbourne Laboratory — 2 Kingston Town Close, Oakleigh, VIC 3166 — 03 8564 5000 — EnviroSampleVic@eurofins.com

Company	Ramboll
Address	50 Glebe Road the Junction
Contact Name	Stephen Maxwell
Phone №	
Special Directions	
Purchase Order	
Quote ID №	180813RAMN_1
Project №	318000780
Project Name	Rail Loop Lead Management
Project Manager	Stephen Maxwell
EDD Format (ESdat, EQuIS, Custom)	Excel and PDF
Sampler(s)	Jake Bourke, Thomas Frank
Handed over by	Jake Bourke
Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Email for Results	smaxwell@ramboll.com, jbourke@ramboll.com,

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

☐ Overnight (9am)* ☐ 1 Day* ☐ 2 Day* ☐ 3 Day* ☐ 5 Day ☐ Other ( )

* Surcharges apply

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing

Containers: 1L Plastic, 250mL Plastic, 125mL Plastic, 200mL Amber Glass, 40mL VOA vial, 500mL PFAS Bottle, Jar (Glass or HDPE), Other (Asbestos AS4964, WA Guidelines)

№		Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Sample Comments / Dangerous Goods Hazard Warning
1		SW6	13/10/20	W	X	X	
2		SED6	13/10/20	S	X		
3		SW10	13/10/20	W	X	X	
4		SED10	13/10/20	S	X		
5		D1_13120	13/10/20	W	X	X	
6		D1_SED_131020	13/10/20	S	X		
7	1	T1_131020	13/10/20	W	X	X	Please forward to ALS
8	2	T1_SED_131020	13/10/20	S	X		Please forward to ALS
9		D2_SED_131020	13/10/20	S	X		
10	3	T2_SED_131020	13/10/20	S	X		Please forward to ALS
		Total Counts			10	4	

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal — Name — Signature — Date __/__/__ — Time __:__

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QS3009_R7 Modified by: Dr. R Symons Approved by: T. Lakeland Approved on: 17 August 2017

JUSTIN 15/10/20 6.40pm

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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☐ Perth Laboratory
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08 9251 9600 EnviroSampleWA@eurofins.com

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

Company	Ramboll	Project №	318000780	Project Manager	Stephen Maxwell	Sampler(s)	Jake Bourke, Thomas Frank
Address	50 Glebe Road the Junction	Project Name	Rail Loop Lead Management	EDD Format (ESdat, EQuIS, Custom)	Excel and PDF	Handed over by	Jake Bourke
Contact Name	Stephen Maxwell					Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Phone №						Email for Results	smaxwell@ramboll.com, jbourke@ramboll.com,
Special Directions							
Purchase Order							
Quote ID №	180813RAMN_1						

Analyses
(Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing.

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
* Surcharges apply
☐ Other ( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	D3_SED_131020	13/10/20	S	X										
2	4 T3_SED_131020	13/10/20	S	X										Please forward to ALS
3	D4_SED_131020	13/10/20	S	X										
4	5 T4_SED_131020	13/10/20	S	X										Please forward to ALS
5	D5_SED_131020	13/10/20	S	X										
6	6 T5_SED_131020	13/10/20	S	X										Please forward to ALS
7	D6_SED_131020	13/10/20	S	X										
8	7 T6_SED_131020 SNR	13/10/20	S	X										Please forward to ALS
9	RIN_131020	13/10/20	S	X										
10														
	Total Counts			9										

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal Name Signature Date / / Time :

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JUSTIN 15/10/20 6.40pm

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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08 9251 9600 EnviroSampleWA@eurofins.com

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

Company	Ramboll
Address	50 Glebe Road the Junction
Contact Name	Stephen Maxwell
Phone №	
Special Directions	
Purchase Order	
Quote ID №	180813RAMN_1
Project №	318000780
Project Name	Rail Loop Lead Management
Project Manager	Stephen Maxwell
EDD Format (ESdat, EQuIS, Custom)	Excel and PDF
Sampler(s)	Jake Bourke, Thomas Frank
Handed over by	Jake Bourke
Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Email for Results	smaxwell@ramboll.com, jbourke@ramboll.com,

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing.

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Filtered Metals (Al, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	SW7	12/10/20	W	X	X									
2	SED7	12/10/20	S	X										
3	SW8	12/10/20	W	X	X									
4	SED8	12/10/20	S	X										
5	SW9	12/10/20	W	X	X									
6	SED9	12/10/20	S	X										
7														
8														
9														
10														
			Total Counts	6	3									

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
* Surcharges apply
☐ Other ( )

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal

Name | Signature | Date __/__/__ | Time __:__

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

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QS3009_R7 Modified by: Dr. R Symons Approved by: T. Lakeland Approved on: 17 August 2017

1 of 1

JUSTIN 15/10/20 6.40pm

CHAIN OF CUSTODY RECORD

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07 3902 4600 EnviroSampleQLD@eurofins.com

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

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

Company	Ramboll	Project №	318000780	Project Manager	S. Maxwell	Sampler(s)	SC and JK
Address	Suite 18, Level 2 The Junction NSW 50 Glebe Road	Project Name	Surface Water Monitoring	EDD Format (ESdat, EQuIS, Custom)		Handed over by	Jordyn Kirsch
Contact Name	Jordyn Kirsch					Email for Invoice	smaxwell@ramboll.com
Phone №	0421 330 255					Email for Results	smaxwell@ramboll.com jkirsch@ramboll.com
Special Directions							
Purchase Order							
Quote ID №							

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered". SUITE code must be listed to attract SUITE pricing)

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
☐ Overnight (9am)* ☐ 1 Day* ☐ 2 Day* ☐ 3 Day* ☑ 5 Day ☐ Other ( )
* Surcharges apply

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Lead (mg/kg)	Toal Metals M13 (Al, As, Ba, Be, Cd, Cr3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Dissolved Metals M13 (Al, As, Ba, Be, Cd, Cr3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	SED1	11/08/20	S	X										1	Please dry out and then analyse in mg/kg.
2	SED1-UP	11/8/20	S	X										1	Please dry out and then analyse in mg/kg.
3	SED2	11/08/20	S	X										1	Please dry out and then analyse in mg/kg.
4	SED3	11/8/20	S	X										1	Please dry out and then analyse in mg/kg.
5	SED4	11/8/20	S	X										1	Please dry out and then analyse in mg/kg.
6	SED5	11/8/20	S	X										1	Please dry out and then analyse in mg/kg.
7	SED6	11/8/20	S	X										1	Please dry out and then analyse in mg/kg.
8	SED7	11/08/20	S	X										1	Please dry out and then analyse in mg/kg.
9	SED8	10/8/20	S	X										1	Please dry out and then analyse in mg/kg.
10	SED9	10/8/20	S	X										1	Please dry out and then analyse in mg/kg.
	Total Counts			10										10	

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature	Date	/ /	Time	:
Eurofins | mgt Laboratory Use Only	Received By	Luca D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	17/08/20	Time 11:26 AM	Temperature	14.5 °C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	/ /	Time :	Report №	738163

CHAIN OF COSTODY RECORD

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

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

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

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

Company	Ramboll	Project №	318000780	Project Manager	S. Maxwell
Address	Suite 18, Level 2 The Junction NSW 50 Glebe Road	Project Name	Surface Water Monitoring	EDD Format (ESdat, EQuIS, Custom)	
Contact Name	Jordyn Kirsch	Sampler(s)	SC and JK	Handed over by	Jordyn Kirsch
Phone №	0421 330 255	Email for Invoice	smaxwell@ramboll.com	Email for Results	smaxwell@ramboll.com jkirsch@ramboll.com
Special Directions					
Purchase Order					
Quote ID №					

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing)

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Lead (mg/kg)	Toal Metals M13 (Al, As, Ba, Be, Cd, Cr3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Dissolved Metals M13 (Al, As, Ba, Be, Cd, Cr3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	DUP01	11/8/20	S	X											Please dry out and then analyse in mg/kg.
2	SW1	11/8/20	W		X	X									
3	SW1_UP	11/8/20	W		X	X									
4	SW2	11/8/20	W		X	X									
5	SW3	11/8/20	W		X	X									
6	SW4	11/8/20	W		X	X									
7	SW5	11/8/20	W		X	X									
8	SW6	11/8/20	W		X	X									
9	SW7	11/8/20	W		X	X									
10	SW8	10/8/20	W		X	X									
	Total Counts			1	9	9									

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
- [ ] Overnight (9am)*
- [ ] 1 Day*
- [ ] 2 Day*
- [ ] 3 Day*
- [x] 5 Day
- [ ] Other ( )

* Surcharges apply

Method of Shipment: [ ] Courier (#) [ ] Hand Delivered [ ] Postal | Name | Signature | Date __/__/__ | Time __:__

Eurofins | mgt Laboratory Use Only									
Received By	Leua D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	[signature]	Date	17/08/20	Time	11:26 AM	Temperature 14.5 °C
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Report № 738163

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CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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Brisbane Laboratory
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Perth Laboratory
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08 9251 9600 EnviroSampleWA@eurofins.com

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

Company	Ramboll	Project №	318000780	Project Manager	S. Maxwell
Address	Suite 18, Level 2 50 Glebe Road The Junction NSW	Project Name	Surface Water Monitoring	EDD Format (ESdat, EQuIS, Custom)	
Contact Name	Jordyn Kirsch	Sampler(s)	SC and JK	Handed over by	Jordyn Kirsch
Phone №	0421 330 255	Email for Invoice	smaxwell@ramboll.com	Email for Results	smaxwell@ramboll.com jkirsch@ramboll.com
Special Directions					
Purchase Order					
Quote ID №					

Analyses
Note: Where metals are requested, please specify "Total" or "Filtered" if SUITE code must be used in other SUITE pricing

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
Overnight (9am)*
1 Day*
2 Day*
3 Day*
5 Day
Other ( )
*Surcharges apply

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Lead (mg/kg)	Toal Metals M13 (Al, As, Ba, Be, Cd, Cr3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	Dissolved Metals M13 (Al, As, Ba, Be, Cd, Cr3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	SW9	10/08/20	W		X	X									
2	DUP01	11/8/20	W		X	X									
3															
4															
5															
6															
7															
8															
9															
10															
	Total Counts				2	2									

Method of Shipment	Courier (#)	Hand Delivered	Postal	Name	Signature	Date	__/__/__	Time	__:__
Eurofins | mgt Laboratory Use Only	Received By	Leua D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	17/08/20	Time	11:26 AM	Temperature	14.5°C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Report №	738163

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Sample Receipt Advice

Company name:	Ramboll Australia Pty Ltd
Contact name:	Stephen Maxwell
Project name:	SURFACE WATER MONITORING
Project ID:	318000780
Turnaround time:	5 Day
Date/Time received	Aug 17, 2020 11:26 AM
Eurofins reference	738163

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Andrew Black on phone : (+61) 2 9900 8490 or by email: AndrewBlack@eurofins.com

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

Note: A copy of these results will also be delivered to the general Ramboll Australia Pty Ltd email address.

eurofins Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

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NATA # 1261
Site # 1254 & 14271

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

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

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

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

New Zealand

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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: SURFACE WATER MONITORING
Project ID: 318000780

Order No.:
Report #: 738163
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 17, 2020 11:26 AM
Due: Aug 24, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																		
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																		
Perth Laboratory - NATA Site # 23736																																		
Newcastle Laboratory																																		
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No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																													
1	SED1	Aug 11, 2020		Soil	S20-Au23104																			X										X
2	SED1-UP	Aug 11, 2020		Soil	S20-Au23105																			X										X
3	SED2	Aug 11, 2020		Soil	S20-Au23106																			X										X
4	SED3	Aug 11, 2020		Soil	S20-Au23107																			X										X
5	SED4	Aug 11, 2020		Soil	S20-Au23108																			X										X
6	SED5	Aug 11, 2020		Soil	S20-Au23109																			X										X
7	SED6	Aug 11, 2020		Soil	S20-Au23110																			X										X
8	SED7	Aug 11, 2020		Soil	S20-Au23111																			X										X
9	SED8	Aug 10, 2020		Soil	S20-Au23112																			X										X

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Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																		
Perth Laboratory - NATA Site # 23736																																		
10	SED9	Aug 10, 2020		Soil	S20-Au23113																			X										X
11	DUP01	Aug 11, 2020		Soil	S20-Au23114																			X										X
12	SW1	Aug 11, 2020		Water	S20-Au23115	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	
13	SW1_UP	Aug 11, 2020		Water	S20-Au23116	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	
14	SW2	Aug 11, 2020		Water	S20-Au23117	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	
15	SW3	Aug 11, 2020		Water	S20-Au23118	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	
16	SW4	Aug 11, 2020		Water	S20-Au23119	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	
17	SW5	Aug 11, 2020		Water	S20-Au23120	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	
18	SW6	Aug 11, 2020		Water	S20-Au23121	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	
19	SW7	Aug 11, 2020		Water	S20-Au23122	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	
20	SW8	Aug 10, 2020		Water	S20-Au23123	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	
21	SW9	Aug 10, 2020		Water	S20-Au23124	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	
22	DUP01	Aug 11, 2020		Water	S20-Au23125	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	

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Melbourne Laboratory - NATA Site # 1254 & 14271																													
Sydney Laboratory - NATA Site # 18217	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
Brisbane Laboratory - NATA Site # 20794																													
Perth Laboratory - NATA Site # 23736																													
Test Counts	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	22	11	11	11	11	11	11	11	11	11	11

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

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Stephen Maxwell**

Report **738163-S**
Project name SURFACE WATER MONITORING
Project ID 318000780
Received Date Aug 17, 2020

Client Sample ID			**SED1**	**SED1-UP**	**SED2**	**SED3**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Au23104**	**S20-Au23105**	**S20-Au23106**	**S20-Au23107**
Date Sampled			**Aug 11, 2020**	**Aug 11, 2020**	**Aug 11, 2020**	**Aug 11, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	1700	23	340	630

Client Sample ID			**SED4**	**SED5**	**SED6**	**SED7**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Au23108**	**S20-Au23109**	**S20-Au23110**	**S20-Au23111**
Date Sampled			**Aug 11, 2020**	**Aug 11, 2020**	**Aug 11, 2020**	**Aug 11, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	1600	24	290	56

Client Sample ID			**SED8**	**SED9**	**DUP01**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Au23112**	**S20-Au23113**	**S20-Au23114**
Date Sampled			**Aug 10, 2020**	**Aug 10, 2020**	**Aug 11, 2020**
Test/Reference	LOR	Unit			
Heavy Metals					
Lead	5	mg/kg	15	24	1000

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
Heavy Metals	Sydney	Aug 19, 2020	180 Days

- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS

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Melbourne Laboratory - NATA Site # 1254 & 14271																																		
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																		
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1	SED1	Aug 11, 2020		Soil	S20-Au23104																			X										X
2	SED1-UP	Aug 11, 2020		Soil	S20-Au23105																			X										X
3	SED2	Aug 11, 2020		Soil	S20-Au23106																			X										X
4	SED3	Aug 11, 2020		Soil	S20-Au23107																			X										X
5	SED4	Aug 11, 2020		Soil	S20-Au23108																			X										X
6	SED5	Aug 11, 2020		Soil	S20-Au23109																			X										X
7	SED6	Aug 11, 2020		Soil	S20-Au23110																			X										X
8	SED7	Aug 11, 2020		Soil	S20-Au23111																			X										X
9	SED8	Aug 10, 2020		Soil	S20-Au23112																			X										X

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Brisbane Laboratory - NATA Site # 20794																																		
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10	SED9	Aug 10, 2020		Soil	S20-Au23113																			X										X
11	DUP01	Aug 11, 2020		Soil	S20-Au23114																			X										X
12	SW1	Aug 11, 2020		Water	S20-Au23115	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	
13	SW1_UP	Aug 11, 2020		Water	S20-Au23116	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	
14	SW2	Aug 11, 2020		Water	S20-Au23117	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	
15	SW3	Aug 11, 2020		Water	S20-Au23118	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	
16	SW4	Aug 11, 2020		Water	S20-Au23119	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	
17	SW5	Aug 11, 2020		Water	S20-Au23120	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	
18	SW6	Aug 11, 2020		Water	S20-Au23121	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	
19	SW7	Aug 11, 2020		Water	S20-Au23122	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	
20	SW8	Aug 10, 2020		Water	S20-Au23123	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	
21	SW9	Aug 10, 2020		Water	S20-Au23124	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	
22	DUP01	Aug 11, 2020		Water	S20-Au23125	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	

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Melbourne Laboratory - NATA Site # 1254 & 14271																													
Sydney Laboratory - NATA Site # 18217	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
Brisbane Laboratory - NATA Site # 20794																													
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Test Counts	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	22	11	11	11	11	11	11	11	11	11	11

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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.

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Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	110			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S20-Au28829	NCP	%	98			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S20-Au28674	NCP	mg/kg	< 5	6.2	57	30%	Fail	Q15

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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

Andrew Black	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

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.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

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Certificate of Analysis

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

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Stephen Maxwell**

Report	**738163-W**
Project name	SURFACE WATER MONITORING
Project ID	318000780
Received Date	Aug 17, 2020

Client Sample ID			**SW1**	**SW1_UP**	**SW2**	**SW3**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S20-Au23115**	**S20-Au23116**	**S20-Au23117**	**S20-Au23118**
Date Sampled			**Aug 11, 2020**	**Aug 11, 2020**	**Aug 11, 2020**	**Aug 11, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	0.05	mg/L	0.88	0.85	0.95	0.61
Aluminium (filtered)	0.05	mg/L	0.53	0.45	0.47	0.69
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	0.04	0.05	0.05	0.05
Barium (filtered)	0.02	mg/L	0.04	0.04	0.04	0.05
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
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	0.0011
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	0.0010
Chromium	0.001	mg/L	0.001	0.002	0.002	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	0.003	0.002	0.004	0.018
Copper (filtered)	0.001	mg/L	0.002	0.002	0.003	0.016
Iron	0.05	mg/L	0.91	0.93	1.0	0.60
Iron (filtered)	0.05	mg/L	0.34	0.30	0.31	0.46
Lead	0.001	mg/L	0.001	< 0.001	0.003	0.011
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.009
Manganese	0.005	mg/L	0.024	0.026	0.043	0.017
Manganese (filtered)	0.005	mg/L	0.018	0.020	0.015	0.014
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
Nickel	0.001	mg/L	0.002	0.002	0.002	0.002
Nickel (filtered)	0.001	mg/L	0.002	0.002	0.002	0.002
Zinc	0.005	mg/L	0.020	0.011	0.028	0.22
Zinc (filtered)	0.005	mg/L	0.011	0.008	0.020	0.20

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Client Sample ID			SW4	SW5	SW6	SW7
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			S20-Au23119	S20-Au23120	S20-Au23121	S20-Au23122
Date Sampled			Aug 11, 2020	Aug 11, 2020	Aug 11, 2020	Aug 11, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	0.05	mg/L	0.59	1.8	1.8	1.7
Aluminium (filtered)	0.05	mg/L	0.63	3.2	2.4	0.95
Arsenic	0.001	mg/L	< 0.001	0.001	0.002	0.003
Arsenic (filtered)	0.001	mg/L	< 0.001	0.001	0.001	0.001
Barium	0.02	mg/L	0.05	0.03	0.06	0.04
Barium (filtered)	0.02	mg/L	0.04	0.03	0.05	0.03
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
Cadmium	0.0002	mg/L	0.0030	0.0009	0.0072	0.0014
Cadmium (filtered)	0.0002	mg/L	0.0029	0.0009	0.0063	0.0010
Chromium	0.001	mg/L	0.001	0.003	0.003	0.002
Chromium (filtered)	0.001	mg/L	< 0.001	0.003	0.003	0.002
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	0.040	0.019	0.10	0.027
Copper (filtered)	0.001	mg/L	0.035	0.016	0.088	0.019
Iron	0.05	mg/L	0.57	1.5	1.4	1.8
Iron (filtered)	0.05	mg/L	0.47	1.4	1.1	0.57
Lead	0.001	mg/L	0.015	0.010	0.022	0.025
Lead (filtered)	0.001	mg/L	0.011	0.006	0.013	0.005
Manganese	0.005	mg/L	0.045	0.012	0.018	0.032
Manganese (filtered)	0.005	mg/L	0.041	0.008	0.013	0.028
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
Nickel	0.001	mg/L	0.006	0.002	0.029	0.003
Nickel (filtered)	0.001	mg/L	0.006	0.002	0.026	0.003
Zinc	0.005	mg/L	0.56	0.11	0.90	0.36
Zinc (filtered)	0.005	mg/L	0.50	0.094	0.79	0.26

Client Sample ID			SW8	SW9	DUP01
Sample Matrix			Water	Water	Water
Eurofins Sample No.			S20-Au23123	S20-Au23124	S20-Au23125
Date Sampled			Aug 10, 2020	Aug 10, 2020	Aug 11, 2020
Test/Reference	LOR	Unit			
Heavy Metals					
Aluminium	0.05	mg/L	0.72	0.53	0.83
Aluminium (filtered)	0.05	mg/L	0.41	0.35	0.54
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	0.04
Barium (filtered)	0.02	mg/L	0.02	0.02	0.04
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Cadmium	0.0002	mg/L	0.0003	0.0004	< 0.0002
Cadmium (filtered)	0.0002	mg/L	0.0002	0.0004	0.0003
Chromium	0.001	mg/L	0.001	0.002	0.002
Chromium (filtered)	0.001	mg/L	0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001

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Client Sample ID			SW8	SW9	DUP01
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**S20-Au23123**	**S20-Au23124**	**S20-Au23125**
Date Sampled			**Aug 10, 2020**	**Aug 10, 2020**	**Aug 11, 2020**
Test/Reference	LOR	Unit			
Heavy Metals					
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	0.008	0.010	0.003
Copper (filtered)	0.001	mg/L	0.007	0.008	0.003
Iron	0.05	mg/L	0.76	0.60	0.89
Iron (filtered)	0.05	mg/L	0.31	0.29	0.34
Lead	0.001	mg/L	0.002	0.002	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	0.004
Manganese	0.005	mg/L	0.035	0.041	0.023
Manganese (filtered)	0.005	mg/L	0.028	0.036	0.018
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Nickel	0.001	mg/L	0.002	0.002	0.002
Nickel (filtered)	0.001	mg/L	0.002	0.002	0.002
Zinc	0.005	mg/L	0.12	0.16	0.017
Zinc (filtered)	0.005	mg/L	0.10	0.14	0.045

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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**
Heavy Metals	Sydney	Aug 18, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Sydney	Aug 17, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Sydney	Aug 17, 2020	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Aug 17, 2020 11:26 AM
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:**	738163	**Due:**	Aug 24, 2020
		Phone:	02 9954 8118	**Priority:**	5 Day
		Fax:	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	SURFACE WATER MONITORING				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																		
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																		
Perth Laboratory - NATA Site # 23736																																		
Newcastle Laboratory																																		
External Laboratory																																		
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																													
1	SED1	Aug 11, 2020		Soil	S20-Au23104																			X										X
2	SED1-UP	Aug 11, 2020		Soil	S20-Au23105																			X										X
3	SED2	Aug 11, 2020		Soil	S20-Au23106																			X										X
4	SED3	Aug 11, 2020		Soil	S20-Au23107																			X										X
5	SED4	Aug 11, 2020		Soil	S20-Au23108																			X										X
6	SED5	Aug 11, 2020		Soil	S20-Au23109																			X										X
7	SED6	Aug 11, 2020		Soil	S20-Au23110																			X										X
8	SED7	Aug 11, 2020		Soil	S20-Au23111																			X										X
9	SED8	Aug 10, 2020		Soil	S20-Au23112																			X										X

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Company Name: Ramboll Australia Pty Ltd
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NSW 2060

Order No.:
Report #: 738163
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 17, 2020 11:26 AM
Due: Aug 24, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Project Name: SURFACE WATER MONITORING
Project ID: 318000780

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																																		
Sydney Laboratory - NATA Site # 18217						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
Brisbane Laboratory - NATA Site # 20794																																		
Perth Laboratory - NATA Site # 23736																																		
10	SED9	Aug 10, 2020		Soil	S20-Au23113																			X										X
11	DUP01	Aug 11, 2020		Soil	S20-Au23114																			X										X
12	SW1	Aug 11, 2020		Water	S20-Au23115	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	
13	SW1_UP	Aug 11, 2020		Water	S20-Au23116	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	
14	SW2	Aug 11, 2020		Water	S20-Au23117	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	
15	SW3	Aug 11, 2020		Water	S20-Au23118	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	
16	SW4	Aug 11, 2020		Water	S20-Au23119	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	
17	SW5	Aug 11, 2020		Water	S20-Au23120	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	
18	SW6	Aug 11, 2020		Water	S20-Au23121	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	
19	SW7	Aug 11, 2020		Water	S20-Au23122	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	
20	SW8	Aug 10, 2020		Water	S20-Au23123	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	
21	SW9	Aug 10, 2020		Water	S20-Au23124	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	
22	DUP01	Aug 11, 2020		Water	S20-Au23125	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	

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Phone : +61 2 4968 8448

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Order No.:
Report #: 738163
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 17, 2020 11:26 AM
Due: Aug 24, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Project Name: SURFACE WATER MONITORING
Project ID: 318000780

Eurofins Analytical Services Manager : Andrew Black

Sample Detail	Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Beryllium	Beryllium (filtered)	Cadmium	Cadmium (filtered)	Chromium	Chromium (filtered)	Cobalt	Cobalt (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																													
Sydney Laboratory - NATA Site # 18217	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
Brisbane Laboratory - NATA Site # 20794																													
Perth Laboratory - NATA Site # 23736																													
Test Counts	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	22	11	11	11	11	11	11	11	11	11	11

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.

Environment Testing

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Aluminium (filtered)	mg/L	< 0.05			0.05	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	
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	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Mercury (filtered)	mg/L	0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	99			80-120	Pass	
Aluminium (filtered)	%	95			80-120	Pass	
Arsenic	%	99			80-120	Pass	
Arsenic (filtered)	%	99			80-120	Pass	
Barium	%	100			80-120	Pass	
Barium (filtered)	%	99			80-120	Pass	
Beryllium	%	90			80-120	Pass	
Beryllium (filtered)	%	90			80-120	Pass	
Cadmium	%	103			80-120	Pass	
Cadmium (filtered)	%	97			80-120	Pass	
Chromium	%	99			80-120	Pass	
Chromium (filtered)	%	96			80-120	Pass	
Cobalt	%	99			80-120	Pass	
Cobalt (filtered)	%	96			80-120	Pass	
Copper	%	96			80-120	Pass	
Copper (filtered)	%	94			80-120	Pass	
Iron	%	101			80-120	Pass	
Iron (filtered)	%	95			80-120	Pass	
Lead	%	100			80-120	Pass	
Lead (filtered)	%	98			80-120	Pass	

eurofins Environment Testing

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Manganese			%	99			80-120	Pass	
Manganese (filtered)			%	96			80-120	Pass	
Mercury			%	108			80-120	Pass	
Mercury (filtered)			%	97			80-120	Pass	
Nickel			%	98			80-120	Pass	
Nickel (filtered)			%	95			80-120	Pass	
Zinc			%	95			80-120	Pass	
Zinc (filtered)			%	97			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	S20-Au25371	NCP	%	103			75-125	Pass	
Arsenic	S20-Au25371	NCP	%	99			75-125	Pass	
Barium	S20-Au25371	NCP	%	114			75-125	Pass	
Beryllium	S20-Au25371	NCP	%	85			75-125	Pass	
Cadmium	S20-Au25371	NCP	%	97			75-125	Pass	
Chromium	S20-Au25371	NCP	%	88			75-125	Pass	
Cobalt	S20-Au25371	NCP	%	86			75-125	Pass	
Copper	S20-Au25371	NCP	%	83			75-125	Pass	
Iron	S20-Au25371	NCP	%	106			75-125	Pass	
Lead	S20-Au25371	NCP	%	89			75-125	Pass	
Manganese	S20-Au25371	NCP	%	99			75-125	Pass	
Mercury	S20-Au25371	NCP	%	100			75-125	Pass	
Nickel	S20-Au25371	NCP	%	84			75-125	Pass	
Zinc	S20-Au25371	NCP	%	79			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	S20-Au23125	CP	%	86			75-125	Pass	
Arsenic (filtered)	S20-Au23125	CP	%	97			75-125	Pass	
Barium (filtered)	S20-Au23125	CP	%	94			75-125	Pass	
Beryllium (filtered)	S20-Au23125	CP	%	93			75-125	Pass	
Cadmium (filtered)	S20-Au23125	CP	%	98			75-125	Pass	
Chromium (filtered)	S20-Au23125	CP	%	96			75-125	Pass	
Cobalt (filtered)	S20-Au23125	CP	%	96			75-125	Pass	
Copper (filtered)	S20-Au23125	CP	%	94			75-125	Pass	
Iron (filtered)	S20-Au23125	CP	%	91			75-125	Pass	
Lead (filtered)	S20-Au23125	CP	%	96			75-125	Pass	
Manganese (filtered)	S20-Au23125	CP	%	95			75-125	Pass	
Mercury (filtered)	S20-Au23125	CP	%	108			75-125	Pass	
Nickel (filtered)	S20-Au23125	CP	%	96			75-125	Pass	
Zinc (filtered)	S20-Au23125	CP	%	89			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S20-Au24999	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Aluminium (filtered)	S20-Au23115	CP	mg/L	0.53	0.51	3.0	30%	Pass	
Arsenic	S20-Au24999	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Arsenic (filtered)	S20-Au23115	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium	S20-Au24999	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Barium (filtered)	S20-Au23115	CP	mg/L	0.04	0.04	2.0	30%	Pass	
Beryllium	S20-Au24999	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Beryllium (filtered)	S20-Au23115	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	S20-Au24999	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	

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Environment Testing

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium (filtered)	S20-Au23115	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S20-Au24999	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chromium (filtered)	S20-Au23115	CP	mg/L	0.001	< 0.001	23	30%	Pass	
Cobalt	S20-Au24999	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	S20-Au23115	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	S20-Au24999	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	S20-Au23115	CP	mg/L	0.002	0.002	<1	30%	Pass	
Iron	S20-Au24999	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Iron (filtered)	S20-Au23115	CP	mg/L	0.34	0.32	4.0	30%	Pass	
Lead	S20-Au24999	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead (filtered)	S20-Au23115	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese	S20-Au24999	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Manganese (filtered)	S20-Au23115	CP	mg/L	0.018	0.018	<1	30%	Pass	
Mercury	S20-Au24999	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Mercury (filtered)	S20-Au23115	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	S20-Au24999	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Nickel (filtered)	S20-Au23115	CP	mg/L	0.002	0.002	3.0	30%	Pass	
Zinc	S20-Au24999	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	S20-Au23115	CP	mg/L	0.011	0.011	2.0	30%	Pass	

Environment Testing

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

Andrew Black	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

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.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CHAIN OF CUSTODY RECORD

[ ] Sydney Laboratory
Unit F3 Bld.F, 16 Mars Rd, Lane Cove West, NSW 2066
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Brisbane Laboratory
Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
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08 9251 9600 EnviroSampleWA@eurofins.com

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

Company	Ramboll
Address	Suite 18, Level 2 The Junction NSW 50 Glebe Road
Contact Name	Steve Cadman
Phone №	0423 583 538
Special Directions	
Purchase Order	
Quote ID №	
Project №	318000780
Project Name	
Project Manager	
EDD Format (ESdat, EQuIS, Custom)	
Sampler(s)	SC and TF
Handed over by	Steve Cadman
Email for Invoice	smaxwell@ramboll.com
Email for Results	smaxwell@ramboll.com jkirsch@ramboll.com

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered".) SUITE code must be used to attract SUITE pricing

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
[ ] Overnight (9am)*
[ ] 1 Day* [ ] 2 Day*
[ ] 3 Day* [x] 5 Day
[ ] Other ( )
* Surcharges apply

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Total Lead (mg/kg)	Toal Metals M13 (Al, As, Ba, Be, Cd, Cr3, Co, Cu, Fe, Pb, Mn, Hg, Ni, Zn)	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	LO_TP02_1.1m	19/08/20	S	X								1		XRF measurement 0 - 5000 mg/kg Pb
2	LO_TP03_1.6m	19/08/20	S	X								1		XRF measurement 0 - 5000 mg/kg Pb
3												1		
4												1		
5												1		
6												1		
7												1		
8												1		
9												1		
10												1		
	Total Counts			2								10		

Method of Shipment: [ ] Courier (#) [ ] Hand Delivered [ ] Postal Name Signature Date _/_/_ Time _:_

Eurofins | mgt Laboratory Use Only										
Received By	[signature]	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	[signature]	Date	24/8/20	Time	3:40pm	Temperature	17.5 C
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	_/_/_	Time	_:_	Report №	

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

739494

Sample Receipt Advice

Company name:	Ramboll Australia Pty Ltd
Contact name:	Stephen Maxwell
Project name:	318000780
Project ID:	318000780
Turnaround time:	5 Day
Date/Time received	Aug 21, 2020 3:40 PM
Eurofins reference	739494

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- **N/A** Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Andrew Black on phone : (+61) 2 9900 8490 or by email: AndrewBlack@eurofins.com

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

Note: A copy of these results will also be delivered to the general Ramboll Australia Pty Ltd email address.

eurofins Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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IANZ # 1290

Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: 318000780
Project ID: 318000780

Order No.:
Report #: 739494
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 21, 2020 3:40 PM
Due: Aug 28, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	LO_TP02_1.1 M	Aug 19, 2020		Soil	S20-Au35842	X	X
2	LO_TP03_1.6 M	Aug 19, 2020		Soil	S20-Au35843	X	X
Test Counts						2	2

eurofins Environment Testing

Certificate of Analysis

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.

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

Attention: **Stephen Maxwell**

Report **739494-S**
Project name 318000780
Project ID 318000780
Received Date Aug 21, 2020

Client Sample ID			LO_TP02_1.1M	LO_TP03_1.6M
Sample Matrix			Soil	Soil
Eurofins Sample No.			S20-Au35842	S20-Au35843
Date Sampled			Aug 19, 2020	Aug 19, 2020
Test/Reference	LOR	Unit		
Heavy Metals				
Lead	5	mg/kg	5700	3000
% Moisture	1	%	8.7	8.9

Environment Testing

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
Heavy Metals	Sydney	Aug 25, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Aug 24, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Aug 21, 2020 3:40 PM
Address:	Level 3/100 Pacific Highway	**Report #:**	739494	**Due:**	Aug 28, 2020
	North Sydney	**Phone:**	02 9954 8118	**Priority:**	5 Day
	NSW 2060	**Fax:**	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	318000780				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	LO_TP02_1.1 M	Aug 19, 2020		Soil	S20-Au35842	X	X
2	LO_TP03_1.6 M	Aug 19, 2020		Soil	S20-Au35843	X	X
Test Counts						2	2

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Environment Testing

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	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	94			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S20-Au40455	NCP	%	116			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S20-Au35825	NCP	mg/kg	470	770	49	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Au35830	NCP	%	6.0	6.3	5.0	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

Andrew Black	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

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.

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

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

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

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

Company	Ramboll	Project №	318000780	Project Manager		Sampler(s)	SC and TF
Address	Suite 18, Level 2 The Junction NSW 50 Glebe Road	Project Name		EDD Format (ESdat, EQuIS, Custom)		Handed over by	Steve Cadman
Contact Name	Steve Cadman					Email for Invoice	smaxwell@ramboll.com
Phone №	0423 583 538					Email for Results	smaxwell@ramboll.com jkirsch@ramboll.com
Special Directions							
Purchase Order							
Quote ID №							

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing.

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked): ☐ Overnight (9am)* ☐ 1 Day* ☐ 2 Day* ☐ 3 Day* ☑ 5 Day ☐ Other ( ) * Surcharges apply

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	pH, electrical conductivity, moisture content	total organic carbon	metal(loid)s; Sb, As, Be, B, Cd, Co, Cu, Cr, Pb, Mn, Hg, Mo, Ni, Se, Sn, V, Zn,	total sulfer	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	RRE_SP01	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
2	RRE_SP02	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
3	RRE_SP03	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
4	RRE_SP04	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
5	RRE_SP05	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
6	RRE_SP06	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
7	RRE_SP07	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
8	RRE_SP08	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
9	RRE_SP09	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
10	RRE_SP10	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
	Total Counts			10	10	10	10							10		

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name	Signature	Date	__/__/__	Time	__:__
Eurofins | mgt Laboratory Use Only	Received By	Luca D	(SYD) | BNE | MEL | PER | ADL | NTL | DRW	Signature	[signature]	Date	24/08/20	Time	3:40PM	Temperature	12.5 'C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Report №	739433

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

 QS3009_R7 Modified by: Dr R Symons Approved by: T Laraland Approved on: 17 August 2017

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

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

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

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

Company	Ramboll	Project №	318000780	Project Manager	
Address	Suite 18, Level 2 The Junction NSW 50 Glebe Road	Project Name		EDD Format (ESdat, EQuIS, Custom)	
Contact Name	Steve Cadman				
Phone №	0423 583 538				
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	SC and TF
Handed over by	Steve Cadman
Email for Invoice	smaxwell@ramboll.com
Email for Results	smaxwell@ramboll.com jkirsch@ramboll.com

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered") SUITE code must be used to attract SUITE pricing

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
☐ Overnight (9am)* ☐ 1 Day* ☐ 2 Day* ☐ 3 Day* ☑ 5 Day ☐ Other ( )
* Surcharges apply

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	pH, electrical conductivity, moisture content	total organic carbon	metal(loid)s; Sb, As, Be, B, Cd, Co, Cu, Cr, Pb, Mn, Hg, Mo, Ni, Se, Sn, V, Zn,	total sulfer	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	RRE_TP01	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
2	RRE_TP02	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
3	RRE_TP03	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
4	RRE_TP04	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
5	RRE_TP05	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
6	RRE_TP06	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
7	RRE_TP07	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
8	RRE_TP08	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
9	RRE_TP09	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
10	RRE_TP10	19/08/20	S	X	X	X	X							1		XRF measurements not recorded
	Total Counts			10	10	10	10							10		

Method of Shipment	☐ Courier (#) ☐ Hand Delivered ☐ Postal	Name		Signature		Date	__/__/__	Time __:__
Eurofins | mgt Laboratory Use Only	Received By: Lena D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date 21/8/20	Time 3:40 pm	Temperature	12.5 C
	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date __/__/__	Time	Report №	737488

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

CHAIN OF CUSTODY RECORD

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

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

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

Company	Ramboll	Project №	318000780	Project Manager	
Address	Suite 18, Level 2 The Junction NSW 50 Glebe Road	Project Name		EDD Format (ESdat, EQuIS, Custom)	
Contact Name	Steve Cadman			Sampler(s)	SC and TF
Phone №	0423 583 538			Handed over by	Steve Cadman
Special Directions				Email for Invoice	smaxwell@ramboll.com
Purchase Order				Email for Results	smaxwell@ramboll.com jkirsch@ramboll.com
Quote ID №					

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.)

№	Client Sample ID	Sampled Date/Time (dd/mm/yy)	Matrix (Solid (S) Water (W))	pH, electrical conductivity, moisture content	total organic carbon	metal(loid)s; Sb, As, Be, B, Cd, Co, Cu, Cr, Pb, Mn, Hg, Mo, Ni, Se, Sn, V, Zn,	total sulfer	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	RRE_TRIP1	11/08/20	S	X	X	X	X									Pease send to ALS
2	RRE_DUP1	11/8/20	S	X	X	X	X									XRF measurements not recorded
3	RRE_DUP2	11/8/20	S	X	X	X	X									XRF measurements not recorded
4	RRE_RINSATE1	11/8/20	W			X										
5																
6																
7																
8																
9																
10																
	Total Counts			3	3	4	#									

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
- Overnight (9am)*
- ☐ 1 Day* ☐ 2 Day*
- ☐ 3 Day* ☐ 5 Day
- ☐ Other ( ) *Surcharges apply

Method of Shipment	Courier (#)	Hand Delivered	Postal	Name	Signature	Date __/__/__	Time __:__
Eurofins | mgt Laboratory Use Only	Received By Luie D	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date 21/8/20	Time 3:40 pm	Temperature 12.5 C	
	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date __/__/__	Time __:__	Report № 739488	

Sample Receipt Advice

Company name:	Ramboll Australia Pty Ltd
Contact name:	Stephen Maxwell
Project name:	318000780
Project ID:	318000780
Turnaround time:	5 Day
Date/Time received	Aug 21, 2020 3:40 PM
Eurofins reference	739488

Sample Information

✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

✓ All samples have been received as described on the above COC.

✓ COC has been completed correctly.

✓ Attempt to chill was evident.

✓ Appropriately preserved sample containers have been used.

✓ All samples were received in good condition.

✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

✓ Appropriate sample containers have been used.

✓ Sample containers for volatile analysis received with zero headspace.

✓ Split sample sent to requested external lab.

✗ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

Sample RRE_TRIP1 forwarded to ALS for analysis

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Andrew Black on phone : (+61) 2 9900 8490 or by email: AndrewBlack@eurofins.com

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

Note: A copy of these results will also be delivered to the general Ramboll Australia Pty Ltd email address.

Global Leader - Results you can trust

eurofins Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

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NATA # 1261
Site # 1254 & 14271

Sydney
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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

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New Zealand

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

Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Aug 21, 2020 3:40 PM
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:**	739488	**Due:**	Aug 28, 2020
		Phone:	02 9954 8118	**Priority:**	5 Day
		Fax:	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	318000780				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
Newcastle Laboratory																											
External Laboratory																											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																						
1	RRE_SP01	Aug 19, 2020		Soil	S20-Au35780	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	RRE_SP02	Aug 19, 2020		Soil	S20-Au35781	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	RRE_SP03	Aug 19, 2020		Soil	S20-Au35782	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	RRE_SP04	Aug 19, 2020		Soil	S20-Au35783	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	RRE_SP05	Aug 19, 2020		Soil	S20-Au35784	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	RRE_SP06	Aug 19, 2020		Soil	S20-Au35785	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	RRE_SP07	Aug 19, 2020		Soil	S20-Au35786	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	RRE_SP08	Aug 19, 2020		Soil	S20-Au35787	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	RRE_SP09	Aug 19, 2020		Soil	S20-Au35788	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

eurofins Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

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Phone : +61 3 8564 5000
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Site # 1254 & 14271

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

Newcastle
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Phone : +61 2 4968 8448

New Zealand

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Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Aug 21, 2020 3:40 PM
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:**	739488	**Due:**	Aug 28, 2020
		Phone:	02 9954 8118	**Priority:**	5 Day
		Fax:	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	318000780				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
10	RRE_SP10	Aug 19, 2020		Soil	S20-Au35789	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11	RRE_TP01	Aug 19, 2020		Soil	S20-Au35790	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12	RRE_TP02	Aug 19, 2020		Soil	S20-Au35791	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13	RRE_TP03	Aug 19, 2020		Soil	S20-Au35792	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	RRE_TP04	Aug 19, 2020		Soil	S20-Au35793	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15	RRE_TP05	Aug 19, 2020		Soil	S20-Au35794	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	RRE_TP06	Aug 19, 2020		Soil	S20-Au35795	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
17	RRE_TP07	Aug 19, 2020		Soil	S20-Au35796	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18	RRE_TP08	Aug 19, 2020		Soil	S20-Au35797	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
19	RRE_TP09	Aug 19, 2020		Soil	S20-Au35798	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20	RRE_TP10	Aug 19, 2020		Soil	S20-Au35799	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21	RRE_DUP1	Aug 11, 2020		Soil	S20-Au35801	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22	RRE_DUP2	Aug 11, 2020		Soil	S20-Au35802	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
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NSW 2060

Project Name: 318000780
Project ID: 318000780

Order No.:
Report #: 739488
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 21, 2020 3:40 PM
Due: Aug 28, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
23	RRE_RINSATE	Aug 11, 2020		Water	S20-Au35803	X	X	X	X	X	X	X		X	X	X	X	X	X		X		X		X	X	
Test Counts						23	23	23	23	23	23	23	22	23	23	23	23	23	23	22	23	22	23	22	23	23	22

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Environment Testing

Certificate of Analysis

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.

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

Attention: **Stephen Maxwell**

Report **739488-S**
Project name 318000780
Project ID 318000780
Received Date Aug 21, 2020

Client Sample ID			RRE_SP01	RRE_SP02	RRE_SP03	RRE_SP04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Au35780	S20-Au35781	S20-Au35782	S20-Au35783
Date Sampled			Aug 19, 2020	Aug 19, 2020	Aug 19, 2020	Aug 19, 2020
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	170	540	91	970
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	7.4	4.3	8.3	6.4
Total Organic Carbon	0.1	%	0.5	0.6	1.8	1.2
Sulphur	5	mg/kg	910	4300	460	14000
% Moisture	1	%	6.4	7.1	7.0	6.1
Heavy Metals						
Antimony	10	mg/kg	< 10	19	24	23
Arsenic	2	mg/kg	21	70	48	130
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.4	mg/kg	2.9	7.0	1.8	10
Chromium	5	mg/kg	25	59	24	60
Cobalt	5	mg/kg	7.4	14	30	8.3
Copper	5	mg/kg	510	960	450	2100
Lead	5	mg/kg	2600	5900	1300	5300
Manganese	5	mg/kg	340	640	520	550
Mercury	0.1	mg/kg	0.2	0.5	0.2	0.7
Molybdenum	5	mg/kg	< 5	< 5	< 5	6.7
Nickel	5	mg/kg	10	29	18	32
Selenium	2	mg/kg	4.3	9.5	< 2	19
Tin	10	mg/kg	15	30	23	49
Vanadium	10	mg/kg	52	64	58	64
Zinc	5	mg/kg	550	1700	2100	1400

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Client Sample ID			RRE_SP05	RRE_SP06	RRE_SP07	RRE_SP08
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Au35784	S20-Au35785	S20-Au35786	S20-Au35787
Date Sampled			Aug 19, 2020	Aug 19, 2020	Aug 19, 2020	Aug 19, 2020
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	620	1100	970	1100
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	4.4	4.4	5.3	4.0
Total Organic Carbon	0.1	%	1.5	0.5	2.3	0.7
Sulphur	5	mg/kg	3900	11000	8600	16000
% Moisture	1	%	5.3	6.3	8.1	9.0
Heavy Metals						
Antimony	10	mg/kg	31	23	25	39
Arsenic	2	mg/kg	190	150	130	190
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.4	mg/kg	8.2	25	10	6.0
Chromium	5	mg/kg	58	130	79	77
Cobalt	5	mg/kg	11	14	12	10
Copper	5	mg/kg	1700	2200	1900	1600
Lead	5	mg/kg	7000	5200	6800	19000
Manganese	5	mg/kg	630	970	680	710
Mercury	0.1	mg/kg	1.2	1.2	1.1	1.6
Molybdenum	5	mg/kg	8.5	5.8	6.4	7.3
Nickel	5	mg/kg	22	45	75	40
Selenium	2	mg/kg	23	18	17	27
Tin	10	mg/kg	190	140	120	80
Vanadium	10	mg/kg	78	77	69	89
Zinc	5	mg/kg	1500	2800	1500	1300

Client Sample ID			RRE_SP09	RRE_SP10	RRE_TP01	RRE_TP02
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Au35788	S20-Au35789	S20-Au35790	S20-Au35791
Date Sampled			Aug 19, 2020	Aug 19, 2020	Aug 19, 2020	Aug 19, 2020
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	410	730	33	53
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	4.4	4.2	6.7	6.1
Total Organic Carbon	0.1	%	< 0.1	0.5	0.3	0.3
Sulphur	5	mg/kg	5900	4100	79	260
% Moisture	1	%	7.9	9.5	4.3	6.1
Heavy Metals						
Antimony	10	mg/kg	10	32	< 10	< 10
Arsenic	2	mg/kg	49	170	15	14
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.4	mg/kg	3.3	4.6	5.5	7.3
Chromium	5	mg/kg	37	71	31	12
Cobalt	5	mg/kg	8.4	11	7.5	< 5
Copper	5	mg/kg	700	1200	490	280
Lead	5	mg/kg	4100	7300	570	820
Manganese	5	mg/kg	540	1100	420	530
Mercury	0.1	mg/kg	0.4	0.6	0.2	0.1
Molybdenum	5	mg/kg	5.4	< 5	< 5	5.3

Client Sample ID			RRE_SP09	RRE_SP10	RRE_TP01	RRE_TP02
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Au35788	S20-Au35789	S20-Au35790	S20-Au35791
Date Sampled			Aug 19, 2020	Aug 19, 2020	Aug 19, 2020	Aug 19, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel	5	mg/kg	18	28	12	22
Selenium	2	mg/kg	8.1	15	< 2	< 2
Tin	10	mg/kg	28	47	< 10	11
Vanadium	10	mg/kg	34	93	76	30
Zinc	5	mg/kg	1100	1300	810	770

Client Sample ID			RRE_TP03	RRE_TP04	RRE_TP05	RRE_TP06
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Au35792	S20-Au35793	S20-Au35794	S20-Au35795
Date Sampled			Aug 19, 2020	Aug 19, 2020	Aug 19, 2020	Aug 19, 2020
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	220	250	620	300
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	4.9	5.2	4.2	6.5
Total Organic Carbon	0.1	%	1.4	1.5	2.2	0.4
Sulphur	5	mg/kg	2200	1700	3600	450
% Moisture	1	%	14	7.6	10	9.3
Heavy Metals						
Antimony	10	mg/kg	18	< 10	11	< 10
Arsenic	2	mg/kg	130	25	77	31
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.4	mg/kg	9.6	5.5	3.5	8.0
Chromium	5	mg/kg	24	15	34	12
Cobalt	5	mg/kg	< 5	< 5	< 5	< 5
Copper	5	mg/kg	1200	670	830	240
Lead	5	mg/kg	8700	1600	4000	230
Manganese	5	mg/kg	150	150	230	70
Mercury	0.1	mg/kg	2.9	0.5	0.3	< 0.1
Molybdenum	5	mg/kg	12	10	12	20
Nickel	5	mg/kg	85	11	11	< 5
Selenium	2	mg/kg	23	3.9	7.7	2.9
Tin	10	mg/kg	400	24	13	< 10
Vanadium	10	mg/kg	58	43	69	53
Zinc	5	mg/kg	1500	1100	600	1100

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Client Sample ID			RRE_TP07	RRE_TP08	RRE_TP09	RRE_TP10
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Au35796	S20-Au35797	S20-Au35798	S20-Au35799
Date Sampled			Aug 19, 2020	Aug 19, 2020	Aug 19, 2020	Aug 19, 2020
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	74	1000	29	38
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.7	5.1	5.0	5.0
Total Organic Carbon	0.1	%	2.7	6.5	1.9	2.0
Sulphur	5	mg/kg	2900	12000	3400	2000
% Moisture	1	%	11	14	13	9.3
Heavy Metals						
Antimony	10	mg/kg	< 10	55	14	18
Arsenic	2	mg/kg	40	79	52	66
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.4	mg/kg	4.0	170	2.4	2.5
Chromium	5	mg/kg	52	130	19	19
Cobalt	5	mg/kg	8.2	18	< 5	< 5
Copper	5	mg/kg	580	4100	1200	1300
Lead	5	mg/kg	1600	9200	4400	5300
Manganese	5	mg/kg	690	720	170	220
Mercury	0.1	mg/kg	0.2	0.9	0.4	0.4
Molybdenum	5	mg/kg	< 5	< 5	9.5	11
Nickel	5	mg/kg	19	79	8.9	8.1
Selenium	2	mg/kg	2.8	15	12	14
Tin	10	mg/kg	10	54	34	38
Vanadium	10	mg/kg	45	67	50	72
Zinc	5	mg/kg	1300	12000	570	580

Client Sample ID			RRE_DUP1	RRE_DUP2
Sample Matrix			Soil	Soil
Eurofins Sample No.			S20-Au35801	S20-Au35802
Date Sampled			Aug 11, 2020	Aug 11, 2020
Test/Reference	LOR	Unit		
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	1000	1200
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	4.0	5.1
Total Organic Carbon	0.1	%	0.5	3.2
Sulphur	5	mg/kg	12000	4200
% Moisture	1	%	10	18
Heavy Metals				
Antimony	10	mg/kg	28	29
Arsenic	2	mg/kg	130	60
Beryllium	2	mg/kg	< 2	< 2
Boron	10	mg/kg	< 10	< 10
Cadmium	0.4	mg/kg	5.6	140
Chromium	5	mg/kg	81	120
Cobalt	5	mg/kg	12	9.6
Copper	5	mg/kg	1300	3400
Lead	5	mg/kg	9100	9000
Manganese	5	mg/kg	660	520
Mercury	0.1	mg/kg	1.0	0.9
Molybdenum	5	mg/kg	5.2	5.6

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Client Sample ID			RRE_DUP1	RRE_DUP2
Sample Matrix			Soil	Soil
Eurofins Sample No.			S20-Au35801	S20-Au35802
Date Sampled			Aug 11, 2020	Aug 11, 2020
Test/Reference	LOR	Unit		
Heavy Metals				
Nickel	5	mg/kg	37	61
Selenium	2	mg/kg	18	16
Tin	10	mg/kg	62	53
Vanadium	10	mg/kg	76	48
Zinc	5	mg/kg	1400	8600

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
Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	Aug 26, 2020	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Aug 26, 2020	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Total Organic Carbon	Melbourne	Aug 27, 2020	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
Sulphur	Melbourne	Aug 27, 2020	7 Days
- Method: LTM-MET-3010 Alkali Metals Sulfur Silicon and Phosphorus by ICP-AES			
Heavy Metals	Sydney	Aug 26, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Aug 24, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Aug 21, 2020 3:40 PM
Address:	Level 3/100 Pacific Highway	**Report #:**	739488	**Due:**	Aug 28, 2020
	North Sydney	**Phone:**	02 9954 8118	**Priority:**	5 Day
	NSW 2060	**Fax:**	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	318000780				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
Newcastle Laboratory																											
External Laboratory																											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																						
1	RRE_SP01	Aug 19, 2020		Soil	S20-Au35780	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	RRE_SP02	Aug 19, 2020		Soil	S20-Au35781	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	RRE_SP03	Aug 19, 2020		Soil	S20-Au35782	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	RRE_SP04	Aug 19, 2020		Soil	S20-Au35783	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	RRE_SP05	Aug 19, 2020		Soil	S20-Au35784	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	RRE_SP06	Aug 19, 2020		Soil	S20-Au35785	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	RRE_SP07	Aug 19, 2020		Soil	S20-Au35786	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	RRE_SP08	Aug 19, 2020		Soil	S20-Au35787	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	RRE_SP09	Aug 19, 2020		Soil	S20-Au35788	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Order No.:
Report #: 739488
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 21, 2020 3:40 PM
Due: Aug 28, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
10	RRE_SP10	Aug 19, 2020		Soil	S20-Au35789	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11	RRE_TP01	Aug 19, 2020		Soil	S20-Au35790	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12	RRE_TP02	Aug 19, 2020		Soil	S20-Au35791	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13	RRE_TP03	Aug 19, 2020		Soil	S20-Au35792	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	RRE_TP04	Aug 19, 2020		Soil	S20-Au35793	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15	RRE_TP05	Aug 19, 2020		Soil	S20-Au35794	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	RRE_TP06	Aug 19, 2020		Soil	S20-Au35795	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
17	RRE_TP07	Aug 19, 2020		Soil	S20-Au35796	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18	RRE_TP08	Aug 19, 2020		Soil	S20-Au35797	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
19	RRE_TP09	Aug 19, 2020		Soil	S20-Au35798	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20	RRE_TP10	Aug 19, 2020		Soil	S20-Au35799	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21	RRE_DUP1	Aug 11, 2020		Soil	S20-Au35801	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22	RRE_DUP2	Aug 11, 2020		Soil	S20-Au35802	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

eurofins Environment Testing

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IANZ # 1290

Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: 318000780
Project ID: 318000780

Order No.:
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Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
23	RRE_RINSATE	Aug 11, 2020		Water	S20-Au35803	X	X	X	X	X	X	X		X	X	X	X	X	X		X		X		X	X	
Test Counts						23	23	23	23	23	23	23	22	23	23	23	23	23	23	22	23	22	23	22	23	23	22

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Environment Testing

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.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
Total Organic Carbon	%	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Antimony	mg/kg	< 10			10	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	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	
Tin	mg/kg	< 10			10	Pass	
Vanadium	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	96			70-130	Pass	
Total Organic Carbon	%	105			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Antimony	%	115			80-120	Pass	
Arsenic	%	116			80-120	Pass	
Beryllium	%	98			80-120	Pass	
Boron	%	101			80-120	Pass	
Cadmium	%	105			80-120	Pass	
Chromium	%	113			80-120	Pass	
Cobalt	%	110			80-120	Pass	
Copper	%	106			80-120	Pass	
Lead	%	110			80-120	Pass	
Manganese	%	111			80-120	Pass	
Mercury	%	102			80-120	Pass	
Molybdenum	%	117			80-120	Pass	
Nickel	%	107			80-120	Pass	
Selenium	%	107			80-120	Pass	
Tin	%	114			80-120	Pass	
Vanadium	%	114			80-120	Pass	
Zinc	%	93			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Boron	S20-Au35514	NCP	%	97			75-125	Pass	
Cadmium	S20-Au42199	NCP	%	107			75-125	Pass	
Copper	S20-Au42199	NCP	%	105			75-125	Pass	
Lead	S20-Au42199	NCP	%	98			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Zinc	S20-Au42199	NCP	%	114			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	S20-Au35786	CP	%	102			75-125	Pass	
Arsenic	S20-Au35786	CP	%	115			75-125	Pass	
Beryllium	S20-Au35786	CP	%	121			75-125	Pass	
Chromium	S20-Au35786	CP	%	105			75-125	Pass	
Cobalt	S20-Au35786	CP	%	106			75-125	Pass	
Mercury	S20-Au35786	CP	%	100			75-125	Pass	
Molybdenum	S20-Au35786	CP	%	108			75-125	Pass	
Nickel	S20-Au35786	CP	%	93			75-125	Pass	
Selenium	S20-Au35786	CP	%	93			75-125	Pass	
Vanadium	S20-Au35786	CP	%	97			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Manganese	S20-Au35826	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			
Sulphur	S20-Au36069	NCP	mg/kg	26	25	3.0	30%	Pass	
% Moisture	S20-Au35780	CP	%	6.4	6.2	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Au35785	CP	mg/kg	23	28	19	30%	Pass	
Arsenic	S20-Au35785	CP	mg/kg	150	180	19	30%	Pass	
Beryllium	S20-Au35785	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	S20-Au35785	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	S20-Au35785	CP	mg/kg	25	17	36	30%	Fail	Q15
Chromium	S20-Au35785	CP	mg/kg	130	130	<1	30%	Pass	
Cobalt	S20-Au35785	CP	mg/kg	14	11	19	30%	Pass	
Copper	S20-Au35785	CP	mg/kg	2200	2500	10	30%	Pass	
Lead	S20-Au35785	CP	mg/kg	5200	6500	22	30%	Pass	
Manganese	S20-Au35785	CP	mg/kg	970	840	13	30%	Pass	
Mercury	S20-Au35785	CP	mg/kg	1.2	1.4	18	30%	Pass	
Molybdenum	S20-Au35785	CP	mg/kg	5.8	6.1	4.0	30%	Pass	
Nickel	S20-Au35785	CP	mg/kg	45	35	24	30%	Pass	
Selenium	S20-Au35785	CP	mg/kg	18	22	21	30%	Pass	
Tin	S20-Au35785	CP	mg/kg	140	170	21	30%	Pass	
Vanadium	S20-Au35785	CP	mg/kg	77	70	10	30%	Pass	
Zinc	S20-Au35785	CP	mg/kg	2800	2300	19	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	S20-Au35787	CP	%	0.7	1.0	44	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	S20-Au35788	CP	uS/cm	410	420	2.0	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S20-Au35788	CP	pH Units	4.4	4.4	Pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Au35790	CP	%	4.3	5.7	29	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Au35795	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	S20-Au35795	CP	mg/kg	31	20	40	30%	Fail	Q15
Beryllium	S20-Au35795	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	S20-Au35795	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	S20-Au35795	CP	mg/kg	8.0	3.8	71	30%	Fail	Q15
Chromium	S20-Au35795	CP	mg/kg	12	13	11	30%	Pass	
Cobalt	S20-Au35795	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	S20-Au35795	CP	mg/kg	240	300	22	30%	Pass	
Lead	S20-Au35795	CP	mg/kg	230	220	7.0	30%	Pass	
Manganese	S20-Au35795	CP	mg/kg	70	89	24	30%	Pass	
Mercury	S20-Au35795	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	S20-Au35795	CP	mg/kg	20	15	27	30%	Pass	
Nickel	S20-Au35795	CP	mg/kg	< 5	5.7	27	30%	Pass	
Selenium	S20-Au35795	CP	mg/kg	2.9	2.9	1.0	30%	Pass	
Tin	S20-Au35795	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Vanadium	S20-Au35795	CP	mg/kg	53	55	4.0	30%	Pass	
Zinc	S20-Au35795	CP	mg/kg	1100	1500	29	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	S20-Au35797	CP	%	6.5	5.6	16	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	S20-Au35798	CP	uS/cm	29	25	14	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S20-Au35798	CP	pH Units	5.0	5.0	Pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Au35801	CP	%	10	11	9.0	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

Andrew Black	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	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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Certificate of Analysis

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

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

WORLD RECOGNISED ACCREDITATION

Attention: **Stephen Maxwell**

Report	**739488-W**
Project name	318000780
Project ID	318000780
Received Date	Aug 21, 2020

Client Sample ID			**RRE_RINSATE**
Sample Matrix			**Water**
Eurofins Sample No.			**S20-Au35803**
Date Sampled			**Aug 11, 2020**
Test/Reference	LOR	Unit	
Heavy Metals			
Antimony	0.005	mg/L	< 0.005
Arsenic	0.001	mg/L	< 0.001
Beryllium	0.001	mg/L	< 0.001
Boron	0.05	mg/L	< 0.05
Cadmium	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	< 0.001
Cobalt	0.001	mg/L	< 0.001
Copper	0.001	mg/L	< 0.001
Lead	0.001	mg/L	< 0.001
Manganese	0.005	mg/L	< 0.005
Mercury	0.0001	mg/L	< 0.0001
Molybdenum	0.005	mg/L	< 0.005
Nickel	0.001	mg/L	< 0.001
Selenium	0.001	mg/L	< 0.001
Tin	0.005	mg/L	< 0.005
Vanadium	0.005	mg/L	< 0.005
Zinc	0.005	mg/L	< 0.005

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Aug 25, 2020	180 Days

- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS

Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Aug 21, 2020 3:40 PM
Address:	Level 3/100 Pacific Highway	**Report #:**	739488	**Due:**	Aug 28, 2020
	North Sydney	**Phone:**	02 9954 8118	**Priority:**	5 Day
	NSW 2060	**Fax:**	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	318000780				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
Newcastle Laboratory																											
External Laboratory																											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																						
1	RRE_SP01	Aug 19, 2020		Soil	S20-Au35780	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	RRE_SP02	Aug 19, 2020		Soil	S20-Au35781	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	RRE_SP03	Aug 19, 2020		Soil	S20-Au35782	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	RRE_SP04	Aug 19, 2020		Soil	S20-Au35783	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	RRE_SP05	Aug 19, 2020		Soil	S20-Au35784	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	RRE_SP06	Aug 19, 2020		Soil	S20-Au35785	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	RRE_SP07	Aug 19, 2020		Soil	S20-Au35786	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	RRE_SP08	Aug 19, 2020		Soil	S20-Au35787	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	RRE_SP09	Aug 19, 2020		Soil	S20-Au35788	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

eurofins Environment Testing

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NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

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Rolleston, Christchurch 7675
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IANZ # 1290

Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: 318000780
Project ID: 318000780

Order No.:
Report #: 739488
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 21, 2020 3:40 PM
Due: Aug 28, 2020
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
10	RRE_SP10	Aug 19, 2020		Soil	S20-Au35789	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11	RRE_TP01	Aug 19, 2020		Soil	S20-Au35790	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12	RRE_TP02	Aug 19, 2020		Soil	S20-Au35791	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13	RRE_TP03	Aug 19, 2020		Soil	S20-Au35792	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	RRE_TP04	Aug 19, 2020		Soil	S20-Au35793	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15	RRE_TP05	Aug 19, 2020		Soil	S20-Au35794	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	RRE_TP06	Aug 19, 2020		Soil	S20-Au35795	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
17	RRE_TP07	Aug 19, 2020		Soil	S20-Au35796	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18	RRE_TP08	Aug 19, 2020		Soil	S20-Au35797	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
19	RRE_TP09	Aug 19, 2020		Soil	S20-Au35798	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20	RRE_TP10	Aug 19, 2020		Soil	S20-Au35799	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21	RRE_DUP1	Aug 11, 2020		Soil	S20-Au35801	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22	RRE_DUP2	Aug 11, 2020		Soil	S20-Au35802	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Aug 21, 2020 3:40 PM
Address:	Level 3/100 Pacific Highway	**Report #:**	739488	**Due:**	Aug 28, 2020
	North Sydney	**Phone:**	02 9954 8118	**Priority:**	5 Day
	NSW 2060	**Fax:**	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	318000780				
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Conductivity (1:5 aqueous extract at 25°C as rec.)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract at 25°C as rec.)	Selenium	Sulphur	Tin	Total Organic Carbon	Vanadium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271																						X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
Brisbane Laboratory - NATA Site # 20794																											
Perth Laboratory - NATA Site # 23736																											
23	RRE_RINSATE	Aug 11, 2020		Water	S20-Au35803	X	X	X	X	X	X	X		X	X	X	X	X	X		X		X		X	X	
Test Counts						23	23	23	23	23	23	23	22	23	23	23	23	23	23	22	23	22	23	22	23	23	22

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.

Environment Testing

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Antimony			mg/L	< 0.005			0.005	Pass	
Arsenic			mg/L	< 0.001			0.001	Pass	
Beryllium			mg/L	< 0.001			0.001	Pass	
Boron			mg/L	< 0.05			0.05	Pass	
Cadmium			mg/L	< 0.0002			0.0002	Pass	
Chromium			mg/L	< 0.001			0.001	Pass	
Cobalt			mg/L	< 0.001			0.001	Pass	
Copper			mg/L	< 0.001			0.001	Pass	
Lead			mg/L	< 0.001			0.001	Pass	
Manganese			mg/L	< 0.005			0.005	Pass	
Mercury			mg/L	< 0.0001			0.0001	Pass	
Molybdenum			mg/L	< 0.005			0.005	Pass	
Nickel			mg/L	< 0.001			0.001	Pass	
Selenium			mg/L	< 0.001			0.001	Pass	
Tin			mg/L	< 0.005			0.005	Pass	
Vanadium			mg/L	< 0.005			0.005	Pass	
Zinc			mg/L	< 0.005			0.005	Pass	
LCS - % Recovery									
Heavy Metals									
Antimony			%	110			80-120	Pass	
Arsenic			%	112			80-120	Pass	
Beryllium			%	99			80-120	Pass	
Boron			%	105			80-120	Pass	
Cadmium			%	110			80-120	Pass	
Chromium			%	105			80-120	Pass	
Cobalt			%	103			80-120	Pass	
Copper			%	106			80-120	Pass	
Lead			%	110			80-120	Pass	
Manganese			%	106			80-120	Pass	
Mercury			%	112			80-120	Pass	
Molybdenum			%	117			80-120	Pass	
Nickel			%	105			80-120	Pass	
Selenium			%	115			80-120	Pass	
Tin			%	108			80-120	Pass	
Vanadium			%	110			80-120	Pass	
Zinc			%	105			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	S20-Au31948	NCP	%	99			75-125	Pass	
Arsenic	S20-Au31948	NCP	%	117			75-125	Pass	
Beryllium	S20-Au31948	NCP	%	93			75-125	Pass	
Boron	S20-Au31948	NCP	%	114			75-125	Pass	
Cadmium	S20-Au31948	NCP	%	114			75-125	Pass	
Chromium	S20-Au31948	NCP	%	114			75-125	Pass	
Cobalt	S20-Au31948	NCP	%	112			75-125	Pass	
Copper	S20-Au31948	NCP	%	112			75-125	Pass	
Lead	S20-Au31948	NCP	%	110			75-125	Pass	
Manganese	S20-Au31948	NCP	%	122			75-125	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury	S20-Au31948	NCP	%	111			75-125	Pass	
Molybdenum	S20-Au31948	NCP	%	115			75-125	Pass	
Nickel	S20-Au31948	NCP	%	109			75-125	Pass	
Selenium	S20-Au31948	NCP	%	105			75-125	Pass	
Vanadium	S20-Au31948	NCP	%	119			75-125	Pass	
Zinc	S20-Au31948	NCP	%	109			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Au35803	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic	S20-Au35803	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Beryllium	S20-Au35803	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron	S20-Au35803	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium	S20-Au35803	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S20-Au35803	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	S20-Au35803	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	S20-Au35803	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	S20-Au35803	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese	S20-Au35803	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Mercury	S20-Au35803	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum	S20-Au35803	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel	S20-Au35803	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Selenium	S20-Au35803	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Tin	S20-Au35803	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium	S20-Au35803	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc	S20-Au35803	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

Andrew Black	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

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.

APPENDIX 6
EIL CALCULATIONS

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
13
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	150
Urban residential and open public spaces	#NUM!	440
Commercial and industrial	#NUM!	730

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
5.9
Enter organic carbon content (%OC) (values from 0 to 50%)
2.2
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	75
Urban residential and open public spaces	#NUM!	200
Commercial and industrial	#NUM!	280

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	40
Urban residential and open public spaces	#NUM!	220
Commercial and industrial	#NUM!	380

Inputs
Select contaminant from list below
Pb
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	Lead generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	110	470
Urban residential and open public spaces	270	1100
Commercial and industrial	440	1800

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
5.9
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	160
Urban residential and open public spaces	#NUM!	450
Commercial and industrial	#NUM!	650

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
13
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	150
Urban residential and open public spaces	#NUM!	440
Commercial and industrial	#NUM!	730

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
5.4
Enter organic carbon content (%OC) (values from 0 to 50%)
2.5
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	60
Urban residential and open public spaces	#NUM!	140
Commercial and industrial	#NUM!	190

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	40
Urban residential and open public spaces	#NUM!	220
Commercial and industrial	#NUM!	380

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
5.4
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	130
Urban residential and open public spaces	#NUM!	330
Commercial and industrial	#NUM!	470

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
8.5
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	130
Urban residential and open public spaces	#NUM!	380
Commercial and industrial	#NUM!	640

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
10
Enter soil pH (calcium chloride method) (values from 1 to 14)
5.2
Enter organic carbon content (%OC) (values from 0 to 50%)
0.8
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	45
Urban residential and open public spaces	#NUM!	100
Commercial and industrial	#NUM!	140

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
10
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	35
Urban residential and open public spaces	#NUM!	170
Commercial and industrial	#NUM!	290

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
10
Enter soil pH (calcium chloride method) (values from 1 to 14)
5.2
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	120
Urban residential and open public spaces	#NUM!	290
Commercial and industrial	#NUM!	410

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
18
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	160
Urban residential and open public spaces	#NUM!	490
Commercial and industrial	#NUM!	810

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
4.7
Enter organic carbon content (%OC) (values from 0 to 50%)
1.3
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	40
Urban residential and open public spaces	#NUM!	85
Commercial and industrial	#NUM!	120

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	40
Urban residential and open public spaces	#NUM!	220
Commercial and industrial	#NUM!	380

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
4.7
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	110
Urban residential and open public spaces	#NUM!	220
Commercial and industrial	#NUM!	300

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
7.5
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	120
Urban residential and open public spaces	#NUM!	370
Commercial and industrial	#NUM!	610

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
9
Enter soil pH (calcium chloride method) (values from 1 to 14)
4.9
Enter organic carbon content (%OC) (values from 0 to 50%)
2.1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	45
Urban residential and open public spaces	#NUM!	100
Commercial and industrial	#NUM!	140

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
9
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	25
Urban residential and open public spaces	#NUM!	140
Commercial and industrial	#NUM!	230

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
9
Enter soil pH (calcium chloride method) (values from 1 to 14)
4.9
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	110
Urban residential and open public spaces	#NUM!	250
Commercial and industrial	#NUM!	340

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
25-09-20

Summary of EILs

		SS94	SS95	SS101	SS112	D03_230919	
Contaminant	**Units**	**Calculated EIL Value**					**Average**
Chromium	mg/kg	440	440	380	490	370	424
Copper	mg/kg	200	140	100	85	100	125
Lead	mg/kg	1100	1100	1100	1100	1100	1100
Nickel	mg/kg	220	220	170	220	140	194
Zinc	mg/kg	450	330	290	220	250	308

APPENDIX 7
PHOTOGRAPHIC LOG

Photograph 1: Location of SW1_UP / SED1_UP. Sampled 13 October 2020. Water flowing.

Photograph 2: Location of SW1 / SED1. Sampled 13 October 2020. Water flowing.

Photograph 3: Location of SW2 /SED2. Sampled 13 October 2020. Water flowing.

Photograph 4: Location of SW3 / SED3. Sampled 13 October 2020. Water flowing.

Photograph 5: Location of SW4 / SED4. Sampled 13 October 2020. Water flowing.

Photograph 6: Location of SW5 / SED5. Sampled 13 October 2020. Water not flowing.

Photograph 7: Location of SW6 / SED6. Sampled 13 October 2020. No water present.

Photograph 8: Location of SW7 / SED7. Sampled 13 October 2020. Not flowing.

Photograph 9: Location of SW10 / SED10. Sampled 13 October2020. Water flowing.

Photograph 10: Location of XBOYD001, XRF measurement of sediment within drainage swale adjacent Boyd Street. No water present.

Photograph 11: Location of XBOYD002, XRF measurement of sediment within drainage swale adjacent Boyd Street. No water present.

Photograph 12: Location of XBOYD003, XRF measurement of sediment within drainage swale adjacent culvert on corner of Boyd Street and Braidwood Road. No water present.

Photograph 13: Location of BR_SED1, XRF measurement of sediment within drain line adjacent Braidwood Road, south of Wallace Street. No water present.

Photograph 14: Location of BR_SED2, XRF measurement of sediment within drain line adjacent Braidwood Road, south of Wallace Street. No water present.

Photograph 15: Location of XBRAID001, XRF measurement of sediment within drainage line west side of Braidwood Road, adjacent school. No water present.

Photograph 16: Location of XBRAID002, XRF measurement of sediment within drainage line west side of Braidwood Road, adjacent school.

Photograph 17: Location of XBRAID003, XRF measurement of sediment within drainage line west side of Braidwood Road, adjacent school. No water present.

Photograph 18: Location of XBRAID004, XRF measurement of sediment within drainage line west side of Braidwood Road. No water present.

Photograph 19: Location of SW_BR001 / SED_BR001. Water not flowing Sampled 13 October 2020. Water not flowing.

Photograph 20: Location of SW_BR002 / SED_BR002. Sampled 13 October 2020. Water flowing but shallow.

Photograph 21: Location of XP6001, XRF measurement of sediment within ephemeral creek bed north of sports ground. No water present.

Photograph 22: Location of XP6002, XRF measurement of sediment within ephemeral creek bed north of sports ground. No water present.

Photograph 23: Location of XP6003, XRF measurement of sediment within ephemeral creek bed north of sports ground. Some water pockets present.

Photograph 24: Location of XP6004, XRF measurement of sediment within ephemeral creek bed north east of sports ground. No water present.

Photograph 25: Location of XP6005, XRF measurement of sediment within ephemeral creek bed north east of sports ground. No water present.

Photograph 26: Test pit LO_TP01 located within the footprint of the former Loadout Facility. Sampled 19 August 2020.

Photograph 27: Test pit LO_TP01 terminated at 1.3 mbgl, refusal on boulder.

Photograph 28: Test pit LO_TP02 located within the footprint of the former Loadout Facility. Sampled 19 August 2020.

Photograph 29: Test pit LO_TP02 terminated at 1.5 mbgl.

Photograph 30: Test pit LO_TP03 located within the footprint of the former Loadout Facility . Sampled 19 August 2020.

	
Testpit 31: Test pit LO_TP03 terminated at 1.7 mbgl.	**Photograph 32:** Test pit LO_TP04 located within the footprint of the former Loadout Facility. Sampled 19 August 2020.
	
Photograph 33: Test pit LO_TP04 terminated at 0.8 mbgl due to refusal on concrete slab.	**Photograph 34:** Test pit LO_TP05 located within the footprint of the former Loadout Facility. Sampled 19 August 2020.
	
Photograph 35: Test pit LO_TP06 located within the footprint of the former Loadout Complex. Sampled 19 August 2020.	**Photograph 36:** Test pit LO_TP06 terminated at 1.5 mbgl.

Photograph 37: Composite sample RRE_TP01 collected from shallow test pit adjacent the northern portion of the rail formation. Sample collected 19 August 2020.

Photograph 38: Composite sample RRE_TP02 collected from shallow test pit adjacent the northern portion of the rail formation. Sample collected 19 August 2020.

Photograph 39: Composite sample RRE_TP03 collected from shallow test pit adjacent northern portion of the rail formation. Sample collected 19 August 2020.

Photograph 40: Composite sample RRE_TP04 collected from shallow soil adjacent the rail formation. Sample collected 19 August 2020.

Photograph 41: Composite sample RRE_TP05 collected from shallow soil adjacent the rail formation. Sample collected 19 August 2020.

Photograph 42: Composite sample RRE_TP06 collected from shallow test pit adjacent the rail formation. Sample collected 19 August 2020.

Photograph 43: Composite sample RRE_TP07 collected from shallow test pit within the rail corridor. Sample collected 19 August 2020.

Photograph 44: Composite sample RRE_TP08 collected from shallow test pit adjacent the central portion of the rail formation. Sample collected 19August 2020.

Photograph 45: Composite sample RRE_TP09 collected from shallow test pit adjacent the southern portion of the rail formation. Sample collected 19 August 2020.

Photograph 46: Composite sample RRE_TP10 collected from shallow soils adjacent the southern portion of the rail formation. Sample collected 19 August 2020.

Photograph 47: Composite sample RRE_SP01 collected from the southern face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.

Photograph 48: Composite sample RRE_SP02 collected from the eastern face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.

	
Photograph 49: Composite sample RRE_SP03 collected from the eastern face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.	**Photograph 50:** Composite sample RRE_SP04 collected from the eastern face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.
	
Photograph 51: Composite sample RRE_SP05 collected from the eastern face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.	**Photograph 52:** Composite sample RRE_SP06 collected from the eastern face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.
	
Photograph 53: Composite sample RRE_SP07 collected from the northern face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.	**Photograph 54:** Composite sample RRE_SP08 collected from the western face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.

	
Photograph 55: Composite sample RRE_SP09 collected from the western face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.	**Photograph 56:** Composite sample RRE_SP10 collected from the western face of onsite stockpile comprising fouled ballast impacted by ore concentrate. Sample collected 19 August 2020.

APPENDIX 8
TESTPIT LOGS

BOREHOLE NUMBER LO_TP01

CLIENT John Holland Rail
PROJECT NAME Tarago Rail Loop
PROJECT NUMBER 318000780
PROJECT LOCATION Former ore concentrate loadout complex building footprint

DATE STARTED 19/8/20 **COMPLETED** 19/8/20 **R.L. SURFACE** **DATUM**
DRILLING CONTRACTOR **SLOPE** 90° **BEARING** ---
EQUIPMENT Excavator (5T) **HOLE LOCATION**
HOLE SIZE 0.5 X 2.0M **LOGGED BY** TF **CHECKED BY** SM
NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
			0.0			FILL; Gravelly CLAY, orange-brown, high plasticity, wet, firm fine gravels	LO_TP01_0.0, XRF 31ppm	
						FILL; Gravelly CLAY, dark brown, low plasticity, medium-coarse gravels, medium grained sands, moist		
			0.5				LO_TP01_0.5, XRF 96ppm	
			1.0				LO_TP01_1.0, XRF 50ppm	
			1.3			Borehole LO_TP01 terminated at 1.3m	LO_TP01_1.3, XRF 58ppm	
			1.5					
			2.0					

BOREHOLE NUMBER LO_TP02

RAMBOLL

CLIENT John Holland Rail
PROJECT NAME Tarago Rail Loop
PROJECT NUMBER 318000780
PROJECT LOCATION Former ore concentrate loadout complex building footprint

DATE STARTED 19/8/20 **COMPLETED** 19/8/20
R.L. SURFACE
DATUM
DRILLING CONTRACTOR
SLOPE 90°
BEARING ---
EQUIPMENT Excavator (5T)
HOLE LOCATION
HOLE SIZE 0.5 X 2.0M
LOGGED BY TF
CHECKED BY SM
NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
			0.0			FILL; Gravelly CLAY, orange-brown, high plasticity, wet, firm fine gravels	LO_TP02_0.0, XRF 176ppm	
			0.5				LO_TP02_0.5, XRF 16ppm	
							LO_TP02_0.9, XRF 11ppm	
			1.0				LO_TP02_1.1, XRF 16ppm	
			1.2			CLAY; orange, high plasticity, firm, dry, minor gravel (natural/reworked natural)	LO_TP02_1.3, XRF 6,900ppm (approx.) LO_TP02_1.35, XRF 85ppm LO_TP02_1.4, XRF 83ppm	
			1.5			Borehole LO_TP02 terminated at 1.5m		
			2.0					

BOREHOLE NUMBER LO_TP03

RAMBOLL

CLIENT John Holland Rail
PROJECT NAME Tarago Rail Loop
PROJECT NUMBER 318000780
PROJECT LOCATION Former ore concentrate loadout complex building footprint

DATE STARTED 19/8/20 **COMPLETED** 19/8/20 **R.L. SURFACE** **DATUM**
DRILLING CONTRACTOR **SLOPE** 90° **BEARING** ---
EQUIPMENT Excavator (5T) **HOLE LOCATION**
HOLE SIZE 0.5 X 2.0M **LOGGED BY** TF **CHECKED BY** SM
NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
			0.0–0.5			FILL; Gravelly CLAY, orange-brown, high plasticity, wet, firm fine gravels	LO_TP03_0.2	
			0.5–1.7			Gravelly CLAY; brown, high plasticity, medium-coarse gravels, medium grained sands, glass, rubble, plastic, ballast etc. present	LO_TP03_0.9, XRF 158ppm LO_TP03_1.5, XRF 1748ppm LO_TP03_1.6, XRF 3662ppm LO_TP03_1.7, XRF 117ppm	
			1.7–2.0			Borehole LO_TP03 terminated at 1.7m		

BOREHOLE NUMBER LO_TP04

RAMBOLL

CLIENT John Holland Rail
PROJECT NAME Tarago Rail Loop
PROJECT NUMBER 318000780
PROJECT LOCATION Former ore concentrate loadout complex building footprint

DATE STARTED 19/8/20 **COMPLETED** 19/8/20
R.L. SURFACE
DATUM
DRILLING CONTRACTOR
SLOPE 90°
BEARING ---
EQUIPMENT Excavator (5T)
HOLE LOCATION
HOLE SIZE 0.5 X 2.0M
LOGGED BY TF
CHECKED BY SM
NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
						FILL; Gravelly CLAY, orange-brown, high plasticity, wet, firm fine gravels	LO_TP04_0.25, XRF 18ppm	
			0.5					
						Gravelly SAND; brown, medium grained, medium-coarse gravels, dry, compact/dense	LO_TP04_0.7, XRF 199ppm	
						Borehole LO_TP04 terminated at 0.8m		
			1.0					
			1.5					
			2.0					

BOREHOLE NUMBER LO_TP05

RAMBOLL

CLIENT John Holland Rail
PROJECT NAME Tarago Rail Loop
PROJECT NUMBER 318000780
PROJECT LOCATION Former ore concentrate loadout complex building footprint

DATE STARTED 19/8/20 **COMPLETED** 19/8/20 **R.L. SURFACE** **DATUM**
DRILLING CONTRACTOR **SLOPE** 90° **BEARING** ---
EQUIPMENT Excavator (5T) **HOLE LOCATION**
HOLE SIZE 0.5 X 2.0M **LOGGED BY** TF **CHECKED BY** SM
NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
						FILL; Gravelly CLAY, orange-brown, high plasticity, wet, firm fine gravels	LO_TP05_0.3, XRF 90ppm	
			0.5			Gravelly SAND; brown, medium grained, medium gravels, minor silt, dense, dry, no observed contamination		
			1.0			Sandy GRAVEL; grey-brown, medium-coarse, medium grained sand, dense, dry (minor plastics, metal, wire, glass)	LO_TP05_0.7, XRF 883ppm LO_TP05_0.85, XRF 605ppm LO_TP05_1.1, XRF 150ppm (approx.) LO_TP05_1.4, XRF 8ppm	
			1.5			Borehole LO_TP05 terminated at 1.5m		
			2.0					

BOREHOLE NUMBER LO_TP06

RAMBOLL

CLIENT John Holland Rail
PROJECT NAME Tarago Rail Loop
PROJECT NUMBER 318000780
PROJECT LOCATION Former ore concentrate loadout complex building footprint

DATE STARTED 19/8/20 **COMPLETED** 19/8/20 **R.L. SURFACE** **DATUM**
DRILLING CONTRACTOR **SLOPE** 90° **BEARING** ---
EQUIPMENT Excavator (5T) **HOLE LOCATION**
HOLE SIZE 0.5 X 2.0M **LOGGED BY** TF **CHECKED BY** SM
NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
						FILL; Gravelly CLAY, orange-brown, high plasticity, wet, firm fine gravels	LO_TP06_0.05, XRF 14ppm	
			0.5				LO_TP06_0.5, XRF nd	
						Clayey SAND; white-grey, fine dense/hard, concrete fragments (likely former surface)	LO_TP06_0.7, XRF 273ppm	
			1.0					
						Borehole LO_TP06 terminated at 1.2m	LO_TP06_1.2, XRF 31ppm	
			1.5					
			2.0					